

Figure 13-1. Impacts of the proposed wind farm on native vegetation and listed communities

Project No: 24129.09

Project location: Macoma Wind Farm, VIC

Date: 13/08/2026

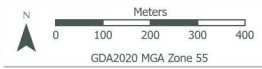
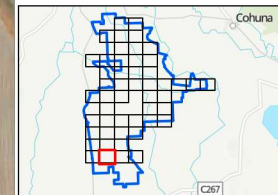
- Project Area
- Investigated area
- Construction footprint - Rev03
- Turbine

Natural Grasslands of the Murray Valley Plains community

- Confirmed
- Potential
- Unlikely

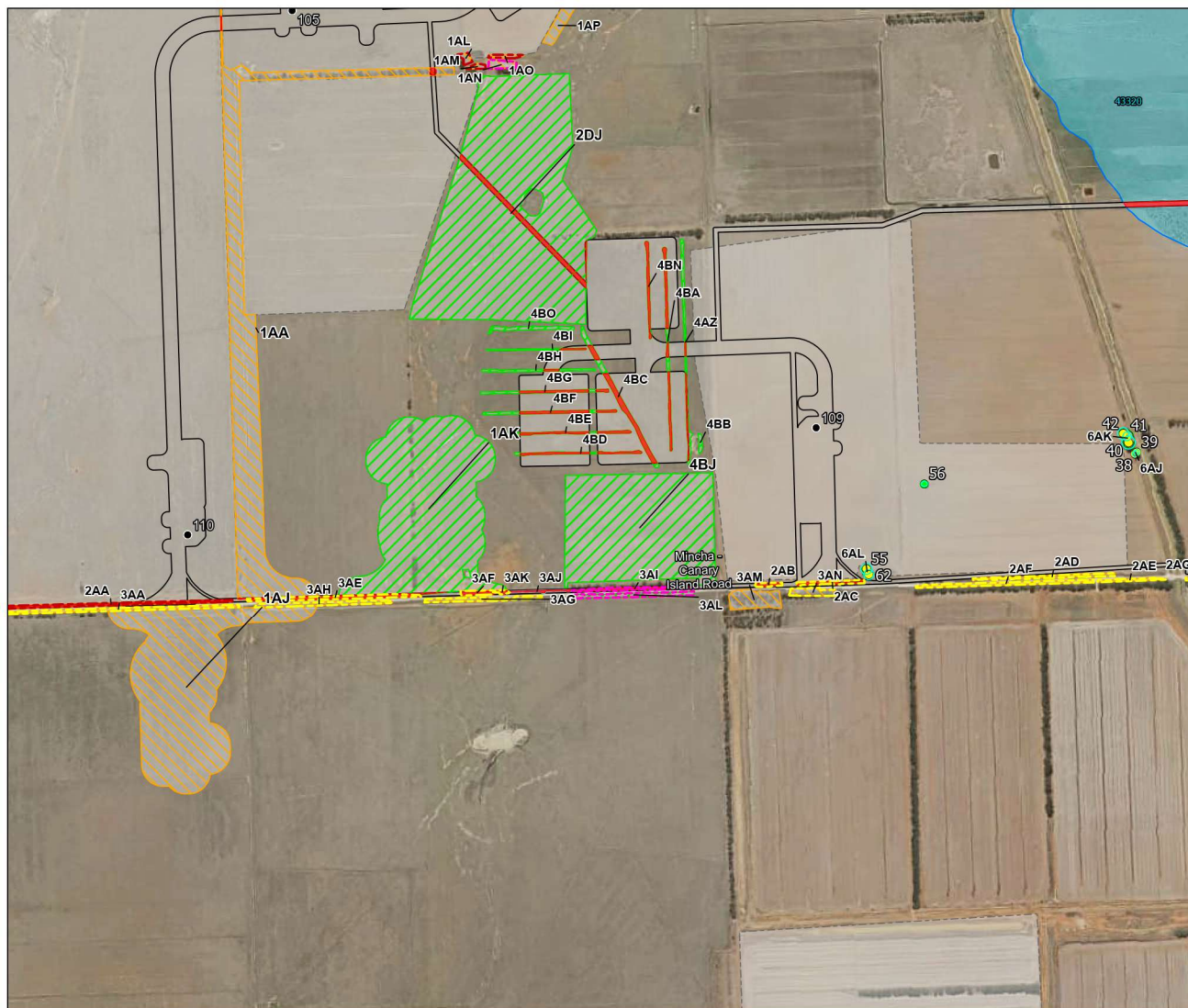
Native vegetation

- Chenopod Grassland (EVC 829); FFG Act listed Northern Plains Grassland Community
- Lignum Swamp (EVC 104)
- Plains Grassland (EVC 132); FFG Act listed Northern Plains Grassland Community
- Riverine Chenopod Woodland (EVC 103)
- DEECA mapped wetland
- Large Scattered Tree
- Large Tree in Patch
- Native vegetation removal



Nature Advisory

1.02/582 Heidelberg Rd, Alphington, VIC 3078, Australia
www.natureadvisory.com.au
03 9815 2111 - info@natureadvisory.com.au



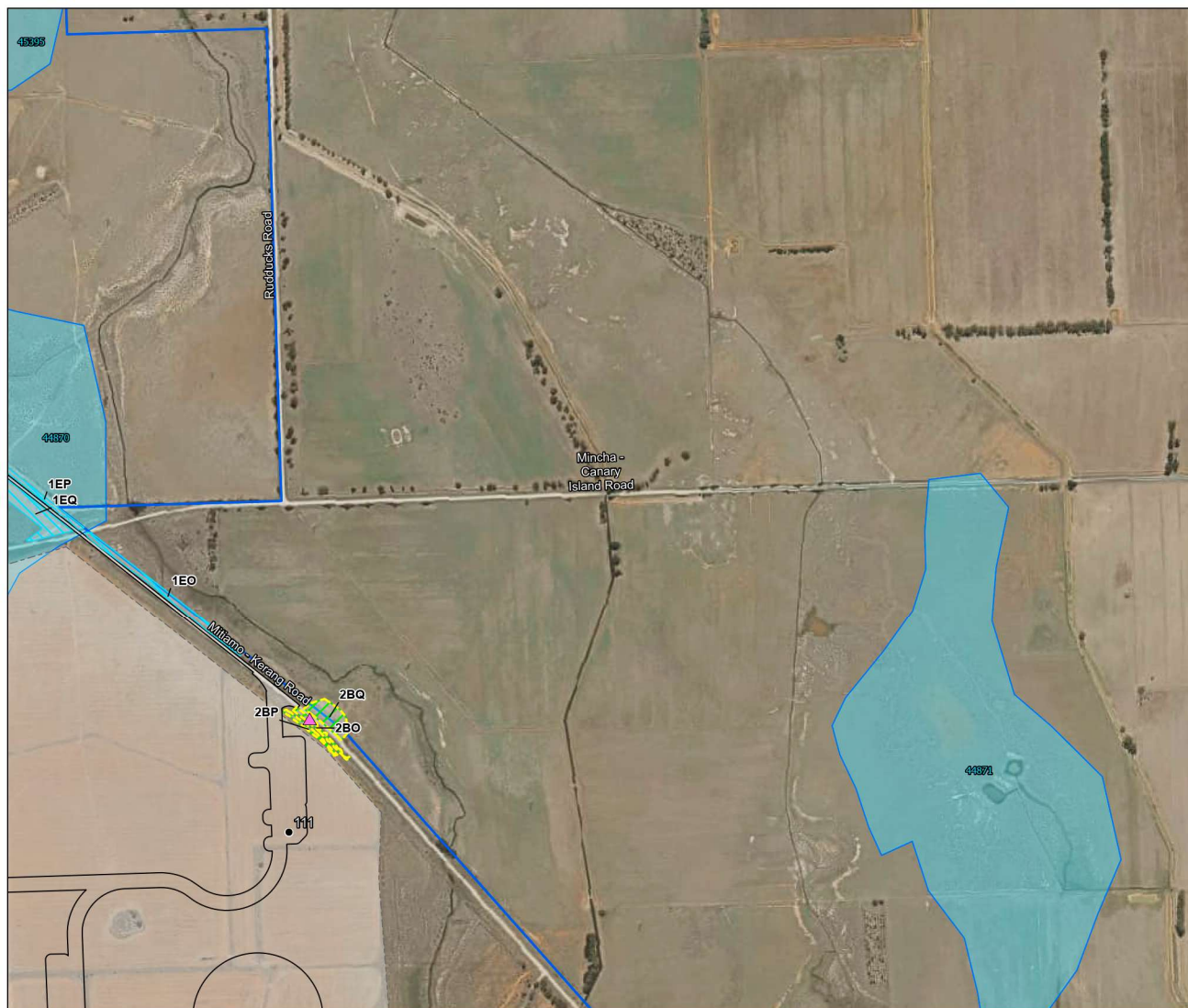


Figure 13-1. Impacts of the proposed wind farm on native vegetation and listed communities
Project No: 24129.09
Project location: Macoma Wind Farm, VIC
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Legend

- Project Area
- Investigated area
- Construction footprint - Rev03
- Turbine

Threatened flora species

- Spiny Lignum

Natural Grasslands of the Murray Valley Plains community

- Potential

Native vegetation

- Chenopod Grassland (EVC 829); FFG Act listed Northern Plains Grassland Community
- Lignum Swamp (EVC 104)
- DEECA mapped wetland
- Native vegetation removal

Inset Map

Shows the location of the project area within the state of Victoria, Australia. The project area is highlighted in red. The inset map includes a scale bar (0 to 400 Meters) and a north arrow.

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1.02/582 Heidelberg Rd, Alphington, VIC 3078, Australia
www.natureadvisory.com.au
03 9815 2111 - info@natureadvisory.com.au

13.3. Impacts to listed flora species

The project will not impact any known occurrences of listed flora species within the study area. The likelihood of occurrence of species listed under the EPBC Act and FFG Act indicates that 50 listed flora species have the potential to occur in the Project Area, but only 30 species might occur within areas of native vegetation proposed to be removed, as displayed in Table 5-5.

Targeted surveys at a seasonally appropriate time are required to confirm the occurrence of these species within the development footprint and, subsequently, the potential impacts of the proposal. Table 5-5 describes the suitable timing for targeted surveys of EPBC and FFG Act-listed flora species.

Implications under the EPBC Act are discussed in Section 14.4, while implications under the FFG Act are detailed in Section 14.5.

13.4. Impacts on listed vegetation communities

The following listed communities were deemed to be impacted by the proposed development plan, as shown in Figure 13-1:

- **Natural Grasslands of the Murray Valley Plains** (EPBC Act: Critically Endangered) – 25.254 ha impacted

The full extent of this ecological community within the study area has not been confirmed through targeted surveys. However, the likelihood of the community occurring has been categorised for each potential occurrence of the community, as defined in Table 5-6 and Section 5.4. Impacts to the community by likelihood of occurrence are summarised below:

- Confirmed – 12.063 ha
- Likely – 1.912 ha
- Potential – 4.493 ha
- Potential but unlikely – 6.786 ha

- **Northern Plains Grasslands Community** (FFG Act: Threatened) – 40.470 ha impacted, 8.310 ha of which is located on public land.

Several patches of native vegetation impacts were identified by the Proponent as areas in which impacts may be justified due to balancing of impacts associated with social and ecological values (Table 13-2).

It should be noted that the above impacts include regrowth that is exempt under Clause 52.17. This is due to the fact that the listing advice for the above communities does not differentiate between regrowth and long-standing remnants, and instead classifies remnant native vegetation on the basis of meeting key diagnostic criteria and condition thresholds alone. Therefore, impacted regrowth that qualifies as the above TECs still requires separate consideration under the EE Act, along with the EPBC Act and FFG Act.

Implications under the EPBC Act are discussed in Section 14.4, while implications under the FFG Act are detailed in Section 14.5.

13.5. Impacts on listed fauna species and communities

The following listed fauna species were recorded within the Project Area or 10 km search region during the field surveys.

Within 10km search region

- Australasian Bittern (EPBC: endangered; FFG: critically endangered)
- Australasian Shoveler (FFG: vulnerable)
- Australian Gull-billed Tern (FFG: endangered)
- Brolga (FFG: endangered)
- Musk Duck (FFG: vulnerable)
- Southern Whiteface (EPBC: vulnerable)
- White-bellied Sea-Eagle (FFG: endangered)

Within the Project Area

- Black Falcon (FFG: critically endangered)
- Blue-winged Parrot (EPBC: vulnerable)
- Brown Treecreeper (EPBC: vulnerable; FFG: vulnerable)
- Eastern Great Egret (FFG: vulnerable)
- Little Eagle (FFG: vulnerable)
- Magpie Goose (FFG: vulnerable)
- Plumed Egret (FFG: critically endangered)
- Bearded Dragon (FFG: vulnerable)

In addition, the likelihood of occurrence analysis indicated that 15 listed fauna species are 'likely to occur' and 25 have the 'potential to occur' as detailed in Table 6-2.

13.5.1. Birds

The results of bird utilisation surveys undertaken to-date indicate that there are unlikely to be high impacts to listed species and species of concern, provided the recommended mitigation measures are implemented. The Proponent has already undertaken several design changes to reduce the potential impact on bird species, including avoidance of habitat and micro-siting of turbines. A 2 km turbine-free buffer around Hird and Johnson Swamps seeks to reduce the likelihood of turbine collisions for the wetland birds that use those habitats. Flight paths of birds coming to and from these swamps would likely be to the northwest, where there are larger wetland habitats in the Kerang Lakes Ramsar system (e.g. Fosters Swamp). Assuming most birds would fly directly towards those habitats, the current layout largely avoids those flight paths and therefore reduces collision risk.

Any residual risks on listed bird species following their implementation are expected to be low and will be managed through the preparation and implementation of a Bat and Avifauna Management (BAM) Plan.

Cumulative risk remains difficult to quantify for many bird species due to limitations in available data, including from other wind farm proponents, particularly for highly mobile taxa (e.g. Little Eagle, Blue-winged Parrot, Black Falcon, and Magpie Goose). Species that range widely across the landscape may interact with multiple developments and land uses over large spatial scales and extended timeframes. As a result, potential cumulative effects may not be fully captured by project-

scale assessments alone. While the Project represents a small and localised contribution to potential residual impacts, the cumulative effects of similar developments across the broader landscape cannot be entirely discounted for species with large home ranges and/or high mobility. Cumulative impacts to species are addressed in Section 13.7.

One FFG Act-listed bird community has the potential to occur - the Victorian Temperate Woodland Bird Community (see Table 6-3). However, further surveys will be necessary to confirm that patch vegetation qualifies as this community. Potential impacts are considered low (0.644 ha; 0.517 ha on public land) given that woodland patches have largely been avoided with the latest wind farm layout.

13.5.2. Bats

Two species listed as threatened under the Commonwealth EPBC Act and/or the Victorian FFG Act have the potential to occur in the study area: Corben's (South-eastern) Long-eared Bat *Nyctophilus corbeni* (EPBC Act: Vulnerable, FFG Act: Endangered), and the Yellow-bellied Sheath-tail Bat *Saccolaimus flaviventris* (FFG Act: Vulnerable). Both species were considered to potentially occur in the Project Area but have not been directly recorded yet. Corben's Long-eared Bat cannot reliably be detected by ultrasonic methods and is addressed by the presence/absence of any long-eared bat species that have been recorded.

This assessment preliminarily concludes that, with the implementation of the recommended mitigation hierarchy, as also outlined in the guidance (DEECA 2025a), the Project is unlikely to result in high impacts to threatened bat species. Mitigation measures, when incorporated into project design and operational management, are expected to substantially reduce potential impact pathways, including collision risk and habitat disturbance.

Notwithstanding this, some residual risk to bats may remain following mitigation. The extent to which such residual impacts may contribute to cumulative effects at a broader landscape scale is difficult to quantify, particularly given the mobility of bat species and the potential for interaction with multiple developments across their range. Such residual risk will be addressed in the Bat and Avifauna Management (BAM) Plan, which will follow guidance documents for the adaptive management of residual risk (DEECA 2025a).

13.5.3. Brolga

There are no breeding wetlands within the Project Area, and historic flocking records are 5 km or more away from the wind farm site, with none of the sites where 10 or more Brolga have been observed in the past qualifying as flocking areas according to definitions within the Handbook (DEECA 2025c).

Impacts to Brolga from the construction and operation of the proposed MAWF will be avoided through the creation of Brolga breeding wetland and potential breeding wetland buffers. Further design refinement and micro-siting will be undertaken to avoid areas where infrastructure currently encroaches into Brolga wetland buffers, where possible. Where this is not possible, compensatory measures may be required in accordance with the Handbook to compensate for any residual risk should Brolga buffers be encroached.

Further recommended investigations include a second year of breeding surveys from July to December 2026, and flocking surveys in 2026/27 flocking season.

No high impacts are expected on the Brolga from the proposed wind farm regarding habitat degradation or collision with turbines. The implementation of a BAM Plan, and if required, a Compensation Plan, will address any residual risk through ongoing monitoring during part of the operation of the wind farm, monitoring for carcasses and provision of pathways for the adoption of adaptive and responsive mitigation measures.

13.5.4. Migratory shorebirds

The field surveys and examination of historical data provided in this assessment indicate that whilst there are large numbers of migratory shorebirds using wetland habitat across the Kerang Wetlands Ramsar to the northwest of the Project Area, there are comparably few shorebirds using the wetlands in closest proximity to the Project Area.

Impacts to migratory shorebirds from the construction and operation of the Project have been largely avoided through the placement of turbines a minimum of 2 km away from major wetland habitat (Hird and Johnson Swamps, forming part of the Kerang Wetlands site). This measure completely avoids impacts to shorebird habitat and reduces the risk of turbine collision and barrier effects.

The highest residual risk for turbine collision and barrier effects is for shorebirds that may use Hird Swamp, as this swamp is the closest to the Project Area, with direct flight lines from some other major wetlands intersecting with the sites of proposed turbines. However, both the collision risk and barrier effect regarding this swamp are reduced by the fact that this wetland is only intermittently used by shorebirds, with just 8 birds recorded there since 2021 and no nationally significant count of a shorebird species since 2006. Residual risk to shorebirds by the Project can be further reduced through the implementation of a BAM Plan, which will provide for the ongoing monitoring of shorebirds during construction and part of the operation of the wind farm, monitor for shorebird carcasses and, in the event of a shorebird mortality, provide pathways for the adoption of adaptive and responsive mitigation measures.

13.5.5. Plains-wanderer

Within the Project Area, habitat suitable for the Plains-wanderer is relatively limited as a result of extensive historical and ongoing cropping and grazing (DoE 2016). However, the assessment has conservatively estimated 1,101.984 ha of 'likely suitable' habitat within the Project Area, with modelling suggesting a further 12,579.218 ha of 'potentially suitable' habitat in the broader 10 km area. Breeding pairs typically require relatively large, contiguous habitat patches (approximately 18 ha or greater), with pairs likely only dispersing 300-400 m between patches (DoE 2016; Marchant and Higgins 1993). Within the search region, 28 such patches of habitat exist, with only 11 being impacted by the Project. None of these patches was reduced to such an extent so as to no longer provide a sufficient size for the species, except for those that were already too small (<18 ha). No patches were fragmented by impacts creating habitat gaps beyond 400 m. As such, while vegetation clearance has the potential to reduce the habitat available to the species by up to 36.395 ha, it is not expected to decrease or fragment patches that already have the capacity to support the species, if present (DoE 2016).

The Plains-wanderer has strongholds to the south-east (Patho Plains Grasslands) and north-west (Lower Avoca Grasslands). It is currently unknown if or how the birds move between these areas and if the Project Area could introduce collision or barrier risk to the birds during such movements. Micrositing infrastructure away from 'likely suitable' habitat may reduce the likelihood of potential barrier effects.

There is likely to be some level of residual impacts, which may result in cumulative effects with impacts from other local and regional developments. The cumulative risk to the species is inherently difficult to quantify due to the limited availability of site-specific data and broader uncertainties regarding other sources of impact within the region, including other proposed wind farms. Notwithstanding these uncertainties, the relatively small scale of habitat impact associated with the Project, combined with the current avoidance of 'likely suitable' habitat, and with the adoption of the above-recommended mitigation measures, supports the conclusion that the Project is unlikely to contribute substantially to cumulative impacts on the species or have a high impact on the population of this species.

13.5.6. Growling Grass Frog

Considering the lack of historical Growling Grass Frog records within the Project Area, the lack of suitable habitat features at most wetlands, and the lack of connectivity to higher-quality wetlands, most wetlands within the Project Area were considered unlikely to support the species for important breeding or dispersal.

Natural wetlands in the area, including floodplain swamps and slow-flowing creeks, are ephemeral and are therefore capable of supporting suitable habitat only intermittently, with a reasonable likelihood of habitat availability under favourable conditions, e.g. heavy rain events or flooding. These wetlands include some sections of Calivil Creek and Nine-Mile Creek, as well as wetlands near Hird Swamp and in the south-eastern part of the Project Area, as well as some small farm dams.

Higher-quality and more reliable breeding habitat occurs in the surrounding landscape outside the project site, including large swamp systems such as Johnson Swamp and Hird Swamp Wildlife Reserves and areas associated with the Loddon River, such as Tragowel and Two Mile Swamps. These areas are expected to retain water for longer periods and offer more consistent breeding opportunities, likely being the key habitat within the search region.

A precautionary approach was followed, buffering artificial drains and channels by 30 m, all habitats assessed as medium quality for GGF by 100 m, and designated creeks within the Project by 100 m along their entire length, as much as practically possible.

These measures are considered suitable to avoid a high impact on this species, with recommendations provided for opportunities to further reduce potential for any impacts. Implications under the EPBC Act are discussed in Section 14.4, while implications under the FFG Act are detailed in Section 14.5

13.6. Impacts on the Kerang Wetlands Ramsar Site

As the MAWF has proposed a 2 km turbine-free buffer from the Kerang Wetlands Ramsar, the Project is unlikely to directly impact the wetlands themselves. The project has also committed to no ground-disturbing works within land parcels directly adjacent to the wetlands. The project is already required to address impacts to many of the values listed under the Ecological Character Description (ECD) through other legislation, such as migratory shorebirds under the EPBC and international agreements and other associated threatened waterbird species. There is potential that the Project may impact waterbirds not listed as threatened under state or federal legislation, but that contribute to the Ramsar sites listing (i.e. high abundance of waterbirds and/or waterbirds that breed in the wetland system). Six non-listed waterbirds associated with the Kerang Wetland Ramsar listing status were observed at RSA heights, with the most abundant being the Straw-

necked Ibis and Australian Shelduck (97.6 % of waterbirds at RSA). While these species may experience a level of collision risk, they have a limited presence in the extensive 22 years of mortality monitoring by Nature Advisory across Victoria and eastern Australia (two Australian Shelducks and six Straw-necked Ibis) (Nature Advisory unpublished mortality data). This suggests that the species are generally avoidant of turbine blades and are unlikely to experience impacts to such an extent that it would impact the listing status of the Ramsar wetland.

Further details on these species with the potential to impact Ramsar listing are found in Section 7.2.3.

13.7. Cumulative impacts

Although the MAWF is located in Victoria, the cumulative impact assessment has been prepared in accordance with the approach outlined in the *New South Wales Cumulative Impact Assessment Guidelines* (DPHI 2026), consistent with feedback received by the Proponent from the DTP IAU on 24 March 2026. In accordance with this guidance and feedback from DTP IAU, the cumulative assessment considered other energy developments within a 35 km radius of the Project Area. This search extent has been adopted to align with the approach DTP IAU had requested of the Proponent and provides the spatial framework for identifying developments with the potential to contribute to cumulative ecological impacts.

The Handbook requires that cumulative impacts be considered, in particular if similar nearby renewable energy facilities have reported mortalities of threatened bird and bat species for which the likely presence has been observed at the proposed development site. No operational wind farms are located within the vicinity of MAWF. Therefore, the assessment addresses existing, approved and publicly exhibited energy developments identified within this search area. Projects that have not yet entered the statutory referral or assessment process are excluded here, as these are not publicly available or sufficiently defined to enable a meaningful assessment as per NSW cumulative impact guidelines (DPHI 2026).

Following the project screening, projects that have been identified as having possible cumulative impacts during construction and/or operation of the Project have been assessed in the following sections. Potential cumulative impacts have been assessed using the impact rating criteria defined for the technical assessment. The projects considered within this assessment are shown in Table 13-3.

We note that, even using the NSW guidelines, cumulative risk remains difficult to quantify for many bird species due to limitations in available data, particularly for highly mobile taxa (e.g. migratory shorebirds, Little Eagle, Blue-winged Parrot, Black Falcon, and Magpie Goose). Species that range widely across the landscape may interact with multiple developments and land uses over large spatial scales and extended timeframes. While proposed developments often represent a relatively small and localised contribution to potential residual impacts, the cumulative effects of similar developments across the broader landscape cannot be entirely discounted for species with large home ranges and/or high mobility.

Table 13-3: Other energy projects within 35 km of the Project Area.

Project	Size (MW)	Cth Status	Vic Status	Approximate distance from Project Area	Project information source	Inclusion into cumulative assessment
Macorna solar farm	(100 MW)	Unknown	Unknown	Encompassed within Project Area	Loddon Council Agenda	Unknown native vegetation removal
Tragowel Solar Farm	(480 MW)	Unknown	Approved	Adjoining Project Area	Project Website Gannawarra/Loddon Council Agenda	9.2728 ha native vegetation removal of unknown detail
Kerang solar farm	(100 MW)	Stages operational		2 km	Gannawarra Planning Permit	1.769 ha native vegetation removal of unknown detail
Cohuna Solar Farm	(34 MW)	Operational		3 km	EPBC referral documents	0 ha native vegetation removal
Normanville Energy Park	up to 17 turbines (120 MW)	Assessment Commenced	Lodged	13 km	DTP and EPBC referral documents	0.335 native vegetation removal, including: 0.026 ha of Northern Grassland TEC 0.167 ha of Buloke woodland TEC 0.114 ha Plains Mallee Box woodland TEC

Project	Size (MW)	Cth Status	Vic Status	Approximate distance from Project Area	Project information source	Inclusion into cumulative assessment
Meering West Wind Farm	up to 164 turbines (1500 MW)	Referred	Planning Application Lodged	15 km	DTP and EPBC referral documents	5.292 native vegetation removal, including: 0.386 ha of Buloke woodland TEC 2.737 ha Plains Mallee Box woodland TEC
Gannawarra Solar Farm	(60 MW)	Stages operational		16 km	EPBC referral documents	0 ha native vegetation removal
Mologa Solar Farm	(250 MW)	Referred	Lodged	17 km	EPBC referral documents	0.171 ha of Plains Woodland
Cannie Wind Farm	up to 174 turbines (1300 MW)	Assessment Commenced	EES required - Scoping requirements finalised	31 km	DTP and EPBC referral documents	- Unknown native vegetation removal, but the following EPBC TECs are considered by the Proponent likely to be impacted: - Mallee Bird Community - Northern Grassland TEC - Buloke woodland TEC - Plains Mallee Box woodland TEC

Construction cumulative impacts

Potential cumulative impacts during construction are primarily associated with the clearing of native vegetation and the resulting loss or modification of habitat. Impacts for all nine projects included in this assessment remain relatively minor, though some are unknown. Across the broader landscape, native vegetation is already highly fragmented and is largely confined to roadsides, waterways and small remnant patches retained within agricultural land. We anticipate that roadside vegetation is likely to represent the vegetation/habitat most susceptible to cumulative losses at these projects.

The current MAWF layout is estimated to require the removal of approximately 45 ha of native vegetation, the majority comprising native grasslands. The Project has undergone extensive avoidance and minimisation during early design, and with additional refinements likely, the final removal is expected to be even lower. The Proponent has committed to further refinement through detailed design, including micro-siting of infrastructure, optimisation of access tracks and hardstands, which will further reduce impacts on native vegetation and habitat. Accordingly, the final extent of native vegetation removal is expected to be lower than that currently assessed.

Of the other projects considered, few had overlapping impacts to the same vegetation and habitat as MAWF. Impacts on the EPBC Act-listed *Natural Grasslands of the Murray Valley Plain* was noted for two projects, Normanville and Cannie Wind Farms. Only the Normanville Energy Park has publicly available information quantifying impacts, which was reported as very small (0.026 ha). While it is noted as considered at Cannie Wind Farm, no information is available. The MAWF is currently estimated to impact up to 25.254 ha of this ecological community. Accordingly, the cumulative assessment for this EPBC community is not expected to differ substantially from that presented for the MAWF.

Lignum Swampy Woodland was only noted as potentially impacted at Meering West Wind Farm, at a minor 0.05 ha. The MAWF includes the proposed removal of up to 0.24 ha of this EVC. No other impacted vegetation at MAWF is currently proposed to be impacted by other projects considered in the cumulative impact assessment. Accordingly, there is no evidence of a broader pattern of substantial, overlapping impacts to this ecological community from other projects in the surrounding landscape.

The cumulative impact assessment does not indicate a corresponding increase in the overall extent or severity of impacts simply as a result of multiple projects occurring within the broader landscape. Rather, the projects considered generally affect different ecological values, habitats and locations, with limited overlap in the values affected. Where impacts to the same ecological values have been identified, the contribution from other projects is generally minor relative to the impacts associated with the Project. Accordingly, the Project is not expected to materially increase the cumulative extent or severity of impacts to native vegetation and habitat beyond those already identified for the Project in isolation.

Therefore, based on the information currently available, the projects considered in this assessment are expected to result in a minimal increase in the cumulative reduction in native vegetation and flora/fauna habitat availability in the wider landscape.

Operational cumulative impacts

Operational cumulative impacts are primarily associated with collision mortality, barrier effects, and increased traffic resulting in roadkill. While several wind farms are proposed within the broader

region, the cumulative operational effects on biodiversity are inherently difficult to quantify due to limited empirical data from operational wind farms in the region. Similarly, there is insufficient information on existing roadkill rates within the region to determine whether additional project-related traffic would result in a measurable cumulative increase in mortality. Consequently, while cumulative effects associated with turbine collisions, barrier effects and roadkill cannot be discounted, their magnitude remains uncertain. Should these projects be approved, each would be subject to its own avoidance and minimisation measures during design, together with species-specific operational management requirements.

For threatened species susceptible to road collision, such as Bearded Dragon and Carpet Python, potential impacts associated with vehicle movements are expected to be managed across the relevant projects through measures implemented under Traffic Management Plans. As these controls are intended to minimise the risk of vehicle-related mortality, the addition of the Project is not expected to result in a material increase in cumulative road-collision impacts for these species.

For turbine collision risk at wind farms, impacts are expected to be addressed through a combination of avoidance, minimisation and management measures. All projects undergo early design and layout refinement to minimise and avoid areas of higher collision risk, with residual risks managed through project-specific Bat and Avifauna Management (BAM) Plans developed in consultation with DEECA and NEPA. Accordingly, the cumulative turbine collision risk is not expected to increase materially as a result of the Project, given that potential impacts across the relevant projects are subject to similar risk-avoidance and management measures.

BAM Plans address cumulative residual risk through incorporating monitoring, prompt reporting, defined impact thresholds, and adaptive management measures where warranted. Communication of residual impacts with DEECA/NEPA allows both Proponents and regulators to respond to impacts at the Project and contextualise with respect to cumulative impacts, as and if they occur. The MAWF will be subject to this same regulatory framework and commitments. Accordingly, while operational cumulative impacts cannot be entirely avoided, the application of consistent avoidance, minimisation, compensation and adaptive management measures across all wind farm projects is expected to reduce the likelihood of high cumulative impacts at the regional scale, such that residual cumulative operational impacts are likely to be low.

14. Implications under legislation and policy

14.1. Implications under the EE Act

The *Ministerial Guidelines for Assessment of Environmental Effects under the Environment Effects Act 1978* (DTP 2023) identifies criteria that indicate whether a Referral to the state Minister for Planning should be made (see Section 3.4). Based on the relevant criteria, a Referral to the state Minister for Planning is recommended, and this report has been prepared to support the Referral.

This proposal meets one relevant ‘individual’ criterion, which triggers a Referral recommendation. That is, the potential to remove, destruct or lop 10 or more ha of native vegetation (defined in the Guidelines) that consists of, or comprises a combination of:

- an EVC classified as endangered (i.e. Plains Grassland and Chenopod Grassland); or
- an EVC that is classified as vulnerable (with a condition score of 0.5 or more) or rare (with a condition score of 0.6 or more).

Further targeted surveys will refine the understanding of particular ecological values and inform further micro-siting and mitigation; however, based on the extensive investigations completed to date, these outstanding investigations are not expected to fundamentally alter the overall character or scale of biodiversity effects identified in this assessment.

14.2. Implications under the *Planning and Environment Act 1987*, Clause 52.17 (Native Vegetation) of the Planning Scheme and the Guidelines

A permit for the proposed removal of native vegetation is required under Cl. 52.17 of the Gannawarra and Loddon Planning Schemes.

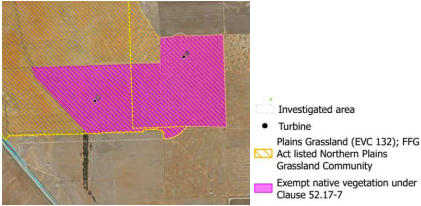
14.2.1. Exemptions to Clause 52.17

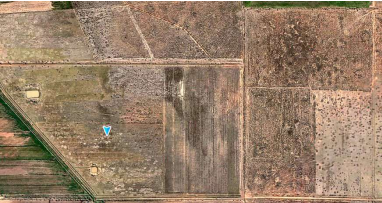
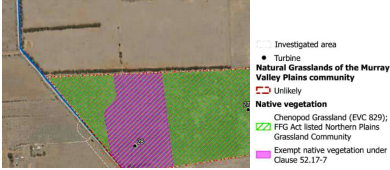
A permit is not required for regrown native vegetation on land lawfully cleared of naturally established native vegetation that is less than 10 years old (Regrowth). The consulting planners conducted an analysis using aerial photography and landowner information about recent land use and concluded that the 8,216 ha of impacted native vegetation is regrowth and qualifies for the 10-year regrowth exemption. Where these are agreed by Nature Advisory, they are shown in the table below and in Figure 13-1.

Table 14-2 details the habitat zones which are exempt from Clause 52.17.

No other exemptions under the Gannawarra or Loddon Planning Schemes are relevant to this project.

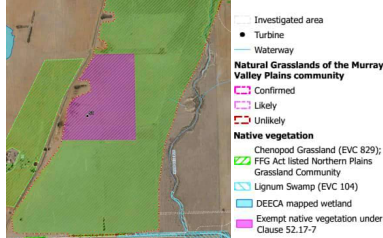
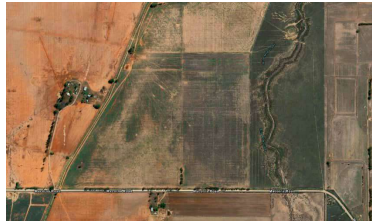
Table 14-1: Habitat Zones exempt from Clause 52.17 under the Regrowth Exemption

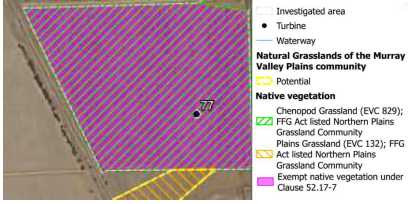
Habitat Zone	Study area section (Turbine ID)	Near Map Imagery and timeline	Notes
2DC (EVC 132)	North-east (T5 and T8)	Habitat Zone and EVC mapping:  Aerial image (11/2025), typical vegetative structure:  Aerial image (29/06/2023) showing irrigation bays: 	Aerial imagery confirms that these paddocks have been utilised for irrigation. The landowner stated that the area was 'previously irrigated', but that irrigation infrastructure was removed or decommissioned. The landowner hasn't specified a specific time frame, thus, it's undetermined whether the native ground layer in this area was lost due to this practice. Imagery from 2016 showed that the land was ploughed, indicating that the loss of native vegetation was <10 years ago. Furthermore, a review of high-resolution historical aerials from November 2025 does not suggest that ploughing resulted in the loss of a native ground layer. This is best demonstrated by the heterogeneous structure of vegetation pictured in these aerials, which is not typical of ground disturbance, and is similar to what was present in 2011 (pre-ploughing). However, it is understood that ploughing may have occurred post-November 2025 (though aerials were not available after this date). Therefore, this vegetation is suitable for classification as regrowth.

Habitat Zone	Study area section (Turbine ID)	Near Map Imagery and timeline	Notes
		Aerial image (7/1/2016) showing land ploughing:  Aerial image (27/8/2011) showing heterogeneous structure of vegetation, similar to what is present in 2015: 	
5AU (EVC 132)	Centre-west (T27 and T28)	Habitat Zone and EVC mapping:  Aerial image (13/10/2021) showing irrigation bays in the west portion of the property:	This habitat zone included a conspicuous shrub layer of chenopods and a comparatively sparse ground layer. A review of high-resolution historical aerials indicates widespread ground disturbance and the loss of understory values, between 11/2023 and 12/2024. This is best demonstrated by the absence of shrubbery in 2024, as shown in the attached images. Therefore, this vegetation is considered suitable for classification as regrowth.

Habitat Zone	Study area section (Turbine ID)	Near Map Imagery and timeline	Notes
		 Aerial image (11/2023) showing widespread cover of shrubbery.  Aerial image (12/2024) demonstrating loss of shrubbery. 	
2DQ (EVC 829)	Centre-west (T37)	Habitat Zone and EVC mapping:	A review of high-resolution historical aerials indicates widespread ground disturbance and the loss of understory values, between 4/2021 and 9/2024. Where previously the vegetative structure appeared textured and heterogenous in 2021, the overall structure of the vegetation in 2024 was uniform and shrubbery appeared absent. This structural change is consistent with the disturbance expected from ploughing and the subsequent loss of native vegetation. Therefore, this vegetation is considered suitable for classification as regrowth.

Habitat Zone	Study area section (Turbine ID)	Near Map Imagery and timeline	Notes
		 Investigated area • Turbine Waterway Natural Grasslands of the Murray Valley Plains community Confirmed Likely Unlikely Native vegetation Chenopod Grassland (EVC 829) FIG Act listed Northern Plains Grassland Community Lignum Swamp (EVC 104) Exempt native vegetation under Clause 52.17-7 Aerial imagery (13/10/2021) showing irrigation bays:  Aerial imagery (4/2021) 	

Habitat Zone	Study area section (Turbine ID)	Near Map Imagery and timeline	Notes
		Aerial imagery (9/2024) 	
2CV (EVC 829)	Centre-west (T53)	Habitat Zone and EVC mapping:  Aerial imagery (24/02/2021) showing evidence of irrigation bays and cropping: 	A review of high-resolution historical aerials did not demonstrate any notable changes in vegetative structure within the specified 3-year timeframe. However, a review of aerial imagery from 2018 and 2021 indicated that ploughing had occurred. This is demonstrated by the fact that the overall structure of the vegetation in these years was uniform and chenopod shrubbery appeared absent. Additionally, ploughing lines were conspicuous in aerial imagery from these years. This level of ploughing is very likely to have resulted in the loss of native vegetation. Therefore, this vegetation is considered suitable for classification as regrowth.

Habitat Zone	Study area section (Turbine ID)	Near Map Imagery and timeline	Notes
		Aerial imagery (8/2018)  Aerial imagery (1/2021) 	
5AX (EVC 829)	Centre-east (T77)	Habitat Zone and EVC mapping:  Investigated area • Turbine — Waterway Natural Grasslands of the Murray Valley Plains community □ Potential Native vegetation - Chenopod Grassland (EVC 829); - FFG Act listed Northern Plains Grassland Community - Plains Grassland (EVC 132); FFG - Act listed Northern Plains Grassland Community - Exempt native vegetation under Clause 52.17-7	Historical aerial imagery from 2016 was not available. However, aerials from 2018 indicated that ploughing likely corresponded with that timing. This is demonstrated by the fact that the overall structure of the vegetation in these years was uniform and chenopod shrubbery appeared absent. Additionally, ploughing lines were conspicuous in aerial imagery. This level of ploughing is very likely to have resulted in the loss of native vegetation. Therefore, this vegetation is considered suitable for classification as regrowth.

Habitat Zone	Study area section (Turbine ID)	Near Map Imagery and timeline	Notes
		Aerial imagery (13/10/2021) showing irrigation bays:  Aerial imagery (8/2018) 	

14.2.2. Avoid and minimise statement

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

Strategic-level planning

The wind farm location was initially selected given its proximity to the proposed Victoria to New South Wales Interconnector West (VNI West) and due to the existing relationships the WindFarmers Energy Group (the original prospectors of the land) had with landowners. The Project Area was then defined based on:

- Proximity to existing and proposed transmission infrastructure
- Wind speed
- Existing land use being largely irrigation and dryland farming, the land is highly compatible with a wind project
- Limited ecological values identified based on early desktop analysis
- Project capacity

Following selection of the Project Area, and commencement of preliminary assessments, key strategic design decisions were made by the proponent, including:

- Application of a 2 km buffer to Hird Swamp and Johnsons Swamp, which are located to the east of the Project Area and are part of the Kerang Wetland Ramsar Site.
- Removal of 11 potential turbine locations in the southwestern part of the project area to avoid impacts on native vegetation and potential Plains-wanderer habitat.

Site-level planning

The following avoidance, minimisation and mitigation measures have been applied to avoid and minimise impacts on threatened fauna species and their habitat, as well as the listed bird community:

- Native woodland patches have been avoided to avoid impacts on woodland-dependent bird species and the listed Victorian Temperate Woodland Bird community.
- The 2 km turbine-free buffer has been retained around Hird Swamp and Johnson Swamp to minimise potential collision risk to migratory shorebirds and other waterbirds. Further, no ground disturbing works are proposed on any land parcels immediately adjacent to Hird Swamp and Johnson Swamp.
- A 100 m buffer has been established around most wetlands assessed as medium-quality for GGF and connective habitat along designated creeks (see Section 12.4.5). Where possible, major artificial drains and water channels have been buffered by 30 m. Where this was not applied, further micro-siting may be possible.

The Project's layout has been through multiple iterations, each aimed at reducing impacts to native vegetation, including:

- 12 turbines have been removed from the design footprint to avoid impacts to areas of high ecological value, including areas that were likely to qualify as the NGMVP EPBC Act-listed ecological community, and patches of endangered native vegetation.
- Removal of 1 turbine within a Brolga breeding wetland buffer.
- Relocation of all turbines out of areas of high ecological value where a viable alternative location was available.
- Adjusting turbine and other infrastructure locations to avoid or minimise impacts to native vegetation and Brolga wetland buffers.
- Some dual passageways, turning bays and cables were removed or rerouted to avoid impacts to native vegetation.
- Temporary lay-down areas have been removed from locations of mapped native vegetation.
- The construction footprint impact area buffer (the additional area of assumed construction footprint impact, outside of the civil or electrical disturbance area) has been reduced from 13 m to 2 m within patches of native vegetation.

Table 14-2 details the design revisions resulting in considerable reductions of impacts to native vegetation through 5 civil design stages.

Table 14-2: Layout revisions and design amendments reducing native vegetation impacts

Layout Revision	No of Turbines	Estimated Native Vegetation Impact (Ha)	Key Considerations
Civil Design 00	133	130.8	▪ Refinement of location T040 for reduction of 1.74 Ha ▪ Refinement of the access track arrangement to T091 to avoid native vegetation impacts (~2 Ha) ▪ Refinement of turbine location 101 (~2.8 Ha) ▪ Refinement of turbine locations 47 and 48 (~2.8 Ha) ▪ Relocation of turbine 57 (1 Ha)
Civil Design 01	133	123.7	▪ Removal of 12 turbines with ecological impacts (38 Ha) ▪ Relocation of T110 (2.75 Ha) ▪ Realignment of access track to T105 & T104 (4.6 Ha) ▪ Removal of roadside entrance for T090 and T087 (0.73 Ha) ▪ Realignment of access track T041 to T044 (0.1 Ha)
Civil Design 02	115	72.4	▪ Minor refinement of Bench locations for native vegetation avoidance (1.8 Ha)
Civil Design 03	115	70.2	▪ Deletion of T015 – avoidance of Brolga buffer

Layout Revision	No of Turbines	Estimated Native Vegetation Impact (Ha)	Key Considerations
			▪ Micrositing of T069, T072, T082 and T083 for shadow flicker compliance (no vegetation impacts)
Civil Design 04	114	70.5	▪ Refinement of all entranceways impacting native vegetation from dual OSOM vehicle access to single OSOM vehicle access in the direction of travel for proposed delivery ▪ Removal or relocation of turning bays and optional hardstand storage in areas of native vegetation ▪ Refinement of cable alignments to avoid native vegetation ▪ Reduction in proposed construction corridor for areas impacting native vegetation
Civil Design 05	114	36.933	▪ Further native vegetation avoidance through: ▫ Refined entranceway designs and optimised access ▫ Localised refinement of the construction footprint during detailed design for areas of the construction footprint that partially impact native vegetation.

Through five iterative design stages, the Project has reduced potential native vegetation impacts from approximately 130.8 ha to 45.523, representing a reduction of over 70%. This has been achieved through turbine removal and micro-siting, access and cable realignment, reduced construction corridors, removal of temporary infrastructure and targeted avoidance of higher-value ecological areas.

The latest layout update (Civil Design 05) has resulted in the following reductions in impacts to native vegetation values compared to initial designs:

- Impacts to native vegetation in patches have reduced from 130.8 ha to 45.523 ha (including exempt regrowth), or one third of the previous impact.
- Impacts to the EPBC Act-listed ecological community NGMVP have been reduced from 58.790 ha to 25.254 ha, including a reduction in impacts to confirmed occurrences of the community from 27.882 ha to 12.063 ha.
- Impacts to the FFG Act-listed ecological community have been reduced from 72.146 ha to 40.470 ha.
- These layout changes have resulted in over half of the native vegetation values that were previously impacted being retained.

Further refinements of the layout are planned to follow targeted flora surveys and confirmation of listed ecological communities during Spring 2026, in addition to other surveys.

Design and construction recommendations to further avoid and minimise impacts to native vegetation and fauna habitat are provided in Section 15.

14.2.3. Modelled species important habitat

The current proposal will impact DEECA modelled habitat to the degree that species-specific offsets will be triggered for the following rare or threatened species:

- Annual Buttons (FFG Act: Endangered)
- Downs Nutgrass (FFG Act: Vulnerable)
- Soft Sunray (FFG Act: Vulnerable)

Species Habitat Units (SHUs) will therefore need to be sourced for the above species, in accordance with the offset requirements detailed in Section 14.2.5 and Appendix 6.

There are potential options of sourcing these SHU as third-party offsets, as outlined in Appendix 25.

14.2.4. Assessment pathway

The assessment pathway is determined by the location category and extent of native vegetation as detailed for the study area as follows:

- **Location Category:** Location 2
- **Extent of native vegetation removal:** A total of 45.523 ha of native vegetation (including exempt regrowth) and five large trees.

Based on the extent of native vegetation removal being ≥ 0.5 ha, the Guidelines stipulate that the proposal is to be assessed under the Detailed assessment pathway, as determined by the following matrix:

Table 14-3: Assessment pathway matrix

Extent of native vegetation	Location 1	Location 2	Location 3
< 0.5 ha and not including any large trees	Basic	Intermediate	Detailed
< 0.5 ha and including one or more large trees	Intermediate	Intermediate	Detailed
≥ 0.5 ha	Detailed	Detailed	Detailed

This proposal **will** trigger a referral to DEECA based on the above criteria.

14.2.5. Offset requirements

Under the Guidelines, all offsets must be secured prior to the removal of native vegetation.

Offsets required to compensate for the proposed removal of native vegetation from the study area are as follows:

- 1.3790 general habitat units, with the following offset attribute requirements:
 - A minimum strategic biodiversity value (SBV) of 0.3918

- Located within the North Central CMA boundary or the Gannawarra Shire, Loddon Shire Council municipal district
 - Include protection of at least four large trees
- 31.397 species habitat units (SHUs), with the following offset attribute requirements:
 - Comprises the mapped habitat according to the habitat importance map for
 - 9.027 SHUs of habitat for Downs Nutgrass *Cyperus bifax*
 - 8.165 SHUs of habitat for Soft Sunray *Leucochrysum molle*
 - 14.205 SHUs of habitat for Annual Buttons *Leptorhynchos orientalis*
 - Include protection of at least one large tree.

14.2.6. Offset statement

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

An online search of the Native Vegetation Credit Register (NVCR) has shown that the required General Habitat Units offset is currently available for purchase from a native vegetation credit owner (Appendix 23).

Evidence that the required offset is available is provided in Appendix 23. The required offset would be secured following approval of the application to remove native vegetation.

Species habitat units offset

An online search of the NVCR has shown that the required SHU offsets are *not available* for purchase from a native vegetation credit owner (Appendix 23). To investigate the availability of suitable species-specific offsets, a desktop offset assessment was undertaken (Appendix 25). The assessment considered Habitat Importance Models (HIMs) for Downs Nutgrass, Soft Sunray and Annual Buttons and identified potential offset opportunities within the broader Project Area. One candidate property was identified that is capable of satisfying the project's SHU offset requirements and also meets the GHU offset requirements, subject to landholder agreement and confirmation of offset suitability.

The findings of this assessment are provided in Appendix 25. An Offset Strategy is currently being prepared to support the identification and securing of suitable offset sites. Subject to project approval, the required offsets will be secured prior to the removal of native vegetation.

14.3. Implications under other planning provisions

14.3.1. Clause 12.01 - Biodiversity

The objectives of Clause 12.01 – *Biodiversity* (outlined in Section 3.1.1) are to protect and enhance Victoria's biodiversity and to ensure that there is no net loss as a result of the removal, destruction or lopping of native vegetation. This is, in general, achieved by the 'Guidelines' and the avoid, minimise and offset obligations as detailed within this report. However, this clause is also relevant to the application by considering the protection and enhancement of habitat for indigenous plants and animals in urban areas and avoiding the fragmentation of habitat.

Additionally, Clause 12.01-1L – *Flora and fauna protection* aims to protect and enhance remnant native vegetation and fauna habitat. It aims to encourage development that avoids fragmenting connections between existing remnant native vegetation and fauna habitat.

This application mostly responds to these objectives by retention of a large proportion of the native vegetation mapped within the Project Area and the avoidance of impacts to native vegetation and threatened ecological communities. The majority of proposed infrastructure occurs on farmland that is devoid of native vegetation. However, some turbines and tracks are located within paddocks that are native and qualify as listed ecological communities. This will result in some impacts to native vegetation and fauna habitat, but is unlikely to result in extensive fragmentation.

A final assessment of how the proposal responds to the aims of Clause 12.01 will be made once the wind farm layout is finalised.

14.3.2. Clause 12.03 – Water bodies and wetlands

The objectives of Clause 12.03 (outlined in Section 3.1.1) are to protect and enhance waterway systems, including river and riparian corridors, waterways, lakes, wetlands and billabongs. They are, in general, achieved by the Guidelines and the avoid, minimise and offset obligations as detailed within this report.

This application responds to these objectives through setbacks from the major waterways in the area, including the Loddon River, Pyramid Creek and other major creeks. Specific layout alterations have also been made to avoid wind farm infrastructure being too close to Hird and Johnson Swamps.

A final assessment of how the proposal responds to the aims of Clause 12.03 will be made once the wind farm layout is finalised.

14.3.3. Zoning

The permit requirements, relevant application requirements, decision guidelines and implications under zoning in the Gannawarra and Loddon Planning Schemes are discussed below.

Farming zone (FZ)

A permit is required to carry out works for a wind energy facility under this zone in both the Gannawarra and Loddon Planning Schemes.

The following decision guidelines are relevant to this investigation under both planning schemes:

- The impact of the proposal on the natural physical features and resources of the area, in particular on soil and water quality.
- The impact of the use or development on the flora and fauna on the site and its surrounds.
- The need to protect and enhance the biodiversity of the area, including the retention of vegetation and faunal habitat and the need to revegetate land including riparian buffers along waterways, gullies, ridgelines, property boundaries and saline discharge and recharge areas.
- The location of on-site effluent disposal areas to minimise the impact of nutrient loads on waterways and native vegetation.

This report deals extensively with the impacts of the proposal on biodiversity, flora and fauna.

Construction methods must be appropriate to avoid impacts to soil and waterways in the surrounding landscapes.

A more detailed assessment of how the proposal meets each objective of this zoning will be made once the wind farm layout is finalised.

Public Conservation and Resource Zone (PCRZ)

A permit is required to develop a wind energy facility under this zone.

Any incorporated plans for how the land is to be developed must consider the following relevant information:

- The location of existing native or other vegetation and any proposed landscaping works or areas of vegetation to be added or removed.
- The identification of sites of flora or fauna significance (including, in particular, any potentially threatened species or significant habitat) or other places of cultural, heritage or scientific value.

No works are proposed in these zones, and thus, no permit will be required.

Transport Zones (TRZ2 and TRZ3)

The aims of these zones are not considered relevant to this investigation.

14.3.4. Overlays

Vegetation Protection Overlay – Schedule 2 (VPO2) – Gannawarra Planning Scheme

A permit is required to remove any native vegetation under this overlay.

This overlay aims to preserve biodiversity values in the landscape, including flora and fauna habitat, high-diversity grasslands and Black Box Grassy Woodlands. It aims specifically to protect remnant vegetation, fauna habitat, ecological processes, genetic diversity, and enhance existing vegetation and habitat corridors.

VPO2 has the following application requirements:

- Indicate the total extent of native vegetation on the subject land and the extent of proposed clearing, destruction or lopping and the location of any river, stream, waterway, wetland or channel on the subject land.
- Specify the purpose of the proposed clearing.
- Demonstrate that the need for removal, destruction or lopping of remnant native vegetation has been reduced to the maximum extent that is reasonable and practicable.
- Specify proposals for revegetation following ground disturbance, or restoration of an alternate site, including proposed species and ground stabilisation.

The following decision guidelines will also be considered:

- The need to retain remnant vegetation and conserve flora and fauna habitats including habitat corridors and biolinks.
- The value of the flora, fauna or habitat in terms of physical condition, rarity or variety.
- The purpose of removal, destruction or lopping of native vegetation and alternative options for carrying out development on the land.
- The likely effect of removal, destruction or lopping of vegetation on resident and migratory fauna and the need to retain trees (live and dead) with hollows, for habitat value.

- The need to retain the connectivity in a local, regional, state wide or national context of linear remnants (vegetation along roadsides, railway lines, rivers and streams), habitat corridors, and biolinks.
- The likely impacts on soil, water, flora, fauna, air and ecosystems.
- The future use of the land and whether it is appropriate to include conditions requiring planting, replanting or other treatment of any part of the land.
- The latest information available on rare or threatened species.

Environmental Significance Overlay – Schedule 1 (ESO1) – Gannawarra Planning Scheme

A permit is required for works within 100 m of a waterway under this overlay.

This overlay aims to conserve the quality of waterways within the wider landscape. Relevant aims of this overlay are to protect and enhance the biodiversity, ecological values and cultural values and the visual landscape quality of the waterway environs, and to protect and encourage the long-term future of flora and fauna habitats along waterways.

The following relevant decision guidelines will be considered:

- The conservation of natural habitats.
- The conservation of natural habitats and the preservation of native fauna, fish and other aquatic life.

Vegetation Protection Overlay – Schedule 1 (VPO1) – Loddon Planning Scheme

A permit is required to remove any native vegetation under this overlay.

The aim of this overlay is to protect remnant native vegetation, especially native grasslands and Box Ironbark Forest.

Any application assessment will take into consideration existing documentation of native vegetation for the region.

A more detailed assessment of whether the proposal will impact native vegetation within any of these overlays, and how the proposal meets each objective of the overlays, will be made once the wind farm layout is finalised.

14.4. Implications under the EPBC Act

The Project will impact the following EPBC Act-listed values, but the proposed impacts have not yet been assessed against the *Matters of National Environmental Significance: Significant Impact Guidelines 1.1* (Department of Environment, 2013).

Ecological Communities

- Natural Grasslands of the Murray Valley Plains (EPBC Act: Critically Endangered) – approximately 25,254 ha impacted. Impacts to the community are summarised by likelihood of occurrence below.
 - *Confirmed* – 12,063 ha impacted
 - *Likely* – 1,912 ha impacted
 - *Potential* – 4,493 ha impacted

- *Unlikely* – 6.786 ha impacted

A targeted survey will be undertaken in Spring 2026 to confirm the extent of impacts to this community in the study area and inform a significant impact assessment under the EPBC Act to determine the likelihood of a significant impact.

Flora species

The following flora species have the potential to be impacted by the development, with impacts to these species will be assessed against the *Matters of National Environmental Significance: Significant Impact Guidelines 1.1* within a separate MNES report. Targeted surveys would be required to determine the status of these values in the study area and to assess any potential impacts to these values. Table 5-2 provides a timeline of planned surveys within suitable months for each of these values. This is based on when each species is readily identifiable.

- River Swamp Wallaby-grass *Amphibromus fluitans* (EPBC Act: Vulnerable)
- Chariot Wheels *Maireana cheelii* (EPBC Act: Vulnerable)
- Ridged Water-milfoil *Myriophyllum porcatum* (EPBC Act: Vulnerable)
- Stiff Groundsel *Senecio behrianus* (EPBC Act: Endangered)
- Slender Darling-pea *Swainsona murrayana* (EPBC Act: Vulnerable)

The results of these surveys will inform significant impact assessments under the EPBC Act to determine the likelihood of a significant impact.

Fauna Species

The following fauna species have been recorded within the Project Area:

- Australasian Bittern (EPBC Act: Endangered)
- Blue-winged Parrot (EPBC Act: Vulnerable)
- Brown Treecreeper (EPBC Act: Vulnerable)
- Southern Whiteface (EPBC Act: Vulnerable)

The following species have potential or are likely to occur within the Project Area:

- Australian Painted Snipe (EPBC Act: Endangered)
- Diamond Firetail (EPBC Act: Vulnerable)
- Hooded Robin (EPBC Act: Endangered)
- Plains-wanderer (EPBC Act: Critically Endangered)
- Corben's Long-eared Bat (EPBC Act: Vulnerable)
- Murray Cod (EPBC Act: Vulnerable)
- Murray Hardyhead (EPBC Act: Endangered)
- Growling Grass Frog (EPBC Act: Vulnerable)

Migratory Species

The following migratory species have been recorded, are likely, or have the potential to occur within the Project Area:

- Caspian Tern (EPBC Act: Migratory)
- Common Greenshank (EPBC Act: Endangered, Migratory)
- Common Sandpiper (EPBC Act: Endangered, Migratory)
- Curlew Sandpiper (EPBC Act: Critically Endangered, Migratory)
- Double-banded Plover (EPBC Act: Migratory)
- Fork-tailed Swift (EPBC Act: Migratory)
- Glossy Ibis (EPBC Act: Migratory)
- Latham Snipe (EPBC Act: Vulnerable, Migratory)
- Long-toed Stint (EPBC Act: Migratory)
- Marsh Sandpiper (EPBC Act: Migratory)
- Pectoral Sandpiper (EPBC Act: Migratory)
- Red-necked Stint (EPBC Act: Migratory)
- Sharp-tailed Sandpiper (EPBC Act: Vulnerable, Migratory)
- White-throated Needletail (EPBC Act: Vulnerable, Migratory)
- White-winged Tern (EPBC Act: Migratory)
- Wood Sandpiper (EPBC Act: Migratory)

Significant impacts to these fauna species are mostly expected to be avoided following careful layout changes to avoid habitat and observing buffers from aquatic habitats and potential breeding sites wherever possible. Potential impacts are possible for some species where further refinement in the design to avoid and minimise impacts is not undertaken (see Section 13)-. The Proponent has committed to undertaking such refinement of the layout. Impacts to these species will be assessed against the *Matters of National Environmental Significance: Significant Impact Guidelines 1.1* within a MNES report.

Some level of residual impacts may persist and could result in cumulative effects with impacts from other local and regional developments. The cumulative risk to the species is inherently difficult to quantify due to the limited availability of site-specific data and broader uncertainties regarding other sources of impact within the region. Notwithstanding these uncertainties, the relatively small scale of fauna habitat impact associated with the Project, combined with the current avoidance of 'likely suitable' habitat for the Plains-wanderer and other threatened fauna and migratory species, and with the adoption of the recommended mitigation measures (Section 15), supports the conclusion that the project is unlikely to contribute substantially to cumulative impacts on flora and fauna species.

A Referral under the EPBC Act will be prepared as the Project has the potential to impact the above-mentioned MNES values. An MNES assessment will also be prepared for the project, which will contribute to the Referral.

14.5. Implications under the FFG Act

A Protected Flora Permit under the FFG Act would be required for the current proposal for impacts to the Northern Plains Grassland Community on public land, as well as any of the below-mentioned FFG Act-listed threatened values if targeted surveys determine that they occur on public land.

Listed ecological communities

The following FFG Act listed community is anticipated to be impacted by the proposed development:

- Northern Plains Grassland Community – 40.470 ha impacted in total, including 8.310 ha on public land.

The following FFG Act-listed community may be impacted, if patch vegetation is determined to qualify:

- Victorian Temperate Woodland Bird Community – 0.644 ha of native patch vegetation potentially qualifying as this community will be impacted, including 0.517 ha on public land.

Impacts to the above FFG Communities on public land will require a permit under the FFG Act.

Threatened flora species

Impacts could not be assessed based on information obtained during the current assessment for the 59 flora species listed under the FFG Act, as targeted surveys have not yet been undertaken.

Therefore, targeted surveys are recommended to determine the status of these values in the study area and to assess any potential impacts on these values. Table 5-2 provides a timeline of suitable months to conduct targeted surveys for each of these species. This is based on when each species is readily identifiable.

These values should be avoided wherever possible, in recognition of their threatened status at a state level. Any application for a planning permit may also be assessed by the responsible or referral authority for potential impacts to FFG Act-listed threatened values as part of broader considerations of impacts to biodiversity, regardless of land tenure.

Protected flora species

No known occurrences of FFG Act values listed as protected are anticipated to be impacted by the proposed development on public land.

Threatened fauna species

No major impacts to FFG Act-listed fauna species are expected. Residual risk exists for bird species such as Black Falcon and Little Eagle that fly at RSA height and have the potential to collide with turbines. However, these residual risks are expected to be low and will be actively managed through adaptive management frameworks.

For Brolga, known breeding habitat buffers have been applied, with no turbines located within Breeding Wetlands or their associated buffers to maintain habitat connectivity and further minimise collision risk. In addition, buffers have been applied to most potential breeding wetlands, with further surveys in 2026 to confirm whether the buffers remain or can be reconfigured based on wetland attributes, as per the Handbook, and inform the requirements around micro-siting and design adjustments. In the event that avoidance of these habitats (buffer areas) is not possible, compensation will be provided, as detailed in a Compensation Plan under the Handbook.

Bearded Dragon and Carpet Python are likely to use waterways and woodland areas, which have been mostly avoided and thus impacts to these species are unlikely.

14.6. CaLP Act

The *Catchment and Land Protection Act 1994* (Vic; 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 CaLP Act, the noxious weed species listed below, which were recorded in the study area, must be controlled.

- African Box-thorn *Lycium ferocissimum*
- Artichoke Thistle *Cynara cardunculus* subsp. *Flavescens*
- Bathurst Burr *Xanthium spinosum*
- Common Prickly-pear *Opuntia stricta*
- Horehound *Marrubium vulgare*
- Saffron Thistle *Carthamus lanatus*
- Silver-leaf Nightshade *Solanum elaeagnifolium*
- Spear Thistle *Cirsium vulgare*
- Spiny Rush *Juncus acutus* subsp. *acutus*
- Variegated Thistle *Silybum marianum*

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.).

14.7. Crown land

Impacts to Crown land and adjacent areas present implications under Clause 12.01-1L and Clause 66.02-2. These clauses respectively require impacts to the environmental values of Crown land to be limited to the greatest extent practicable and to be approved by DEECA.

As demonstrated in Figure 13-1, impacts to Crown land are very limited in extent and largely associated with roadside areas. These roadside areas typically supported lower-quality native vegetation, which had been degraded through damaging edge effects and weed invasion. In many instances, roadside native vegetation patches lacked a native ground layer and demonstrated very limited floral diversity. Furthermore, a significant proportion of infrastructure sited in Crown land will not impact native vegetation, due to this infrastructure primarily being sited in areas of exotic vegetation. Therefore, the overall impacts to environmental values on Crown land are anticipated to be very limited and will not undermine the objectives of Clause 12.01-1L.

This proposal has been referred to DEECA and will require DEECA approval, as per Clause 66.02 2.

15. Recommendations

15.1. Further assessments

The following surveys are recommended based on the outcomes of this assessment:

- Targeted surveys for listed flora species and ecological communities commencing in Spring 2026;
- Continuation of BUS surveys to complete two full years of seasonal bird surveys;
- Continuation of Bat surveys to complete two years of echolocating insectivorous bat surveys;
- A second season of Brolga breeding surveys from July to December 2026 (commenced);
- A Brolga flocking survey during the non-breeding season (e.g. December to June);
- Targeted surveys to confirm the presence or likely absence of the Plains-wanderer;
- Targeted raptor surveys during breeding season to identify any active nests, if present; and
- An MNES assessment.

15.2. Design recommendations

Significant design modifications have been undertaken to date to avoid impacts to the highest quality areas of native vegetation, wetlands and waterways on the site (as detailed in Section 13.2).

Further micro-siting will be undertaken to:

- Move infrastructure outside of confirmed Brolga breeding wetlands;
- Move infrastructure outside of Brolga potential breeding wetland buffers, unless unavoidable due to other constraints;
- Move infrastructure outside of buffers for Growling Grass Frog as recommended in Section 12.4.4 unless unavoidable due to other constraints;
- Move infrastructure to avoid patches of grassland identified as 'likely suitable' for Plains-wanderer, unless unavoidable due to other constraints;
- Avoid constructing new crossings over creeks, drains or water channels plausibly functioning as GGF dispersal corridors, and where this is not possible, implement the GGF Crossing Design Standards (DELWP 2017e) if practicable;
- Avoid the loss of scattered trees (esp. hollow-bearing trees) and the fragmentation of intact habitat patches to such an extent as to create a movement barrier for those listed species that are present; and
- Avoid or minimise impacts as identified from further assessments outlined in Section 15.1.

15.3. Ongoing monitoring, management and adaptive management measures

The following plans will be developed in conjunction with DEECA and in line with the Handbook to ensure adaptive management is a core part of the ongoing operation of the Project:

- Environmental Management Framework (EMF);
- Bat and Avifauna Management Plan (BAM Plan);

- Traffic Management Plan (TMP) (including measures in Section 12.4.4); and
- Brolga Compensation Plan (if required).

15.4. Construction mitigation recommendations

Recommendations to mitigate impacts to native flora and fauna during construction are provided below:

- Establish appropriate vegetation protection zones around areas of native vegetation to be retained prior to works to prevent damage to native vegetation.
- Establish appropriate TPZs around scattered native trees to be retained prior to works.
- Ensure all construction personnel are appropriately briefed prior to works, and that no construction personnel, machinery or equipment are placed inside vegetation zones/TPZs.
- A suitably qualified zoologist should undertake a pre-clearance survey of trees to be removed during the week prior to removal to identify the presence of any nests or hollows.
- If considered necessary based on the results of the pre-clearance survey, a suitably qualified zoologist should be on-site during any tree removal works to capture and relocate any displaced fauna that may be present (e.g. Carpet Python).

Measures to reduce potential degradation of habitat will be included within a Construction Environmental Management Plan (CEMP). This plan will align with industry standards, best practices, and guidelines. It may include, but is not limited to:

- Native vegetation and tree protection zones,
- Hygiene controls, including weed and pathogen controls
- Weed management plan,
- Dust control measures,
- Erosion and sediment control,
- Noise control,
- Maintenance and monitoring schedules,
- Using low-impact construction methods to minimise impacts where possible (e.g. Horizontal Directional Drilling under creeks),
- The requirements and protocols for pre-clearance surveys of fauna habitat, including hollow-bearing trees and wetland habitat,
- Protocols in the event that wildlife are found trapped, injured or dead, in accordance with the *Wildlife Act 1975*,
- Establish and maintain no-go zones around retained native vegetation and fauna habitat,
- Site inductions that address all of the above.
- A site plan will be prepared that clearly identifies the location of:
 - Access tracks,
 - Washdown bays,

- Chemical storage,
- Refuelling,
- Waste storage,
- Stockpiles,
- Native vegetation removal and retention, and
- No-go zones.

16. References

- ACHRIS 2025, *Victorian Aboriginal Cultural Heritage Boundaries Map*, <https://achris.vic.gov.au/weave/wca.html>, accessed 7 December 2025.
- Adams A, Jantzen M, Hamilton R and Fenton M 2012, Do you hear what I hear? Implications of detector selection for acoustic monitoring of bats, *Methods in Ecology and Evolution*, 3(6):992–998, doi:10.1111/j.2041-210x.2012.00244.x.
- Adams MD, Law BS and French KO 2009, Vegetation structure influences the vertical stratification of open- and edge-space aerial-foraging bats in harvested forests, *Forest Ecology and Management*, 258(9):2090–2100, doi:10.1016/j.foreco.2009.08.002.
- Agranat I 2014, Detecting bats with ultrasonic microphones: Understanding the effects of microphone variance and placement on detection rates, *Internal Report, Wildlife Acoustics Inc., USA*.
- AIATSIS 1994, *AIATSIS Map of Indigenous Australia*, <https://aiatsis.gov.au/explore/map-indigenous-australia>, accessed 7 December 2025.
- ALA 2026, *Atlas of Living Australia*, <https://www.ala.org.au/>.
- Amber 2026, *Macorna Wind Farm: Preliminary Traffic Impact Assessment*, Prepared for Atmost Renewables Pty Ltd.
- ARI 2026, *Brolga Tracker*, <https://arisci.shinyapps.io/brolgaTracker/>, accessed 17 February 2026.
- Armstrong K, Broken-brow J, Hoyer G, Ford G, Thomas M and Corben C 2021, Effective detection and identification of sheath-tailed bats of Australian forests and woodlands, *Australian Journal of Zoology*, 68(6):346–363, doi:<https://doi.org/10.1071/Z020044>.
- Arnett EB, Hein CD, Schirmacher MR, Huso MMP and Szewczak JM 2013, Evaluating the effectiveness of an ultrasonic acoustic deterrent for reducing bat fatalities at wind turbines, *PLoS ONE*, 8(6):e65794.
- Arnol J, White D and Hastings I 1984, *Management of the Brolga (Grus rubicundus) in Victoria*, Department of Conservation, Forests and Lands, Victoria.
- Arnol JD, White DM and Hastings I 1984, *Management of the Brolga (Grus rubicundus) in Victoria*, Department of Conservation, Forests, East Melbourne.
- Australasian Bat Society 2026, *BatMap*, <https://www.ausbats.org.au/batmap.html>.
- Baerwald EF, D'Amours GH, Klug BJ and Barclay RMR 2008, Barotrauma is a significant cause of bat fatalities at wind turbines, *Current Biology*, 18(16):R695–R696, doi:10.1016/j.cub.2008.06.029.
- Baker A and Gynther I 2023, *Strahan's Mammals of Australia*, New Holland Publishers, Sydney.
- Baker-Gabb D 2014, Not happy wanderers, *Australian Birdlife*, June:6–7.
- Ballinger R 2008, *Gannawarra Shire Heritage Study Stage One: Volume One Thematic Environmental History*, History in the Making, Maldon, Victoria.

Barclay RMR 1999, Bats are Not Birds--a Cautionary Note on Using Echolocation Calls to Identify Bats: a comment, *Journal of Mammalogy*, 80(1):290–296, doi:10.2307/1383229.

Barré K, Froidevaux JSP, Sortillo A, Roemer C and Kerbiriou C 2023, Drivers of bat activity at wind turbines advocate for mitigating bat exposure using multicriteria algorithm-based curtailment, *Science of the Total Environment*, 866, doi:161404.
<https://doi.org/10.1016/j.scitotenv.2023.161404>.

Bernardino J, Bevanger K, Barrientos R, Dwyer JF, Marques AT, Martins RC, Shaw JM, Silva JP and Moreira F 2018, Bird collisions with power lines: State of the art and priority areas for research, *Biological Conservation*, 222:1–13, doi:10.1016/j.biocon.2018.02.029.

Biosis 2023, *Dundonnell Wind Farm: Year 2 annual report - bat and avifauna management plan implementation. Report for Tilt Renewables Australia Pty Ltd*, Melbourne,
<https://tiltwebsite.blob.core.windows.net/tiltwebsitecontainer/2025/07/DDWF-Year-2-BAM-Plan-Monitoring-Report.pdf>.

BirdLife Australia 2025, *Birddata*, Melbourne, <https://birddata.birdlife.org.au/about-birddata>.

BoM 2026, *Victoria in March, Maps*, Bureau of Meteorology, <http://www.bom.gov.au>, accessed 31 March 2026.

BOM 2026, *National monthly and seasonal climate summaries*,
<https://www.bom.gov.au/climate/current/>, accessed 10 February 2026.

Churchill Sue 2008, *Australian Bats*, Allen & Unwin, Australia.

Churchill S 2008, *Australian Bats*, Allen & Unwin, Crows Nest.

Clemann N and Gillespie G 2012, National Recovery Plan for the Southern Bell Frog *Litoria raniformis*, Department of Sustainability and Environment, East Melbourne, Victoria.

Clemann N and Swan M 2023, *Frogs of Victoria: A Guide to Identification, Ecology and Conservation*, CSIRO Publishing, Melbourne.

Clemens R, Rogers DI, Hansen BD, Gosbell K, Minton CDT, Straw P, Bamford M, Woehler EJ, Milton DA, Weston MA, Venables B, Wellet D, Hassell C, Rutherford B, Onton K, Herrod A, Studds CE, Choi C-Y, Dhanjal-Adams KL, Murray NJ, Skilleter GA and Fuller RA 2016, Continental-scale decreases in shorebird populations in Australia, *Emu - Austral Ornithology*, 116(2):119–135, doi:10.1071/MU15056.

Cooper C and Walters J 2002a, Effects of remnant size and connectivity on the response of Brown Treecreepers to habitat fragmentation, *Emu - Austral Ornithology*, 102(3):249–256.

Cooper C and Walters J 2002b, Experimental evidence of disrupted dispersal causing decline of an Australian passerine in fragmented habitat, *Conservation Biology*, 16(2):471–478.

Cornell Lab of Ornithology 2026, *eBird. An online database of bird distribution and abundance*, eBird, Cornell Lab of Ornithology, Ithaca, New York, <http://www.ebird.org>.

Costermans L and Vanden Berg A 2022, *Stories Beneath Our Feet - Exploring the Geology and Landscapes of Victoria and Surrounds*, Costermans Publishing, Frankston, Victoria.

- DCCEEW 2022, *National Recovery Plan for the Australian Painted Snipe Rostratula australis*, Department of Climate Change, Energy, the Environment and Water, Canberra, <https://www.dcceew.gov.au/sites/default/files/documents/national-recovery-plan-australian-painted-snipe-2022.pdf>.
- DCCEEW 2023a, Conservation Advice for the Buloke Woodlands of the Riverina and Murray-Darling Depression Bioregions, *Department of Climate Change, Energy, the Environment and Water, Canberra*, <https://www.environment.gov.au/biodiversity/threatened/communities/pubs/3-conservation-advice.pdf>.
- DCCEEW 2023b, *Conservation advice for Neophema chrysostoma (blue-winged parrot)*, Department of Climate Change, Energy, the Environment and Water, Canberra.
- DCCEEW 2023c, Conservation Advice for Climacteris picumnus victoriae (brown treecreeper (south-eastern)), <https://www.environment.gov.au/biodiversity/threatened/species/pubs/67062-conservation-advice-31032023.pdf>.
- DCCEEW 2024a, Onshore Wind Farm Guidance Best practice approaches when seeking approval under Australia's national environmental law, *Department of Climate Change, Energy, the Environment and Water, Canberra*.
- DCCEEW 2024b, *Conservation Advice for Litoria raniformis (southern bell frog)*, Australian Government, Canberra, Australia.
- DCCEEW 2025, Draft National Recovery Plan for the South-eastern Longeared Bat, Nyctophilus corbeni.
- DCCEEW 2026a, Directory of Important Wetlands in Australia, <https://www.dcceew.gov.au/water/wetlands/australian-wetlands-database/directory-important-wetlands>, accessed 18 March 2026.
- DCCEEW 2026b, *EPBC Act Protected Matters Search Tool*, Department of Climate Change, Energy, the Environment and Water, Canberra, <https://www.environment.gov.au/epbc/pmst/index.html>.
- DCE 2026a, *Additional Wetlands Investigations, Macorna Wind Farm*, Report prepared by Dalton Consulting Engineers (DCE).
- DCE 2026b, *Macorna Wind Farm: Hydrology and stormwater constraints investigation*.
- DCE 2026c, *Calivil Creek Wetlands Investigation, Macorna Wind Farm*, Report prepared by Dalton Consulting Engineers (DCE).
- DCE 2026d, *Hydrology and Stormwater Constraints Investigation, Macorna Wind Farm*, Report prepared by Dalton Consulting Engineers (DCE).
- Debus D, McRitchie B and Debus S 2025, Fledgling productivity and breeding parameters of the Black Falcon Falco subniger in southern Victoria, 2014–2024, *Australian Field Ornithology*, 42:17–23.
- Debus S 2014, Black Falcons and collisions, *Boobook*, 32(15), <https://ausraptorgroup.org/>.

Debus S 2019, *A Field Guide Birds of Prey Australia*, CSIRO Publishing.

Debus S 2022, *Australian Falcons: Ecology, Behaviour, and Conservation*, CSIRO Publishing, Melbourne.

Debus S, Bauer A and Mitchell G 2017, Breeding biology, behaviour and foraging ecology of the Black Falcon *Falco subniger* near Tamworth, New South Wales, *Corella*, 41:71–82.

DEE 2017, *EPBC Act Policy Statement 3.21 - Industry guidelines for avoiding, assessing and mitigating impacts on EPBC Act listed migratory shorebird species*, Department of Environment and Energy, Commonwealth of Australia, Canberra, <https://www.dcceew.gov.au/sites/default/files/documents/bio4190517-shorebirds-guidelines.pdf>.

DEECA 2023, *Earth Resources - GeoVic - Explore Victoria Online*.

DEECA 2024a, *Flora and Fauna Guarantee Act 1988 – Declared Protected Flora List, May 2024*, Department of Energy, Environment and Climate Action, Melbourne.

DEECA 2024b, *Updated Species of Concern list for Victoria, relevant to onshore wind energy facilities*, Department of Climate Change, Energy, the Environment and Water, Melbourne.

DEECA 2025a, *Appendix 3: Species specific guidance for onshore wind energy facilities - Bat species of concern*, Department of Energy, Environment, and Climate Action, Melbourne, https://www.environment.vic.gov.au/__data/assets/pdf_file/0022/752080/Appendix-3-Guidance-for-Onshore-Wind-Energy-Facilities-Bat-Species-of-Concern.pdf.

DEECA 2025b, *Appendix 5: Guidance for developing Bat and Avifauna Management (BAM) Plans for Onshore Wind Energy Facilities*, Department of Energy, Environment, and Climate Action, Melbourne, https://www.environment.vic.gov.au/__data/assets/pdf_file/0020/752060/Appendix-5-Guidance-for-BAM-Plans-for-Onshore-Wind-Energy-Facilities.pdf.

DEECA 2025c, *Appendix 2: Species specific guidance for onshore wind energy facilities - Victorian Brolga*, Department of Energy, Environment, and Climate Action, Melbourne, https://www.environment.vic.gov.au/__data/assets/pdf_file/0024/752082/Appendix-2-Guidance-for-Onshore-Wind-Energy-Facilities-Victorian-Brolga.pdf.

DEECA 2025d, *Handbook for the development of renewable energy in Victoria*, Department of Energy, Environment, and Climate Action, Victoria.

DEECA 2025e, *Flora and Fauna Guarantee Act 1988 – Threatened List, September 2025*, Department of Energy, Environment and Climate Action, Melbourne.

DEECA 2025f, NatureKit, <https://www.environment.vic.gov.au/biodiversity/naturekit>.

DEECA 2025g, *Native Vegetation – Flora and Fauna Guarantee Act Listed Communities*, Department of Climate Change, Energy, the Environment and Water, Melbourne.

DEECA 2025h, *Appendix 1: Species of Concern List for Onshore Wind Energy Facilities*, Department of Energy, Environment, and Climate Action, Melbourne, https://www.environment.vic.gov.au/__data/assets/pdf_file/0028/752059/Appendix-1-Updated-Species-of-Concern-list.pdf.

DEECA 2025i, *Brolga breeding habitat suitability model*, Department of Energy, Environment and Climate Action, Melbourne,
https://www.ari.vic.gov.au/__data/assets/pdf_file/0018/751311/Brolga-habitat-suitability-model_2025_Summary-Report.pdf.

DEECA 2026a, NatureKit, <https://www.environment.vic.gov.au/biodiversity/naturekit>.

DEECA 2026b, *Victorian Wetland Inventory*, <https://metashare.maps.vic.gov.au/>.

DEECA 2026c, *MapShareVic*, <https://mapshare.vic.gov.au/mapsharevic/>.

DEECA 2026d, *Native Vegetation Regulation Map*, Department of Energy, Environment and Climate Action, Melbourne, <https://www.environment.vic.gov.au/native-vegetation/NVRMap>.

DEECA 2026e, *Victorian Biodiversity Atlas 3.2.8*, <https://vba.dse.vic.gov.au>.

DELWP 2017a, *Guidelines for the removal, destruction or lopping of native vegetation*, Department of Environment, Land, Water and Planning, now DEECA, Melbourne.

DELWP 2017b, *Native Vegetation Regulation Condition (2017) - 75 m resolution*, Department of Environment, Land, Water and Planning.

DELWP 2017c, *Growling Grass Frog Master Plan for Melbourne's Growth Corridors*, Melbourne Strategic Assessment, Department of Environment, Land, Water and Planning, East Melbourne.

DELWP 2017d, *Growling Grass Frog Habitat Design Standards*, Melbourne Strategic Assessment, Department of Environment, Land, Water and Planning, East Melbourne.

DELWP 2017e, *Growling Grass Frog Crossing Design Standards*, Melbourne Strategic Assessment, Department of Environment, Land, Water and Planning, East Melbourne.

DELWP 2018a, *Native Vegetation – Flora and Fauna Guarantee Act Listed Communities* (Resource Name: NV2005_FFG_COMM, dated 1 February 2018), Department of Environment, Land, Water and Planning, now Department of Energy, Environment and Climate Action (DEECA), Melbourne.

DELWP 2018b, *Assessor's Handbook – Applications to remove, destroy or lop native vegetation*, V1.1, Department of Environment, Land, Water and Planning, now Department of Energy, Environment and Climate Action (DEECA), Melbourne,
https://www.environment.vic.gov.au/__data/assets/pdf_file/0022/91255/Assessors-handbook-V1.2-June-2025Final.pdf.

DELWP 2019, *Ramsar Information Sheet: Site 265, Kerange Wetlands*, Department of Environment, Land, Water and Planning, Melbourne,
https://rsis.ramsar.org/RISapp/files/RISrep/AU265RIS_1907_en.pdf.

Department of the Environment 2013, *Matters of National Environmental Significance - Significant Impact Guidelines 1.1*, Australian Government, Canberra.

Department of the Environment 2015, *Wildlife Conservation Plan for Migratory Shorebirds*, Department of the Environment.

- DEPI 2013, *Kerang Wetlands Ramsar Site Boundary Description*, Department of Environment and Primary Industries, Melbourne,
https://www.water.vic.gov.au/__data/assets/pdf_file/0037/672796/Kerang_Wetlands_Boundary_Description_Dec2013.pdf.
- DEWHA 2009, *Significant Impact Guidelines for the Vulnerable Growling Grass Frog (Litoria raniformis)*, *Nationally threatened species and ecological communities guidelines*, EPBC Act Policy Statement 3.14, Department of Environment, Water, Heritage, and the Arts, Canberra.
- DEWHA 2010, *Survey Guidelines for Australia's Threatened Bats*, Department of the Environment, Water, Heritage and the Arts, Canberra.
- DoE 2013, *Species Profile and Threats Database: Nyctophilus corbeni – Corben's Long-eared Bat, South-Eastern Long-eared Bat*,
http://apps.internal.environment.gov.au/cgi-bin/sprat/intranet/showspecies.pl?taxon_id=83395.
- DoE 2016, *National Recovery Plan for the Plains-wanderer (Pedionomus torquatus)*, Department of Environment, Canberra,
<https://www.dcceew.gov.au/sites/default/files/documents/national-recovery-plan-plains-wanderer.pdf>.
- DPHI 2026, *Cumulative Impact Assessment Guidelines for state significant Projects*,
<https://www.planning.nsw.gov.au/sites/default/files/2023-03/cumulative-impact-assessment-guidelines-for-ssp.pdf>.
- Drewitt A and Langston R 2006, Assessing the impacts of windfarms on birds, *Ibis*, 148:29–42.
- Driessen J, Kidd L, Weller D, Purnell C, Maguire G, Jaensch R and LeClair S 2025, *Australian National Directory of Important Migratory Shorebird Habitat*, BirdLife Australia, Melbourne.
- DSE 2003, *Flora and Fauna Guarantee Action Statement: Inland Carpet Python (Morelia spilota metcalfei)*, *Department of Sustainability and Environment, East Melbourne*.
- DSE 2004a, *Ecological Vegetation Class (EVC) Benchmarks by Bioregion*, *Department of Sustainability and Environment (DSE), now Department of Energy, Environment and Climate Action (DEECA), Melbourne*.
- DSE 2004b, *Native Vegetation: sustaining a living landscape, Vegetation Quality Assessment Manual – guidelines for applying the Habitat Hectare scoring method (Version 1.3)*, *Department of Sustainability and Environment (DSE), now Department of Energy, Environment and Climate Action (DEECA), Melbourne*.
- DSE 2012, *Interim Guidelines for the Assessment, Avoidance, Mitigation and Offsetting of Potential Wind Farm Impacts on the Victorian Brolga Population 2011*, Department of Sustainability and Environment, Melbourne., https://www.swift.net.au/resources/Brolga-Guidelines_2011_Final_online-v2.pdf.
- DSEWPac 2011, *Kerang Wetlands Ramsar Site: Ecological Character Description*, Department of Sustainability, Environment, Water, Population and Communities, Canberra.

DTP 2023a, Planning Guidelines for the Development of Wind Energy Facilities, *Department of Transport and Planning, East Melbourne*.

DTP 2023b, Ministerial Guidelines for Assessment of Environmental Effects under the Environmental Effects Act 1978, *Department of Transport and Planning (DTP), Melbourne*.

Du Guesclin P 2003, *Action Statement No 119: Brolga Antigone rubicunda*, Department of Sustainability, Environment, Victoria.

EAAFP 2025, *East Asian - Australasian Flyway Network*, <https://eaaflyway.net/the-flyway/>, accessed 10 February 2026.

Ecology and Heritage Partners 2025, *Migratory Shorebird Surveys for the proposed Macorna Wind Farm, Macorna, Victoria*.

EGA Energy Grid Alliance 2022, Best Practice Approach for Protection of Wedge-tailed Eagles in Electricity Transmission Infrastructure Development, *Energy Grid Alliance, Australia*.

EHP 2024, *Preliminary Ecological and Cultural Heritage Assessment for the proposed Macorna Wind Farm: Macorna, Victoria*, consultant report prepared for WindFarmers Pty Ltd, Ecology and Heritage Partners Pty Ltd, Melbourne.

EHP 2025a, *Preliminary native vegetation assessment within set-back areas for the proposed Macorna Wind Farm, Macorna, Victoria*, consultant report prepared for WindFarmers Pty Ltd, Ecology and Heritage Partners Pty Ltd, Melbourne.

EHP 2025b, *Brolga Roaming Surveys and Habitat Assessments: Macorna Wind Farm*, Ecology and Heritage Partners Pty Ltd, Melbourne.

EHP 2025c, *Migratory Shorebird Surveys for the proposed Macorna Wind Farm*, Ecology and Heritage Partners Pty Ltd, Melbourne.

Erickson JL and West SD 2002, The influence of regional climate and nightly weather conditions on activity patterns of insectivorous bats, *Acta Chiropterologica*, 4(1):17–24.

Fenton MB 2013, Questions, ideas and tools: lessons from bat echolocation, *Animal Behaviour*, 85(5):869–879, doi:10.1016/j.anbehav.2013.02.024.

Fraser E, Silvis A, Brigham R and Czenze Z 2020, *Bat Echolocation Research: A Handbook for Planning and Conducting Acoustic Studies (2nd ed.)*, Bat Conservation International, Austin, Texas, USA.

Fullard J, Koehler C, Surlykke A and McKenzie N 1991, Echolocation ecology and flight morphology of insectivorous bats (Chiroptera) in south-western Australia, *Australian Journal of Zoology*, 39(4):427–438, doi:10.1071/Z09910427.

Gannawarra Shire Council 2010, *Gannawarra 2025, Strategic Community Plan*, McKinna et al Consulting, Albert Park, Victoria.

Garnett S and Baker GB 2020, *The action plan for Australian Birds 2020*, CSIRO Publishing, Clayton South VIC, Australia.

Geering A, Agnew L and Harding S 2007, *Shorebirds of Australia*, CSIRO Publishing, Victoria.

- Goerlitz HR 2018, Weather conditions determine attenuation and speed of sound: Environmental limitations for monitoring and analyzing bat echolocation, *Ecology and Evolution*, 8(10):5090–5100.
- Goldstraw P and Du Guesclin P 1991, Bird casualties from collisions with a 500 kv transmission line in southwestern Victoria, Australia, in *Proceedings from the 1987 International Crane Workshop*.
- Gonsalves L, Law B, Barssil T, O'Loughlin C and Kerr I 2024, Miniature GPS tags reveal extensive movements by a threatened narrow-space bat and highlight sensitivity to forest clearing, *Austral Ecology*, 49:e70012.
- Goodship N and Furness R 2022, Disturbance Distances Review: An updated literature review of disturbance distances of selected bird species, *NatureScot Research Report 1283*.
- Griffiths SR, Lumsden LF, Robert KA and Lentini PE 2020, Nest boxes do not cause a shift in bat community composition in an urbanised landscape, *Scientific Reports*, 10(1), doi:10.1038/s41598-020-63003-w.
- Hall LS and Richards GC 2023, Yellow-bellied Sheath-tail Bat *Saccolaimus flaviventris* (Peters, 1867), in *Strahan's Mammals of Australia*, Reed New Holland Publishers, NSW, Australia.
- Hayes J 2000, Assumptions and practical considerations in the design and interpretation of echolocation-monitoring studies, *Acta Chiropterologica*, 2:225–236.
- Heard G and Scroggie M 2010, *Guidelines for managing the endangered Growling Grass Frog in urbanising landscapes*, Arthur Rylah Institute for Environmental Research.
- Heard GW, Scroggie MP and Malone BS 2012, Classical metapopulation theory as a useful paradigm for the conservation of an endangered amphibian, *Biological Conservation*, 148(1):156–166, doi:10.1016/j.biocon.2012.01.018.
- Herring M 2005, *Threatened Species and Farming Brolga: Management of breeding wetlands in Northern Victoria*, Arthur Rylah Institute, Heidelberg.
- Herring M 2018, *Brolga breeding habitat: a guide to managing wetlands on your farm*, 2nd Edition, Corowa District Landcare Inc., New South Wales, <https://www.murraywildlife.com.au/wp-content/uploads/2018/09/Brolga-Breeding-Habitat-FINAL.pdf>.
- Herring M 2018, *Brolga breeding habitat: a guide to managing wetlands on your farm*, 2nd Edition, Corowa District Landcare Inc., NSW.
- Herring MW, Robinson WA, Zander KK and Garnett ST 2021, Increasing water-use efficiency in rice fields threatens an endangered waterbird, *Agriculture, Ecosystems & Environment*, 322:107638, doi:10.1016/j.agee.2021.107638.
- Higgins P (ed) 1999, *Handbook of Australian, New Zealand and Antarctic birds, volume 4: Parrots to dollarbird*, Oxford University Press, Melbourne.
- Higgins P and Davies S 1996, *Handbook of Australian, New Zealand and Antarctic birds, volume 3: Snipe to pigeon*, Oxford University Press, Melbourne.

- Jenkins A, Smallie M and Diamond M 2010, Avian collisions with power lines: a global review of causes and mitigation with a South African perspective, *Bird Conservation International*, 20(3):263–278.
- Johnsgaard P 1983, *Cranes of the World*, Indiana University Press.
- Kushland J and Hancock J 2005, *The Herons*, Oxford University Press, Oxford.
- Lo Cascio A, Kasel S and Ford G 2022, A new method employing species-specific thresholding identifies acoustically overlapping bats, *Ecosphere*, 13(11):e4278, doi:e4278. <https://doi.org/10.1002/ecs2.4278>.
- Lugg A 1989, *Waterbirds of the wetlands in the Kerang Lakes area – Report No. 4 to the Kerang Lakes Working Group*, Department of Conservation, Forests, and Lands, Bendigo.
- Lumsden L, Moloney P and Smales I 2019, Developing a science-based approach to defining key species of birds and bats of concern for wind farm developments in Victoria, *Arthur Rylah Institute for Environmental Research*, Technical Report Series No. 301, https://www.ari.vic.gov.au/__data/assets/pdf_file/0015/435300/ARI-Technical-Report-301-Developing-a-science-based-approach-to-defining-key-species-of-concern-for-wind-farm-developments.pdf.
- Marchant S and Higgins P 1990, *Handbook of Australian, New Zealand and Antarctic Birds, Volume 1: Ratites to Ducks*, Oxford University Press, Melbourne, Victoria.
- Marchant S and Higgins P 1993, *Handbook of Australian, New Zealand and Antarctic Birds, Volume 2: Raptors to Lapwings*, Oxford University Press, Melbourne, Victoria.
- Melville DS, Chen Y and Ma Z 2016, Shorebirds along the Yellow Sea coast of China face an uncertain future—a review of threats, *Emu - Austral Ornithology*, 116(2):100–110, doi:10.1071/MU15045.
- Menkhorst P 1996, *Mammals of Victoria*, Oxford University Press, Melbourne, Australia.
- Menkhorst P, Rogers D, Clarke R, Davies J, Marsack P and Franklin K 2017, *The Australian Bird Guide*, CSIRO Publishing, Clayton South, Victoria.
- Miller A 2016, *The development of microsatellite loci through next generation sequencing, and a preliminary assessment of population genetic structure for the iconic Australian crane, Brolga (Antigone rubicunda)*, Nature Glenelg Trust, Warrnambool, Victoria.
- Mills DJ, Norton TW, Parnaby HE, Cunningham RB and Nix HA 1996, Designing surveys for microchiropteran bats in complex forest landscapes—a pilot study for south-east Australia, *Forest Ecology and Management*, 85:149–161.
- Milne D 2002, Key to the bat calls of the top end of the Northern Territory, Technical Report 71, *Parks and Wildlife Commission of the Northern Territory, Darwin*.
- Milne DJ, Fisher A, Rainey I and Pavey CR 2005, Temporal patterns of bats in the Top End of the Northern Territory, Australia, *Journal of Mammalogy*, 86(5):909–920.
- Moloney S, Lumsden L and Smales I 2019, *Investigation of existing post-construction mortality monitoring at Victorian wind farms to assess its utility in estimating mortality rates*, Department of Environment, Land, Water and Planning (Vic).

- Moss CF and Surlykke A 2001, Auditory scene analysis by echolocation in bats, *The Journal of the Acoustical Society of America*, 110(4):2207–2226.
- Myers A 2001, *Factors influencing the nesting success of brolgas, Grus rubicundra in Western Victoria*, Deakin University, Burwood.
- Nature Advisory 2024, Patterns of microbat mortality at Australian wind farms: insights from two decades of post construction monitoring, *Ecological Society of Australia Conference*, Melbourne.
- Nature Advisory 2025, *Macorna Wind Farm: Likelihood of occurrence and Initial Risk Assessment - Report No. 24129.02 (2.0)*, consultant report prepared for Cogency Pty Ltd, Nature Advisory Pty Ltd, Hawthorn East.
- Nature Advisory unpublished mortality data, Carcass search data 2004-2024.
- Nearmap 2026, *Macorna, VIC and surrounds*, www.nearmap.com.
- NSW Office of Environment and Heritage 2021, *Threatened Species Profile Database - Yellow-bellied Sheath-tailed Bat Saccoleimus falviventris*.
- Nugent D, Baker-Gabb D, Green P, Ostendorf B, Dawlings F, Clarke R and Morgan J 2022, Multi-scale habitat selection by a cryptic, critically endangered grassland bird—The Plains-wanderer (*Pedionomus torquatus*): Implications for habitat management and conservation, *Austral Ecology*, 47(3):698–712, doi:10.1111/aec.13157.
- Parker D and Oliver D 2006, *Plains-wanderer habitat management guide. A photographic guide for visually assessing the grassland structure of Plains-wanderer habitat. 2nd edition*, Department of Environment and Conservation.
- Parkes D, Newell G and Cheal D 2003, Assessing the quality of native vegetation: The ‘habitat hectares’ approach, *Ecological Management and Restoration*, 4(s1):29–38.
- Parris KM and Hinze B 2021, *Impacts of urban noise on acoustic communication in the growling grass frog Litoria raniformis across Greater Melbourne: A preliminary assessment*, Clean Air and Urban Landscapes Hub.
- Pennay M, Law B and Reinhold L 2004, *Bat Calls of New South Wales: Region based guide to the echolocation calls of microchiropteran bats*, Department of Environment and Conservation (NSW).
- R Core Team 2026, *A Language and Environment for Statistical Computing. R Foundation for Statistical Computing, Vienna, Austria, R Foundation for Statistical Computing, Vienna, Austria*, <https://www.R-project.org/>.
- Rakali Ecological Consulting 2021a, *Report on Curlew sandpiper and other shorebirds within the Kerang Wetlands Ramsar Site, November 2020 to April 2021*.
- Rakali Ecological Consulting 2021b, *Report on Curlew sandpiper and other shorebirds within the Kerang Wetlands Ramsar Site, November 2020 to April 2021*.
- Rakali Ecological Consulting 2022, *Report on Curlew sandpiper and other shorebirds within the Kerang Wetlands Ramsar Site, November 2021 to April 2022*.

- Rakali Ecological Consulting 2023a, *Report on the Curlew sandpiper and other shorebirds within the Kerang Wetlands Ramsar Site, September 2022 to April 2023.*
- Rakali Ecological Consulting 2023b, *Report on the Curlew sandpiper and other shorebirds within the Kerang Wetlands Ramsar Site, September 2022 to April 2023.*
- Rakali Ecological Consulting 2024a, *Report on the curlew sandpiper and other shorebirds within the Kerang Wetlands Ramsar Site, October 2023 to May 2024.*
- Rakali Ecological Consulting 2024b, *Report on the curlew sandpiper and other shorebirds within the Kerang Wetlands Ramsar Site, October 2023 to May 2024.*
- Rakali Ecological Consulting 2025a, *Interim Report: Survey of the Curlew Sandpiper and other Shorebirds in the Kerang Wetlands Ramsar Site October 2024 to March 2025.*
- Rakali Ecological Consulting 2025b, *Interim Report: Survey of the Curlew Sandpiper and other Shorebirds in the Kerang Wetlands Ramsar Site October 2024 to March 2025.*
- Rakali Ecological Consulting 2022, *Report on Curlew sandpiper and other shorebirds within the Kerang Wetlands Ramsar Site, November 2021 to April 2022.*
- Regan R, Bruce M, van Harten E and Lumsden L 2025, Estimating the potential effectiveness of wind farm mitigations using structured expert elicitation - Arthur Rylah Institute for Environmental Research Technical Report Series No. 394, https://www.ari.vic.gov.au/__data/assets/pdf_file/0022/751315/ARI-Technical-Report-394-Estimating-the-potential-effectiveness-of-wind-farm-mitigations-using-structured-expert-elicitation.pdf.
- Reid K, Baker GB and Woehler EJ 2023, An ecological risk assessment for the impacts of offshore wind farms on birds in Australia, *Austral Ecology*, 48(2):418–439, doi:10.1111/aec.13278.
- Reinhold L, Law B, Ford G and Pennay M 2001, *Key to the bat calls of south-east Queensland and north-east New South Wales*, Department of Natural Resources and Mines, Queensland. NRIM Job 16730, QNRM1001, March 2001.
- Rhodes M 2002, Assessment of variance sources in microchiropteran wing morphology in southeast Queensland, *Canadian Journal of Zoology*, 80(3):450–460.
- Rogers DI, Stamation K, Loyn RH and Menkhorst P 2015, Literature Review: Management of Non-Tidal Ponds for Shorebirds.
- Rollins KE, Meyerholz DK, Johnson GD, Capparella AP and Loew SS 2012, A forensic investigation into the etiology of bat mortality at a wind farm: barotrauma or traumatic injury?, *Veterinary Pathology*, 49(2):362–371, doi:10.1177/0300985812436745.
- Runkel V, Gerdin G and Marckmann U 2021, *The Handbook of Acoustic Bat Detection*, Pelagic Publishing, Exter, UK.
- Russo D, Ancillotto L and Jones G 2018, Bats are still not birds in the digital era: echolocation call variation and why it matters for bat species identification, *Canadian Journal of Zoology*, 96(2):63–78.

- SAC 2000, Final recommendation on a nomination for listing: Victorian Temperate Woodland Bird Community, *Flora and Fauna Guarantee - Scientific Advisory Group*, https://www.environment.vic.gov.au/___data/assets/pdf_file/0030/587424/Nom512_Victorian_Temperate_Woodland_Bird_Community_FRR.pdf.
- SAC 2002, Final recommendation on a nomination for listing: Victorian Mallee bird community, *Flora and Fauna Guarantee - Scientific Advisory Group*.
- SAC 2015, *Flora and Fauna Guarantee Act 1988 – Threatened List: Characteristics of Threatened Communities*, Scientific Advisory Committee (SAC), Department of Energy, Environment and Climate Action, Melbourne.
- Schnitzler H and Kalko EKV 2001, Echolocation by insect-eating bats, *Bioscience*, 51(7):557–569.
- Sheldon R 2005, Breeding and flocking: comparison of seasonal wetland habitat use by the brolga *Grus rubicunda* in south-western Victoria, *Australian Field Ornithology*, 22:5–11.
- Smales I 2006, Wind farm collision risk for birds: cumulative risks for threatened and migratory species. Report to Australian Government Department of the Environment and Heritage, *Biosis Research Pty. Ltd.*
- Stone T and Cupper M 2003, Last Glacial Maximum Ages for Robust Humans at Kow Swamp, Southern Australia, *Journal of Human Evolution*, 45:99–111.
- SWIFFT 2025, *State-wide Integrated Flora and Fauna Teams - Brolga*, *State Wide Integrated Flora and Fauna Teams*, https://www.swiff.net.au/cb_pages/sp_brolga.php.
- van Swinderen L, Hansen BD, Fuller RA, Rogers DI, Clemens RS, Newman M, Woehler EJ, Weller DR and LeClair S 2025, *Revision of the East Asian-Australasian Flyway Population Estimates for 37 listed Migratory Shorebird Species*.
- Symbolix 2020, *Post construction bird and bat monitoring at wind farms in Victoria*, prepared for 13th Wind Wildlife Research Meeting 2020.
- Thompson B, Churchill S and Lo Casio A 2024, *Australian Bats Field Guide*, Mobile App.
- TSSC 2006, *Commonwealth Listing Advice on White Box-Yellow Box-Blakely's Red Gum Grassy Woodland and Derived Native Grassland*, Threatened Scientific Species Committee, Commonwealth of Australia, Canberra.
- TSSC 2010, *Commonwealth Listing Advice on Grey Box (Eucalyptus microcarpa) Grassy Woodlands and Derived Native Grasslands of South-eastern Australia*, Department of the Environment, Water, Heritage and the Arts, Canberra, <https://www.environment.gov.au/biodiversity/threatened/communities/pubs/86-listing-advice.pdf>.
- TSSC 2012, *Approved Conservation Advice for Natural Grasslands of the Murray Valley Plains ecological community*, Threatened Scientific Species Committee Established under the Environment Protection and Biodiversity Conservation Act 1999, Canberra.
- TSSC 2020, *Conservation Advice for the Plains Mallee Box Woodlands of the Murray Darling Depression, Riverina and Naracoorte Coastal Plain Bioregions*, Threatened Scientific

Species Committee Established under the Environment Protection and Biodiversity Conservation Act 1999, Canberra.

TSSC 2021, *Conservation Advice for the Mallee Bird Community of the Murray Darling Depression Bioregion*, Threatened Scientific Species Committee Established under the Environment Protection and Biodiversity Conservation Act 1999, Canberra.

Van Harten E, Stevenson S, Stamation K, Mazor T, Macak P, Lentini P, Veltheim I, Rogers D, Griffiths S and Lumsden L 2026, *Review of effectiveness of onshore and offshore wind farm collision risk avoidance and mitigation measures*, Arthur Rylah Institute for Environmental Research report for the Department of Climate Change, Energy, the Environment and Water.

Veltheim, I 2018, *Movements, behaviour and ecology of the brolga, Antigone rubicunda, at multiple spatial and temporal scales* [PhD], Federation University, Ballarat.

Veltheim I, Cook S, McCarthy M, Palmer G and Hill F 2022, Partial migration of Brolgas (*Antigone rubicunda*) within a restricted range is revealed by GPS tracking, *Emu - Austral Ornithology*, 122(1):39–50.

Veltheim I, Cook S, Palmer G, Hill FAR and McCarthy M 2019, Breeding home range movements of pre-fledged brolga chicks, *Antigone rubicunda* (Gruidae) in Victoria, Australia – Implications for wind farm planning and conservation, *Global Ecology and Conservation*, 20:e00703, doi:<https://doi.org/10.1016/j.gecco.2019.e00703>.

Veltheim I and Sundar KSG 2019, Species Review: Brolga (*Grus rubicunda*), in *Crane Conservation Strategy*, International Crane Foundation, Wisconsin, USA, https://savingcranes.org/wp-content/uploads/2024/10/crane_conservation_strategy_brolga.pdf.

Victorian Places 2015, *Macorna*, <https://www.victorianplaces.com.au/macorna>, accessed 7 December 2025.

Watts BD, Smith FM, Hines C, Duval L, Hamilton DJ, Keyes T, Paquet J, Pirie-Dominix L, Rausch J, Truitt B, Winn B and Woodard P 2021, The costs of using night roosts for migrating whimbrels, *Journal of Avian Biology*, 52(1), doi:10.1111/jav.02629.

Whitby MD, Teague O'Mara M, Hein CD, Huso MMP and Frick WF 2024, A decade of curtailment studies demonstrates a consistent and effective strategy to reduce bat fatalities at wind turbines in North America, *Ecological Solutions and Evidence*, 5(3):e12371, doi:<https://doi.org/10.1002/2688-8319.12371>.

Williams E 2024, Conservation management of the critically endangered matuku-hurepo/Australasian bittern, *Science for Conservation*, 341.

Wood M 2014, *Utilisation of habitat by Brolga (Grus rubicunda) within the vicinity of the Macarthur Wind Farm – 2014*, AGL Energy Limited.

Wood M 2017, *Utilisation of habitat by Brolga (Grus rubicundra) within the vicinity of the Macarthur Wind Farm during the breeding season of 2016*, AGL Energy Limited.

Appendix 1: Detailed habitat hectare assessment results

Habitat Zone			1AA	1AB	1AC	1AD	1AE	1AF	1AG	1AH	1AI	1AJ	1AK	1AL	1AM	1AN	1AO
Bioregion			Vriv	Vriv	Vriv	Vriv	Vriv	Vriv	Vriv	Vriv	Vriv	Vriv	Vriv	Vriv	Vriv	Vriv	Vriv
EVC Number			132	104	829	829	829	829	829	829	829	132	829	132	132	132	132
Total area of Habitat Zone (ha)			7.724	0.842	0.602	0.02	0.031	0.536	0.48	16.85	0.275	8.846	10.06	0.051	0.037	0.113	0.052
Site Condition	Large 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	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	N/A	N/A
	Lack of Weeds	/15	0	6	4	0	0	0	0	0	0	0	4	0	0	7	0
	Understorey	/25	5	5	15	5	5	5	5	5	5	5	5	5	5	5	5
	Recruitment	/10	6	10	6	5	5	6	6	6	6	6	3	6	6	6	6
	Organic Litter	/5	4	3	3	2	2	2	2	2	2	4	2	2	2	5	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	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	1.36
	Site Condition subtotal		20	33	38	16	16	18	18	18	18	20	19	18	18	31	18
Landscape Context	Patch Size	/10	6	6	6	1	1	1	1	1	1	4	6	1	1	1	1
	Neighbourhood	/10	0	2	1	1	1	1	1	1	1	2	3	3	3	3	3
	Distance to Core	/5	0	0	0	0	0	0	0	0	0	0	3	1	1	1	1
Total Condition Score			/100	26	41	45	18	18	20	20	20	26	31	23	23	36	23

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

Habitat Zone			1AP	1AQ	1AR	1AS	1AT	1AU	1AV	1AW	1AX	1AY	1AZ	1BA	1BB	1BC
Bioregion			Vriv	Vriv	Vriv	Vriv	Vriv	Vriv	Vriv	Vriv	Vriv	Vriv	Vriv	Vriv	Vriv	Vriv
EVC Number			132	132	132	104	829	132	132	829	104	829	132	103	132	132
Total area of Habitat Zone (ha)			1,606	37,86	28,2	13,27	7,743	0,334	0,27	10,64	0,917	1,101	3,244	0,034	0,077	0,009
Site Condition	Large Trees	/10	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	10	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	3	N/A	N/A
	Lack of Weeds	/15	0	0	0	0	4	0	0	4	4	0	2	0	0	0
	Understorey	/25	5	15	15	5	15	5	5	5	15	5	5	5	5	5
	Recruitment	/10	6	6	6	6	6	6	6	6	0	5	3	0	3	10
	Organic Litter	/5	4	2	2	3	2	4	4	2	5	2	4	3	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	4	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	1,00	1,36	1,36
	Site Condition subtotal		20	31	31	19	37	20	20	23	33	16	19	25	14	23
Landscape Context	Patch Size	/10	8	8	8	6	8	1	1	4	1	1	2	1	1	1
	Neighbourhood	/10	1	3	3	3	3	0	0	3	1	1	3	1	0	0
	Distance to Core	/5	0	1	1	1	3	1	1	3	3	3	0	3	3	3
Total Condition Score			/100	29	43	43	29	51	22	22	33	38	21	24	30	27

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



Habitat Zone			1BD	1BE	1BF	1BG	1BH	1BI	1BJ	1BK	1BL	1BM	1BN
Bioregion			Vriv	Vriv	Vriv	Vriv	Vriv	Vriv	Vriv	Vriv	Vriv	Vriv	Vriv
EVC Number			132	104	104	132	829	829	132	132	132	132	103
Total area of Habitat Zone (ha)			0.269	0.092	0.221	0.201	0.795	0.522	0.021	0.029	0.495	11.014	0.426
Site Condition	Large Trees	/10	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0
	Tree Canopy Cover	/5	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0
	Lack of Weeds	/15	0	9	9	0	4	6	0	0	0	0	2
	Understorey	/25	5	5	5	5	10	10	5	5	5	5	5
	Recruitment	/10	6	6	6	6	6	6	10	10	10	6	0
	Organic Litter	/5	4	3	3	4	2	3	2	2	2	2	2
	Logs	/5	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0
	Site condition standardising multiplier*		1.36	1.36	1.36	1.36	1.36	1.36	1.36	1.36	1.36	1.36	1.00
	Site Condition subtotal		20	31	31	20	30	34	23	23	23	18	9
Landscape Context	Patch Size	/10	1	1	1	1	2	1	1	1	1	6	4
	Neighbourhood	/10	0	0	0	0	0	0	0	0	0	3	0
	Distance to Core	/5	3	1	1	1	3	3	1	1	1	1	0
Total Condition Score		/100	24	33	33	22	35	38	25	25	25	28	13

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



Habitat Zone			1B0	1BP	1BQ	1BR	1BS	1BT	1BU	1BV	1BW	1BX	1BY
Bioregion			Vriv	Vriv	Vriv	Vriv	Vriv	Vriv	Vriv	Vriv	Vriv	Vriv	Vriv
EVC Number			103	132	132	104	104	104	104	132	829	829	829
Total area of Habitat Zone (ha)			1.916	6.745	2.645	0.028	0.053	0.049	1.678	7.413	0.085	0.086	0.672
Site Condition	Large 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	6	4	0	7	7	7	0	0	2	7	2
	Understorey	/25	15	10	5	5	5	5	0	5	5	5	5
	Recruitment	/10	6	10	10	0	0	0	6	6	1	0	0
	Organic Litter	/5	4	5	4	5	5	5	3	5	2	3	2
	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*		1.00	1.36	1.36	1.36	1.36	1.36	1.36	1.36	1.36	1.36	1.36
	Site Condition subtotal		31	40	26	23	23	23	12	22	14	20	12
Landscape Context	Patch Size	/10	4	4	4	1	1	1	4	8	1	1	1
	Neighbourhood	/10	3	3	3	0	0	0	0	3	0	0	0
	Distance to Core	/5	0	0	1	1	1	1	0	1	1	1	1
Total Condition Score		/100	38	47	34	25	25	25	16	34	16	22	14

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



Habitat Zone			1BZ	1CA	1CB	1CC	1CD	1CE	1CF	1CG	1CH	1CI	1CJ
Bioregion			Vriv	Vriv	Vriv	Vriv	Vriv	Vriv	Vriv	Vriv	Vriv	Vriv	Vriv
EVC Number			829	829	829	103	103	132	132	132	132	132	132
Total area of Habitat Zone (ha)			0.05	0.176	0.184	0.069	0.163	0.067	0.188	0.04	0.054	0.214	0.439
Site Condition	Large Trees	/10	N/A	N/A	N/A	9	10	N/A	N/A	N/A	N/A	N/A	N/A
	Tree Canopy Cover	/5	N/A	N/A	N/A	2	5	N/A	N/A	N/A	N/A	N/A	N/A
	Lack of Weeds	/15	6	0	6	0	6	6	6	6	6	6	6
	Understorey	/25	5	5	5	10	15	5	5	5	5	5	5
	Recruitment	/10	0	1	3	0	3	6	6	6	6	6	3
	Organic Litter	/5	3	3	2	3	3	2	2	2	2	2	3
	Logs	/5	N/A	N/A	N/A	5	0	N/A	N/A	N/A	N/A	N/A	N/A
	Site condition standardising multiplier*		1.36	1.36	1.36	1.00	1.00	1.36	1.36	1.36	1.36	1.36	1.36
	Site Condition subtotal		19	12	22	29	42	26	26	26	26	26	23
Landscape Context	Patch Size	/10	1	2	2	1	1	1	1	1	1	4	1
	Neighbourhood	/10	0	0	0	0	0	0	0	0	0	1	1
	Distance to Core	/5	1	1	1	3	3	1	1	1	1	1	1
Total Condition Score			/100	21	15	25	33	46	28	28	28	32	26

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



Habitat Zone			1CK	1CL	1CM	1CN	1CO	1CP	1CQ	1CR	1CS	1CT	1CU
Bioregion			Vriv	Vriv	Vriv	Vriv	Vriv	Vriv	Vriv	Vriv	Vriv	Vriv	Vriv
EVC Number			132	132	132	829	132	829	132	829	829	829	829
Total area of Habitat Zone (ha)			2.12	5.229	12.127	0.657	0.159	0.307	0.151	0.999	0.307	0.088	0.083
Site Condition	Large Trees	/10	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
	Lack of Weeds	/15	6	6	2	6	2	6	2	2	7	7	7
	Understorey	/25	5	5	5	10	5	10	5	5	5	5	5
	Recruitment	/10	3	6	3	6	6	6	6	0	0	0	0
	Organic Litter	/5	3	5	4	3	4	3	4	2	3	3	3
	Logs	/5	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
	Site Condition subtotal		23	30	19	34	23	34	23	12	20	20	20
Landscape Context	Patch Size	/10	2	8	8	8	1	8	2	1	1	1	1
	Neighbourhood	/10	1	2	3	3	1	3	3	0	2	2	2
	Distance to Core	/5	1	1	1	1	1	1	1	1	1	1	1
Total Condition Score			/100	27	41	31	46	26	46	29	14	24	24

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



Habitat Zone			1CV	1CW	1CX	1CY	1CZ	1DA	1DB	1DC	1DD	1DE	1DF
Bioregion			Vriv	Vriv	Vriv	Vriv	Vriv	Vriv	Vriv	Vriv	Vriv	Vriv	Vriv
EVC Number			829	829	829	104	104	132	132	132	132	132	829
Total area of Habitat Zone (ha)			0,025	0,155	0,365	0,017	0,44	2,022	1,372	0,078	0,229	0,28	0,851
Site Condition	Large Trees	/10	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
	Lack of Weeds	/15	7	6	6	0	0	6	6	6	6	6	6
	Understorey	/25	5	5	5	5	5	5	5	5	5	5	5
	Recruitment	/10	0	3	3	10	10	3	6	6	3	3	0
	Organic Litter	/5	3	2	2	2	2	3	3	3	3	3	3
	Logs	/5	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
	Site Condition subtotal		20	22	22	23	23	23	27	27	23	23	19
Landscape Context	Patch Size	/10	1	1	1	1	1	1	1	1	1	1	1
	Neighbourhood	/10	2	3	3	1	1	1	0	0	1	1	0
	Distance to Core	/5	1	3	3	3	3	3	1	1	3	3	1
Total Condition Score			/100	24	29	29	28	28	29	29	28	28	21

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



Habitat Zone			1DG	1DH	1DI	1DJ	1DK	1DL	1DM	1DN	1DO	1DP	1DQ
Bioregion			Vriv	Vriv	Vriv	Vriv	Vriv	Vriv	Vriv	Vriv	Vriv	Vriv	Vriv
EVC Number			829	132	132	104	132	132	132	132	132	132	132
Total area of Habitat Zone (ha)			0.197	0.115	0.009	0.047	0.032	0.247	0.065	0.07	0.061	0.024	0.051
Site Condition	Large Trees	/10	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
	Lack of Weeds	/15	4	6	6	0	6	6	9	6	6	6	6
	Understorey	/25	5	5	5	5	5	5	5	5	5	5	5
	Recruitment	/10	0	6	6	10	0	6	6	6	6	6	6
	Organic Litter	/5	3	3	3	2	3	3	3	3	3	3	3
	Logs	/5	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
	Site Condition subtotal		16	27	27	23	19	27	31	27	27	27	27
Landscape Context	Patch Size	/10	1	1	1	1	1	1	1	1	1	1	1
	Neighbourhood	/10	0	3	3	3	0	0	1	1	1	1	1
	Distance to Core	/5	1	3	3	3	1	1	1	1	1	1	1
Total Condition Score			/100	18	34	34	30	21	29	34	30	30	30

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



Habitat Zone			1DR	1DS	1DT	1DU	1DV	1DW	1DX	1DY	1DZ	1EA	1EB	
Bioregion			Vriv	Vriv	Vriv	Vriv	Vriv	Vriv	Vriv	Vriv	Vriv	Vriv	Vriv	
EVC Number			132	132	132	104	104	104	829	829	829	132	132	
Total area of Habitat Zone (ha)			0.686	0.485	0.2	0.16	0.289	0.356	0.225	0.086	1.036	0.773	0.631	
Site Condition	Large Trees	/10	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	Inaccessible - modelled score applied	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	
	Lack of Weeds	/15	6	6	6	9	9	9	6	6		6	6	
	Understorey	/25	5	5	5	5	5	5	5	5		5	5	
	Recruitment	/10	6	6	6	6	6	6	1	1		6	6	
	Organic Litter	/5	3	3	3	3	3	3	2	2		3	3	
	Logs	/5	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
	Site Condition subtotal		27	27	27	31	31	31	19	19		27	27	
Landscape Context	Patch Size	/10	1	1	8	8	8	8	8	8	2	2		
	Neighbourhood	/10	1	2	2	1	1	1	1	1	0	0		
	Distance to Core	/5	1	1	1	1	1	1	1	1	1	1		
Total Condition Score		/100	30	31	38	41	41	41	29	29	59	30	30	

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

