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Meering West Wind Farm Project: Level One and Two Brolga Assessments

Final Report

Prepared for Virya Energy Pty Ltd

24 April 2026

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Document information

Report to:	Virya Energy Pty Ltd
Prepared by:	Dr Aymeric Fromant
Biosis project no.:	41107
File name:	41107.Meering.West.WF.Brolga-Assessment.FIN03.20260424.docx
Citation:	Biosis 2026. Meering West Wind Farm Project: Level One and Two Brolga Assessments. Report prepared for Meering West Wind Farm Pty Ltd. Authors: Fromant A, Biosis Pty Ltd, Melbourne, Vic. Project no. 41107

Document control

Version	Internal reviewer	Date issued
Draft version 01	Mark Venosta	23/05/2025
Final version 01	Claire Tingate	16/07/2025
Final version 02	Dr John Martin	03/03/2026

Acknowledgements

Biosis acknowledges the contribution of the following people and organisations in undertaking this study:

- Meering West Wind Farm Pty Ltd: Phil Burn

Biosis staff involved in this project were:

- Karthika Jayakumar, Thomas Perret, Yonina Eizenberg, Claire Tingate, Hayley Cox, Aymeric Fromant (field assistance)
- Michael Knudsen (mapping)
- Mark Venosta, Claire Tingate, Dr John Martin (quality assurance)

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We pay our respects to the Traditional Custodians and Elders past and present and honour their connection to Country and ongoing contribution to society.

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Summary

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The Meering West Wind Farm is required to assess the presence of Brolga *Antigone rubicunda* and consider if the wind farm has the potential to impact this species. Assessment was undertaken in accordance with the methods outlined in the *Interim Brolga Guidelines* (DSE 2012) and the recently released *Species-Specific Guidance for Onshore Wind Energy Facilities – Victorian Brolga* published in the *Revised Draft – Handbook for the development of renewable energy in Victoria* (DEECA 2025). This document summarises the investigations completed to date to address Level One and Two of the assessment. The Level Three investigation, which comprises a four-step process, has not been initiated, as the information gathered during the first two levels does not indicate the need for further assessment.

The desktop review (Level One – Step One) identified 48 Brolga records within 10 kilometres of the proposed wind farm boundary. These records were concentrated east and north-east of the study area, particularly at Lake Murphy (6 kilometres north-east of the study area). Notably, Lake Murphy was identified as a high-quality breeding habitat, supported by breeding records from 2019. Another breeding record from 1984 was noted approximately 8 kilometres east near the Loddon River. No known flocking sites were found within 25 kilometres of the study area, and Brolga flock sizes recorded did not exceed five individuals, which is below the threshold (10 Brolgas) defining flocking habitat in the *Interim Guidelines*.

Field verification during the Level One – Step Two Assessment classified only Lake Murphy as a high-quality breeding wetland. Although this wetland showed suitable characteristics for potential breeding, no direct Brolga observations had been recorded within this lake during recent surveys. The Level Two Assessment confirmed the absence of high-quality breeding habitat for the species within the radius of investigation, elsewhere than at Lake Murphy. During both the August and October-November 2024 field surveys, no Brolgas were observed. In addition, between August 2024 and March 2026, no Brolga was recorded during the bird utilisation surveys conducted throughout the study area, including five survey points close to the wetlands occurring near the eastern boundary of the study area. These wetlands were also surveyed during targeted shorebird and Latham's Snipe surveys (11 visits from December 2024 to March 2026), and Brolga were not observed. This is consistent with available online biodiversity databases (Victorian Biodiversity Atlas, Birddata, eBird) indicating that no individuals were recorded within 10 kilometres of the study area during the last 32-month period.

Community consultation with landholders and local community groups (environment, Landcare and bird groups) was conducted in March and April 2026 to obtain undocumented records within 10 kilometres of the proposed wind farm. A total of 298 pieces of correspondence were sent, and 21 responses were received. This survey confirmed the absence of flocking or breeding Brolga records within the study area and within 5 kilometres of the proposed site.

The integrated Level One and Two Assessments confirm that the Meering West Wind Farm is unlikely to result in a significant impact on Brolgas. The absence of Brolga sightings during extensive recent surveys and the lack of suitable high-quality breeding habitat within five kilometres indicate a low risk of collision, disturbance, or habitat loss to this species from the project. No flocking sites are present within the broader landscape, further reducing potential impact concerns.

According to the Handbook (DEECA 2025) the present project does not trigger the Level Three – Qualitative risk assessment for the following reasons:

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- There are no known flocking sites within at least 25 kilometres of the study site.
- No breeding records within 5 kilometres of the proposed area.
- No high-quality Brolga breeding wetland within 5 kilometres of the proposed area, based on the criteria that high-quality habitat requires wetlands with sufficient emergent vegetation to allow for nest building, which is not a feature present in any of the wetlands occurring within the radius of investigation other than Lake Murphy in 2018 to 2020.
- No record of Brolga utilising the wetlands within or in the direct vicinity of the proposed site, or flying over the proposed wind farm.

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1 Introduction

1.1 Project Background

Biosis Pty Ltd (Biosis) was commissioned by Meering West Wind Farm as trustee for the Meering West Wind Farm Trust (the Proponent) to undertake a Brolga *Antigone rubicunda* impact assessment related to the proposed wind farm, located approximately 25 kilometres south-west of Kerang, Victoria.

In Victoria, the species is reliant on wetland habitats in the north and west of the state and is listed as endangered under Victoria's *Flora and Fauna Guarantee Act 1988* (FFG Act). The assessment was conducted in accordance with the *Interim Guidelines for the Assessment, Avoidance, Mitigation and Offsetting of Potential Wind Farm Impacts on the Victorian Brolga Population 2011* (DSE 2012), which provide a tiered framework for assessing potential impacts on Brolgas. These guidelines establish a phased approach, starting with a Level One Assessment to identify the presence, number, and habitat of Brolgas within a 10-kilometre radius of the proposed wind farm boundary.

At the time of the assessment commenced (August 2024), the Victorian Department of Energy, Environment and Climate Action (DEECA) was developing updated guidance in *The Handbook for the Development of Renewable Energy in Victoria* (DEECA 2025; the new handbook), which now supersedes the Interim Guidelines and provides updated standards for managing impacts of renewable energy on Brolgas and other species. This report integrates data from the Level One and Level Two Assessments of the Interim Guidelines and aligns findings with the new handbook.

1.2 Objectives

The primary objective of this assessment was to determine the potential presence and distribution of Brolgas and their habitat within a 10 kilometres radius of the proposed Meering West Wind Farm. The assessment aimed to identify known and potential breeding and flocking sites, assess habitat suitability, and evaluate the likelihood of impacts associated with the wind farm development. Initial steps involved a desktop review of biodiversity records followed by field verification of habitat quality and presence of individuals within. Subsequently, a comprehensive survey was undertaken during the breeding season (July–December) to confirm the presence or absence of breeding and/or foraging Brolgas (DEECA 2025). Extensive consultation with landholders and local community groups (environment, landcare and bird groups) within the investigation area has also been undertaken March and April 2026. The objective of this consultation was to identify current and historical brolga flocking and breeding wetlands not recorded in available databases or accessible during field studies.

Finally, this assessment sought to provide recommendations for further action, considering both the requirements of the Interim Guidelines and the new handbook (DEECA 2025). This approach aims to ensure that the project's environmental management aligns with current best practice standards and regulatory expectations.

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2 Brolga assessment overview

2.1 Species description and distribution in Victoria

The Brolga is listed as endangered in Victoria under the FFG Act. It belongs to the crane family (Gruidae), one of two crane species found in Australia. Brolgas are large, long-legged birds, weighing 4–8 kg, standing up to 1.8 metres tall with a wingspan of about 2 metres. Outside the breeding season they may gather in flocks of up to 200 birds, though groups of 10–20 are more typical (BirdLife Australia 2023). Breeding pairs form long-term bonds, and if one partner dies it may take several seasons to find another. Pairs usually raise only one or two chicks each year, resulting in low population growth (BirdLife Australia 2023).

Brolgas have an annual cycle with two main phases. From July to December, breeding pairs nest in shallow, often temporary freshwater wetlands. From December to June, birds disperse to larger, more permanent wetlands, forming flocks that roost together and forage in surrounding wetland and terrestrial habitats. Movements between breeding and flocking sites occur during transitional migration periods (BirdLife Australia 2023).

The distribution of the Brolga in Victoria varies seasonally. In the breeding season adult pairs disperse to small and moderately sized seasonal or semi-permanent wetlands to breed as territorial pairs. At this time, small numbers of non-breeding birds can form flocks on larger wetlands. In the flocking season, birds congregate in larger wetlands as the smaller, seasonal wetlands dry out over summer (BirdLife Australia 2023). See Figure 1 for Brolga records within 10 kilometres of the study area.

Brolga movements in Victoria are not yet completely understood. Seasonal movements, referred to as migration movements, occur in south-east Australia between flocking and breeding sites. Local movements can also take place when birds are moving between roosting and feeding sites. Long distance movements may take place in very dry years and populations may move from dry inland wetlands to wetlands associated with the Murray River (Marchant and Higgins 1993). In very wet seasons, birds may remain at breeding sites throughout the year and not move to flocking sites.

2.2 Brolga habitat

Brolgas occur across a range of habitats in Victoria and use different environments during the breeding and non-breeding (flocking) seasons (Arnol et al. 1984). During the breeding season, territorial pairs nest in shallow freshwater wetlands, many of which are ephemeral and hold water reliably only through winter and spring (Herring 2005). In contrast, during the non-breeding season, Brolgas congregate at larger, often permanent wetlands where they roost, drink, and forage, and from which they move across the surrounding landscape to feed in terrestrial habitats (Johnsgard 1983; Arnol et al. 1984).

Brolgas depend on hydrologically and ecologically functional wetlands to provide nesting sites, food resources, and secure night-time roosting areas. In the breeding season (July–December), they nest in shallow freshwater marshes less than 50 cm deep with emergent vegetation, as well as in freshwater meadows less than 30 cm deep that are dominated by annual herbs, rushes, or tussock grasses. Emergent vegetation in these wetlands is critical, supplying nesting material, supporting food resources, providing shelter for prey species, and offering cover that protects chicks from predators.

Brolga families spend most of their time foraging within the nesting wetland but will move to nearby wetlands to feed or roost as chicks grow and local food resources decline. They also forage in adjacent pastures and, to a lesser extent during the breeding season, in cereal and canola crops near breeding wetlands and night roost sites. Brolgas typically roost in wetlands at night and move within, around, and between wetlands during the day to forage (Veltheim 2018; Veltheim et al. 2019).

The primary threat to Brolgas is the drainage and hydrological alteration of wetlands (Du Guesclin 2003). Wetlands that have been permanently drained, partially drained so they hold water only briefly during the breeding season, or converted to small, unvegetated farm dams provide little habitat value. Such sites lack the physical structure and biological resources required for nest construction, egg incubation, chick feeding, protection of young from ground predators, and successful fledging of older chicks.

2.3 Interim Brolga guidelines

The objective of the Interim Brolga Guidelines was to ensure that each wind farm development achieves, at a minimum, no net impact on the Victorian Brolga population (DSE 2012). To meet this objective, up to three levels of investigation may be required. Information collected at each level informs the impact assessment and the development of appropriate mitigation measures. Each level builds on the previous one, and all three levels are applied where there is potential for a significant impact requiring detailed mitigation and offset measures.

This Brolga assessment has been undertaken in accordance with the methods outlined in the DSE (2012) Interim Brolga Guidelines. This document summarises the investigations completed to date to address Levels One and Two of the assessment. The Level Three investigation, which comprises a four-step process, has not been initiated, as the information gathered during the first two levels does not currently indicate the need for further assessment. Further details on the assessment levels and steps in the Interim Brolga Guidelines, and their application in this study, are provided in the Table 1 below.

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Table 1 Three-level assessment of wind farm impact on Brolga: current investigation

		Criteria	Site specific information
Level 1	Triggers	The proposed wind farm site is situated within the Victorian range of the Brolga.	Yes (along the north-western boundary of the range)
		The presence of Brolgas within the radius of investigation (i.e. within 10 km of the proposed wind farm boundary).	Yes
		The presence of potential Brolga habitat within the radius of investigation.	Yes
		The location of the proposed development is within an area that may be used by Brolgas during seasonal movements between breeding and flocking habitats.	Unlikely
	Assessment	Preliminary survey to identify the potential presence, number and location of any Brolgas or potential Brolga habitat within the radius of investigation (10 km). It is carried out utilising a combination of desktop data review (Step 1), field studies (Step 2) and consultation with local residents and community environment groups. This copied document to be made available for the sole purpose of enabling its consideration and review as part of a planning process under the Planning and Environment Act 1987. The document must not be used for any purpose which may breach any copyright	Level 1 Step 1: - 48 records of foraging birds within 10 km of the wind farm (WF) boundary, all on the east side of the WF - The closest records are from Lake Meran and Little Lake Meran (2.1 and 3.3 km of the nearest proposed turbine, respectively) - Two records of breeding attempts at 6.3 and 8.7 km east of the WF boundary Level 1 Step 2: - In August 2024, suitable Brolga breeding habitat was identified in the north-east section of the study area within the wind farm site and radius of investigation. Community consultation: - Targeted community consultation concluded in April 2026 - Consultation with landholders associated with Salt Lake, Little and Great Spectacle Lakes, Round Lake and Tobacco Lake indicate that Brolgas have not been observed at these locations - 298 pieces of correspondence were sent to landholders and local community groups within 10 kilometres of the proposed wind farm, and 21 responses were received. No flocking or breeding Brolga were reported within the study area and within 5 kilometres of the proposed site. See Section 3 for more details
Level 2	Triggers	Records of breeding or flocking habitats within the radius of investigation (10 km).	Two breeding records within 10 km of the proposed WF
		The proposed development is located in an area which may be used by Brolgas moving seasonally between breeding and foraging sites, and may potentially create a barrier effect reducing movements between these habitats.	Unlikely. Current records show that Brolgas only occur north-east and east of the proposed wind farm. The absence of records directly west and south of the site suggests that it is unlikely that the proposed wind farm would impact movements from breeding to foraging sites within the distribution range of the northern Victorian population.

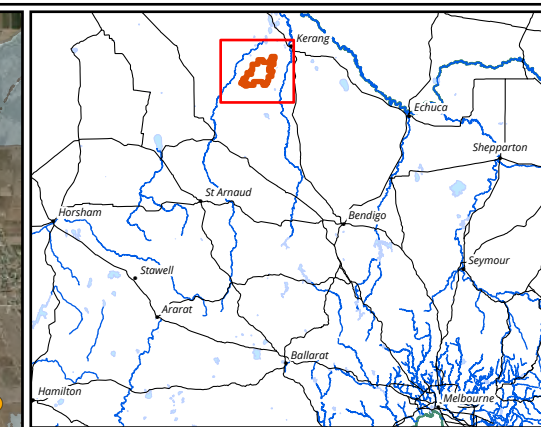
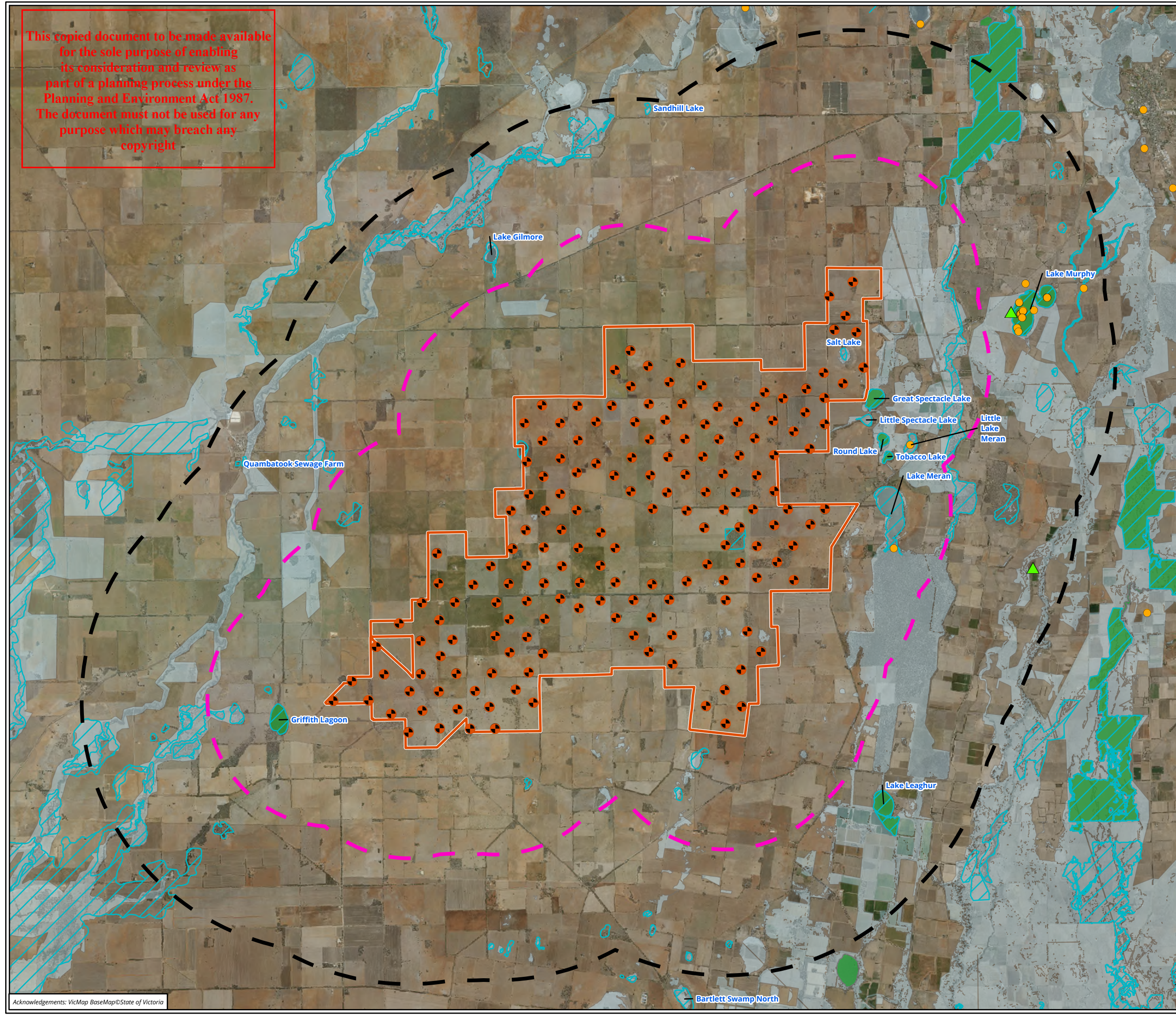
Criteria		Site specific information	
Level 3		The proposed development is located in an area which may be used by Brolgas for diurnal movements between foraging and roosting sites.	Uncertain. There is no record of Brolga within the boundary of the proposed wind farm. However, it is uncertain if Brolga would forage within the study area during large flood events (such as in 2011 or 2022).
		The proposed location of new overhead powerlines associated with the development may create new collision risks for Brolgas.	Unlikely. Powerlines associated with the development will be restricted to the west side of the proposed wind farm in a north-east/south-west direction (see Figure 1).
	Assessment	This copied document to be made available for the sole purpose of enabling its consideration and review as part of a planning process under the Planning and Environment Act 1987. The document must not be used for any purpose which may breach any copyright	Initial targeted Brolga surveys were conducted in October and November 2024 to map and assess Brolga breeding habitat within the radius of investigation. Only one site was determined as high potential (Lake Murphy, 6.3km from the nearest turbine). All wetlands retaining water during the survey period were monitored regularly in 2024, 2025 and 2026 during both the breeding and non-breeding season: - Aug, Oct and Nov 2024 - Mar, Apr, Jul, Sep, Oct and Dec 2025 - Jan, Feb and Mar 2026 No Brolga were observed breeding or foraging during the survey period (Aug 2024 – Mar 2026). No Brolga records have been added to eBird, Birddata, or the VBA within the radius of investigation since the commencement of the assessment (August 2024). The most recent record dates from February 2022 at Lake Murphy (6.3km from the nearest turbine). Based on the current information (no breeding record within 5km, limited foraging habitat within the study area, no breeding habitat within the study area, no flocking site within 25km), the risk of significant impact on Brolgas was determined to be low. See Section 4 for more details
		Provide a comprehensive record of the location, nature and extent of Brolga habitats within the radius of investigation (10 km) and assess the potential for impacts arising from collision risk, indirect disturbance and barrier effects.	
		Triggers	Qualitative risk assessment (AusWEA 2005) of project following site design is greater than “low”.
Assessment	Avoid or mitigate all potential impacts to Brolga breeding and flocking home ranges within the radius of investigation with turbine-free buffer areas.	Establishment of turbine free buffers around suitable wetlands.	
	Develop a site-specific collision risk model (CRM) for Brolga utilising or moving through the radius of investigation.	The collision risk model is based on field observations of all bird species flight data at the WF site. However, no flight observations were recorded of Brolga despite two years of targeted surveys and over 400 hours of bird utilisation surveys.	
	Estimate the impact of the proposed development on the population.	Not applicable without a CRM (see above point).	

Criteria		Site specific information
	Identify appropriate compensation strategies to ensure a zero net impact on Victorian Brolga population.	Not applicable without a CRM (see above points).

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- Legend**
- Study area
 - Turbine layout
 - 5km turbine buffer
 - 10km turbine buffer
- Database Brolga records**
- Observation
 - Breeding
- Wetlands and areas investigated during field surveys**
- DEECA Wetland
 - Brolga Breeding Habitat Model (ARI 2025)
 - Flooded area (2022 floods)

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Figure 1 Wetlands and Brolga records within the radius of investigation (10 km) of Meering Wind Farm

0 1.5 3 4.5 6 7.5
Kilometers
Scale: 1:140,000 @ A3
Coordinate System: GDA 1994 VICGRID94



Matter: 41107,
Date: 02 March 2026 ,
Prepared for: AF, Prepared by: MK, Last edited by: mknudsen
Layout: 41107_F1_BreedingQuality1
Project: P:\41100s\41107\Mapping\
41107_MeeringWF_Brolga.aprx

3 Level One Assessment

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3.1 Methods

3.1.1 Level One Assessment methods

The Level One Assessment comprised two key steps. Step One involved a desktop review of all relevant biodiversity databases and literature to collate known Brolga observations and identify potential breeding and flocking sites within a 10-kilometre radius of the proposed wind farm boundary. Data sources included the following:

- Victorian Biodiversity Atlas (VBA), accessed in August 2024 reviewed in April 2026
- eBird
- The Atlas of Australian Birds and Birddata (BirdLife Australia), accessed in August 2024 reviewed in April 2026.
- Arthur Rylah Institute (ARI) - Brolga tracking program: <https://arisci.shinyapps.io/brolgaTracker/>
- ARI - *Wetland monitoring and assessment program for environmental water: Stage 3 Final Report* (Papas et al. 2021)

Step Two involved field verification conducted in August 2024, during which wetlands listed in the Victorian Wetland Inventory (VWI) within the radius of investigation were inspected for habitat suitability. Particular focus was given to breeding habitat characteristics based on emergent vegetation cover and other ecological indicators.

In accordance with the interim guidelines, extensive consultation with landholders and local community groups (environment, landcare and bird groups) within the investigation area (10 kilometres) was also undertaken, from the 4th March 2026 through until the 19th of April 2026. The purpose of this engagement was to seek out any undocumented records and help confirm the nature and extent of Brolga breeding habitat within a 10-kilometre radius of the project.

Engagement involved direct correspondence from Meering West Wind Farm and the following recipients:

- Email to landholders directly involved with the project (28 recipients).
- Email to community groups (including Landcare groups) and neighbouring landholders where their emails have been compiled for the purposes of project updates (40 recipients).
- Australia Post mail out to all postal addresses within 10 kilometres of the project (urban environs of Quambatook removed) (230 recipients).

Correspondence sent out provided the following information:

- A link to the project website for context and general information.
- Information about Brolga Assessment being undertaken and the importance of local knowledge information.

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- Email address and phone number where respondents can provide information regarding Brolga records.
- A note stating the project ecologists (Biosis) may be in contact with respondents for additional information.
- A link to Birdlife Australia's website for general information on the Brolga.

In addition to the letters and emails, an online webform was completed on the website for BirdLife Australia - Bendigo-Echuca District.

If a response was received that mentioned observations of Brolgas, the following additional questions were asked:

- How long have you lived on/owned this property?
- How many and where are the wetland areas on your property (use map)?
- When and how long do wetlands hold water for and what is the depth/drainage structure now and historically?
- Are you able to identify a Brolga?
- Have you seen Brolga/Brolgas on your property?
- If so, how many did you see?
- When did you see them?
- How long did they stay?
- What were they doing?
- Where did you see them (use map)?

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If a Brolga record was suggestive of nesting/breeding or flocking behaviour further questions asked for clarification, including:

- Do you have photos of the brolgas?
- Did you see the nest and are its remains still there?
- Did you see any young brolgas (chicks)?
- If so, for how long?
- Did anyone else observe the flocking roost site or breeding site?

3.1.2 Breeding site definition

Each breeding record was reviewed and its location assessed to determine whether the record was valid and whether the wetland could support a breeding pair of Brolgas to successfully rear a chick. A wetland was considered suitable for breeding if it met the following criteria (ARI 2025):

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- Shallow freshwater 30-50 cm deep that flood for >120 consecutive days within the 10 years prior to the commencement of the assessment. Inundation periods were determined using the Copernicus Data Space Ecosystem Browser (<https://dataspace.copernicus.eu/browser/>)
- Open wetland with emergent vegetation approximately 90 cm tall
- Covered an area greater than 0.2 hectares

Wetlands that did not meet the above criteria were deemed unsuitable for breeding. All historical breeding records associated with a wetland were assumed to represent sites where breeding could potentially occur again in the future.

3.1.3 Flocking site definition

The Interim Brolga Guidelines (DSE 2012) specify that a flock roost site must meet all three of the following criteria:

- Recorded in more than one year
- Includes at least one count of 10 or more individuals
- Recorded in more than one month

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Traditional flocking sites are considered to be of substantially higher value to Brolgas than one-off flocking sites, as they represent key habitats used for safe overnight roosting after a day of foraging in the surrounding landscape. Movements to and from one-off sites are more likely to reflect movements undertaken during the migration season, which the Guidelines indicate may be considered when assessing the residual risk of a project to the Victorian Brolga population.

In addition, one-off flocking records may represent observations of birds foraging during the day away from their traditional roost sites. These records often involve birds using non-wetland habitats, such as crops or pasture.

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3.2 Results

3.2.1 Desktop review: historical breeding and flocking sites (Level One – Step One)

The proposed Meering West Wind Farm is located on the western boundary of the northern Victorian Brolga population (Riverina area), which supports approximately 60–70 individuals (DSE 2012; 'Brolga Guidelines'). Several large wetlands, as well as numerous ephemeral wetlands, occur in the vicinity of the study site (Figure 1).

A review of available databases (August 2024) identified 48 Brolga records within 10 kilometres of the wind farm boundary. All records are located to the east or north-east of Meering. The closest records are from Lake Meran and Little Lake Meran, both of which are directly adjacent to the project boundary (2.0 and 3.2 kilometres, respectively). Most observations (41 records) are from Lake Murphy, approximately 6 kilometres north-east of the wind farm boundary. Lake Murphy (6.3 kilometres) is also one of two sites where breeding attempts have been recorded (observed in 2019). The second breeding record is from a location on the western side of the Loddon River (observed in 1984), approximately 8.7 kilometres east of the wind farm boundary.

Across all observations within the investigation radius, the maximum number of Brolgas recorded at any one time was five individuals. Therefore, none of these sites meets the criteria for a potential flocking site as defined in the Brolga Guidelines. There are no known flocking sites within at least 25 kilometres of the study area.

3.2.2 Initial field assessment (Level One – Step Two)

Wetlands listed in the Victorian Wetland Inventory (VWI) within 10 kilometres of the proposed wind farm boundary were investigated in August 2024, and breeding habitat suitability information was collected for every accessible wetland (Figure 2).

Summary information for each wetland is provided in Table 2.

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Table 2 Inventory and assessment of wetlands within the radius of investigation. Wetlands highlighted in green (high breeding habitat suitability), yellow (medium breeding habitat suitability) or orange (low breeding habitat suitability but holding previous records and/or suitable in the Breeding Habitat Suitability Model) are further discussed in Section 4

Wetland ID (VWI)	Type	Nearest proposed turbine	Brolga records (<10 years)	Breeding Habitat Suitability Model (ARI 2025)	Breeding habitat suitability based on field assessment	Rationale for breeding habitat suitability ranking
43139	Semi-permanent saline lake	10.7km	-	-	Low	- Saline wetland - No emergent vegetation
43141	Semi-permanent saline lake	10.2km	-	-	Low	- Saline wetland - No emergent vegetation
43146	Semi-permanent saline lake	9.5km	-	-	Low	- Saline wetland - No emergent vegetation
43150 (southern section of Little Lake Beal Beal)	Permanent open freshwater lake	9.6km	-	-	Low	- Mostly closed/forested wetland - No emergent vegetation
43157	Semi-permanent saline lake	10.4km	-	-	Low	- Saline wetland - No emergent vegetation
43159	Semi-permanent saline lake	9.8km	-	-	Low	- Saline wetland - No emergent vegetation
43190 (Lake Elizabeth)	Permanent saline lake	10.4km	Feb-2020 (two adults non-breeding)	-	Low	- Saline wetland - No emergent vegetation
43201	Temporary shrub swamp	4.6km	-	Suitable	Low	- Closed/forested wetland - Not inundated for >120 days in the last 10 years

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Wetland ID (VWI)	Type	Nearest proposed turbine	Brolga records (<10 years)	Breeding Habitat Suitability Model (ARI 2025)	Breeding habitat suitability based on field assessment	Rationale for breeding habitat suitability ranking
43208 (Pelican Lake)	Semi-permanent saline lake	10.1km	-	-	Low	- Saline wetland - No emergent vegetation
43213 (Lake Wandella)	Permanent saline lake	9.5km	-	-	Low	- Saline wetland - No emergent vegetation
43220	Temporary saline lake	9.7km	-	-	Not accessed (likely low)	- Saline wetland - No emergent vegetation
43216	Temporary freshwater swamp	9.1km	-	-	Not accessed, assessed from roadside (likely low)	- Limited emergent vegetation - Not inundated for >120 days in the last 10 years
43314	Temporary shallow wetland/claypan	8.9km	-	-	Not accessed, assessed from roadside (likely low)	- Limited emergent vegetation - Not inundated for >120 days in the last 10 years
43222	Temporary shallow wetland/claypan	8.7km	-	-	Low	- Not inundated for >120 days in the last 10 years
43215	Temporary freshwater lake	8.4km	-	-	Low	- Drained, cropped farmland - Not inundated for >120 days in the last 10 years
43223	Temporary shallow wetland/claypan	8.2km	Dec-2018 (no status information)	-	Low	- Mosaic of cropped and grass land, probably good foraging habitat when inundated, but did not hold water for more than >120 days in the last 10 years. The wetland was not inundated in December 2018 (VBA record)
43205 (Lake Murphy)	Temporary freshwater lake	6.2km	2015, 2019, 2021 and 2022	Suitable	High	- Suitable foraging and breeding habitat, more likely in the northern section of the lake

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				(one breeding record in 2019)			- Foraging habitat within 2km of the lake includes wetlands 43222, 43223, 43211 and cropped land - Landholders adjacent to the lake mentioned Brolgas regularly foraging in paddocks during wet years. - This lake has regularly been monitored as part of the Lake Murphy Wildlife Reserve
	43197	Temporary lignum swamp	3.2km	-	-	Low	- Closed/forested wetland - Not inundated for >120 days in the last 10 years
	43165 (Salt Lake)	Temporary lignum swamp however (Biosis suggest updating to Semi-permanent saline lake)	0.7km	-	-	Low	- Saline wetland, - No emergent vegetation
	43344	Temporary lignum swamp	9.7km	-	-	Low	- Closed/forested wetland - Not inundated for >120 days in the last 10 years
	43211	Temporary lignum swamp	7.5km	-	-	Low	- Cropped farmland - Not inundated for >120 days in the last 10 years
	43206	Temporary saline lake	7.0km	-	-	Low	- Saline wetland - No emergent vegetation
	43339	Temporary shallow wetland/claypan	8.5km	-	-	Low	- Not inundated for >120 days in the last 10 years

Wetland ID (VWI)	Type	Nearest proposed turbine	Brolga records (<10 years)	Breeding Habitat Suitability Model (ARI 2025)	Breeding habitat suitability based on field assessment	Rationale for breeding habitat suitability ranking
43204	Temporary lignum swamp	6.7km	-	-	Low	- Mostly closed/forested wetland - Not inundated for >120 days in the last 10 years
43168 (Great Spectacle Lake)	Temporary freshwater lake	1.0km	-	Suitable	Low	- Deeper than 50 cm - No emergent vegetation - Landholder has never observed Brolgas in this lake (foraging or breeding). - This lake has regularly been monitored as part of the Great Spectacle Lake Complex Wildlife Reserve
43167 (Little Spectacle Lake)	Temporary freshwater marsh or meadow (Biosis suggest updating to Temporary freshwater lake)	1.2km	-	-	Low	- No emergent vegetation - Landholder has never observed Brolgas in this lake (foraging or breeding). - This lake has regularly been monitored as part of the Great Spectacle Lake Complex Wildlife Reserve
43178 (Round Lake)	Temporary shallow wetland/claypan (Biosis suggest updating to Temporary freshwater lake)	2.2km	-	Suitable	Low (no emergent vegetation, densely treed along the water line)	- Deeper than 50 cm - No emergent vegetation - Landholder has never observed Brolgas in this lake (foraging or breeding) - This lake has regularly been monitored as part of the Great Spectacle Lake Complex Wildlife Reserve
43181 (Tobacco Lake)	Temporary freshwater lake	3.0km	-	Suitable	Medium	- Potential breeding habitat restricted to the south-west of the lake (shallower area of 0.5 hectare) - Landholder has never observed Brolgas in this lake (foraging or breeding)

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Wetland ID (VWI)	Type	Nearest proposed turbine	Brolga records (<10 years)	Breeding Habitat Suitability Model (ARI 2025)	Breeding habitat suitability based on field assessment	Rationale for breeding habitat suitability ranking
						- This lake has regularly been monitored as part of the Great Spectacle Lake Complex Wildlife Reserve
43187 (Little Lake Meran)	Temporary freshwater lake	3.2km	Jun-2020 (1 adult) non-breeding)	-	Medium	- Potential breeding habitat restricted to the south and north of the lake (shallower area of 2 and 1 hectare, respectively) - This lake has regularly been monitored as part of the Great Spectacle Lake Complex Wildlife Reserve
314981	Temporary freshwater lake (drained)	3.4km	-	-	Not accessed (likely low)	- Drained, cropped farmland - Not inundated for >120 days in the last 10 years
43180 (Lake Meran)	Temporary freshwater lake	2.0km	Apr-2017 (no status information)	-	Low	- Deeper than 50 cm - No emergent vegetation - This lake has regularly been monitored as part of the Lake Meran Wildlife Reserve - Landholders adjacent to the lake mentioned Brolgas occasionally foraging in paddocks during wet years.
314265	Temporary shrub swamp	2.9km	-	-	Low	- Closed/forested wetland
43171 (Lake Leaghur)	Temporary freshwater lake	6.3km	-	Suitable	Low	- Deeper than 50 cm - No emergent vegetation - This lake has regularly been monitored as part of the Lake Leaghur Wildlife Reserve
43170	Temporary shallow wetland/claypan	6.7km	-	Suitable	Low (Box woodland community with	- Closed/forested wetland - Not inundated for >120 days in the last 10 years

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Wetland ID (VWI)	Type	Nearest proposed turbine	Brolga records (<10 years)	Breeding Habitat Suitability Model (ARI 2025)	Breeding habitat suitability based on field assessment	Rationale for breeding habitat suitability ranking
					dense shrubby understory)	
43135	Temporary shrub swamp	1.3km	-	-	Low	- Deeper than 50 cm - No emergent vegetation
43130	Temporary lignum swamp	3.1km	-	-	Not accessed	- Unknown vegetation cover. Cropped when not inundated - Retained water for >120 days during the breeding season on one occasion (2023) in the last 10 years - Was not inundated during the survey period
42732	Temporary lignum swamp	8.6km	-	-	Low	- Closed/forested wetland - Not inundated for >120 days in the last 10 years
42637	Temporary lignum swamp	9.2km	-	-	Not accessed (likely low)	- Mostly closed/forested wetland - Not inundated for >120 days in the last 10 years
42754	Temporary freshwater swamp	8.5km	-	-	Low	- Closed/forested wetland
42753	Temporary shallow wetland/claypan	8.1km	-	-	Not accessed (likely low)	- Cropped farmland - Not inundated for >120 days in the last 10 years
42733	Temporary shrub swamp	9.1km	-	-	Not accessed (likely low)	- Mostly closed/forested wetland - Not inundated for >120 days in the last 10 years
42625	Temporary lignum swamp (Biosis suggest updating to	8.5km	-	-	Low	- Cropped farmland - Not inundated for >120 days in the last 10 years

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Wetland ID (VWI)	Type	Nearest proposed turbine	Brolga records (<10 years)	Breeding Habitat Suitability Model (ARI 2025)	Breeding habitat suitability based on field assessment	Rationale for breeding habitat suitability ranking
	Temporary freshwater swamp)					
42622	Temporary shrub swamp (Biosis suggest updating to Temporary freshwater swamp)	8.4km	-	-	Low	- Cropped farmland - Not inundated for >120 days in the last 10 years
42621	Temporary lignum swamp (Biosis suggest updating to Temporary freshwater swamp)	8.5km	-	-	Low	- Cropped farmland - Not inundated for >120 days in the last 10 years
42619	Temporary freshwater swamp	8.5km	-	-	Low	- Cropped farmland - Not inundated for >120 days in the last 10 years
43118	Temporary shallow wetland/claypan (Biosis suggest updating to Temporary lignum swamp)	2.3km	-	-	Low	- Limited emergent vegetation (lignum)
43100	Temporary lignum swamp	6.5km	-	-	Not accessed (likely low)	- Closed/forested wetland - Not inundated for >120 days in the last 10 years
40931	Temporary shallow wetland/claypan	7.9km	-	-	Low	- Not inundated for >120 days in the last 10 years
41416	Temporary river red gum swamp	8.7km	-	-	Not accessed (likely low)	- Closed/forested wetland - Not inundated for >120 days in the last 10 years

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Wetland ID (VWI)	Type	Nearest proposed turbine	Brolga records (<10 years)	Breeding Habitat Suitability Model (ARI 2025)	Breeding habitat suitability based on field assessment	Rationale for breeding habitat suitability ranking
41407	Temporary river red gum swamp	7.7km	-	-	Low	- Closed/forested wetland - Not inundated for >120 days in the last 10 years
41406	Temporary lignum swamp (Biosis suggest updating to Temporary freshwater swamp)	7.9km	-	-	Low	- Not inundated for >120 days in the last 10 years
41405	Temporary lignum swamp (Biosis suggest updating to Temporary freshwater swamp)	7.7km	-	-	Low	- Cropped farmland - Not inundated for >120 days in the last 10 years
41404	Temporary lignum swamp (Biosis suggest updating to Temporary freshwater swamp)	9.2km	-	-	Low	- Not inundated for >120 days in the last 10 years
313979	Temporary shallow wetland/claypan	8.8km	-	-	Low	- Not inundated for >120 days in the last 10 years
43103 (Griffith Lagoon)	Temporary lignum swamp (Biosis suggest updating to Temporary river red gum swamp)	1.9km	-	Suitable	Low	- Closed/forested wetland - No emergent vegetation
43101	Temporary lignum swamp	3.6km	-	-	Not accessed (likely low)	- Closed/forested wetland
43279	Temporary river red gum swamp	4.3km	-	-	Not accessed	

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Wetland ID (VWI)	Type	Nearest proposed turbine	Brolga records (<10 years)	Breeding Habitat Suitability Model (ARI 2025)	Breeding habitat suitability based on field assessment	Rationale for breeding habitat suitability ranking
					(likely low)	
41412	Temporary lignum swamp	5.0km	-	-	Not accessed (likely low)	- Mix of cropped land and closed/forested wetland
41410	Temporary river red gum swamp	5.5km	-	-	Not accessed (likely low)	- Closed/forested wetland
41411	Temporary river red gum swamp	5.7km	-	-	Not accessed (likely low)	- Mostly closed/forested wetland
41409		6.6km	-	-	Not accessed (likely low)	- Closed/forested wetland
41408	Temporary lignum swamp	7.1km	-	-	Not accessed (likely low)	- Closed/forested wetland
43102	Temporary lignum swamp (cropped and drained)	2.5km	-	-	Low	- Cropped farmland - Not inundated for >120 days in the last 10 years
43277	Temporary freshwater swamp	3.4km	-	-	Low	- Mix of cropped land and closed/forested wetland - Open wetland not inundated for >120 days in the last 10 years
43275	Temporary freshwater lake (Biosis suggest updating to Temporary freshwater swamp)	5.2km	-	-	Low	- Cropped farmland - Not inundated for >120 days in the last 10 years
43274	Temporary shrub swamp	5.9km	-	-	Low	- Mix of cropped land and closed/forested wetland

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Wetland ID (VWI)	Type	Nearest proposed turbine	Brolga records (<10 years)	Breeding Habitat Suitability Model (ARI 2025)	Breeding habitat suitability based on field assessment	Rationale for breeding habitat suitability ranking
43249	Sewage treatment pond	8.4km	-	-	Low	- Not inundated for >120 days in the last 10 years
43248	Sewage treatment pond	8.6km	-	-	Low	- Deeper than 50 cm - No emergent vegetation
43105	Temporary freshwater swamp	7.6km	-	-	Low	- Closed/forested wetland - Not inundated for >120 days in the last 10 years
43104	Temporary freshwater swamp	7.9km	-	-	Low	- Cropped farmland - Not inundated for >120 days in the last 10 years
43409	Temporary freshwater swamp	7.5km	-	-	Low	- Mix of cropped land and closed/forested wetland - Open wetland not inundated for >120 days in the last 10 years
43106	Temporary freshwater swamp	8.1km	-	-	Low	- Mix of cropped land and closed/forested wetland - Not inundated for >120 days in the last 10 years
43116 (Lake Gilmore)	Temporary saline lake	5.5km	-	-	Not accessed (likely low)	- Saline wetland - No emergent vegetation
43271	Temporary lignum swamp	9.6km	-	-	Low	- Closed/forested wetland - Not inundated for >120 days in the last 10 years
43298	Temporary lignum swamp	9.9km	-	-	Low	- Closed/forested wetland

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Wetland ID (VWI)	Type	Nearest proposed turbine	Brolga records (<10 years)	Breeding Habitat Suitability Model (ARI 2025)	Breeding habitat suitability based on field assessment	Rationale for breeding habitat suitability ranking
						- Not inundated for >120 days in the last 10 years
43114	Temporary lignum swamp	9.1km	-	-	Low	- Closed/forested wetland - Not inundated for >120 days in the last 10 years
43264	Temporary lignum swamp	9.6km	-	-	Low	- Closed/forested wetland - Not inundated for >120 days in the last 10 years
43281	Temporary lignum swamp	9.6km	-	-	Low	- Closed/forested wetland - Not inundated for >120 days in the last 10 years
43265	Temporary lignum swamp	8.3km	-	-	Low	- Closed/forested wetland - Not inundated for >120 days in the last 10 years
43282	Temporary lignum swamp	7.8km	-	-	Low	- Closed/forested wetland - Not inundated for >120 days in the last 10 years
43283	Temporary lignum swamp	8.7km	-	-	Low	- Closed/forested wetland - Not inundated for >120 days in the last 10 years
43284	Temporary lignum swamp	8.9km	-	-	Low	- Closed/forested wetland - Not inundated for >120 days in the last 10 years
43266	Temporary lignum swamp	8.6km	-	-	Low	- Closed/forested wetland - Not inundated for >120 days in the last 10 years

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Wetland ID (VWI)	Type	Nearest proposed turbine	Brolga records (<10 years)	Breeding Habitat Suitability Model (ARI 2025)	Breeding habitat suitability based on field assessment	Rationale for breeding habitat suitability ranking
43285	Temporary lignum swamp	8.7km	-	-	Low	- Closed/forested wetland - Not inundated for >120 days in the last 10 years
43267	Temporary lignum swamp	8.8km	-	-	Low	- Closed/forested wetland - Not inundated for >120 days in the last 10 years
43297	Temporary lignum swamp	8.2km	-	-	Low	- Closed/forested wetland - Not inundated for >120 days in the last 10 years
43300	Temporary lignum swamp	7.9km	-	-	Low	- Closed/forested wetland - Not inundated for >120 days in the last 10 years
43286	Temporary shallow wetland/claypan (Biosis suggest updating to Temporary lignum swamp)	8.8km	-	-	Low	- Closed/forested wetland - Not inundated for >120 days in the last 10 years
43131	Salt pan/flat	9.3km	-	-	Low	- Saline wetland - No emergent vegetation
43276	Temporary lignum swamp	0.2km	-	-	Low	- Closed/forested wetland
43278	Temporary freshwater swamp (Biosis suggest to remove this wetland from the VWI)	0.1km	-	-	Low	- Closed/forested wetland - Not inundated for >120 days in the last 10 years

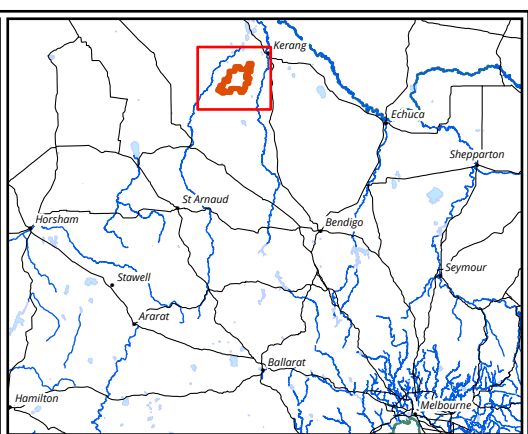
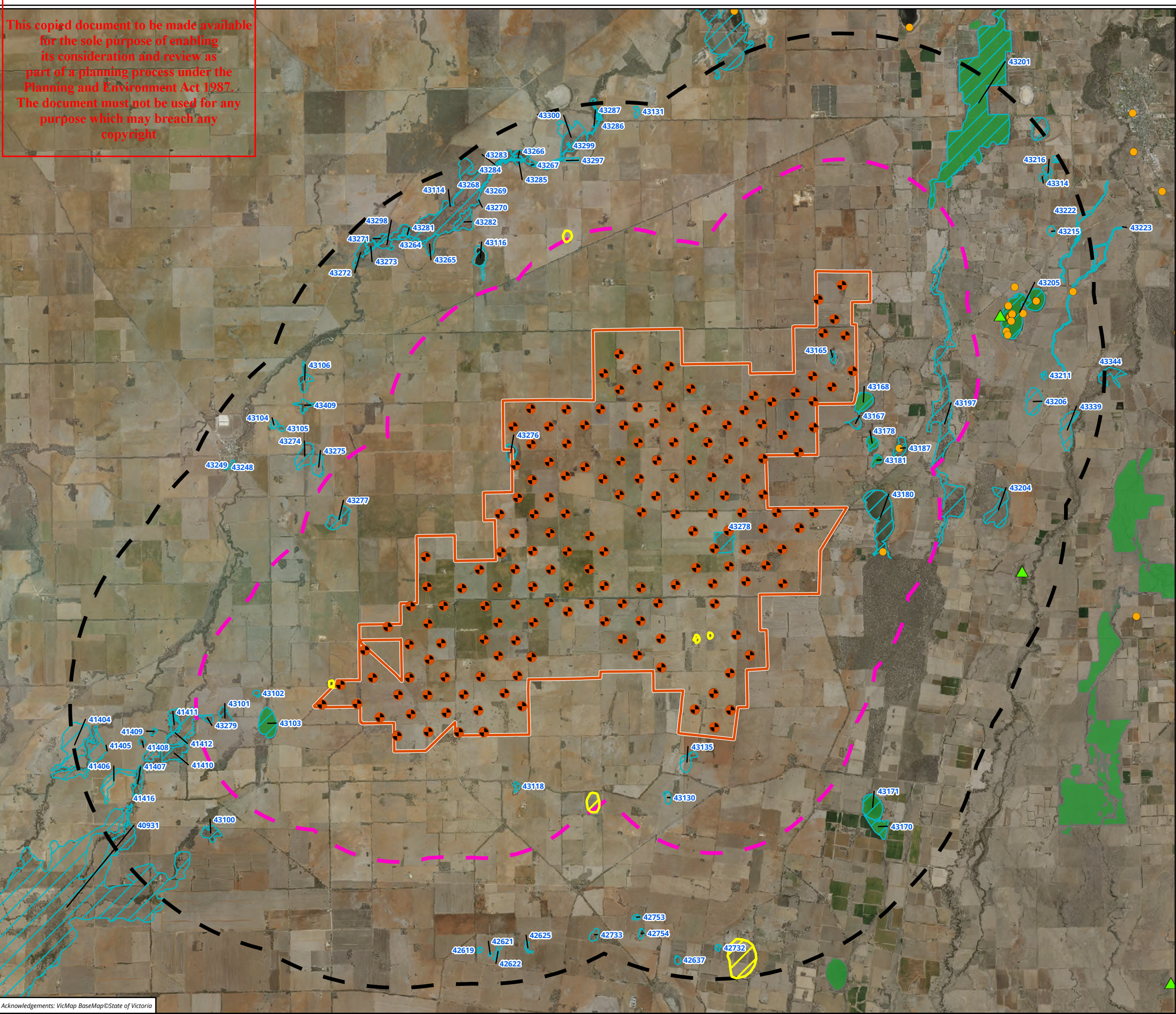
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Wetland ID (VWI)	Type	Nearest proposed turbine	Brolga records (<10 years)	Breeding Habitat Suitability Model (ARI 2025)	Breeding habitat suitability based on field assessment	Rationale for breeding habitat suitability ranking
Additional wetland inundated for >120 days in the last 10 years not recorded in the VWI						
Lon: 143.670 Lat: -35.778	Likely Temporary saline lake	5.0km	-	-	Not accessed (likely low)	- Saline wetland - No emergent vegetation
Lon: 143.725 Lat: -35.922	Temporary freshwater swamp	1.3km	-	-	Low	- Closed/forested wetland - No emergent vegetation
Lon: 143.730 Lat: -35.920	Temporary freshwater swamp	1.0km	-	-	Low	- Closed/forested wetland - No emergent vegetation
Lon: 143.744 Lat: -36.036	Temporary freshwater swamp (drained)	8.7km	-	-	Low	- Drained, cropped farmland - No emergent vegetation
Piccoli Swamp Lon: 143.678 Lat: -35.980	Temporary freshwater swamp	4.5km	-	-	Low	- Cropped farmland - No emergent vegetation - Landholders adjacent to the wetland mentioned Brolgas have occasionally been observed foraging.
Lon: 143.563 Lat: -35.936	Temporary freshwater swamp	0.3km	-	-	Low	- Closed/forested wetland - No emergent vegetation

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- Legend**
- Study area
 - Turbine layout
 - 5km turbine buffer
 - 10km turbine buffer
- Database Brolga records**
- Observation
 - Breeding
- Wetlands and areas investigated during field surveys**
- DEECA Wetland
 - Brolga Breeding Habitat Model (ARI 2025)
 - Unidentified wetland

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Figure 2 Wetlands investigated during the Level One Assessment

0 1.5 3 4.5 6 7.5
Kilometers
Scale: 1:140,000 @ A3
Coordinate System: GDA 1994 VICGRID94



Matter: 41107,
Date: 02 March 2026 ,
Prepared for: AF, Prepared by: MK, Last edited by: mknudsen
Layout: 41107_F1_WetlandsInvestigated
Project: P:\41100s\41107\Mapping\41107_MeeringWF_Brolga.aprx

A total of 90 wetlands in the radius of investigation were assessed. An additional six unknown wetlands were identified as having held water for >120 days within the past 10 years. At the time of the survey, only one wetland was classified as high quality, Lake Murphy, which is one of the two sites with a breeding record within the radius of investigation. Wetlands classified as medium quality for breeding habitat suitability (Tobacco Lake and Little Lake Meran) are all located north-east of the study area in the direct vicinity of the eastern boundary (3 kilometres).

3.2.3 Community consultation

Community consultation with landholders and local community groups (environment, landcare and bird groups) was conducted in March and April 2026 to obtain undocumented records within 10 kilometres of the proposed wind farm. The community consultation confirmed the results of the filed surveys as the absence of flocking or breeding Brolga records within the study area and within 5 kilometres of the proposed site.

In total 298 pieces of correspondence were sent. Responses were received from 21 landholders, including the following:

- 10 respondents had not seen brolgas on their properties.
- 11 respondents had seen brolgas on their properties, of which:
 - Two respondents provided no information on where their properties were located (including after follow-up). There were no photos or videos to confirm these observations.
 - Four respondents did not provide any details of where, when and what was observed (including after follow-up). There were no photos or videos to confirm these observations.
 - One respondent has misidentified Brolgas. This followed a conversation with project ecologists who concluded that the species observed was likely White-faced Herons.
 - Four respondents were located adjoining Lake Murphy (5-7 kilometres east of the proposed wind farm), a known breeding location for Brolgas. One of these respondents provided photographs of Brolga foraging in paddocks.
 - One respondent was located 8.5 kilometres east of the proposed wind farm, between Delamare Ln and Hewitt Rd. This landholder mentioned observing chicks at two occasions. There were no photos or videos to confirm these observations.
 - One respondent was located 4.5 kilometres south of the proposed wind farm (Piccoli Swamp), mentioning Brolgas occasionally foraging in the swamp. There were no photos or videos to confirm these observations.
 - One respondent was located adjoining Koorangie State Game Reserve (9 kilometres north of the proposed wind farm), mentioning Brolgas occasionally foraging in paddocks. There were no photos or videos to confirm these observations.

It is noted that, in two instances, records initially reported as Brolga were subsequently confirmed to be White-faced and/or White-necked Herons. Of the remaining observations, all but one (near Lake Murphy) could not be confirmed due to the absence of photos or videos.

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3.3 Conclusion – Level One Assessment

This Brolga Level One Assessment showed potential breeding habitat and several Brolga records east and north-east of the study area. This includes two breeding records within the radius of investigation. Based on this assessment, it was concluded that the project would meet at least the first trigger for a Level Two Assessment as outlined in the Interim Brolga Guidelines (records of breeding habitats within the radius of investigation) (DSE 2012).

The community consultation confirmed the absence of flocking or breeding Brolga records within the study area and within 5 kilometres of the proposed site.

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4 Level Two Assessment

The Level Two Assessment collects comprehensive data about the location, nature and extent of brolga habitats, and patterns of habitat use and behaviour at breeding, flocking and foraging sites within the radius of investigation (DSE 2012). Extensive investigations to meet the Level Two criteria were completed for the project between August 2024 and March 2026.

4.1 Methods

Following the *Interim Guidelines* (DSE 2012), the objective of a Level Two Assessment was to conduct a comprehensive survey on the presence and movements of Brolga within the radius of investigation. According to these guidelines and based on the limited potential breeding habitat identified during the Level One Assessment, roaming surveys were determined to be the most suited method to detect isolated breeding Brolga for this assessment.

4.1.1 Survey effort

The breeding season occurs during the wetter months of the year, predominantly July to December in Victoria, the period during which roaming surveys were conducted. Because detecting breeding Brolgas can be difficult when they occur at low density, Biosis undertook two rounds of surveys (two separate four-day field assessments), in October and November 2024. For this assessment, in addition to survey wetlands listed in the VWI, all the areas flooded in October to December 2022 that retained water for six months or more were investigated within five kilometres of the study area, and information about presence of Brolga and habitat suitability for breeding Brolgas was collected.

4.1.2 Additional survey effort

In addition to the targeted Brolga surveys, more than 400 hours of bird utilisation monitoring were conducted between August 2024 and March 2026. This was complemented by seven targeted shorebird surveys, four targeted Latham's Snipe surveys, and two raptor surveys carried out between December 2024 and March 2026. Although these surveys were not specifically designed to detect Brolga, they represent a substantial additional survey effort and contribute to a more comprehensive understanding of the species' presence within and around the study area. In particular, all key wetlands within the radius of investigation, including Lake Murphy and the Great Lake Spectacle Complex, were inspected regularly during these surveys.

Further information on the timing of each survey is provided in Appendix 1.

4.1.3 Wetland assessment

A functional wetland potentially provides nesting, foraging and/or roosting habitat for Brolga. Several features influence the suitability of wetland habitat for Brolga breeding. These include:

- Type and cover of vegetation, and associated biological productivity
- Physical characteristics of wetlands, including total size and shoreline slope
- Hydrological function, such as depth and duration of inundation

To assess potential Brolga habitat, three methods were used:

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- Assessment of mapped wetlands in the VWI. Wetlands in the VWI database are categorised based on wetland system type, water regime, and dominant vegetation.
- Hydrological assessment to determine the periods and duration of wetland inundation.
- Ecological field assessments completed for each open freshwater wetland that held water for more than 120 days within the past 10 years. This 10-year period includes the 2022 major flood event, which was considered a reference event for determining the extent of potential Brolga breeding habitat. Particular attention was given to wetlands determined to have medium or high habitat suitability during the Level One Assessment and/or wetlands identified as suitable in the Breeding Habitat Suitability Model (ARI 2025).

The dates the wetland surveys were undertaken were:

- August 2024
- October 2024
- January 2025
- April 2025
- July 2025
- September 2025
- October 2025
- December 2025
- January 2026
- February 2026
- March 2026

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For wetlands that were not inundated, the presence of emergent vegetation was investigated using the Copernicus Sentinel-2 false-colour images. This uses infrared and visible bands to highlight environmental features, with healthy vegetation displaying vibrant red (see Photo 1).

4.2 Results

4.2.1 Brolga presence within the radius of investigation

During 2024-2026 survey period no Brolga individual was observed either breeding or foraging within the radius of investigation. In addition, during this period, no Brolga was recorded during the 400 hours of bird utilisation surveys that were conducted throughout the proposed area, including five survey points in close proximity to the wetlands occurring near the eastern boundary of the study site. These wetlands were also surveyed during targeted shorebird surveys (11 visits from August 2024 to March 2026), and no Brolga was observed. This compares well with available online databases (VBA, Birddata, eBird) indicating that no individual was recorded within 10 kilometres of the study area during the last 36-month period.

4.2.2 Brolga habitat assessment

Rainfall and runoff between August 2024 and March 2026 were below average; therefore, most seasonal wetlands were dry during the survey period. Only semi-permanent and permanent freshwater lakes

(including Lake Murphy and the Great Lake Spectacle Complex) were inundated for some or all of the survey period. Additional information on inundation patterns over the past 10 years is provided in Appendix 1.

An analysis was undertaken on wetlands that could potentially provide breeding habitat for Brolga based on the review of existing information and previous breeding records (see Section 3: Level One Assessment). Of the 90 wetlands identified and assessed during the Level One Assessment, 11 were determine potential breeding habitat or had records of Brolga utilising this wetland. Hydrological information and photos are provided in Appendix 1.

The Level Two Assessment confirmed that only Lake Murphy provides suitable Brolga Breeding habitat. This shallow freshwater lake provides suitable depth, hydrology and emergent vegetation. The location of emergent vegetation in the northern section of Lake Murphy is shown in Photo 1. Over the last 10 years before the assessment commenced, Lake Murphy was inundated during the following periods:

- January 2011 to December 2015
- May 2018 to December 2019
- October 2021 to November 2024

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Two wetlands were identified as having medium Brolga breeding suitability habitat during the Level One Assessment: Tobacco Lake and Little Lake Meran. However, the Level Two Assessment concluded that neither of these wetlands is high-quality Brolga breeding habitat. Although both Tobacco Lake and the nearby Round Lake (250 metres north of Tobacco Lake) (Photo 2) were determined to be suitable habitat by the Breeding Habitat Suitability Model (ARI 2025), they do not appear to provide appropriate habitat conditions. In particular, these lakes do not have emergent vegetation during inundation phases (Photo 3). This assessment is consistent with the fact that the landholder of both Tobacco and Round Lake has never observed Brolgas there, either foraging or breeding.

Similarly, Little Lake Meran (Photo 4) does not appear to provide adequate emergent vegetation cover for breeding (Photo 5). However, the single record of an individual in June 2020 suggests that this wetland may occasionally be used for foraging.

A total of six wetlands were determined to be suitable habitat by the Breeding Habitat Suitability Model (ARI 2025) but were subsequently assessed as having low suitability following the Level One Assessment and was confirmed with the Level Two Assessment. These wetlands include:

- Wetland 43201 (Temporary shrub swamp): This wetland is a lignum swampy woodland dominated by lignum and black box. It is not suitable Brolga breeding habitat and has not been inundated for more than 120 days in the past 10 years.
- Great Spectacle Lake (Temporary freshwater lake): This lake does not appear to provide adequate emergent vegetation cover for breeding. The landholder has never observed Brolgas there, either foraging or breeding.
- Round Lake (Temporary freshwater lake): This lake does not appear to provide adequate emergent vegetation cover for breeding (see assessment for Tobacco Lake). The landholder has never observed Brolgas there, either foraging or breeding.
- Lake Leaghur: This lake does not appear to provide adequate emergent vegetation cover for breeding.
- Wetland 43170 (Temporary shallow wetland/claypan): This wetland is a swampy woodland dominated by a box woodland community with a dense shrubby understorey. It is not suitable Brolga breeding habitat and has not been inundated for more than 120 days in the past 10 years.

- Griffith Lagoon (Temporary lignum swamp): This wetland is densely treed with limited open areas and does not provide adequate emergent vegetation cover for breeding.

Further information about these wetlands is provided in Appendix 1.

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Photo 1 Fieldbased photos of Lake Murphy in August 2024 (top left) and February 2026 (bottom left). The Copernicus Sentinel-2 false-colour image on the right shows the emergent vegetation (white arrows) in September 2019 (last known breeding record)

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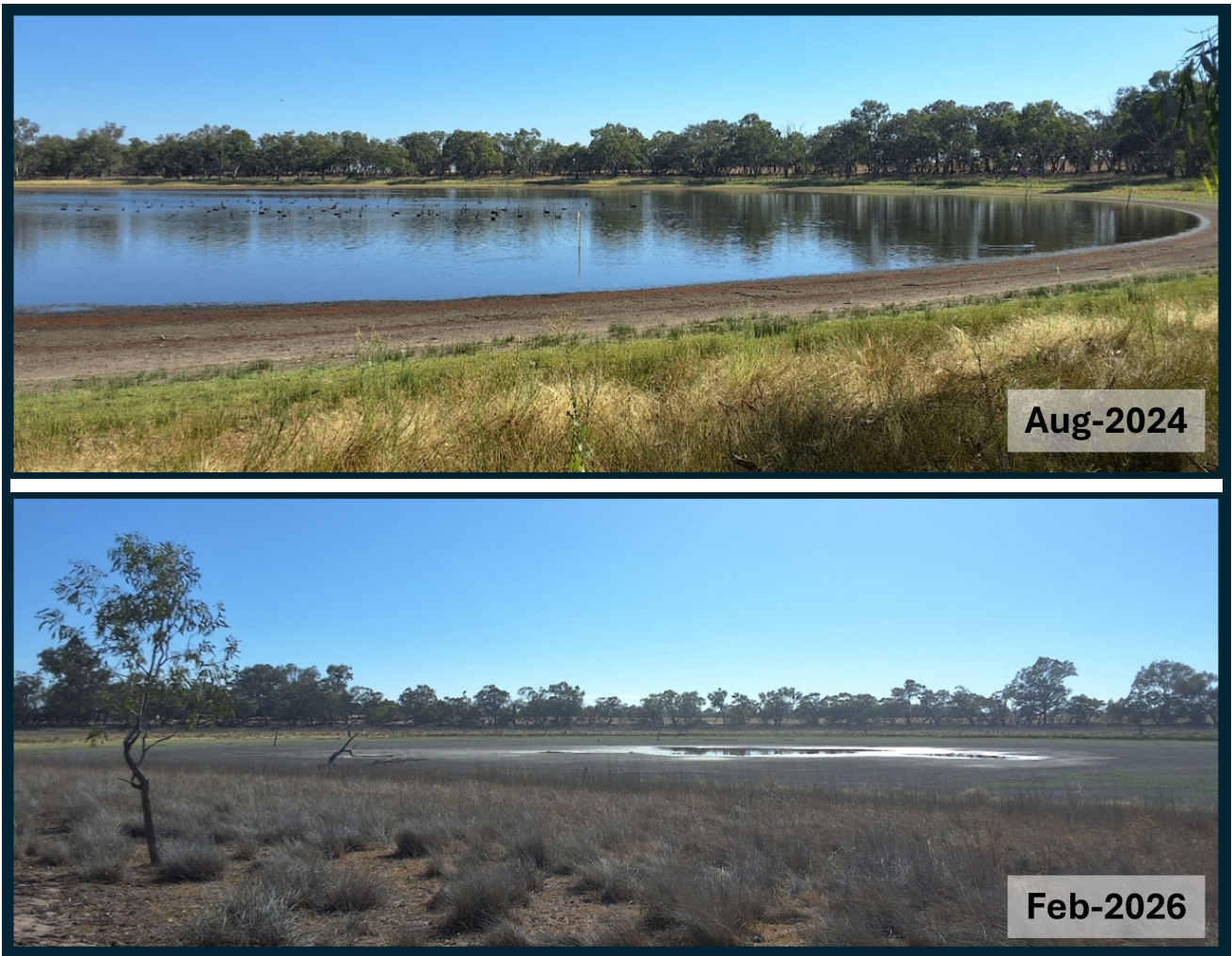


Photo 2 Tobacco Lake in August 2024 (top) and February 2026 (bottom)

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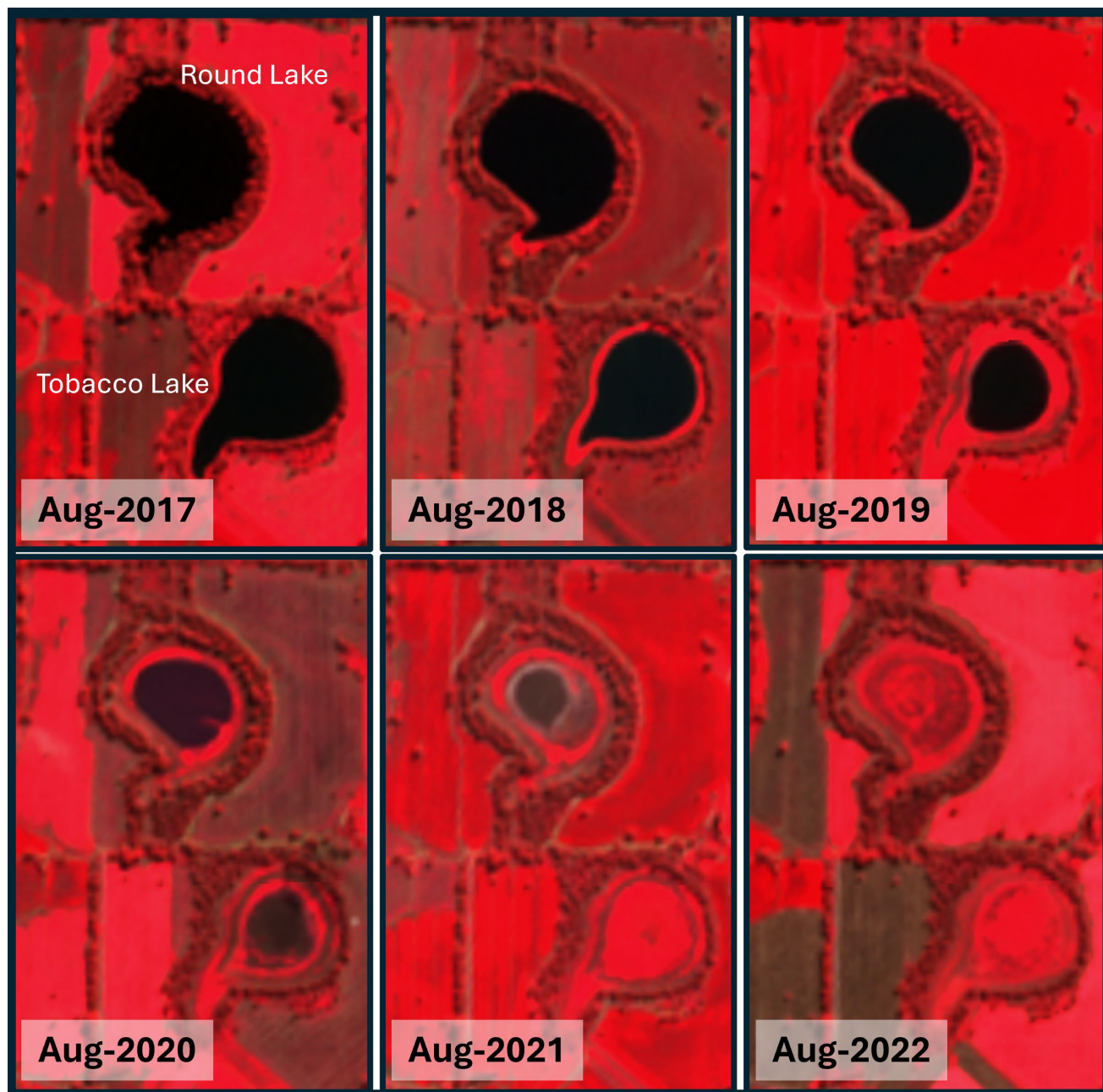


Photo 3 Copernicus Sentinel-2 false-colour images of Tobacco Lake and Round Lake during a full inundation cycle

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Photo 4 Little Lake Meran in August 2024 (top) and February 2026 (bottom)

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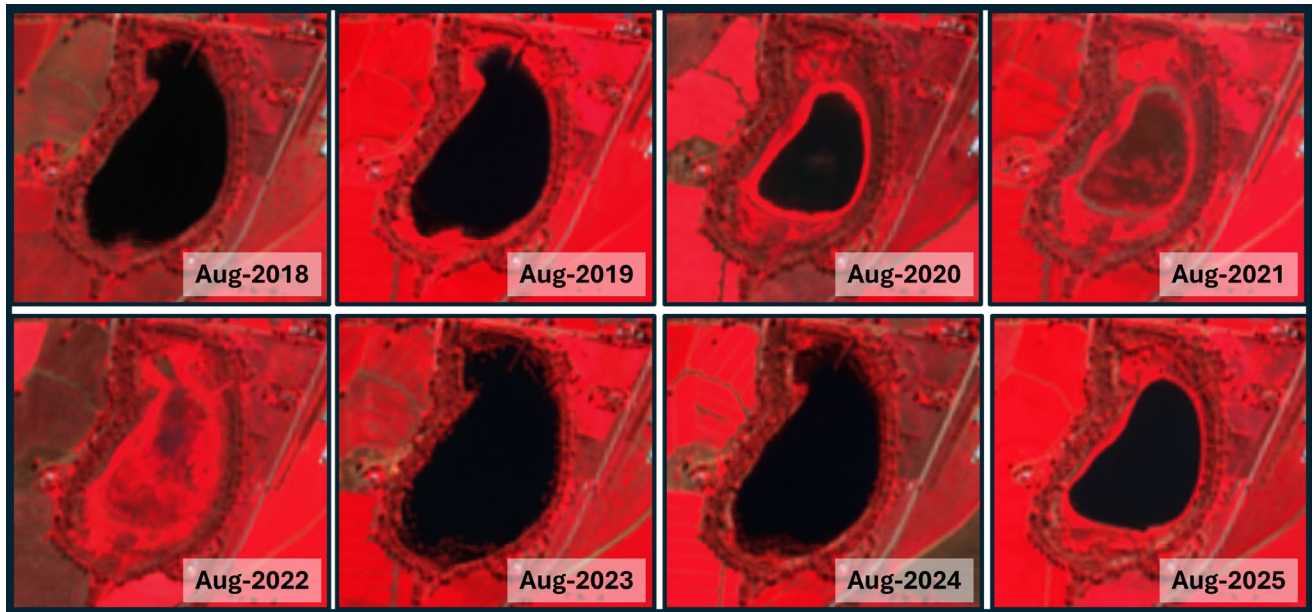


Photo 5 Copernicus Sentinel-2 false-colour images of Little Lake Meran during two inundation cycles. The only known record of a Brolga at this location was in June 2020 (one individual)

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5 Discussion – Level One and Two Assessments

The desktop review identified 48 Brolga records within 10 kilometres of the proposed wind farm boundary (Figure 1). These records were concentrated east and north-east of the study area, particularly at Lake Murphy (6 kilometres north-east of the study area). Notably, Lake Murphy was identified as a high-quality breeding habitat, supported by one breeding record from 2019. A breeding record from 1984 was noted approximately 8 kilometres east near the Loddon River. No known flocking sites were found within 25 kilometres of the study area, and Brolga flock sizes recorded did not exceed five individuals, below the threshold defining flocking habitat in the *Interim Guidelines*.

Community consultation with landholders and local community groups (environment, landcare and bird groups) was conducted in March and April 2026 to obtain undocumented records within 10 kilometres of the proposed wind farm. A total of 298 pieces of correspondence were sent, and 21 responses were received. This survey confirmed the absence of flocking or breeding Brolga records within the study area and within 5 kilometres of the proposed site.

Field verification during the Level One – Step Two Assessment classified only Lake Murphy as a high-quality breeding wetland. Although this wetland showed suitable characteristics for potential breeding, no direct Brolga observations had been recorded within this lake during recent surveys. The Level Two Assessment confirmed the absence of high-quality breeding habitat for the species within the radius of investigation, elsewhere than at Lake Murphy. During both the August and October-November field surveys, no Brolgas were observed. In addition, between August 2024 and March 2026, no Brolga was recorded during the bird utilisation surveys that were conducted throughout the study area, including five survey points close to the wetlands occurring near the eastern boundary of the study area. These wetlands were also surveyed during targeted shorebird and Latham's Snipe surveys (11 visits from December 2024 to March 2026), and no Brolga was observed. This is consistent with available online biodiversity databases (VBA, Birddata, eBird) indicating that no individuals were recorded within 10 kilometres of the study area during the last 32-month period.

According to the recently released *Species-Specific Guidance for Onshore Wind Energy Facilities – Victorian Brolga* published in the *Revised Draft – Handbook for the development of renewable energy in Victoria* (DEECA 2025) the present project does not trigger the Level Three – Qualitative risk assessment for the following reasons:

- There are no known flocking sites within at least 25 kilometres of the study site.
- No breeding records within 5 kilometres of the proposed area.
- No high-quality Brolga breeding wetland within 5 kilometres of the proposed area, based on the criteria that high-quality habitat requires wetlands with sufficient emergent vegetation to allow for nest building, which is not a feature present in any of the wetlands occurring within the radius of investigation other than Lake Murphy in 2018 to 2020.
- No record of Brolga utilising the wetlands within or in the direct vicinity of the proposed site, or flying over the proposed wind farm.

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6 Conclusion and recommendations

The integrated Level One and Level Two Assessments confirm that the Meering West Wind Farm is unlikely to result in a significant impact on Brolgas. The absence of Brolga sightings during extensive surveys, covering 2024 to 2026, and the lack of suitable high-quality breeding habitat within 5 kilometres indicate a low risk of collision, disturbance, or habitat loss to this species from the project. No flocking sites are present within the broader landscape, further reducing potential impact concerns. Accordingly, the project does not trigger the requirement for a Level Three Qualitative Risk Assessment under the *Interim Guidelines* (DSE 2012).

Since the completion of these assessments, *The Handbook for the Development of Renewable Energy in Victoria* (DEECA 2025) has been formally released. This handbook consolidates and supersedes previous guidance documents, including the *Interim Guidelines* (DSE 2012), by providing updated standards and best practice protocols for managing biodiversity impacts of renewable energy projects in Victoria. The new handbook integrates the latest scientific understanding of Brolga ecology and risk management, emphasizing a risk-based approach tailored to local habitat quality and species presence. Under the new handbook, projects such as Meering West Wind Farm, which demonstrate an absence of high-quality Brolga breeding habitat within the immediate vicinity and lack recent Brolga detections despite targeted surveys, are considered to present a low ecological risk to the species. This aligns with the findings of the Level Two Assessment, affirming that no further intensive monitoring or mitigation measures specific to Brolgas are required at this stage.

Nonetheless, *The New Handbook* recommends ongoing environmental vigilance through the implementation of an adaptive Bird and Bat Management Plan that includes post-construction monitoring. For the proposed Meering West Wind Farm, this means ensuring that any future alterations to habitat availability, (in particular around the wetland known as Salt Lake, Spectacle Lakes, Lake Meran, Little Lake Meran) such as flooding events, are considered in ongoing ecological management and will be included in the Bird and Bat Adaptive Management Plan. In the case of Salt Lake, Meering West Wind Farm proposes a mitigation measure to limit the risk of collision to waterbirds (including Brolga) during periods when this temporary wetland retains water. According to satellite data, this wetland only retains water after major flood events (such as October 2022), occurring on average every 10-20 years. Therefore, the proponent proposes to implement the following mitigation measures in addition to the Bird and Bat Adaptive Management Plan so as to reduce the risk of collision for threatened and migratory shorebird and waterbird species:

- Maintaining a 1-kilometre turbine free buffer to Great Spectacle Lake and Little Spectacle Lake.
- Inclusion of a permanent 500 m wind turbine free buffer around Salt Lake, and
- Shut down three wind turbines (WTG16, WTG 10 and WTG05, positioned between Salt Lake and the wetland system occurring east and south-east of this area) during periods when the wetland retains water.

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Appendix 1

Table 3 Wetland determined to be suitable habitat by the Breeding Habitat Suitability Model (ARI 2025) or had a Brolga record but were subsequently assessed as having low suitability following the Level One Assessment

Wetland ID (VWI)	Wetland Type	Nearest proposed turbine	Brolga records (<10 years)	Breeding habitat suitability model (ARI 2025)	Inundation periods (<10 years)	Survey date	Photo
43201	Temporary shrub swamp	4.6km	-	Suitable	Oct2016-Nov2016 Oct2022-Dec2022	13/08/2024 09/10/2024	Photo 6
43168 Great Spectacle Lake	Temporary freshwater lake	1.0km	-	Suitable	Oct2022 - on going (April 2026)	15/08/2024 16/08/2024 29/08/2024 10/10/2024 24/10/2024 07/01/2025 27/03/2025 28/03/2025 16/04/2025 09/07/2025 15/07/2025 16/07/2025 16/09/2025 20/10/2025 21/10/2025 10/12/2025 13/01/2026	Photo 7 and 8

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Wetland ID (VWI)	Wetland Type	Nearest proposed turbine	Brolga records (<10 years)	Breeding habitat suitability model (ARI 2025)	Inundation periods (<10 years)	Survey date	Photo
						14/01/2026 10/02/2026 17/02/2026 17/03/2026 19/03/2026	
43178 Round Lake	Temporary freshwater lake	2.2km	-	Suitable	Oct2016-Dec2020 Oct2022-on going (April 2026)	12/08/2024 08/10/2024 10/12/2024 09/07/2025 15/07/2025 16/09/2025 10/02/2026 17/02/2026	Photo 3
43170/43171 Lake Leaghur	Temporary shallow wetland/claypan/Temporary freshwater lake	6.3km	-	Suitable	Oct2016-Jun2018 May2021-Apr2022 Oct2022-Dec2025	14/08/2024 06/10/2024 28/03/2025 16/09/2025 10/02/2026	Photo 9
43103 Griffith Lagoon	Temporary lignum swamp	1.9km	-	Suitable	Oct2016-Dec2017 Oct2022-Dec2024	13/08/2024 09/10/2024 18/09/2025 16/12/2025 12/01/2026 17/03/2026	Photo 10

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Wetland ID (VWI)	Wetland Type	Nearest proposed turbine	Brolga records (<10 years)	Breeding habitat suitability model (ARI 2025)	Inundation periods (<10 years)	Survey date	Photo
43223	Temporary shallow wetland/claypan	8.2km	Dec-2018 (no status information)	-	Oct2016-Nov2016 Oct2022-Dec2022	13/08/2024 08/10/2024	Photo 11
43180 Lake Meran	Temporary freshwater lake	2.0km	Apr-2017 (no status information)	-	Continuously inundated since 2010	13/08/2024 15/08/2024 08/10/2024 24/10/2024 25/10/2024 28/03/2025 09/09/2025 18/09/2025 10/12/2025 10/02/2026 17/03/2026	Photo 12

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Photo 6 Wetland 43201

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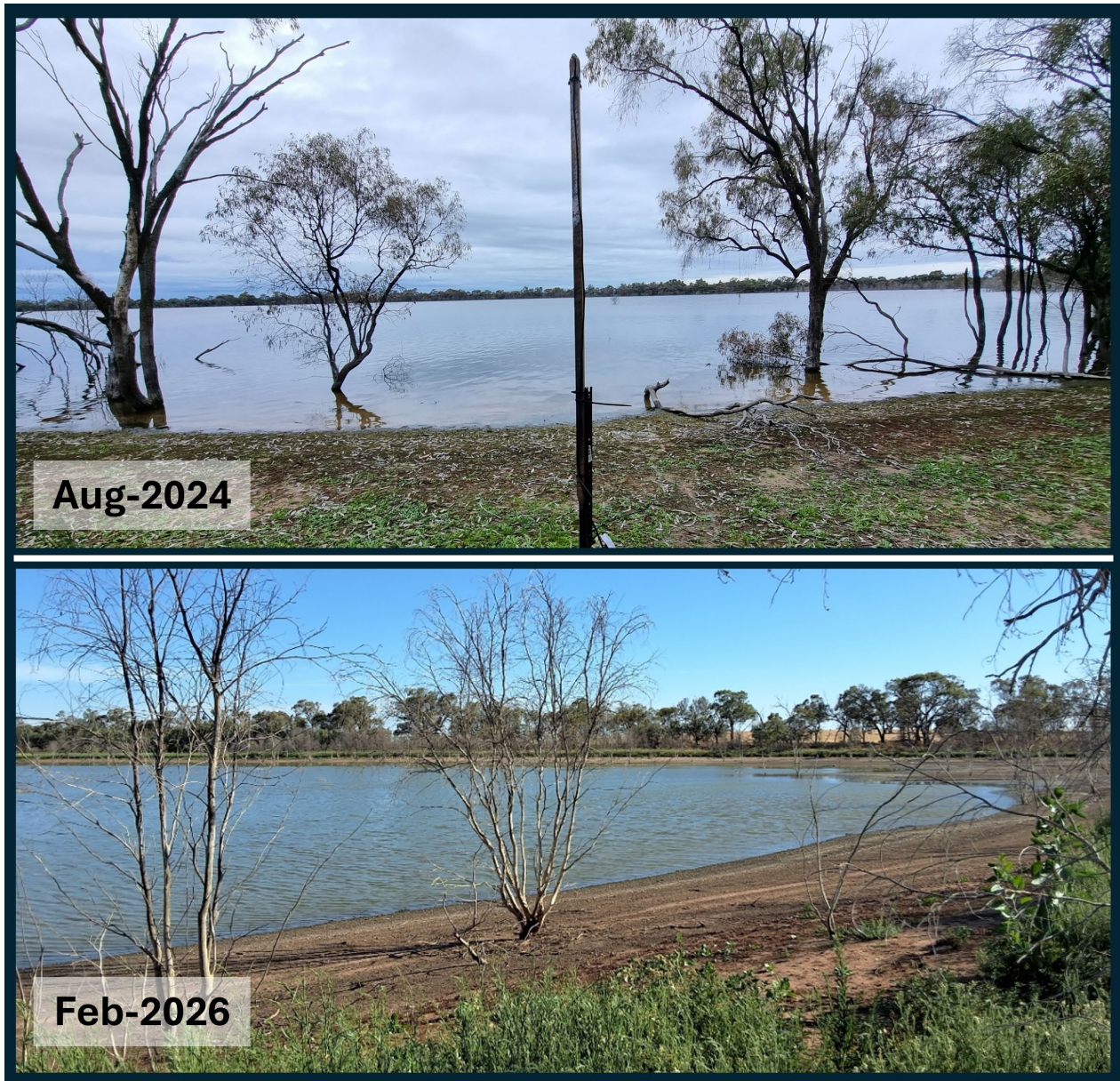


Photo 7 Great Spectacle Lake

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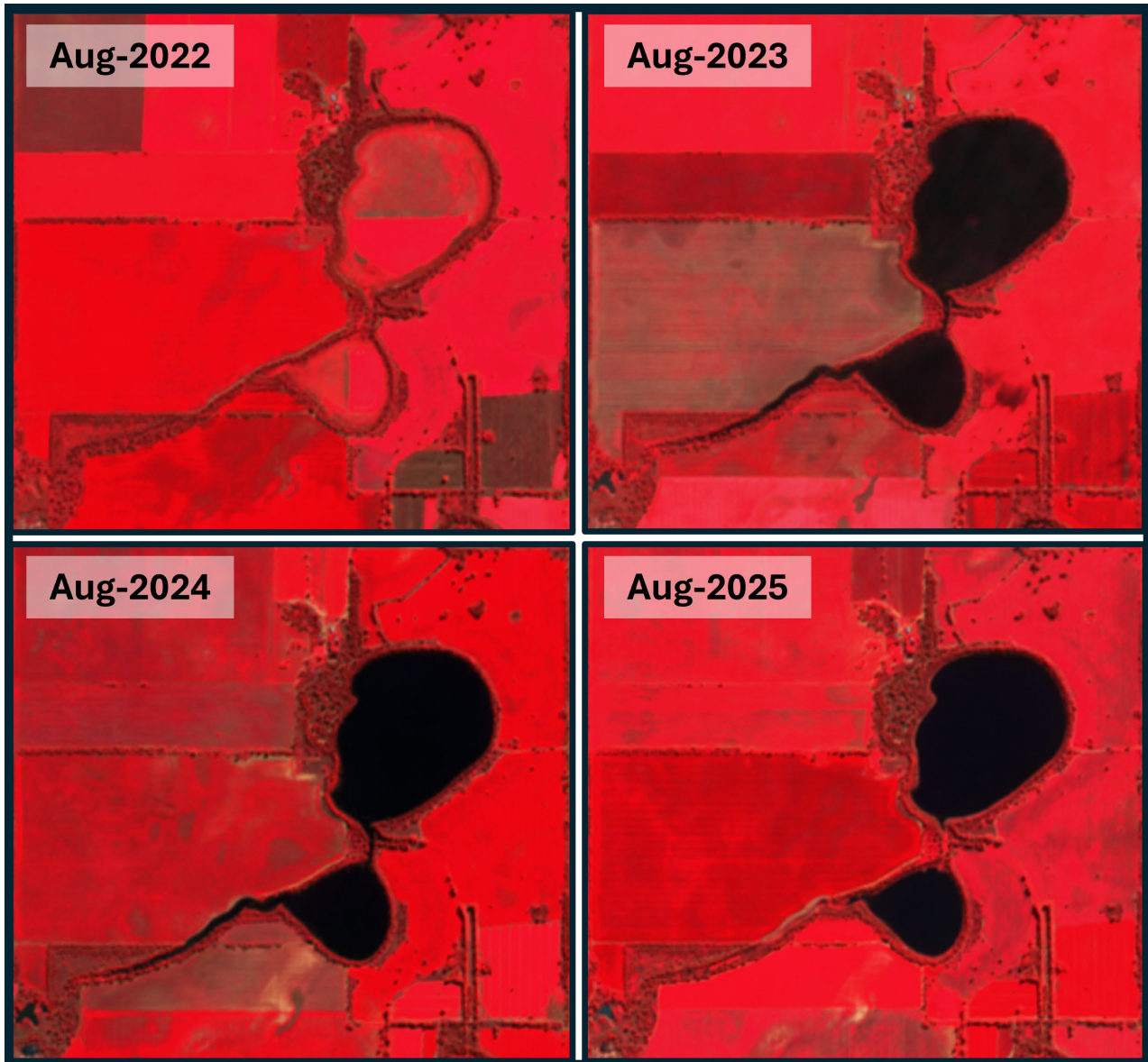


Photo 8 Copernicus Sentinel-2 false-colour images of Little and Great Spectacle Lakes during the last winters. Note the absence of emergent vegetation

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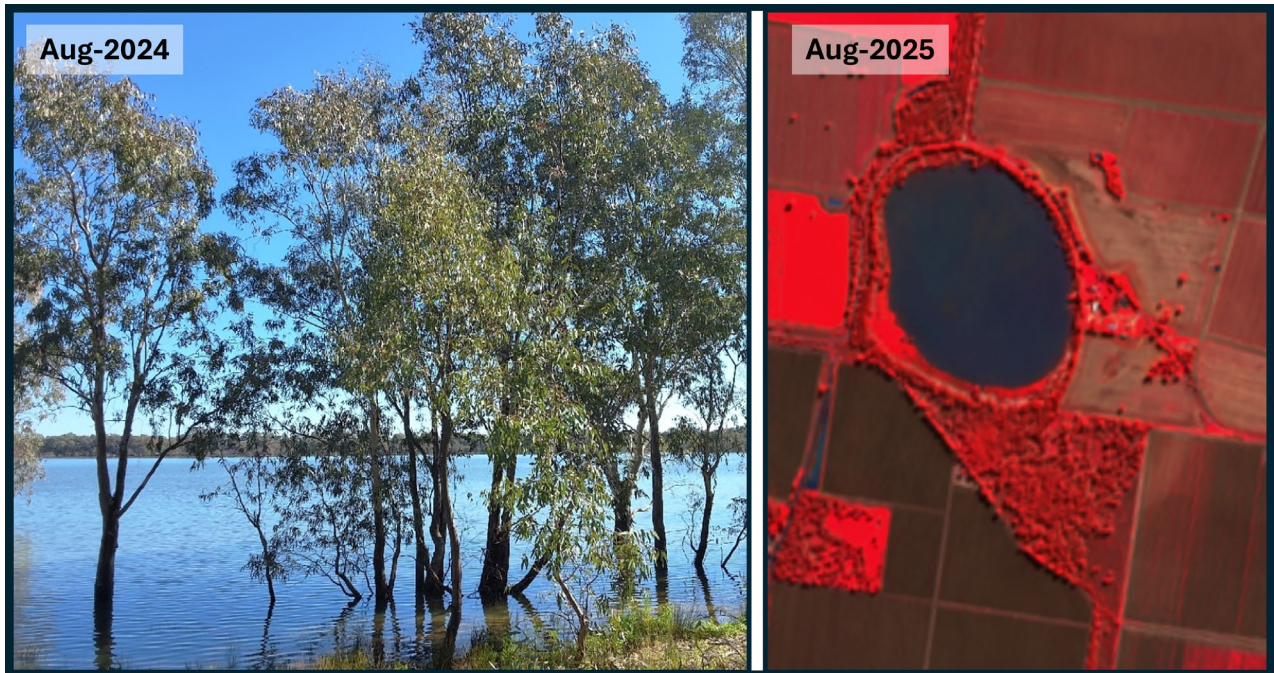


Photo 9 Lake Leaghur. On the right, the Copernicus Sentinel-2 false-colour image shows the absence of emergent vegetation

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Photo 10 Griffith Lagoon. On the right, the Copernicus Sentinel-2 false-colour image shows the absence of emergent vegetation

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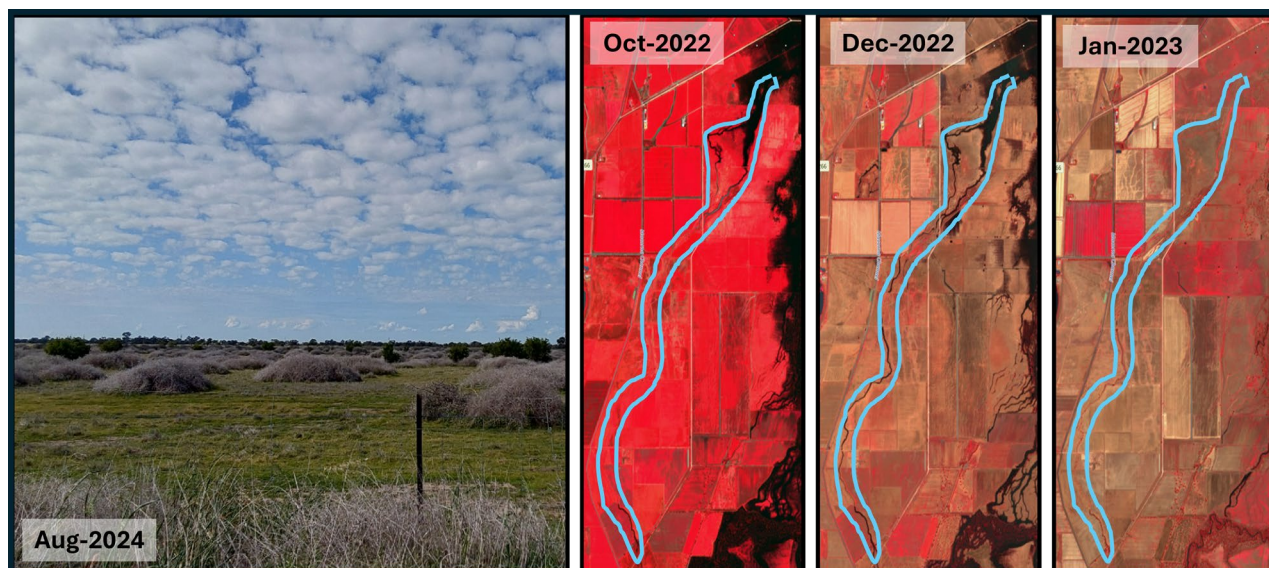


Photo 11 Wetland 43223. This wetland has not hold water for more than 120 days in the past 10 years

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Photo 12 Lake Meran

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