**Re: Keri Keri Wind Farm – Aviation Impact Assessment Technical Memorandum**

The Keri Keri Wind Farm (The Project) is located about 30 kilometres (km) southeast of Balranald, and 75 km southwest of Hay in the Murray River Local Government Area (LGA). The Project is within the South West Renewable Energy Zone (REZ) and is directly south of the Sturt Highway on land that is predominantly used for sheep grazing and cropping. The Project extends over an area of approximately 18,006 hectares (ha) across 66 freehold land parcels (Project Area). It is anticipated that up to 764 ha of this land will be subject to construction and operation of the Project (Disturbance Footprint).

ERM has engaged Aviation Projects to prepare an Aviation Impact Assessment (AIA) technical memorandum for the amended Project and address submissions received from CASA and NPWS, to support the proposed application.

## 1. Background

The Applicant has made amendments to the Project since the EIS was exhibited. The Amended Project has:

- Further avoided and/or minimised adverse environmental impacts
- Protected sensitive areas and receivers identified through specialist assessments including:
    - biodiversity
    - heritage
    - visual
    - hazards and risks
- Addressed matters raised in submissions of the exhibited Project EIS and outcomes of ongoing engagement with the community, landowners, government agencies, local council and other stakeholders
- Maximised the yield of wind power generation through optimising the position of WTGs on-site and in consideration of heritage and environmental constraints

Specifically, the amendments include:

- Revised Project area to remove two site access points
- Removal of 41 WTGs
- Micro-siting (moved <100 m) of 57 WTGs
- Relocation (moved >100m) of 6 WTGs
- Optimisation of electrical reticulation, including:
    - Eliminating 64.5 km of 33 kV overhead transmission;
    - Increase in the length of 33 kV underground transmission by 20.3 km
    - Decrease in the length of 330 kV overhead transmission by 3.79 km
- Reduction in the number of proposed O&M facilities, from three to one
- Reduction in the number of security huts, from four to two

- Optimisation of internal access tracks, which has reduced the total length by 31.8 km (from 148.3 km to 116.5 km)
- Relocation (<100 m, within micro-siting corridor) of ancillary infrastructure including:
    - 33/330 kV substations
    - 200 MW/800 MWh BESS
- Reduction in the number of biosecurity wash bays from 4 to 2 (aligned with the reduction in site access points)
- Removal of the option to use Port of Newcastle as a port of import, and associated transport route from the Port of Newcastle
- Relocation (<100 m, within micro-siting corridor) of temporary infrastructure, including:
    - Worker accommodation camp
    - Concrete batching plants
    - Laydown areas
    - Carparks
    - Construction compounds
- Reduction in the number of permanent meteorological masts, from four to three, with a height change of up to 200 m above ground level (AGL).
- Reduction in the number of temporary meteorological masts, from four to three, with a height change of up to 200 m above ground level (AGL).

The proposed WTGs model would change from an N163 to N175; the hub height remains up to 200 m, and the blade remains up to 91.5 m, resulting in a maximum tip height of 291.5m above ground level (AGL).

## 2. References

The following information sources were referenced during the preparation of this report:

- Airservices Australia
    - Airservices Australia, *Aeronautical Information Package (AIP)*, effective 27 November 2025.
    - Designated Airspace Handbook (DAH), effective 27 November 2025.
- Australian Government, Department of Infrastructure, Transport, Regional Development, Communications, the Arts and Sport (DITRDCAS), National Airport Safeguarding Framework (NASF), Guideline D *Managing the Risk to aviation safety of wind turbine installations (wind farms)/Wind Monitoring Towers*, dated July 2012.
- Civil Aviation Safety Authority
    - Advisory Circular (AC) 91-02 V1.2, *Guidelines for aeroplanes with MTOW not exceeding 5700 kg – suitable places to take off and land*, dated November 2022.
    - AC 91-10 v1.6: *Operations in the vicinity of non-controlled aerodromes*, dated September 2025.

- AC 139.E-01 v1.0—*Reporting of Tall Structures*, dated December 2021.
- AC 139.E-05 v1.1 *Obstacles (including wind farms) outside the vicinity of a CASA certified aerodrome* (October 2022).
- CASR Part 139 Manual of Standards (MOS)– *Aerodromes.*
- CASR Part 173 MOS – *Standards Applicable to Instrument Flight Procedure Design.*
- Civil Aviation Regulations 1988 (CAR).
- Civil Aviation Safety Regulations 1998 (CASR).

- International Civil Aviation Organization (ICAO):
  - Doc 8168 *Procedures for Air Navigation Services—Aircraft Operations* (PANS-OPS).
  - Annex 14—*Aerodromes.*
- OzRunways, aeronautical navigation charts extracts, dated December 2025
- Standards Australia, ISO 31000:2018 *Risk management – Guidelines*

## 3. Wind turbine generator description

In the amended Project layout, the ground elevation of terrain for the highest WTG location (WTG 75) would be 70.24 m Australian Height Datum (AHD), with the 291.5m (956.4 ft) AGL WTG maximum tip height results in a maximum overall height of 361.7 m (1186.8 ft) above mean sea level (AMSL).

Figure 1 illustrates the amended Project layout, identifying the highest WTG location, WTG 75 (source: ERM, Google Earth).

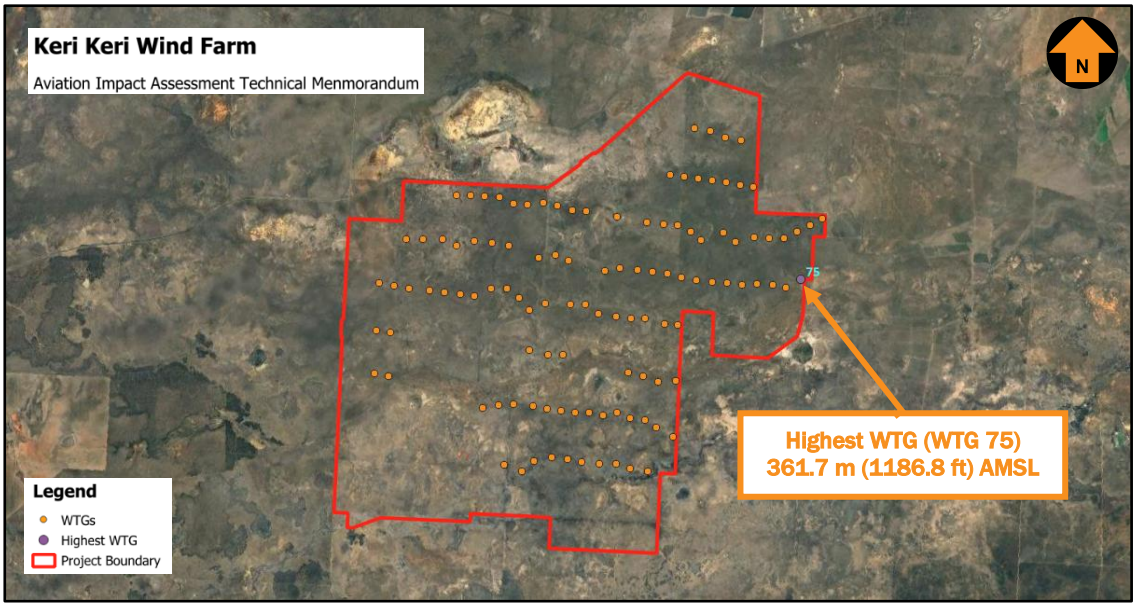


Figure 1 Project layout and highest WTG location

## 4. Wind monitoring tower description

The Project site is to comprise of three (3) temporary and three (3) permanent wind monitoring towers (WMTs) with a maximum height of up to 200 m AGL.

Figure 2 illustrates the Project's WMT layout (source: ERM, Google Earth).

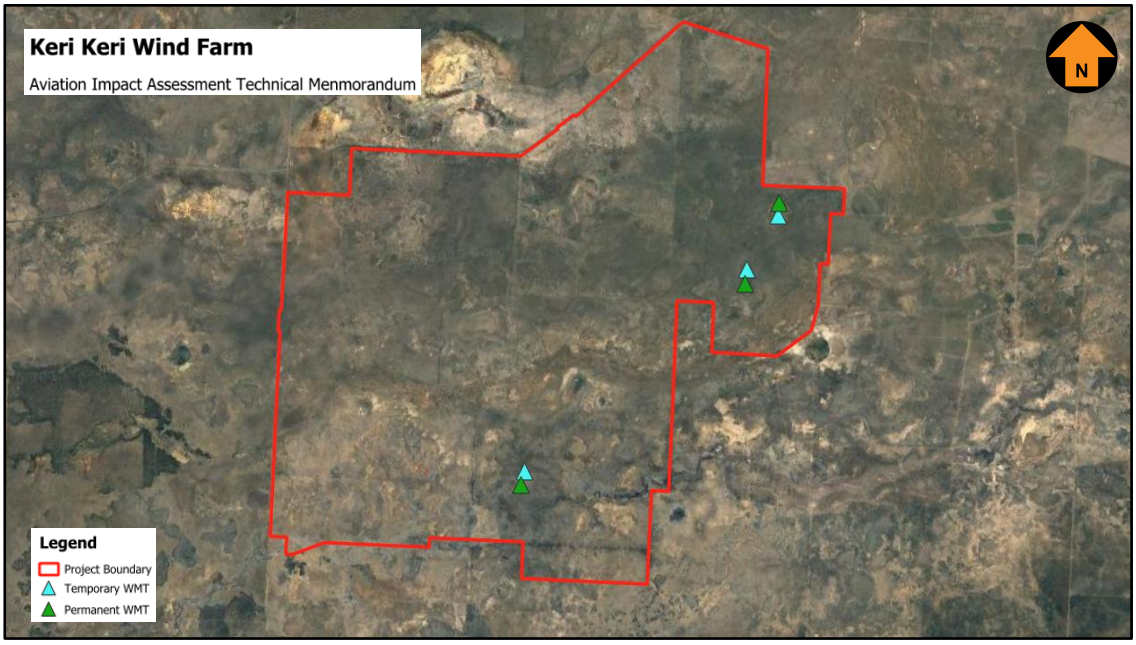


Figure 2 WMT locations

WMTs constructed prior to the WTGs, should be appropriately lit and marked in accordance with NASF Guideline D and MOS 139 Section 8.110 / 9.30. The details of the WMTs will be reported to Airservices Australia for entry into the Vertical Obstruction Database when the construction is completed.

## 5. Grid transmission

Optimisation of electrical reticulation, including:

- Eliminating 64.5 km of 33 kV overhead transmission;
- Increase in the length of 33 kV underground transmission by 81.2 km;
- Decrease in the length of 330 kV overhead transmission by 3.83 km;

Figure 3 shows the extent of overhead and underground electrical reticulation and transmission lines within the Project site.

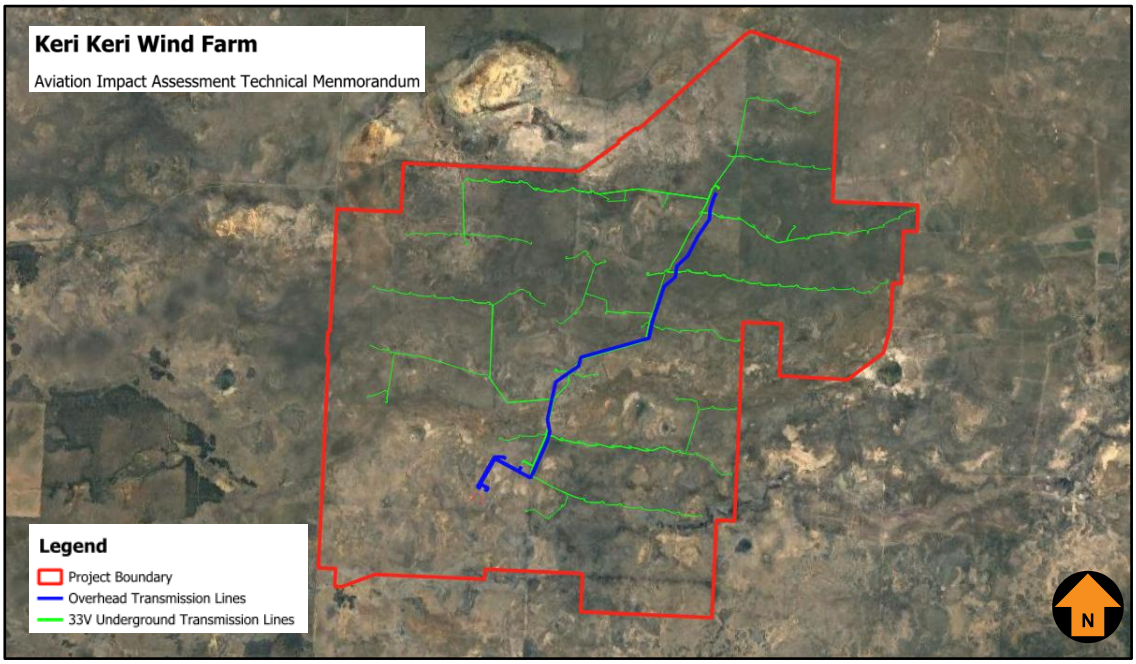


Figure 3 Electrical reticulation and transmission lines within the Project site

## 6. Balranald Airport (YBRN)

Balranald Airport is a non-instrument-certified aerodrome operated by Balranald Shire Council.

Obstacle Limitation Surfaces (OLS) are established for each aerodrome runway. For the Code 1 non-instrument runway at Balranald, the maximum lateral extent of the OLS is up to 2.7 km for the conical surface and 1.6 km for the take-off and approach surfaces.

The Project site is located beyond the horizontal extent of the OLS. Therefore, the amended Project will not impact upon the Balranald Airport OLS.

As there is no instrument flight procedure at Balranald Airport, no Procedures for Air Navigation Services – Aircraft Operations (PANS-OPS) assessment is required for this airport.

## 7. Air routes and Grid LSALT

CASR Part 173 MOS requires that the published lowest safe altitude (LSALT) for a particular airspace grid or air route provide a minimum of 1000 ft clearance above the controlling (highest) obstacle within the relevant airspace grid or air route tolerances. LSALTs may only be increased in increments of 100 ft.

### 7.1 Grid LSALT

The proposed met mast options are located within two (2) airspace grid LSALTs (Source: ERC Low National, OzRunways, December 2025, Google Earth). As of the most recent aeronautical information data, both of the Grid LSALTs are 1800 ft AMSL, providing clearance above obstacles up to 800 ft AMSL. The project spans across two Grid LSALTs horizontally, this report will refer to each grid as left or right in reference to their position laterally across the project. Grid LSALTs are not given identification numbers.

Figure 4 shows the Grid LSALT relative to the met mast (source: ERC Low National, OzRunways, Google Earth).

The highest WTG in the left 1800 ft Grid LSALT sector is approximately 360.2 m (1181.7 ft AMSL), which is 381.7 ft higher than the 800 ft obstacle height limit. The left 1800 ft Grid LSALT will need to be increased by 400 ft to 2200 ft AMSL.

The highest WTG in the right 1800 ft Grid LSALT sector is approximately 361.7 m (1186.8 ft AMSL), which is 386.8 ft higher than the 800 ft obstacle height limit. The right 1800 ft Grid LSALT will need to be increased by 400 ft to 2200 ft AMSL.

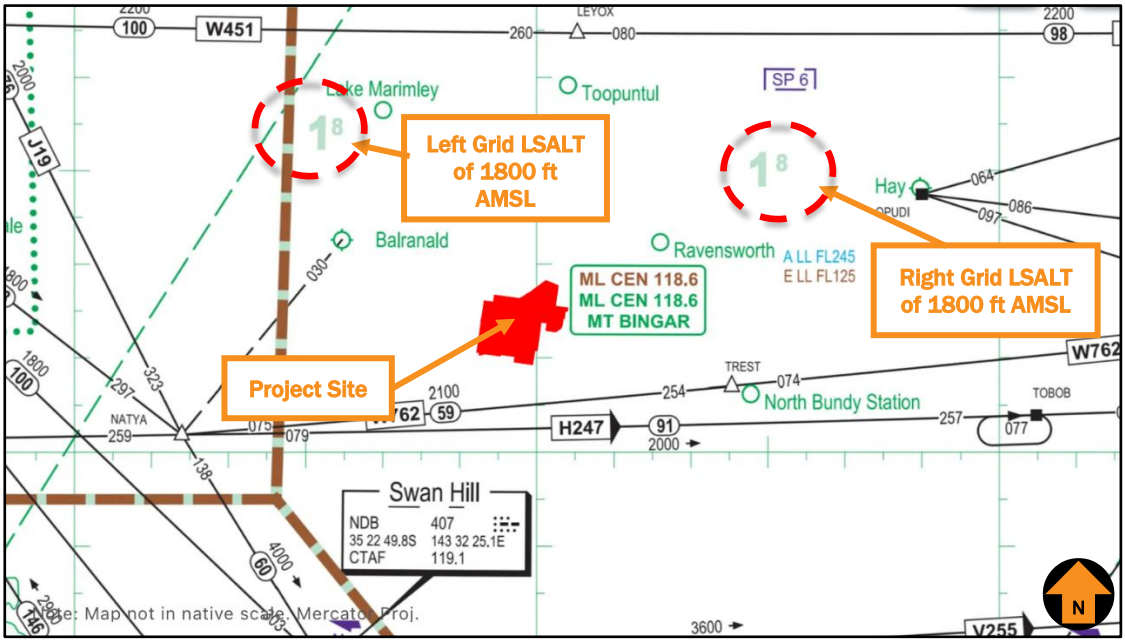


Figure 4 Grid LSALT in proximity to the Project Site.

The Applicant will engage with Airservices Australia prior to the construction of the Project regarding the changes to Grid LSALTs.

### 7.2 Air Route LSALTs

A protection area of 7 nautical miles (nm) laterally on either side of an air route is used to assess the LSALT for the air route.

There are two air routes within 7 nm of the Project Site. An impact analysis of those surrounding air routes is provided in the Table 1.

The Project Site will have an impact on the two air routes. W762 will need to be raised by 100 ft to 2200 ft AMSL, and H247 will need to be raised by 200 ft to 2200 ft AMSL.

Table 1 Air route impact analysis

| *Air route* | *Waypoint pair* | *Route LSALT* | *Protection Surface* | *Impact on airspace design* | *Potential solution* | *Impact on aircraft ops* |
|---|---|---|---|---|---|---|
| W762 | NATYA to TREST | 2100 ft AMSL | 1100 ft AMSL | WTGs exceed the obstacle limit by 86.8 ft | Raise LSALT by 100 ft to | Nil |

| Air route | Waypoint pair | Route LSALT | Protection Surface | Impact on airspace design | Potential solution | Impact on aircraft ops |
|---|---|---|---|---|---|---|
| | | | | | 2200 ft AMSL | |
| H247 | NATYA to TOBOB | 2000 ft AMSL | 1000 ft AMSL | WTGs exceed obstacle limit by 186.8 ft | Raise LSALT by 200 ft to 2200 ft AMSL | Nil |

The Applicant will engage with Airservices Australia prior to the construction of the Project regarding the changes to Air Route LSALTs.

## 8. Uncertified Aerodromes

Aviation Projects searched various aviation datasets to identify uncertified aerodromes near the project area. It is important to note that uncertified aerodromes are not subject to CASR Part 139 regulations and do not have the same airspace protection requirements as a CASR Part 139 certified aerodrome.

As a guide, an area of interest within a 3 nm radius of an uncertified aerodrome is used to assess the potential impacts of proposed developments on aircraft operations at or within the vicinity of the uncertified aerodrome. The 3 nm radius is considered to be the area in which aircraft are making preparations to join the circuit prior to landing and within which to manoeuvre after take-off to depart from the aerodrome.

No new uncertified aerodromes have been identified for this project. The Project Site remains the same and is located southwest of Jeraly Aerodrome and north of Keri Keri Aerodrome.

Keri-Keri Aerodrome's owner indicates that the aerodrome is seldom used, likely only *"about once a year over the past 5 years."*[1]

Uncertified Aerodromes in the vicinity of the Project Site are shown in Figure 5 (source: OzRunways, National Map, ERM, Google Earth). There are no WTGs within 3 nm of both aerodromes.

[1] Email from Raymond Andrew Dowling dated 12 April 2023

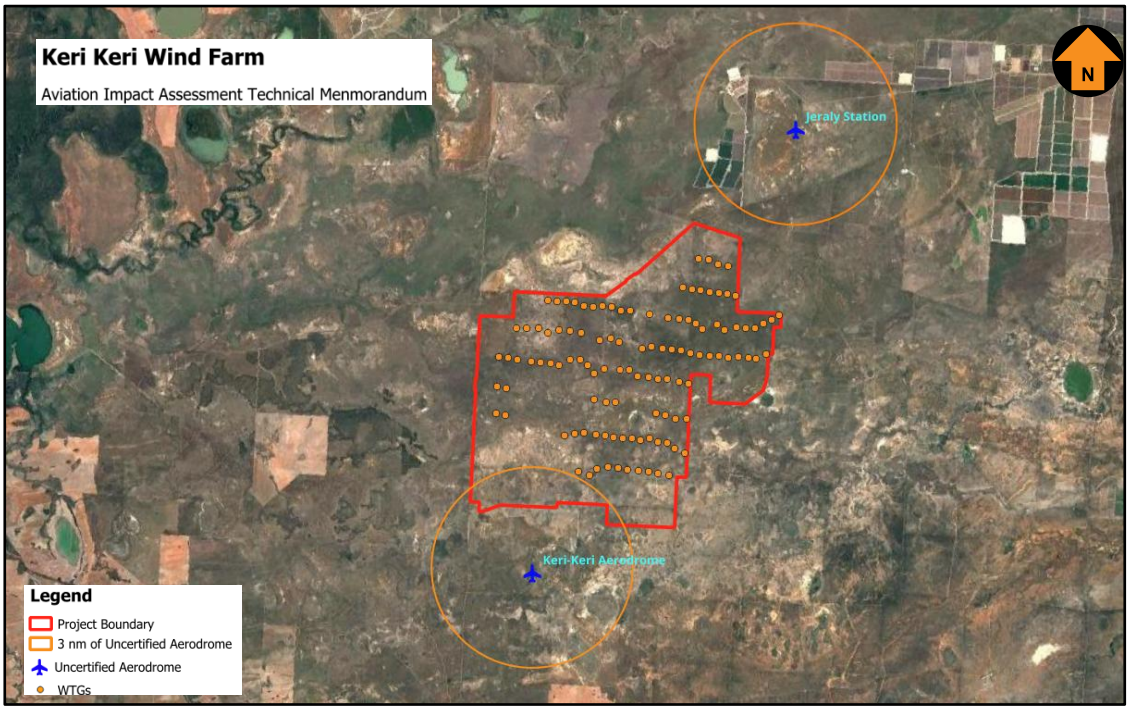


Figure 5 Uncertified Aerodromes in the vicinity of the Project Site

### 8.1 NSW National Parks and Wildlife Service (NPWS)

The Project is close to the Yanga State Conservation Area (SCA), Figure 6 (Source: NSW National Parks and Wildlife Service webpages) shows the park boundary.

NPWS provides feedback regarding the WTGs related to Yanga SCA. In NPWS's input, two landing facilities have been identified. Both landing facilities are located more than 26 km away from the closest WTGs, which is more than 3 nm radius from the closest WTGs, and should not cause any concerns.

Prior to construction, a lighting plan will be prepared in consultation with CASA, which will include minimum 200 candela intensity obstacle lighting and identify WTGs which will include obstacle lighting. It will meet the requirements of NPWS.

The Applicant is also committed to developing operational procedures in consultation with NPSW to minimise the identified impacts to NPSW and to ensure safe flight practices.

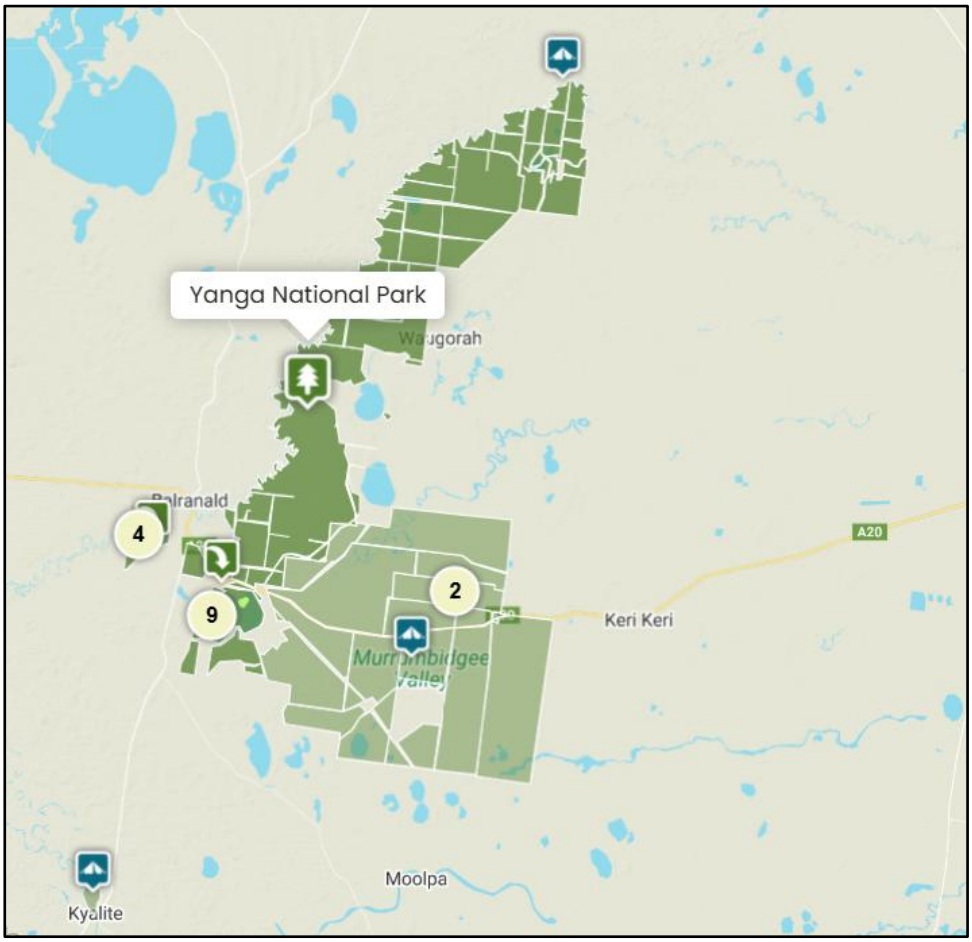


Figure 6 National Park

## 9. Potential wake turbulence impacts

National Airports Safeguarding Framework (NASF) Guideline D – *Managing the Risk to Aviation Safety of Wind Turbine Installations (Wind Farms)/Wind Monitoring Towers* provides guidance to State/Territory and local government decision makers, airport operators and developers of wind farms to jointly address the risk to civil aviation arising from the development, presence and use of wind farms and WMTs.

The rotor diameter for each WTG is up to 183 m. Based on this scenario, the effects of wake turbulence detailed in the NASF could be noticeable at 2928 m from the WTGs.

Aviation Projects applies a conservative area within 10 rotor diameters when assessing downwind turbulence from WTGs. It would be the maximum area where wake turbulence from WTGs would be felt by pilots operating in the circuit area of an aerodrome. This turbulence would not be considered to create an adverse impact to the aircraft. This area would therefore have a maximum radius of 1830 m from a WTG.

Due to removal of the WTGs closest to Jeraly Station as part of the amended Project, there is no longer any wake turbulence extending within 3 nm of Jeraly Station. Therefore, WTGs of the Project Site have no impact on Jeraly Station.

It can be seen that the effects of wake turbulence could extend slightly into the 3 nm area north of the Keri-Keri Aerodrome. Note that this is consistent with the EIS assessment. Aircraft departing or arriving at the Keri-

Keri Aerodrome within the 3 nm area, and outside the standard circuit area, would be expected to be above the WTGs. The area within 1 nm of the runway is considered to be the area in which aircraft conduct standard circuit operations immediately after take-off and prior to landing. There is a limited possibility of wake turbulence affecting operations of aircraft arriving and departing at the Keri-Keri Aerodrome from the north or northeast, but highly unlikely in the circuit area. The landowner has advised that this aerodrome is rarely used. Figure 7 shows the applicable distances.

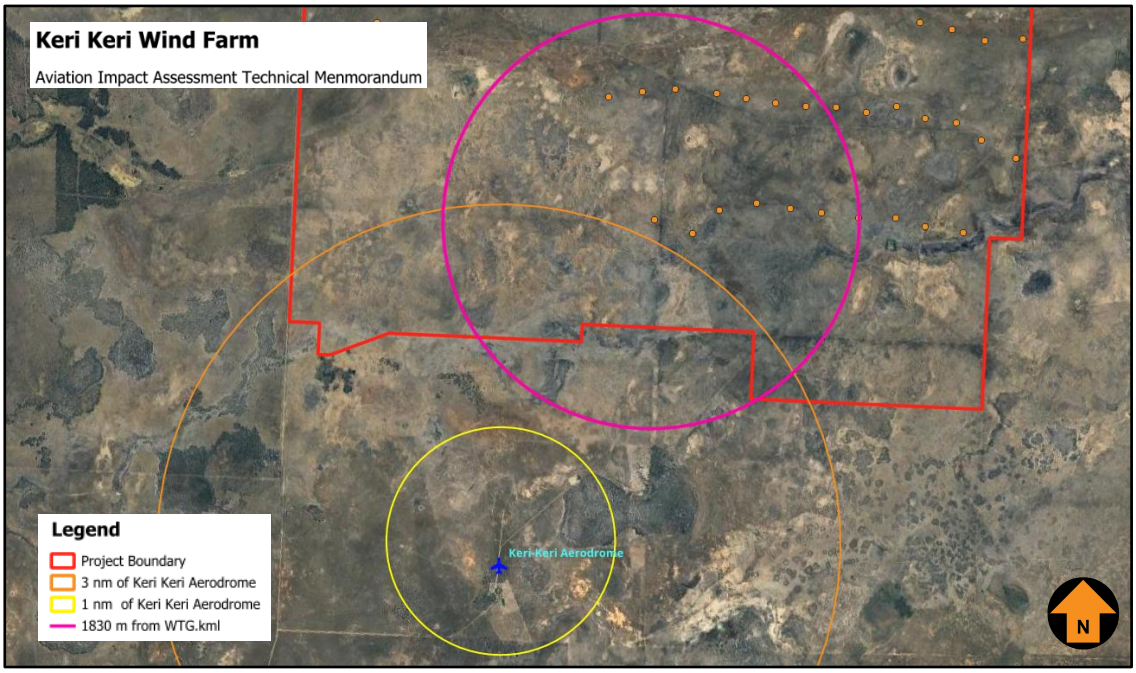


Figure 7 Keri-Keri Aerodrome

## 10. Airspace Protection

The Project area is located in Class G airspace which is uncontrolled airspace, and is not located in any Prohibited, Restricted, or Danger Areas.

As the Project Site remains the same, there will not be an impact on controlled or designated airspace.

## 11. Aviation facilities

The Project area is located at a sufficient distance from nearby certified airports and will not affect those airports' aviation facilities.

## 12. Radar installations

Airservices Australia requires an assessment of the potential for the WTGs to affect radar line of sight. The closest radar facility to the Project site is the Mt Macedon Secondary Surveillance Radar (SSR), which is located approximately 296 km to the south.

As the Project Site remains the same and is outside the range of the Mt Macedon radar, the Project will not impact this facility.

## 13. Risk Assessment

Risk assessment has been included in the previous final report. As there are no major changes to the outcome of the amended Project Layout. There are no changes to the risk assessment.

## 14. Lighting of WTGs

For this Project, CASA has recommended that 200 candela as a minimum intensity lighting on the nacelle would suffice, due mainly to the lack of background lighting in the vicinity of the turbines. The obstacle lighting should be steady medium-low intensity red obstacle lighting. The obstacle lighting should be monitored to alert the wind farm operator of any outage and at least some of the obstacle lights remain on during an outage (CASA Assessment – Keri Keri Wind Farm SSD-38358962, dated 12 June 2024).

Prior to construction, a lighting plan will be prepared in accordance with NASF Guideline D and in consultation with CASA. This lighting plan will identify which WTGs will require obstacle lighting, as it is expected that not all WTGs will require obstacle lighting.

## 15. Summary

The following list of findings summarises the changed results from the previous report (100507-01_Keri_Keri_WF_AIA_Final V1.0 240229), based on the Project WTG layout and maximum blade tip height of up to 291.5 m AGL, the blade tip elevation of the highest WTG, which would be WTG 75, would not exceed 361.7 m (1186.8 ft) AMSL. Most of the finds remain the same as the previous report (V1.0 240229). The only difference would be:

- The Project Site would have an impact on two grid LSALTs, which both now have 1800 ft Grid LASTs.
    - both Grid LSALTs will need to be increased to 2200 ft AMSL.
- The Project Site does not have potential wake turbulence impacts extending within 3 nm of Jeraly Station.
- Prior to construction, a lighting plan will be prepared in consultation with CASA, which will include minimum 200 candela intensity obstacle lighting and identify WTGs which will include obstacle lighting.
- The Applicant will engage with Airservices Australia prior to the construction of the Project regarding the changes to LSALTs.

If you wish to clarify or discuss the contents of this correspondence, please get in touch with me on 0433 747 835.

Kind regards

PP 

Lyn Wang

Aviation Specialist Consultant

19 December 2025