Appendix I

Aviation Impact Assessment

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AVIATION PROJECTS

November 2024

AVIATION IMPACT ASSESSMENT

NORMANVILLE ENERGY PARK

Prepared for Westwind Energy Development Pty Ltd

AVIATION PROJECTS

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ACRONYMS

AAAA	Aerial Application Association of Australia
AC	Advisory Circular
AFAC	Australasian Fire and Emergency Services Council
AGL	above ground level
AHD	Australian Height Datum
AIA	aviation impact assessment
AIP	Aeronautical Information Package
AIS	aviation impact statement
ALA	aircraft landing area
ALARP	as low as reasonably practicable
AMSL	above mean sea level
ARP	Aerodrome Reference Point
AS	Australian Standards
AsA	Airservices Australia
ATSB	Australian Transport Safety Bureau
BoM	Bureau of Meteorology
CAAP	Civil Aviation Advisory Publications
CAO	Civil Aviation Orders
CAR	Civil Aviation Regulation (1988)
CASA	Civil Aviation Safety Authority
CASR	Civil Aviation Safety Regulation (1998)
CFIT	controlled flight into terrain
CNS	communications, navigation and surveillance
CTAF	common traffic advisory frequency
DAH	Designated Airspace Handbook
EIS	environmental impact statement
ERC-H	en-route chart high
ERC-L	en-route chart low
ERSA	En Route Supplement Australia
GA	general aviation

ICAO	International Civil Aviation Organization
IFR	instrument flight rules
IMC	instrument meteorological conditions
LGA	local government area
LSALT	lowest safe altitude
MOC	minimum obstacle clearance
MOS	Manual of Standards
MSA	minimum sector altitude
NASAG	National Airports Safeguarding Advisory Group
NASF	National Airports Safeguarding Framework
NDB	non-directional (radio) beacon
OLS	obstacle limitation surface
PANS-OPS	Procedures for Air Navigation Services – Aircraft Operations
PSR	primary surveillance radar
RAAF	Royal Australian Air Force
RFDS	Royal Flying Doctor Service
RPT	regular public transport
RSR	route surveillance radar
SSR	secondary surveillance radar
VFR	visual flight rules
VFRG	visual flight rules guide
VMC	visual meteorological conditions
WMTs	wind monitoring towers
WTGs	wind turbine generators

UNITS OF MEASUREMENT

ft	feet	(1 ft = 0.3048 m)
km	kilometres	(1 km = 0.5399 nm)
m	metres	(1 m = 3.281 ft)
nm	nautical miles	(1 nm = 1.852 km)

DEFINITIONS

Definitions of key aviation terms are included in **Annexure 2**

NOTES

Nil

EXECUTIVE SUMMARY

Introduction

Westwind Energy Pty Ltd (Westwind Energy - the Proponent) is proposing to develop the Normanville Energy Park (the Project), located approximately 15 km southwest of Kerang, in Victoria's Gannawarra Shire region.

Westwind Energy is currently undertaking detailed planning and environment investigations for the Project and has engaged Aviation Projects to prepare an Aviation Impact Assessment (AIA) for the Project to inform and support the Project's design, referrals and applications, including referrals under the Environment Effects Act 1978 and Environment Protection and Biodiversity Conservation Act 1999 (Cth), an Environment Effects Statement (if required) and a planning permit application.

This AIA assesses the potential aviation impacts, provides aviation safety advice in respect of relevant requirements of air safety regulations and procedures, and informs and documents consultation with relevant aviation agencies. This AIA assesses the Project's specific impacts on nearby airstrips and certified aerodromes and any other matters that should be considered during the referrals process including the potential impact to operations at Kerang aerodrome.

This AIA report includes an Aviation Impact Statement (AIS) and a qualitative risk assessment to determine the need for obstacle lighting and of applicable aspects for client review and acceptance before submission to external aviation regulators.

The AIA and supporting technical data will provide evidence and analysis for the planning application to demonstrate that appropriate risk mitigation strategies have been identified. The AIA will be undertaken in accordance with:

- National Airports Safeguarding Framework (NASF) Guideline D: *Managing the Risk to aviation safety of wind turbine installations (wind farms)/Wind Monitoring Towers effective July 2012*
- Specific requirements as advised by Airservices Australia and the Civil Aviation Safety Authority (CASA).

Project description

The Normanville Energy Park includes the following:

- The construction and operation of a wind farm with a maximum of 17 wind turbine generators (WTGs) with a maximum tip height of up to 280 m AGL
- 7.2 km of external transmission line to connect to the proposed Koorangie Terminal Station, which will be located between 4 – 5 km north of the Project Area
- Ancillary infrastructure, including access tracks, road upgrades, underground and overhead electricity cabling, substations, transmission lines and grid connection to the transmission network
- Permanent WMT is 150 m (492 ft) AGL. And the temporary Met Mast is 107 m (351 ft) AGL.

Conclusions

Based on a comprehensive analysis and assessment detailed in this report, the following conclusions were made:

Planning considerations

1. The Project may be affected by the application of the Gannawarra Shire Council Planning Scheme which has strategic directions for transport established, including to:
    a. Discourage land use and development that impacts on the functions of Kerang Airport
    b. Protect local landing strips for commuting and emergency use.
2. It is considered that consultation with the Gannawarra Shire Council and confirmation of the impact to the terminal instrument flight procedures are required to manage the impact of the strategic transport directions established in the planning scheme. It is anticipated that the required changes to the instrument flight procedures could be made without adversely affecting the overall efficacy of the procedures and without affecting the accessibility of emergency aircraft to the aerodrome.
3. Consultation feedback received on 18 September 2024 by Craig Maffescioni (Manager – Operational Services) from Gannawarra Shire Council and confirm that: *At this stage Council has no issue with the with the proposal and has been in contact with the relevant agencies to update the necessary documents.*

Certified airports

4. There are 3 certified airports located within 30 nm of the Project Site. The closest certified aerodrome is Kerang aerodrome (YKER) which is located approximately 12.6 km (6.8 nm) east-northeast of the Project Area boundary to the aerodrome reference point. Swan Hill (YSWH) and Wycheproof (YWYF) aerodromes are also located within 30 nm of the Project Area.
5. The Project will impact Procedures for Air Navigation Services - Aircraft Operations (PANS-OPS) surfaces by infringing the 10 nm and 25 nm minimum sector altitude (MSA) of the of terminal instrument flight procedures at Kerang aerodrome and the 25 nm MSA for Swan Hill aerodrome. These procedures will need to be amended to accommodate the Project. Wycheproof aerodrome does not have terminal instrument flight procedures implemented and won't be affected by the Project.

Obstacle Limitation Surfaces

6. The Project WTGs and wind monitoring tower (WMT) are located outside the horizontal extent of and won't impact the obstacle limitation surface of any certified aerodrome, including Kerang aerodrome.

Aircraft Landing Areas (ALAs)

7. There are no ALAs impacting the Project. As a guide, an area of interest within a 3 nm radius of an ALA is used to assess potential impacts of proposed developments on aircraft operations at or within the vicinity of the ALA.

Air Routes and Lowest Safe Altitude (ERCL)

8. The Project will impact the grid LSALT of 2000 ft above mean sea level (AMSL) established in EnRoute Chart – Low (ERCL 2).

Airspace

9. The Project Area is located outside of controlled airspace (wholly within Class G airspace), Prohibited or Restricted areas.

Aviation Facilities

10. The Project WTGs will not penetrate any protection areas associated with aviation facilities.

Radar

11. Due to the distance and intervening terrain between the Project Area and the Mt Macedon Air Traffic Control (ATC) surveillance radar and Gellibrand Hill Primary Surveillance Radar facilities, it is anticipated that the Project will not impact radar facilities.

Aviation Impact Statement (AIS)

12. Based on the proposed Project WTG layout and maximum blade tip height of up to 280 m AGL, the blade tip elevation of the highest WTG will not exceed 374.7 m Australian height Datum (AHD) (1229 ft AMSL) and:

    a) will not penetrate any obstacle limitation surfaces of any certified aerodrome

    b) **will** impact PANS-OPS surfaces by infringing the 10 nm and 25 nm MSA of the of terminal instrument flight procedures at Kerang aerodrome and the 25 nm MSA for Swan Hill aerodrome

    c) will not have an impact on the operations of any proximate ALAs

    d) **will** impact the grid LSALT of 2000 ft AMSL established in ERCL 2

    e) will not have an impact on nearby designated air routes

    f) is wholly contained within Class G airspace

    g) is outside the clearance zones associated with civil aviation navigation aids and communication facilities.

Obstacle lighting risk assessment

13. Aviation Projects has undertaken a safety risk assessment of the Project and concludes that the proposed WTGs will not require obstacle lighting to maintain an acceptable level of safety to aircraft

14. The WMT which is proposed to be installed prior the WTGs is not strictly required to have an obstacle light however the proponent is electively installing a low-intensity obstacle light to reduce the risk of collision further

15. Following consultation with local aerial application operators, if a risk assessment is required, the Proponent should follow standards outlined in the Australian Standards (AS) 3891.2:2018 *Air navigation – Cables and their supporting structures – Marking and safety requirements Part 2: Low level aviation operations*.

Consultation

The Proponent will undertake consultation with the stakeholders identified in this assessment during the planning application process.

Summary of key recommendations

A summary of the key recommendations of this AIA is set out below.

The full list of recommendations and associated details are provided in Section 11 'Recommendations' at the end of this report.

1. 'As constructed' details of the coordinates and elevations of the WTGs and WMT should be provided to Airservices Australia, using the Vertical Obstruction Data form (https://www.airservicesaustralia.com/wp-content/uploads/ATS-FORM-0085_Vertical_Obstruction_Data_Form.pdf to the following email address: vod@airservicesaustralia.com
2. The Proponent should consider engaging with local aerial agricultural operators and aerial firefighting operators in developing procedures for such aircraft operations in the vicinity of the Project site.
3. Details of the final wind farm layout should be provided to local and regional aircraft operators prior to construction so they can plan their operations accordingly.
4. The rotor blades, nacelles and towers of the WTGs will be coloured light grey and should be easily visible to pilots during the day.
5. Overhead transmission lines and/or supporting poles associated with the Project that are located where they could adversely affect aerial application operations should be identified in consultation with local aerial agriculture operators and marked in accordance with Part 139 Manual of Standards (MOS) Chapter 8 Division 10 section 8.110 (7) and section 8.110 (8) where applicable.

1. INTRODUCTION

1.1. Situation

Westwind Energy is currently undertaking detailed planning and environment investigations for the Normanville Energy Park and has engaged Aviation Projects to prepare an Aviation Impact Assessment (AIA) for the Project. This will inform and support the Project's design, referrals and applications, including referrals under the Environment Effects Act 1978 and Environment Protection and Biodiversity Conservation Act 1999 (Cth), an Environment Effects Statement (if required) and a planning permit application.

This AIA assesses the potential aviation impacts, provides aviation safety advice in respect of relevant requirements of air safety regulations and procedures, and informs and documents consultation with relevant aviation agencies.

This AIA report includes an AIS and a qualitative risk assessment to determine the need for obstacle lighting.

1.2. Purpose and Scope

The purpose and scope of work is to prepare an AIA for consideration by Airservices Australia, CASA and Department of Defence and to support the development application.

The AIA specifically responds to the following key legislation, approvals, and guidance material:

- Policy and Planning Guidelines for Development of Wind Energy Facilities in Victoria, dated September 2023
- Gannawarra Planning Scheme, last updated 11 October 2024
- National Airspace Safeguarding Framework Guideline D: Managing the Risk to aviation safety of wind turbine installations (wind farms)/Wind Monitoring Towers effective July 2012
- Civil Aviation Safety Authority (CASA) Part 139 (Aerodromes) Manual of Standards
- Other specific requirements as advised by Airservices Australia.

1.3. Methodology

Aviation Projects conducted the task in accordance with the following methodology:

1. Confirm the scope and deliverables with the Proponent (or representative)
2. Review client material
3. Review relevant regulatory requirements and information sources
4. Prepare a draft AIA and supporting technical data that provides evidence and analysis for the planning application to demonstrate that appropriate risk mitigation strategies have been identified
5. Prepare an AIS and a qualitative risk assessment to determine need for obstacle lighting and marking
6. Identify risk mitigation strategies that provide an acceptable alternative to night lighting. The risk assessment was completed following the guidelines in *ISO 31000:2018 Risk Management – Guidelines*

7. Consult with relevant Councils, Part 173 procedure designers, Airservices Australia and aerodrome operators of the nearest aerodrome/s to seek endorsement of the proposal to change instrument procedures (if applicable)
8. Consult/engage with stakeholders to negotiate acceptable outcomes (if required)
9. Finalise the AIA report for client acceptance when responses received from stakeholders for client review and acceptance.

1.4. Aviation Impact Statement (AIS)

The AIS included in this report (see Section 6) includes the following specific requirements as advised by Airservices Australia:

Aerodromes:

- Specify all certified aerodromes that are located within 30 nm (55.6 km) of the project site
- Nominate all instrument approach and landing procedures at these aerodromes
- Review the potential effect of the Project operations on the operational airspace of the aerodrome(s)

Air Routes:

- Nominate air routes published in ERC-L & ERC-H which are located near/over the project site and review potential impacts of Project operations on aircraft using those air routes
- Specify two waypoint names located on the routes which are located before and after the obstacles

Airspace:

- Nominate the airspace classification – A, C, D, E, G etc where the project site is located

Navigation/Radar:

- Nominate radar navigation systems with coverage overlapping the site.

1.5. Material reviewed

Material provided by the Proponent for preparation of this assessment include:

- Updated WTG layout, NMEP_WTGLayout_v15-01_Current.shp, received by email 04 November 2024
- Updated WTG elevation, Copy of NMEP_WTGLayout.dbf.xlsx, received by email 01 November 2024
- Site boundary, NMEP_SiteBoundary_v09-01.kml, received by email 18 April 2024
- Easement Routes, NMEP_TransmissionLine_v15-01_Current.shp, received by email 04 November 2024
- Met Mast location, Met Mast.kml, received by email 06 November 2024

2. BACKGROUND

2.1. Site overview

The Normanville Energy Park site boundary is located approximately 11 km southwest of the town of Kerang, 115 km northwest of Bendigo and 247 km northwest of Melbourne in northern Victoria.

An overview of the Project site relative to the town of Kerang and nearby roads is provided in Figure 1 (source: Westwind Energy, Google Earth).

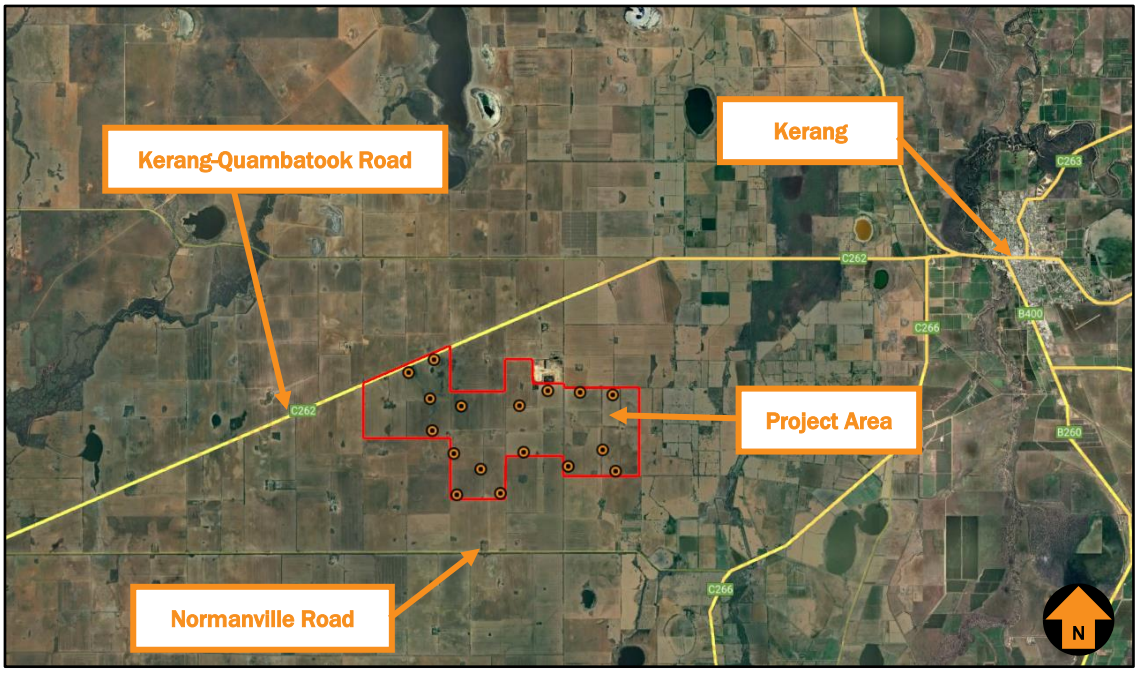

Figure 1 Project site overview

2.2. Project Description

The Project involves the construction and operation of the Normanville Energy Park, including a final layout of up to 17 wind turbine generator (WTG) locations with associated electrical and ancillary infrastructure.

WTGs will have maximum tip heights of 280 m AGL.

17 different WTG locations have been identified and are assessed in this aviation impact assessment.

3. EXTERNAL CONTEXT

3.1. National Airports Safeguarding Framework

The National Airports Safeguarding Advisory Group (NASAG) was established by Commonwealth Department of Infrastructure and Transport to develop a national land use planning framework called the National Airports Safeguarding Framework (NASF). The purpose of the NASF is to enhance the current and future safety, viability, and growth of aviation operations at Australian airports through:

- the implementation of best-practice in relation to land use assessment and decision making in the vicinity of airports
- assurance of community safety and amenity near airports
- better understanding and recognition of aviation safety requirements and aircraft noise impacts in land use and related planning decisions
- the provision of greater certainty and clarity for developers and landowners
- improvements to regulatory certainty and efficiency
- the publication and dissemination of information on best practice in land use and related planning that supports the safe and efficient operation of airports.

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 wind monitoring towers.

3.2. Victorian Planning Context

The Department of Transport and Planning has published *Planning Guidelines for Development of Wind Energy Facilities* (revised September 2023). These guidelines provide advice to inform planning decisions about a wind energy facility proposal.

The purpose of these guidelines is to set out:

- a framework to provide a consistent and balanced approach to the assessment of wind energy projects across the state
- a set of consistent operational performance standards to inform the assessment and operation of a wind energy facility project
- guidance as to how planning permit application requirements might be met.

The guidelines provide advice regarding locations in the state that are not appropriate for wind energy facilities. They also give a framework to ensure proposals for wind energy facilities are thoroughly assessed, including other considerations and approvals required in the process.

Section 4.3.5 *Aircraft safety issues* and Section 5.1.5 *Aircraft safety* are relevant to this AIA and details are extracted below:

Section 4.3.5 Aircraft safety issues

The height of wind energy turbines can be substantial, resulting in potential impacts upon nearby airfields and air safety navigation. Applicants (for a wind energy facility permit) should address aircraft safety issues by considering the site's proximity to airports, aerodromes, or landing strips.

Applicants should consult with the Civil Aviation Safety Authority (CASA) for wind energy facility proposals that:

- *are within 30 kilometres of a declared aerodrome or airfield*
- *infringe the obstacle limitation surface around a declared aerodrome*
- *include a building or structure the top of which will be 110 metres or more above natural ground level (height of a wind turbine is that reached by the tip of the turbine blade when vertical above ground level).*

Early engagement with aviation safety organisations like CASA is encouraged as aviation safety is a complex area of wind energy facility assessment.

In addition to CASA consultation, the following is relevant for anemometers and other pre-permit infrastructure.

The Aeronautical Information Service of the Royal Australian Air Force (RAAF AIS) maintains a database of tall structures in the country. The RAAF AIS should be notified of all tall structures meeting the following criteria:

- *30 metres or more above ground level for structures within 30km of an aerodrome; or*
- *45 metres or more above ground level for structures located elsewhere.*

The contact details for the RAAF AIS are: tel: (03) 9282 5750 or ais.charting@defence.gov.au.

Operators of certified aerodromes are required to notify CASA if they become aware of any development or proposed construction near the aerodrome that is likely to create an obstacle to aviation, or if an object will infringe the Obstacle Limitation Surfaces (OLS) or Procedures for Air Navigation Services –Operations (PANS-OPS) surfaces of an aerodrome. Operators of registered aerodromes should advise CASA if the proposal will infringe the OLS; CASA will ask Airservices to determine if there is an impact on published flight procedures for the aerodrome.

More information can be found on the aviation safety page at infrastructure.gov.au.

5.1.5 Aircraft safety

The height of wind energy turbines can be substantial, resulting in potential impacts upon nearby airfields and air safety navigation. A responsible authority should consider the proximity of the site to airports, aerodromes or landing strips, and ensure that any aircraft safety issues are identified and addressed appropriately.

Although the Civil Aviation Safety Authority (CASA) is not a formal referral authority for wind energy facility permit applications, a responsible authority should nevertheless consult with CASA in relation to aircraft safety impacts of a wind energy facility proposal, particularly proposals that:

- *are within 30 kilometres of a declared aerodrome or airfield;*
- *infringe the obstacle limitation surface around a declared aerodrome;*

- *include a building or structure the top of which will be 110 metres or more above natural ground level (height of a wind turbine is that reached by the tip of the turbine blade when vertical above ground level).*

Other private airstrips may not be identified by consultation with CASA. These may be identified using aerial photographs, discussions with the relevant council, or consultation with local communities.

A responsible authority should ensure that the proponent has consulted appropriately with CASA in relation to aircraft safety and navigation issues. It is recommended that the proponent consults and receives approval from CASA before lodging their application for ease of process. Refer to Section 4.3.5 of these guidelines for more detail.

CASA may recommend appropriate safeguards to ensure aviation safety. These may include changes to turbine locations, turbine heights and/or the provision of aviation safety lighting. A responsible authority should ensure that any concerns raised by CASA are appropriately reflected in permit conditions.

Aviation safety lighting can impact the amenity of the surrounding area. Responsible authorities may consider the following impact reduction measures (subject to CASA requirements and advice):

- *reducing the number of wind turbines with obstacle lights;*
- *specifying an obstacle light that minimises light intensity at ground level;*
- *specifying an obstacle light that matches light intensity to meteorological visibility;*
- *mitigating light glare from obstacle lighting through measures such as baffling (fittings that absorb or screen light glare).*

End excerpt.

This aviation impact assessment considers the application of the *Development of Wind Energy Facilities Policy and Planning Guidelines* in relation to potential impacts on aircraft safety and the operation of nearby aerodromes. The aviation impact statement included in Section 6 of this report addresses the aircraft safety issues specified in the guidelines.

3.3. Gannawarra Shire Council

The Project is wholly located within the Gannawarra Shire Council Local Government Area (LGA). The Gannawarra Planning Scheme was last updated on 11 October 2024 and sets the long-term vision for future use, development, protection and conservation of land.

The purpose of the planning scheme is specified as:

- To provide a clear and consistent framework within which decisions about the use and development of land can be made.
- To express state, regional, local and community expectations for areas and land uses.
- To provide for the implementation of State, regional and local policies affecting land use and development.
- To support responses to climate change.

The planning scheme recognises the importance of 2 sealed aerodromes in the LGA, Cohuna and Kerang aerodromes, in Section 02.03-8, T*ransport.*

Strategic directions for transport are established, which are to:

- Discourage land use and development that impacts on the functions of Kerang Airport.
- Protect local landing strips for commuting and emergency use.
- Support use and development that maintains and improves existing local transport infrastructure, including local roads, streets and bridges, that are essential for local access and economic activity.
- Encourage walking and cycling, including by maintaining and improving existing tracks.

Section 52.32 Wind Energy Facility establishes the planning context for the LGA for the development of wind energy facilities. The purpose of the scheme with regards to development of wind energy facilities is established as:

> *To facilitate the establishment and expansion of wind energy facilities, in appropriate locations, with minimal impact on the amenity of the area.*

The Gannawarra Planning scheme specifies that a permit is required to use and develop land for a wind energy facility. The scheme specifies that the use and development of land for a wind energy facility is prohibited at a location listed in the table in the scheme in support of clause 52.32.-2 (unless otherwise approved). The prohibited areas include within 1 km of an existing dwelling (unless otherwise specified), national parks (as described in the National Parks Act 1975) and land declared as a Ramsar wetland.

Clause 52.32-5 specifies the decision guidelines for the responsible authority to consider applicable to wind energy facilities:

- The Municipal Planning Strategy and the Planning Policy Framework.
- The effect of the proposal on the surrounding area in terms of noise, blade glint, shadow flicker and electromagnetic interference.
- The impact of the development on significant views, including visual corridors and sightlines.
- The impact of the facility on the natural environment and natural systems.
- The impact of the facility on cultural heritage.
- The impact of the facility on aircraft safety.
- Policy and Planning Guidelines for Development of Wind Energy Facilities in Victoria
- The New Zealand Standard NZS6808:2010, Acoustics - Wind Farm Noise.

This aviation assessment considers the application of the Gannawarra Planning scheme in relation to the impact of the Project on aircraft safety, and the potential impact to Kerang aerodrome.

3.4. Aircraft operations at non-controlled aerodromes

There are several uncontrolled aerodromes in the vicinity of the Project Area. Advisory Circulars (ACs) provide advice and guidance from CASA to illustrate a means, but not necessarily the only means, of complying with the Regulations, or to explain certain regulatory requirements. Advisory Circular (AC) 91-10 v1.1 *Operations in the vicinity of non-controlled aerodromes* provides guidance for pilots flying at or in the vicinity of non-controlled aerodromes, with respect to CASR 91.

A conventional circuit pattern and heights are provided in AC 91-10 v1.1. The standard circuit consists of a series of flight paths known as *legs* when departing, arrival or when conducting circuit practice. Illustrations of

the standard aerodrome traffic circuit procedures provided in AC 91-10 v1.1. are shown in Figure 2 and Figure 3.

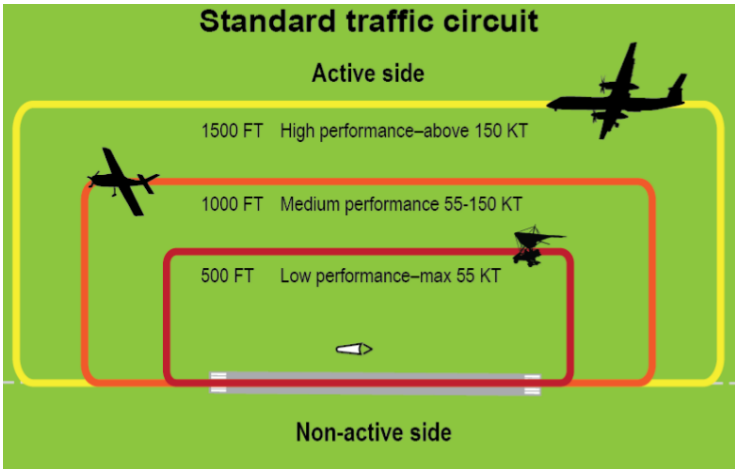

Figure 2 Lateral and vertical separation in the standard aerodrome traffic circuit

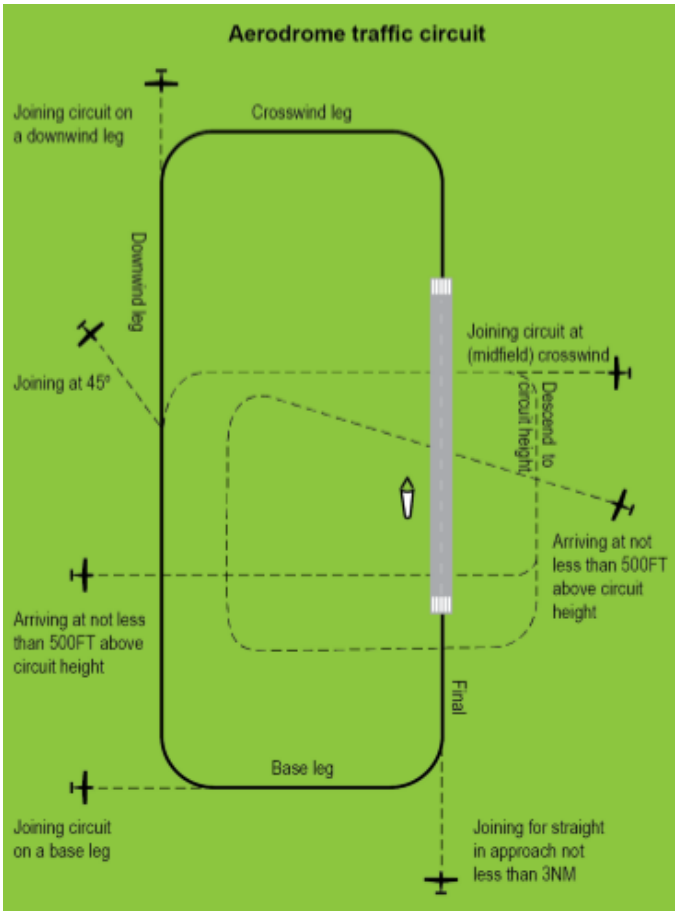

Figure 3 Aerodrome standard traffic circuit, showing arrival and joining procedures.

AC 91-10 v1.1. paragraph 7.10 refers to a distance that is "normally" well outside the circuit area and where no traffic conflict exists, which is at least 3 nm The paragraph is copied below:

7.10 Departing the circuit area

7.10.1 Aircraft should depart the aerodrome circuit area by extending one of the standard circuit legs or climbing to depart overhead. However, the aircraft should not execute a turn to fly against the circuit direction unless the aircraft is well outside the circuit area and no traffic conflict exists. This will normally be at least 3 NM from the departure end of the runway but may be less for aircraft with high climb performance. In all cases, the distance should be based on the pilot's awareness of traffic and the ability of the aircraft to climb above and clear of the circuit area.

3.5. Rules of flight

3.5.1. Flight under Day Visual Flight Rules (Day VFR)

According to Australia's Aeronautical Information Package (AIP) the meteorological conditions required for visual flight in the applicable (class G) airspace at or below 3,000 ft AMSL or 1,000 ft AGL (whichever is the higher) are: 5,000 m visibility, clear of clouds and in sight of ground or water.

Civil Aviation Safety Regulation (1998) 91.267 (Minimum height rules—other areas) prescribes the minimum height for flight. Generally speaking, and unless otherwise approved, aircraft are restricted to a minimum height of 500 ft AGL above the highest point of the terrain and any object on it within a radius of 300 m in visual flight during the day when not in the vicinity of built-up areas, and 1000 ft AGL over built up areas (within a horizontal radius of 600 m of the point on the ground or water immediately below the aeroplane).

These height restrictions do not apply if through stress of weather or any other unavoidable cause it is essential that a lower flying height be maintained.

Flight below these height restrictions is also permitted in certain other circumstances.

3.5.2. Flight under Night Visual Flight Rules (Night VFR)

With respect to flight under the VFR at night, Civil Aviation Safety Regulations (1998) 91.277 requires that the pilot in command of an aircraft flying VFR at night must not fly below the following heights (unless during take-off and landing operations, within 3 nm of an aerodrome, or with an air traffic control clearance):

a) *the published lowest safe altitude for the route or route segment (if any);*

b) *the minimum sector altitude published in the authorised aeronautical information for the flight (if any);*

c) *the lowest safe altitude for the route or route segment;*

d) *1,000 ft above the highest obstacle on the ground or water within 10 nautical miles ahead of, and to either side of, the aircraft at that point on the route or route segment;*

e) *the lowest altitude for the route or route segment calculated in accordance with a method prescribed by the Part 91 Manual of Standards for the purposes of this paragraph.*

3.5.3. Flight under Instrument Flight Rules (Day or Night) (IFR)

According to CASR 91, flight under the instrument flight rules (IFR) requires an aircraft to be operated at a height clear of obstacles that is calculated according to an approved method. Obstacle lights on

structures not within the vicinity of an aerodrome are effectively redundant to an aircraft being operated under the IFR, except in non-standard conditions.

3.6. Aircraft operator characteristics

Flying training may be conducted under either the instrument flying rules (IFR) or visual flying rules (VFR). Other general aviation operations under either IFR or VFR are also likely to be conducted at various aerodromes in the area.

Operations conducted under VFR are required to remain in visual meteorological conditions (VMC) (at least 5,000 m horizontal visibility at a similar height of the WTGs) and clear of the highest point of the terrain by 500 ft vertical distance and 300 m horizontal distance. In VMC, the WTGs will likely be sufficiently conspicuous to allow adequate time for pilots to avoid the obstacles. VFR operators will most likely avoid the Project Area once WTGs are erected.

Flight under day VFR is conducted above 500 ft above the highest point of the terrain within a 300 m radius unless the operation is approved to operate below 500 ft above the highest point of the terrain.

It is expected that the proposed WTGs will be sufficiently visually conspicuous to pilots conducting VFR operations within the vicinity of the Project Area to enable appropriate obstacle avoidance manoeuvring.

IFR and Night VFR (which are required to conform to IFR applicable altitude requirements) aircraft operations are addressed in Section 6.

3.7. Passenger transport operations

Scheduled and non-scheduled passenger transport operations are generally operated under the IFR.

3.8. Private operations

Private operations are generally conducted under day or night VFR, with some IFR. Flight under day VFR is conducted above 500 ft AGL in areas outside city and township built-up areas.

3.9. Military operations

There may be some high-speed low-level military jet aircraft and helicopter operations conducted in the area. Military operations are conducted under separate but compatible regulations and standards, including obstacle separation requirements.

Consultation with the recommended authorities will take place during the planning application process. Refer to Section 5 for consultation.

3.10. Aerial application operations

Aerial application operations including such activities as fertiliser, pest and crop spraying are generally conducted under day VFR below 500 ft AGL: usually between 60 ft and 100 ft AGL.

Aerial application operations are conducted in the region.

Due to the nature of the operations conducted, aerial agriculture pilots are subject to rigorous training and assessment requirements to obtain and maintain their licence to operate under these conditions.

The Aerial Application Association of Australia (AAAA) has a formal risk management program (which is recommended for use by its members) to assess the risks associated with their operations and implement applicable treatments to ensure an acceptable level of safety can be maintained.

The impact of the proposed WTGs on the safe and efficient aerial application of agricultural fertilisers and pesticides in the vicinity of the MCWF site was assessed.

3.10.1. Aerial Agricultural Association of Australia (AAAA)

In previous consultation with the AAAA, Aviation Projects has been directed to the AAAA Windfarm Policy (dated March 2011) which states in part:

As a result of the overwhelming safety and economic impact of wind farms and supporting infrastructure on the sector, AAAA opposes all wind farm developments in areas of agricultural production or elevated bushfire risk.

In other areas, AAAA is also opposed to wind farm developments unless the developer is able to clearly demonstrate they have:

1. consulted honestly and in detail with local aerial application operators;

2. sought and received an independent aerial application expert opinion on the safety and economic impacts of the proposed development;

3. clearly and fairly identified that there will be no short or long term impact on the aerial application industry from either safety or economic perspectives;

4. if there is an identified impact on local aerial application operators, provided a legally binding agreement for compensation over a fair period of years for loss of income to the aerial operators affected; and

5. adequately marked any wind farm infrastructure and advised pilots of its presence.

AAAA had developed National Windfarm Operating Protocols (adopted May 2014). These protocols note the following comments:

At the development stage, AAAA remains strongly opposed to all windfarms that are proposed to be built on agricultural land or land that is likely to be affected by bushfire. These areas are of critical safety importance to legitimate and legal low-level operations, such as those encountered during crop protection, pasture fertilisation or firebombing operations.

However, AAAA realises that some wind farm proposals may be approved in areas where aerial application takes place. In those circumstances, AAAA has developed the following national operational protocols to support a consistent approach to aerial application where windfarms are in the operational vicinity.

The protocols list considerations for developers during the design/build stage and the operational stage, for pilots/aircraft operators during aircraft operations and discusses economic compensation. NASF Guideline D is included in the Protocols document as Appendix 1, and AAAA Aerial Application Pilots Manual – excerpts on planning are provided as Appendix II. The considerations have been addressed herein.

3.10.2. Local aerial application operators

Local aerial application operators consulted in previous studies undertaken by Aviation Projects have stated that a wind farm would, in all likelihood, prevent aerial agricultural operations in that particular area, but that properties adjacent to the wind farm would have to be assessed on an individual basis.

Aerial application operators generally align their positions with the AAAA policies.

Based on previous studies for other wind farm projects undertaken by Aviation Projects, and the results of consultation with AAAA and local aerial application operators, it is reasonable to conclude that safe aerial application operations would be possible on properties within the Project site and on neighbouring properties, subject to final WTG locations and by implementing recommendations provided in this report at Section 11.

To facilitate the flight planning of aerial application operators, details of the Project, including location and height information of WTGs, wind WMTs and overhead powerlines should be provided to landowners so that, when asked for hazard information on their property, the landowner may provide the aerial application pilot with all relevant information.

The use of helicopters enables aerial application operations to be conducted in closer proximity to obstacles than would be possible with fixed wing aircraft due to their greater manoeuvrability.

3.11. Emergency services

3.11.1. Royal Flying Doctor Service/Air Ambulance

Royal Flying Doctor Service (RFDS) and other emergency services operations are generally conducted under the IFR, except when arriving/departing a destination that is not serviced by instrument approach aids or procedures, in which case they would be operating day or night VFR.

Most emergency aviation services organisations have formal risk management programs to assess the risks associated with their operations and implement applicable treatments to ensure an acceptable level of safety can be maintained.

For example, pilots and crew require specific training and approvals, additional equipment is installed in the aircraft, and special procedures are developed.

3.11.2. Aerial firefighting

Aerial firefighting operations (firebombing in particular) are conducted under Day VFR, sometimes below 500 ft AGL. Under certain conditions visibility may be reduced/limited by smoke/haze.

Most aerial firefighting organisations have formal risk management programs to assess the risks associated with their operations and implement applicable treatments to ensure an acceptable level of safety can be maintained. For example, pilots require specific training and approvals, additional equipment is installed in the aircraft, and special procedures are developed.

The Australasian Fire and Emergency Services Council (AFAC) has developed a national position on wind farms, their development and operations in relation to bushfire prevention, preparedness, response and recovery, set out in the document titled *Wind Farms and Bushfire Operations*, version 3.0, dated 25 October 2018.

Of specific interest in this document is the section extracted from under the 'Response' heading, copied below:

Wind farm operators should be responsible for ensuring that the relevant emergency protocols and plans are properly executed in an emergency event. During an emergency, operators need to react quickly to ensure they can assist and intervene in accordance with their planned procedures.

The developer or operator should ensure that:

- *liaison with the relevant fire and land management agencies is ongoing and effective*

- *access is available to the wind farm site by emergency services response for on-ground firefighting operations*
- *wind turbines are shut down immediately during emergency operations – where possible, blades should be stopped in the 'Y' or 'rabbit ear' position, as this positioning allows for the maximum airspace for aircraft to manoeuvre underneath the blades and removes one of the blades as a potential obstacle.*

Aerial personnel should assess risks posed by aerial obstacles, wake turbulence and moving blades in accordance with routine procedures.

4. INTERNAL CONTEXT

4.1. Wind farm site description

The Normanville Energy Park site boundary is located approximately 15 km southwest of the town of Kerang, 115 km northwest of Bendigo and 247 km northwest of Melbourne in northern Victoria.

The Project Area is located on flat cropping and pastoral land. Figure 4 and Figure 5 shows the general nature of the Project Area

Figure 4 General nature of Project Area

Figure 5 Project Area

4.2. Wind turbine generator (WTG) description

The Project is proposed to comprise of 17 WTGs. The WTGs are proposed to have a maximum tip height of 280 m above ground level (AGL).

Ground elevation has been provided by WestWind Energy. The ground elevation for the highest WTG location (WTG T003) is 94.7 m AHD which, with a 280 m WTG height, results in a maximum overall height of 374.7 m AHD (1229 ft AMSL).

The WTG project height applied in this analysis is summarised in Table 1. The maximum Project height is highlighted.

Table 1 WTG heights

WTG ID	*Site elevation m AHD*	*Tip height m AGL*	*Tip height m AHD*	*Tip height ft AMSL*
T001	86.1	280	366.1	1201
T002	85.1	280	365.1	1198
T003	94.7	280	374.7	1229
T004	91.3	280	371.3	1218

WTG ID	Site elevation m AHD	Tip height m AGL	Tip height m AHD	Tip height ft AMSL
T005	81.1	280	361.1	1185
T006	86.3	280	366.3	1202
T007	86.4	280	366.4	1202
T008	90.0	280	370.0	1214
T009	87.8	280	367.8	1207
T010	88.1	280	368.1	1208
T011	93.2	280	373.2	1225
T012	91.2	280	371.2	1218
T013	89.9	280	369.9	1213
T014	92.4	280	372.4	1222
T015	85.8	280	365.8	1200
T016	91.0	280	371.0	1217
T017	92.1	280	372.1	1221

Figure 6 illustrates the Project layout identifying the highest WTG location (source: West Wind Energy, Google Earth).

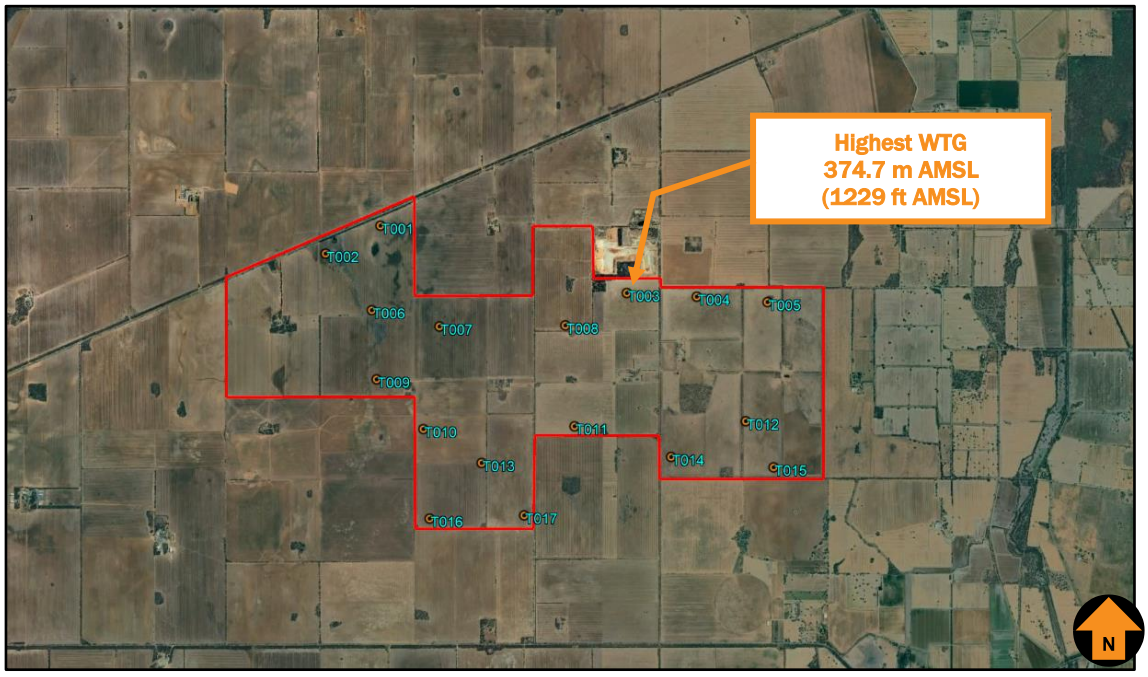

Figure 6 Project layout and highest WTG location

'Micrositing' of WTGs means an alteration to the siting of a WTG by not more than 100 m and any consequential changes to access tracks and internal power cable routes. The potential micrositing of the WTGs has been considered in the assessment with the estimate of the overall maximum height being based on the highest ground level within 100 m of the nominal WTG position. The micrositing of the WTGs is not likely to result in a change in the maximum overall blade tip height of the Project. This AIA assumes that a maximum blade tip height of 280 m AGL is implemented at all WTG locations.

4.3. Wind monitoring tower description

Two wind monitoring towers (WMTs) will be installed in the Project Area. Permanent WMT is on the eastern side, with a maximum height of 150 m (492 ft) AGL. Temporary Met Mast is on the western side, with a maximum height of 107 m (351 ft) AGL.

Aviation Projects has not undertaken an aviation impact assessment for the WMTs.

The WMT locations are provided in Figure 7 (Source: West Wind Energy, Google Earth)

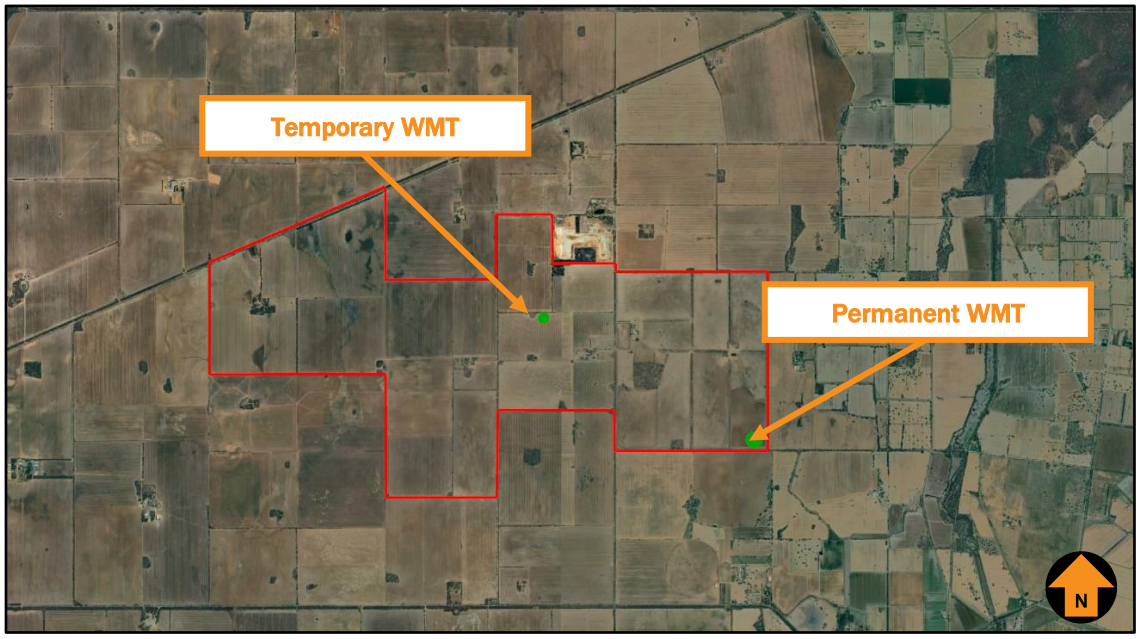

Figure 7 WMT location

Table 2 provides the details of the WMT provided by West Wind Energy.

Table 2 WMT details

Parameter	Permanent WMT	Temporary WMT
Location	6035795.44 m S 753050.76 m E	6037584.92 m S 750163.39 m E
Ground elevation at site	82 m (269 ft AMSL)	91 m (299 ft AMSL)
Height of tower AGL	150 m (351 ft)	107 m (492 ft)

Parameter	Permanent WMT	Temporary WMT
WMT tip height	232 m AHD (761 ft AMSL)	198 m AHD (650 ft AMSL)
Lighting	100 cd low intensity steady light	100 cd low intensity steady light
Marking	Top 1/3 banding with 1/7 band heights. Aviation marker balls (in accordance with NASF guidance)	Top 1/3 banding with 1/7 band heights. Aviation marker balls (in accordance with NASF guidance)
Design	Steel lattice	Steel lattice

4.4. Grid transmission

Proposed electrical infrastructure consists of underground electrical cables connecting turbines to each other and 7.2 km of external underground transmission line to connect the collector station to the proposed Koorangie Terminal Station located approximately 4-5 km north of the Project Area, providing connection into the National Electricity Market (NEM).

Indicative transmission line routes connecting the Project to the proposed Koorangie Terminal Station is shown in Figure 8 (Source, West Wind Energy, Google Earth).

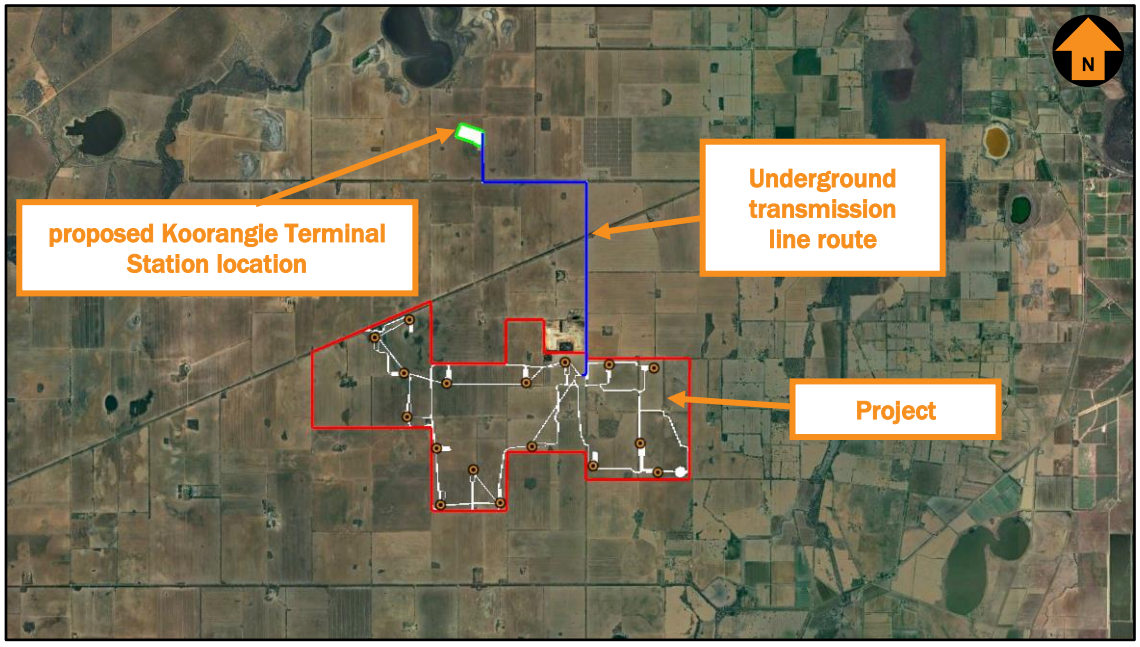

Figure 8 Transmission line indicative route

5. CONSULTATION

The following list of stakeholders were identified as requiring consultation and will be consulted with during the planning application process:

- Airservices Australia
- Global Airspace Solutions
- Department of Defence
- Gannawarra Shire Council
- Swan Hill Rural City Council
- Royal Flying Doctor
- Aerial operators

Details and results of the recommended consultation activities are provided in Table 3.

Table 3 Recommended consultation table (to occur during planning application preparation)

Agency/Contact	*Activity/Date*	*Response/ Date*	*Issues Raised During Consultation*	*Action Proposed*
Airservices Australia	03 June 2024	01 August 2024 by Alex Blight Airspace Development & Protection Coordinator	Hi there, I refer to your request for an Airservices assessment of the proposed Normanville Wind Farm. **Airspace Procedures** With respect to procedures designed by Airservices in accordance with ICAO PANS-OPS and Doc 9905, at a maximum height of 374.7m (1229ft) AHD, the project will affect the 25NM MSA at Swan Hill aerodrome. To accommodate the project the YSWH 25NM MSA will need to be raised by 300ft from 2000ft to 2300ft. Consequently, the following instrument approaches linked to this MSA will also require a 300ft increase to their respective commencement altitudes: • GNSS Arrival • NDB-A • RNP RWY 26 The maximum height of the project without affecting any procedures at YSWH aerodrome is 309.6m (1016ft) AHD. The project will not affect any air routes. Note: Procedures not designed by Airservices at Swan Hill aerodrome were not considered in this assessment.	Consult with aerodrome operators

Agency/Contact	Activity/Date	Response/ Date	Issues Raised During Consultation	Action Proposed
			Grid lowest safe altitude (LSALT) It is our view that the proposed wind farm will impact the published Grid LSALT. The maximum height without affecting the published Grid LSALT is 1000ft AHD. **Communications/Navigation/Surveillance (CNS) Facilities** We have assessed the proposed activity to the above specified height for any impacts to Airservices Precision/Non-Precision Navigation Aids, Anemometers, HF/VHF/UHF Communications, A-SMGCS, Radar, PRM, ADS-B, WAM or Satellite/Links and have no objections to it proceeding. **Air Traffic Control (ATC) Operations** There are no additional instructions or concerns from our ATC. **Summary – Airspace Procedures** It is our view that the proposed Normanville Wind Farm impacts Airservices designed airspace procedures, CNS facilities or ATC operations at Swan Hill aerodrome. Please consult with the aerodrome and aviation operators to ensure that they accept the proposed changes. We need confirmation from the aerodrome before we make any changes. All amendments to airspace procedures are on a commercial basis.	

Agency/Contact	Activity/Date	Response/ Date	Issues Raised During Consultation	Action Proposed
			Summary – Grid LSALT It is our view that the proposed Normanville Wind Farm impacts Airservices designed Grid LSALT as currently presented. The Grid LSALT will need to increase to 2300ft. Please advise the Vertical Obstacle Data (VOD) team at VOD@airservicesaustralia.com of any need to increase Grid LSALT heights at least two (2) weeks before construction commencing by supplying the below information: Approved wind turbine locations Elevations at the top of the highest point of the turbine in metres AHD A copy of this email **Vertical Obstacle Notification** This proposed wind farm is more than 30m (99ft) AGL. Please follow the below notification process: Complete the Vertical Obstacle Notification Form: ATS-FORM-0085_Vertical_Obstruction_Data_Form.pdf (airservicesaustralia.com) Submit completed form to: VOD@airservicesaustralia.com as soon as the development reaches the maximum height. For further information regarding the reporting of tall structures, please contact the VOD team:	

Agency/Contact	Activity/Date	Response/ Date	Issues Raised During Consultation	Action Proposed
			Phone - (02) 6268 5622 Email - VOD@airservicesaustralia.com Or refer to: Civil Aviation Safety Regulation Part 175 — Airservices and You - Airservices (airservicesaustralia.com)	
Global Airspace Solutions – YKER TIFP designer	04 June 2024	09 July 2024, by Bas Smeulders - Chief Designer	Assessed the possible Normanville windfarm against the published IFPs of Kerang Airport and have the following conclusions: 1. T003 is the critical wind turbine with the highest elevation 2. The wind farm only affects the 10 and 25 NM MSA 3. The new values for the 10 and 25 NM MSA will be 2300 ft. 4. Several changes to the DAP plates must be made, due to the change of starting altitude to 2300 ft and then submitted to Airservices. Total cost for this would be **$3,678.40 incl GST**. What is the expected timeline for the construction of this windfarm? The DAP plates must be updated before starting the construction and the submission date is 112 days before any AIRAC date which changes the DAP. These AIRAC dates are normally in March, June, September and November.	Kerang aerodrome operator will need to provide permission for these changes to be made. Gas must be provided with notice of the project construction in order to make the required changes to DAP in accordance with the aeronautical information publication cycle.

Agency/Contact	*Activity/Date*	*Response/ Date*	*Issues Raised During Consultation*	*Action Proposed*
Department of Defence	05 August 2024	24 October 2024, by Anthony Deutschmann - Assistant Director	Defence has conducted an assessment of the proposed Normanville Energy park project for potential impacts on the safety of military low flying operations as well as possible interference to Defence communications and radar. As the proposed transmission line meets the requirement for reporting tall structures, Defence requests that you provide Air Services Australia (AsA) with vertical obstacle notification. Marking tall structures on aeronautical charts assists pilot navigation and enhances flight safety. Airservices Australia (ASA) is responsible for recording the location and height of tall structures. The information is held in a central database managed by ASA and relates to the erection, extension, or dismantling of tall structures, the top of which is above: a. 30 metres AGL, that are within 30 kilometres of an aerodrome; and b. 45 metres AGL elsewhere for RAAF. Defence therefore requests that the following processes to be followed: 1. Complete the Vertical Obstacle Notification Form: ATS-FORM-0085_Vertical_Obstruction_Data_Form.pdf (airservicesaustralia.com) 2. Submit completed form to: VOD@airservicesaustralia.com as soon as	Defence therefore requests that the following processes to be followed: 1. Complete the Vertical Obstacle Notification Form: ATS-FORM-0085_Vertical_Obstruction_Data_Form.pdf (airservicesaustralia.com) Submit completed form to: VOD@airservicesaustralia.com as soon as the development reaches the maximum height.

Agency/Contact	Activity/Date	Response/ Date	Issues Raised During Consultation	Action Proposed
			the development reaches the maximum height. For further information regarding the reporting of tall structures, please contact the VOD team: • Phone - (02) 6268 5622 • Email - VOD@airservicesaustralia.com • Or refer to: Civil Aviation Safety Regulation Part 175 — Airservices and You - Airservices (airservicesaustralia.com)	
Gannawarra Shire Council – operator Kerang aerodrome	09 July 2024	18 September 2024 by Craig Maffescioni – Manager Operational Services	At this stage Council has no issue with the with the proposal and has been in contact with the relevant agencies to update the necessary documents.	No Auction Required
Swan Hill Rural City Council – operator Swan Hill aerodrome	3 September 2024	24 October 2024 by Kerry Young (Engineer Assistant)	Swan Hill Rural City Council writes with regard to the Normanville Energy Park Wind Farm Aviation Impact Assessment 102402-01 (included). Council approve and authorise Airservices Australia to make the Data Change Requests as contained and requested in the Aviation Impact Assessment Reference 102402-01. This document details the changes to the Aeronautical Information Package (AIP) for Swan Hill aerodrome (YSWH) resulting from the proposed Normanville Wind Farm. This authorisation follows consultation with Lyn Wang (Aviation Projects) and a review of Swan Hills approach procedures and the proposed changes	Please notify Swan Hill Rural Council in advance of the changes, so the Swan Hill aerodrome manual can be revised to show the changes.

Agency/Contact	Activity/Date	Response/ Date	Issues Raised During Consultation	Action Proposed
			outlined in the Normanville Wind Farm. Please notify Swan Hill Rural Council in advance of the changes, so the Swan Hill aerodrome manual can be revised to show the changes.	
RFDS Victoria	05 August 2024	Not received a response by 07 November 2024		
Aerial Operator – Robins Aviation	05 August 2024	Not received a response by 07 November 2024		

6. AVIATION IMPACT STATEMENT

6.1. Overview

The NASF Guideline D: *Managing the Risk of Wind Turbine Farms as Physical Obstacles to Air Navigation* provides information to proponents and planning authorities to help identify any potential safety risks posed by WTG and wind monitoring installations from an aviation perspective.

Potential safety risks include (but are not limited to) impacts on flight procedures and aviation communications, navigation, and surveillance (CNS) facilities which require assessment by Airservices Australia.

To facilitate these assessments all wind farm proposals submitted to Airservices Australia must include an Aviation Impact Statement (AIS).

This analysis considers the aeronautical impact of the WTGs on the following:

- The operation of nearby certified aerodromes
- The operation of nearby aircraft landing areas (uncertified aerodromes)
- Grid and air route Lowest Safe Altitudes (LSALTS)
- Airspace protection
- Aviation facilities
- Radar installations
- Local aircraft operations.

6.2. Nearby certified aerodromes

The area of 30 nm (56 km) from a certified airport's aerodrome reference point (ARP) is used to identify possible constraints from the Project.

The closest certified aerodrome to the Project Area is Kerang (YKER), located approximately 12.6 km (6.8 nm) east-northeast of the Project Area boundary to the aerodrome reference point (ARP). Swan Hill (YSWH) and Wycheproof (YWYF) are also located within 30 nm of the Project Area. The 30 nm radius represents the 25 nm minimum sector altitude (MSA) for certified aerodromes with terminal instrument flight procedures. The 25 nm MSA minimum altitude is determined by assessing obstacles within 30 nm of the reference point.

The location of the nearest certified aerodromes to the Project Area is shown in Figure 9 (source: West Wind Energy, OzRunways, Google Earth). A 30 nm radius from each of the certified aerodrome's reference points is shown.

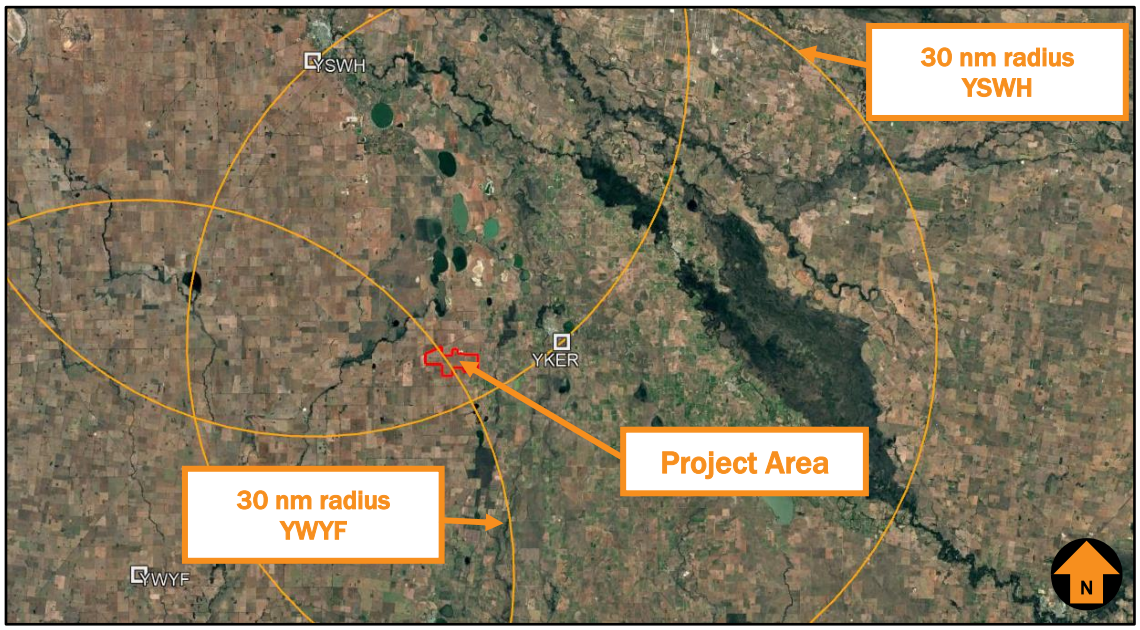

Figure 9 nearest certified aerodromes in relation to the Project Area

6.3. Kerang aerodrome (YKER)

YKER is a certified aerodrome operated by the Gannawarra Shire Council. YKER has two runways:

- Runway 14/32, sealed, 18 m wide and 1067 m long, with a runway strip width of 90 m
- Runway 05/32, unsealed, 18 m wide and 692 m long, with a runway strip width of 90 m

Figure 10 shows the YKER runway layout (source, Airservices Australia, 2024)

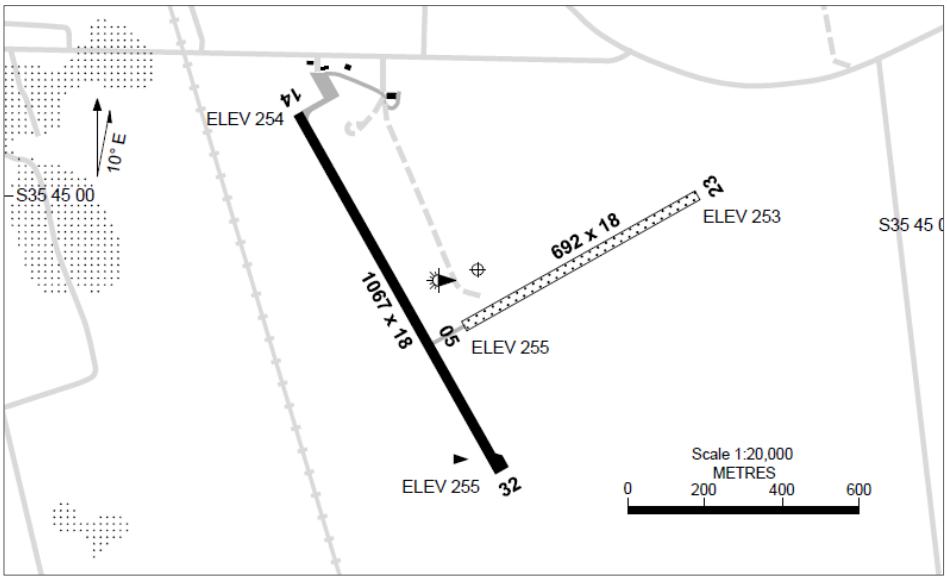

Figure 10 YKER aerodrome layout

6.4. Obstacle limitation surface – YKER

An obstacle limitation surface (OLS) must be established at a certified aerodrome in accordance with the specifications established in Part 139 MOS 2019 Chapter 7. Objects located or proposed to be located within the OLS of an aerodrome must be reported to CASA and there may be some kinds of aerodrome operations that are limited or not permitted, as determined.

OLS standards for runways vary between non-instrument runways and instrument runways (those runways with terminal instrument flight procedures implemented). For YKER, terminal instrument flight procedures have been implemented for runway 14/32 for both landing directions. Runway 05/23 is a non-instrument runway.

The code number for each runway is declared in the En Route Supplement Australia (ERSA) part of the aeronautical information package (AIP), maintained by Airservices Australia. For Kerang aerodrome, the runway code for each runway is:

- Runway 05/23: Code 1
- Runway 14/32: Code 1

For the purpose of this assessment, the maximum horizontal distances applicable to a code 1, non-precision instrument runway OLS have been applied, which is a maximum length of 2,500 m for the take-off and approach surfaces, and 4,700 m from each runway strip end for the combined inner horizontal and conical surfaces.

Figure 11 shows the Project location in relation to the OLS lateral extremities for YKER established using the specifications of Part 139 MOS 2019 for a code 1, non-precision instrument runway (Source, WestWind Energy, Google Earth, CASA).

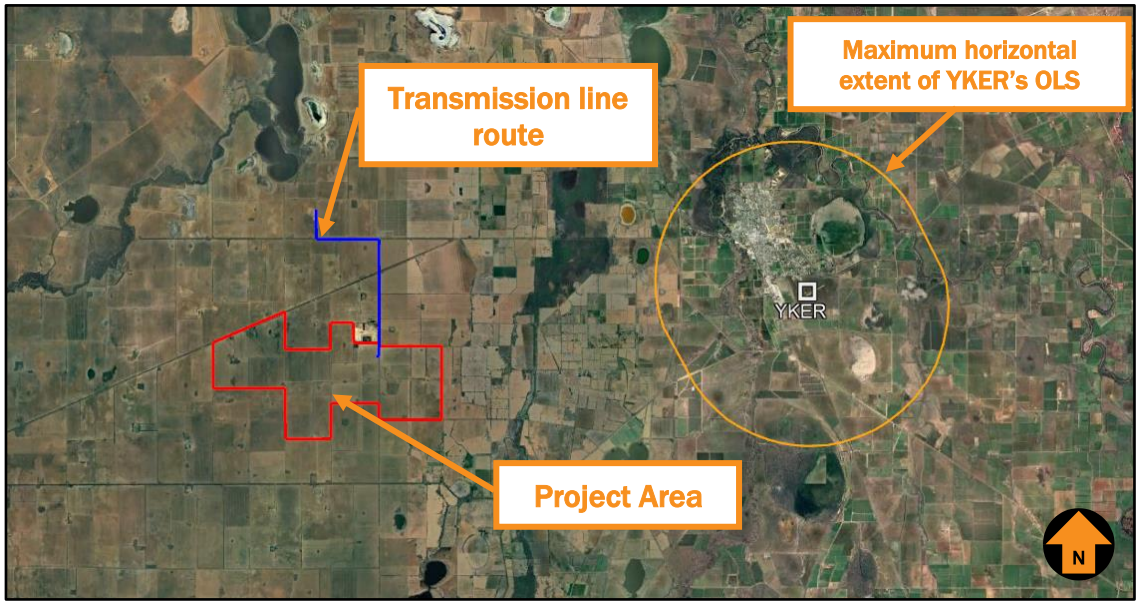

Figure 11 Project Area in relation to YKER's OLS

The Project WTGs will be located clear of the obstacle limitation surface at Kerang aerodrome.

The Project transmission line connection is proposed to occur at the proposed Koorangie Terminal Station located approximately 4 – 5 km north of the Project Area. The Project transmission line will not impact the obstacle limitation surface at Kerang aerodrome.

6.5. Instrument procedures – YKER

A non-precision instrument approach provides horizontal (lateral) guidance to an aircraft flying the published approach procedure and improves access to an aerodrome for aircraft in low cloud and/or poor visibility.

A check of Aeronautical Information Package (AIP) via the Airservices Australia website showed that YKER is served by non-precision terminal instrument flight procedures, consisting of 2 separate RNAV (GNSS) procedures aligned with runway 14/32.

Table 4 identifies the aerodrome and procedure charts for YKER, designed by Global Airspace Solutions (GAS) and Airservices Australia (AsA).

Table 4 YKER aerodrome and procedure charts

Chart name	*Effective date*
AERODROME CHART (AsA)	05 September 2024 (KERGN02-180)
RNP RWY 14 – GAS	05 September 2024 (KERGN02-180)
RNP RWY 32 – GAS	05 September 2024 (KERGN01-180)

6.6. YKER – Minimum sector altitude (MSA)

Obstacles within the 10 nm MSA and within the 25 nm MSA of YKER's aerodrome reference point (ARP) define the minimum altitude at which an aircraft can fly when within 10 nm and 25 nm without the required visual reference to the ground or water until they commence the instrument approach procedure.

The minimum obstacle clearance (MOC) specified in ICAO Document 8186 Volume II and as applied in Australia requires minimum obstacle clearance of 984 ft below the published MSA is maintained.

An image of the Minimum Safe Altitude (MSA) published for YKER is provided in Figure 12 showing the MSA based on the aerodrome reference point (Source: Airservices).

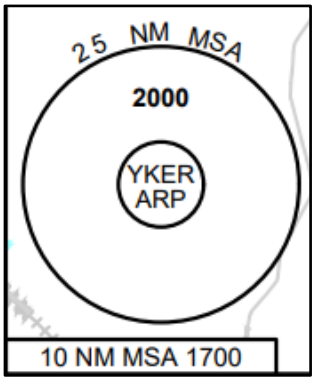

Figure 12 YKER MSA

Figure 13 shows the location of the Project Area boundary and WTGs in relation to YKER's 10 nm and 25 nm MSA area (Source, West Wind Energy, Airservices, Google Earth)

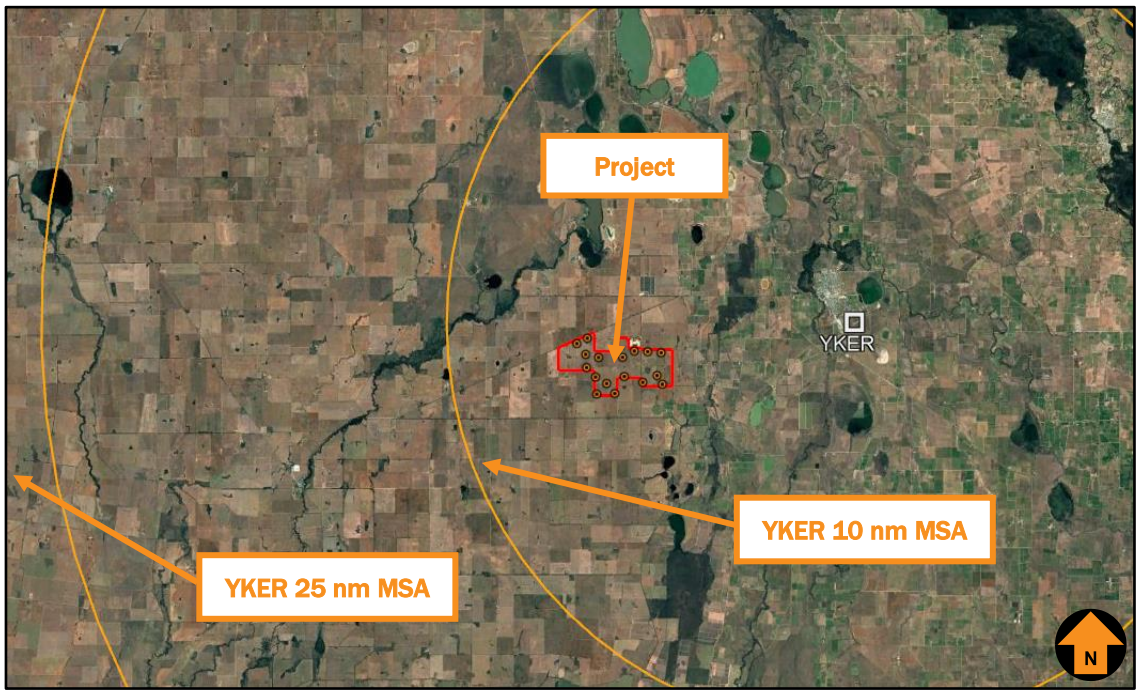

Figure 13 Project Area in relation to YKER MSA

An impact analysis of YKER's MSA is provided in Table 5. The impact is shown for the overall maximum Project height of 374.7 m AHD (1229 ft AMSL).

Table 5 YKER MSA analysis

MSA	*Minimum altitude (ft AMSL)*	*PANS OPS Surface (ft AMSL)*	*Impact on airspace design (WTGs)*	*Potential solution*	*Impact on aircraft ops*
10 nm	1700	716	All proposed WTGs infringe surface. Maximum infringement 513 ft	Increase MSA to 2300 ft AMSL	Moderate impact, though no impact anticipated to procedure MDA
25 nm	2000	1016	25 nm MSA cannot be lower than the 10 nm MSA and will need to be increased in conjunction with the 10 nm MSA.	Increase MSA to 2300 ft AMSL	Moderate impact, though no impact anticipated to procedure MDA

The 10 nm and 25 nm MSA for YKER will need to be increased to 2300 ft AMSL to accommodate the Project in the proposed configuration. This may be considered a moderate impact however this is not anticipated to affect the overall efficacy of the instrument flight procedures, and the accessibility of aircraft to YKER should not be adversely impacted.

Global Airspace Solutions (GAS) has assessed the proposed Project (July 2024) and confirmed the impact to the 10 nm and 25 nm MSA, with a required increase to 2300 ft AMSL. GAS would need to be engaged commercially to make the required amendments, with a total cost of $ 3,678.40 including GST (as advised by GAS on 09 July 2024, subject to change).

6.7. Potential impact to terminal instrument flight procedures at Kerang aerodrome

The RNP procedures for runways 14 and 32 at YKER will be impacted by the Project WTGs in conjunction with the impact to the 10 nm and 25 nm MSA as specified above.

The initial approach fix altitude, holding altitude and initial procedure altitude would need to be increased in conjunction with the 25 nm MSA to accommodate the Project WTGs. Figure 14 shows the vertical profile of the RNP instrument flight procedure for runway 14 at YKER, with the initial approach fix and initial procedure altitude identified.

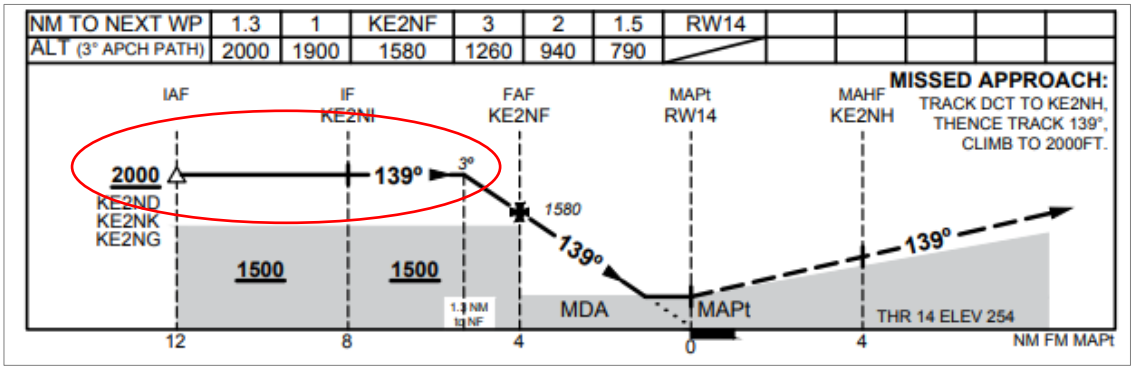

Figure 14 Vertical profile of RNAV (GNSS) instrument flight procedure runway 14 at YKER

Summary – The Project will impact the terminal instrument flight procedures at YKER, however the procedures could be amended to accommodate the Project without impacting the final minimum descent altitude (MDA) and without adversely impacting the overall accessibility of aircraft to YKER while flying the instrument flight procedures.

6.8. Circling approach areas – YKER terminal instrument flight procedures

A circling approach is an extension of an instrument approach to the specified circling minima (lowest altitude permitted without visual reference to the ground) at which point the pilot will visually manoeuvre the aircraft to align with the runway for landing. Typically, a circling approach is only conducted where there is no runway-aligned instrument procedure, or if the runway used for the approach procedure is not suitable for landing.

Circling areas are established by the instrument flight procedure designer based on ICAO specifications, related to the performance category of the design aircraft. The circling area is determined by drawing an arc centred on the threshold of each usable runway and joining these arcs by tangents. The most demanding aircraft category provided for in YKER's instrument flight procedure's is Category B.

The radii for each relevant category of aircraft are provided below:

- Category A – 1.68 nm / 3.11 km
- Category B – 2.66 nm / 4.93 km.

The Project is located beyond the circling area for all runway ends at YKER will not impact circling areas established for terminal instrument flight procedures.

6.9. Swan Hill aerodrome (YSWH)

YSWH is a certified aerodrome operated by the Swan Hill Rural City Council. YSWH has two runways:

- Runway 04/22, unsealed, 23 m wide and 980 m long, with a runway strip width of 90 m
- Runway 08/26, sealed, 30 m wide and 1495 m long, with a runway strip width of 90 m

Figure 15 shows the YSWH runway layout (source, Airservices Australia)

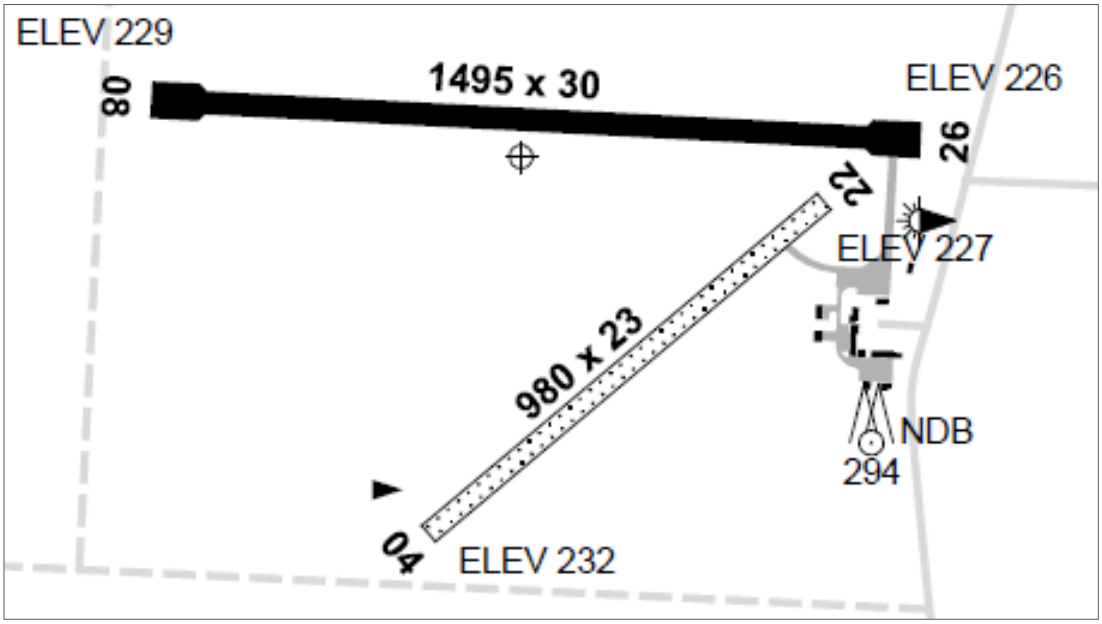

Figure 15 YSWH aerodrome layout

6.10. YSWH Obstacle Limitation Surface

Obstacle Limitation Surface (OLS) are established for each certified aerodrome runway. For the Code 3 non-precision runway at YSWH, the maximum lateral extent of the OLS is up to 5.5 km for the conical surface and 15km for the take-off and approach surfaces.

The closest WTG in the Project Area to YSWH is located approximately 47 km to the southeast of the aerodrome reference point and beyond the horizontal extent of the obstacle limitation surfaces of Swan Hill aerodrome.

6.11. Instrument procedures – YSWH

A check of Aeronautical Information Package (AIP) via the Airservices Australia website showed that YSWH is served by non-precision terminal instrument flight procedures.

Table 6 identifies the aerodrome and procedure charts for YSWH, designed by Airservices Australia (AsA).

Table 6 YSWH aerodrome and procedure charts

Chart name	*Effective date*
AERODROME CHART (AsA)	15 June 2023 (SWHAD01-175)
GNSS ARRIVAL PROCEDURES (AsA)	30 November 2023 (SWHDG01-177)
NDB-A (AsA)	17 June 2021 (SWHNB01-167)
RNP RWY 26 (AsA)	15 June 2023 (SWHGN01-175)

6.12. YSWH Minimum Sector Altitude

An image of the MSA published for YSWH is provided in Figure 16 showing the MSA based on the aerodrome reference point and Non-Directional Beacon (NDB) located at the aerodrome (Source: Airservices).

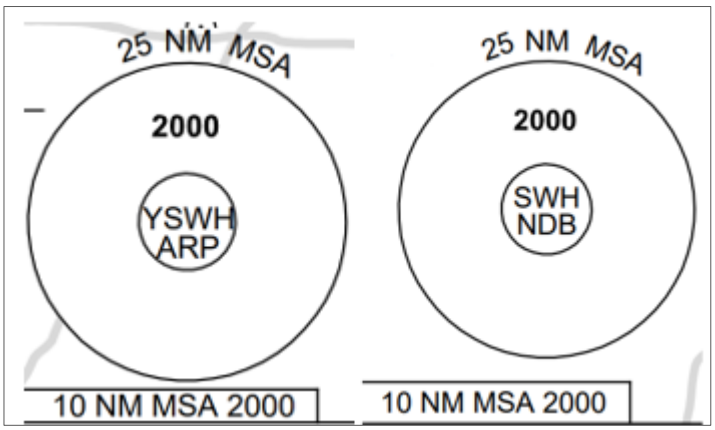

Figure 16 YSWH MSA

Figure 17 shows the location of the Project Area boundary and WTGs in relation to YSWH's 10 nm and 25 nm MSA area (Source, West Wind Energy, Airservices, Google Earth). The MSA is shown from the location of the NDB at YSWH.

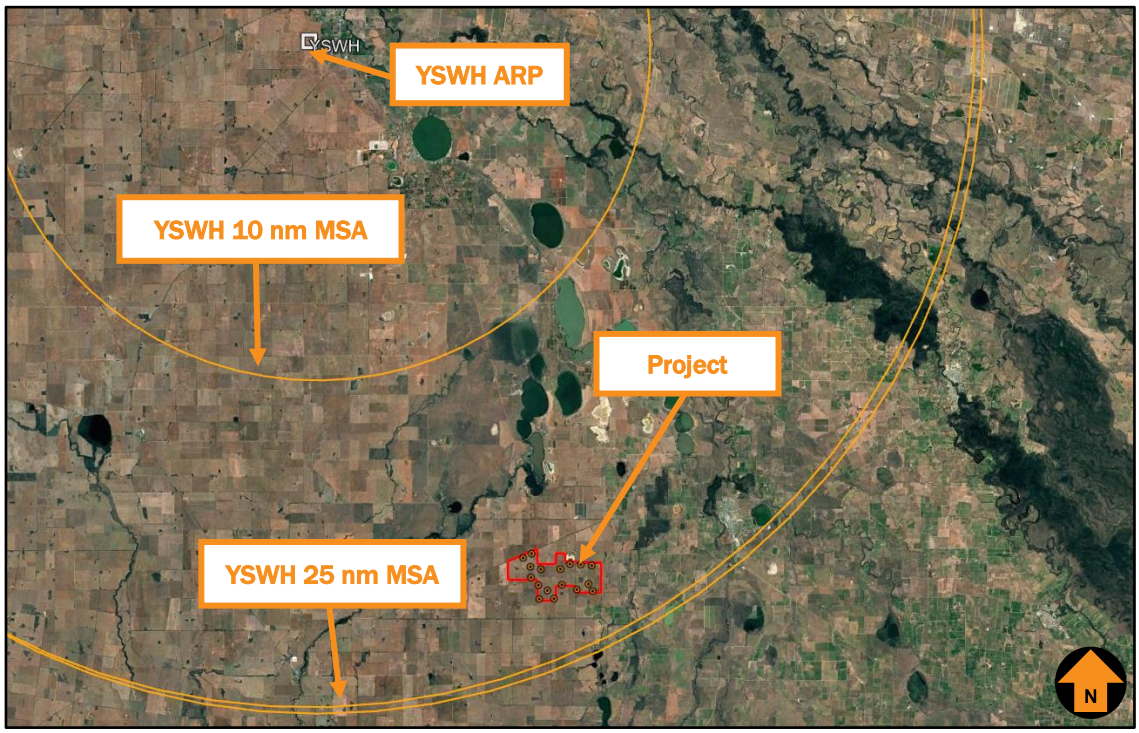

Figure 17 Project Area in relation to YSWH MSA

The Project is wholly located within the 25 nm MSA of YSWH. An impact analysis of YSWH's MSA is provided in Table 7. The impact is shown for the overall maximum Project height of 374.7 m AHD (1229 ft AMSL).

Table 7 YSWH MSA analysis

MSA	*Minimum altitude (ft AMSL)*	*PANS OPS Surface (ft AMSL)*	*Impact on airspace design (WTGs)*	*Potential solution*	*Impact on aircraft ops*
10 nm	2000	1016	Nil – Project located outside the 10 nm MSA	N/A	N/A
25 nm	2000	1016	All proposed WTGs infringe surface. Maximum infringement 213 ft	Increase MSA to 2300 ft AMSL	Minor impact

The 25 nm MSA for YSWH will need to be increased to 2300 ft AMSL to accommodate the Project in the proposed configuration. This may be considered a minor impact and is not anticipated to affect the overall efficacy of the instrument flight procedures.

Procedure altitudes for the GNSS Arrival and RNP Runway 26 instrument flight procedures will need to be increased at YSWH to accommodate the Project WTGs. These changes will need to be conducted by Airservices Australia as the instrument flight procedure designer for YSWH on a commercial basis, and the operator of YSWH will need to provide permission for the changes to occur. Overall, the accessibility of aircraft to YSWH should not be adversely impacted by these changes.

There may be an opportunity to sectorise a southwestern portion of the 25 nm MSA at 2300 ft AMSL to provide the required obstacle clearance over the Project Area from the 25 nm MSA, while the remainder of the 25 nm MSA could remain at the existing 2000 ft AMSL and not impact the initial approach fix altitude, holding altitude and initial procedure altitude as the initial approach and holding fixes would all be located outside the higher 25 nm MSA sector.

6.13. Wycheproof aerodrome (YWYF)

YWYF is a certified aerodrome operated by the Buloke Shire Council. YWYF has two runways:

- Runway 17/35, unsealed, 30 m wide and 1032 m long, with a runway strip width of 90 m
- Runway 08/26, unsealed, 30 m wide and 718 m long, with a runway strip width of 90 m.

Figure 18 shows the YWYF runway layout (source, Airservices, 2024)

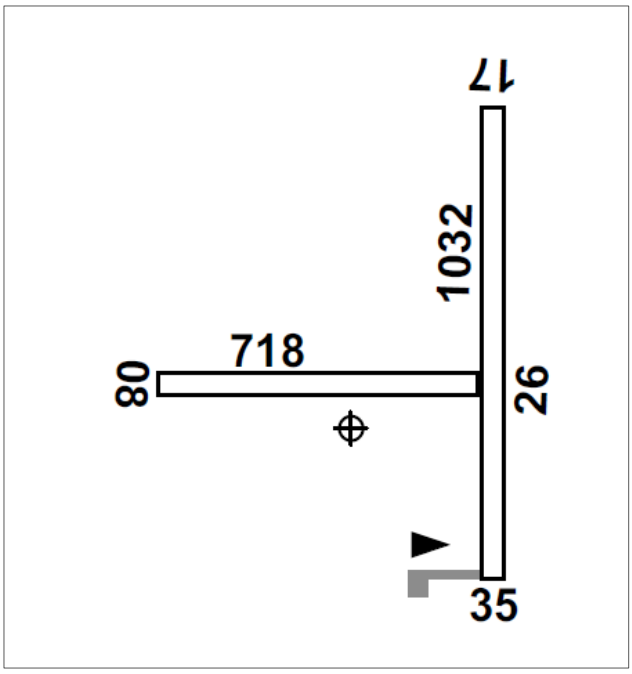

Figure 18 YWCH aerodrome layout

6.14. YWYF Obstacle limitation surface

The maximum lateral extent of the OLS for the Code 2 non-instrument runway at YWYF is up to 3.6 km for the conical surface and 2.5 km for the take-off surface.

The closest WTG in the Project Area to YWYF is located approximately 54 km to the northeast of the aerodrome reference point, and beyond the horizontal extent of the obstacle limitation surfaces of Wycheproof aerodrome.

6.15. Instrument procedures – YWYF

There are no terminal instrument flight procedures implemented at Wycheproof aerodrome, and therefore the Project will not impact the aerodrome.

6.16. Nearby aircraft landing areas (uncertified aerodromes)

An area of 3 nm (5.6 km) radius of an aircraft landing areas (ALA) is used to assess potential impacts of proposed developments on aircraft operations at or within the vicinity of the ALA.

A search on OzRunways, which sources its data from Airservices Australia (AIP) and Aircraft Owners and Pilots Association (AOPA) Australia Airfield Directory did not identify any ALAs within 3nm of the Project site boundary. The aeronautical data provided by OzRunways is approved under CASA CASR Part 175. The closest verified ALA is Quambatook (OZQUA) which is located approximately 11.8 nm (22 km) southwest of the nearest proposed WTG location. The Project WTGs will not impact operations at OZQUA.

An unverified ALA (Meran Park) was identified in National Maps, approximately 4.2 nm (7.8 km) south of the nearest proposed WTG location. The operational status of this ALA is not verified however based on the distance from the nearest proposed WTG, there will be no impact for aircraft using the ALA caused by the Project.

The location of identified ALAs relative to the project boundary and WTGs is shown in Figure 19 (source: OzRunways, WestWind, Google Earth). A 3 nm radius, representing the area of interest for ALA impacts, is shown for each ALA.

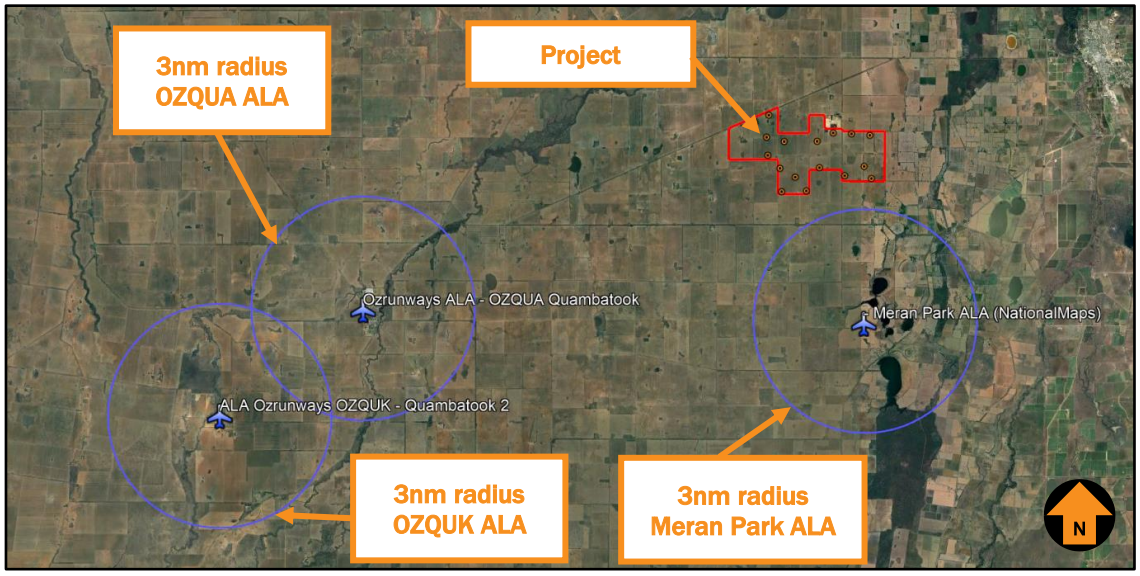

Figure 19 ALAs in the vicinity of the Project Area

The Project will not affect any ALA in the proposed configuration.

6.17. Potential wake turbulence impacts

National Airports Safeguarding Framework (NASF) Guideline D – *Managing the Risk of Wind Turbine Farms as Physical Obstacles to Air Navigation* 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.

NASF Guideline D provides guidance regarding WTG wake turbulence which states:

> *Wind farm operators should be aware that wind turbines may create turbulence which noticeable up to 16 rotor diameters from the turbine. In the case of one of the larger wind turbines with a diameter*

of 150 metres, turbulence may be present two kilometres downstream. At this time, the effect of this level of turbulence on aircraft in the vicinity is not known with certainty. However, wind farm operators should be conscious of their duty of care to communicate this risk to aviation operators in the vicinity of the wind farm…

For the purpose of the wake turbulence analysis, a maximum of 200 m rotor diameter has been used. Based on this scenario, the effects of wake turbulence could be noticeable at 3200 m from the WTGs.

Figure 20 shows 3200 m rings (associated with potential maximum horizontal extent of wake turbulence) around the relevant boundary WTGs in relation to Meran Park ALA and Kerang aerodrome. A nominal 1 nm circuit pattern is shown for reference at both aerodromes.

Wake turbulence from the WTG nearest to Meran Park ALA does not extend inside the 3nm assessment area or circuit pattern. Therefore, wake turbulence from WTGs will not impact aircraft operations at Kerang aerodrome, Meran Park ALA or any other aerodrome.

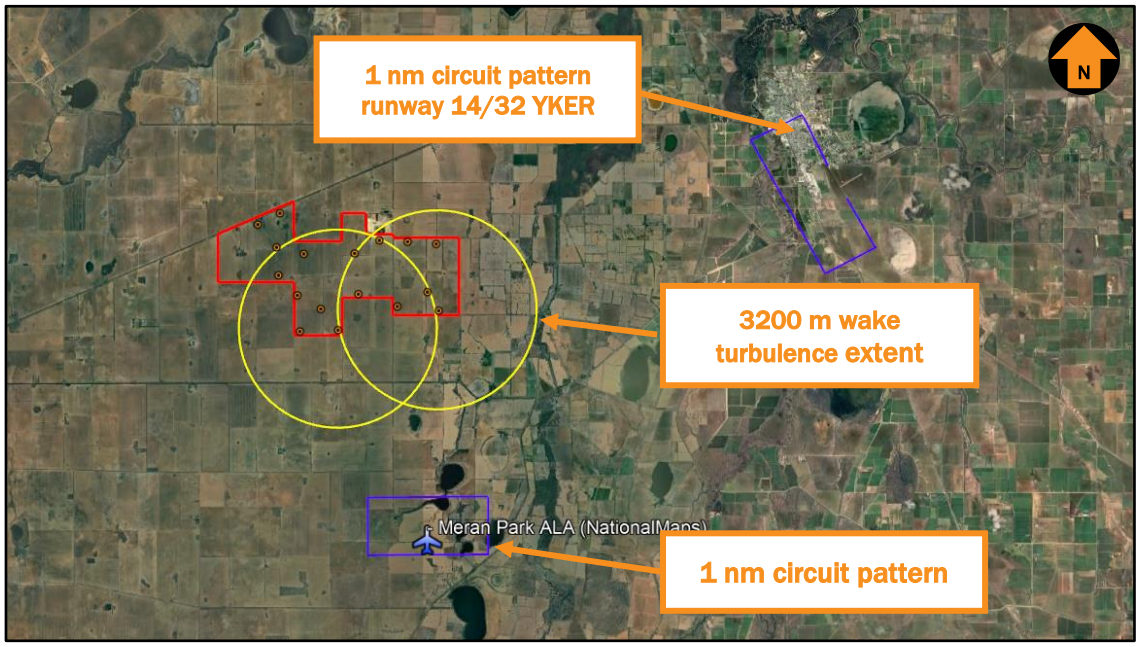

Figure 20 Possible extent of Wake Turbulence from WTGs

6.18. Grid and Air routes LSALT

MOS 173 requires that the published lowest safe altitude (LSALT), for a particular airspace grid or air route, provides a minimum of 1000 ft clearance above the controlling (highest) obstacle within the relevant airspace grid or air route tolerances.

The Project will be located in a grid identified in the EnRoute Chart – Low. (ERCL 2) The grid LSALT applicable to the proposed WTG locations is 2000 ft AMSL, with an obstacle clearance surface elevation of 1000 ft AMSL.

A protection area 7 nm laterally either side of an air route is used to assess the LSALT for the air route. The Project is located in the vicinity of 3 low-level air routes, H119, between waypoints NATAYA and SALRI, V173, between waypoints ASWAN and CANTY, and W720, between SWH NDB and waypoint TELIP. Figure 21 shows the low-level grid LSALT and air routes in proximity to the Project site (source: West Wind Energy, Airservices)

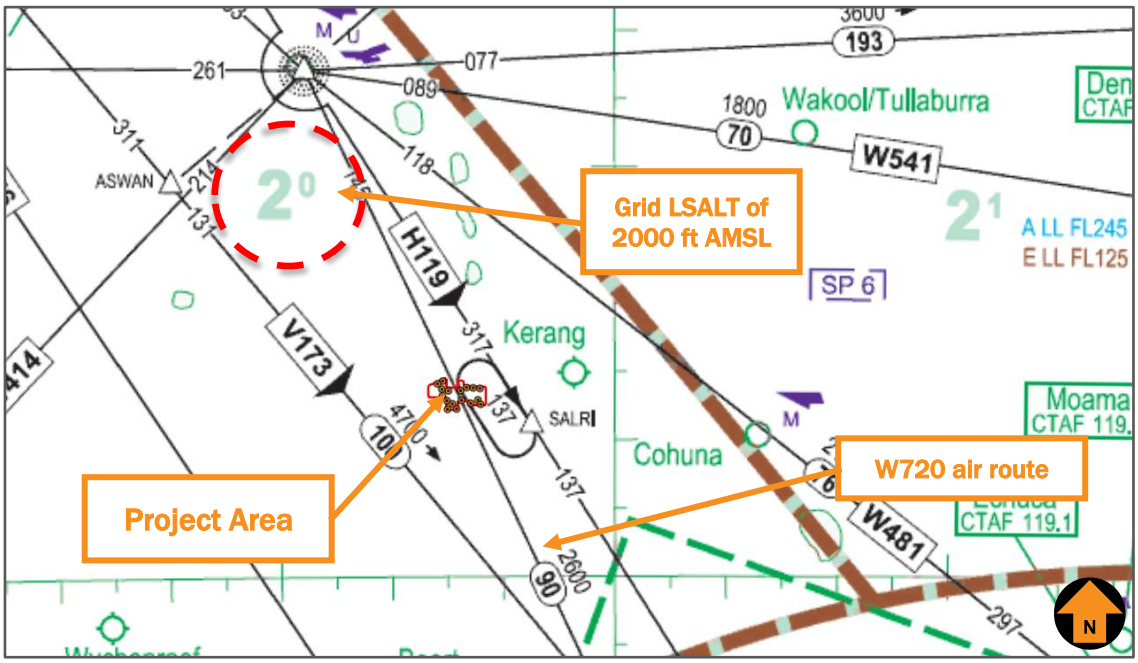

Figure 21 Grid and air route LSALTs in proximity to the Project site (ERC-Low)

The Project will be located in a grid identified in the EnRoute Chart – High (H3 South) The grid LSALT applicable to the proposed WTG locations is 5200 ft AMSL, with an obstacle clearance surface elevation of 4200 ft AMSL. The ERCH3 grid LSALT is different to the ERCL-2 chart grid LSALT because grid squares in the ERCH3 chart are formed by the parallels and meridians at 2°intervals instead of 1°for the ERCL charts.

The Project is located in the vicinity of 2 high-level air routes, H119, between waypoints NATAYA and SALRI, and UH336, between waypoints KEPPA and NATYA.

Figure 22 shows the Project in relation to the grid LSALT and air routes established on ERC H3 South (Source, WestWind Energy, Ozrunways May 2024)

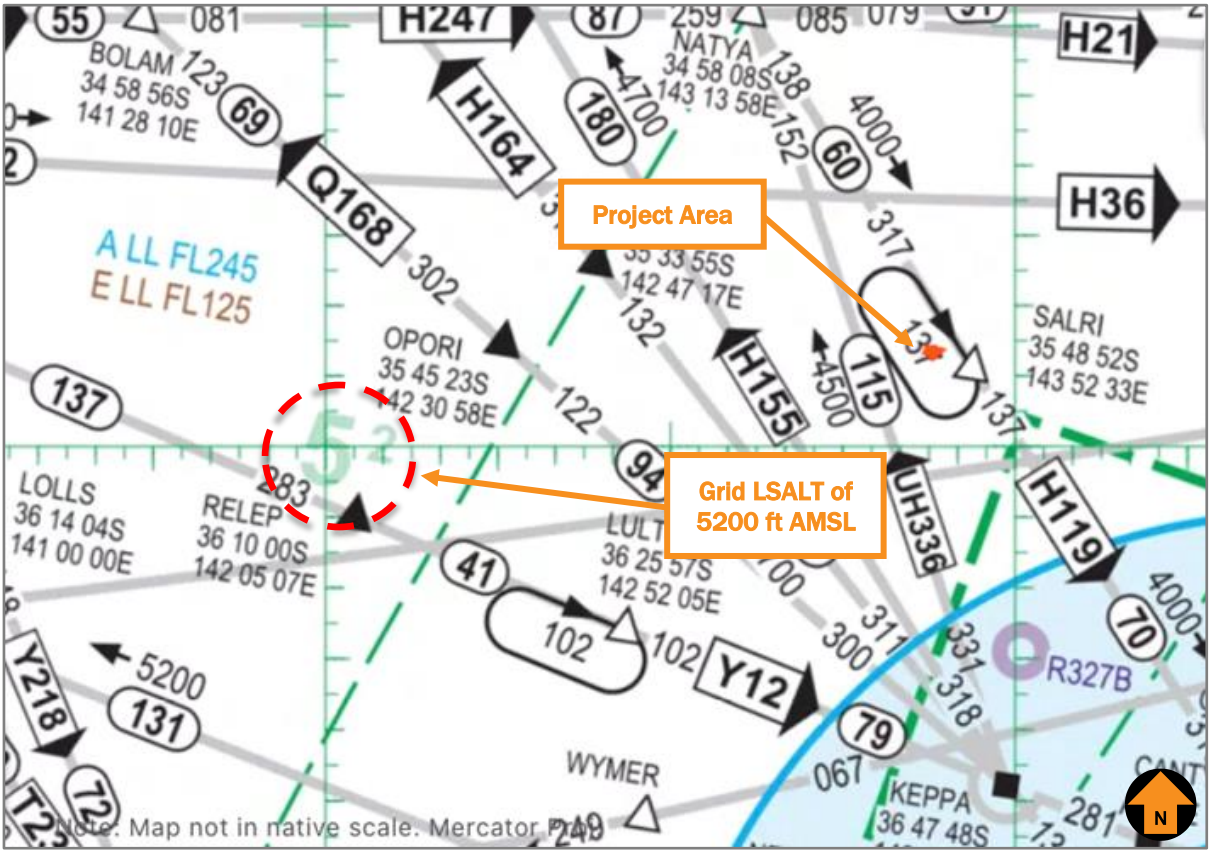

Figure 22 Grid LSALT and air routes in proximity to the Project Area on ERC H3 South

An impact analysis of the surrounding air routes and grid LSALT is provided in Table 8, based on the maximum Project height of 374.7 m AHD (1229 ft AMSL).

Table 8 Air route impact analysis

Air route	*Waypoint pair*	*Route LSALT*	*Obstacle Height Limit*	*Impact on airspace design*	*Potential solution*	*Impact on aircraft ops*
W720	SWH NDB to TELIP	2600 ft AMSL	1600 ft AMSL	Nil	N/A	N/A
H119	NATAYA to SALRI	4000 ft AMSL	3000 ft AMSL	Nil	N/A	N/A
V173	ASWAN to CANTY	4700 ft AMSL	3700 ft AMSL	Nil	N/A	N/A
UH336	KEPPA to NATYA	4500 ft AMSL	3500 ft AMSL	Nil	N/A	N/A

Air route	Waypoint pair	Route LSALT	Obstacle Height Limit	Impact on airspace design	Potential solution	Impact on aircraft ops
Grid (L)	N/A	2000 ft AMSL	1000 ft AMSL	Impacts LSALT by 229 ft	Raise LSALT by 300 ft	Minor
Grid (H)	N/A	5200 ft AMSL	4200 ft AMSL	Nil	N/A	N/A

With a maximum height of 1229 ft, the Project will impact the grid LSALT of 2000 ft AMSL established in ERC-L2 VIC. The LSALT will need to be increased to 2300 ft AMSL to accommodate the Project which is not anticipated to cause significant adverse impacts to aircraft operations.

6.19. Airspace Protection

The Project Site is located outside of controlled airspace (wholly within Class G airspace) and are not located in any Prohibited, Restricted and Danger areas. Therefore, the Project site will not have an impact on controlled or designated airspace.

6.20. Communication, Navigation and Surveillance Systems

Part 139 MOS 2019 specifies the protection of aviation Communication, Navigation and Surveillance Systems (CNS) from development which may affect the function of these systems.

The Project is not located within the prescribed clearance zones or areas of interest as specified in Part 139 MOS 2019 Chapter 19 and will not affect any CNS facilities.

6.21. 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 Route Surveillance Radar (RSR), which is located approximately 103 nm (190 km) to the southeast of the Project Area boundary. The Gellibrand Hill Primary Surveillance Radar is located approximately 123 nm (228 km) to the southeast of the Project Area boundary.

EUROCONTROL guidelines for assessing the potential impact on wind turbines and WMTs on radar surveillance sensors stipulate the following assessment requirements:

Primary Surveillance Radar (PSR)

- Zone 1 0-500 m: Not permitted
- Zone 2 500 m – 15 km: Detailed assessment
- Zone 3: Further than 15 km but within maximum instrumented range and in radar line of sight: Simple assessment
- Zone 4: Anywhere within maximum instrumented range but not in radar line of sight or outside the maximum instrumented range: No assessment

Secondary Surveillance Radar (SSR)

- Zone 1: 0-500 m: Not permitted

- Zone 2 500 m – 16 km but within maximum instrumented range and in radar line of sight: Detailed assessment
- Zone 4: Further than 16 km or not in radar line of sight: No assessment
- (Zone 3 is not established for secondary surveillance radar)

Due to the distance and intervening terrain between the Project Area and the facilities, it is anticipated that the Project will not impact the Mt Macedon ATC surveillance radar or Gellibrand Hill Primary Surveillance Radar.

Airservices Australia will review the potential impact of the Project on these radar facilities once notified of the Project.

6.22. AIS Summary

Based on the Project WTG layout and maximum blade tip height of up to 280 m AGL, the blade tip elevation of the highest WTG will not exceed 374.7 m AHD (1229 ft AMSL) and:

- will not penetrate any obstacle limitation surfaces of any certified aerodrome
- **will** impact Procedures for Air Navigation Services - Aircraft Operations PANS-OPS surfaces by infringing the 10 nm and 25 nm minimum sector altitude (MSA) of the of terminal instrument flight procedures at Kerang aerodrome and the 25 nm MSA for Swan Hill aerodrome
- will not have an impact on the operations of any proximate ALAs
- **will** impact the grid LSALT of 2000 ft AMSL established in EnRoute Chart – Low. (ERCL 2)
- will not impact an air route LSALTs
- is wholly contained within Class G airspace
- is outside the clearance zones associated with civil aviation navigation aids and communication facilities.

6.23. Assessment recommendations

Based on the information contained within this section and the analysis conducted, the following recommendations are made:

- Consultation should be undertaken with Airservices Australia to assess potential impacts of the Project.
- Consultation should be undertaken with Global Airspace Solutions to assess and verify the impacts of the Project on terminal instrument flight procedures at Kerang aerodrome.
- Consultation should be undertaken with the operators of Kerang and Swan Hill aerodrome to provide advice on the potential impact to terminal instrument flight procedures at the aerodromes and to obtain permission for the procedures to be amended in accordance with the results of the review by the procedure designers.
- Department of Defence should be consulted to identify any potential impacts from the Project on military operations.

An appropriate and justified level of consultation will be undertaken with relevant parties during the planning application phase. Refer to **Section 5** for details of the recommended stakeholder engagement activity.

7. HAZARD LIGHTING AND MARKING

Based on the risk assessment set out in Section 9 it is concluded that aviation lighting is not required for WTGs and WMTs that are in close proximity to a WTG. Obstacle lighting is recommended for WMTs that are installed prior to WTG installation and WMTs that are not in close proximity to a WTG. For completeness, relevant lighting standards and guidelines are summarised in **Annexure 3.**

7.1. Wind monitoring towers (WMT)

Given that aerial operators might use the airspace within the Project site and that it is expected that the WMT will be constructed prior to WTGs, the WMTs may be free-standing and not surrounded by any other obstacles. Therefor the proposed WMT should be marked with red/white/red bands as per the NASF Guideline D.

In terms of obstacle marking and lighting requirements, relevant requirements set out in MOS 139 and NASF are provided below.

Consideration could be given to marking the WMTs according to the requirements set out in MOS 139 Chapter 8 Division 10 Obstacle Markings; specifically:

> *8.109 Obstacles and hazardous obstacles*
>
> *(1) The following objects or structures at an aerodrome are obstacles and must be marked in accordance with this Division unless CASA determines otherwise under subsections (3) and (5):*
>
> > *any fixed object or structure, whether temporary or permanent in nature, extending above the obstacle limitation surfaces. Note an ILS building is an example of a fixed object;*
> >
> > *any object or structure on or above the movement area that is removable and is not immediately removed.*
>
> *8.110 Marking of hazardous obstacles*
>
> *(5) long, narrow structures like masts, poles and towers which are hazardous obstacles must be marked in contrasting colour bands so that:*
>
> > *(a) the darker colour is at the top; and*
> >
> > *(b) the bands:*
> >
> > > *i. are, as far as physically possible, marked at right angles along the length of the long, narrow structure; and*
> > >
> > > *ii. have a length ("z" in Figure 8.110 (5)) that is, approximately, the lesser of:*
> > >
> > > > *(A) 1/7 of the height of the structure; or*
> > > >
> > > > *(B) 30 m.*
>
> *(7) Hazardous obstacles in the form of wires or cables must be marked using 3-dimensional coloured objects attached to the wire or cables. Note: Spheres and pyramids are examples of 3-dimensional objects.*
>
> *(8) The objects mentioned in subsection (7) must:*
>
> > *(a) be approximately equivalent in size to a cube with 600 mm sides; and*
>
> *(b) be spaced 30 m apart along the length of the wire or cable.*

NASF Guideline D suggests consideration of the following measures specific to the marking and lighting of WMTs:

- *the top 1/3 of wind monitoring towers to be painted in alternating contrasting bands of colour. Examples of effective measures can be found in the Manual of Standards for Part 139 of the Civil Aviation Safety Regulations 1998. In areas where aerial agriculture operations take place, marker balls or high visibility flags can be used to increase the visibility of the towers;*
- *marker balls or high visibility flags or high visibility sleeves placed on the outside guy wires;*
- *ensuring the guy wire ground attachment points have contrasting colours to the surrounding ground/vegetation; or*
- *a flashing strobe light during daylight hours.*

The WMT is not strictly required to be lit in accordance with Part 139 MOS 2019. The proponent may consider electively installing an obstacle light on the WMT in accordance with Part 139 MOS 2019 specifications.

Characteristics of medium-intensity lights are specified in MOS 139 Section 9.33:

1) Medium-intensity obstacle lights must:

a) be visible in all directions in azimuth; and

b) if flashing — have a flash frequency of between 20 and 60 flashes per minute.

2) The peak effective intensity of medium-intensity obstacle lights must be 2 000 ± 25% cd with a vertical distribution as follows:

*a) for **vertical beam spread** — a minimum of 3 degrees;*

b) at -1 degree elevation — a minimum of 50% of the lower tolerance value of the peak intensity;

c) at 0 degrees elevation — a minimum of 100% of the lower tolerance value of the peak intensity.

*3) For subsection (2), **vertical beam spread** means the angle between 2 directions in a plane for which the intensity is equal to 50% of the lower tolerance value of the peak intensity.*

4) If, instead of obstacle marking, a flashing white light is used during the day to indicate temporary obstacles in the vicinity of an aerodrome, the peak effective intensity of the light must be increased to 20 000 ± 25% cd when the background luminance is 50 cd/m² or greater.

CASA have supported the use of 200 candela low-intensity obstacle lighting on masts in rural and remote settings where there is little backlight.

7.2. Transmission line

There is no regulatory requirement to mark or light power poles or overhead transmission lines, unless they infringe the obstacle limitation surface of a certified aerodrome. The Project transmission line will connect to the proposed Koorangie Terminal Station located approximately 4 – 5 km north of the Project Area and will not infringe the obstacle limitation surface of any certified aerodrome. It is anticipated that the external transmission line for the Project will be underground, however this section is included for reference.

According to the AAAA *Powerlines Policy* dated March 2011:

Most agricultural land in Australia is crisscrossed with powerlines and aerial application companies and pilots put enormous effort into managing these hazards safely, generally using a risk identification, assessment and management process in line with Australian Standard AS4360/ISO 3[1]000.

The agricultural pilot curriculum mandated by CASA includes training for the safe management of powerlines and AAAA has been active in providing ongoing professional development for application pilots that includes a focus on planning, risk management and a knowledge of human factors relevant to managing powerlines in a low-level aviation environment.

AAAA runs a specific training course for aerial application pilots entitled 'Wire Risk Management' to address these issues.

Overhead transmission lines and/or supporting poles that are located where they could adversely affect aerial application operations should be identified in consultation with local aerial application operators and marked in accordance with MOS 139 Chapter 8 Division 10 section 8.110 (7) and section 8.110 (8):

8.110 Marking of hazardous obstacles

(7) Hazardous obstacles in the form of wires or cables must be marked using 3-dimensional coloured objects attached to the wire or cables. Note: Spheres and pyramids are examples of 3-dimensional objects.

(8) The objects mentioned in subsection (7) must:
(a) be approximately equivalent in size to a cube with 600 mm sides; and
(b) be spaced 30 m apart along the length of the wire or cable.

Following consultation with aerial operators, if a risk assessment is required, the Proponent should follow standards outlined in the AS 3891.2:2018 *Air navigation – Cables and their supporting structures – Marking and safety requirements Part 2: Low level aviation operations.*

8. ACCIDENT STATISTICS

This section establishes the external context to ensure that stakeholders and their objectives are considered when developing risk management criteria, and that externally generated threats and opportunities are properly taken into account.

8.1. General aviation operations

The general aviation (GA) activity group is considered by the Australian Transport Safety Bureau (ATSB) to be all flying activities that do not involve commercial air transport (activity group), which includes scheduled (RPT) and non-scheduled (charter) passenger and freight type. It may involve Australian civil (VH–) registered aircraft, or aircraft registered outside of Australia. General aviation/recreational encompasses:

- Aerial work (activity type). Includes activity subtypes: agricultural mustering, agricultural spreading/spraying, other agricultural flying, photography, policing, firefighting, construction – sling loads, other construction, search and rescue, observation and patrol, power/pipeline surveying, other surveying, advertising, and other aerial work.
- Own business travel (activity type).
- Instructional flying (activity type). Includes activity subtypes: solo and dual flying training, and other instructional flying.
- Sport and pleasure flying (activity type). Includes activity subtypes: pleasure and personal transport, glider towing, aerobatics, community service flights, parachute dropping, and other sport and pleasure flying.
- Other general aviation flying (activity type). Includes activity subtypes: test flights, ferry flights and other flying.

8.2. ATSB occurrence taxonomy

The ATSB uses a taxonomy of occurrence sub-type. Of specific relevance to the subject assessment are terms associated with **terrain collision**. Definitions sourced from the ATSB website are provided below:

- **Collision with terrain**: Occurrences involving a collision between an airborne aircraft and the ground or water, where the flight crew were aware of the terrain prior to the collision.
- **Controlled flight into terrain (CFIT):** Occurrences where a serviceable aircraft, under flight crew control, is inadvertently flown into terrain, obstacles, or water without either sufficient or timely awareness by the flight crew to prevent the event.
- **Ground strike:** Occurrences where a part of the aircraft drags on, or strikes, the ground or water while the aircraft is in flight, or during take-off or landing.
- **Wirestrike:** Occurrences where an aircraft strikes a wire, such as a powerline, telephone wire, or guy wire, during normal operations.

8.3. National aviation occurrence statistics 2010-2019

The Australian Transport Safety Bureau (ATSB) recently published a summary of aviation occurrence statistics for the period 2010-2019 (AR-2020-014, Final - 29 April 2020).

According to the report, there were no fatalities in high or low capacity RPT operations during the period 2010-2019. In 2019, 220 aircraft were involved in accidents in Australia, and a further 154 aircraft involved in serious incidents (an incident with a high probability of becoming an accident). In 2019 there were 35 fatalities from 22 fatal accidents**.** There have been no fatalities in scheduled commercial air transport in Australia since 2005.

Of the 326 fatalities recorded in the 10-year period, almost two thirds (175 or 53.68%) occurred in the general aviation segment. On average, there were 1.51 fatalities per aircraft associated with a fatality in this segment. The fatalities to aircraft ratio ranges from 1.09 to 177:1. Whilst it can be inferred from the data that the majority of fatal accidents are single person fatalities, it is reasonable to assert that the worst credible effect of an aircraft accident in the general aviation category will be multiple fatalities.

A breakdown of aircraft and fatalities by general aviation sub-categories is provided in Table 9 (source: ATSB).

Table 9 Number of fatalities by General Aviation sub-category – 2010 to 2019

Sub-category	*Aircraft assoc. with fatality*	*Fatalities*	*Fatalities to aircraft ratio*
Aerial work	37	44	1.18:1
Instructional flying	11	19	1.72:1
Own business travel	3	5	1.6:1
Sport and pleasure flying	53	94	1.77:1
Other general aviation flying	11	12	1.09:1
Totals	115	174	1.51:1

Figure 23 refers to Fatal Accident Rate by operation type per million departures over the 6-year period (source: ATSB). Note the rates presented are not the full year range of the study (2010–2019). This was due to the availability of exposure data (departures and hours flown) which was only available between these years. According to the ATSB report, the number of fatal accidents per million departures for GA aircraft over the 6-year reporting period ranged between 6.6 in 2014 and 4.9 in 2019.

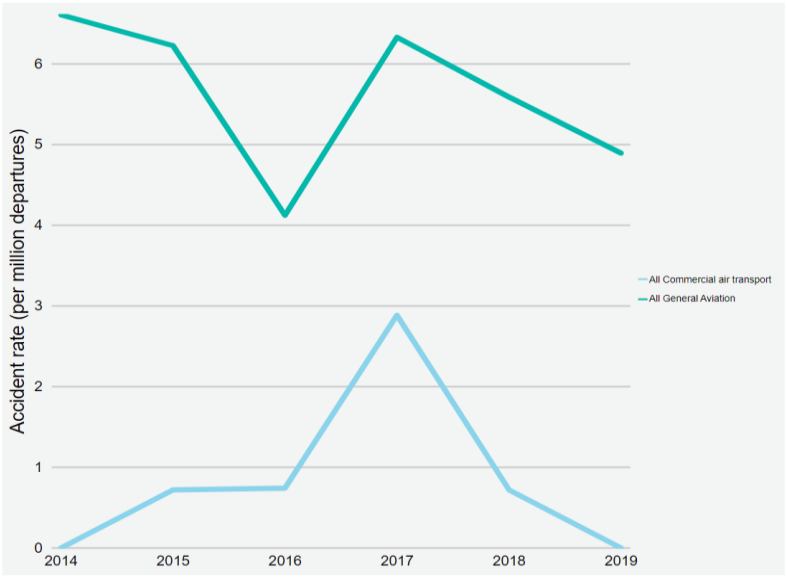

Figure 23 Fatal Accident Rate (per million departures) by Operation Type

In 2018, there were 9 fatal accidents and 9 fatalities involving GA aircraft, resulting in a rate of 5.6 fatal accidents per million departures and 7.7 fatal accidents per million hours flown.

In 2019, there were 1,760,000 landings, and 1,320,000 hours flown by VH-registered general aviation aircraft in Australia, with 8 fatal accidents and 17 fatalities. Based on these results, in 2019 there were 4.9 fatal accidents per million departures and 6.4 fatal accidents per million hours flown. A summary of fatal accidents from 2010-2019 by GA sub-category is provided in Table 10 (source: ATSB).

Table 10 Fatal accidents by GA sub-category – 2010 -2019

Sub-category	*Fatal accidents*	*Fatalities*
Agricultural spreading/spraying	13	13
Agricultural mustering	11	12
Other agricultural	1	1
Survey and photographic	5	10
Search and rescue	2	2
Firefighting	2	2
Other aerial work	3	4
Instructional flying	11	19
Own business travel	3	5
Sport and pleasure flying	53	94
Other general aviation flying	11	12
Total	**115**	**174**

Over the 10-year period, no aircraft collided with a WTG or a WMT in Australia.

Of the 20,529 incidents, serious incidents and accidents in GA operations in the 10-year period, 1,404 (6.83%) were terrain collisions.

The underlying fatality rate for GA operations discussed above is considered tolerable within Australia's regulatory and social context.

8.4. Worldwide accidents involving wind farms

Worldwide since aviation accident statistics have been recorded, there have been a total of 4 aviation accidents involving a wind farm (i.e. where WTGs were erected). To provide some perspective on the likelihood of a VFR aircraft colliding with a WTG, a summary of the 4 accidents and the relevant factors applicable to this assessment is incorporated in this section.

Based on the statistics set out in the Global Wind Energy Council (GWEC) report 2016, there were 341,320 WTGs operating around the world at the end of 2016. In 2019, approximately 60.4 GW of wind power had been installed worldwide.

Based on the Australia's Clean Energy Council statistics there were 102 wind farms in Australia at the end of 2019. Aviation Projects has researched public sources of information, accessible via the world wide web, regarding aviation safety occurrences associated with wind farms. Occurrence information published by Australia, Canada, Europe (Belgium, Denmark, France, Germany, Norway, Sweden and The Netherlands), New Zealand, the United Kingdom and the United States of America was reviewed.

The 4 recorded aviation accidents involving a wind farm are summarised as follows:

- One accident, which resulted in 2 fatalities, occurred in Palm Springs in 2001. This accident involved a wind farm but was not caused by the wind farm. The cause of the accident was the inflight separation of the majority of the right canard and all of the right elevator resulting from a failure of the builder to balance the elevators per the kit manufacturer's instructions. The accident occurred above a wind farm, and the aircraft struck a WTG on its descent and therefore the cause of the accident was not attributable to the wind farm and not applicable to this AIA.
- Two accidents involving collision with a WTG were during the day, as follows:
    - One accident occurred in Melle, Germany in 2017 as the result of a collision with a WTG mounted on a steel lattice tower at a very low altitude during the day with good visibility and no cloud. The accident resulted in one fatality. If the tower was solid and painted white, as is standard on contemporary wind farms, then it more than likely would have been more visible than if it were to be equipped with an obstacle light which in all likelihood would not have been operating during daylight with good visibility conditions.
    - One accident occurred in Plouguin, France in 2008 when the pilot decided to descend below cloud in an attempt to find the destination aerodrome. The aircraft was flying in conditions of significantly reduced horizontal visibility in fog where the top of the WTGs were obscured by cloud. The WTGs became visible too late for avoidance manoeuvring and the aircraft made contact with two WTGs. The aircraft was damaged but landed safely. No fatalities were recorded.
    - In both of the above cases, it is difficult to conclude that obstacle lighting would have prevented the accidents.
- One fatal accident, near Highmore, South Dakota in 2014 occurred at night in Instrument Meteorological Conditions (IMC).

There is one other accident mentioned in a database compiled by an anti-wind farm lobby group (wind-watch.org), which suggests a Cessna 182 collided with a WTG near Baraboo, Wisconsin, on 29 July 2000. The NTSB database records details of an accident involving a Cessna 182 that occurred on 28 July 2000 in the same area. For this particular accident, NTSB found that the probable cause of the accident was VFR flight into IMC encountered by the pilot and exceeding the design limits of the aircraft. A factor was flight to a destination alternate not performed by the pilot. No mention in the NTSB database is made of WTGs or a wind farm.

A summary of the 4 accidents is provided in Table 11.

Table 11 Summary of accidents involving collision with a WTG

ID	Description	Date	Location	Fatalities	Flight rules	WTG height	Obstacle lighting	Cause of accident	Relevant to obstacle lighting at night
1	Diamond DA320-A1 D-EJAR Collided with a WTG approximately 20 m above the ground, during the day in good visibility. The mast was grey steel lattice, rather than white, although the blades were painted in white and red bands.	02 Feb 2017	Melle, Germany	1	Day VFR No cloud and good visibility	Not specified	Not specified	Not specified	Not applicable

ID	Description	Date	Location	Fatalities	Flight rules	WTG height	Obstacle lighting	Cause of accident	Relevant to obstacle lighting at night
2	The Piper PA-32R-300, N8700E, was destroyed during an impact with the blades of a WTG, at night in IMC. The wind farm was not marked on either sectional chart covering the accident location; however, the pilot was reportedly aware of the presence of the wind farm.	27 Apr 2014	10 miles south of Highmore, South Dakota	4	Night IMC Low cloud and rain	420 ft AGL overall	Fitted but reportedly not operational on the WTG that was struck	The NTSB determined the probable cause(s) of this accident to be the pilot's decision to continue the flight into known deteriorating weather conditions at a low altitude and his subsequent failure to remain clear of an unlit WTG. Contributing to the accident was the inoperative obstacle light on the WTG, which prevented the pilot from visually identifying the WTG.	An operational obstacle light may have prevented the accident.

ID	Description	Date	Location	Fatalities	Flight rules	WTG height	Obstacle lighting	Cause of accident	Relevant to obstacle lighting at night
3	Beechcraft B55 The pilot was attempting to remain in VMC by descending the aircraft through a break in the clouds. The pilot, distracted by trying to visually locate the aerodrome, flew into an area of known presence of WTGs. After sighting the WTGs he was unable to avoid them. The tip of the left wing struck the first WTG blade, followed by the tip of the right wing striking the blade of a second WTG. The pilot was able to maintain control of the aircraft and landed safely.	04 Apr 2008	Plouguin, France	0	Day VFR The weather in the area of the WTGs had deteriorated to an overcast of stratus cloud, with a base between 100 ft to 350 ft and tops of 500 ft.	328 ft AGL hub height, 393 ft AGL overall	Not specified	This pilot reported having been distracted by a troubling personal matter which he had learned of before departing for the flight. The wind farm was annotated on aeronautical charts.	Not applicable

ID	Description	Date	Location	Fatalities	Flight rules	WTG height	Obstacle lighting	Cause of accident	Relevant to obstacle lighting at night
4	VariEze N25063 The aircraft collided with a WTG following in-flight separation of the majority of the right canard and all of the right elevator.	20 July 2001	Palm Springs, USA	2	Day VFR	N/A	N/A	The failure of the builder to balance the elevators per the kit manufacturer's instructions. The cause of this accident is not attributable to the wind farm.	Not applicable

9. RISK ASSESSMENT

A risk management framework is comprised of likelihood and consequence descriptors, a matrix used to derive a level of risk, and actions required of management according to the level of risk.

The risk assessment framework used by Aviation Projects and risk event description is provided in **Annexure 4.**

9.1. Risk Identification

The primary risk being assessed is that of aviation safety associated with the height and location of WTGs and WMTs proposed by the Project.

Based on an extensive review of accident statistics data (see summary in Section 8 above) and stakeholders who were consulted during the preparation of this AIA (see Section 5), 5 identified risk events associated with WTGs and WMTs relate to aviation safety or potential visual impact, and are listed as follows:

1. potential for an aircraft to collide with a WTG, controlled flight into terrain (CFIT) (related to aviation safety).
2. potential for an aircraft to collide with a WMT (CFIT) (related to aviation safety).
3. potential for a pilot to initiate manoeuvring in order to avoid colliding with a WTG or WMT resulting in collision with terrain (related to aviation safety).
4. potential for the hazards associated with the Project to invoke operational limitations or procedures on operating crew (related to aviation safety).
5. Potential effect of obstacle lighting on neighbours (related to potential visual impact).

It should be noted that according to guidance provided by the Commonwealth Department of Infrastructure Transport, Regional Development, Communications and the Arts (Airspace and Air Traffic Management Risk Management Policy Statement). and in line with generally accepted practice, the risk to be assessed should primarily be associated with passenger transport services. The risk being assessed herein is primarily associated with smaller aircraft likely to be flying under the VFR, and so the maximum number of passengers exposed to the nominated consequences is likely to be limited.

The five risk events identified here are assessed in detail in the following section.

9.2. Risk Analysis, Evaluation and Treatment

For the purpose of considering applicable consequences, the concept of worst credible effect has been used. Untreated risk is first evaluated, then, if the resulting level of risk is unacceptable, further treatments are identified to reduce the residual level of risk to an acceptable level.

A summary of the level of risk associated with the Project, under the proposed treatment regime, with specific consideration of the effect of obstacle lighting, is provided in Table 12 through to Table 16.

Table 12 Aircraft collision with wind turbine generator (WTG)

Risk ID:	1. Aircraft collision with wind turbine generator (WTG) (CFIT)

Discussion

An aircraft collision with a WTG would result in harm to people and damage to property. Property could include the aircraft itself, as well as the WTG.

There have been 4 reported occurrences worldwide of aircraft collisions with a component of a WTG structure since the year 2000 as discussed in Section 1. These reports show a range of situations where pilots were conducting various flying operations at low level and in the vicinity of wind farms in both IMC and VMC. No reports of aircraft collisions with wind farms in Australia have been found.

In consideration of the circumstances that would lead to a collision with a WTG:

- GA VFR aircraft operators generally don't individually fly a significant number of hours in total, let alone in the area in question
- There is a very small chance that a pilot, suffering the stress of weather, will continue into poor weather conditions (contrary to the rules of flight) rather than divert away from it, is not aware of the wind farm, will not consider it or will not be able to accurately navigate around it.
- If the aircraft was flown through the wind farm, there is still a very small chance that it would hit a WTG.

Refer to the discussion of worldwide accidents in Section 1.

There are known aerial application operations during the day in the vicinity of the Project site.

There are no known aerial application operations conducted at night in the vicinity of the Project site.

If a proposed object or structure is identified as likely to be an obstacle, details of the relevant proposal must be referred to CASA for CASA to determine, in writing:

(a) whether the object or structure will be a hazard to aircraft operations

(b) whether it requires an obstacle light that is essential for the safety of aircraft operations

The Project site is clear of the obstacle limitation surfaces (OLS) of any aerodrome.

Consequence

If an aircraft collided with a WTG, the worst credible effect would be multiple fatalities and damage beyond repair. This would be a Catastrophic consequence.

Consequence	Catastrophic

Untreated Likelihood

There have been 4 reports of aircraft collisions with WTGs worldwide, which have resulted in a range of consequences, where aircraft occupants sustained minor injury in some cases and fatal injuries in others (see Section 8). Similarly, aircraft damage sustained ranged from minor to catastrophic. One of these accidents resulted from structural failure of the aircraft before the collision with the WTG. Only two relevant accidents occurred during the day, and only one resulted in a single fatality. It is assessed that collision with a WTG resulting in multiple fatalities and damage beyond repair is unlikely to occur, but possible (has occurred rarely), which is classified as Possible.

Untreated Likelihood	Possible

Current Treatments (without lighting)

- The Project site is clear of the obstacle limitation surfaces (OLS) of any aerodrome.
- Aircraft are restricted to a minimum height of 500 ft (152.4 m) AGL above the highest point of the terrain and any object on it within a radius of 300 m in visual flight during the day when not in the vicinity of built-up areas. The proposed WTGs will be a maximum of 280 m (919 ft) at the top of the blade tip. The rotor blade at its maximum height will be approximately 127.6 m (418.6 ft) above aircraft flying at the minimum altitude of 152.4 m AGL (500 ft).
- In the event that descending cloud forces an aircraft lower than 500 ft (152.4 m) AGL, the minimum visibility of 5,000 m required for visual flight during the day should provide adequate time for pilots to observe and manoeuvre their aircraft clear of WTGs.
- If cloud descends below the WTG hub (assumed to be approximately 200 m AGL), obstacle lighting would be obscured and therefore ineffective.
- Aircraft are restricted to a minimum height of 304.8 m (1,000 ft) above obstacles (including terrain) which are within 10 nm of the aircraft in visual flight at night and potentially even higher during instrument flight (day or night).
- Aircraft authorised to intentionally fly below 152.4 m (500 ft) AGL (day) or below safety height (night) are operated in accordance with procedures developed as an outcome of thorough risk management activities undertaken specifically for and prior to undertaking such authorised flights. Any obstacle including WTGs in the path of the authorised flight would be specifically risk assessed during that process.
- The WTGs will be painted light grey and will be visible to pilots during the day.
- The 'as constructed' details of WTGs are required to be notified to Airservices Australia so that the location and height of all WTGs can be noted on aeronautical maps and charts.
- Because the Project WTGs are proposed to be above 100 m AGL, there is a statutory requirement to report the WTGs to CASA and notified to Airservices Australia prior to construction.

Level of Risk

The level of risk associated with a Possible likelihood of a Catastrophic consequence is 8 (Unacceptable).

Current Level of Risk	8 - Unacceptable

Risk Decision

A risk level of 8 is classified as Unacceptable: Immediate action required by either treating or avoiding risk. Refer to executive management.

Risk Decision	Unacceptable

Recommended Treatments

The following treatments which can be implemented at little cost will provide an acceptable level of safety:

- Details of the Project should be communicated to local and regional aircraft operators (refer to **Section 5**) prior to construction to heighten their awareness of its location and so that they can plan their operations accordingly. Specifically:

• Engage with local aerial agricultural and aerial firefighting operators to develop procedures, which may include, for example, stopping the rotation of the WTG blades prior to the commencement of the subject aircraft operations within the Project site.
Residual Risk With the implementation of the Recommended Treatments listed above, the likelihood of an aircraft collision with a WTG resulting in multiple fatalities and damage beyond repair will be **Unlikely**, and the consequence remains **Catastrophic**, resulting in an overall risk level of **7 - Tolerable**. It is considered that the significant cost of obstacle lighting (which is not a preventative control), may only slightly reduce the likelihood of a collision given that the pilot is already in a highly undesirable situation (and not in all situations – such as where the obstacle light may be obscured by cloud) and hence is not justified. The level of risk with the implementation of the Recommended Treatments is considered **As Low As Reasonably Practicable (ALARP).** **It is our assessment that there will be an acceptable level of aviation safety risk associated with the potential for an aircraft collision with a Project WTG without obstacle lighting on the WTGs.**
Residual Risk | 7 - Tolerable

Table 13 Aircraft collision with wind monitoring tower (WMT)

Risk ID:	2. Aircraft collision with a wind monitoring tower (WMT) (CFIT)

Discussion

An aircraft collision with a WMT would result in harm to people and damage to property.

The proposed WMT should be marked in accordance with Part 139 MOS 2019 specifications (as modified by the guidance in NASF Guideline D).

The location of the proposed WMT location and other applicable details will be provided to Airservices Australia prior to construction.

There are a few instances of aircraft colliding with a WMT, but they were all during the day with good visibility, and none were in Australia.

There is a relatively low rate of aircraft activity in the vicinity of the Project site.

There are known aerial application operations conducted during the day in the region.

There are no known aerial application operations conducted at night in the immediate vicinity of the wind farm.

Kerang aerodrome is available for night operations with runway lighting provided on the main runway 14/32.

For an object that is 100 m or taller, details of the relevant proposal must be referred to CASA for CASA to determine, in writing:

- whether the object or structure will be a hazard to aircraft operations
- whether it requires an obstacle light that is essential for the safety of aircraft operations

Consequence

If an aircraft collided with a WMT, the worst credible effect would be multiple fatalities and damage beyond repair. This would be a Catastrophic consequence.

Consequence	Catastrophic

Untreated Likelihood

There are a few occurrences of an aircraft colliding with a WMT, but all were during the day with good visibility when obstacle lighting would arguably be of no effect, and none were in Australia. It is assessed that a collision with a WMT without obstacle lighting that would be effective in alerting the pilot to its presence is unlikely to occur, but possible (has occurred rarely), which is classified as Possible.

Untreated Likelihood	Possible

Current Treatments

- The WMT locations will be advised to CASA and Airservices Australia prior to construction as specified in this assessment.
- Aircraft are restricted to a minimum height of 152.4 m (500 ft) AGL above the highest point of the terrain and any object on it within a radius of 300 m in visual flight during the day when not in the vicinity of built-up areas.
- The 100 m WMT will not penetrate navigable airspace.

- In the event that descending cloud forces an aircraft lower than 152.4 m (500 ft) AGL, the minimum visibility of 5,000 m required for visual flight during the day should provide adequate time for pilots to observe and manoeuvre their aircraft clear of the tower.
- Aircraft are restricted to a minimum height of 304.8 m (1,000 ft) above obstacles within 10 nm of the aircraft in visual flight at night and potentially even higher during instrument flight (day or night).
- Aircraft authorised to intentionally fly below 152.4 m (500 ft) (day) or below safety height (night) are operated in accordance with procedures developed as an outcome of thorough risk management activities.

Level of Risk

The level of risk associated with a Possible likelihood of a Catastrophic consequence is 8.

Current Level of Risk	8 - Unacceptable

Risk Decision

A risk level of 8 is classified as Unacceptable: Immediate action required by either treating or avoiding risk. Refer to executive management.

Risk Decision	Unacceptable

Recommended Treatments

The following treatments which can be implemented at little cost will provide an acceptable level of safety:

- Details of any WMTs when they are constructed should be advised to Airservices Australia.
- The WMT should be marked with aviation marker balls and consideration should be made to Part 139 MOS Chapter 8 Division 10 Obstacle Markings (as modified by the guidance in NASF Guideline D); specifically:

  8.110 (5) As illustrated in Figure 8.110 (5), long, narrow structures like masts, poles and towers which are hazardous obstacles must be marked in contrasting colour bands so that the darker colour is at the top; and the bands are, as far as physically possible, marked at right angles along the length of the long, narrow structure; and have a length ("z" in Figure 8.110 (5)) that is, approximately, the lesser of: 1/7 of the height of the structure; or 30 m.

  8.110 (7) Hazardous obstacles in the form of wires or cables must be marked using 3-dimensional coloured objects attached to the wire or cables. Note: Spheres and pyramids are examples of 3-dimensional objects. (8) The objects mentioned in subsection (7) must: be approximately equivalent in size to a cube with 600 mm sides; and be spaced 30 m apart along the length of the wire or cable.

- WMTs that are installed prior to WTG installation and WMTs that are not in close proximity to a WTG, should be fitted with a medium intensity steady red obstacle light at the top of the tower to ensure visibility in low light and deteriorated atmospheric conditions. Characteristics of medium-intensity lights are specified in MOS 139 Section 9.33:

  5) Medium-intensity obstacle lights must:

  c) be visible in all directions in azimuth; and

  d) if flashing — have a flash frequency of between 20 and 60 flashes per minute.

6) *The peak effective intensity of medium-intensity obstacle lights must be 2 000 ± 25% cd with a vertical distribution as follows:*

d) *for **vertical beam spread** — a minimum of 3 degrees;*

e) *at -1 degree elevation — a minimum of 50% of the lower tolerance value of the peak intensity;*

f) *at 0 degrees elevation — a minimum of 100% of the lower tolerance value of the peak intensity.*

7) *For subsection (2), **vertical beam spread** means the angle between 2 directions in a plane for which the intensity is equal to 50% of the lower tolerance value of the peak intensity.*

8) *If, instead of obstacle marking, a flashing white light is used during the day to indicate temporary obstacles in the vicinity of an aerodrome, the peak effective intensity of the light must be increased to 20 000 ± 25% cd when the background luminance is 50 cd/m² or greater.*

- CASA have supported the use of 200 candela low-intensity obstacle lighting on masts in rural and remote settings where there is little backlight.
- Ensure details of any additional WMTs at the Project site have been communicated to Airservices Australia, and local and regional aerodrome and aircraft operators before, during and following construction.

Residual Risk

With the additional Recommended Treatments listed above, the likelihood of an aircraft collision with a WMT resulting in multiple fatalities and damage beyond repair will be **Unlikely**, and the consequence remains **Catastrophic**, resulting in an overall risk level of **7 – Tolerable**.

It is considered that the significant cost of obstacle lighting (which is not a preventative control), may only slightly reduce the likelihood of a collision given that the pilot is already in a highly undesirable situation (and not in all situations – such as where the obstacle light may be obscured by cloud) considering the WMT is 100 m AGL and will not penetrate navigable airspace. However, the use of obstacle lighting will make the WMT more visible at night and should be considered to be installed electively. A low-intensity light should be suitable because of the lack of backlight in the Project area.

Under these circumstances, the level of risk under the proposed treatment plan is considered **ALARP.**

It is our assessment that there will be an acceptable level of aviation safety risk associated with the potential for an aircraft collision with the Project permanent WMT installed prior to the development of WTGs that is 100 m AGL with low-intensity obstacle lighting on the WMT.

Residual Risk	7 - Tolerable

Table 14 Harsh manoeuvring leading to controlled flight into terrain

Risk ID:	3. Harsh manoeuvring leads to controlled flight into terrain (CFIT)

Discussion

An aircraft colliding with terrain as a result of manoeuvring to avoid colliding with a WTG would result in harm to people and damage to property.

There are a few ground collision accidents resulting from manoeuvring to avoid wind farms, but none in Australia, and all were during the day.

The Project is clear of the OLS of any aerodrome.

Aircraft are restricted to a minimum height of 152.4 m (500 ft) above the highest point of the terrain and any object on it within a radius of 300 m in visual flight during the day when not in the vicinity of built up areas.

The proposed WTGs will be a maximum of 280 m (919 ft) at the top of the blade tip. The rotor blade at its maximum height will be approximately 127.6 m (418.6 ft) above aircraft flying at the minimum altitude of 152.4 m AGL (500 ft).

Nevertheless, the minimum visibility of 5000 m required for visual flight during the day should provide adequate time for pilots to observe and manoeuvre their aircraft clear of WTGs.

If cloud descends below the WTG hub, obstacle lighting would be obscured and therefore ineffective.

Aircraft are restricted to a minimum height of 304.8 m (1000 ft) above obstacles within 10 nm of the aircraft in visual flight at night and potentially even higher during instrument flight (day or night).

Aircraft authorised to intentionally fly below 152.4 m (500 ft) AGL (day) or below safety height (night) are operated in accordance with procedures developed as an outcome of thorough risk management activities.

Assumed risk treatments

- The WTGs will be coloured light grey and should be visible during the day.
- The 'as constructed' details of WTGs are required to be notified to Airservices Australia so that the location and height of WTGs can be noted on aeronautical maps and charts.
- Since the WTGs will be 100 m AGL, there is a statutory requirement to report the WTG to CASA.

Consequence

If an aircraft collided with terrain, the worst credible effect would be multiple fatalities and damage beyond repair. This would be a Catastrophic consequence.

Consequence	Catastrophic

Untreated Likelihood

There are a few ground collision accidents resulting from manoeuvring to avoid WTGs, but none in Australia, and all were during the day (see Section 8). It is assessed that a ground collision accident following manoeuvring to avoid a WTG is unlikely to occur, but possible (has occurred rarely), which is classified as Possible.

Untreated Likelihood	Possible

Current Treatments (without lighting)

- The Project is clear of the OLS of any aerodrome.

- Aircraft are restricted to a minimum height of 152.4 m (500 ft) above the highest point of the terrain and any object on it within a radius of 300 m in visual flight during the day when not in the vicinity of built-up areas.
- The proposed WTGs will be a maximum of 280 m (919 ft) at the top of the blade tip. The rotor blade at its maximum height will be approximately 127.6 m (418.6 ft) above aircraft flying at the minimum altitude of 152.4 m AGL (500 ft).
- Nevertheless, the minimum visibility of 5000 m required for visual flight during the day should provide adequate time for pilots to observe and manoeuvre their aircraft clear of WTGs.
- If cloud descends below the WTG hub, obstacle lighting would be obscured and therefore ineffective.
- Aircraft are restricted to a minimum height of 304.8 m (1000 ft) above obstacles within 10 nm of the aircraft in visual flight at night and potentially even higher during instrument flight (day or night).
- Aircraft authorised to intentionally fly below 152.4 m AGL (500 ft) (day) or below safety height (night) are operated in accordance with procedures developed as an outcome of thorough risk management activities.
- The WTGs are typically coloured white, typical of most WTGs operational in Australia, so they should be visible during the day.
- The 'as constructed' details of WTGs are required to be notified to Airservices Australia so that the location and height of wind farms can be noted on aeronautical maps and charts.
- Since the WTGs will be higher than 100 m AGL, there is a statutory requirement to report the WTGs to CASA.

Level of Risk

The level of risk associated with a Possible likelihood of a Catastrophic consequence is 8.

Current Level of Risk	8 – Unacceptable

Risk Decision

A risk level of 8 is classified as Unacceptable: Immediate action required by either treating or avoiding risk. Refer to executive management.

Risk Decision	Unacceptable

Recommended Treatments

The following treatments which can be implemented at little cost will provide an acceptable level of safety:

- Ensure details of the Project WTGs have been communicated to Airservices Australia, and local and regional aerodrome and aircraft operators prior to construction.
- Although there is no requirement to do so, the Proponent may consider engaging with local aerial agricultural and aerial firefighting operators to develop procedures for their safe operation within the Project site.

Residual Risk

With the additional Recommended Treatments listed above, the likelihood of ground collision resulting from manoeuvring to avoid a WTG resulting in multiple fatalities and damage beyond repair will be **Unlikely**, and the consequence remains **Catastrophic**, resulting in an overall risk level of **7 – Tolerable.** It is considered that the significant cost of obstacle lighting (which is not a preventative control), may only slightly reduce the likelihood of a collision given that the pilot is already in a highly undesirable situation (and not in all situations – such as where the obstacle light may be obscured by cloud) and hence is not justified. In the circumstances, the level of risk under the proposed treatment plan is considered **ALARP.** **It is assessed that there is an acceptable level of aviation safety risk associated with the potential for ground collision resulting from manoeuvring to avoid a Project WTG without obstacle lighting on the WTGs.**	
Residual Risk	7 - Tolerable

Table 15 Effect of the Project on operating crew

Risk ID:	**4. Effect of the Project on operating crew**
Discussion Introduction or imposition of additional operating procedures or limitations can affect an aircraft's operating crew. There are no known aerial application operations conducted at night in the vicinity of the Project site.	
Consequence The worst credible effect a wind farm could have on flight crew would be the imposition of operational limitations, and in some cases, the potential for use of emergency procedures. This would be a Minor consequence.	
Consequence	Minor
Untreated Likelihood The imposition of operational limitations is unlikely to occur, but possible (has occurred rarely), which is classified as Possible.	
Untreated Likelihood	Possible
Current Treatments • The Project is clear of the OLS of any aerodrome. • Aircraft are restricted to a minimum height of 152.4 m (500 ft) above the highest point of the terrain and any object on it within a radius of 300 m in visual flight during the day when not in the vicinity of built-up areas. • The proposed WTGs will be a maximum of 280 m (919 ft) at the top of the blade tip. The rotor blade at its maximum height will be approximately 127.6 m (418.6 ft) above aircraft flying at the minimum altitude of 152.4 m AGL (500 ft). • In the event that descending cloud forces an aircraft lower than 500 ft (152.4 m) AGL, the minimum visibility of 5000 m required for visual flight during the day should provide adequate time for pilots to observe and manoeuvre their aircraft clear of WTGs. • Nevertheless, the minimum visibility of 5000 m required for visual flight during the day should provide adequate time for pilots to observe and manoeuvre their aircraft clear of WTGs. • If cloud descends below the WTG hub, obstacle lighting would be obscured and therefore ineffective. • Aircraft are restricted to a minimum height of 304.8 m (1000 ft) above obstacles within 10 nm of the aircraft in visual flight at night and potentially even higher during instrument flight (day or night). • Aircraft authorised to intentionally fly below 152.4 m AGL (500 ft) (day) or below safety height (night) are operated in accordance with procedures developed as an outcome of thorough risk management activities.	

- The WTGs will be coloured light grey and they should be highly visible during the day.
- The 'as constructed' details of WTGs are required to be notified to Airservices Australia so that the location and height of wind farms can be noted on aeronautical maps and charts.
- Since the WTGs will be higher than 100 m AGL, there is a statutory requirement to report the WTGs to CASA.

Level of Risk

The level of risk associated with a Possible likelihood of a Minor consequence is 5.

Current Level of Risk	5 - Tolerable

Risk Decision

A risk level of 5 is classified as Tolerable: Treatment action possibly required to achieve ALARP - conduct cost/benefit analysis. Relevant manager to consider for appropriate action.

Risk Decision	Accept, conduct cost benefit analysis

Recommended Treatments

Given the current treatments and the limited scale and scope of flying operations conducted within the vicinity of the Project, there is likely to be little additional safety benefit to be gained by installing obstacle lighting, other than if a WMT exceeds 150 m AGL in height and is not in relatively close proximity to a wind turbine.

However, the following treatments, which can be implemented at little cost, will provide an additional margin of safety:

- Ensure details of the Project have been communicated to Airservices Australia, and local and regional aerodrome and aircraft operators before, during and following construction.
- Although there is no requirement to do so, The Proponent may consider engaging with local aerial agricultural and aerial firefighting operators to develop procedures for such aircraft operations in the vicinity of the Project.

Residual Risk

Notwithstanding the current level of risk is considered **Tolerable**, the additional recommended treatments will enhance aviation safety. The likelihood remains **Possible**, and consequence remains **Minor**. In the circumstances, the risk level of 5 is considered **as low as reasonably practicable ALARP.**

It is our assessment that there is an acceptable level of aviation safety risk associated with the potential for operational limitations to affect aircraft operating crew, without obstacle lighting on the WTGs, and with a low-intensity obstacle lighting on the WMT of the Project.

Residual Risk	5 – Tolerable

Table 16 Effect of obstacle lighting on neighbours

Risk ID:	**5. Effect of obstacle lighting on neighbours**

Discussion

This scenario discusses the consequential impact of a decision to install obstacle lighting on the wind farm.

Installation and operation of obstacle lighting on WTGs or WMT can have an effect on neighbours' visual amenity and enjoyment, specifically at night and in good visibility conditions.

If a proposed object or structure is identified as likely to be an obstacle, details of the relevant proposal must be referred to CASA for CASA to determine, in writing:

(a) whether the object or structure will be a hazard to aircraft operations

(b) whether it requires an obstacle light that is essential for the safety of aircraft operations.

In general, objects outside an OLS and above 100 m would require obstacle lighting unless CASA, in an aeronautical study, assesses it is shielded by another lit object or it is of no operational significance.

Consequence

The worst credible effect of obstacle lighting specifically at night in good visibility conditions would be:

- Moderate site impact, minimal local impact, important consideration at local or regional level, possible long-term cumulative effect. Not likely to be decision making issues. Design and mitigation measures may ameliorate some consequences.

This would be a Moderate consequence.

Consequence	Moderate

Untreated Likelihood

The likelihood of moderate site impact, minimal local impact is Almost certain - the event is likely to occur many times (has occurred frequently).

Untreated Likelihood	Almost certain

Current Treatments

If the WTGs or WMTs will be higher than 150 m (492 ft) AGL, they must be regarded as obstacles unless CASA assess otherwise. In general, objects outside an OLS and above 100 m would require obstacle lighting unless CASA, in an aeronautical study, assesses it is shielded by another lit object or it is of no operational significance.

Level of Risk

The level of risk associated with an Almost certain likelihood of a Moderate consequence is 8.

Current Level of Risk	8 - Unacceptable

Risk Decision

A risk level of 8 is classified as Unacceptable: Immediate action required by either treating or avoiding risk. Refer to executive management.

Risk Decision	Unacceptable

Recommended Treatments

Not installing obstacle lighting would completely remove the source of the impact.

As per the above safety risk assessment, the provision of lighting for the WTGs and WMTs is not considered necessary to provide an acceptable level of safety, however installing a light on the WMT that is installed prior to the development of WTGs may reduce the risk slightly.

If CASA or a planning authority decide that obstacle lighting is required there are impact reduction measures that can be implemented to reduce the impact of lighting on surrounding neighbours, including:

- reducing the number of WTGs with obstacle lights
- specifying an obstacle light that minimises light intensity at ground level
- specifying an obstacle light that matches light intensity to meteorological visibility
- mitigating light glare from obstacle lighting through measures such as baffling.

These measures are designed to optimise the benefit of the obstacle lights to pilots while minimising the visual impact to residents within and around the Project site.

Consideration may be given to activating the obstacle lighting via a pilot activated lighting system.

An option is to consider using Aircraft Detection Lighting Systems (referred in the United States Federal Aviation Administration Advisory Circular AC70/7460-1L CHG1 – *Obstruction Marking and Lighting*). Such a system would only activate the lights when an aircraft is detected in the near vicinity and deactivate the lighting once the aircraft has passed. This technology reduces the impact of night lighting on nearby communities and migratory birds and extends the life expectancy of obstruction lights.

Residual Risk

Not installing obstacle lights would clearly be an acceptable outcome to those potentially affected by visual impact.

If lighting is required, consideration of visual impact in the lighting design should enable installation of lighting that reduces the impact to neighbours. A low-intensity light on the WMT would reduce the visual impact slightly.

The likelihood of a **Moderate** consequence remains **Likely**, with a resulting risk level of **7 – Tolerable**.

It is our assessment that visual impact from obstacle lights can be negated if they are not installed. If obstacle lights are to be installed, they can be designed so that there is an acceptable risk of visual impact to neighbours.

Residual Risk	**7 - Tolerable**

10. CONCLUSIONS

The key conclusions of this AIA are summarised as follows:

10.1. Project description

The Project will comprise the following:

- Up to 17 WTGs with a maximum overall height (tip height) of up to 280 m AGL
- The highest WGT has a ground elevation of 94.7 m AHD and overall height of 374.7 m AHD (1229 ft AMSL).
- Permanent WMT is 150 m (492 ft) AGL. And the temporary Met Mast is 107 m (351 ft) AGL.
- Associated high voltage equipment and transmission infrastructure including underground connection to the proposed Koorangie Terminal Station

10.2. Planning considerations

The Project may be affected by the application of the Gannawarra Shire Council Planning Scheme which has strategic directions for transport established, including to

- Discourage land use and development that impacts on the functions of Kerang Airport.
- Protect local landing strips for commuting and emergency use.

It is considered that consultation with the Gannawarra Shire Council and confirmation of the impact to the terminal instrument flight procedures are required to manage the impact of the strategic transport directions established in the planning scheme. It is anticipated that the required changes to the instrument flight procedures could be made without adversely affecting the overall efficacy of the procedures and without affecting the accessibility of emergency aircraft to the aerodrome.

Consultation feedback received on 18 September 2024 by Craig Maffescioni (Manager – Operational Services) from Gannawarra Shire Council and confirm that:

> *At this stage Council has no issue with the with the proposal and has been in contact with the relevant agencies to update the necessary documents.*

10.3. Aviation Impact Statement

Based on the Project WTG layout and maximum blade tip height of up to 280 m AGL, the blade tip elevation of the highest WTG will not exceed 374.7 m AHD (1229 ft AMSL) and:

- will not penetrate any obstacle limitation surfaces of any certified aerodrome
- **will** impact Procedures for Air Navigation Services - Aircraft Operations PANS-OPS surfaces by infringing the 10 nm and 25 nm minimum sector altitude (MSA) of the of terminal instrument flight procedures at Kerang aerodrome and the 25 nm MSA for Swan Hill aerodrome
- will not have an impact on the operations of any proximate ALAs
- **will** impact the grid LSALT of 2000 ft AMSL established in EnRoute Chart – Low. (ERCL 2)
- will not impact an air route LSALTs

- will not have an impact on operational airspace
- is wholly contained within Class G airspace
- is outside the clearance zones associated with civil aviation navigation aids and communication facilities.

10.4. Aircraft operator characteristics

Aircraft operations in the vicinity of the Project Area are likely to be related to aerial application operations at nearby properties, and aircraft approaching and departing Kerang aerodrome and nearby uncertified aerodromes.

Aircraft will be required to navigate around the Project site in low cloud conditions where aircraft need to fly at 500 ft AGL.

WTGs are generally not a safety concern to aerial agricultural operators. WMTs remain the primary safety concern to aerial agricultural operators, who have expressed a general desire for these towers to be more visible.

Aeromedical aircraft operating to Kerang aerodrome are likely to be using the terminal instrument flight procedures implemented for runway 14/32, and would not normally be required to overfly the Project Area. Aircraft operating at night over the Project Area will be required to maintain at least the established lowest safe altitude or minimum sector altitude which will provide at least 1000 ft of clearance over the highest object.

10.5. Hazard marking and lighting

The following conclusions apply to hazard marking and lighting:

- With respect to CASR Part 139 Division 139.E., the proposed WTGs must be reported to CASA.
- CASA will review the proposed WTG development and make a recommendation for obstacle lighting if required.
- With respect to the marking of WTGs, a white colour will provide sufficient contrast with the surrounding environment to maintain an acceptable level of safety while lowering visual impact to the neighbouring residents.
- It is not mandatory to mark the WMTs, however the following markings are recommended to be implemented in consideration of potential day VFR aerial work operations in accordance with NASF Guideline D:
    - Obstacle marking for at least the top 1/3 of the mast and be painted in alternating contrasting bands of colour
    - Marker balls or high visibility flags or high visibility sleeves placed on the outside guy wires; and
    - Guy wire ground attachment points in contrasting colours to the surrounding ground/vegetation

10.6. Summary of risks

A summary of the level of residual risk associated with the Project with the Recommended Treatments implemented, is provided in Table 17.

Table 17 Summary of Residual Risks

Identified Risk	*Consequence*	*Likelihood*	*Risk*	*Actions Required*
Aircraft collision with wind turbine generator (WTG)	Catastrophic	Unlikely	7	**Acceptable without obstacle lighting (ALARP).** Communicate details of the Project WTGs to local and regional operators and make arrangements to publish details in ERSA for surrounding aerodromes before, during and following construction.
Aircraft collision with wind monitoring tower (WMT)	Catastrophic	Unlikely	7	**Acceptable with obstacle lighting (ALARP).** Although there is no obligation to do so, consideration has been made for marking the WMTs according to the requirements set out in MOS 139 Chapter 8 Division 10 Obstacle Markings, specifically 8.110 (5), (7) and (8). The WMT is not strictly required to be lit however installing a low-intensity light on the WMT will reduce the risk of collision slightly. Communicate details of WMTs to local and regional operators and make arrangements to publish details in ERSA for surrounding aerodromes following construction.
Avoidance manoeuvring leads to ground collision	Catastrophic	Unlikely	7	**Acceptable without obstacle lighting on WTGs (ALARP).** Communicate details of the Project WTGs and WMTs to local and regional operators
Effect on crew	Minor	Possible	5	**Acceptable without obstacle lighting on WTGs (ALARP)** Communicate details of the Project WTGs and WMTs to local and regional operators
Visual impact from obstacle lights	Moderate	Likely	7	**Acceptable without obstacle lighting** (zero risk of visual impact from obstacle lighting). If lights are installed, design to minimise impact. Low intensity light on the WMT will reduce impact slightly.

11. RECOMMENDATIONS

Recommended actions resulting from the conduct of this assessment are provided below.

Notification and reporting

1. 'As constructed' details of WTG and WMT exceeding 100 m AGL must be reported to CASA *as soon as practicable after forming the intention to construct or erect the proposed object or structure,* in accordance with CASR Part 139.165(1)(2). This notification goes to Airspace.Protection@casa.gov.au

2. 'As constructed' details of WTG and WMT coordinates and elevation should be provided to Airservices Australia, using the following form https://www.airservicesaustralia.com/wp-content/uploads/ATS-FORM-0085_Vertical_Obstruction_Data_Form.pdf

3. Any obstacles above 100 m AGL (including temporary construction equipment) should be reported to Airservices Australia NOTAM office until they are incorporated in published operational documents. With respect to crane operations during the construction of the Project, a notification to the NOTAM office may include, for example, the following details:

    a. The planned operational timeframe and maximum height of the crane; and

    b. Either the general area within which the crane will operate and/or the planned route with timelines that crane operations will follow.

4. Details of the Project must be reported to Global Airspace Solutions Pty Ltd (GAS) as the instrument flight procedure designer for the RNAV(GNSS) procedures for runway 14/32 at YKER, using the following email address: admin@globalairspacesolutions.com. (The consultation phase of this assessment will include notifying GAS of the Project and confirming the impact to YKER's instrument flight procedures). Airservices Australia must be notified of the Project for review of the impact to Swan Hill aerodrome (YSWH)'s instrument procedures (to be undertaken during consultation).

5. Details of the wind farm should be provided to local and regional aircraft operators prior to construction in order for them to consider the potential impact of the wind farm on their operations.

6. To facilitate the flight planning of aerial application operators, details of the Project, including the 'as constructed' location and height information of WTGs, WMTs and overhead transmission lines should be provided to landowners so that, when asked for hazard information on their property, the landowner may provide the aerial application pilot with all relevant information.

Operation

7. Whilst not a statutory requirement, the Proponent should consider engaging with any local aerial agricultural operators and aerial firefighting operators in developing procedures for such aircraft operations in the vicinity of the Project.

Marking of WTGs

8. The rotor blades, nacelle and the supporting mast of the WTGs should be painted white, typical of most WTGs operational in Australia. No additional marking measures are required for WTGs.

Lighting of WTGs

9. Aviation Projects has assessed that the Project will not require obstacle lighting to maintain an acceptable level of safety to aircraft.

Marking of wind monitoring towers

10. It is not mandatory to mark the WMTs however the following markings are recommended to be implemented in consideration of potential day VFR aerial work operations in accordance with NASF Guideline D:

    a. Obstacle marking for at least the top 1/3 of the mast and be painted in alternating contrasting bands of colour

    b. Marker balls or high visibility flags or high visibility sleeves placed on the outside guy wires; and

    c. Guy wire ground attachment points in contrasting colours to the surrounding ground/vegetation

Lighting of wind monitoring towers

11. For temporary WMTs installed prior to WTG installation and WMTs that are not in close proximity to a WTG, there will be an acceptable level of aviation safety risk associated with the potential for an aircraft collision provided obstacle lighting is fitted to ensure visibility in low light and deteriorating atmospheric conditions.

Micrositing

12. The potential micrositing of the WTGs and WMTs has been considered in the assessment with the estimate of the overall maximum height being based on the highest ground level within 100 m of the nominal WTG and WMT positions. Providing the micrositing is within 100 m of the WTGs and WMTs is likely to not result in a change in the maximum overall blade tip height of the Project. No further assessment is likely to be required from micrositing and the conclusions of this AIA would remain the same.

Overhead transmission line

13. Overhead transmission lines and/or supporting poles that are located where they could adversely affect aerial application operations should be identified in consultation with local aerial application operators and marked in accordance with Part 139 MOS 2019 Chapter 8 Division 10 section 8.110 (7) and section 8.110 (8).

Triggers for review

14. Triggers for review of this risk assessment are provided for consideration:

    a. prior to construction to ensure the regulatory framework has not changed

    b. following any significant changes to the context in which the assessment was prepared, including the regulatory framework

    c. following any near miss, incident or accident associated with operations considered in this risk assessment.

ANNEXURES

1. References
2. Definitions
3. CASA regulatory requirements – Lighting and Marking
4. Risk Framework
5. Approval Letter from Swan Hill City Council

ANNEXURE 1 – REFERENCES

References used or consulted in the preparation of this report include:

- Airservices Australia, Aeronautical Information Package; including AIP Book, Departure and Approach Procedures, Designated Airspace Handbook and En Route Supplement Australia effective 28 November 2024
- Gannawarra Planning Scheme, last updated on 11 October 2024
- Civil Aviation Safety Authority, Civil Aviation Regulations 1988 (CAR)
- Civil Aviation Safety Authority, Civil Aviation Safety Regulations 1998 (CASR)
- Civil Aviation Safety Authority, Advisory Circular (AC) 91-10 v1.1: *Operations in the vicinity of non-controlled aerodromes*, dated November 2021
- Civil Aviation Safety Authority, Manual of Standards Part 173 – *Standards Applicable to Instrument Flight Procedure Design*, version 1.5, dated March 2016
- Civil Aviation Safety Authority, *Part 139 (Aerodromes) Manual of Standards 2019*, dated 10/2/2024
- Civil Aviation Safety Authority, Advisory Circular 139.E-01 v1.0—Reporting of Tall Structures, dated 08 December 2021
- Civil Aviation Safety Authority, Advisory Circular (AC) 139.E-05 v1.1 Obstacles (including wind farms) outside the vicinity of a CASA certified aerodrome, October 2022
- Department on Environment, Land, Water and Planning (DELWP) *Development of Wind Energy Facilities in Victoria Policy and Planning Guidelines* (revised March 2019)
- Department of Infrastructure and Regional Development, Australian Government, National Airport Safeguarding Framework, Guideline D *Managing the Risk to Aviation Safety of Wind Turbine Installations(Wind Farms)/Wind Monitoring Towers, Physical Obstacles to Air Navigation*, dated July 2012
- International Civil Aviation Organization (ICAO) Doc 8168 Procedures for Air Navigation Services—Aircraft Operations (PANS-OPS)
- ICAO Standards and Recommended Practices, Annex 14—Aerodromes
- OzRunways, aeronautical navigation charts extracts, dated November 2024
- Standards Australia, ISO 31000:2018 *Risk management – Guidelines*

ANNEXURE 2 – DEFINITIONS

Term	*Definition*
Aerial Agricultural Operator	Specialist pilot and/or company who are required to have a commercial pilot's licence, an agricultural rating and a chemical distributor's licence
Aerodrome	A defined area on land or water (including any buildings, installations, and equipment) intended to be used either wholly or in part for the arrival, departure, and surface movement of aircraft.
Aerodrome facilities	Physical things at an aerodrome which could include: a. the physical characteristics of any movement area including runways, taxiways, taxilanes, shoulders, aprons, primary and secondary parking positions, runway strips and taxiway strips; b. infrastructure, structures, equipment, earthing points, cables, lighting, signage, markings, visual approach slope indicators.
Aerodrome reference point (ARP)	The designated geographical location of an aerodrome.
Aeronautical Information Publication (AIP)	Details of regulations, procedures, and other information pertinent to the operation of aircraft
Aeronautical Information Publication En-route Supplement Australia (AIP ERSA)	Contains information vital for planning a flight and for the pilot in flight as well as pictorial presentations of all licensed aerodromes
Civil Aviation Safety Regulations 1998 (CASR)	Contain the mandatory requirements in relation to airworthiness, operational, licensing, enforcement.
Instrument meteorological conditions (IMC)	Meteorological conditions expressed in terms of visibility, distance from cloud, and ceiling, less than the minimum specified for visual meteorological conditions.
Manual of Standards (MOS)	The means CASA uses in meeting its responsibilities under the Act for promulgating aviation safety standards
National Airports Safeguarding Framework (NASF)	The Framework has the objective of developing a consistent and effective national framework to safeguard both airports and communities from inappropriate on and off airport developments.
Obstacles	All fixed (whether temporary or permanent) and mobile objects, or parts thereof, that are located on an area intended for the surface movement of

Term	*Definition*
	aircraft or that extend above a defined surface intended to protect aircraft in flight.
Runway	A defined rectangular area on a land aerodrome prepared for the landing and take-off of aircraft.
Runway strip	A defined area including the runway and stopway, if provided, intended: a. to reduce the risk of damage to aircraft running off a runway; and b. to protect aircraft flying over it during take-off or landing operations.
Safety Management System	A systematic approach to managing safety, including organisational structures, accountabilities, policies and procedures.

ANNEXURE 3 – CASA REGULATORY REQUIREMENTS – LIGHTING AND MARKING

In considering the need for aviation hazard lighting and marking, the applicable regulatory context was determined.

The Civil Aviation Safety Authority (CASA) regulates aviation activities in Australia. Applicable requirements include the Civil Aviation Regulations 1988 (CAR), Civil Aviation Safety Regulations 1998 (CASR) and associated Manual of Standards (MOS) and other guidance material. Relevant provisions are outlined in further detail in the following section.

Civil Aviation Safety Regulations 1998, Part 139—Aerodromes

CASR 139.165 requires the owner of a structure (or proponents of a structure) that will be 100 m or more above ground level to inform CASA. This must be given in written notice and contain information on the proposal, the height and location(s) of the object(s) and the proposed timeframe for construction. This is to allow CASA to assess the effect of the structure on aircraft operations and determine whether the structure will be hazardous to aircraft operations.

Manual of Standards Part 139—Aerodromes

Chapter 9 sets out the standards applicable to Visual Aids Provided by Aerodrome Lighting.

Section 9.30 provides guidance on Types of Obstacle Lighting and Their Use:

1. *The following types of obstacle lights must be used, in accordance with this MOS, to light hazardous obstacles:*
    a. *low-intensity;*
    b. *medium-intensity;*
    c. *high-intensity;*
    d. *a combination of low, medium or high-intensity.*

2. *Low-intensity obstacle lights:*
    a. *are steady red lights; and*
    b. *must be used on non-extensive objects or structures whose height above the surrounding ground is less than 45 m.*
3. *Medium-intensity obstacle lights must be:*
    a. *flashing white lights; or*
    b. *flashing red lights; or*
    c. *steady red lights.*

    Note CASA recommends the use of flashing red medium-intensity obstacle lights.

4. *Medium-intensity obstacle lights must be used if:*
    a. *the object or structure is an extensive one; or*

b. *the top of the object or structure is at least 45 m but not more than 150 m above the surrounding ground; or*

c. *CASA determines in writing that early warning to pilots of the presence of the object or structure is desirable in the interests of aviation safety.*

Note For example, a group of trees or buildings is regarded as an extensive object.

5. *For subsection (4), low-intensity and medium-intensity obstacle lights may be used in combination.*

6. *High-intensity obstacle lights:*

a. *must be used on objects or structures whose height exceeds 150 m; and*

b. *must be flashing white lights.*

7. *Despite paragraph (6) (b), a medium-intensity flashing red light may be used if necessary, to avoid an adverse environmental impact on the local community.*

Sections 9.31 (8) and (9) provide guidance on obstacle lighting specific to wind farms:

8. *Subject to subsection (9), for wind turbines in a wind farm, medium-intensity obstacle lights must:*

a. *mark the highest point reached by the rotating blades; and*

b. *be provided on a sufficient number of individual wind turbines to indicate the general definition and extent of the wind farm, but such that intervals between lit turbines do not exceed 900 m; and*

c. *all be synchronised to flash simultaneously; and*

d. *be seen from every angle in azimuth.*

Note: This is to prevent obstacle light shielding by the rotating blades of a wind turbine and may require more than 1 obstacle light to be fitted.

9. *If it is physically impossible to light the rotating blades of a wind turbine:*

a. *the obstacle lights must be placed on top of the generator housing; and*

b. *a note must be published in the AIP-ERSA indicating that the obstacle lights are not at the highest position on the wind turbines.*

10. *If the top of an object or structure is more than 45 m above:*

a. *the surrounding ground (ground level); or*

b. *the top of the tallest nearby building (building level); then the top lights must be medium-intensity lights, and additional low-intensity lights must be:*

c. *provided at lower levels to indicate the full height of the structure; and*

d. *spaced as equally as possible between the top lights and the ground level or building level, but not so as to exceed 45 m between lights.*

Advisory Circular 139.E-01 v1.0—Reporting of Tall Structures

In Advisory Circular (AC) 139.E-01 v1.0—Reporting of Tall Structures, CASA provides guidance to those

authorities and persons involved in the planning, approval, erection, extension or dismantling of tall structures so that they may understand the vital nature of the information they provide.

Airservices Australia has been assigned the task of maintaining a database of tall structures. RAAF and Airservices Australia require information on structures which are:

a) 30 metres or more above ground level—within 30 kilometres of an aerodrome; or

b) 45 metres or more above ground level elsewhere for the RAAF, or

c) 30 m or more above ground level elsewhere for Airservices Australia.

The purpose of notifying Airservices Australia of these structures is to enable their details to be provided in aeronautical information databases and maps/charts etc used by pilots, so that the obstacles can be avoided.

The proposed WTGs must be reported to Airservices Australia. This action should occur once the final layout after micrositing is confirmed and prior to construction.

International Civil Aviation Organisation

Australia, as a contracting State to the International Civil Aviation Organisation (ICAO) and signatory to the Chicago Convention on International Civil Aviation (the Convention), has an obligation to implement ICAO's standards and recommended practices (SARPs) as published in the various annexes to the Convention.

Annex 14 to the Convention — *Aerodromes, Volume 1,* Section 6.2.4 provides SARPs for the obstacle lighting and marking of WTGs, which is copied below:

6.2.4 Wind turbines

6.2.4.1 A wind turbine shall be marked and/or lighted if it is determined to be an obstacle.

Note 1. — Additional lighting or markings may be provided where in the opinion of the State such lighting or markings are deemed necessary.

Note 2. — See 4.3.1 and 4.3.2

Markings

6.2.4.2 Recommendation. — The rotor blades, nacelle and upper 2/3 of the supporting mast of wind turbines should be painted white, unless otherwise indicated by an aeronautical study.

Lighting

6.2.4.3 Recommendation. — When lighting is deemed necessary, in the case of a wind farm, i.e. a group of two or more wind turbines, the wind farm should be regarded as an extensive object and the lights should be installed:

a) to identify the perimeter of the wind farm;

b) respecting the maximum spacing, in accordance with 6.2.3.15, between the lights along the perimeter, unless a dedicated assessment shows that a greater spacing can be used;

c) so that, where flashing lights are used, they flash simultaneously throughout the wind farm;

d) so that, within a wind farm, any wind turbines of significantly higher elevation are also identified wherever they are located; and

e) at locations prescribed in a), b) and d), respecting the following criteria:

i) for wind turbines of less than 150 m in overall height (hub height plus vertical blade height), medium-intensity lighting on the nacelle should be provided;

ii) for wind turbines from 150 m to 315 m in overall height, in addition to the medium-intensity light installed on the nacelle, a second light serving as an alternate should be provided in case of failure of the operating light. The lights should be installed to assure that the output of either light is not blocked by the other; and

iii) in addition, for wind turbines from 150 m to 315 m in overall height, an intermediate level at half the nacelle height of at least three low-intensity Type E lights, as specified in 6.2.1.3, should be provided. If an aeronautical study shows that low-intensity Type E lights are not suitable, low-intensity Type A or B lights may be used.

Note. — The above 6.2.4.3 e) does not address wind turbines of more than 315 m of overall height. For such wind turbines, additional marking and lighting may be required as determined by an aeronautical study.

6.2.4.4 Recommendation. — The obstacle lights should be installed on the nacelle in such a manner as to provide an unobstructed view for aircraft approaching from any direction.

6.2.4.5 Recommendation. — Where lighting is deemed necessary for a single wind turbine or short line of wind turbines, the installation should be in accordance with 6.2.4.3 e) or as determined by an aeronautical study.

As referenced in Section 6.2.4.3(e)(iii), Section 6.2.1.3 is copied below:

6.2.1.3 The number and arrangement of low-, medium- or high-intensity obstacle lights at each level to be marked shall be such that the object is indicated from every angle in azimuth. Where a light is shielded in any direction by another part of the object, or by an adjacent object, additional lights shall be provided on that adjacent object or the part of the object that is shielding the light, in such a way as to retain the general definition of the object to be lighted. If the shielded light does not contribute to the definition of the object to be lighted, it may be omitted.

As referenced in Section 6.2.4.3(b), Section 6.2.3.15 is copied below:

6.2.3.15 Where lights are applied to display the general definition of an extensive object or a group of closely spaced objects, and

a) low-intensity lights are used, they shall be spaced at longitudinal intervals not exceeding 45 m; and

b) medium-intensity lights are used, they shall be spaced at longitudinal intervals not exceeding 900 m.

Section 4.3 Objects outside the OLS states the following:

4.3.1 Recommendation.— Arrangements should be made to enable the appropriate authority to be consulted concerning proposed construction beyond the limits of the obstacle limitation surfaces that extend above a height established by that authority, in order to permit an aeronautical study of the effect of such construction on the operation of aeroplanes.

4.3.2 Recommendation. — In areas beyond the limits of the obstacle limitation surfaces, at least those objects which extend to a height of 150 m or more above ground elevation should be regarded

as obstacles, unless a special aeronautical study indicates that they do not constitute a hazard to aeroplanes.

Note. — This study may have regard to the nature of operations concerned and may distinguish between day and night operations.

ICAO Doc 9774 Manual on Certification *of Airports* defines an aeronautical study as:

An aeronautical study is a study of an aeronautical problem to identify potential solutions and select a solution that is acceptable without degrading safety.

Light characteristics

If obstacle lighting is required, installed lights should be designed according to the criteria set out in the applicable regulatory material and taking CASA's recommendations into consideration in the case that CASA has reviewed this risk assessment and provided recommendations.

The characteristics of the obstacle lights should be in accordance with the applicable standards in Part 139 MOS 2019.

The characteristics of low and medium intensity obstacle lights specified in Part 139 MOS 2019, Chapter 9, are provided below.

Part 139 MOS 2019 Chapter 9 Division 4 – Obstacle Lighting section 9.32 outlines Characteristics of Low Intensity Obstacle Lights.

1. *Low-intensity obstacle lights must have the following:*
    a. *fixed lights showing red;*
    b. *a horizontal beam spread that results in 360-degree coverage around the obstacle;*
    c. *a minimum intensity of 100 candela (cd);*
    d. *a vertical beam spread (to 50% of peak intensity) of 10 degrees;*
    e. *a vertical distribution with 50 cd minimum at +6 degrees and +10 degrees above the horizontal;*
    f. *not less than 10 cd at all elevation angles between –3 degrees and +90 degrees above the horizontal.*

    Note: The intensity requirement in paragraph (c) may be met using a double-bodied light fitting. CASA recommends that double-bodied light fittings, if used, should be orientated so that they show the maximum illuminated surface towards the predominant, or more critical, direction of aircraft approach.

2. *To indicate the following:*
    a. *taxiway obstacles;*
    b. *unserviceable areas of the movement area; low-intensity obstacle lights must have a peak intensity of at least 10 cd.*

Part 139 MOS 2019 Chapter 9 Division 4 – Obstacle Lighting section 9.33 outlines Characteristics of Medium Intensity Obstacle Lights.

1. *Medium-intensity obstacle lights must:*

a. *be visible in all directions in azimuth; and*

b. *if flashing — have a flash frequency of between 20 and 60 flashes per minute.*

2. *The peak effective intensity of medium-intensity obstacle lights must be 2 000 ☐ 25% cd with a vertical distribution as follows:*

a. *for vertical beam spread — a minimum of 3 degrees;*

b. *at -1-degree elevation — a minimum of 50% of the lower tolerance value of the peak intensity;*

c. *at 0 degrees elevation — a minimum of 100% of the lower tolerance value of the peak intensity.*

3. *For subsection (2), vertical beam spread means the angle between 2 directions in a plane for which the intensity is equal to 50% of the lower tolerance value of the peak intensity.*

4. *If, instead of obstacle marking, a flashing white light is used during the day to indicate temporary obstacles in the vicinity of an aerodrome, the peak effective intensity of the light must be increased to 20 000 ± 25% cd when the background luminance is 50 cd/m² or greater.*

Visual impact of night lighting

Annex 14 Section 6.2.4 and Part 139 MOS 2019 Chapter 9 are specifically intended for WTGs and recommends that medium intensity lighting is installed.

Generally accepted considerations regarding minimisation of visual impact are provided below for consideration in this aeronautical study:

- To minimise the visual impact on the environment, some shielding of the obstacle lights is permitted, provided it does not compromise their operational effectiveness;
- Shielding may be provided to restrict the downward component of light to either, or both, of the following:
    - such that no more than 5% of the nominal intensity is emitted at or below 5 degrees below horizontal; and
    - such that no light is emitted at or below 10 degrees below horizontal;
- If a light would be shielded in any direction by an adjacent object or structure, the light so shielded may be omitted, provided that such additional lights are used as are necessary to retain the general definition of the object or structure.
- If flashing obstacle lighting is required, all obstacle lights on a wind farm should be synchronised so that they flash simultaneously; and
- A relatively small area on the back of each blade near the rotor hub may be treated with a different colour or surface treatment, to reduce reflection from the rotor blades of light from the obstacle lights, without compromising the daytime visibility of the overall WTG.

Marking of WTGs

ICAO Annex 14 Vol 1 Section 6.2.4.2 recommends that the rotor blades, nacelle and upper 2/3 of the supporting mast of the WTGs should be painted a shade of white, unless otherwise indicated by an aeronautical study.

It is generally accepted that a shade of white colour will provide sufficient contrast with the surrounding environment to maintain an acceptable level of safety while lowering visual impact to the neighbouring residents.

Wind monitoring towers

The details of the WMT were introduced in **Section 4** of this report.

Consideration could be given to marking any WMTs according to the requirements set out in Part 139 MOS 2019 Chapter 8 Division 10 Obstacle Markings; specifically:

> *8.110 Marking of Hazardous Obstacles*
>
> *(5) As illustrated in Figure 8.110 (5), long, narrow structures like masts, poles and towers which are hazardous obstacles must be marked in contrasting colour bands so that the darker colour is at the top; and the bands are, as far as physically possible, marked at right angles along the length of the long, narrow structure; and have a length ("z" in Figure 8.110 (5)) that is, approximately, the lesser of: 1/7 of the height of the structure; or 30 m.*
>
> *(7) Hazardous obstacles in the form of wires or cables must be marked using 3-dimensional coloured objects attached to the wire or cables. Note: Spheres and pyramids are examples of 3-dimensional objects.*
>
> *(8) The objects mentioned in subsection (7) must:*
> *(a) be approximately equivalent in size to a cube with 600 mm sides; and*
> *(b) be spaced 30 m apart along the length of the wire or cable.*

NASF Guideline D suggests consideration of the following measures specific to the marking and lighting of WMTs:

- the top 1/3 of wind monitoring towers to painted in alternating contrasting bands of colour. Examples of effective measures can be found in the Manual of Standards for Part 139 of the Civil Aviation Safety Regulations 1998. In areas where aerial application operations take place, marker balls or high visibility flags can be used to increase the visibility of the towers
- marker balls or high visibility flags or high visibility sleeves placed on the outside guy wires
- ensuring the guy wire ground attachment points have contrasting colours to the surrounding ground/vegetation or
- a flashing strobe light during daylight hours.

Temporary WMTs installed prior to WTG installation and WMTs not in close proximity to a WTG should be lit with medium-intensity steady red obstacle lighting at the top of the WMT mast. Characteristics of medium-intensity obstacle lighting is contained in MOS 139, Section 9.33

Overhead transmission lines

Overhead transmission lines and/or supporting poles that are located where they could adversely affect aerial application operations should be identified in consultation with local aerial application operators and marked in accordance with Part 139 MOS 2019 Chapter 8 Division 10 section 8.110 (7) and section 8.110 (8):

> *8.110 Marking of hazardous obstacles*
>
> *(7) Hazardous obstacles in the form of wires or cables must be marked using 3-dimensional coloured objects attached to the wire or cables. Note: Spheres and pyramids are examples of 3-dimensional objects.*

(8) The objects mentioned in subsection (7) must:

(a) be approximately equivalent in size to a cube with 600 mm sides; and

(b) be spaced 30 m apart along the length of the wire or cable.

ANNEXURE 4 – RISK FRAMEWORK

A risk management framework is comprised of likelihood and consequence descriptors, a matrix used to derive a level of risk, and actions required of management according to the level of risk.

The risk assessment framework used by Aviation Projects has been developed in consideration of ISO 31000:2018 *Risk management—Guidelines* and the guidance provided by CASA in its Safety Management System (SMS) for Aviation guidance material, which is aligned with the guidance provided by the International Civil Aviation Organization (ICAO) in Doc 9589 *Safety Management Manual*, Third Edition, 2013. Doc 9589 is intended to provide States (including Australia) with guidance on the development and implementation of a State Safety Programme (SSP), in accordance with the International SARPs, and is therefore adopted as the primary reference for aviation safety risk management in the context of the subject assessment.

Section 2.1 of the ICAO Doc 9589 *The concept of safety* defines safety as follows [author's underlining]:

> *2.1.1 Within the context of aviation, safety is "the state in which the possibility of harm to persons or of property damage is reduced to, and maintained at or below, an acceptable level through a continuing process of hazard identification and safety risk management."*

Likelihood

Likelihood is defined in ISO 31000:2018 as the chance of something happening. Likelihood descriptors used in this report are as indicated in Table 1.

Table 1 Likelihood Descriptors

No	*Descriptor*	*Description*
1	Rare	It is almost inconceivable that this event will occur
2	Unlikely	The event is very unlikely to occur (not known to have occurred)
3	Possible	The event is unlikely to occur, but possible (has occurred rarely)
4	Likely	The event is likely to occur sometimes (has occurred infrequently)
5	Almost certain	The event is likely to occur many times (has occurred frequently)

Consequence

Consequence is defined as the outcome of an event affecting objectives, which in this case is the safe and efficient operation of aircraft, and the visual amenity and enjoyment of local residents.

Consequence descriptors used in this report are as indicated in Table 2.

Table 2 Consequence Descriptors

No	Descriptor	People Safety	Property/Equipment	Effect on Crew	Environment
1	Insignificant	Minor injury – first aid treatment	Superficial damage	Nuisance	No effects or effects below level of perception
2	Minor	Significant injury – outpatient treatment	Moderate repairable damage – property still performs intended functions	Operations limitation imposed. Emergency procedures used.	Minimal site impact – easily controlled. Effects raised as local issues, unlikely to influence decision making. May enhance design and mitigation measures.
3	Moderate	Serious injury - hospitalisation	Major repairable damage – property performs intended functions with some short-term rectifications	Significant reduction in safety margins. Reduced capability of aircraft/crew to cope with conditions. High workload/stress on crew. Critical incident stress on crew.	Moderate site impact, minimal local impact, and important consideration at local or regional level, possible long-term cumulative effect. Not likely to be decision making issues. Design and mitigation measures may ameliorate some consequences.
4	Major	Permanent injury	Major damage rendering property ineffective in achieving design functions without major repairs	Large reduction in safety margins. Crew workload increased to point of performance decrement. Serious injury to small number of occupants. Intense critical incident stress.	High site impact, moderate local impact, important consideration at state level. Minor long-term cumulative effect. Design and mitigation measures unlikely to remove all effects.
5	Catastrophic	Multiple Fatalities	Damaged beyond repair	Conditions preventing continued safe flight and landing. Multiple deaths with loss of aircraft	Catastrophic site impact, high local impact, national importance. Serious long-term cumulative effect. Mitigation measures unlikely to remove effects.

Risk matrix

The risk matrix, which correlates likelihood and consequence to determine a level of risk, used in this report is shown in Table 3.

Table 3 Risk Matrix

		CONSEQUENCE				
		INSIGNIFICANT 1	MINOR 2	MODERATE 3	MAJOR 4	CATASTROPHIC
LIKELIHOOD	ALMOST CERTAIN 5	6	7	8	9	10
	LIKELY 4	5	6	7	8	9
	POSSIBLE 3	4	5	6	7	8
	UNLIKELY 2	3	4	5	6	7
	RARE 1	2	3	4	5	6

Actions required

Actions required according to the derived level of risk are shown in Table 4.

Table 4 Actions Required

8-10	**Unacceptable Risk**	Immediate action required by either treating or avoiding risk. Refer to executive management.
5-7	**Tolerable Risk**	Treatment action possibly required to achieve As Low As Reasonably Practicable (ALARP) - conduct cost/benefit analysis. Relevant manager to consider for appropriate action.
0-4/5	**Broadly Acceptable Risk**	Managed by routine procedures, and can be accepted with no action.

ANNEXURE 5 – APPROVAL LETTER FROM SWAN HILL CITY COUNCIL

Docusign Envelope ID: D2208D1C-4159-48E1-BBB0-49815F41C58B

REF: 2217/24/S09/01-02-08
PR/KY

24 Oct 2024

SWAN HILL
Rural City Council

Airservices Australia
Airport Developments
Windfarms
airport.developments@airservicesaustralia.com

To Whom It May Concern

AVIATION IMPACT ASSESSMENT 102402-01
NORMANVILLE ENERGY PARK

Swan Hill Rural City Council writes with regard to the Normanville Energy Park Wind Farm Aviation Impact Assessment 102402-01 (included).

Council approve and authorise Airservices Australia to make the Data Change Requests as contained and requested in the Aviation Impact Assessment Reference 102402-01. This document details the changes to the Aeronautical Information Package (AIP) for Swan Hill aerodrome (YSWH) resulting from the proposed Normanville Wind Farm.

This authorisation follows consultation with Lyn Wang (Aviation Projects) and a review of Swan Hills approach procedures and the proposed changes outlined in the Normanville Wind Farm.

Please notify Swan Hill Rural Council in advance of the changes, so the Swan Hill aerodrome manual can be revised to show the changes.

If you would like to discuss this matter further, please do not hesitate to contact Council's Engineer Assistant, Kerry Young on 0407 505 607.

Yours sincerely

DocuSigned by:
Peter Ross
Y0665544DC7345C...

Peter Ross
Engineering and Strategic Projects Manager

ADVERTISED PLAN

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