AVIATION PROJECTS

April 2025

AVIATION IMPACT ASSESSMENT

BEENUP WIND FARM

Prepared for SynergyRED

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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

SynergyRED is preparing a proposal for the development of the proposed Beenup Wind Farm project, which is located in the Shire of Augusta Margaret River Local Government Area (LGA).

The current proposed layout includes 20 wind turbines.

SynergyRED has engaged Aviation Projects to prepare an Aviation Impact Assessment (AIA) to support the proposed application and formally consult with aviation agencies.

The Project requires an aviation impact assessment to be undertaken in accordance with the:

- Civil Aviation Safety Regulations 1998
- National Airspace Safeguarding Framework Guideline D: *Managing the Risk to aviation safety of wind turbine installations (wind farms)/Wind Monitoring Towers effective July 2012*
- Western Australia Government, Department of Planning, Lands and Heritage, *Position Statement: Renewable energy facilities, March 2020*
- Specific requirements as advised by Airservices Australia

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 Aviation Impact Statement (AIS) and a qualitative risk assessment to determine the need for obstacle lighting.

Project description

Beenup Wind Farm includes the following:

- Up to 20 wind turbine generators (WTGs) with a maximum tip height of 250 m AGL
- The ground elevation for the highest WTG location is 40 m AHD, which, with a 250 m WTG height, results in a maximum overall height of 290 m AHD (951.4 ft AMSL).

Conclusions

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

Planning considerations

1. The Project, as proposed, satisfies the planning provisions of Shire of Augusta Margaret River's Planning Scheme 2024, *Shire of Augusta-Margaret River's* Local Planning Strategy, City of Busselton's Local Planning Strategy 2014 and will not create incompatible intrusions or compromise the safety of existing airports and associated navigation and communication facilities

Certified airports

2. The project site is located within 30 nm (55.56 km) of one certified airport – Busselton Airport (YBLN)
    a. The WTGs will infringe the YBLN PANS-OPS surfaces of the following procedures but will not change flight paths or descent gradients

i. 25 nm MSA surfaces, which need to be increased by 100 ft to 2000 ft or sectorised to exclude the Wind Farm

ii. GNSS Arrival Sector A approach surfaces.

- The initial approach minimum altitude needs to be increased to 2000 ft.
- The commencement altitude would need to be increased to meet the requirement of increasing the 25 nm MSA to 2000 ft.

Obstacle Limitation Surfaces

3. The Project is located outside the horizontal extent of obstacle limitation surfaces (OLS) of Busselton Airport (YBLN).

Uncertified Aerodromes

4. There are two uncertified aerodromes identified within 3 nm of the project site – Unknown Aerodrome 1 and Boley Aerodrome

   - Unknown Aerodrome 1

     i. The proposed wind farm would be considered potentially hazardous obstacles

     ii. When the wind blows from the north, downstream wake turbulence from the closer WTGs will extend into the aerodrome's right side of the circuit area. Further consultation with the owner/operator of this aerodrome would be beneficial in understanding the potential extent of these impacts.

   - Boley Aerodrome

     - The proposed wind farm would be considered potentially hazardous obstacles
     - When the wind blows from east, downstream wake turbulence from the closer WTGs will extend into the aerodrome's right side of the circuit area. Further consultation with the owner/operator of this aerodrome would be beneficial to understand the potential extent of these impacts.

Air Routes and Lowest Safe Altitude (LSALT)

5. The WTGs will not impact the Grid LSALT and any Air Route LSALT

Airspace

6. The project area is located within Class G airspace and outside all controlled airspace, Prohibited, Restricted and Danger areas.

Aviation Facilities

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

ATC Surveillance Radar

8. The project site is located outside the area of interest to assess the potential impact of the development on surveillance radar. The Project will not impact the Perth Preliminary Surveillance Radar (PSR)/ Secondary Surveillance Radar (SSR) and Kalamunda Air Route Surveillance Radar (RSR).

Aviation Impact Statement (AIS)

9. Based on the proposed WTG layout and maximum blade tip height of 250 m AGL, the blade tip elevation of the highest wind turbine will not exceed 290 m (951.4 ft AMSL).

   a. There is one certified airport located within 30 nm (56 km) from the Project - Busselton Airport (YBLN)

      i. The WTGs will not impact on the OLS of YBLN

      ii. The WTGs will infringe the YBLN PANS-OPS surfaces of the following procedures but will not change flight paths or descent gradients

         - 25 nm MSA surfaces, which need to be increased by 100 ft to 2000 ft or sectorised to exclude the Wind Farm
         - GNSS Arrival Sector A approach surfaces.
            - The initial approach minimum altitude needs to be increased to 2000 ft.
            - The commencement altitude would need to be increased to meet the requirement of increasing the 25 nm MSA to 2000 ft.

   b. There are two uncertified aerodromes identified within 3 nm of the project site – Unknown Aerodrome 1 and Boley Aerodrome

      i. Unknown Aerodrome 1

         - The proposed wind farm would be considered potentially hazardous obstacles
         - When the wind blows from north, downstream wake turbulence from the closer WTGs will extend into the aerodrome's right side of the circuit area. Further consultation with the owner/operator of this aerodrome would be beneficial to understand the potential extent of these impacts

      ii. Boley Aerodrome

         - The proposed wind farm would be considered potentially hazardous obstacles
         - When the wind blows from east, downstream wake turbulence from the closer WTGs will extend into the aerodrome's right side of the circuit area. Further consultation with the owner/operator of this aerodrome would be beneficial to understand the potential extent of these impacts.

   c. The WTGs will not impact the Grid LSALT and any air route LSALT

   d. The project area is located within Class G airspace and outside all controlled airspace, Prohibited, Restricted and Danger areas.

   e. The WTGs will not impact the aviation facilities of nearby certified airports.

   f. The WTGs will not impact the closest radar installations.

   g. The WTGs must be reported to CASA, and construction details must be provided to Airservices.

   h. The closest WTG is approximately 1.2 km away from the boundary of the Scott National Park. Liaison with Western Australia Department of Biodiversity, Conservation and Attractions - Parks and Wildlife Service will be required regarding the buffer area of the boundary.

Obstacle lighting risk assessment

10. Aviation Projects has undertaken a safety risk assessment of the Project and concludes that the proposed WTGs would not require obstacle lighting to maintain an acceptable level of safety to aircraft.
11. Over the 12-year period between 2010-2022, no aircraft collided with a WTG or a WMT in Australia.
12. There is no regulatory requirement to mark or light power poles or overhead transmission lines.

Consultation

Refer to Section 5 for detailed responses from relevant aviation stakeholders once received.

The consultation process will commence after approval of the Final Draft AIA and authorisation to proceed from the client. It will continue throughout the review of the Development Application.

The risk assessment will be updated, and this report will be finalised based on the feedback received during the consultation process. Feedback will be documented in this report.

Summary of key recommendations

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

Notification and reporting

1. Details of WTGs 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).
2. 'As constructed' details of WTG coordinates and elevation should be provided to Airservices Australia, by submitting the form at this webpage: https://www.airservicesaustralia.com/wp-content/uploads/ATS-FORM-0085_Vertical_Obstruction_Data_Form.pdf to the following email address: vod@airservicesaustralia.com
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 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.
5. To facilitate the flight planning of aerial application operators, details of the Project, including the 'as constructed' location and height information of WTGs 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.
6. The closest WTG is approximately 1.2 km from the boundary of Scott National Park. Regarding the buffer area of the boundary, liaison with the Western Australia Department of Biodiversity, Conservation and Attractions—Parks and Wildlife Service will be required.

Marking of WTGs

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

Lighting of WTGs

8. CASA will determine whether obstacle lighting is recommended for the WTGs. Lighting the WTGs is not a formal requirement.

Micrositing

9. Providing the micrositing is within 100 m of the WTGs, it will not likely 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.

Aerial firefighting

10. The developer or operator should consider the guidance contained in the National Council for Fire and Emergency Services, Wind Farms and Bushfire Operations to ensure:
    a. Liaison with the relevant fire and land management agencies is ongoing and effective
    b. Access is available to the wind farm site by emergency services for on-ground firefighting operations.

Triggers for review

11. 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
    c. Following any near miss, incident or accident associated with operations considered in this risk assessment.

1. INTRODUCTION

1.1. Situation

SynergyRED is preparing a proposal for the development of the proposed Beenup Wind Farm project, which is located in the Shire of Augusta Margaret River Local Government Area (LGA).

The current proposed layout includes 20 wind turbines.

SynergyRED has engaged Aviation Projects to prepare an Aviation Impact Assessment (AIA) to support the proposed application and formally consult with aviation agencies.

1.2. Purpose and Scope

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

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

- Civil Aviation Safety Regulations 1998
- National Airspace Safeguarding Framework Guideline D: *Managing the Risk to aviation safety of wind turbine installations (wind farms)/Wind Monitoring Towers effective July 2012*
- Western Australia Government, Department of Planning, Lands and Heritage, *Position Statement: Renewable energy facilities, March 2020*
- Specific requirements as advised by Airservices Australia

1.3. Methodology

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

- Confirm the scope and deliverables
- Review client material
- Conduct a site visit to properly investigate aviation safety aspects of the proposed project site
- Review relevant regulatory requirements and information sources
- Identify and assess any likely impacts to:
  - Certified aerodromes within 30 nm (55.5 km) of the project
  - Uncertified aerodromes within 5 nm (9.3 km) of the project
  - Military aerodromes and associated Special Use Airspace (SUA)
  - Other SUA in the vicinity of the project.
- Prepare a draft aviation impact assessment and supporting technical data that provides evidence and analysis for the planning application to demonstrate that appropriate risk mitigation strategies have been identified. The draft aviation impact assessment report will include an Aviation Impact Statement (AIS) and a qualitative risk assessment to determine need for obstacle lighting and of applicable aspects for client review and acceptance before submission to external aviation regulators

- Identify risk mitigation strategies that provide an acceptable alternative to night lighting. The risk assessment will be completed following the guidelines in *ISO 31000:2018 Risk Management – Guidelines*
- Consult with aviation regulators, consisting of Airservices Australia (and other Part 173 procedure designers if applicable), and the Department of Defence
- Consult with relevant Council (s), and aerodrome operators of the nearby aerodrome/s to seek endorsement of the proposal to change instrument procedures (if applicable)
- Consult/engage with stakeholders (including RFDS) to negotiate acceptable outcomes (if required)
- Finalise the aviation impact assessment report when responses are 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 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.

Airspace:

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

Navigation/Radar:

- Nominate aviation navigation systems in proximity to the project site.

1.5. Material reviewed

The material provided by the Proponent for the preparation of this assessment includes:

- 00039_BNWFCadastral.pdf
- 00040_BNWFProposedRoad.pdf
- 00041_BNWF.pdf
- 00043_BNWF.pdf
- Beenup - 29.06.2024 - DA development layout 20 WTG with Roads.kmz
- Ground elevation and coordinates in email (received on 30 July 2024 from Wilson Mandisodza)

2. BACKGROUND

2.1. Site Overview

The project site boundary is approximately 13.5 km northeast of Augusta, within the Shire of Augusta Margaret River Local Government Area (LGA).

An overview of the site relative to Augusta is provided in Figure 1 (source: SynergyRED, Google Earth).

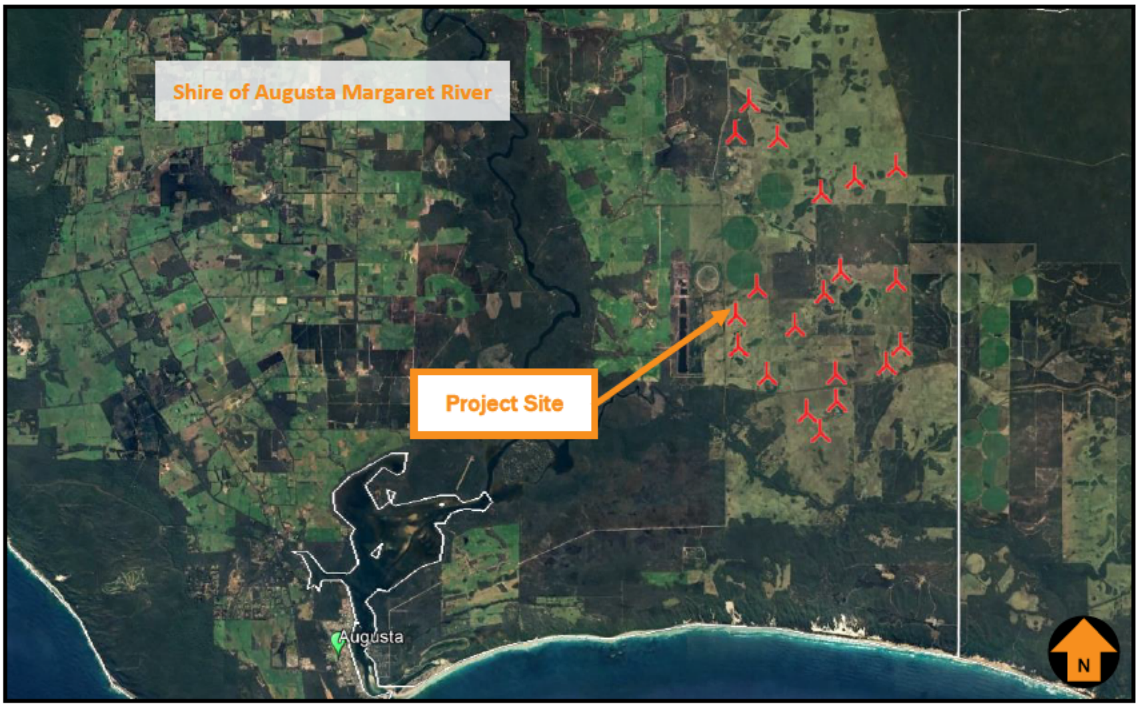

Figure 1 Project site overview

2.2. Project Description

The Project involves constructing, operating, maintaining and decommissioning the Beenup Wind Farm, including a final layout of up to 20 wind turbine generators (WTGs).

The WTGs will have a rotor diameter of approximately 180 m, with a maximum tip height of 250 m AGL.

The ground elevation for the highest WTG location is 40 m AHD, which, with a 250 m WTG height, results in a maximum overall height of 290 m AHD (951.4 ft AMSL).

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 WMTs.

The methodology for preparing the risk assessment is contained in the NASF Guideline D.

The risk assessment will have regard to all potential aviation activities within the vicinity of the project site including recreation, commercial, civil (including for agricultural purposes) and military operations.

NASF Guideline D strongly encourages consultation with aviation stakeholders in the early stages of wind farm development planning, including with aerodrome owners and operators, regional aircraft operators and CASA and Airservices.

3.2. Western Australia Government, Department of Planning, Lands and Heritage

The Western Australian Planning Commission administers responsibility for approving renewable energy facilities through local councils. The Department of Planning, Lands and Heritage has published *Position Statement: Renewable energy facilities* (March 2020) on behalf the Western Australia Planning Commission. These guidelines provide advice to inform planning decisions about a wind energy facility proposal.

The intent of this position statement is to:

- Outline the Western Australian Planning Commission (WAPC) requirements to support the consistent consideration and provision of renewable energy facilities within Western Australia
- Identify assessment measures to facilitate appropriate development of renewable energy facilities.

The position statement applies to the preparation and assessment of planning instruments including regional and local planning schemes and strategies.

The position statement supersedes Planning Bulletin 67 Guidelines for Wind Farm Development (2004).

Section 5.3.1 *Community Consultation* and Section 5.3.5 *Public and Aviation safety* are relevant to this assessment and are extracted below:

> ***Section 5.3.1 Community Consultation***
>
> *Early consultation with the community and stakeholders by the proponents is encouraged to ensure that the proposal is compatible with existing land uses on and near the site. The local government should be consulted with respect to the community consultation program. Relevant stakeholders may include:*
>
> - *Air Services Australia*
> - *Australian Wind Alliance*
> - *Civil Aviation Safety Authority*
>
> ***5.3.5 Public and aviation safety***
>
> *Proponents of wind turbine proposals should refer to the National Airports Safeguarding Framework (NASF) Guideline D: Managing the Risk to Aviation Safety of Wind Turbine Installation (Wind Farms) / Wind Monitoring Towers to determine any potential aviation safety risks and possible mitigation measures.*
>
> *Any potential aviation safety risks identified require consultation with Civil Aviation Safety Authority (CASA), Air Services Australia and/or the Commonwealth Department of Defence.*

The position paper defines Renewable energy facility as premises used to generate energy from a renewable energy source and includes any building or other structure used in, or relating to, the generation of energy by a renewable resource. It does not include renewable energy electricity generation where the energy produced principally supplies a domestic and/or business premises and any on selling to the grid is secondary.

An aviation impact assessment would include consultation with relevant aviation stakeholders and address aviation-related matters included in the Position Statement

3.3. Shire of Augusta-Margaret River Planning Scheme

The Project will be subject to Shire of Augusta-Margaret River's planning scheme, amended May 2024. Section 1.5 of the scheme provides the purpose of the scheme, including to:

a) Set out the local government's planning aims and intentions for the Scheme area;

b) Set aside land for public purposes;

c) Zone land within the Scheme area for the purposes defined in the Scheme;

d) Control and guide land use and development;

e) Set out procedures for the assessment and determination of planning applications;

f) Make provisions for the administration and enforcement of the Scheme; and

g) Address other matters set out in the Schedule 7 to the Planning and Development Act 2005;

3.4. Shire of Augusta-Margaret River Planning Strategy

The Shire of Augusta-Margaret River's Local Planning Strategy was endorsed by the Western Australia Planning Commission *on* 18 January 2022. The strategy *sets a vision for the size, look and feel of the Shire's neighbourhoods, towns and natural areas over a 10 to15-year period*.

The Local Planning Strategy identifies the Busselton Margaret Rive Airport (Busselton Airport), located in the City of Busselton LGA, referencing the 2018 major works that were undertaken on the airport to facilitate tourism and economic growth by accommodating larger passenger aircraft types.

Public and private landing strips are also referenced in the planning strategy:

> *Two dedicated public landing strips are located at Margaret River and Augusta (see Figure 5), providing opportunities for limited recreational and commercial air transport, together with facilities for the Royal Flying Doctor Service. A number of private landing strips are also located within the Shire, which have limited impacts owing to the low level of airport operations in the Shire.*

There is no specific aerodrome safeguarding policy or framework established in the planning strategy. This assessment considers that the Project is not affected by the Shire of Augusta-Margaret River Planning Strategy in relation to aviation impacts. Based on the proposed WTG layout (where there is no WTG located within 30 nm of the NDB or ARP of Busselton Airport), there is no impact to Busselton airport caused by the Project.

3.5. City of Busselton

The City of Busselton's Local Planning Strategy was endorsed by the Western Australia Planning Commission on 15 October 2014.

> *5.8 AIRPORT PROTECTION AREA (Amendment No. 46 - GG. 30 July 2021)*
>
> *5.8.1 Development within the Airport Protection Area requires the prior development approval of the local government.*
>
> *5.8.2 The Airport Protection area generally contains all lands likely to be within the predicted 55dB(A)Ldn noise contour for the Busselton Regional Airport.*
>
> *5.8.3 The local government will not grant development approval for uses in the Airport Protection area that involve residential use, schools, hospitals, overnight tourist accommodation or other habitable buildings unless those uses are ancillary to the operations of the Busselton Regional Airport and/or where the proponent for the use can demonstrate that the design of buildings is such that noise not louder than 55dB(A)Ldn will be experienced by residents or occupants of those buildings.*
>
> *5.8.4 Notwithstanding any other provisions of this Scheme, the local government shall not grant development approval for any development unless it is satisfied that such development will not constitute an obstruction, hazard or potential hazard to aircraft flying in the vicinity and may consult with and consider the advice of the Civil Aviation Safety Authority in making such determination.*

3.6. 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.

3.7. Civil Aviation Safety Authority (CASA)

CASA provides the following guidance to inform pilots of their obligations at non-certified aerodromes.

3.7.1. Advisory Circular (AC) 91-02 V1.2, Guidelines for aeroplanes with MTOW not exceeding 5700 kg – suitable places to take off and land, dated November 2022

This Advisory Circular (AC) provides guidance for pilots of:

- Aeroplanes with maximum take-off weight (MTOW) not exceeding 5700 kg that are operated under Part 91 of CASR, including experimental aircraft, and
- Light sport aircraft (LSA) under Part 103 of CASR.

Purpose

This AC provides guidance to assist aeroplane pilots when determining the suitability of a place to safely take off and land. It provides an overview of pilot responsibilities, discusses the relevant circumstances recommended to be considered and includes general information and advice to enhance the safety of taking off and landing at any place.

2 Introduction

2.2 Use of Aerodromes

2.2.1 Regulation 91.410 authorises a place for use as an aerodrome if: (i) it is suitable for the landing and taking-off of aircraft; and (ii) an aircraft can land at or take off from the place safely, having regard to all the circumstances of the proposed landing or take-off (including the prevailing weather conditions).

4.2.4 The examples below are two of many possible considerations:

- the obstacles surrounding the aerodrome have been accurately described and are still current (e.g. have the trees on final grown taller since last reported), and

– the information provided enables the pilot to judge whether or not a landing approach can be made from both runway directions.

3.7.2. AC 91-10 v1.1, Operations in the vicinity of non-controlled aerodromes, dated November 2021

This AC provides guidance on procedures that, when followed, will improve situational awareness and safety for all pilots when flying at, or in the vicinity of, non-controlled aerodromes.

7.2 Traffic circuit direction

7.2.1 The standard aerodrome traffic circuit facilitates the orderly flow. Unless an alternative requirement for an aerodrome is stated in the ERSA or NOTAMs, all turns must be made to the left (regulation 91.385).

7.2.2 When arriving at an aerodrome to land, the pilot will normally join the circuit on upwind, crosswind (midfield), or at or before mid-downwind. Landings and take-offs should be made on the active runway or the runway most closely aligned into wind.

7.4.2 During initial climb-out, the turn onto crosswind should be appropriate to the performance of the aircraft but, in any case, not less than 500 ft above terrain so as to be at circuit height when turning downwind (regulation 91.390). Pilots may vary the size of the circuit depending on:

– the performance of the aircraft

– AFM/Pilot's Operating Handbook requirements

– company standard operating procedures

– other safety reasons.

7.7 Final approach

7.7.1 The turn onto final approach should be:

– completed by a distance and height that is common to all operations at the aerodrome

– commensurate with the speed flown in the circuit for all aircraft of the same type.

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

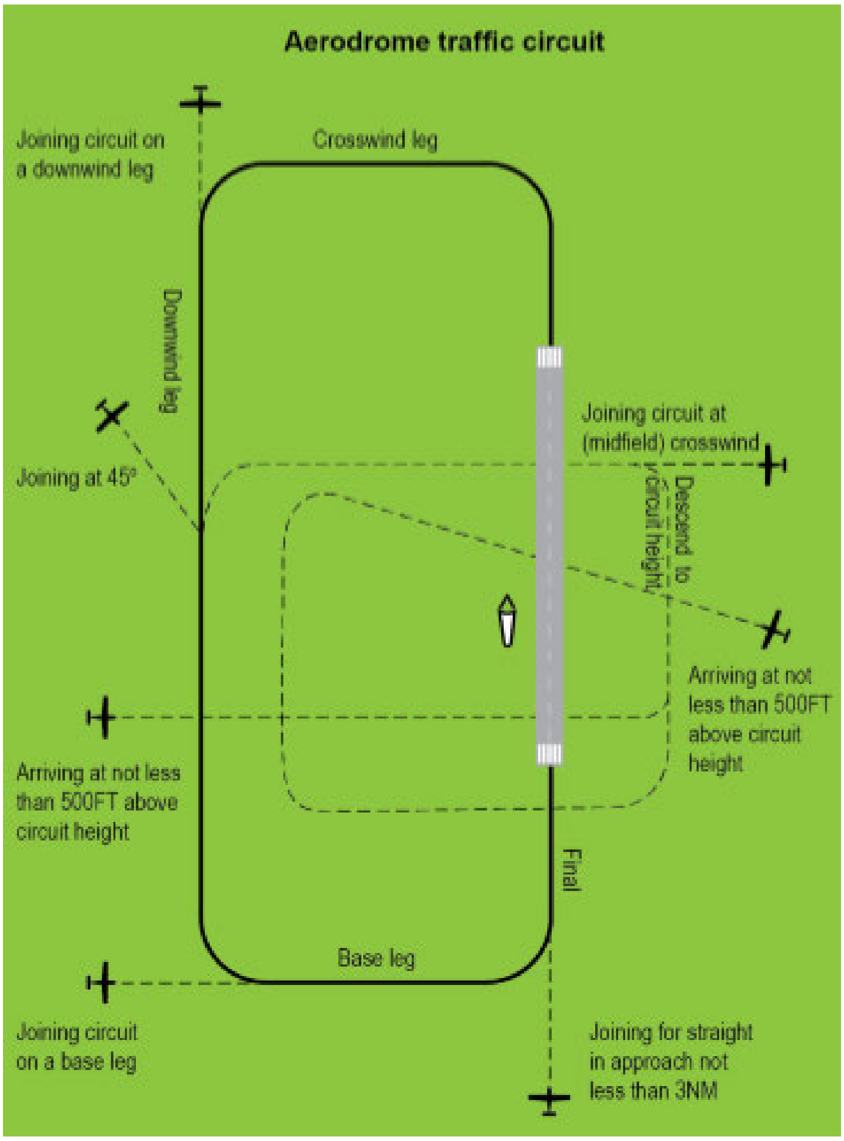

Figure 2 Aerodrome standard traffic circuit, showing arrival and joining procedures.

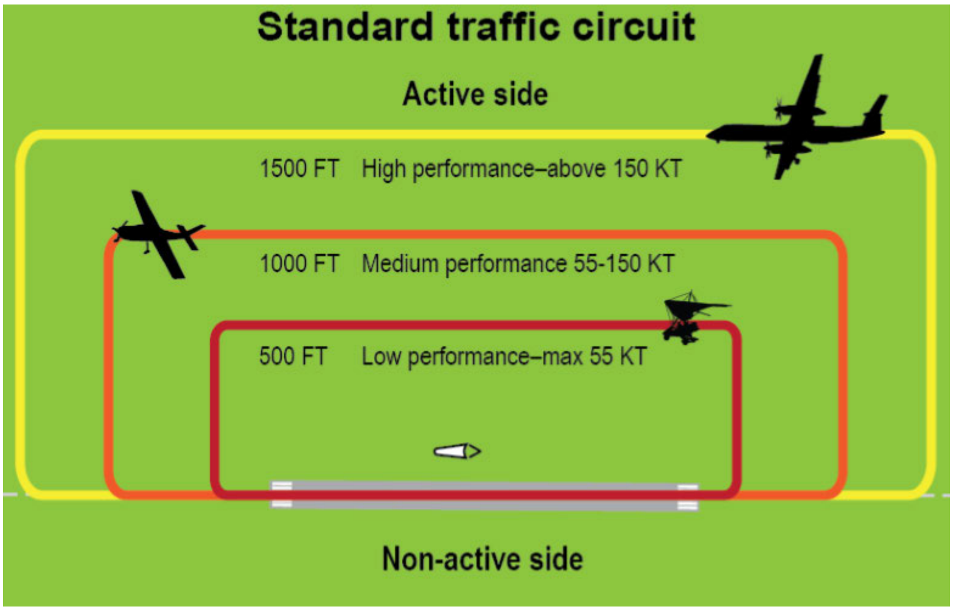

Figure 3 Lateral and vertical separation in the standard aerodrome traffic circuit

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.*

3.8. Rules of flight

3.8.1. 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.

CASR 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.

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

With respect to flight under the VFR at night CASR 91.277 requires that the pilot in command of an aircraft flying VFR at night must not fly below the appropriate lowest safe altitude (unless during take-off and landing operations, within 3 nm of an aerodrome).

3.8.3. 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.

3.9. 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.

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.

3.10. Passenger transport operations

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

3.11. 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.

3.12. 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.

Refer to Section 5 for a detailed response from the Department of Defence.

3.13. 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 6.5 ft and 100 ft AGL.

The low flight operations conducted by NSW National Parks and Wildlife Service (NPWS) in Goodiman State Conservation Area are often concentrated along the boundaries of the park.

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 site was assessed.

3.13.1. 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), now superseded by the AAAA Tall Structures Policy dated March 2024, which states in part:

> *The development of tall structures in agricultural and bush fire prone areas can pose a direct threat to aviation safety, particularly where fixed and rotary aircraft may be requested to operate for agricultural or bush/grass fire control.*
> *The absence of historical aircraft use in an area is considered an insufficient reason to discount the threat to Aviation Operations.*
>
> *The AAAA will oppose any development application or similar process unless the proponent has:*
> - *Identified the structure as posing a low-level flying risk that needs to be managed on an ongoing basis*
> - *Consulted honestly and in detail with local aerial application operators or the AAAA where a local operator cannot be identified*
> - *Consulted with adjoining landowners regarding the impact on adjacent properties*
> - *Included appropriate lighting and marking in the development proposal, consistent with providing a warning to low level flying*
> - *Identified the process for advising of the location height and presence of the structure to the relevant authorities, and*

Ensure that the proposal is in keeping with CASA requirements for structures near aerodromes, including temporary landing areas.

3.13.2. 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 monitor towers (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.

3.14. Emergency services

3.14.1. Royal Flying Doctor Service

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.

3.14.2. 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 project site boundary is approximately 13.5 km northeast of Augusta, within the Shire of Augusta Margaret River Local Government Area (LGA).

Figure 4 and Figure 5 show a few roadside views of the Project site. (Source: Aviation Projects).

Figure 4 Project Site roadside view 1

Figure 5 Project Site roadside view 2

4.2. Wind turbine generator (WTG) description

The project site will comprise up to 20 WTGs, with a maximum blade tip height of 250 m above ground level (AGL).

The ground elevation for the highest WTG location is 40 m AHD, which, with a 250 m WTG height, results in a maximum overall height of 290 m AHD (951.4 ft AMSL).

Figure 6 Illustrates the project layout identifying the highest WTGs' location (source: Google Earth).

'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. The estimate of the overall maximum height being based on the highest ground level is within 100 m of the nominal WTG position. The micrositing of the WTGs is not likely to result in a change in the Project's maximum overall blade tip height. This AIA assumes a maximum blade tip height of 250 m AGL is implemented at all WTG locations.

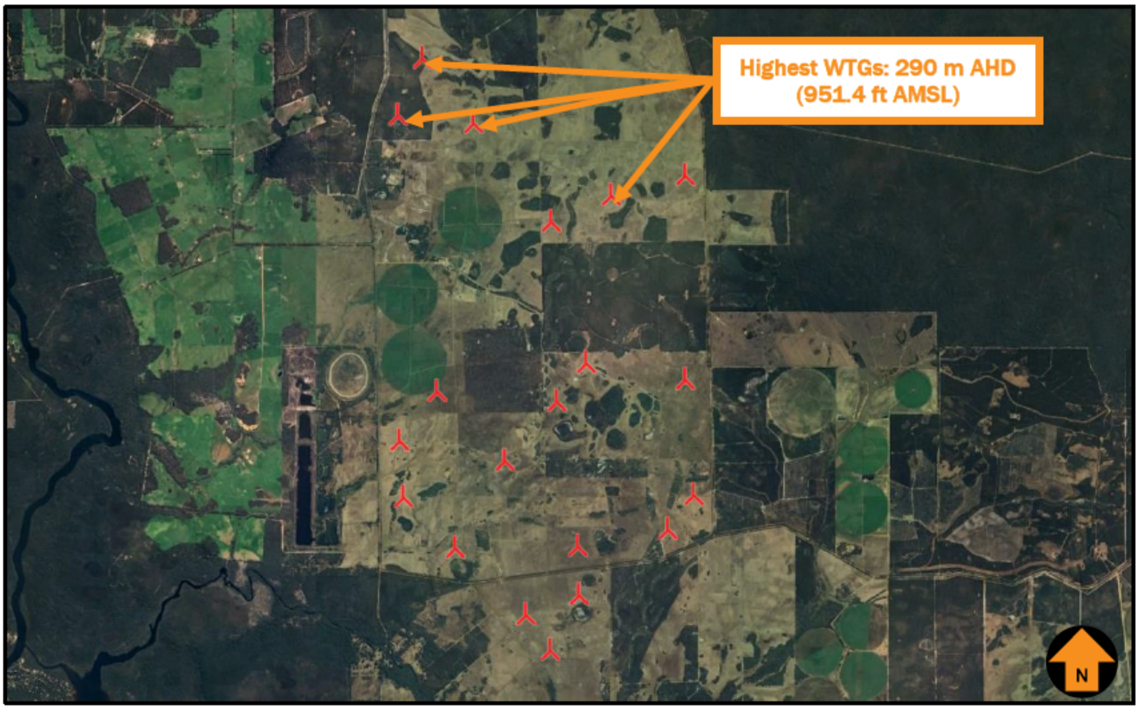

Figure 6 Project layout and highest WTG location

5. CONSULTATION

The following list of stakeholders were identified as requiring consultation:

1. Airservices Australia
2. Department of Defence
3. Shire of Augusta Margaret River
4. City of Busselton
5. Global Airspace Solutions
6. Western Australia Department of Biodiversity, Conservation and Attractions - Parks and Wildlife Service
7. Royal Flying Doctor Service
8. St John WA
9. Western Australia Department of Fire and Emergency Services
10. Western Australia Police Force.

Details and results of the consultation activities are provided in Table 1.

Table 1 Stakeholder consultation details

Agency/Contact	Activity/Date	Response/ Date	Issues Raised During Consultation	Action Proposed
Airservices Australia	Email sent on 06 November 2024 to Airservices Australia	Email received on 25 February 2025 from Airport Development & Protection	**Airspace Procedures** With respect to procedures designed by Airservices in accordance with ICAO PANS-OPS and Doc 9905, at a maximum 290 m (952 ft) AHD the wind farm will affect the minimum sector altitude and GNSS arrival instrument procedures at Busselton aerodrome. In order to accommodate the wind farm the minimum sector altitude and GNSS arrival SECTOR A instrument procedures will need to be re-designed. The maximum height of wind farm without affecting any procedures at Busselton aerodrome is 274.3m (900ft) AHD. Note: Procedures not designed by Airservices at Busselton aerodrome were not considered in this assessment. **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. Note: Meteorological instruments not owned by Airservices were not considered in this assessment.	Please consult with the aerodrome and aviation operators to ensure that they accept the proposed changes. We need confirmation from the aerodrome operator before we will make any changes. All amendments to airspace procedures are made on a commercial basis. **Vertical Obstacle Notification** As this proposed activity is more than 30m (99ft) AGL, please follow the below notification process: 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 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

Agency/Contact	Activity/Date	Response/ Date	Issues Raised During Consultation	Action Proposed
			Please consult with the Bureau of Meteorology to ensure that the proposed activity does not adversely impact their equipment. **Air Traffic Control (ATC) Operations** There are no additional instructions or concerns from ATC. **Summary – permanent impact (WF)** The proposed activity will penetrate the current Airservices-designed airspace procedures and/or impact CNS facilities or ATC operations at Busselton aerodrome. Please consult with the aerodrome and aviation operators to ensure that they accept the proposed changes. We need confirmation from the aerodrome operator before we will make any changes. All amendments to airspace procedures are made on a commercial basis.	• Or refer to: Civil Aviation Safety Regulation Part 175 – Airservices and You - Airservices (airservicesaustralia.com)
Department of Defence	Email sent on 06 November 2024 to Department of Defence	Email received on 09 January 2025 from Anthony Deutschmann (Assistant Director)	The Department of Defence (Defence) has conducted an assessment of the proposed Beenup Wind Farm 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 wind farm 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	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 the development reaches the maximum height.

Agency/Contact	Activity/Date	Response/ Date	Issues Raised During Consultation	Action Proposed
			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.	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)
Shire of Augusta Margaret River	Email sent on 06 November 2024 to Shire of Augusta Margaret River	Email received on 28 February 2025 from Nick Logan (Director Sustainable Development and Infrastructure)	We don't have anything to add at this point. We have a statutory function in assessing the complete form of the formal application against a number of criteria and will give full consideration if it progresses to that point. Just to note that: • The AMR Shire Tallinup Augusta Aerodrome is used relatively consistently and more so than Margaret River. • Aerial bushfire suppression is used in this area from time to time	No Action Required
City of Busselton	Email sent on 06 November 2024 to City of Busselton	Email received on 13 March 2025 from Bonnie Allen (Senior Airport Administration Officer)	The City of Busselton acknowledges receipt of the AIA of the Beenup WF and authorises Airservices Australia to make the required changes to the 25 nm MSA and GNSS Arrival.	The approval letter was sent to Airservices Australia, and in Annexure 6

Agency/Contact	*Activity/Date*	*Response/ Date*	*Issues Raised During Consultation*	*Action Proposed*
Global Airspace Solutions	Email sent on 11 March 2025 to Global Airspace Solutions	Email received on 11 March 2025 from Bas Smeulders (Chief Designer)	• Airservices probably did not provide you with the information of the other IFPs, because AsA only assesses the IFPs under their responsibility. • The NDB RWY 21 MSA is certainly affected by the one wind turbine, because the MSA centre-point is the NDB. Aircraft OPS not impacted, but the plate is. • Every IFP plate is affected by the one wind turbine located within the MSA PANS-OPS surfaces with the NDB as the centre-point. Even if the ARP is the centre-point and the MSA surfaces are not overlapping the one wind turbine, the western sector has to be revised to 2000 ft, to maintain the same MSA values on all IFP plates. We do not publish different MSA values for the same aerodrome. • There is no impact on aircraft ops, but there is an impact on the IFP plates and changing them would probably come with a cost.	There is no impact on aircraft ops, but there is an impact on the IFP plates and changing them would probably come with a cost.
Royal Flying Doctor Service	Email sent on 06 November 2024 to Royal Flying Doctor Service	No Response received by 14 April 2025		
St John WA	Email sent on 06 November 2024 to St John WA	No Response received by 14 April 2025		

Agency/Contact	*Activity/Date*	*Response/ Date*	*Issues Raised During Consultation*	*Action Proposed*
Western Australia Department of Fire and Emergency Services / Western Australia Department of Biodiversity, Conservation and Attractions - Parks and Wildlife Service	Email sent on 06 November 2024 to Western Australia Department of Fire and Emergency Services and Western Australia Department of Biodiversity, Conservation and Attractions - Parks and Wildlife Service	Email received on 09 December 2024 from Mathew Wansborough (Regional Coordinator) and Email received on 21 March 2025 from Ray Buchan (Superintendent – Aviation Services)	A few meetings have been set up, and further communication will continue. Meeting Summary – 17 February 2025: • Aerial fire suppression activities are not prohibited within wind farms. There are currently no procedures specific to aerial fire suppression operations around wind farms. • Aerial firefighting around wind farms is not treated any differently to other aerial firefighting i.e. the same risk assessment processes are undertaken to ensure the aerial fire suppression operation can be undertaken safely as for all fires. • Aerial operations are via contractors, and they will have their own Standard Operating Procedures and risk assessment processes that form part of their Safety Management System. • Pilots will take the wind turbines into consideration in their risk assessments and will make a determination on the day whether it is safe to operate inside the wind farm envelope. • If the wind farm is operating during a bushfire, suppression operations will be modified or suspended. • If the wind farm is able to be shutdown / paused remotely (i.e. blades moving at approx. 1 RPM), then suppression operations will be considered	• Synergy will notify CASA, Air Services Australia, DBCA and DFES notification of all turbine locations • Turbines at least 300 metres apart • Meteorological masts and guy wires to be marked to ensure visibility to aircraft as per CASA regulations • Synergy will investigate lighting for wind turbines (for rescue helicopters) • Synergy will not oppose shutting down the wind farm in the case of an emergency • Synergy will provide data in the preferred format for DBCA and DFES to inform their risk assessment. • Synergy will provide opportunities for site familiarisation and orientations • Should the project go ahead, the preferred turbine technology will have a fire suppression system. • Synergy to provide a detailed BMP / EMP which includes emergency contacts (Detail slides are in Annexure 7)

Agency/Contact	Activity/Date	Response/ Date	Issues Raised During Consultation	Action Proposed
			based on a risk assessment and conditions on the day. • DFES acknowledges that due to the rapid onset of bushfires it is very difficult to achieve a Y position, it is assumed that it cannot be achieved in a timely manner. However, pausing turbines to approx. 1 RPM is recommended. • DFES will prioritise static fresh water supplies over salt or brackish water i.e. preference is to not take salt water for firefighting • While aerial firefighting only operates during the day, rescue services operate day and night – 24/7/365 • DFES recommends medium intensity lighting on wind turbines for rescue purposes due to operating at night. Refer to 2017 NSW CASA guidance. • Emphasised the significance of operator and DFES/DBCA Incident Controllers in the decision-making process for firefighting operations near wind farms. • Provision of information regarding tall objects within the wind farm at the point of construction is critical in being able to assess the risk during a bushfire emergency.	

Agency/Contact	*Activity/Date*	*Response/ Date*	*Issues Raised During Consultation*	*Action Proposed*
			• Emphasised importance of local/regional involvement in the planning and development of the wind farm. • Emergency Response Plan to be developed and shared with DFES. Must have contact details for wind farm and available 24/7 to first responders and Incident Controllers. Meeting Summary - 24 February 2025 • Aerial fire suppression and pest control operate under daytime VFR (visual flight rules). No rescue services operated by DBCA. • Aerial fire suppression will consider the risk on the day and location, will be at the pilot's discretion. Dispatch operators will always flag the coordinates of any obstacles / tall objects (such as wind turbines). • DBCA also acknowledges that due to the rapid onset of bushfires it is very difficult to achieve a Y position, it is assumed that it cannot be achieved in a timely manner. • There are currently no procedures specific to wind farms. • Need to confirm secondary airstrips have been assessed. • Feedback from DBCA forum with Chief pilots is that there is no special consideration for wind	

Agency/Contact	Activity/Date	Response/ Date	Issues Raised During Consultation	Action Proposed
			farms but as the decision to is at the pilot's discretion.	
Western Australia Police Force	Email sent on 06 November 2024 to Western Australia Police Force	No Response received by 14 April 2025		

6. AVIATION IMPACT STATEMENT

6.1. Overview

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 certified aerodromes within 30 nm of the wind farm
- The operation of nearby aircraft landing areas within 3 nm of the wind farm
- Grid and air route Lowest Safe Altitudes (LSALTs)
- Airspace protection
- Aviation navigation facilities
- ATC surveillance radar installations
- Local aircraft operations.

6.2. Nearby certified aerodromes

One airport, Busselton Airport (YBLN), is certified by the CASA under CASR Part 139 and is located within 30 nm of the proposed site.

The location of the project site relative to Busselton (YBLN) is shown in Figure 7 (Source: SynergyRED, Google Earth). The orange circle around Busselton Airport represents a distance of 30 nm from the airport's aerodrome reference point (ARP). The green circle represents a distance of 30 nm from the Non-Directional Beacon (NDB). There is one WTG within the 30 nm from NDB.

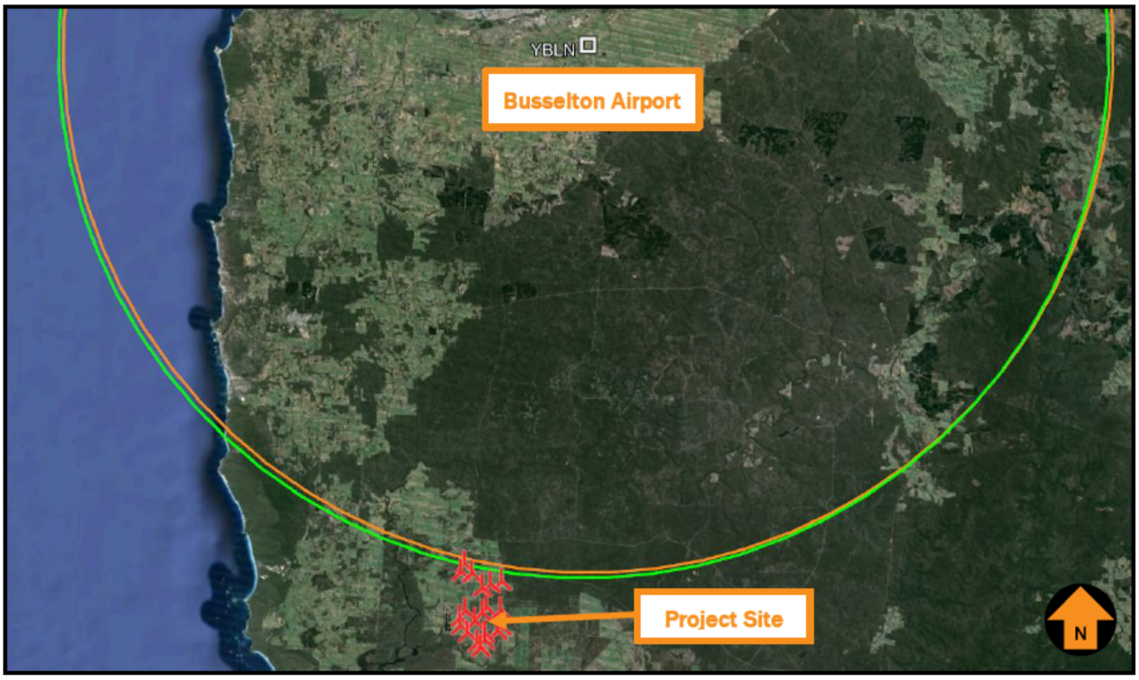

Figure 7 Location of Certified Airports in relation to Project Area

6.3. Obstacle Limitation Surfaces

Obstacle Limitation Surfaces (OLS) are established for each certified aerodrome runway.

For the Code 4 non-precision runway at Busselton Airport, the maximum lateral extent of the OLS is up to 6 km for the conical surface and 15 km for the take-off and approach surfaces.

The closest WTG in the project area is approximately 56 km south of Busselton Airport's aerodrome reference point, which is beyond the horizontal extent of the obstacle limitation surfaces of Busselton Aerodromes.

6.4. Busselton Airport (YBLN)

Busselton Airport is a certified aerodrome operated by the City of Busselton. Its published aerodrome elevation is 17 m AHD (56 ft AMSL) (source: AIP, effective 28 November 2024).

Busselton Airport's aerodrome reference point (ARP) coordinates published in Airservices Australia's Designated Airspace Handbook (DAH) are Latitude 33°41'14" S and Longitude 115°24'01" E (Source: AIP, effective 28 November 2024).

6.4.1. Instrument approach and departure procedures

A check of the Aeronautical Information Package (AIP) via the Airservices Australia website showed that Busselton Airport is served by non-precision instrument flight procedures for each runway (source: AIP, effective 28 November 2024).

Table 2 Identifies the aerodrome and procedure charts for Busselton Airport, which were designed by AsA and Global Airspace Solution (GAS) as indicated.

Table 2 Busselton Airport (YBLN) aerodrome and procedure charts

Chart name	Effective date
AERODROME CHART (AsA)	13 June 2024 (Am 179)
SID Busselton one departure (GAS)	17 June 2021 (Am 167)
GNSS Arrival (AsA)	23 May 2019 (Am 159)
RNP Z RWY 03 (GAS)	07 September 2023 (Am 176)
RNP X RWY 03 (AR) (GAS)	07 September 2023 (Am 176)
RNP W RWY 03 (AR) (GAS)	07 September 2023 (Am 176)
NDB RWY 03 (GAS)	25 March 2021 (Am 166)
RNP RWY 21 (GAS)	07 September 2023 (Am 176)
RNP RWY 21 (AR) (GAS)	07 September 2023 (Am 176)
NDB RWY 21 (GAS)	21 March 2024 (Am 178)

6.4.2. PANS-OPS Surfaces

A detailed assessment of the PANS-OPS surfaces associated with the published instrument approach procedures was undertaken:

- MSA Surfaces
- IFR Circling Areas
- PANS-OPS Approach and Departure Procedure Surfaces.

MSA surfaces

The minimum sector altitude (MSA) applies to each instrument approach procedure at Busselton Airport. Images of the MSA published for Busselton Airport are shown in Figure 8 (source: AIP, effective 28 November 2024).

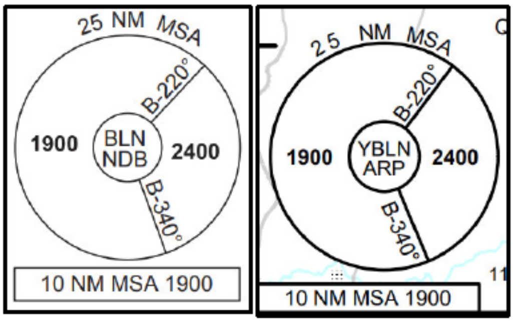

Figure 8 MSA at Busselton Airport

The CASR Part 173 MOS requires a minimum obstacle clearance (MOC) of 984 ft to be applied above the highest terrain or obstacle within the applicable segment.

Obstacles within the 25 nm MSA of Busselton Airport's ARP or NDB define the minimum height at which an IFR aircraft can fly when within 25 nm of the airport when not in visual flight conditions.

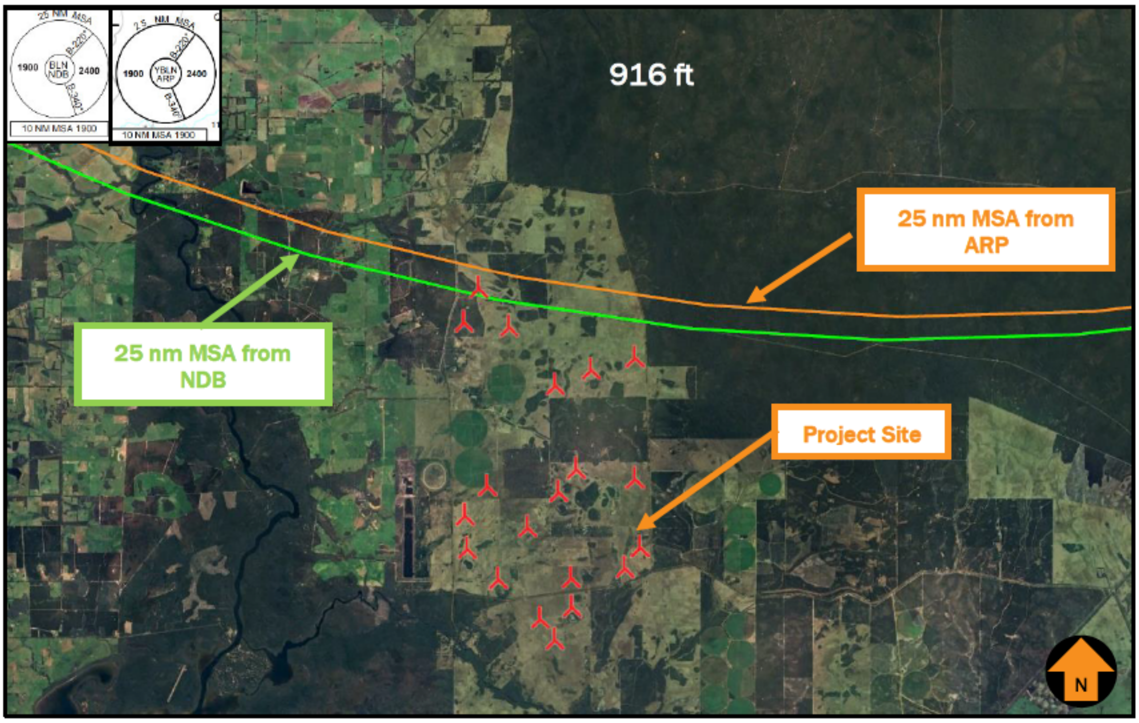

Figure 9 Busselton Airport MSA

One of the highest WTGs will be within Busselton Airport's 25 nm MSA western sector. Figure 9 (Source: SynergyRED, Google Earth) shows Busselton Airport's 25 nm MSA from ARP (orange) and NDB (green) and their related PANS-OPS surface heights (ft AMSL).

The 25 nm MSA western sector's minimum altitude is 579 m AHD (1900 ft AMSL), with a PANS-OPS surface elevation of 279 m AHD (916 ft AMSL). An impact analysis of Busselton Airport's MSA is provided in Table 3.

Table 3 Busselton Airport MSA Impact Analysis

MSA	Minimum altitude (ft AMSL)	PANS-OPS surface (ft AMSL)	Impact on airspace design	Potential solution	Impact on aircraft ops
10 nm MSA	1900	916	Nil – outside the protection surface	N/A	N/A
25 nm MSA – Eastern Sector	2400	1416	Nil – outside the protection surface	N/A	N/A
25 nm MSA – Western Sector	1900	916	The highest WTG is higher than the PANS-OPS surface by 35.4 ft	Increase minimum altitude by 100 ft or sectorise to exclude the WF	Minor. No change to flight paths.

There is only one WTG within the MSA surface, and its height is 290 m AHD (951.4 ft AMSL). It will be higher than Busselton Airport's 25 nm MSA western sector by 10.8 m (35.4ft).

The Project will impact Busselton Airport's 25 nm MSA western sector surfaces, which will need to be increased by 100 ft to 2000 ft or sectorised to exclude the wind farm.

The increase to the 25 nm MSA will require a proportional increase in the commencement altitude and the minimum holding altitude for the GNSS Arrival approach procedures. There is sufficient distance between the procedures' initial approach fixes to accommodate the minimum altitude increase without affecting aircraft operations or efficiency.

IFR Circling areas.

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 designed aircraft. The circling area is determined by drawing an arc centred on the threshold of each usable runway and joining these arcs by tangents. Category D is the most demanding aircraft category provided for in Busselton Airport's instrument flight procedures.

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
- Category C – 4.20 nm / 7.78 km
- Category D – 5.28 nm / 9.78 km

The closed WTG is 29.5 nm / 54.7 km from Runway 03's threshold and beyond the circling area for all runway ends at Busselton Airport.

The Project will not impact circling areas established for instrument flight procedures.

PANS-OPS Approach Procedure Surfaces

A detailed assessment of the PANS-OPS surfaces associated with the published instrument approach procedures was undertaken. Table 4 Details the assessment for each instrument approach procedure.

Table 4 Busselton Airport PANS-OPS Assessment

Busselton Airport Instrument Approach Title	*Minimum Altitude over Project (ft AMSL)*	*PANS-OPS Surface (ft AMSL)*	*Impact on the procedure by WTGs*	*Potential solution*	*Impact on aircraft ops*
SID Busselton one departure	Nil	Nil	Nil – outside the protection surface	N/A	N/A
GNSS Arrival – Sector A	1900	900	Yes – penetrate the initial approach protection surface	Need to raise by 100 ft	Minor. No change to flight paths.
GNSS Arrival – Sector B	2400 (MSA)	1416	Nil – underneath protection surface	N/A	N/A
RNP Z RWY 03	2400 (MSA)	1416	Nil – Outside protection surface	N/A	N/A
RNP X RWY 03 (AR)	2400 (MSA)	1416	Nil – Outside protection surface	N/A	N/A
RNP W RWY 03 (AR)	2400 (MSA)	1416	Nil – Outside protection surface	N/A	N/A
NDB RWY 03	2400 (MSA)	1416	Nil – Outside protection surface	N/A	N/A
RNP RWY 21	2400 (MSA)	1416	Nil – Outside protection surface	N/A	N/A
RNP RWY 21 (AR)	2400 (MSA)	1416	Nil – Outside protection surface	N/A	N/A
NDB RWY 21	2400 (MSA)	1416	Nil – Outside protection surface	N/A	N/A

GNSS Arrival

A DME/GPS arrival procedure is designed to permit an aircraft to descend from an en-route altitude at or above the lowest safe altitude to a minimum altitude at an aerodrome using DME or GPS distance measurement and ground based azimuth guidance facilities. The procedure is prescribed for particular tracks or sectors and takes the form of a series of descending steps at appropriate distances.

DME/GPS arrivals are instrument approach procedures. DME and DME/GPS arrival procedures are not included in ICAO DOC 8168 – OPS/611 Volume II, but are designed using the criteria contained in that document applicable to non-precision approaches and therefore have initial, intermediate and final approach segments. To account for control area steps, the step information is frequently extended beyond the initial approach fix (IAF) into the en-route segment.

Minimum obstacle clearance is as follows:

- Initial approach and en-route segments – 1,000 ft;
- Intermediate approach segment – 500 ft;
- Final approach segment – 300 ft.

Figure 10 Shows Busselton Airport GNSS Arrival Sector A display (Source: AsA: GNSS Arrival Procedures – 23 May 2019).

The only WTG within the GNSS Arrival—Sector A will infringe on the initial approach area's minimum altitude. The WTG will be 290 m AHD (951.4 ft AMSL), which is 51.4 ft higher than the minimum altitude. The minimum altitude for the initial approach area will need to be increased from 1900 ft to 2000 ft.

The commencement altitude would need to be increased due to the requirement to increase the 25 nm MSA to 2000 ft. However, the flight path gradient will not change.

This procedure will need to be amended, and the procedure designer will make a detailed assessment.

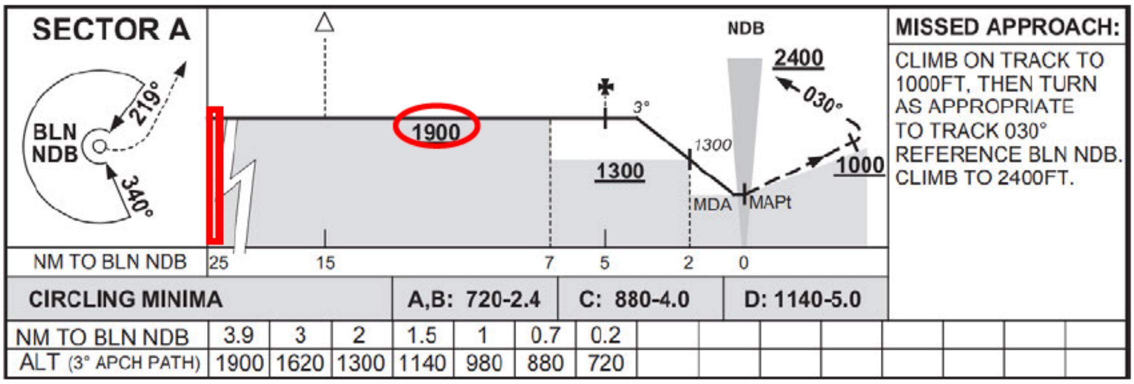

Figure 10 Busselton Airport GNSS Arrival – Sector A

Rest Procedures:

All procedures need the same MSA values to reflect the 2000ft in the western sector. Therefore, all other procedures will need to be updated.

6.5. Nearby uncertified aerodrome

A search of various aviation datasets identified uncertified aerodromes in proximity to the project area. These are non-certified aerodromes and are not subject to CASR Part 139 regulations.

The aviation datasets used for the search are:

- AIP aeronautical charts effective 05 September 2024
- OzRunways - which sources its data from Airservices Australia (AIP). The aeronautical data provided by OzRunways is approved under CASA CASR Part 175
- Australian Government National Map online.

As a guide, an area of interest within a 3 nm radius of an uncertified aerodrome is used to assess the potential impacts of proposed developments on aircraft operations at or within the vicinity of the uncertified aerodrome.

Figure 11 Shows the location of nearby uncertified aerodromes relative to the project site and a nominal 3 nm buffer from the closer uncertified aerodromes (source: Google Earth).

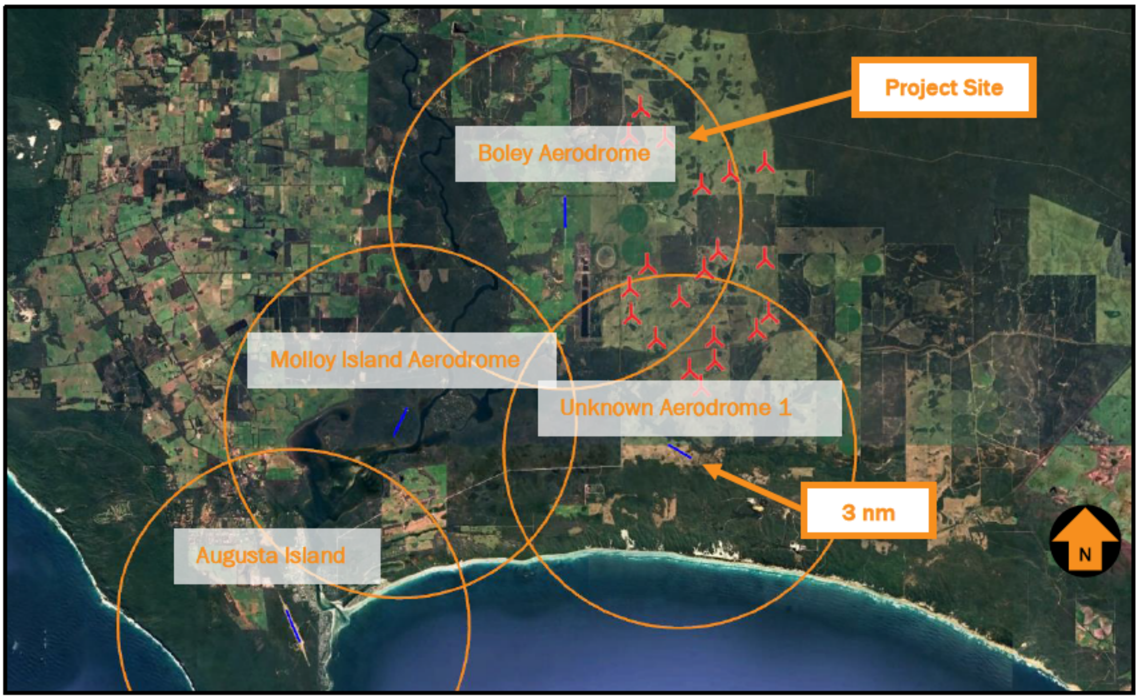

Figure 11 Uncertified Aerodromes in the vicinity of the project site

Unknown uncertified aerodromes 1 and Boley Aerodrome are the closest in relation to the Project. The Project is located within a radius of 3 nm of those uncertified aerodromes.

6.5.1. Unknown Aerodrome 1

The Unknown Aerodrome 1 is approximately 2 km south of the closest WTG. Limited published information about the aerodrome is available. Satellite imaging shows a prepared runway, as shown in Figure 12 (Source: Google Earth).

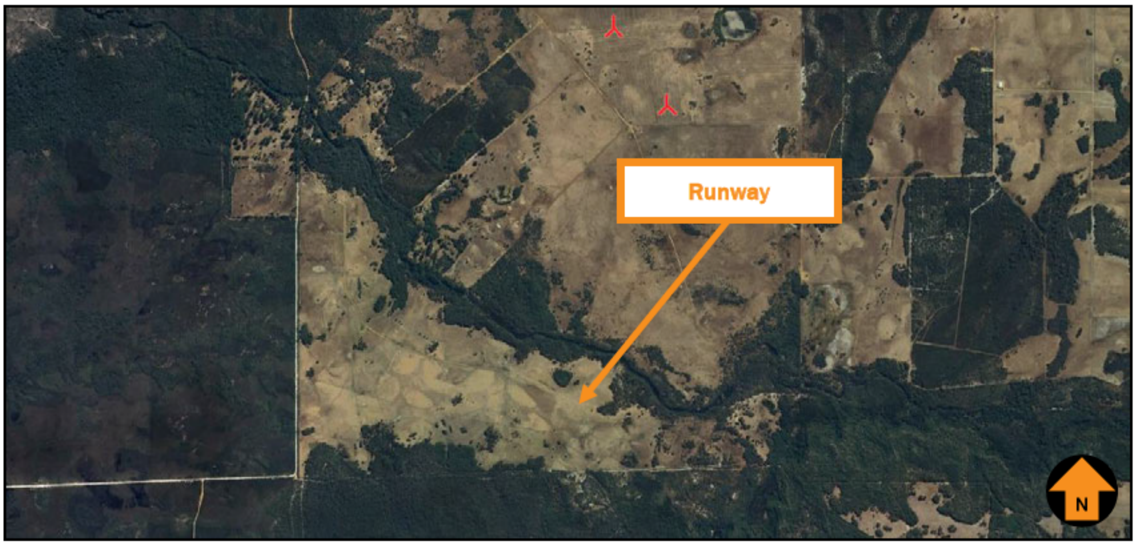

Figure 12 Close-up Google Earth image of Unknown Aerodrome 1's runway

Approximately 10 WTGs are proposed to be located within 3 nm of this aerodrome, as shown in Figure 13 (Source: SynergyRED, Google Earth).

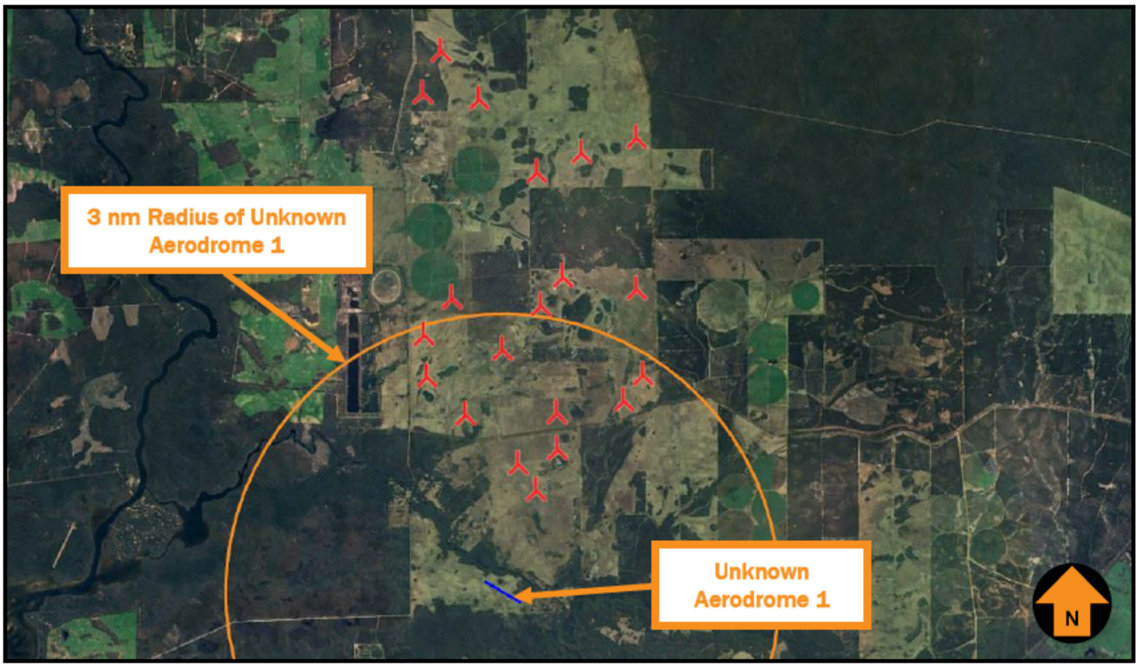

Figure 13 Unknown Aerodrome 1 in relation to The Project

Aircraft typically operate in circuit patterns when arriving and departing from an aerodrome. AC 91-10 *'Operations in the vicinity of non-controlled aerodromes'* describes the standard traffic circuit and heights at which aircraft should fly. This is shown in Figure 3 (Section 3.7.2).

In addition, various entry and departure procedures for aircraft joining and departing a standard traffic circuit are described. Figure 2 in Section 3.7.2 shows the standard arrival and joining procedures for a standard traffic circuit.

By regulation and for safety reasons, aircraft are required to conduct left-hand circuits when operating at an aerodrome unless otherwise not available due to terrain or populous areas, etc., and they are notified in AIP. Left-hand circuits after take-off and landing on the runways would need to fly above the proposed wind farm. WTGs within 3nm of Unknown Aerodrome 1 that would be considered potentially hazardous obstacles, shown in Figure 14 (Source: SynergyRED, Google Earth).

Uncertified aerodromes do not have the same regulatory status and protections as certified aerodromes. Potential impacts upon a private aerodrome caused by a wind farm would not preclude the regulatory approval of the wind farm under the Position Statement. However, it is highly recommended that any wind farm be designed to avoid, minimise, and/or mitigate impact(s) on private aerodromes.

During the site visit, the aerodrome is unlikely to be activity. The status of the aerodrome needs to be confirmed with the owner.

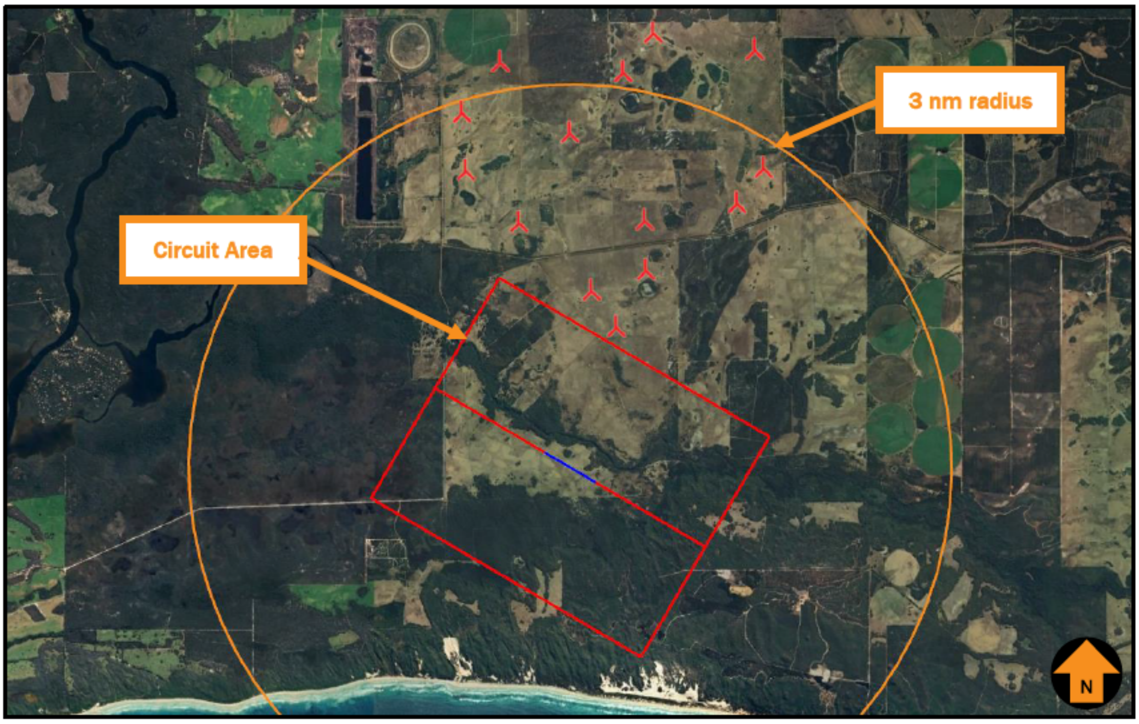

Figure 14 WTGs in relation to circuit operation of Unknown Aerodrome 1

6.5.2. Boley Aerodrome

The Boley Aerodrome is approximately 2.7 km west of the closest WTG. Limited published information about the aerodrome is available. Satellite imaging shows a prepared runway, as shown in Figure 15 (Source: Google Earth).

Figure 15 Close-up Google Earth image of aerodrome's runway

Approximately 12 WTGs are proposed to be located within 3 nm of this aerodrome, as shown in Figure 16 (Source: SynergyRED, Google Earth).

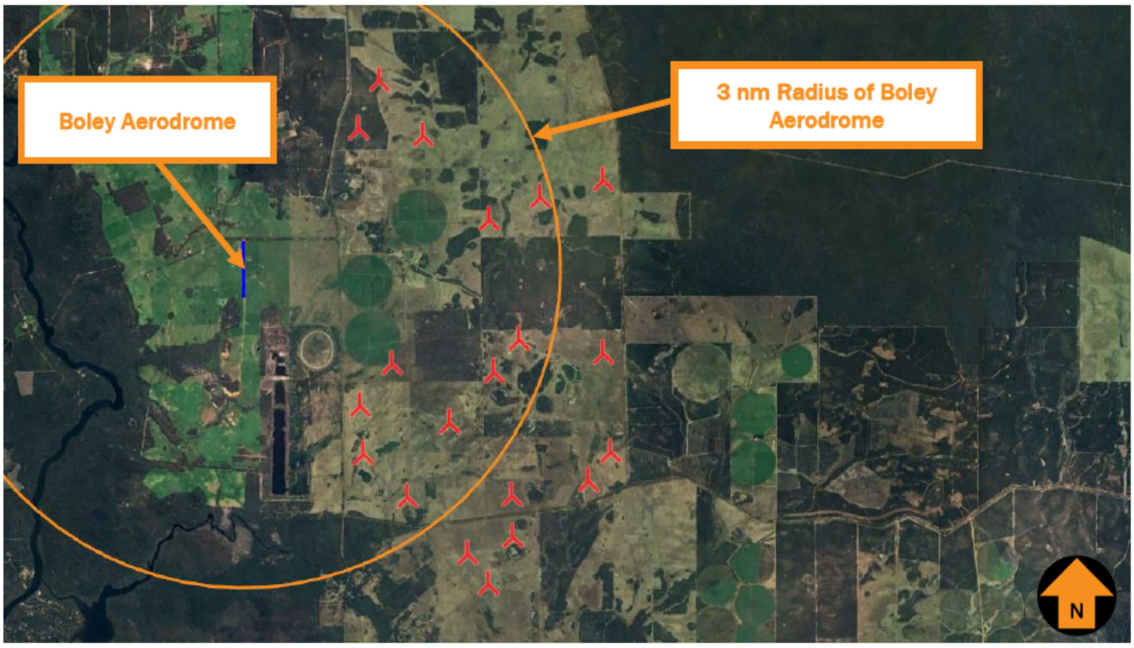

Figure 16 Boley Aerodrome in relation to The Project

WTGs within 3 nm of Boley Aerodrome that would be considered potentially hazardous obstacles, shown in Figure 17 (Source: SynergyRED, Google Earth).

Figure 17 WTGs in relation to circuit operation of Boley Aerodrome

6.6. Potential wake turbulence impacts

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

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…*

The key wording in the NASF guidance is "*noticeable*" and that "*the level of turbulence in the vicinity is not known with certainty.*"

There are many situations in aviation where pilots "notice" their aircraft moving away from the desired flight path or altitude and take appropriate action to maintain control of the aircraft with minimal input.

Pilot training standards are regulated by CASA to ensure that all qualified pilots have demonstrated to a suitably qualified and authorised check pilot that they can maintain control of their aircraft along the chosen flight path, across a significant range of atmospheric conditions that cause the aircraft to deviate from the pilot's chosen flight path.

Aircraft are designed to withstand a significant variation in atmospheric disturbances to ensure airframe integrity is maintained. The limits of the airframe's integrity are known by the pilot and considered in every flight activity. Significant weather events such as thunderstorms are avoided because of the likelihood of airframe limits being exceeded by the strong wind shear type conditions within, beneath and surrounding thunderstorm cells.

Wind turbines have been assessed in a limited number of studies, in which the highest classification of hazard is considered to be medium only within approximately 7 rotor diameters (RD) downwind of the wind turbine. There are no assessments that consider that the downwind turbulence is significant and outside the ability of the aircraft to endure the impacts and for the pilot to be able to control the aircraft using normal control inputs.

There also have been no reported aircraft accidents or incidents involving an aircraft encounter with the turbulence downwind of a wind turbine.

Assessment

A 180 m rotor diameter has been used for the wake turbulence analysis. Based on this scenario, NASF Guideline D suggests the effects of wake turbulence could be noticeable from the WTGs within 2880 m of the runway and the nominal circuit area, depending on wind direction.

Based on the results of published scientific studies which indicate that any medium level of turbulence would in most circumstances be confined to within 7 rotor diameters of a wind turbine generator (WTG), Aviation Projects considers that a conservative area of 10 rotor diameters is likely to be the maximum area where wake turbulence from WTGs would be noticed by pilots of light aircraft operating downstream of a WTG.

These studies also indicated that where any such turbulence is experienced, the pilot would be able to control the aircraft using normal control inputs.

Two of those studies are referred to below.

The *European Academy of Wind Energy* published an open access report titled "*Do wind turbines pose roll hazards to light aircraft?*" dated 2 November 2018. This study concluded:

> *In neutral conditions, the largest of these hazards are classified as medium hazards and exist 6.5 D downwind of the turbine in the bottom-left portion of the rotor disk. The highest hazards in the stable case also remained within the medium threshold and are located in two separate regions of the wake: approximately 4 D downwind in the bottom-right quadrant of the rotor and 6 D downwind in the top-left quadrant of the rotor.*

The United Kingdom (UK) Civil Aviation Authority commissioned the University of Liverpool to conduct a *Wind Turbine Wake Encounter Study*, the results of which were published in March 2015.

> *At University of Liverpool, a full CFD method [4] was used with the HMB solver to study wind turbine wakes. The CFD results showed good agreement for the blade surface pressure distributions and flow field velocities with the wind tunnel measurements. The wake was then solved on a very fine mesh able to capture the wake vortices up to 8 radii downstream of the blades on the MEXICO wind turbine rotor.*
>
> *In general, the LIDAR measurements captured the regular wake mean velocity patterns. Statistic LIDAR data indicate that the effects of wind turbine rotor wake, in term of velocity deficit, are limited within a downwind distance of 5D. This is generally in agreement with the results of the full CFD method and the velocity deficit models.*
>
> *For a wind turbine with size similar to the WTN250, and using the Beddoes circulation formula, the off-line simulation results indicate that the wind turbine wake did not pose any hazards to the encountering aircraft 5 diameters further from the wind turbine. The dominant upset that the wake generated is a yawing moment on the aircraft. The wake generated crosswind, is smaller than the maximum crosswind of 17.75 ft/s for an airport (codes A-I or B-I) that is expected to accommodate single engine aircraft. These conclusions are in line with that found in the piloted flight simulation.*

These two studies are the only major studies of their kind.

Wind farm designers and developers recognise the impact of downwind changes in wind strength and direction when designing the overall wind farm to ensure that the turbines are located at minimum distances from each other in order to prevent turbulence from one or more turbines affecting the operational efficiency of a downwind turbine or causing damage to the downwind turbine blades. The minimum distance between turbines typical wind farms is approximately 800 m, a significantly shorter distance than either 16 RD or 10 RD presents.

The turbulence from a wind turbine could be described as a shear type turbulence which is caused by the difference of the free flow wind speed at the edge of the turbine rotor (the blade tip) being disrupted by the turbine blade being rotated by the wind and altering the wind speed within the rotor diameter moving downwind from the turbine. This shear type turbulence descends and weakens as it gets further away from the turbine. It is not a stream of turbulence being generated by the blades being turned by a mechanical force such as occurs with an aircraft propellor or ceiling fan in a house or factory.

The WTG blades change pitch, dependent on the wind strength, to maintain a constant rotor speed. They interfere with the natural wind flow and cause some degree of turbulence downwind of the WTG. A consistent theme among the studies was that the higher turbulence exists very close to the WTG and rapidly dissipates due to the effect of convection, mechanical turbulence from other sources such as the wind flowing over trees, buildings and terrain undulations.

The studies indicate that turbulence is likely to dissipate below a level that could be felt by pilots within 7 rotor diameters (RD) from the WTG. Aviation Projects considers that a more conservative value of 10 RD is best used to assess areas where the likely turbulence created downwind of a WTG will not be felt by or impact pilots of light aircraft.

The studies referenced above also indicate that aircraft controllability is maintained when experiencing the likely turbulence when the aircraft is approximately 6 RD from a WTG.

Table 5 Wake Turbulence Distances

1 RD (m)	*16 RD (m)*	*10 RD (m)*	*7 RD (m)*
180	2880	1800	1260

In conditions of high wind speed the WTGs are "parked" with the blades in a "feathered" condition to reduce the wind impact upon them. Turbulence from the "feathered" blades still exists but would be less than when the turbine is rotating. Other mechanical turbulence generated by trees, hills and other objects during high winds would significantly exceed and break up any minor turbulence from a stationary WTG.

Aircraft are designed to withstand significant turbulence according to aviation meteorological standards that are recognised and accepted worldwide. Even in recent circumstances with an airliner experiencing severe turbulence which injured passengers, the aircraft was controllable (except for the first part of the event where it descended rapidly) and has not suffered any significant damage (although it will undergo a major inspection). It was an encounter with severe turbulence far greater than normally experienced and is avoided wherever areas of severe turbulence is forecast or known to exist.

The downwind turbulence from WTGs beyond 7RD may be felt by the pilot of a light aircraft but the pilot will only need to make minor control adjustments to maintain control of the aircraft's attitude, altitude and heading. Such turbulence is likely to be classified as Light on an intensity scale published by the Australian Bureau of Meteorology shown in Figure 18.

Within the 7 RD boundary the turbulence is considered to create a medium hazard which is likely to equate to pilots experiencing "Moderate" turbulence in which the *"Pilot remains in control at all times."* (Figure 18)

Intensity	Airspeed Fluctuat-ions (kt/s)	Vertical Gust (ft/s)	G Load	Aircraft Reaction	Reaction Inside Aircraft
Light	5 – 14	5 - 19	0.15 – 0.49	Momentary slight and erratic changes in attitude and/or altitude. Rhythmic bumpiness.	Little effect on loose objects.
Moderate	15 – 24	20 - 35	0.50 – 0.99	Appreciable changes in attitude and/or altitude. Pilot remains in control at all times. Rapid bumps or jolts.	Unsecured objects move. Appreciable strain on seatbelts.
Severe	≥ 25	36 -49	1.0 – 1.99	Large abrupt changes in attitude and/or altitude. Momentary loss of control.	Unsecured objects are tossed about. Occupants violently forced against seatbelts.
Extreme	≥ 25	≥ 50	> 2.0	Very difficult to control aircraft. May cause structural damage.	

Figure 18 Turbulence intensities[1]

[1] Bureau of Meteorology – Hazardous Weather Phenomena – Turbulence

Light and moderate turbulence can be generated by lines of trees near runways.

> *Turbulence may disturb an aircraft's attitude about its major axis, and cause rapid bumps or jolts to be experienced, but in most cases it does not significantly alter the aircraft's flight path.* [2]

Adverse turbulence from any source is most critical during initial climb after take-off until the aircraft is established in a climb and at the appropriate speed, and during final approach where the aircraft is configured for landing and operating at a slow speed prior to landing. The research studies indicate that adverse or severe turbulence is not created by wind turbines outside the 5 RD distance.

6.6.1. Unknown Aerodrome 1

Figure 19 Shows 10 times (1800 m) around the relevant boundary WTGs in relation to the Unknown Aerodrome 1 (sources: Google Earth).

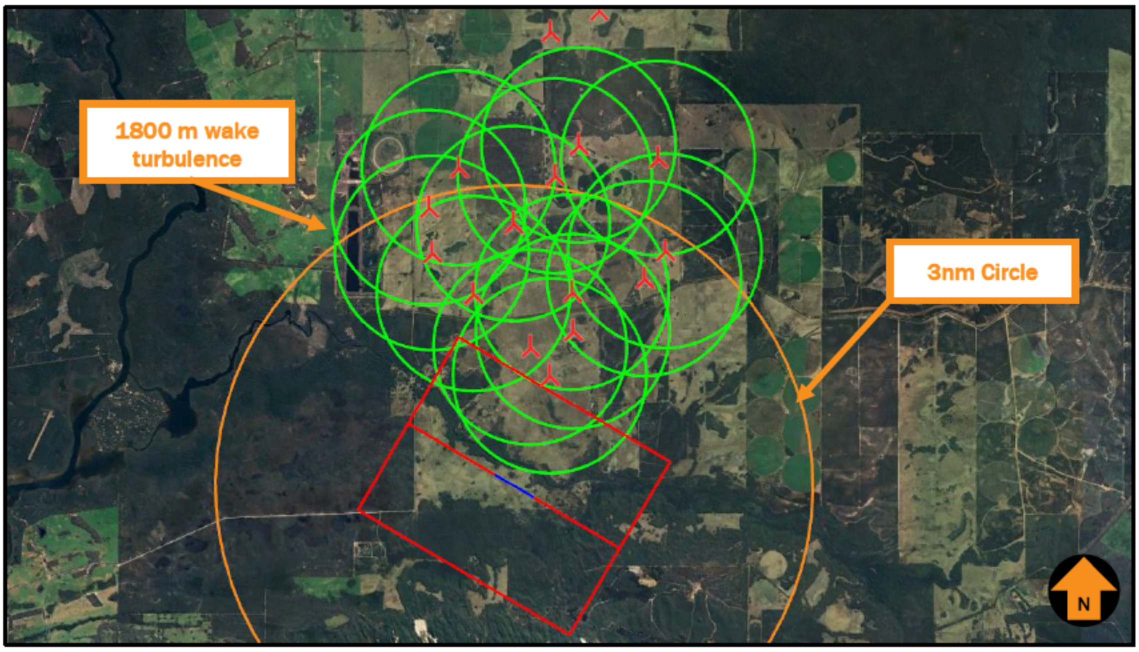

Figure 19 Possible extent of wake turbulence from WTGs to Unknown Aerodrome 2

When the wind blows from the north, downstream wake turbulence from the closer WTGs will extend into the aerodrome's right side of the circuit area.

Further consultation with the owner/operator of this aerodrome would be beneficial to understand the potential extent of these impacts

6.6.2. Boley Aerodrome

Figure 20 Shows 10 times (1800 m) around the relevant boundary WTGs in relation to the Boley Aerodrome (sources: Google Earth).

When the wind blows from the east, downstream wake turbulence from the closer WTGs will extend into the aerodrome's right side of the circuit area.

[2] Bureau of Meteorology – Hazardous Weather Phenomena – Turbulence

Further consultation with the owner/operator of this aerodrome would be beneficial to understand the potential extent of these impacts.

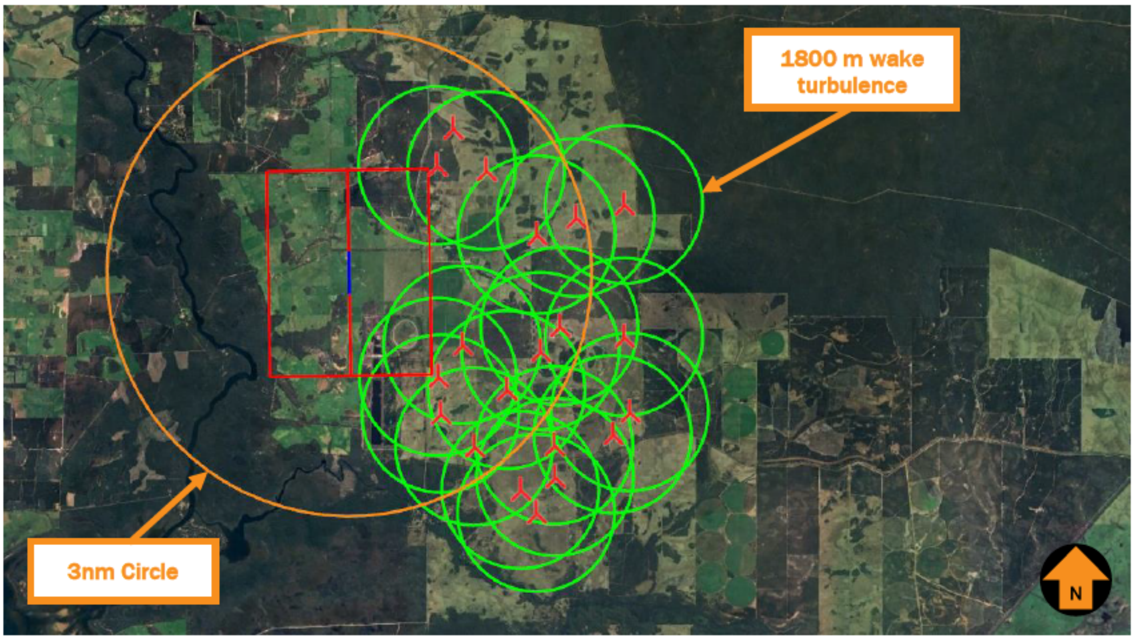

Figure 20 Possible extent of wake turbulence from WTGs to Boley Aerodrome

6.7. Grid and Air routes LSALT

CASR Part 173 MOS requires the published LSALT for a particular airspace grid or air route to provide a minimum of 1000 ft clearance above the controlling (highest) obstacle within the relevant airspace grid or air route tolerances.

6.7.1. Grid LSALT

The project site is located within an airspace grid with LSALT of 2600 ft AMSL, which provides clearance above obstacles with heights up to 1600 ft AMSL.

Figure 21 shows the grid LSALT in proximity to the project site (source: ERC Low National, OzRunways, October 2024, Google Earth).

The highest WTG is 290 m AHD (951.4 ft AMSL), below the 1600 ft obstacle height limit.

Therefore, the WTGs will not impact the 2600 Grid LSALT.

Figure 21 Grid LSALT in proximity to the project site

6.7.2. Air Route LSALTs

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

There is no air route within 7 nm of the project site. Therefore, the WTGs will not impact any Air Route LSALT.

6.8. Airspace Protection

The project site is located outside of controlled airspace (wholly within Class G airspace) and is not located in any Prohibited, Restricted and Danger areas.

The Project will not have an impact on controlled or designated airspace.

6.9. Aviation facilities

NASF Guideline G, *Protection of Aviation Facilities - Communication, Navigation and Surveillance (CNS)* and CASR Part 139 MOS specify the area where development of buildings and structures has the potential to cause unacceptable interference to CNS facilities.

The project site is located a sufficient distance away from nearby certified airports and aviation facilities and will not have an impact.

6.10. ATC Surveillance Radar installations

Airservices Australia requires an assessment of the potential for the WTGs that may affect radar line of sight. The three closest radar facilities to the project site are:

- Perth Preliminary Surveillance Radar (PSR) and Secondary Surveillance Radar (SSR), which is located approximately 260 km south of the project site.
- Kalamunda Air Route Surveillance Radar (RSR), which is located approximately 256 km south of the project site.

EUROCONTROL guidelines for assessing the potential impact on wind turbines 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)

The project site is outside the line-of-sight range of Perth PSR/SSR and Kalamunda RSR radars and will not impact these facilities.

6.11. Western Australia Department of Biodiversity, Conservation and Attractions - Parks and Wildlife Service

Scott National Park is only 1.2 km from the project's boundary. Some low-level flight operations might occur in Scott National Park, which will require a safe flight corridor without turbines along the park's boundaries.

Figure 22 (Source: Google Earth) shows the park boundary in relation to the Project. The closest WTG is approximately 1.2 km away from the boundary of the Scott National Park. Liaison with Western Australia Department of Biodiversity, Conservation and Attractions - Parks and Wildlife Service will be required regarding the buffer area of the boundary.

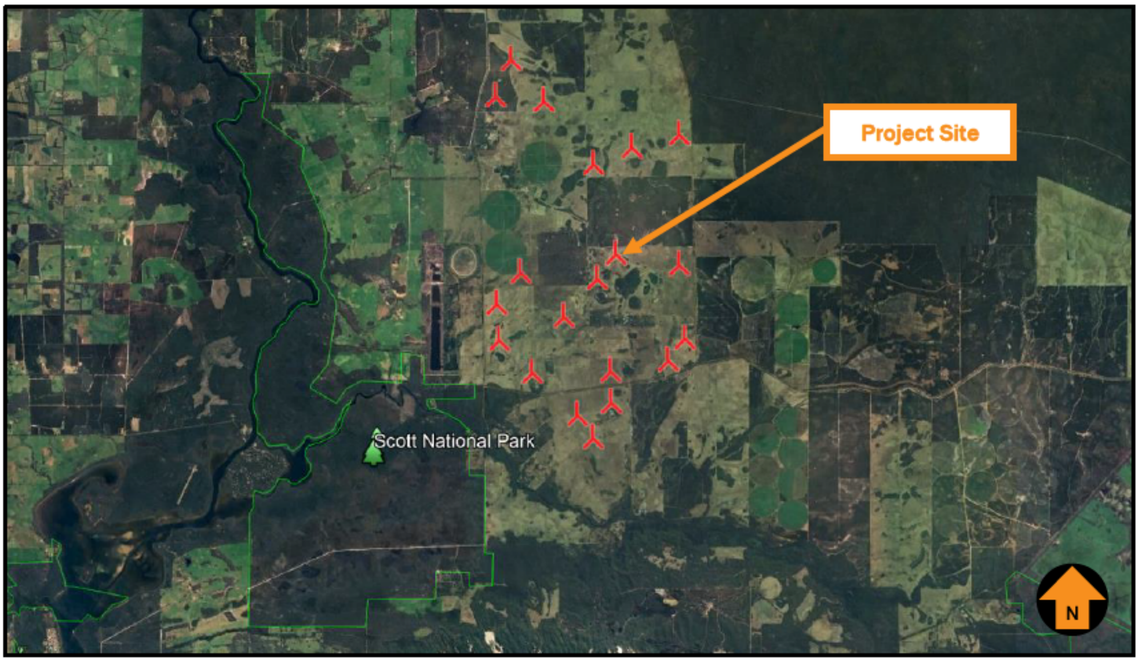

Figure 22 National Park boundary related to WTGs

6.12. AIS Summary

Based on the WTG layout and maximum blade tip height of up to 250 m AGL, the blade tip elevation of the highest WTG, will not exceed 290 m AHD (951.4 ft AMSL) and;

- There is one certified airport located within 30 nm (56 km) from the Project - Busselton Airport (YBLN)
  - The WTGs will not impact on the OLS of YBLN
  - The WTGs will infringe the YBLN PANS-OPS surfaces of the following procedures but will not change flight paths or descent gradients
    - 25 nm MSA surfaces, which need to be increased by 100 ft to 2000 ft or sectorised to exclude the Wind Farm
    - GNSS Arrival Sector A approach surfaces.
      - The initial approach minimum altitude needs to be increased to 2000 ft.
      - The commencement altitude would need to be increased to meet the requirement of increasing the 25 nm MSA to 2000 ft.
- There are two uncertified aerodromes identified within 3 nm of the project site – Unknown Aerodrome 1 and Boley Aerodrome .
  - Unknown Aerodrome 1
    - The proposed wind farm would be considered potentially hazardous obstacles
    - When the wind blows from north, downstream wake turbulence from the closer WTGs will extend into the aerodrome's right side of the circuit area. Further

consultation with the owner/operator of this aerodrome would be beneficial to understand the potential extent of these impacts.

- Boley Aerodrome
  - The proposed wind farm would be considered potentially hazardous obstacles
  - When the wind blows from east, downstream wake turbulence from the closer WTGs will extend into the aerodrome's right side of the circuit area. Further consultation with the owner/operator of this aerodrome would be beneficial to understand the potential extent of these impacts.

- The WTGs will not impact the Grid LSALT and any air route LSALT
- The project area is located within Class G airspace and outside all controlled airspace, Prohibited Restricted and Danger areas.
- The WTGs will not impact the aviation navigation facilities.
- The WTGs will not impact the closest ATC surveillance radar installations.
- The WTGs must be reported to CASA, and construction details must be provided to Airservices.
- The closest WTG is approximately 1.2 km away from the boundary of the Scott National Park. Liaison with Western Australia Department of Biodiversity, Conservation and Attractions - Parks and Wildlife Service will be required regarding the buffer area of the boundary.

6.13. Assessment recommendations

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

1. Details of WTGs 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 139.165(1)(2).
2. 'As constructed' details of WTG coordinates and elevation should be provided to Airservices Australia, by submitting the form at this webpage: https://www.airservicesaustralia.com/wp-content/uploads/ATS-FORM-0085_Vertical_Obstruction_Data_Form.pdf to the following email address: vod@airservicesaustralia.com
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 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.
5. To facilitate the flight planning of aerial application operators, details of the Project, including the 'as constructed' location and height information of WTGs 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.

6. Consultation with Western Australia Department of Biodiversity, Conservation and Attractions - Parks and Wildlife Service will be required regarding the buffer area of the boundary

Marking of WTGs

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

Lighting of WTGs

8. CASA will determine whether obstacle lighting is recommended for the WTGs. Lighting the WTGs is not a formal requirement.

Micrositing

9. Providing the microsite is within 100 m of the planned WTGs, it is not likely to change the project's maximum overall blade tip height. No further assessment is likely to be required from the microsite, and the conclusions of this AIA would remain the same.

Aerial firefighting

10. The developer or operator should consider the guidance contained in the National Council for Fire and Emergency Services, Wind Farms and Bushfire Operations to ensure:

    a. Liaison with the relevant fire and land management agencies is ongoing and effective

    b. Access is available to the wind farm site by emergency services for on-ground firefighting operations.

Triggers for review

11. 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.

7. HAZARD LIGHTING AND MARKING

Based on the risk assessment set out in Section 9 It is concluded that aviation lighting is not likely to be required.

For completeness, relevant lighting standards and guidelines are summarised in Annexure 3.

Once the details of the wind farm, along with this report, are provided by the planning authority to CASA, CASA is likely to recommend obstacle lighting be fitted to sufficient obstacles to delineate the outline of the wind farm and the highest WTGs within it.

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 considered.

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) published a summary of aviation occurrence statistics for the period 2010-2019 (AR-2020-047, Final - 4 November 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 6 (source: ATSB).

Table 6 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.

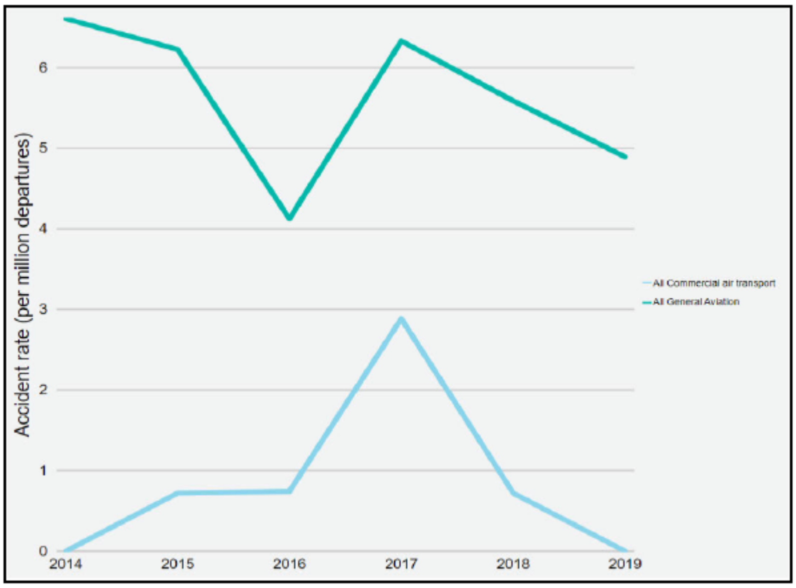

Figure 23 Fatal Accident Rate (per million departures) by Operation Type

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 7 (source: ATSB).

Table 7 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 5 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 5 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 2023, approximately 77.6 GW of wind power had been installed worldwide around the world at the end of 2022.

Based on the Australia's Clean Energy Council statistics there were 110 wind farms in Australia at 2023. 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 5 recorded aviation accidents involving a wind farm are summarised as follows:

- One accident occurred in Texas, United States in October 2019 resulting in minor aircraft damage no injury to the pilot and significant injury to a person on the ground. The aircraft, an Air Tractor AT502, was returning from a local aerial application flight and was flown deliberately at low-level in close vicinity to a wind turbine generator (WTG) because the pilot believed his friend was working on the turbine. The aircraft collided with a tagline rope that was attached to a blade of the WTG and which was being held by a person working on the ground. The worker was thrown about 20 ft in the air and experienced significant non-life-threatening injuries. The aircraft sustained minor damage however the pilot landed the aircraft without further incident.
- 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. 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.

A summary of the 4 accidents is provided in Table 8.

Table 8 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	Air Tractor AT502 N9143F collided with a tagline rope attached to wind turbine generator blade while being flown deliberately in close proximity to the WTG.	22 October 2019	Dawson County, Texas	0	Day VFR	Not specified	Not specified	The pilot's improper decision to manoeuvre at a low altitude and in close proximity to a wind turbine undergoing maintenance, which resulted in a collision with a tagline rope being held by a worker on the ground and serious injury to the worker.	Not applicable
2	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
3	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
4	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
5	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 comprises 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 a pilot to initiate manoeuvring in order to avoid colliding with a WTG or WMT resulting in collision with terrain (related to aviation safety).
3. Potential for the hazards associated with the Project to invoke operational limitations or procedures on operating crew (related to aviation safety).
4. 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. Therefore, 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 9 through to Table 12.

Table 9 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 5 reported occurrences worldwide of aircraft collisions with a component of a WTG structure since the year 2000 as discussed in Section 8. 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 8.

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 5 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 certified 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 height of 250 m (820.2 ft) AGL at the top of the blade tip. The rotor blade at its maximum height will be approximately 97.6 m (320.2 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. • 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 are typically coloured white so they should 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 prior to construction to heighten their awareness of its location and so that they can plan their operations accordingly. Specifically:

a. 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. b. Arrangements should be made to publish details of the Project in ERSA for surrounding aerodromes, which would involve notification to Airservices Australia.
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. In the circumstances, the level of risk under the proposed treatment plan 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 wind turbine, without obstacle lighting on the turbines of the Project.**

Residual Risk	7 - Tolerable

Table 10 Harsh manoeuvring leading to controlled flight into terrain

Risk ID:	2. 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 250 m (820.2 ft) AGL at the top of the blade tip. The rotor blade at its maximum height will be approximately 97.6 m (320.2 ft) above aircraft flying at the minimum altitude of 152.4 m (500 ft) AGL.

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 are typically coloured white 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 WTGs 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 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. • WTGs will be a maximum of 250 m (820.2 ft) AGL at the top of the blade tip. The rotor blade at its maximum height will be approximately 97.6 m (320.2 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. • The WTGs and masts will be shown on aeronautical charts at the next publication cycle date available and NOTAMS prior to the publication date. This allows pilots to be aware of the existence of the wind farm at the pre-flight planning stage and during flight with reference to the aeronautical chart. • 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.	
With the additional recommended treatments, the likelihood of ground collision resulting from manoeuvring to avoid a wind turbine 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 our assessment that there is an acceptable level of aviation safety risk associated with the potential for ground collision resulting from manoeuvring to avoid a wind turbine, without obstacle lighting on the turbines of the Project.**	
Residual Risk	7 – Tolerable

Table 11 Effect of the Project on operating crew

Risk ID:	3. 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 WTGs and masts will be shown on aeronautical charts at the next publication cycle date available and NOTAMS prior to the publication date. This allows pilots to be aware of the existence of the wind farm at the pre-flight planning stage and during flight with reference to the aeronautical chart. • WTGs will be a maximum of 250 m (820.2 ft) AGL at the top of the blade tip. The rotor blade at its maximum height will be approximately 97.6 m (320.2 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 are typically coloured white 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 Moderate consequence is 5.

Current Level of Risk	5 - Tolerable

Risk Decision

A risk level of 6 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

WMTs installed prior to WTG installation and those that are not in relatively close proximity to a WTG should be lit to ensure they are visible in low light and deteriorating atmospheric conditions

The following additional treatments will provide an additional margin of safety:

- Ensure details of the Project WTGs and WMTs 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 such aircraft operations in the vicinity of the Project site.

Residual Risk

Notwithstanding the current level of risk is considered **Tolerable,** the additional Recommended Treatments listed above will enhance aviation safety. The likelihood remains **Possible**, and consequence remains **Minor**. In the circumstances, the risk level of 5 is considered **Tolerable.**

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 Project WTGs and Permanent WMTs in close proximity to a WTG, and with obstacle lighting for temporary WMTs installed prior to WTG installation and WMTs that are not in close proximity to a WTG.

Residual Risk	5 – Tolerable

Table 12 Effect of obstacle lighting on neighbours

Risk ID:	*4.* **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 permanent WMTs is not necessary to provide an acceptable level of safety. For temporary WMTs installed prior to WTG installation and WMTs that are not in close proximity to a WTG, obstacle lighting is recommended to ensure visibility in low light and deteriorating atmospheric conditions. 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. 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. Planning considerations

The Project, as proposed, satisfies the planning provisions of Shire of Augusta Margaret River's Planning Scheme 2024, *Shire of Augusta-Margaret River's* Local Planning Strategy, City of Busselton's Local Planning Strategy 2014 and will not create incompatible intrusions or compromise the safety of existing airports and associated navigation and communication facilities.

10.2. Aviation Impact Statement

Based on the WTG layout and maximum blade tip height of 250 m AGL, the blade tip elevation of the highest WTG will not exceed 290 m AHD (951.4 ft AMSL) and:

- There is one certified airport located within 30 nm (56 km) from the Project - Busselton Airport (YBLN)
  - The WTGs will not impact on the OLS of YBLN
  - The WTGs will infringe the YBLN PANS-OPS surfaces of the following procedures but will not change flight paths or descent gradients
    - 25 nm MSA surfaces, which need to be increased by 100 ft to 2000 ft or sectorised to exclude the Wind Farm
    - GNSS Arrival Sector A approach surfaces.
      - The initial approach minimum altitude needs to be increased to 2000 ft.
      - The commencement altitude would need to be increased to meet the requirement of increasing the 25 nm MSA to 2000 ft.
- There are two uncertified aerodromes identified within 3 nm of the project site – Unknown Aerodrome 1 and Boley Aerodrome .
  - Unknown Aerodrome 1
    - The proposed wind farm would be considered potentially hazardous obstacles
    - When the wind blows from north, downstream wake turbulence from the closer WTGs will extend into the aerodrome's right side of the circuit area. Further consultation with the owner/operator of this aerodrome would be beneficial to understand the potential extent of these impacts.
  - Boley Aerodrome
    - The proposed wind farm would be considered potentially hazardous obstacles
    - When the wind blows from east, downstream wake turbulence from the closer WTGs will extend into the aerodrome's right side of the circuit area. Further consultation with the owner/operator of this aerodrome would be beneficial to understand the potential extent of these impacts.
- The WTGs will not impact the Grid LSALT and any air route LSALT

- The project area is located within Class G airspace and outside all controlled airspace, Prohibited Restricted and Danger areas..
- The WTGs will not impact the aviation navigation facilities.
- The WTGs will not impact the closest ATC surveillance radar installations.
- The WTGs must be reported to CASA, and construction details must be provided to Airservices.
- The closest WTG is approximately 1.2 km away from the boundary of the Scott National Park. Liaison with Western Australia Department of Biodiversity, Conservation and Attractions - Parks and Wildlife Service will be required regarding the buffer area of the boundary.

10.3. Aircraft operator characteristics

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

Aircraft flying at night in visual conditions are permitted to descend or climb to or from an appropriate minimum altitude only when within 3 nm of the aerodrome.

WTGs are generally not a safety concern to aerial agricultural operators.

The closest WTG is approximately 1.2 km away from the boundary of the Scott National Park. Liaison with Western Australia Department of Biodiversity, Conservation and Attractions - Parks and Wildlife Service will be required regarding the buffer area of the boundary.

10.4. 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 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.

10.5. Summary of risks

A summary of the level of residual risk associated with the Project with the Recommended Treatments implemented is provided in Table 13.

Table 13 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

Identified Risk	*Consequence*	*Likelihood*	*Risk*	*Actions Required*
				aerodromes before, during and following construction.
Avoidance manoeuvring leads to ground collision	Catastrophic	Unlikely	7	**Acceptable without obstacle lighting (ALARP).** Communicate details of the Project WTGs and WMTs to local and regional operators and make arrangements to publish details in ERSA for surrounding aerodromes before, during and following construction.
Effect on crew	Minor	Possible	5	**Acceptable without obstacle lighting (ALARP)** Communicate details of the Project WTGs and WMTs to local and regional operators and make arrangements to publish details in ERSA for surrounding aerodromes before, during and following construction.
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.

11. RECOMMENDATIONS

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

Notification and reporting

1. Details of WTGs 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).
2. 'As constructed' details of WTG coordinates and elevation should be provided to Airservices Australia, by submitting the form at this webpage: https://www.airservicesaustralia.com/wp-content/uploads/ATS-FORM-0085_Vertical_Obstruction_Data_Form.pdf to the following email address: vod@airservicesaustralia.com
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 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.
5. To facilitate the flight planning of aerial application operators, details of the Project, including the 'as constructed' location and height information of WTGs 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.
6. The closest WTG is approximately 1.2 km away from the boundary of the Scott National Park. Liaison with Western Australia Department of Biodiversity, Conservation and Attractions - Parks and Wildlife Service will be required regarding the buffer area of the boundary.

Marking of WTGs

7. 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

8. CASA will determine whether obstacle lighting is recommended for the WTGs. It is not a formal requirement to light the WTGs.

Micrositing

9. Providing the micrositing is within 100 m of the planned WTGs it is not likely to 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.

Aerial firefighting

10. The developer or operator should consider the guidance contained in the National Council for Fire and Emergency Services, Wind Farms and Bushfire Operations to ensure:

a. Liaison with the relevant fire and land management agencies is ongoing and effective

b. Access is available to the wind farm site by emergency services for on-ground firefighting operations

Triggers for review

11. 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

    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. WTG coordinates and heights
6. Approval Letter from the City of Busselton
7. Agreed presentation slide for DFES and DBCA Feedback – Aerial Firefighting

ANNEXURE 1 – REFERENCES

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

- Airservices Australia
  - Aeronautical Information Package, effective 28 November 2024
  - Designated Airspace Handbook, effective 28 November 2024.
- Civil Aviation Safety Authority
  - Civil Aviation Regulations 1988 (CAR)
  - Civil Aviation Safety Regulations 1998 (CASR)
  - Advisory Circular (AC) 91-02 V1.2, *Guidelines for aeroplanes with MTOW not exceeding 5700 kg – suitable places to take off and land*, dated November 2022
  - Advisory Circular (AC) 91-10 v1.1: *Operations in the vicinity of non-controlled aerodromes*, dated November 2021
  - CASR Part 173 MOS– *Standards Applicable to Instrument Flight Procedure Design*, version 1.8, dated August 2022
  - CASR Part 139 MOS– *Aerodromes*, F2024C00161 registered 16/02/2024
  - Advisory Circular 139.E-01 v1.0—*Reporting of Tall Structures*, dated December 2021
  - Advisory Circular (AC) 139.E-05 v1.1 *Obstacles (including wind farms) outside the vicinity of a CASA certified aerodrome* (October 2022)
- City of Busselton's Local Planning Strategy, 15 October 2014
- Department of Infrastructure, Transport, Regional Development, Communications and Arts, Australian Government, National Airport Safeguarding Framework, Guideline D *Managing the Risk to aviation safety of wind turbine installations (wind farms)/Wind Monitoring Towers*, 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, dated October 2024
- Standards Australia, ISO 31000:2018 *Risk management – Guidelines*
- Shire of Augusta-Margaret River's planning scheme, amended May 2024
- Shire of Augusta-Margaret River's Local Planning Strategy

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 aircraft or that extend above a defined surface intended to protect aircraft in flight.

Term	*Definition*
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.

CASR 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.

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 5
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 – PROJECT TURBINE COORDINATES AND HEIGHTS

Reference file: email received from Wilson Mandisodza on 30 July 2024

Easting - MGA2020, Zone 50	*Northing – MGA2020, Zone 50*	*Base Elevation (m AHD)*	*Tip Height (m AGL)*	*Max Height (m AHD)*	*Max Height (ft AMSL)*
343,193	6,207,619	30	250	280	918.64
340,893	6,210,691	25.2	250	275.2	902.89
343,579	6,209,172	30	250	280	918.64
340,963	6,209,853	22.7	250	272.7	894.69
344,919	6,209,443	30	250	280	918.64
341,919	6,215,415	40	250	290	951.44
343,230	6,211,314	31	250	281	921.92
343,609	6,208,448	30	250	280	918.64
343,989	6,214,377	40	250	290	951.44
341,439	6,211,432	30	250	280	918.64
341,140	6,216,362	40	250	290	951.44
345,139	6,211,672	30	250	280	918.64
341,749	6,209,113	21.4	250	271.4	890.42
345,089	6,214,695	36.8	250	286.8	940.94
340,789	6,215,512	40	250	290	951.44
345,296	6,209,961	29.2	250	279.2	916.01
343,100	6,213,973	38.7	250	288.7	947.18
342,822	6,208,140	30	250	280	918.64
342,469	6,210,422	30	250	280	918.64
343,658	6,211,892	32.4	250	282.4	926.51

ANNEXURE 6 – APPROVAL LETTER FROM THE CITY OF BUSSELTON

City of Busselton
Geographe Bay

Contact: [redacted]

13 March 2025

Airservices Australia
Airport Development & Protection
Via Email

To Whom it May Concern

RE: REQUEST FOR APPROVAL WA-WF-059 - BEENUP WF- REF - 105603-03 CONSULTATION

The City of Busselton acknowledges receipt of the AIA of the Beenup WF and authorises Airservices Australia to make the required changes to the 25 nm MSA and GNSS Arrival.

Yours sincerely

[redacted]

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ANNEXURE 7 – AGREED PRESENTATION SLIDE FOR DFES AND DBCA FEEDBACK – AERIAL FIREFIGHTING

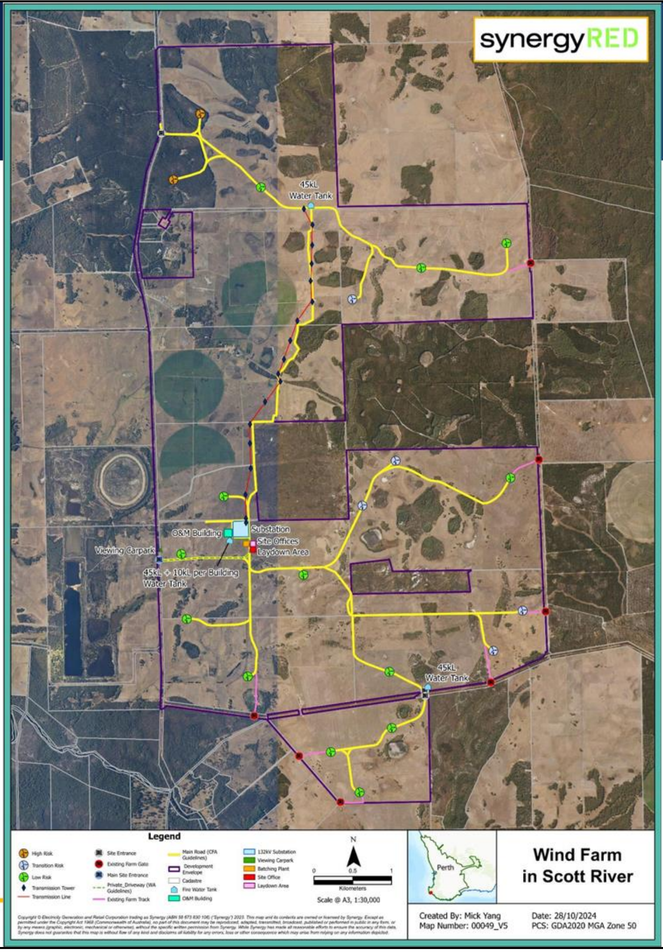
Potential wind farm – Scott River

Proposed facility

- Up to 20 turbines
- 132 kV transmission line, connection into existing Manjimup to Beenup 132 kV line
- Meteorological mast(s) and Substation
- Operations and maintenance (O&M) building / workshop
- Access tracks suitable for firefighting appliances
- Firewater tank(s)

Guidelines referenced

- SPP 3.7 Planning in bushfire prone areas
- CFA (2023) Design Guidelines and Model Requirements: Renewable Energy Facilities
- AFAC (2018) Guideline - Wind farms and bushfire operations



Department of Fire and Emergency Services (DFES)

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Meeting summary - 17 February 2025

- **DFES - Ray Buchan – Superintendent Aviation Services; Steven Sartain – Manager Emergency Rescue and Helicopter Services**
- **Synergy – Chris Binstead, Emma Jones and Wilson Mandisodza**
- Aerial fire suppression activities are not prohibited within wind farms. There are currently no procedures specific to aerial fire suppression operations around wind farms.
- Aerial firefighting around wind farms is not treated any differently to other aerial firefighting i.e. the same risk assessment processes are undertaken to ensure the aerial fire suppression operation can be undertaken safely as for all fires.
- Aerial operations are via contractors, and they will have their own Standard Operating Procedures and risk assessment processes that form part of their Safety Management System.
- Pilots will take the wind turbines into consideration in their risk assessments and will make a determination on the day whether it is safe to operate inside the wind farm envelope.
- If the wind farm is operating during a bushfire, suppression operations will be modified or suspended.
- If the wind farm is able to be shutdown / paused remotely (i.e. blades moving at approx. 1 RPM), then suppression operations will be considered based on a risk assessment and conditions on the day.
- DFES acknowledges that due to the rapid onset of bushfires it is very difficult to achieve a Y position, it is assumed that it cannot be achieved in a timely manner. However, pausing turbines to approx. 1 RPM is recommended.
- DFES will prioritise static fresh water supplies over salt or brackish water i.e. preference is to not take salt water for firefighting
- While aerial firefighting only operates during the day, rescue services operate day and night – 24/7/365
- DFES recommends medium intensity lighting on wind turbines for rescue purposes due to operating at night. Refer to 2017 NSW CASA guidance.
- Emphasised the significance of operator and DFES/DBCA Incident Controllers in the decision-making process for firefighting operations near wind farms.
- Provision of information regarding tall objects within the wind farm at the point of construction is critical in being able to assess the risk during a bushfire emergency.
- Emphasised importance of local/regional involvement in the planning and development of the wind farm.
- Emergency Response Plan to be developed and shared with DFES. Must have contact details for wind farm and available 24/7 to first responders and Incident Controllers.

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Department of Biodiversity, Conservation and Attractions (DBCA)

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Meeting held 24 February 2025

- DBCA - Erin Tassel – Fire Aviation Manager
- Synergy – Chris Binstead, Emma Jones and Wilson Mandisodza
- DBCA and DFES share similar fire suppression contractors.
- Aerial fire suppression and pest control operate under daytime VFR (visual flight rules). No rescue services operated by DBCA.
- Aerial fire suppression will consider the risk on the day and location, will be at the pilot's discretion. Dispatch operators will always flag the coordinates of any obstacles / tall objects (such as wind turbines).
- DBCA also acknowledges that due to the rapid onset of bushfires it is very difficult to achieve a Y position, it is assumed that it cannot be achieved in a timely manner.
- There are currently no procedures specific to wind farms.
- Need to confirm secondary airstrips have been assessed.
- Feedback from DBCA forum with Chief pilots is that there is no special consideration for wind farms but as the decision to is at the pilot's discretion.

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Pre flight risk assessment (DFES)

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DFES and DBCA Process

- Operator and incident control decision making operation
- Pilot’s pre-briefing
- Risk assessment by operator at site taking into account the conditions on the day
- AOC to determine operating procedures
- DFES and DBCA procedures may not be the same as Operator procedures.

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Shutdown of turbines in the event of a fire

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DFES Process

- Synergy is not opposed to shutting down the wind farm if required (i.e. pausing the turbine blades)
- Synergy can reduce the ????
- Typically, a wind farm would continue to operate based on the guidance from AEMO, Western Power and other bodies.
- Decision making needs to include DFES as the decisions will influence operator and incident control decision making
- DFES open to some turbines being shut down or sector management if required.

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Synergy's commitments

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- Synergy will notify CASA, Air Services Australia, DBCA and DFES notification of all turbine locations
- Turbines at least 300 metres apart
- Meteorological masts and guy wires to be marked to ensure visibility to aircraft as per CASA regulations
- Synergy will investigate lighting for wind turbines (for rescue helicopters)
- Synergy will not oppose shutting down the wind farm in the case of an emergency
- Synergy will provide data in the preferred format for DBCA and DFES to inform their risk assessment.
- Synergy will provide opportunities for site familiarisation and orientations
- Should the project go ahead, the preferred turbine technology will have a fire suppression system.
- Synergy to provide a detailed BMP / EMP which includes emergency contacts

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Next steps
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Next steps

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- Synergy will obtain feedback from DBCA's forum with the Chief Pilots – this can include Chief Pilots for DFES Air Operations contractors as there are combined DFES / DBCA Chief Pilots meetings
- Synergy will finalise the BMP
- If any additional detail or differences arise, Synergy to organise a meeting between Synergy, DFES and DBCA.

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