

FINAL REPORT

WILLATOOK WIND FARM

PERMIT AMENDMENT

AERONAUTICAL IMPACT ASSESSMENT

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CCP06WR

**23 April 2026
WR v5**



Willatook Wind Farm Pty Ltd
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DOCUMENT RELEASE APPROVAL

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EXECUTIVE SUMMARY

The Willatook Wind Farm (WWF) is located between the towns of Willatook, Orford, Broadwater and Hawkesdale and is approximately 32km Northwest of Warrnambool.

The proposed wind farm will comprise of up to 52 turbines with a maximum tip height up to 254m Above Ground Level (AGL).

The Willatook Wind Farm Project in south-west Victoria has progressed through a comprehensive environmental assessment under the *Environment Effects Act 1978* (Vic), with the associated Environment Effects Statement (EES). Following public exhibition (in July-August 2022) and an Independent Panel Hearing/Inquiry (in Oct-Nov 2022), Minister for Planning issued her Assessment of the EES (in July 2023). The project was recommended for approval provided there were modifications to the project relating to threatened fauna.

Since the conclusion of the EES process, the Victorian Government developed new biodiversity policy. In response, the project proponent has refined the wind farm layout and reduced the overall project scale to align with the Minister's recommendations, and applying the new Handbook. This removed 7 proposed wind turbine generators and shifted several other proposed wind turbines. There were also changes to the proposed track, cable and quarry designs. These changes have not increased the impact on aviation safety and aircraft operations.

The Minister for Planning concluded "Subject to the recommendations of my assessment to ensure no turbines penetrate the minimum safe altitude for Warrnambool airport operations, the project infrastructure will have acceptable effects on aviation safety and aircraft operations."

Since the last assessment under the EES, the 10nm MSA for YWBL has increased from 2100ft to 2200ft which removes the impact of the amended layout to the approach path of this aerodrome. Any of the other impacts are of the same nature. It is therefore concluded that the amended layout complies with the Ministers assessment with regards to aviation safety and aircraft operations.

Section 4.4.3 of this report demonstrates that the proposed wind farm layout and turbine tip height of up to 254m AGL does not penetrate the protected airspace, which includes the minimum safe altitude, of the Warrnambool Aerodrome. This meets the requirements of the Minister for Planning as stated above.

There are three Certified aerodromes within 30nm (56km) of the boundary of the WWF. These are Portland (YPOD), Hamilton (YHML) and Warrnambool (YWBL). Each of these aerodromes have Pilot Activated Lighting (PAL) and non-precision Instrument Approach Procedures (IAP).

There are several known uncertified airstrips within 30nm of the wind farm.

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The AIS concluded that the WWF will not impact upon the following: -

- The Obstacle Limitation Surface (OLS) of any certified aerodrome;
- The Procedures for Air Navigation Services – Aircraft Operations (PANS-OPS) surfaces associated with the Instrument Approach Procedures of any certified aerodrome;
- The performance of Navigation Aids and Communication Facilities; or
- The performance of any surveillance radars.

A review of the known airstrips (uncertified aerodromes) in the vicinity of the WWF demonstrates that they will remain safe and usable for the current occasional aerial applications operations.

The Qualitative Risk Assessment demonstrates that for the WWF:

- By day, the wind turbines are conspicuous by their size and colour;
- Night operations of aircraft do not occur below prescribed airspace;
- Aerodromes equipped for night operations are sufficiently distant.
- Obstacle lighting is not required as the risk to aviation is LOW and no additional mitigating strategies are necessary.

The WWF proponent will report the wind turbines and meteorological monitoring masts, as tall structures, to the Vertical Obstacle Database, managed by Airservices Australia in accordance with CASA Advisory Circular AC 139.E-01 v1.0 *Reporting of tall structures*.

The WWF is assessed as a LOW risk to aviation and is therefore not a hazard to aircraft safety. Aviation obstacle lighting is not required.

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1. INTRODUCTION

The Willatook Wind Farm Project in south-west Victoria has progressed through a comprehensive environmental assessment under the *Environment Effects Act 1978* (Vic), with the associated Environment Effects Statement (EES). Following public exhibition (in July-August 2022) and an Independent Panel Hearing/Inquiry (in Oct-Nov 2022), Minister for Planning issued her Assessment of the EES (in July 2023). The project was recommended for approval provided there were modifications to the project relating to threatened fauna.

The Minister for Planning concluded "Subject to the recommendations of my assessment to ensure no turbines penetrate the minimum safe altitude for Warrnambool airport operations, the project infrastructure will have acceptable effects on aviation safety and aircraft operations."

Since the conclusion of the EES process, the Victorian Government developed new biodiversity policy. In response, the project proponent has refined the wind farm layout and reduced the overall project scale to align with the Minister's recommendations, and applying the new Handbook. This removed 7 proposed wind turbine generators and shifted several other proposed wind turbines. There were also changes to the proposed track, cable and quarry designs.

Willatook Wind Farm Pty. Ltd. has requested Chiron Aviation Consultants undertake an Aeronautical Impact Assessment for the revised Willatook Wind Farm. This wind farm was originally assessed by Airservices Australia as VIC-WF-011 P3.

1.1 Location

The Willatook Wind Farm (WWF) is located between the towns of Willatook, Orford, Broadwater and Hawkesdale and is approximately 32km Northwest of Warrnambool. Refer to Figure 1 below.

The proposed wind farm will comprise of up to 52 turbines with a maximum tip height of up to 254m Above Ground Level (AGL).

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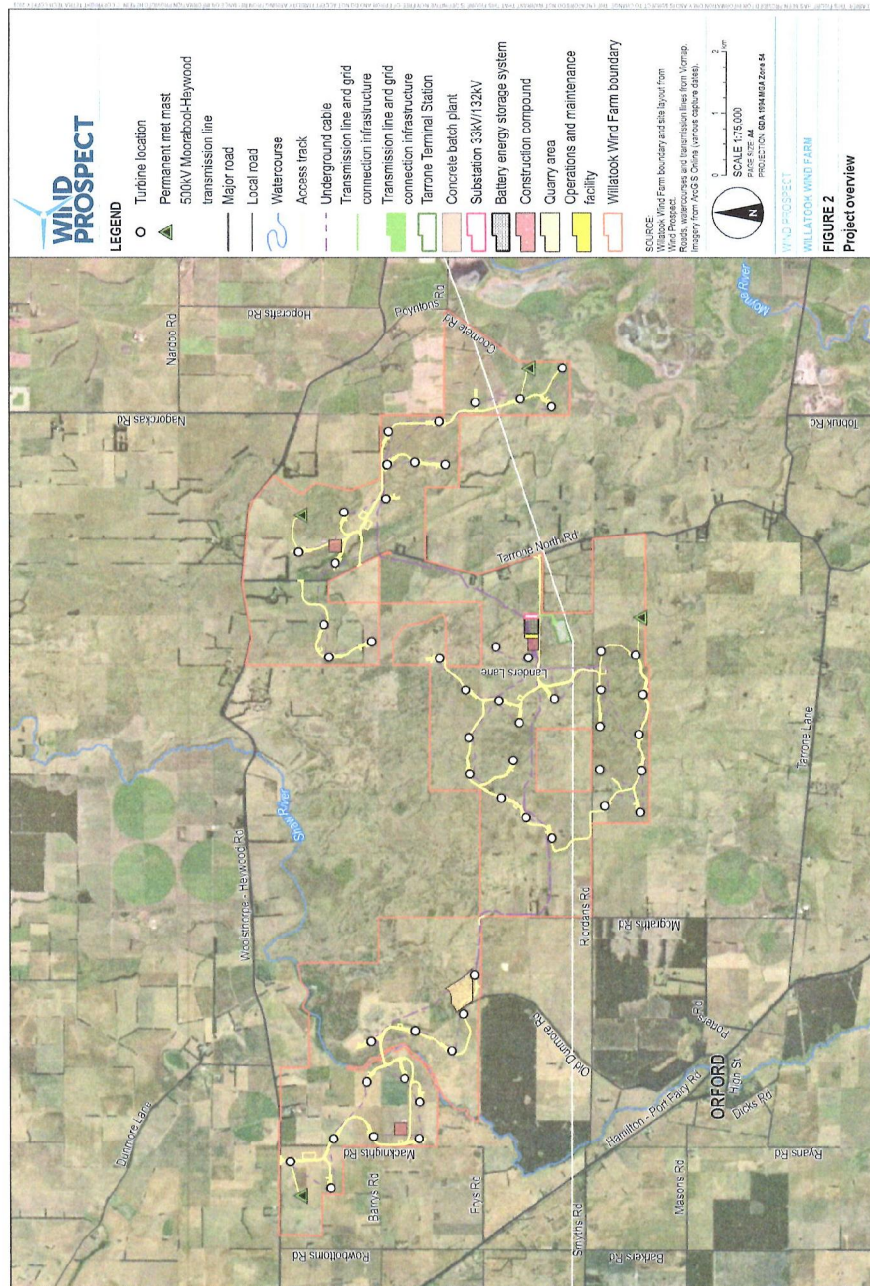


Figure 1 – Willatook Wind Farm Location and Turbine Layout¹

¹ Willatook Wind Farm Pty Ltd

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1.2 Aerodromes and Airstrips

Aerodromes fall into three categories:

- Military or Joint (combined military and civilian);
- Certified;
- Uncertified often referred to as Aeroplane Landing Areas (ALA)

A Military aerodrome is operated by the Department of Defence and is suitable for the operation of military aircraft. A Joint User aerodrome is a Military aerodrome used by both military and civilian aircraft, for example Darwin International and Townsville International Airports.

A Certified Aerodrome, certified under Civil Aviation Safety Regulation (CASR) 139.040, is available for Regular Public Transport and Charter operations and has a runway suitable for use by an aircraft having a maximum carrying capacity of more than 3,400kg or a passenger seating capacity of more than 30 seats, for example Melbourne Tullamarine Airport, Portland Airport and Warrnambool Airport.

An Uncertified Aerodrome is any other aerodrome or airstrip and is referred to as an Aeroplane Landing Area (ALA). These range in capability and size from having a sealed runway with lighting capable of accommodating corporate jet aircraft to a grass paddock that is smooth enough to land a single engine light aircraft or a purpose built aerial agricultural aircraft.

Military and Certified aerodromes are listed in the Aeronautical Information Publication² (AIP) and are subject to a NOTAM³ service that provides the aviation industry with current information on the status of the aerodrome facilities. This information is held in the public domain, is available through aeronautical publications and charts and is kept current by mandatory reporting requirements.

Uncertified aerodromes (ALA) are not required to be listed in the AIP so information about them is not held in the public domain, is not available through aeronautical publications and charts and is not required to be reported. Where ALA information is published in the AIP it is clearly annotated that it is not kept current. A local example is Cobden Airport. Consequently, ALA can come into use and fall out of use without any formal notification to CASA or any other authority. Airstrips that appear on survey maps often no longer exist; others exist but do not feature on maps. Similarly, a grass paddock used occasionally as an ALA is not usually discernable on satellite mapping services such as Google Earth.

Military and Certified aerodromes have Obstacle Limitation Surfaces (OLS) and, if equipped with a published Instrument Approach Procedure, Procedures for Air Navigation – Operations (PANS-OPS) protected airspace surfaces associated with the published instrument approach and landing procedures. An uncertified aerodrome cannot have a published instrument approach and landing procedure so cannot have

² AIP; a mandatory worldwide distribution system for the promulgation of aviation rules, procedures and information

³ NOTAM (Notice to Airmen); a mandatory reporting service to keep aerodrome and airways information current and available to the aviation industry worldwide



associated protected OLS or PANS-OPS airspace. All operations into ALA therefore must be conducted in accordance with the Visual Flight Rules (VFR) and in Visual Meteorological Conditions (VMC).

1.3 Aerodromes in the Area

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There are Certified Aerodromes at: -

- Portland (YPOD) situated 30.63nm (56.73km) West Southwest of the WWF at turbine T4
- Hamilton (YHML) situated 29.49nm Northwest of the WWF at T2; and
- Warrnambool (YWBL) situated 12.45 nm Southeast of the WWF at T59.

There is an Uncertified ALA at Port Fairy (YPFA), 11.12nm South of T43.

There are several known uncertified airstrips on properties close to the wind farm.

1.4 Air Routes in the Area

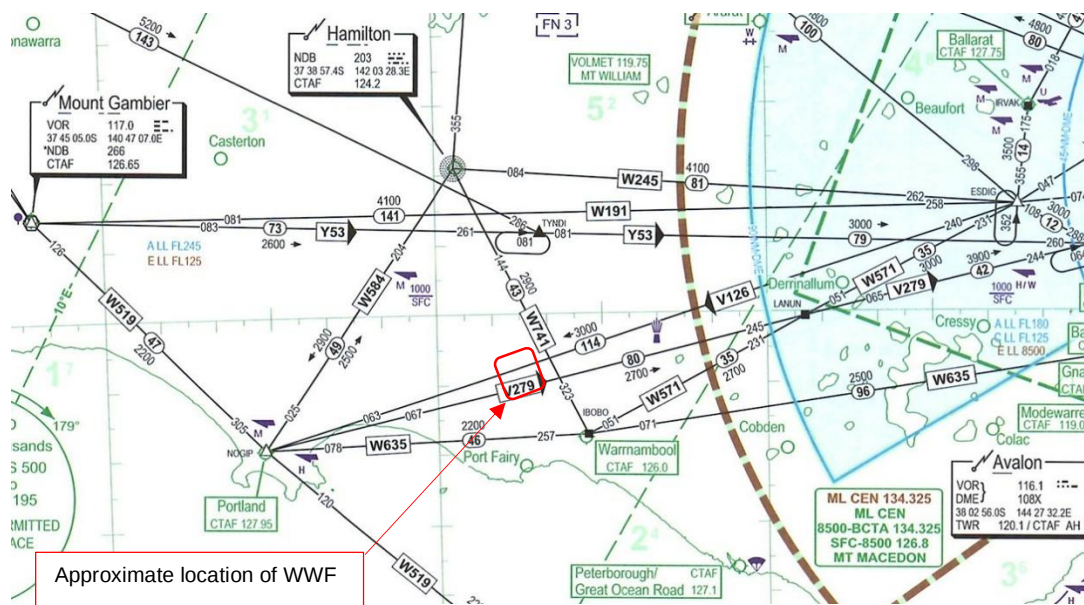


Figure 2 – Nearby Air Routes⁴

The WWF sits below three nearby air routes as shown in Figure 2 above.

⁴ AIP ERC L2, dated 27 November 2025

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1.5 Airspace in the Area

The WWF is in Class G airspace with Class E airspace above having a lower limit of FL125 (12,500ft).

Class G airspace is non-controlled airspace where aircraft operate without an Air Traffic Control (ATC) clearance or the need to contact ATC. Aircraft may operate in accordance with both Instrument Flight Rules (IFR) and Visual Flight Rules (VFR) within Class G airspace. The Pilot in Command is responsible for maintaining appropriate clearance with other aircraft, obstacles and the ground in accordance with the Civil Aviation Safety Regulations (CASR).

Class E airspace is controlled airspace open to both IFR and VFR flights. IFR aircraft must have an ATC clearance and communicate with the ATC Centre.

A Control Area (CTA) is defined as a controlled airspace extending upwards from a specified limit above the earth.⁵

Within Class G airspace an aircraft flying in accordance with the Visual Flight Rules (VFR) away from a populous area is, when flying below 3000ft, required by Civil Aviation Safety Regulation (CASR) 91.267 to remain at 500ft above the highest point of the terrain and any obstacle on it within a radius of 300m from a point on the terrain directly below the aircraft. For a wind farm this equates to 500ft above the turbine tip height. For the WWF this is $833 + 500 = 1333\text{ft}$ Above Ground Level (AGL).

There are no Special Use, Prohibited, Restricted or Danger (PRD) areas, nor published flying training areas in the vicinity of the WWF.

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⁵ AIP Enroute, ENR 1.4 ñ 5, para 1.2.1, 27 November 20251



2. SCOPE

To support the amendment of the Planning Permit Application of the Willatook Wind Farm required Chiron Aviation Consultants to reassess the project in relation to changes in the wind farm design made to meet the recommendations of the Minister for Planning that "Subject to the recommendations of my assessment to ensure no turbines penetrate the minimum safe altitude for Warrnambool airport operations, the project infrastructure will have acceptable effects on aviation safety and aircraft operations."

2.1 Aviation Impact Statement

Airservices Australia (AsA) requires that all developers of proposed wind farms prepare an Aviation Impact Statement and submit this to AsA for evaluation and consideration.

The AIS required the following tasks to be undertaken: -

- Provide the coordinates and elevations of the Obstacles and associated topographical drawings;
- Specify all registered and certified aerodromes within 30nm (55.6km):
 - Nominate all instrument approach and landing procedures;
 - Confirm that the obstacles do not penetrate the Annex 14 OLS;
 - Confirm that the obstacles do not penetrate the PANS-OPS;
- Specify any published air routes over or near the obstacles
- Specify the airspace classification of the airspace surrounding the development
- Investigate any impact on aviation Communications, Navigation and Surveillance (CNS) facilities

Details of Aerodromes, OLS, PANS-OPS procedures, Lowest Safe Altitudes (LSALT), Navigation and Airspace Surveillance facilities were obtained from the Australian Aeronautical Information Publications (AIP), AsA sources and CASA publications.

2.2 Qualitative Risk Assessment

The QRA required the following tasks to be undertaken: -

- The identification and assessment of potential aviation risk elements through:
 - Reference to CASA publications;
 - Reference to the AIP;
 - Reference to the National Airports Safeguarding Framework (NASF) guidelines;
 - Consultations with key relevant stakeholders;
- Assessment of the perceived impacts of the turbines on the operation of aerodromes and airstrips in the immediate vicinity of the wind farm;



- Assessment of the perceived impacts of the turbines on aviation activity including:
 - General Aviation training;
 - Recreational/Commercial flying activity;
 - Air Ambulance Operations;
 - Police Aviation Operations;
 - Aerial Fire Fighting Operations;
 - Aerial Agricultural Operations;
 - Known highly trafficked VFR routes;
 - Night flying for light aircraft;
- Assessment of any implications for the above from topographical, weather and visibility issues;
- Assessment of other issues as identified through stakeholder consultations and the assessment process;
- Conclusions on the degree of aviation risk posed by the above described issues with commensurate recommendations on any mitigating actions; and
- An assessment of the need, against the outcomes of the Qualitative Risk Assessment, for obstacle lighting of the wind farm.

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3. METHODOLOGY

The following methodology was used to complete the tasks outlined in the scope.

3.1 Aviation Impact Statement

To meet Airservices Australia requirements for an Aviation Impact Statement the following methodology was used: -

- The obstacle (turbines and meteorological masts) coordinates and elevations were listed to the requisite accuracy and associated drawings and charts were obtained;
- The AIP was reviewed to determine;
 - All certified and military aerodromes located within 30nm (55.6km) of the wind farm
 - Any associated Instrument Departure and Approach Procedures (DAP);
 - The extent of the OLS and PANS-OPS surfaces for the identified DAP;
 - Published air routes located over or near the wind farm;
 - The classification of the airspace surrounding the wind farm;
- Ascertain the locations of CNS facilities that may be impacted and analyse the impact on;
 - Communications facilities;
 - Navigation facilities;
 - Surveillance facilities (in accordance with EUROCONTROL Guidelines); and
- Compile a report for review by Airservices Australia and Department of Defence.

3.2 Qualitative Risk Assessment

A Qualitative Risk Assessment is the analysis for risks, through facilitated interviews or meetings with stakeholders and outside experts, as to their probability of occurrence and impact expressed using non-numerical terminology, for example low, medium and high. The basis for the QRA is ASNZS ISO 31000-2018 *Risk Management – Guidelines*.

The methodology for the Qualitative Risk Assessment was as follows:

- The Australian AIP and CASA documents were reviewed to identify relevant physical and operational aviation issues that may impact on the requirement for lighting of the wind farm;
- Current topographical maps were studied to assess the local terrain and identify any local airstrips and any other relevant features;

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- Key stakeholders, including local operators, recreational aviation groups and State Government Police Air Wing, Air Ambulance and Fire Services, were identified, contacted and interviewed to ascertain the extent of local aviation activity in the vicinity of the proposed wind farm. This included any informal low flying areas and highly trafficked unpublished air routes that may exist within the vicinity of the proposed wind farm. See Appendix F for a Stakeholder List.
- Based on the above, the nature of any impacts because of the operation of the wind farm was considered and discussed regarding;
 - General Aviation training;
 - Recreational and sport aviation activities;
 - Approved low flying activities (including aerial agricultural applications)
 - Any known highly trafficked VFR routes; and
 - Emergency Services (air ambulance, police and fire service);
- In addition, further consideration was given to the consequences (for the above elements) of the potential influence of topography and poor weather; and
- Consideration of the NASF, Guideline D *Managing the Risk to Aviation Safety of Wind Turbine Installations (Wind Farms)/Wind Monitoring Towers* in relation to the QRA findings.

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4. AVIATION IMPACT STATEMENT

The Aviation Impact Statement meets the requirements of Airservices Australia for their assessment of the WWF potential impact on the items listed in Section 3. This AIS is to support a Planning Permit Amendment.

The Airservices Assessment, VIC-WF-011-P3, for the permitted WWF required changes to the Warrnambool aerodrome non-precision RNAV-Z instrument approach. Since the assessment, the nature of non-precision GNSS instrument approaches has changed from RNAV-Z to the more accurate RNP procedure. Consequently the safety buffer zones protecting these approaches has reduced due to the greater accuracy of the airborne equipment. The revised protected airspace associated with the Warrnambool RNP Instrument Approach [viz RNAV-Z], means the changes notified in VIC-WF-011-P3 are no longer required.

Since the EES process for the WWF concluded the 10nm MSA for Warrnambool Aerodrome has changed from 2100ft to 2200ft. [Note altitude is measured in feet]. This change is shown in the 20 March 2025 edition of the AIP DAP WBLGN02-182.

The Airservices Assessment, WF-VIC-011 P4, is dated 5 February 2026 and refers to the current amended WWF turbine layout. This assessment does not require any changes to the airspace procedures; LSALT or CNS facilities.

4.1 Location

As noted in section 1.1 the WWF is located between the towns of Willatook, Orford, Broadwater and Hawkesdale and is approximately 32km Northwest of Warrnambool aerodrome (YWBL).

4.2 Obstacles

The WWF will comprise of up to 52 turbines with a maximum tip height up to 254m AGL. The tallest turbine is T2 at 1216.88ft (371m) AHD. Rounded up this gives a tip height of 1217ft; add the Minimum Obstacle Clearance (MOC) of 1000ft gives a LSALT of 2217ft rounded up to the nearest hundred the LSALT over the WWF is 2300ft.

The turbine locations and elevations are shown at Appendix A.

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4.3 Drawings

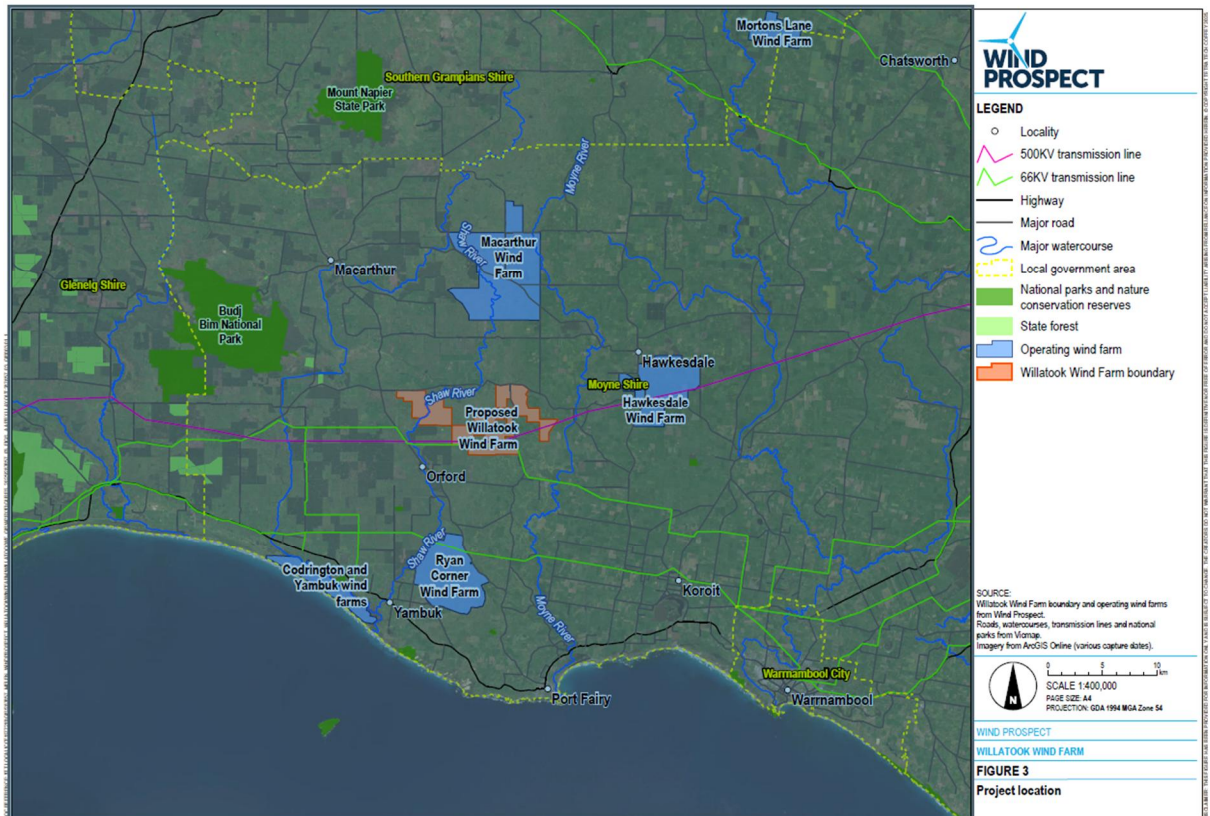


Figure 3 – Location of Willatook Wind Farm⁶

The drawing above shows the location of the WWF to the North of Port Fairy and Southeast of Macarthur.

4.4 Aerodromes within 30nm

There are three Certified Aerodromes within 30nm (56km) of the proposed WWF as detailed below.

- Portland (YPOD) situated 30.63nm (56.73km) West Southwest of the WWF at turbine T4
- Hamilton (YHML) situated 29.49nm Northwest of the WWF at turbine T2; and
- Warrnambool (YWBL) situated 12.45 nm Southeast of the WWF at turbine T59.

⁶ Supplied by Willatook Wind Farm Pty Ltd

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4.4.1 Portland (YPOD)

Portland (YPOD) is a Certified Aerodrome located 30.63nm (56.73km) West Southwest of WWF turbine T4. The main runway, RWY 08/26 is 1616m sealed and equipped with Pilot Activated Lighting (PAL). YPOD has non-precision RNP Instrument Approach Procedures (IAP) for Runways 08 and 26. The WWF is beyond the 15km Obstacle Limitation Surface (OLS) and the 25nm Minimum Safe Altitude (MSA) for YPOD.

The WWF does not affect the OLS, or PANS-OPS protected airspace of the IAP for YPOD.

4.4.2 Hamilton (YHML)

Hamilton (YHML) is a Certified Aerodrome located 29.49nm (54.62km) Northwest of WWF turbine T2. The main runway, RWY 17/35 is 1704m sealed and equipped with PAL. YHML has non-precision RNP IAP and an NDB-A ground-based radio navigation aid IAP. The WWF is beyond the 15km OLS and the 25nm MSA for YHML. The 25nm MSA over the WWF is 2700ft.

The WWF does not affect the OLS, or PANS-OPS protected airspace for the IAP at YHML.

4.4.3 Warrnambool (YWBL)

Warrnambool (YWBL) is a Certified Aerodrome located 12.45nm (23.06km) Southeast of WWF turbine T59. The main runway, RWY 13/31 is 1372m sealed and equipped with PAL. YWBL is not available to aircraft with a Maximum Take Off Weight (MTOW) exceeding 5700kg without prior permission from the aerodrome operator. YWBL has non-precision RNP IAP. The WWF is beyond the 15km OLS.

The WWF does not affect the YWBL OLS. See Figure 4.

The tallest WWF turbines are:

- T2 at 1216.88ft AHD is the tallest turbine;
 - 19.60nm northwest of the YWBL Aerodrome Reference Point (ARP);
 - 7.62nm west southwest of the RWY13 Initial Approach Fix (IAF) WB2WE;
 - 6.54nm northwest of the IAF WB2WD and
 - Outside the 10nm MSA of 2200ft.
 - At 2300 LSALT T2 is below the 25nm MSA of 3300ft.
- T1 turbine, at 1209.34ft AHD is;
 - 19.57nm northwest of the YWBL ARP
 - 7.62nm west southwest of the RWY13 IAF WB2WE;
 - 6.59nm northwest of RWY13 IAF WB2WD and



- Outside the 10nm MSA of 2200ft.
- At 2300 LSALT is below the 25nm MSA of 3300ft.
- T3 turbine, at 1203.76ft AHD is;
 - 19.19nm northwest of the YWBL ARP
 - 7.22nm west southwest of the RWY13 IAF WB2WE;
 - 6.21nm northwest of RWY13 IAF WB2WD and
 - Outside the 10nm MSA of 2200ft
 - At 2300 LSALT is below the 25nm MSA of 3300ft

These turbines have a LSALT of 2300ft and are beyond the 10nm MSA (15nm with buffer) and therefore do not affect the YWBL OLS or RNP RWY13 PANS-OPS surfaces. See Figure 4.

The minimum holding altitude at WB2WE is 3300ft which is well above the WWF LSALT of 2300ft.

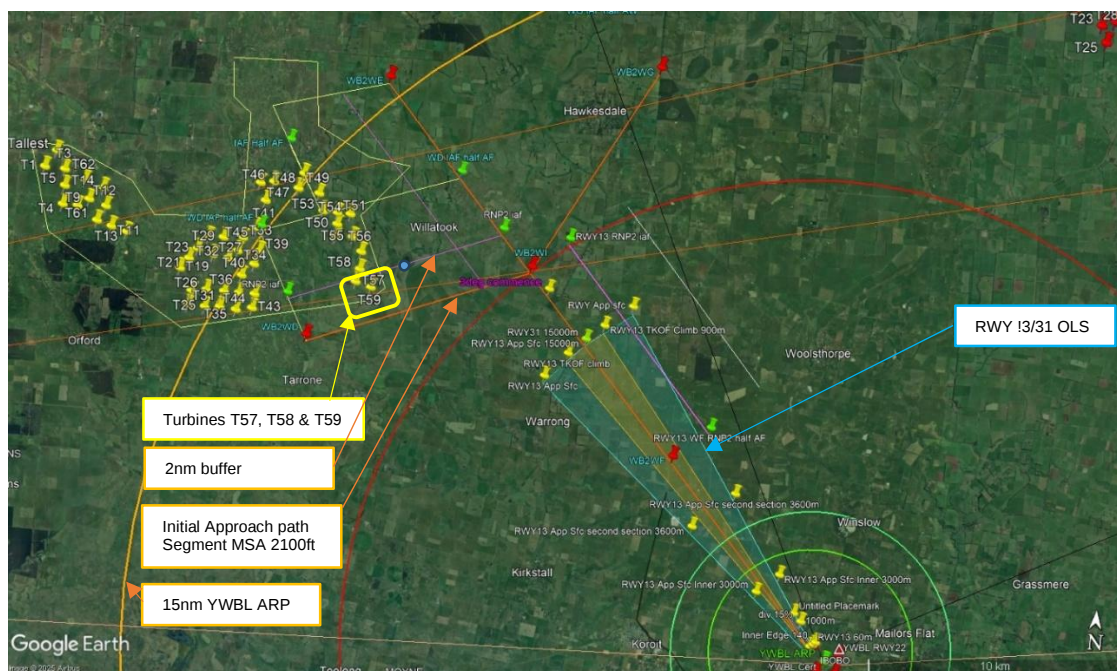


Figure 4 – YWBL RNP RWY 13 overlaid on WWF (Depicted by red line)

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4.4.3.1 YWBL IAP Protected Airspace

A number of the WWF turbines are within 15nm of the YWBL ARP and are therefore below the 10nm MSA of 2200ft. These turbines are denoted in Appendix A with a red background to the turbine number. Each of these turbines has a LSALT of 2200ft or less and therefore do not penetrate the 10nm MSA of 2200ft. *[Same level is considered outside due to the safety margins of the Minimum Obstacle Clearance].*

Three turbines sit below the outer segments of the YWBL RNP RWY 13 Instrument Approach, between Initial Approach Fixes (IAF) WB2WD and WB2WE with the closest turbine T59 being 3.46nm from the Intermediate Fix (IF) WB2WI. This is shown in Figures 4 and 5.

Turbines T57, T58 and T59 are within the 2nm buffer zone for the RNP RWY13 approach path between the IAF WB2WD and the IF WB2WI. The Segment Minimum Safe Altitude for this segment of the approach is 2100ft. Turbines T57, T58 and T59 have a LSALT of 2100ft which is below the Segment MSA and therefore do not impact the approach path between WB2WD and WB2WI. See Figure 4 and 5.

The WWF, using a tip height of up to 254m AGL does not impact the PANS-OPS surfaces of YWBL RNP Instrument Approach Procedures.

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4.4.4 Other aerodromes and airstrips

There are nine airstrips known to exist on properties near the WWF. These airstrips, from the information provided by WWF, are used infrequently for aerial agricultural applications operations.

The impact of the WWF on these airstrips is reviewed in Section 6 of the original AIA report and that assessment remains unchanged.

There is an Uncertified Aeroplane Aerodrome at Port Fairy (YPFA), 11.09nm South of T59. There are no details for YPFA listed in ERSA. This ALA is considered sufficiently distant from the WWF to be unaffected.

The Cobden (YCDE) Uncertified Aerodrome is 40.2nm SE of WWF and is sufficiently distant to be unaffected.

4.5 Air Routes and Lowest Safe Altitudes

The significant published air routes in the vicinity of the WWF and their LSALT are shown in Table 1 and Figure 6 below.

Route	Segment	LSALT
Grid		2400
W635	NOGIP/IBOBO	2200
W741	WBL/HML	2900
V279	One Way NOGIP/STONE	2700
V126	One Way ESDIG/NOGIP	3000

Table 1 – Published LSALT

The tallest turbine tip is T2 at 1217ft AHD. Adding the required MOC of 1000ft gives the lowest safe altitude of 2217ft rounded up to 2300ft. The published LSALT for W635 is 2200ft, however the WWF is outside the RNP 2 buffer [of 2nm] for this route and therefore the WWF does not penetrate any published LSALT.

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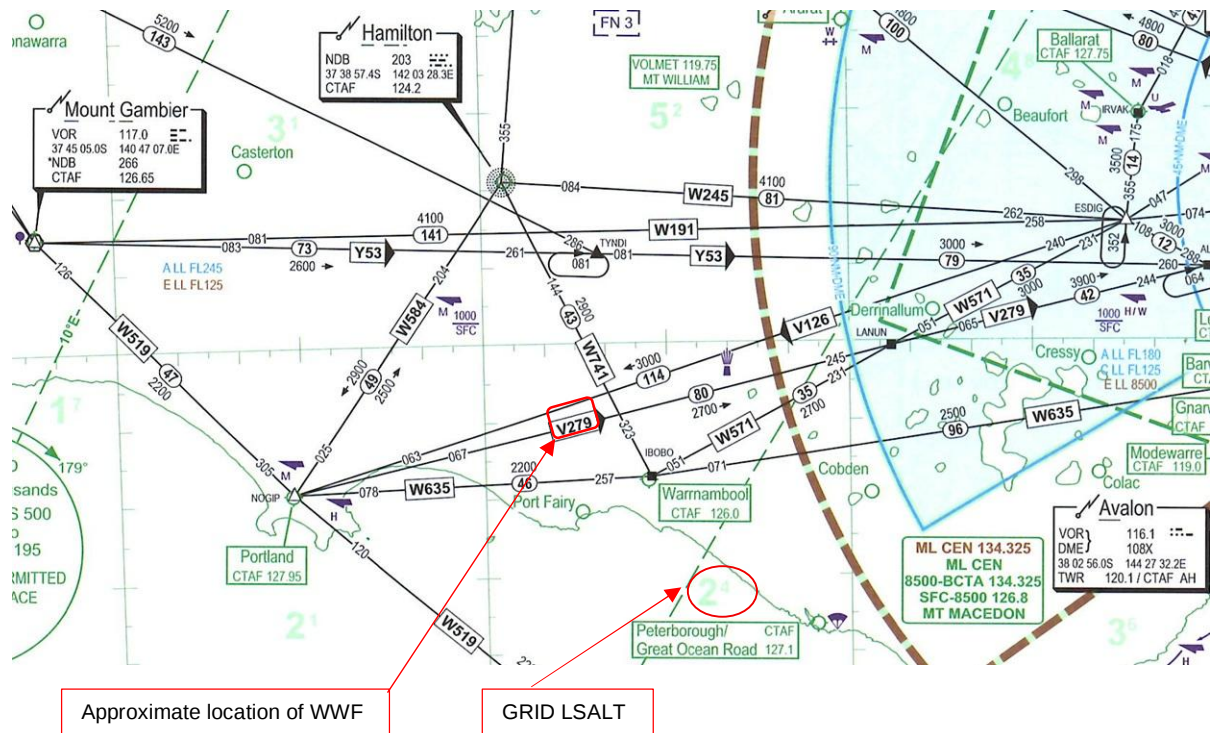


Figure 6 – Nearby Air Routes⁸

4.6 Airspace

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The WWF is in Class G airspace below Class E airspace with a lower limit of FL125. Aircraft operations in Class G airspace are uncontrolled with the Pilot in Command being responsible for separating the aircraft from the ground, obstacles and other aircraft.

There are no Special Use, Prohibited, Restricted or Danger Areas (PRD) within the vicinity of the WWF.

There are no published flying training areas in the vicinity of the WWF.

4.7 Communications, Navigation and Surveillance

Wind turbines by their size and construction may cause interference to air traffic control communications, navigation and surveillance (CNS) facilities. Airservices Australia (AsA) recommends the use of the *EuroControl Guidelines on How to Assess the Potential Impact of Wind Turbines on Surveillance Sensors*.

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⁸ AIP ERC L2, dated 27 November 2025



4.7.1 Communications

There is an Airservices Australia ATC communications facility at Mt William 55nm to the North of the WWF. The WWF will have no impact on the operations of these facilities.

4.7.2 Navigation

The nearest ground based navigation aid is the Non Directional Beacon (NDB) at YHML. This NDB has a range of 45nm. An NDB is a low frequency (203 kHz) radio transmitter and will not be affected by the WWF turbines some 30nm distant.

4.7.3 Surveillance

The nearest civil aviation surveillance facility is a Secondary Surveillance Radar (SSR) at Mt Macedon 238km (120nm) Northeast. The Primary Surveillance Radar (PSR) at Gellibrand Hill (Tullamarine airport) is 238km (129nm) Northeast.

The applicable document, as referred to in the Airservices letter, is the Eurocontrol Guidelines "How to Assess the Potential Impact of Wind Turbines on Surveillance Sensors" edition 1.2, September 2014 (EUROCONTROL-GUID-130).

This guideline nominates the following four zones (shown below) and the associated level of assessment for PSR installations.

Zone	Zone 1	Zone 2	Zone 3	Zone 4
Description	0 ñ 500m	500m 0 15km and in radar line of sight	Further than 15km but within maximum instrumented range and in line of sight	Anywhere within maximum instrumented range but not in line of sight or outside the maximum instrumented range
Assessment Requirements	Safeguarding	Detailed assessment	Simple assessment	No assessment

The guideline nominates the following three zones (shown below) for the assessment of SSR.

Zone	Zone 1	Zone 2	Zone 4
Description	0 ñ 500m	500m ñ 16km but within maximum instrumented range and in radar line of sight	Further than 16km or not in radar line of sight
Assessment Requirements	Safeguarding	Detailed Assessment	No assessment

Note: There is no Zone 3 for SSR

The Mt Macedon SSR, at 225km (122nm) Northeast is well beyond the 16km distance, therefore no assessment is required.

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The Primary Surveillance Radar (PSR) at Gellibrand Hill (Tullamarine airport) is 240km (130nm) Northeast. The antenna height is 228m AHD. The maximum tip height of the WWF is 377m AHD, however there is high ground of approximately 480m AHD between the PSR site and the WWF turbines. This will put the WWF outside the line of site of the Gellibrand Hill PSR, therefore no assessment is required.

The WWF is beyond the line of site of both the Mt. Macedon and Gellibrand Hill radars and will not affect their operation.

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4.8 AIS Conclusions

The AIS concluded that the WWF, with a turbine tip height up to 254m AGL, will not impact upon the following:

- The OLS surfaces of any certified aerodrome;
- The PANS-OPS surfaces associated with the Instrument Approach Procedures at:
 - Portland;
 - Hamilton; or
 - Warrnambool.
- The published LSALT, both GRID and nearby published air routes.
- The performance of Navigation Aids and Communication Facilities; or
- The performance of any surveillance radars.

4.9 Airservices Australia Response

The response from Airservices Australia is shown at Appendix C. This response, WF-VIC-011 P4, is dated 5 February 2026 and refers to the current amended WWF turbine layout. This assessment does not require any changes to the airspace procedures; LSALT or CNS facilities.

4.10 Department of Defence Response

The Department of Defence response is shown at Appendix D.

The Department of Defence has no objections to the WWF. Defence note that the turbines and meteorological masts must be reported in accordance with AC 139-08 v2.0 *Reporting tall structures*.

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5. QUALITATIVE RISK ASSESSMENT

The expression 'in the vicinity of the aerodrome' is considered by CASA to mean within the boundaries of either the OLS or the PANS-OPS surfaces of a certified or registered aerodrome.

The NASF Guideline D considers 30km (16.2nm) from a certified or registered aerodrome to be 'in the vicinity'.

Within Victoria, the Planning Authority refers to aerodromes within 15km (8nm) of a wind farm for consideration.

More generally the impact on any regulated aerodrome within 56km (30nm) of a wind farm is considered. The 30nm distance ensures that the PANS-OPS prescribed airspace protecting published instrument approach procedures is included.

5.1 Certified Aerodromes

As noted in Section 4.4 there are three Certified aerodromes, Portland (YPOD), Hamilton (YHML), and Warrnambool (YWBL), within 30nm of the proposed WWF.

The amended WWF layout, using turbines with a tip height up to 254m, does not affect the OLS or PANS-OPS protected airspace for YHML, YPOD and YWBL. Since the original AIA was completed, and post 7 September 2023, the YWBL 10nm MSA has been raised from 2100 to 2200ft.

5.2 Identified Uncertified Aerodromes

There is an Uncertified ALA at Port Fairy (YPFA), 11.12nm South of T43. There are no details for this ALA listed in ERSA. This ALA is considered sufficiently distant to be unaffected.

The Cobden (YCDE) Uncertified aerodrome (ALA) is 40.2nm (74.44km) East Southeast of WWF at T59 and is sufficiently distant to be unaffected.

There are several known airstrips on properties close to the wind farm. The impact on these ALA is discussed within Section 6 of the original AIA report.

5.3 Airspace

The WWF is in Class G airspace below Class E airspace with a lower limit of FL125.

There are no Special Use, Prohibited, Restricted or Danger Areas (PRD) nor published flying training areas in the vicinity of the WWF.

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5.4 Relevant Air Routes

Section 4.5 assesses the impact of the WWF on the LSALT of nearby published air routes.

The LSALT for air route W635 does not require amendment as it is beyond the track criteria used to calculate lowest safe altitudes for RNP 2 [2nm buffer] criteria air routes.

5.5 Night Flying

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Aircraft flying at night under either IFR, or VFR are protected by published or calculated LSALT. Descent below the LSALT for a VFR at Night flight is restricted to within 3nm (5.4km) of the aerodrome and with it in sight. Where an IFR aircraft is using a published instrument approach it is protected by PANS-OPS surfaces.

The aerodromes at YPOD, YHML and YWBL are equipped with Pilot Activated Lighting (PAL) and non-precision RNP Instrument Approach Procedures and therefore are available for night operations by aircraft in accordance with both IFR and VFR at Night flights.

Night operations into YPOD, YHML and YWBL are not affected by the WWF.

5.6 General Aviation Flying Training

Wind turbines, by their size and colour are highly conspicuous and therefore not an issue for VFR flight by day. Flying training is conducted in accordance with VFR for a major part of the ab initio course. In the latter stages of training student airline pilots progress to night flying in accordance with VFR at Night procedures and then to IFR training. Flying training is usually conducted in light General Aviation (GA) aircraft such as Cessna C182 or Diamond DA40 aircraft. As discussed previously night flying is undertaken at or above the LSALT and therefore is above the WWF.

5.7 Recreational and Sport Aviation

Recreational and Sport aircraft, particularly ultra-lights registered with Recreational Aviation Australia (RA-Aus) are limited to daytime flight in accordance with the Visual Flight Rules (VFR). This requires the aircraft to remain clear of cloud and a minimum of 500ft above the ground or highest obstacle. Ultra-light aircraft have a Maximum Take-Off Weight (MTOW) of 600kgs or less. By comparison, a small GA aircraft such as a Cessna C172 has a MTOW of 1110kg. The cruising speed of ultra-light aircraft is generally lower than for a GA aircraft thus giving the pilot more time to see and avoid





obstacles. *The photo shows an Australian built Lightwing ultra-light aircraft.*

5.8 Aerial Applications Activity

The Aerial Application Association of Australia opposes wind farm developments unless the developer has (inter alia):

- Consulted in detail with local operators;
- Received independent expert advice on safety and economic impacts; and
- Considered the impacts on the aerial application industry.⁹

An aerial application operator made the comment that *“the decision to host wind turbines is one made by the landholder who must accept that there will most probably be limitations to any aerial applications on the property”*¹⁰.

Another operator made the comment that *“wind farms are becoming common, they’re a fact of life, we know more about them and can operate safely in their vicinity.”*¹¹

One aerial application operator indicated that the WWF may impact on aerial applications in the area, however it is dependent on the seasons, pests and the needs of the farmers.



There are four known aerial applications operators that work in the general area of southwestern Victoria. Aerial application is used for spraying and spreading in some of the rougher, less accessible areas where ground applications is limited. The operators interviewed all accept that wind farms will impose some limitations on aerial applications, however, they agree that their knowledge of operating near wind farms has improved and that the limitations are not considered as severe as they used to be.

All the operators consider meteorological monitoring masts to be difficult because they are very difficult to see. The agreement amongst them was that as a minimum the masts should be marked in accordance with the NASF Guideline D, except for the strobe light, and that the base around the outer guy wires should be marked in a contrasting colour to the ground.

5.9 Known Highly Trafficked Areas

There are no known highly trafficked areas in the vicinity of the WWF.

⁹ <http://www.aerialag.com.au/ResourceCenter/Policies.aspx>

¹⁰ Expert opinion obtained by the author during previous QRA work

¹¹ Stakeholder interview with aerial applications operator.

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5.10 Emergency Services Flying

All Emergency Services flying is subject to ongoing dynamic risk assessment throughout the flight. The safety of the aircraft and its crew is paramount.

5.10.1 Police Air Wing

The Police Air Wing helicopters are capable of IFR flight and flown by suitably IFR rated pilots who are also qualified for low level flight, for example, search and rescue operations.

From previous work done by the author for other wind farms in Victoria the Police Air Wing utilise dynamic risk assessment for all operations and the pilot in command has the final say as to whether the operation is aborted because of the risk to the aircraft and crew. For low level night operations, the aircraft are equipped with Night Vision Imaging Systems (NVIS) enabling the pilot to see in reduced light conditions. For the final descent and landing the onboard searchlight is used to illuminate the landing area.

5.10.2 Helicopter Emergency Medical Services

The Helicopter Emergency Medical Service (HEMS) utilise helicopters capable of IFR flight. For low level night operations, the aircraft are equipped with NVIS enabling the pilot to see in reduced light conditions. For the final descent and landing the onboard searchlight is used to illuminate the landing area. All HEMS operations are subject to a dynamic risk assessment and the pilot in command has the final say as to whether the operation is aborted due to the risk to the aircraft and crew.

The Senior Base Pilot made the comment that *“There are lots of them (wind farms) around and we are conscious of their locations. The presence of a wind farm will not stop our operations, we know they are there and fly accordingly.”*¹² The presence of tall obstacles influences the cruising level of the helicopters in known aircraft icing conditions due to the capabilities of the aircraft anti-icing equipment.

5.10.3 Fixed Wing Air Ambulance

Fixed wing Air Ambulance operations in Victoria are undertaken in twin engine turbo-prop aircraft in accordance with IFR. The aircraft are usually Beechcraft Super Kingair (BE200) which have a MTOW of 5700kg and use suitable aerodromes. The primary use of these aircraft is for patient transfer from regional to major city hospitals. The WWF will not affect fixed wing Air Ambulance operations due to the nature of the operations and the aircraft size.

The Senior Base Pilot made the comment that *“The wind farm does not need lights. In solid IMC (Instrument Meteorological Conditions) you can’t see them (the lights), and in VMC (Visual Meteorological Conditions) you don’t need them.”*¹³

¹² Stakeholder interview Senior Base Pilot, HEMS Victoria.

¹³ Stakeholder interview, Senior Base Pilot, Pelair, Fixed Wing Air Ambulance.



5.11 Fire Fighting

Firefighting is a multi-faceted operation utilising multiple resources and equipment appropriate to the circumstances. A fire ground is a dynamic place where resources are continually being reassigned to have the best effect.

“Aircraft support, firefighters suppress”¹⁴

Firefighters on the ground use aircraft and other aerial resources to help them fight bushfires. Firefighting aircraft, regardless of their size or type, do not extinguish a bushfire on their own.

5.11.1 Aerial Firefighting

At all times, the pilot in command has the ultimate responsibility for the safety of the aircraft.¹⁵

Aerial firefighting operations are only effective when followed up with intense firefighting activities by ground firefighting crews.

Firebombing is used to slow or halt the rate of spread of a fire edge long enough for ground crews to access the fire line and mop up or supplement the knockdown process.

Aerial firefighting flying is conducted at low level using specialist aircraft flown by appropriately rated pilots in accordance with the Visual Flight Rules. The pilot is required to maintain forward visibility with the ground; therefore, they will remain clear of smoke so that they can accurately and safely drop the fire retardant.



From previous work undertaken by the author regarding firefighting within wind farms it is noted that the rural firefighting agencies in Victoria, New South Wales, South Australia and Western Australia all view wind turbines and wind farms to be just another hazard that must be considered in the risk management process associated with aerial firefighting.

The photograph above shows an AT802 dropping retardant next to a power line.

The Victorian Country Fire Authority (CFA) recommends:

“... a minimum distance between turbines of 300 metres. This provides adequate distance for aircraft to operate around a wind energy facility given the appropriate weather and terrain conditions. Fire suppression aircraft operate under the ‘Visual Flight Rules.’ As

¹⁴ CFS Aerial Firefighting, CFS website <https://www.cfs.sa.gov.au/about-cfs/what-we-do/aerial-firefighting/>

¹⁵ This is part of the Civil Aviation Regulations 1988 and a point reiterated in an interview by the author with a Victorian Forest Fire Management Fire Ground Manager, 6 August 2019.



such, fire suppression aircraft only operate in areas where there is no smoke and can operate during the day or night.”¹⁶

There will be times when aerial firefighting is not possible due to heat, turbulence, smoke, strong wind or erratic fire behaviour.

Aircraft operate more efficiently in denser air. As temperature increases, air density decreases. This has a dramatic effect on aircraft performance. On very hot days, aircraft may need to reduce their load capacities to operate safely. High air temperatures and low relative humidity will also reduce the overall effectiveness of firebombing operations on the ground as water content rapidly evaporates.

Even the Boeing 737 very large air tanker (VLAT) operated by the NSW Rural Fire Service has had to abort retardant dropping operations due to severe turbulence over the fireground. This is a 70 tonne aircraft the same as that used by QANTAS and Virgin to carry up to 180 passengers.

One of the issues with VLAT in Victoria is the limited number of suitable aerodromes. For the B737, the only suitable aerodromes are Melbourne, Avalon, Mildura and East Sale RAAF Base. Consequently the turnaround time between retardant drops can be considerable.



NSW RFS B737 VLAT – Based at RAAF Richmond

Certified video evidence of an Air Tractor AT802 flying firefighting operations within a wind farm was presented to the South Australian Environment, Resources, and Development court in 2017. The video evidence also demonstrated the improved access for large ground based firefighting appliances due to the wind farm.

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¹⁶ CFA Guidelines for Renewable Energy Facilities, March 2021 section 5.1.3

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*A Hercules Large Air Tanker operating in the Waubra Wind Farm January 2019
Photo courtesy The Ballarat Courier.*

There have been trials of night flying for aerial firefighting conducted in Victoria. At present there is a small number of organisations authorised by CASA to conduct aerial firefighting at night. These organisations utilise specific helicopters equipped for night flight that are flown as a two-pilot operation who are both appropriately rated. Night aerial firefighting by fixed wing aircraft is currently undertaken only by the foreign registered Large Aerial Tankers such as the Boeing 737.

5.11.2 Ground Based Firefighting



From previous work done regarding firefighting within wind farms it is noted that the rural fire fighting agencies in Victoria, New South Wales, South Australia, and Western Australia all make the point that access for fire trucks and personnel, and consequently their ability to fight the fire within a wind farm, is greatly enhanced by the access roads built for the construction

and maintenance of the turbines. These roads also function as fire breaks which can slow or contain the fire spread across the open ground. The area around the base of each tower is kept clear of vegetation and as such offers a refuge for fire fighters and their vehicles. There are often water storages associated with the wind farm that are available for firefighting purposes.



The CFA recommends:

“To enable access for fire appliances the following provisions should be considered:

- *Constructed roads should be a minimum of 3.5 metres in trafficable width (with 0.5m each side) with a four (4) metre vertical clearance for the width of the formed road surface*
- *Roads should be of all-weather and capable of accommodating a vehicle of 15 tonnes.”¹⁷*

The CFA further recommends:

Facility operators are to undertake the following fuel management measures are included in their plans during the Fire Danger Period:

- *Grass to be maintained at below 100mm in height during the declared Fire Danger Period;*
- *A fire break area of ten (10) metres width is to be maintained around the perimeter of the facilities, electricity compounds and substations.”¹⁸*

5.12 Topographical and Marginal Weather Conditions

The topography of the area of the WWF is generally sloping coastal hinterland rising from sea level to 200m AHD¹⁹. As such the area is subject to areas of low cloud. It is an area known for periods of forecast marginal and/or non VMC. Pilots flying VFR are aware of this and plan their flight accordingly.

VMC are the weather conditions required for VFR flight at or below either 3000ft AMSL or 1000ft AGL, namely: -

- Clear of cloud;
- In sight of the ground or water; and
- With a forward visibility of 5000m²⁰.

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The rules governing VFR flight require that pilots remain clear of cloud and not get into such situations by turning away from the low cloud and terminating the flight at the nearest suitable aerodrome.

Aircraft operating under Instrument Flight Rules (IFR) can operate in poor weather conditions and in cloud which precludes visual acquisition of obstacles and terrain.

¹⁷ CFA Guidelines for Renewable Energy Installations Version 4 August 2023 section 4

¹⁸ CFA Guidelines for Renewable Energy Installations Version 4 August 2023 section 4.2

¹⁹ World Aeronautical Chart (WAC) 3469 HAMILTON, 19th edition hypsometric tints.

²⁰ CASR, MOS Part 91, Division 2.4 *Definition of VMC Criteria*, table 2.07(3) dated 1 March 2025

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These operations are protected by PANS OPS surfaces and I SALTs that are designed to keep the aircraft clear of obstacles and terrain.

CASR 91.267, Minimum Height Rules ñ other areas states that an aircraft must not be flown below 500 ft above the highest feature or obstacle within a horizontal radius of 300 m of the point on the ground or water immediately below the aircraft; and none of the circumstances mentioned in subregulation (3) applies. Subregulation (3) includes such items as approved low flying activity, taking off and landing, practice forced landings, circuit area flying and determining the suitability of an aerodrome for landing. CASR 91.267 does not provide an exemption for ñstress of weather or any other unavoidable cause.ñ

Flying into marginal or non VMC weather is entirely avoidable. It should be noted that a non-instrument rated pilot flying in cloud almost always has a fatal outcome.²¹

5.13 Advisory Circular AC139.E-05 v1.1

AC139.E-05 v1.1, October 2022, *Obstacles (including wind farms) outside the vicinity of a CASA certified aerodrome.*

This AC states in the introduction: -

CASA provides advice about lighting and marking of wind farms and other tall structures in submissions to planning authorities who are considering a wind farm or tall structure proposal.

Regardless of CASA advice, planning authorities make the final determination whether a wind farm or tall structure not in the vicinity of a CASA regulated aerodrome will require lighting or not.

The AC defines: -

outside the vicinity of an aerodrome is outside the limits of the obstacle limitation surface (OLS) of a CASA certified aerodrome

The AC recommends that an aeronautical study be conducted by the wind farm proponent including a risk analysis using AS/NZS ISO 31000:2018 *Risk Management and Guidelines*.

This Aeronautical Impact Assessment risk assessment uses the standard and follows the same process as CASA as outlined in the advisory circular.

Section 5.15 below shows the results of the risk assessment for the WWF.

The result of the risk assessment shows that the WWF is a LOW risk to aviation and is therefore *not a hazard to aircraft safety*.

²¹ Accidents involving Visual Flight Rules pilots in Instrument Meteorological Conditions, Australian Transport Safety Bureau, 22 August 2019,



Consequent to this, aviation obstacle lighting is not required

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5.14 NASF Guidelines

The National Airports Safeguarding Framework ñ Guideline D *Managing the Risk to Aviation Safety of Wind Turbine Installations (Wind Farms)/Wind Monitoring Towers* provides guidance for the siting and marking of the turbines and meteorological monitoring towers associated with wind farms.

5.14.1 Notification to Authorities

Paragraph 20 of Guideline D advises that:

When wind turbines over 150m above ground level are to be built within 30km (16.2nm) of a certified or registered aerodrome, the proponent should notify the Civil Aviation Safety Authority and Airservices. If the wind farm is within 30km of a military aerodrome, Defence should be notified.

The WWF turbines are greater than 150m and are within 16.2nm or 30km of a military, certified or registered aerodrome.

The turbines and meteorological monitoring towers used in the WWF must be reported to Airservices Australia and the RAAF in accordance with AC 139.E-01 v1.0 *Reporting of Tall Structures* to ensure their position is marked on aeronautical charts.

5.14.2 Risk Assessment

The NASF Guideline has the following requirements for a risk assessment.

26. Following preliminary assessment by an aviation consultant of potential issues, proponents should expect to commission a formal assessment of any risks to aviation safety posed by the proposed development. This assessment should address any issues identified during stakeholder consultation.

The risk assessment for the WWF indicates that the overall risk to aviation is LOW. A risk assessment of LOW indicates that the wind farm is *'not a hazard to aircraft safety.'*

27. The risk assessment should address the merits of installing obstacle marking or lighting. The risk assessment should determine whether or not a proposed structure will be a hazardous object. CASA may determine, and subsequently advise a proponent and relevant planning authorities that the structures have been determined as:

- (a) Hazardous but that the risks to aircraft safety would be reduced by the provision of approved lighting and/or marking;*
or



- (b) ~~Hazardous and should not be built, either in the location and/or to the height proposed as an unacceptable risk to aircraft safety will be created; or~~
- (c) *Not a hazard to aircraft safety.*

By day, the WWF turbines are conspicuous by their size and colour. The WWF does not impact on any LSALT in the area. Night operations for aircraft do not occur below the LSALT for IFR and VFR at Night. IFR aircraft are protected by the LSALT, and PANS-OPS prescribed airspace at each aerodrome. Where an approach to land is undertaken operating to VFR at Night, descent below the LSALT does not occur until within 3nm of the airport and in VMC. The nearest aerodrome equipped for night operations is Warrnambool 12.46nm (22.07km) to the southeast.

Given the above, the WWF does not require obstacle lighting as the risk to aviation is LOW and no additional mitigating strategies are required.

Overall, the risk assessment demonstrates that the WWF is a LOW risk to aviation and is therefore *not a hazard to aircraft safety*.

28 If CASA advice is that the proposal is hazardous and should not be built, planning authorities should not approve the proposal. If a wind turbine will penetrate a PANS-OPS surface, CASA will object to the proposal. Planning decision makers should not approve a wind turbine to which CASA has objected.

The WWF will not penetrate any OLS or PANS-OPS surfaces, either civil or military, therefore CASA has no reason to determine that it is hazardous.

29 In the case of military aerodromes, Defence will conduct a similar assessment to the process described above if required. Airservices, or in the case of a military aerodrome, Defence, may object to a proposal if it will adversely impact on Communications, Navigation or Surveillance (CNS) infrastructure. Airservices/Defence will provide detailed advice to proponents on request regarding the requirements that a risk assessment process must meet from the CNS perspective.

There is no civil or known military CNS infrastructure that will be impacted by the WWF.

30 During the day, large wind turbines are sufficiently conspicuous due to their shape and size, provided the colour of the turbine is of a contrasting colour to the background. 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. Other colours are also acceptable unless the colour of the turbine is likely to blend in with the background.

The WWF turbines will be appropriately painted to ensure they are conspicuous by day.



5.14.3 Lighting of Wind Turbines

33 Where a wind turbine 150m or taller in height is proposed away from aerodromes, the proponent should conduct an aeronautical risk assessment.

34. The risk assessment, to be conducted by a suitably qualified person(s), should examine the effect of the proposed wind turbines on the operation of aircraft. The study must be submitted to CASA to enable an assessment of any potential risk to aviation safety. CASA may determine that the proposal is:

(a) hazardous, but that the risks to aircraft safety would be reduced by the provision of approved lighting and/or marking; or

(b) not a hazard to aircraft safety.

The WWF is not sited within the OLS of any certified aerodrome and does not penetrate any PANS-OPS airspace. Consequently, it is assessed as a LOW risk to aviation and is therefore *not a hazard to aircraft safety*.

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5.15 QRA Findings

The basis for the QRA is ASNZS ISO 31000-2018 *Risk Management – Guidelines*.

A Qualitative Risk Assessment is the analysis for risks, through facilitated interviews or meetings with stakeholders and outside experts, as to their probability of occurrence and impact expressed using non-numerical terminology, for example low, medium and high.

For example, a hazard that may cause a catastrophic outcome, but is unlikely to occur is a LOW risk. Given that wind turbines, by their size and colour are conspicuous by day and that VFR pilots fly by visual reference to the ground at least 500ft above the tallest obstacle, it is unlikely that an aircraft will collide with a turbine. Therefore, the risk to aviation safety is LOW.

The QRA for the Willatook Wind Farm assesses it as *not a hazard to aircraft safety*.

Risk Element	Assessed Level of Risk	Report Section	Comments
Certified aerodrome Operations	LOW	4.4	
Uncertified aerodrome Operations	LOW	4.4.4	
Port Fairy	LOW	4.4.4	Dry weather only
Known airstrips in area	LOW	4.4.4	Current usage can continue safely
Known Highly Trafficked Routes	LOW	5.9	None identified
Published Air Routes	LOW	4.5	Nil impact
PRD Airspace	LOW	4.6	Nil exists in the area
Promulgated Flying Training Areas	LOW	4.6	Nil exists in the area
GA Flying	LOW	5.6	
Night Flying	LOW	5.7	
Emergency Services Flying	LOW	5.10 & 5.11	
Recreational and Sport Aviation	LOW	5.7	
Recreational Pilot Training (RA-AUS)	LOW	5.7	
Weather and Topographical Issues	LOW	5.12	

Table 2 – Risk Assessment Summary

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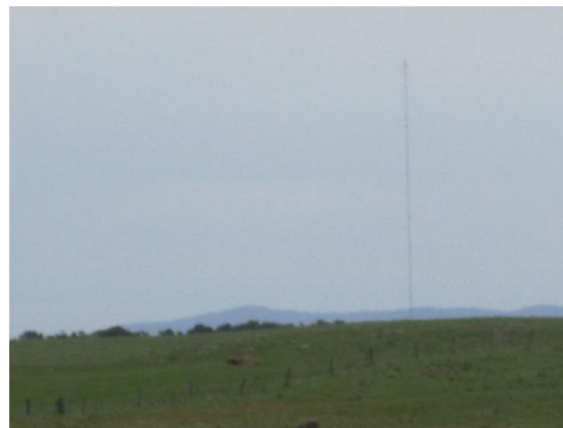
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6. WIND MONITORING TOWERS

Meteorological Monitoring Masts are very difficult to see due to their slender construction and thin guy wires. The masts are often a grey (galvanised steel) colour that readily blends with the background.

The photograph in Fig 7 shows a Meteorological Monitoring Mast as seen from the ground.



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Figure 7 – A Meteorological Monitoring Mast photographed from the ground

The aerial applications operators and the emergency services pilots all note the danger of meteorological monitoring masts to low flying aircraft. These pilots all made comment that met masts are extremely dangerous. Each of these stakeholders requested that the NASF Guidelines, except for the strobe light, be used to make the masts more visible and that the markings be maintained in a serviceable condition.

The aerial applications pilots all requested that the outer guy wire ground anchor points be painted a contrasting colour to enhance their visibility. When low flying, particularly when spraying, the pilot is looking at the ground as their reference point. The contrasting ground anchor point is the most valuable visual cue in this situation.

It is generally considered by aerial agricultural pilots that a flashing strobe light is ineffective and as such should not be used.

All the markings used to make the masts more visible must be maintained in a serviceable condition. This is particularly important for balls, flaps and sleeves that deteriorate due to wind and sun damage.

6.1 NASF Guidelines – Marking of Meteorological Monitoring Masts

The NASF guideline also refers to the marking and lighting of wind monitoring towers. The relevant points are summarised as:

Wind monitoring towers are very difficult to see from the air due to



their slender construction and guy wires. This is a particular problem for low flying aircraft, particularly aerial agricultural and emergency services operations.

Measures to be considered to improve visibility include:

- *The top one third of wind monitoring towers be painted in alternating contrasting bands of colour. Examples can be found in the CASA MOS 139 sections 8 and 9;*
- *Marker balls, high visibility flags or high visibility sleeves placed on the outer guy wires;*
- *Ensuring the guy wire ground attachment points have contrasting colours to the surrounding ground and vegetation; or*
- *A flashing strobe light during daylight hours*

6.2 Reporting of Tall Structures

The turbines proposed for the WWF have a tip height of 254m (833ft) AGL; therefore, they must be reported as per CASR 175.480.

CASR Part 175E requires that obstacles having a height of 100m AGL (turbines and meteorological monitoring masts) be reported as tall structures for inclusion in the vertical obstacle database and on appropriate aeronautical charts.

The procedure for reporting tall structures is contained in Advisory Circular AC 139.E-01 v1.0 *Reporting of Tall Structures*²².

Meteorological Monitoring Masts for the WWF must also be reported as per AC 139.E-01 and to the Aerial Application Association of Australia (admin@aaaaa.org.au).

Consideration should be given to ensuring a NOTAM or Aeronautical Information Circular (AIC) that provides the height and location of the structure is issued. This is due to the current lead time between reporting tall structures and the information appearing on aeronautical charts. The Airservices Australia Vertical Obstacles Database group will facilitate this as the masts are constructed and reported.

6.3 Recommendations

It is recommended that Willatook Wind Farm Pty Ltd ensure the wind monitoring towers used in the WWF are:

- Appropriately marked as per guidelines above except for strobe light;

²² Advisory Circular AC 139.E-01 v1.0 December 2021



- Reported as tall structures in accordance with AC139-08;
- Notified to the Aerial Application Association of Australia;
- Subject to a NOTAM specifying their location and height.

7. CONCLUSIONS – AERONAUTICAL IMPACT ASSESSMENT

The Willatook Wind Farm Project in southwest Victoria has progressed through a comprehensive environmental assessment under the *Environmental Effects Act 1978* (Vic), with the associated Environmental Effects Statement (EES). Following public exhibition (in July ñ August 2022) and an Independent Panel Hearing/Inquiry (in October ñ November 2022), the Minister for Planning issued her Assessment of the EES (in July 2023). The project was recommended for approval provided there were modifications to the project relating to threatened fauna. The Minister for Planning concluded ‘Subject to the recommendations of my assessment to ensure no turbines penetrate the minimum safe altitude for Warrnambool Airport operations, the project will have acceptable effects on aviation safety and aircraft operations.’ Since the EES, the layout of WWF has changed to address the Minister's Recommendations. It has reduced the turbine numbers by 7 and has had some turbines shifting slightly within the site.

This assessment considered the modified design with respect to aviation risks

7.1 Aviation Impact Statement

The WWF will not impact upon the following:

- The OLS surfaces for any Certified or Registered aerodrome;
- The LSALT for any published air routes in the vicinity;
- The PANS-OPS surfaces associated with the Instrument Approach Procedures at:
 - Portland;
 - Hamilton or;
 - Warrnambool
- The performance of Navigation Aids and Communications Facilities; or
- The performance of any surveillance radars.

Since the original assessment of the WWF was conducted the 10nm MSA at Warrnambool has been raised from 2100ft to 2200ft and the non-precision instrument approach is now at RNP 2 standard. Turbines T57, T58 and T59 are within the RNP 2 Segment MSA between waypoints WB2WD and WB2WI and have a LSALT of 2100ft. The Segment Minimum Safe Altitude for this segment of the approach is 2100ft. Therefore, Turbines T57, T58 and T59 do not impact the approach path. See Figure 5.

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The WWF, using a tip height of up to 254m AGL does not impact the PANS-OPS surfaces of the YWBL RNP Instrument Approach Procedures.

Consequently the WWF turbines are clear the PANS-OPS airspace.

7.1.1 Airservices Response to AIS

The Airservices Australia assessment WF-VIC-011-P4 dated 5 February 2026 is shown at Appendix C. The response indicates that the proposed activity does not penetrate the current Airservices designed airspace procedure, nor does it adversely impact CNS facilities or ATC operations at Hamilton, Portland and Warrnambool aerodromes.

The response from Airservices Australia, WF-VIC-011 P3, dated 30 April 2021 [before the YWBL 10nm MSA was raised], is shown at Appendix C 1.

Given the changes to the Warrnambool RNP 2 non-precision instrument approach it can be assumed that, as per Section 4.4.3 above, Airservices will not require changes to the PANS-OPS surfaces for Warrnambool Certified Aerodrome.

This April 2021 response indicated that the WWF

- LSALT for W635 will not require raising as the nearest turbine is beyond the RNP2²³ criteria used to calculate LSALT ñ *This assessment remains true*
- Will not affect any CNS facilities - *This assessment remains true*
- would require changes to the 10nm MSA ñ raise from 2100 to 2200 and the RWY 13 RNAV-Z Approach ñ *These two points are no longer valid as the 10nm MSA is now 2200ft.*

7.1.2 Department of Defence Response to AIS

The Department of Defence has no objections to the proposed WWF.

7.2 Risk Assessment

The QRA demonstrates that the WWF will “*not be a hazard to aircraft safety*” and therefore “*not of operational significance*” to aircraft operations.

7.3 Met Masts

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Meteorological Monitoring Masts used on the WWF should have the:

- Top one third painted in alternating contrasting colour bands;

²³ RNP 2 is Required Navigation Performance category 2, which uses 2nm either side of track tolerance for calculating LSALT



- Outer guy wires fitted with marker balls, high visibility flags or sleeves; and
- Outer guy wire ground attach points painted in contrasting colour.

7.4 Reporting of Tall Structures

The WWF wind turbines and meteorological monitoring masts are tall structures, therefore they must be reported to the Vertical Obstacle Database, managed by Airservices Australia. The procedure for reporting tall structures is contained in Advisory Circular AC 139.E-01 V1.0 *Reporting tall structures*.

Airservices Australia will facilitate the issue of a NOTAM or Aeronautical Information Circular (AIC) that provides the height and location of the structure when construction of the first turbine or mast is completed and reported to the Vertical Obstacle Database.

7.5 Impact of Revised WWF Layout and Turbine Height

Since the EES, the layout of WWF has changed to respond to the Minister's recommendations. The revised design is consistent with the previous design, and the changes have not increased the impact on aviation. Therefore the Minister's Assessment remains valid.

Since the last assessment for the EES, the 10nm MSA for YWBL has changed from 2100ft to 2200ft which reduces the impact of the amended layout to the approach path of this aerodrome. Any of the other impacts are of the same nature; therefore, it is concluded that the amended layout complies with the Minister's assessment with regards to aviation.

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APPENDIX A

Willatook Wind Farm Turbine Locations and Heights April 2026 [v120]

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Appendix A

ID	Elevation [m]	Latitude S	Longitude E	Tip Height AGL [m]	Tip Height AHD [m]	Tip Height AHD [ft]	Add MOC	LSALT
T1	114.7	38.14663609	142.0783933	254	368.7	1209.336	2209.336	2300
T11	89.7	38.16549809	142.1103349	254	343.7	1127.336	2127.336	2200
T12	90	38.15859287	142.1071608	254	344	1128.32	2128.32	2200
T13	90.4	38.16703052	142.1173682	254	344.4	1129.632	2129.632	2200
T14	89.4	38.1522235	142.1051937	254	343.4	1126.352	2126.352	2200
T19	83	38.17798504	142.1426358	254	337	1105.36	2105.36	2200
T2	117	38.14074853	142.083093	254	371	1216.88	2216.88	2300
T20	63.2	38.1906532	142.1475611	254	317.2	1040.416	2040.416	2100
T21	79.7	38.17424467	142.1463219	254	333.7	1094.536	2094.536	2100
T22	66.7	38.18556873	142.148646	254	320.7	1051.896	2051.896	2100
T23	81.7	38.17064655	142.1498216	254	335.7	1101.096	2101.096	2200
T24	88.9	38.16606858	142.1541855	254	342.9	1124.712	2124.712	2200
T25	64.4	38.19077664	142.1551909	254	318.4	1044.352	2044.352	2100
T26	67.2	38.18480938	142.155296	254	321.2	1053.536	2053.536	2100
T27	81.4	38.172295	142.1567828	254	335.4	1100.112	2100.112	2100
T29	82.9	38.16587525	142.1608941	254	336.9	1105.032	2105.032	2200
T3	113	38.14695222	142.08743	254	367	1203.76	2203.76	2300
T30	68.9	38.19034084	142.1619098	254	322.9	1059.112	2059.112	2100
T31	71.5	38.18477376	142.1632767	254	325.5	1067.64	2067.64	2100
T32	78.7	38.17309129	142.1637535	254	332.7	1091.256	2091.256	2100
T33	83.5	38.16532859	142.1696188	254	337.5	1107	2107	2200
T34	81	38.17014999	142.1677194	254	335	1098.8	2098.8	2100
T35	68.4	38.19083643	142.1691801	254	322.4	1057.472	2057.472	2100
T36	75.7	38.17860816	142.1704118	254	329.7	1081.416	2081.416	2100
T37	70.7	38.18486251	142.1699695	254	324.7	1065.016	2065.016	2100
T39	88.4	38.16958352	142.1775164	254	342.4	1123.072	2123.072	2200
T4	95.5	38.15931494	142.0876797	254	349.5	1146.36	2146.36	2200
T40	81.9	38.17432472	142.1756265	254	335.9	1101.752	2101.752	2200
T41	93.5	38.15166692	142.1782013	254	347.5	1139.8	2139.8	2200
T42	90.5	38.14555254	142.1752546	254	344.5	1129.96	2129.96	2200
T43	68.7	38.18977328	142.1763684	254	322.7	1058.456	2058.456	2100
T44	74.2	38.18480677	142.1769964	254	328.2	1076.496	2076.496	2100
T45	89.2	38.1615327	142.1753477	254	343.2	1125.696	2125.696	2200
T46	84	38.14476295	142.1812027	254	338	1108.64	2108.64	2200
T47	79.7	38.14630793	142.1924113	254	333.7	1094.536	2094.536	2100
T48	104	38.14097524	142.1943785	254	358	1174.24	2174.24	2200



ID	Elevation [m]	Latitude S	Longitude E	Tip Height AGL [m]	Tip Height AHD [m]	Tip Height AHD [ft]	Add MOC	LSALT
T49	89.9	38.14746429	142.2018623	254	343.9	1127.992	2127.992	2200
T5	98.7	38.15269163	142.0879529	254	352.7	1156.856	2156.856	2200
T50	78.5	38.15765202	142.2111263	254	332.5	1090.6	2090.6	2100
T51	89.2	38.15362584	142.210638	254	343.2	1125.696	2125.696	2200
T52	75.5	38.16205327	142.2108053	254	329.5	1080.76	2080.76	2100
T53	82.7	38.15348363	142.204358	254	336.7	1104.376	2104.376	2200
T54	96.4	38.15373134	142.2166425	254	350.4	1149.312	2149.312	2200
T55	81.4	38.16171027	142.218551	254	335.4	1100.112	2100.112	2200
T56	67.9	38.1665513	142.2228884	254	321.9	1055.832	2055.832	2100
T57	67	38.17722608	142.2215998	254	321	1052.88	2052.88	2100
T58	67.5	38.17271501	142.2229458	254	321.5	1054.52	2054.52	2100
T59	72	38.17874186	142.2286263	254	326	1069.28	2069.28	2100
T6	91.7	38.15934259	142.0943764	254	345.7	1133.896	2133.896	2200
T61	87.5	38.16388773	142.1036618	254	341.5	1120.12	2120.12	2200
T62	85.7	38.15004685	142.0967104	254	339.7	1114.216	2114.216	2200
T9	92.7	38.15667357	142.099363	254	346.7	1137.176	2137.176	2200

Turbine ID # with red shading are within the YWBL 10nm MSA buffer

Turbine T2 is the tallest with a LSALT of 2300ft.

Turbines T57, T58 and T59 are below the IAF Segment MSA of 2100ft between waypoints IAF WB2WD to IF WB2WI.

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APPENDIX B

***Willatook Wind Farm
Turbine Locations and Heights
Superseded***

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APPENDIX B

The table below shows the 59 WWF turbine layout (V162_6_v080). The volume of airspace occupied by the turbines has not increased from that assessed for the previous layout, therefore the original assessment for the AIS and AIA remains valid.

WTG ID	Elev (m)	X (I)	Y (I)	Latitude (S)	Longitude (E)	250m WTG Tip Height AHD(m)	250m WTG Tip Height AHD (ft)	Add MOC 1000ft	LSALT
T40	83	602973.6584	5774260.39	38 10 25.29	148 10 32.21	333	1092.52	2092.52	2100
T39	87	602963.0559	5774822.01	38 10 07.073	148 10 31.49	337	1105.64	2105.64	2200
T23	81	600735.5939	5774615.87	38 10 14.67	148 09 00.06	331	1085.96	2085.96	2100
T33	83	602181	5775353	38 09 50.17	148 09 59.08	333	1092.52	2092.52	2100
T54	96	606583.5523	5776428.62	38 09 13.44	148 12 59.38	346	1135.17	2135.17	2200
T24	89	601107.0938	5775129.72	38 09 57.85	148 09 15.07	339	1112.20	2112.20	2200
T56	67	606959	5774946	38 10 01.38	148 13 15.61	317	1040.03	2040.03	2100
T2	117	594911.8799	5778008.34	38 08 26.89	148 04 59.13	367	1204.07	2204.07	2300
T21	79	600465.2245	5774157.76	38 10 29.63	148 08 49.19	329	1079.40	2079.40	2100
T43	67	602995.3704	5772438.99	38 11 24.36	148 10 24.06	317	1040.03	2040.03	2100
T45	89	603085	5775834	38 09 34.19	148 10 35.97	339	1112.20	2112.20	2200
T51	93	606007.2877	5776591.24	38 09 08.41	148 12 35.62	343	1125.33	2125.33	2200
T35	67	602429.801	5772373.75	38 11 26.71	148 10 10.84	317	1040.03	2040.03	2100
T18	94	598453.5869	5775587.48	38 09 44.06	148 07 25.81	344	1128.61	2128.61	2200
T53	77	606137.7868	5775998.83	38 09 27.57	148 12 41.30	327	1072.83	2072.83	2100
T59	71	607608	5773622	38 10 44.04	148 13 41.99	321	1053.15	2053.15	2100
T41	89	602978.2972	5776743.87	38 09 04.72	148 10 31.11	339	1112.20	2112.20	2200
T44	74	603078.996	5773025.39	38 11 05.30	148 10 37.19	324	1062.99	2062.99	2100
T25	64	601274.292	5772372.77	38 11 27.21	148 09 23.35	314	1030.18	2030.18	2100
T13	90	597418.3826	5775400.63	38 09 50.52	148 06 43.37	340	1115.49	2115.49	2200
T57	65	606986	5773741	38 10 40.45	148 13 17.37	315	1033.46	2033.46	2100
T20	63	600427	5772376	38 11 27.45	148 08 48.52	313	1026.90	2026.90	2100
T47	78	604412.6799	5777217.77	38 08 48.76	148 11 29.78	328	1076.12	2076.12	2100
T4	85	595295.3225	5775291.71	38 09 54.87	148 05 16.19	335	1099.08	2099.08	2100
T22	67	600595	5772972	38 11 08.05	148 08 55.13	317	1040.03	2040.03	2100
T9	91	596385.3098	5776184.31	38 09 25.50	148 06 00.54	341	1118.77	2118.77	2200
T58	66	607132	5774276	38 10 23.03	148 13 23.08	316	1036.75	2036.75	2100
T26	66	601286.5085	5773051.44	38 11 05.19	148 09 23.51	316	1036.75	2036.75	2100
T52	75	606013.3039	5775518.13	38 09 43.22	148 12 36.44	325	1066.27	2066.27	2100
T7	86	595987.3945	5775115.84	38 10 00.31	148 05 44.71	336	1102.36	2102.36	2200
T10	89	596523.8448	5775137.5	38 09 59.40	148 06 06.45	339	1112.20	2112.20	2200
T6	88	595539.092	5775735.76	38 09 40.37	148 05 25.99	338	1108.92	2108.92	2200
T48	99	604705.908	5777584.47	38 08 36.74	148 11 41.63	349	1145.01	2145.01	2200
T15	91	597785.8393	5775729.16	38 09 39.72	148 06 58.31	341	1118.77	2118.77	2200



WTG ID	Elev (m)	X (I)	Y (I)	Latitude (S)	Longitude (E)	250m WTG Tip Height AHD(m)	250m WTG Tip Height AHD (ft)	Add MOC 1000ft	LSALT
T29	83	601720.192	5775144.83	38 09 57.11	148 09 40.25	333	1092.52	2092.52	2100
T34	81	602338.8407	5774679.84	38 10 11.94	148 10 05.91	331	1085.96	2085.96	2100
T36	74	602447.6091	5773726.48	38 10 42.87	148 10 10.87	324	1062.99	2062.99	2100
T8	88	596022.8786	5775884.55	38 09 35.36	148 05 45.80	338	1108.92	2108.92	2200
T14	89	597509.1747	5776427.72	38 09 17.17	148 06 46.59	339	1112.20	2112.20	2200
T11	89	596819.6707	5775529	38 09 46.59	148 06 18.71	339	1112.20	2112.20	2200
T37	71	602448.5613	5773036.04	38 11 05.22	148 10 11.27	321	1053.15	2053.15	2100
T30	69	601827	5772400	38 11 26.10	148 09 46.05	319	1046.59	2046.59	2100
T27	79	601372.7727	5774416.31	38 10 20.88	148 09 26.35	329	1079.40	2079.40	2100
T16	91	598102.2931	5776261.04	38 09 22.34	148 07 11.04	341	1118.77	2118.77	2200
T55	82	606753.3193	5775545.46	38 09 42.02	148 13 06.83	332	1089.24	2089.24	2100
T12	90	597011.6545	5776113.53	38 09 27.55	148 06 26.31	340	1115.49	2115.49	2200
T49	90	605324.2281	5777145.1	38 08 50.73	148 12 07.27	340	1115.49	2115.49	2200
T17	92	598280.5902	5775069.54	38 10 00.92	148 07 18.96	342	1122.05	2122.05	2200
T50	83	605522.582	5776473.9	38 09 12.42	148 12 15.77	333	1092.52	2092.52	2100
T42	91	602981.6674	5777383.01	38 08 43.99	148 10 30.92	341	1118.77	2118.77	2200
T1	116	594541.4029	5777512.05	38 08 43.13	148 04 44.15	366	1200.79	2200.79	2200
T31	71	601867.9658	5773034.19	38 11 05.52	148 09 47.41	321	1053.15	2053.15	2100
T19	83	600069.0369	5773732.93	38 10 43.57	148 08 33.12	333	1092.52	2092.52	2100
T32	77	601951.2991	5774372.66	38 10 22.06	148 09 50.15	327	1072.83	2072.83	2100
T3	116	595052.1934	5777425.48	38 08 45.75	148 05 05.18	366	1200.79	2200.79	2200
T38	87	602652	5775570	38 09 42.94	148 10 18.32	337	1105.64	2105.64	2200
T28	92	601416	5777791	38 08 31.39	148 09 26.40	342	1122.05	2122.05	2200
T5	96	595355.7736	5776399.03	38 09 18.93	148 05 18.14	346	1135.17	2135.17	2200
T46	84	603504	5777464	38 08 41.15	148 10 52.34	334	1095.80	2095.80	2100

Layout V162_6_v080 – **Note** WTG ID numbering is not sequential
Tallest turbine tip height – T2 at 367m

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APPENDIX C

***Airservices Australia
AIS Response
VIC-WF-011 P4
5 February 2026***

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APPENDIX C

ian_jennings@netspace.net.au

From: Airport Developments <Airport.Developments@AirservicesAustralia.com>
Sent: Thursday, 5 February 2026 9:23 AM
To: 'ian_jennings@netspace.net.au'
Cc: airspace.protection@casa.gov.au
Subject: Airservices Response: VIC-WF-011 P4 - Willatook Wind Farm Amended Layout

OFFICIAL

Hello,

I refer to your request for an Airservices assessment of the proposed activity at Willatook Wind farm, VIC.

Airspace Procedures

With respect to procedures designed by Airservices in accordance with ICAO PANS-OPS and Doc 9905, at a height of 377m (1237ft) AHD the wind farm will not affect any sector or circling altitude, nor any instrument approach or departure procedure at Hamilton, Portland and Warrnambool aerodromes.

At a height of 377m (1237ft) AHD the wind farm will not affect any air route LSALT.

Note: Procedures not designed by Airservices at Hamilton, Portland and Warrnambool aerodromes 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. In accordance with Part 139 (Aerodromes) Manual of Standards, Chapter 19, we recommend consulting with the Bureau of Meteorology (the Bureau) to ensure that the proposed activity does not adversely affect their equipment. The Bureau can be contacted at airport.developments@bom.gov.au

Air Traffic Control (ATC) Operations

There are no additional instructions or concerns from our ATC.

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

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- Or refer to: Civil Aviation Safety Regulation Part 175 — Airservices and You - Airservices (airservicesaustralia.com)

Summary

The proposed activity does not penetrate the current Airservices-designed airspace procedures, nor does it adversely impact CNS facilities or ATC operations at Hamilton, Portland and Warrnambool aerodromes.

If you have any further queries, please let our team know.



Alex Kwan

Aeronautical Information Specialist
Da Vinci Building 101, 2A Boronia Road,
Brisbane Airport QLD 4008, Australia
www.airservicesaustralia.com

OFFICIAL

From: Airport Developments
Sent: Wednesday, 10 December 2025 11:29 AM
To: ian_jennings@netspace.net.au
Subject: RE: Willatook Wind Farm VIC-WF-011 P3 Amended Layout

Hi Ian,

We have processed your application, and it is now with our assessment teams. Should you have any enquiries regarding your application, please contact us and quote the reference code: **VIC-WF-011 P4**.

In the interim, please advise the expected construction start and completion dates to enable the team to factor this into any potential changes to procedures.

Please note Airservices assessments may take up to six weeks to complete. However, due to our Christmas break shutdown, application processing times will be extended and may exceed six weeks.

Please be advised that a copy of Airservices response may be provided to the Civil Aviation Safety Authority and we may also send a copy to the Bureau of Meteorology (the Bureau).

Additionally, please note that meteorological instruments not owned by Airservices will be excluded from this assessment. In accordance with Part 139 (Aerodromes) Manual of Standards, Chapter 19, we recommend consulting with the Bureau to ensure that the proposed activity does not adversely affect their equipment. The Bureau can be contacted at airport.developments@bom.gov.au

If you have any queries, please let our team know.

Thanks, and regards,
AMS Data & Airspace Development Protection

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Email: airport.developments@airservicesaustralia.com
Phone: 0436 325 205



I acknowledge Aboriginal and Torres Strait Islander peoples as the traditional custodians of country throughout Australia where we live, learn and work.



From: ian_jennings@netspace.net.au <ian_jennings@netspace.net.au>
Sent: Monday, 8 December 2025 4:10 PM
To: Airport Developments <Airport.Developments@AirservicesAustralia.com>
Subject: Willatook Wind Farm VIC-WF-011 P3 Amended Layout

CAUTION: This email was sent from an external email address. Do not click any links or open any attachments unless you trust the sender and know the content is safe.

Team,
Please find attached the revised AIS for an amended Willatook Wind Farm.
The initial AsA assessment is VIC-WF-011 P3.
This wind farm has planning approval however the proponent wishes to amend the layout and turbine height.
Given the changes to the Warrnambool YWBL RNP RWY13 instrument approach the WWF no longer penetrates any protected airspace.
Any questions please contact me.
Seasons' Greetings
Ian

Ian Jennings
Chiron Aviation Consultants
27 Hilda Street
Essendon Vic 3040
Australia
Mob +61 (0)402 025 223
E-mail ian_jennings@netspace.net.au
URL www.chironaviationconsultants.com.au

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APPENDIX C1

Airservices Australia AIS Response

Note – This response refers to the original 86 turbine layout

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APPENDIX C1

ian_jennings@netspace.net.au

From: Airport Developments <Airport.Developments@AirservicesAustralia.com>
Sent: Friday, 30 April 2021 3:30 PM
To: 'ian_jennings@netspace.net.au'
Cc: 'Airspace Protection (Airspace.Protection@casa.gov.au)'
Subject: AIRSERVICES RESPONSE: VIC-WF-011 P3 - Willatook Wind Farm [SEC=OFFICIAL]

Hi Ian,

I refer to your request for an Airservices assessment of the Willatook Wind Farm.

Airspace Procedures

With respect to procedures designed by Airservices in accordance with ICAO PANS-OPS and Document 9905, at the various heights provided, WTGs 46, 47, 49, 50, 58, 59, 60 and 61 will **affect** the 10NM minimum sector altitude (MSA). WTG 61 will affect the RNAV-Z (GNSS) RWY 13 procedure at Warrnambool aerodrome.

In order to accommodate the wind farm the 10NM MSA and the segment minimum altitude for the initial segment of RNAV-Z (GNSS) RWY13 will need to be permanently increased by 100ft from 2100ft to 2200ft.

The maximum height of WTGs 46, 47, 49, 50, 58, 59, 60 and 61 without affecting any procedures at Warrnambool aerodrome is **340.15m/1116ft AHD**.

The wind farm will not affect any air route LSALT.

Note: procedures not designed by Airservices at Warrnambool and Hamilton aerodromes were not considered in this assessment.

Communications/Navigation/Surveillance (CNS) Facilities

This wind farm, to a maximum height of 372.8m (1223ft) AHD, will not adversely impact the performance of Precision/Non-Precision Navigational Aids, HF/VHF Communications, A-SMGCS, Radar, PRM, ADS-B, WAM or Satellite/Links.

Summary

Based on the above assessment as it is currently presented with the existing instrument flight procedure at Warrnambool Airport, Airservices view is that the proposed Willatook Wind Farm would have an impact on the safety, efficiency or regularity of existing, or future air transport operations into or out of Warrnambool Airport.

Airservices recommends that both aviation operators and the airports are consulted to ensure that all stakeholders fully understand the extent of the impact of these proposed changes. Furthermore, any Airservices work associated with amending the impacted procedure will be undertaken on a commercial basis and require further consultation.

Vertical Obstacle Notification

If the wind farm receives approval, as soon as construction commences, the proponent must complete the Vertical Obstacle Notification Form for tall structures and submit the completed form to VOD@airservicesaustralia.com. For further information regarding the reporting of tall structures, please contact (02) 6268 5622, email VOD@airservicesaustralia.com or refer to the web link below:

<http://www.airservicesaustralia.com/services/aeronautical-information-and-management-services/part-175/>

If you have any further queries, please let me know.

Kind regards,

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APPENDIX D

Department of Defence AIS Response

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APPENDIX D Department of Defence AIS Response



Australian Government
Department of Defence
Estate and Infrastructure Group

Charles Mangion
Director Land Planning and Regulation
Estate Planning Branch
Brindabella Business Park (BP26-1-A053)
PO Box 7925
Department of Defence
CANBERRA BC ACT 2610
☎: (02) 6266 8291
✉: Charles.mangion@defence.gov.au

ID-EP-DLP&R/OUT/2019/BS7302661

Mr Ian Jennings
Chiron Aviation Consultants
27 Hilda Street
Essendon Vic 3040

Dear Mr Jennings

NOTIFICATION REGARDING WILLATOOK WIND FARM – AVIATION IMPACT STATEMENT

Thank you for referring the abovementioned wind farm proposal to the Department of Defence (Defence) for comment. Defence understands that the proposal is to construct up to 86 wind turbines at a site approximately 32 kilometres north-west of Warrnambool in western Victoria. The proposal includes turbines with an overall tip height of 250 metres above ground level (AGL).

Defence has conducted an assessment of the proposed wind farm for potential impacts on the safety of Defence flying operations as well as possible interference to Defence communications and radar.

There is an ongoing need to obtain and maintain accurate information about tall structures so that this information can be marked on aeronautical charts. Marking tall structures on aeronautical charts assists pilot navigation and enhances flight safety. Airservices Australia (ASA) is responsible for recording the location and height of tall structures. The information is held in a central database managed by ASA and relates to the erection, extension, or dismantling of tall structures, the top of which is above:

- a. 30 metres AGL, that are within 30 kilometres of an aerodrome; and
- b. 45 metres AGL elsewhere.

The proposed 250 metres AGL turbines meet the requirements for reporting of tall structures. Defence therefore requests that the applicant provide ASA with “as constructed” details. The details can be emailed to ASA at vod@airservicesaustralia.com.

Defence notes that the *National Airports Safeguarding Framework Guideline D – Managing the Risk to Aviation Safety of Wind Turbine Installations (Wind Farms)/Wind Monitoring Towers* recommends that where a wind turbine 150 metres or taller in height is proposed away from aerodromes, the proponent should conduct an aeronautical risk assessment. It also recommends that the risk assessment be submitted to the Civil Aviation Safety Authority (CASA) to determine whether the proposal is a hazard to aircraft safety and requires approved lighting or marking. Defence supports this requirement and believes that in this instance, it would be prudent for the risk assessment of this proposal to be sent to CASA for consideration.

Defending Australia and its National Interests

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If CASA determines that obstacle lighting is to be provided, it should be compatible with persons using night vision devices. If LED lighting is proposed, the frequency range of the LED light emitted should be within the range of wavelengths 665 to 930 nanometres.

If wind monitoring towers are to be constructed as part of the proposal, Defence notes that the *National Airports Safeguarding Framework Guideline D – Managing the Risk to Aviation Safety of Wind Turbine Installations (Wind Farms)/Wind Monitoring Towers - Paragraph 39* recommends the top 1/3 of wind monitoring towers are painted in alternating contrasting bands of colour in accordance with the Manual of Standards for Part 139 of the Civil Aviation Safety Regulations 1998.

Defence has no objection to the proposed wind farm provided that the project complies with the above conditions.

Should you wish to discuss the content of this advice further, my point of contact is Mr Tim Hogan at land.planning@defence.gov.au or by telephone on (02) 6266 8193.

Yours sincerely

Charles.Mangion Digitally signed by Charles.Mangion
Date: 2019.12.03 14:56:40 +11'00'

Charles Mangion
Director Land Planning & Regulation

3 December 2019



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APPENDIX E

South Australian Country Fire Service Aerial Firefighting Fact Sheet

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APPENDIX E



CFS FACT SHEET Aerial firefighting

Although aircraft are often the most visible part of the response to a fire, and therefore believed to be the most important, almost all fires are still extinguished by ground crews.

The Country Fire Service (CFS) currently has a base fleet of 26 aircraft which can be relocated across several airstrips across the state to offer aerial firefighting support to ground crews.

Aircraft are particularly valuable for fires in difficult terrain or fast moving fires that are too dangerous for ground crews to be placed in front of.

They may not be able to fly if wind speeds are too high, dust or smoke covers the fire, or when daylight is fading.

Firefighting aircraft will also be grounded if Remotely Piloted Aircraft (drones) are flown without permission over a fire ground.

Although other places in the world may be experimenting with night aerial firefighting, the Country Fire Service can only legally and safely operate during daylight hours.

Single Engine Air Tanker (SEAT)

The CFS currently contracts 14 SEATs, or fire bombers, throughout South Australia. The SEATs can fly at almost 300kph and carry 3,200 litres of water and firefighting chemicals.

Tactical and Strategic Overview aircraft

Eight helicopters and three aeroplanes make up the CFS tactical and strategic overview fleet.

These aircraft are used to observe, collect information to help predict the path of the fire, gather and relay information, and map the perimeter of the fire. They also help to coordinate SEATs to specifically support firefighters at problematic parts of the fire ground where ground crews may not be able to access the fire, or where people, homes and buildings may be in danger.



 **South Australian
Country Fire Service**
cfs.sa.gov.au

Contact the Bushfire
Information Hotline
1800 362 361 (TTY 133 677)
@Countryfireservice
@CFSAlerts





Aerial firefighting

Page 2
CFS FACT SHEET



Erickson Aircrane (S-64E)

The Erickson Aircrane can carry 7,200 litres of water and firefighting chemicals and can use its pump to refill from open water sources in just 45 seconds.

The Erickson is based in the Mount Lofty Ranges, where it is close to multiple open water supplies.



Large Air Tankers (LATs) and Very Large Air Tankers (VLATs)

As part of a national firefighting agreement LATs may be requested from interstate.

LATs are currently operated by the New South Wales and Victorian firefighting organisations, and may carry between 15,000 and 38,000 litres of water and firefighting chemicals.

CFS air support teams work with the support of the Royal Australian Air Force at Edinburgh to refill LATs at the airbase if multiple drops are required.

Cleaning up if firefighting chemicals are used on your property

The concentrations of chemicals used in drops are not harmful to animals or humans and are biodegradable.

It is recommended that you wash in cold water with a mild soap as a precaution to avoid possible skin irritation if you come in contact with the products.

If your house is doused and your gutters run off to a rainwater tank, you should drain and flush the gutters and tank, then refill with fresh water.

The concentrations of chemicals used by the CFS do not pose health risks but may change the taste and potability of drinking water.

Water mixed with aerial drops in rainwater tanks can still be used for cleaning and firefighting.

Animals, cars or buildings that are doused in firefighting drops can also be washed with water and appropriate shampoos or soaps to remove residue.

If fruit trees or vegetables are doused it is recommended they are washed thoroughly before consuming to remove any possible residue taste.

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South Australian
Country Fire Service
cfs.sa.gov.au

Contact the Bushfire
Information Hotline
1800 362 361 (TTY 133 677)
@Countryfireservice
@CFSalerts



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APPENDIX F

Stakeholder List

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APPENDIX F

The following organisations were consulted.

Stakeholder	Contact
Warrnambool City Council	Aerodrome Manager
Air Apply	Chief Pilot
Rohan Flying Services	Chief Pilot
Border Air	Chief Pilot
Field Air	Chief Pilot
Police Air Wing	Senior Base Pilot
Fixed Wing Ambulance (Pelair)	Senior Base Pilot
Helicopter Emergency Medical Service	Senior Base Pilot

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APPENDIX G

Glossary of Terms And Abbreviations

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APPENDIX G

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Glossary of Terms and Abbreviations

AERONAUTICAL STUDY GLOSSARY

To facilitate the understanding of aviation terminology used in this report, the following is a glossary of terms and acronyms that are commonly used in aeronautical impact assessments and similar aeronautical studies. A full list of terms and abbreviations used in this report is included as an Appendix.

AC (Advisory Circulars) are issued by CASA and are intended to provide recommendations and guidance to illustrate a means, but not necessarily the only means, of complying with the *Regulations*.

Aeronautical study is a tool used to review aerodrome and airspace processes and procedures to ensure that safety criteria are appropriate.

AHD (Australian Height Datum) is the datum to which all vertical control for mapping is to be referred. The datum surface is that which passes through mean sea level at the thirty tide gauges and through points at zero AHD height vertically below the other basic junction points.

AIP (Aeronautical Information Publication) is a publication promulgated to provide operators with aeronautical information of a lasting character essential to air navigation. It contains details of regulations, procedures and other information pertinent to flying and operation of aircraft. In Australia, the AIP may be issued by CASA or Airservices Australia.

Air routes exist between navigation aid equipped aerodromes or waypoints to facilitate the regular and safe flow of aircraft operating under Instrument Flight Rules (IFR).

Airservices Australia is the Australian government-owned corporation providing safe and environmentally sound air traffic management and related airside services to the aviation industry.

Altitude is the vertical distance of a level, a point or an object, considered as a point, measured from mean sea level.

AMSL (Above Mean Sea Level) is the elevation (on the ground) or altitude (in the air) of any object, relative to the average sea level datum. In aviation, the ellipsoid known as World Geodetic System 84 (WGS 84) is the datum used to define mean sea level.

ATC (Air Traffic Control) service is a service provided for the purpose of:

- a. preventing collisions:
 1. between aircraft; and
 2. on the manoeuvring area between aircraft, vehicles and obstructions; and
- b. expediting and maintaining an orderly flow of air traffic.

CASA (Civil Aviation Safety Authority) is the Australian government authority responsible under the *Civil Aviation Act 1988* for developing and promulgating appropriate, clear and concise aviation



safety standards. As Australia is a signatory to the ICAO *Chicago Convention*, CASA adopts the standards and recommended practices established by ICAO, except where a difference has been notified.

CASR (Civil Aviation Safety Regulations) are promulgated by CASA and establish the regulatory framework (*Regulations*) within which all service providers must operate.

Civil Aviation Act 1988 (the Act) establishes the CASA with functions relating to civil aviation, in particular the safety of civil aviation and for related purposes.

ICAO (International Civil Aviation Organization) is an agency of the United Nations which codifies the principles and techniques of international air navigation and fosters the planning and development of international air transport to ensure safe and orderly growth. The ICAO Council adopts standards and recommended practices concerning air navigation, its infrastructure, flight inspection, prevention of unlawful interference, and facilitation of border-crossing procedures for international civil aviation. In addition, the ICAO defines the protocols for air accident investigation followed by transport safety authorities in countries signatory to the Convention on International Civil Aviation, commonly known as the *Chicago Convention*. Australia is a signatory to the *Chicago Convention*.

IFR (Instrument Flight Rules) are rules applicable to the conduct of flight under IMC. IFR are established to govern flight under conditions in which flight by outside visual reference is not safe. IFR flight depends upon flying by reference to instruments in the flight deck, and navigation is accomplished by reference to electronic signals. It is also referred to as, a term used by pilots and controllers to indicate the type of flight plan an aircraft is flying, such as an IFR or VFR flight plan.

IMC (Instrument Meteorological Conditions) are meteorological conditions expressed in terms of visibility, distance from cloud and ceiling, less than the minimum specified for visual meteorological conditions.

LSALT (Lowest Safe Altitudes) are published for each low-level air route segment. Their purpose is to allow pilots of aircraft that suffer a system failure to descend to the LSALT to ensure terrain or obstacle clearance in IMC where the pilot cannot see the terrain or obstacles due to cloud or poor visibility conditions. It is an altitude that is at least 1,000 feet above any obstacle or terrain within a defined safety buffer region around a particular route that a pilot might fly.

MOS (Manual of Standards) comprises specifications (*Standards*) prescribed by CASA, of uniform application, determined to be necessary for the safety of air navigation.

NASAG (National Airports Safeguarding Advisory Group) set up in May 2010 to implement the Australian Government's National Aviation Policy White Paper, *Flight Path to the Future* initiatives relating to safeguarding airports and surrounding communities from inappropriate development. NASAG comprises representatives from state and territory planning and transport departments, the Civil Aviation Safety Authority (CASA), Airservices Australia, the Department of Defence and the Australian Local Government Association (ALGA) and is chaired by the Department of Infrastructure and Transport (DoIT).

NASF (National Airports Safeguarding Framework) is the published guidelines from the NASAG.

NOTAMs (Notices to Airmen) are notices issued by the NOTAM office containing information or instruction concerning the establishment, condition or change in any aeronautical facility, service,



procedure or hazard, the timely knowledge of which is essential to persons concerned with flight operations.

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.

OLS (Obstacle Limitation Surfaces) are a series of planes associated with each runway at an aerodrome that defines the desirable limits to which objects may project into the airspace around the aerodrome so that aircraft operations may be conducted safely.

PANS-OPS (Procedures for Air Navigation Services - Aircraft Operations) is an Air Traffic Control term denominating rules for designing instrument approach and departure procedures. Such procedures are used to allow aircraft to land and take off under Instrument Meteorological Conditions (IMC) or Instrument Flight Rules (IFR). ICAO document 8168-OPS/611 (volumes 1 and 2) outlines the principles for airspace protection and procedure design which all ICAO signatory states must adhere to. The regulatory material surrounding PANS-OPS may vary from country to country.

PANS OPS Surfaces. Like an Obstacle Limitation Surface, the PANS-OPS protection surfaces are imaginary surfaces in space which guarantee the aircraft a certain minimum obstacle clearance. These surfaces may be used as a tool for local governments in assessing building development. Where buildings may (under certain circumstances) be permitted to penetrate the OLS, they cannot be permitted to penetrate any PANS-OPS surface, because the purpose of these surfaces is to guarantee pilots operating under IMC an obstacle free descent path for a given approach.

Prescribed airspace is an airspace specified in, or ascertained in accordance with, the Regulations, where it is in the interests of the safety, efficiency or regularity of existing or future air transport operations into or out of an airport for the airspace to be protected. The prescribed airspace for an airport is the airspace above any part of either an OLS or a PANS OPS surface for the airport and airspace declared in a declaration relating to the airport.

Regulations (Civil Aviation Safety Regulations)

VFR (Visual Flight Rules) are rules applicable to the conduct of flight under VMC. VFR allow a pilot to operate an aircraft in weather conditions generally clear enough to allow the pilot to maintain visual contact with the terrain and to see where the aircraft is going. Specifically, the weather must be better than basic VFR weather minima. If the weather is worse than VFR minima, pilots are required to use instrument flight rules.

VMC (Visual Meteorological Conditions) are meteorological conditions expressed in terms of visibility, distance from cloud and ceiling, equal or better than specified minima

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ABBREVIATIONS

Abbreviations used in this report, and the meanings assigned to them for the purposes of this report are detailed in the following table:

Abbreviation	Meaning
AC	Advisory Circular (document support CASR 1998)
ACFT	Aircraft
AD	Aerodrome
AHD	Australian Height Datum
AIP	Aeronautical Information Publication
Airports Act	Airports Act 1996, as amended
ALA	Aeroplane Landing Area
AMSL	Above Minimum Sea Level
ARP	Aerodrome Reference Point
AsA	Airservices Australia
ATC	Air Traffic Control(ler)
CAR	Civil Aviation Regulation
CASA	Civil Aviation Safety Authority
CASR	Civil Aviation Safety Regulation
DAP	Departure and Approach Procedures (charts published by AsA)
DME	Distance Measuring Equipment
ELEV	Elevation (above mean sea level)
ENE	East Northeast
ERSA	Enroute Supplement Australia
FAF	Final Approach Fix
FAP	Final Approach Point
ft	feet
GA	General Aviation
GNSS	Global Navigation Satellite System
GP	Glide Path
IAP	Instrument Approach Procedure
IAS	Indicated Airspeed
ICAO	International Civil Aviation Organisation
IFR	Instrument Flight Rules
IHS	Inner Horizontal Surface, an Obstacle Limitation Surface
ILS	Instrument Landing System
IMC	Instrument Meteorological Conditions
ISA	International Standard Atmosphere
km	kilometres
kt	Knot (one nautical mile per hour)
LAT	Latitude
LONG	Longitude
LSALT	Lowest Safe Altitude
m	metres

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Abbreviation	Meaning
MAPt	Missed Approach Point
MDA	Minimum Descent Altitude
MOC	Minimum Obstacle Clearance
MOS	Manual of Standards, published by CASA
MSA	Minimum Sector Altitude
SSR	Monopulse Secondary Surveillance Radar
MVA	Minimum Vector Altitude
NASAG	National Airports Safeguarding Advisory Group
NASF	National Airports Safeguarding Framework
NDB	Non Directional Beacon
NE	Northeast
NM or nm	Nautical Mile (= 1.852 km)
nnDME	Distance from the DME (in nautical miles)
NNE	Northeast
NOTAM	NOTice To AirMen
OAS	Obstacle Assessment Surface
OCA	Obstacle Clearance Altitude
OCH	Obstacle Clearance Height
OHS	Outer Horizontal Surface
OIS	Obstacle Identification Surface
OLS	Obstacle Limitation Surface
PANS-OPS	Procedures for Air Navigation Services – Aircraft Operations, ICAO Doc 8168
PROC	Procedure
PSR	Primary Surveillance Radar
QNH	An altimeter setting relative to height above mean sea level
Rnnn	Restricted Airspace – promulgated in AIP as R with 3 numbers
REF	Reference
RL	Relative Level
RNAV	aRea NAVigation
RNP	Required Navigation Performance
RPT	Regular Public Transport
RWY	Runway
SFC	Surface
SID	Standard Instrument Departure
SSR	Secondary Surveillance Radar
TAR	Terminal Area Radar
THR	Threshold (Runway)
TODA	Take-Off Distance Available
VFR	Visual Flight Rules
VMC	Visual Meteorological Conditions
VOR	Very high frequency Omni directional Range

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