

Lachlan Gadd  
Project Developer  
Engie Australia & New Zealand

July 2025

By email: [lachlan.gadd@engie.com](mailto:lachlan.gadd@engie.com)

Our ref: 100509-03

Dear Lachlan

**Re: The Plains Renewable Hub – Wind Turbine Obstacle Lighting**

This correspondence responds to a request for an Aviation Obstacle Lighting Plan in accordance with the relevant guidelines and as per CASA's advice.

**1.1. References**

- Advisory Circular (AC)139.E-05 *Obstacles (including wind farms) outside the vicinity of a CASA-certified aerodrome*
- Civil Aviation Safety Regulation (CASR) 1998 Part 139: *Aerodromes, Manual of Standards*
- Department of Planning, Housing and Infrastructure – *Wind Energy Guideline (November 2024)*
- National Airports Safeguarding Framework (NASF) *Guideline D: Managing the Risk of Wind Turbine Farms as Physical Obstacles to Air Navigation*

**1.2. Background**

Engie Australia & New Zealand (Engie) received a Request for Information (RFI) from the Department of Planning, Housing and Infrastructure (DPHI), one of the items and comments was:

*Aviation Lighting: Provide an aviation night lighting plan in accordance with Civil Aviation Safety Authority (CASA) requirements.*

**1.3. Aviation Impact Assessment V1.3 (AIA V1.3)**

Aviation Projects prepared an AIA (100509-03\_The Plains Renewable Hub \_AIA\_Final\_V1.3\_250326) for the Plain Renewable Hub and concluded that:

7. *Based on NSW Wind Energy Guideline,*

*If turbines are 150 m or more above ground, lighting is required for the most critical turbines (e.g. turbines at highest elevations and/or around the project perimeter).*

*lighting of turbines and ancillary infrastructure should be designed to minimise potential amenity impacts by using the lowest intensity lighting suitable for the site.*

*CASA provided feedback regarding lighting on 2 May 2024:*

*CASA considers the proposed wind farm will be a hazard to aviation safety and recommends that the wind farm is obstacle lit with steady medium-low intensity red obstacle lighting in accordance with*

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the National Airports Safeguarding Framework Guideline D 'Managing the Risk of Wind Turbine Farms as Physical Obstacles to Air Navigation' National Airports Safeguarding Framework Principles and Guidelines ([infrastructure.gov.au](http://infrastructure.gov.au)) and section 9.31 of Part 139 Aerodromes Manual of Standards Part 139 (Aerodromes) Manual of Standards 2019 ([legislation.gov.au](http://legislation.gov.au)).

International standards require, and the NASF guideline recommends, 2,000 candela lighting intensity. CASA recommends that 200 candela as a minimum intensity lighting would suffice obstacle lighting should be monitored to alert the wind farm operator of any outage. The lighting system should have a failsafe mode to ensure that at least some of the obstacle lights remain on during an outage, and a management system developed to ensure any outages are corrected promptly. CASA is prepared to review a lighting plan that indicates which turbines are proposed to be lit. As the Aviation Safety regulator, CASA does not consider the visual impact of obstacle lighting on neighbours / homesteads. However, there are mitigations for visual impact such as baffling and intensity control (as described in the Aviation Impact Assessment Table 16 / Page 59 'Effect of obstacle lighting on neighbours').

#### 1.4. CASR Part 139 (Aerodromes) Manual of Standards 2019 (13 March 2024)

CASR Part 139 (Aerodromes) Manual of Standards 2019 (13 March 2024) Section 9.31, (8) and (9) specifies as follows in relation to obstacle lights for wind farms:

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

- (a) mark the highest point reached by the rotating blades; and
- (b) be provided on a sufficient number of individual wind turbines to indicate the general definition and extent of the wind farm, but such that intervals between lit turbines do not exceed 900 m; and
- (c) all be synchronised to flash simultaneously; and
- (d) be seen from every angle in azimuth.

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

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

- (a) the obstacle lights must be placed on top of the generator housing; and
- (b) a note must be published in the AIP-ERSA indicating that the obstacle lights are not at the highest position on the wind turbines.

Section 9.33 specifies the characteristics of medium-intensity obstacle lights

##### 9.33 Characteristics of medium-intensity obstacle lights

(1) Medium-intensity obstacle lights must:

- (a) be visible in all directions in azimuth; and
- (b) if flashing – have a flash frequency of between 20 and 60 flashes per minute.

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

- (a) for vertical beam spread – a minimum of 3 degrees;

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

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

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

(4) If, instead of obstacle marking, a flashing white light is used during the day to indicate temporary obstacles in the vicinity of an aerodrome, the peak effective intensity of the light must be increased to  $20\,000 \pm 25\%$  cd when the background luminance is  $50\text{ cd/m}^2$  or greater.

CASR Part 139 MOS allows for obstacle lights to be provided on a sufficient number of individual wind turbines to indicate the general definition and extent of the wind farm, with intervals between lit turbines not exceeding 900 m.

## 1.5. AC139.E-05 Obstacles (including wind farms) outside the vicinity of a CASA certified aerodrome

In Australia, CASA has accepted the use of 200 candela (cd) lighting in some circumstances due to a lack of back lighting in rural and remote areas, meaning that a lower intensity light is still visible to pilots at an acceptable distance to permit a pilot to see and avoid the obstacle. In AC 139.E-05 Section 2.6 describes the reasoning behind CASA's preference to recommend aviation hazard lighting for tall structures and aircraft detection systems for wind farms.

*2.6.2 Hazard lighting for wind farms and other tall structures is intended to alert pilots, flying at low altitude, to the presence of an obstacle allowing them sufficient awareness to safely navigate around or avoid it. The pilot is responsible for avoiding other traffic and obstacles based on the "alerted" see-and-avoid principle.*

*2.6.3 Unless the wind farm or tall structure is located near an airport, it is not expected to pose a risk to regular public transport operations. The kind of air traffic that is usually encountered at low altitude in the vicinity of a wind farm or tall structure includes light aircraft (e.g., private operators, flight schools, sport aviation, agricultural, survey, and fire spotting and control) and helicopters (military, police, emergency services, survey, and fire spotting and control). Hazard lights are therefore designed to provide pilots with sufficient awareness about the presence of the structure(s), so they can avoid it. This means that the intensity of the hazard lights should be such that the acquisition distance is sufficient for the pilot to recognise the danger, take evasive action and avoid the obstacle by a safe margin in all visibility conditions. This outcome considers the potential speed of an aircraft to determine the distance by which the pilot must become aware of the obstacle to have enough time and manoeuvrability to avoid it.*

## 1.6. National Airports Safeguarding Framework (NASF) Guideline D

NASF Guideline D provides guidance to State/Territory and local government decision makers, airport operators and developers of wind farms to jointly address the risk to civil aviation arising from the development, presence and use of wind farms and wind monitoring towers.

Paragraphs 35 to 37 provide guidance in relation to obstacle lighting for wind turbines:

*35. When lighting has been recommended by CASA to reduce risk to aviation safety, medium-intensity obstacle lights should be used. Where used, lighting on wind farms should be installed:*

*(a) to identify the perimeter of the wind farm;*

(b) respecting a maximum spacing of 900m between lights along the perimeter, unless an aeronautical study shows that a greater spacing can be used;

(c) where flashing lights are used, they flash simultaneously; and

(d) within a wind farm, any wind turbines of significantly higher elevation are identified wherever located.

36. To minimise the visual impact on the environment, obstacle lights may be partially shielded, provided it does not compromise their operational effectiveness. Where obstacle lighting is provided, lights should operate at night, and at times of reduced visibility. All obstacle lights on a wind farm should be turned on simultaneously and off simultaneously.

37. Where obstacle lighting is provided, proponents should establish a monitoring, reporting and maintenance procedure to ensure outages, including loss of synchronisation, are detected, reported and rectified. This would include making an arrangement for a recognised responsible person from the wind farm to notify the relevant CASA office, so that CASA can advise pilots of light outages.

### **1.7. New South Wales Department of Planning, Housing and Infrastructure – Wind Energy Guideline (November 2024)**

This Wind Energy Guideline will help the community, industry, applicants and regulators navigate the planning framework under which we assess wind energy. This guideline identifies key planning considerations relevant to wind energy development and provides policy and technical guidance on key issues of the technology.

Whilst the Renewable Energy Planning Framework, inclusive of the Wind Energy Guideline does not immediately apply to the Project (as the EIS was lodged before 12 November 2024) aspects relating to aviation safety are relevant to consider to avoid ambiguity in regard to the need for obstacle lighting. Those key principles are outlined below.

#### *5.3.1 Key principles*

##### *Aviation safety and lighting principles*

- *Wind energy projects should be designed to reduce aviation safety risk.*
- *If turbines are 150 m or more above ground, lighting is required for the most critical turbines (e.g. turbines at highest elevations and/or around the project perimeter).*
- *Lighting of turbines and ancillary infrastructure should be designed to minimise potential amenity impacts by using the lowest intensity lighting suitable for the site.*
- *An aviation impact assessment must include a full assessment of the risks to aviation safety in the context of existing flight patterns and airport approach routes.*

##### *Lighting*

*While important from a safety perspective, aviation obstacle lighting has the potential to impact regional and rural areas where other light sources are minimal. Applicants should seek to minimise the effects of lighting on visual amenity while still having regard to the aviation safety risk assessment. The visibility and impact of any lighting depends on the nature and intensity of the lighting required and the potential cumulative effects with other developments.*

*NSW adopts a risk-based approach assessing the potential risk of wind energy projects to aviation safety. We acknowledge CASA's expectation to recommend some level of aviation obstacle lighting for tall structures, including wind turbines.*

For tall structures (including turbines) that are greater than 150 metres above ground level, the most critical structures (turbines at the highest elevations and/or around the project's perimeter) will require lighting.

Lighting turbines and tall structures is intended to improve safety outcomes and alert pilots to the presence of potential obstacles in low-altitude flight paths. Aircraft detection systems can be used to trigger lights only when an approaching aircraft is identified. CASA has also advised that using management systems to regulate obstacle lights and their intensity (such as visibility meters or radar detection systems) is an acceptable option in Australia.

Australia aviation authorities have generally adopted international standards<sup>21</sup> for lighting intensity, which recommend 2,000 candela medium intensity obstacle lights for structures greater than 150 metres above ground level. However, CASA has accepted the use of 200 candela lighting in circumstances where a lack of back lighting, such as in rural and remote areas, means the lower intensity light is still visible to pilots at an acceptable distance to avoid the obstacle<sup>22</sup>

To mitigate negative impacts on visual amenity, consider:

- minimising the number of turbines that need to be lit to clearly indicate the general height and extent of the development – high-risk turbines at high elevations must be lit
- using the lowest intensity turbine light suitable for the site
- where fixed lighting is proposed (instead of being controlled through detection systems), turning on all turbine lighting simultaneously, using a steady medium-intensity red light, and to not have flashing lights
- directing ancillary lighting below the horizontal to avoid unnecessary impact on residences.

<sup>21</sup> ICAO (International Civil Aviation Organization) Annex 14, Volume 1, Chapter 6.2

<sup>22</sup> CASA Advisory Circular AC 139.E-05v1.1 Obstacles (including wind farms) outside the vicinity of a CASA certified aerodrome, October 2022

## 1.8. Obstacle lighting arrangements

In applying the requirements of CASR Part 139 MOS or NASF Guideline D in relation to obstacle lighting on wind turbines, and in particular the 900 m interval, it is suggested that the wind turbines (illustrated in Figure 1 and specified in Table 1) are lit. The Plains Renewable Hub should have 200 cd low intensity steady red obstacle lighting that is fitted and operational.

Light and Shielding Specification:

- *Lights:*
  - 2 low intensity steady red lights (per lit wind turbine):
    - Fixed lights showing red.
    - A horizontal beam spread that results in 360° coverage around the obstacle.
    - A minimum intensity of 200 cd.
    - A vertical beam spread (to 50% of peak intensity) of 10.°
    - Low-intensity obstacle lights must have a peak intensity of at least 10 cd.

- A vertical distribution with 50 cd minimum at +6° and +10° above the horizontal.
- Not less than 10 cd at all elevation angles between -3° and +90° above the horizontal.
- Obstacle lights should operate at night, and at times of reduced visibility.
- *Shielding:*
  - Shielding of the downward component of obstacle lighting is permitted, and if used, must be such that:
    - No more than 5% of the nominal light intensity is emitted at or below 5° below the horizontal.
    - No light is emitted at or below 10° below horizontal.
  - Two lights must be provided on top of the generator housing in a way that allows at least one of the lights to be seen from every angle in azimuth.
- *Department of Defence obstacle lighting requirement:*
  - The frequency range of the LED light emitted must fall within the range of wavelengths 655 to 930 nanometres.

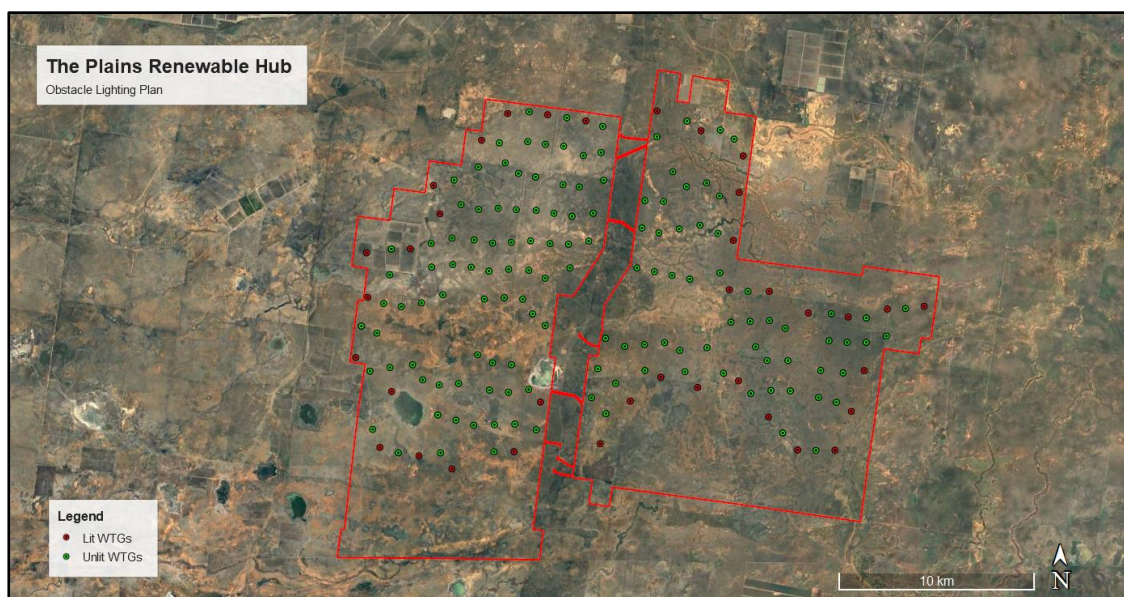


Figure 1 Proposed obstacle lighting layout

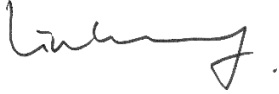
Table 1 Wind turbine ID proposed for obstacle lighting

<i>WTG ID</i>	<i>X coordinates</i>	<i>Y Coordinates</i>
Optional WTG Ellipse (5)	301393.5142	6164506.879
Optional WTG Ellipse (6)	286254.0037	6151647.154
Optional WTG Ellipse (7)	288125.8477	6149959.902
WTG Ellipse (7)	305681.6389	6160454.512
WTG Ellipse (13)	305436.8862	6158015.522
WTG Ellipse (27)	311392.94	6154252.097
WTG Ellipse (29)	313385.8086	6154697.624
WTG Ellipse (45)	312272.8573	6151540.242
WTG Ellipse (49)	311657.9872	6149459.334
WTG Ellipse (52)	300345.3429	6149737.411
WTG Ellipse (53)	298848.6993	6147535.398
WTG Ellipse (55)	297765.7607	6163925.454
WTG Ellipse (57)	295798.999	6164191.705
WTG Ellipse (62)	292450.7748	6162825.467
WTG Ellipse (76)	290402.5319	6159042.692
WTG Ellipse (86)	288927.7599	6157228.76
WTG Ellipse (88)	286687.1496	6156975.254
WTG Ellipse (118)	295753.9242	6149590.057
WTG Ellipse (128)	294453.098	6147039.906
WTG Ellipse (130)	287592.203	6147107.425
WTG Ellipse (137)	289591.1807	6146721.507

<i>WTG ID</i>	<i>X coordinates</i>	<i>Y Coordinates</i>
WTG Ellipse (143)	291300.4775	6146092.767
WTG Ellipse (145)	305854.0378	6150884.632
WTG Ellipse (152)	305283.1646	6155500.099
WTG Ellipse (153)	307333.2201	6155464.127
WTG Ellipse (154)	309349.843	6154411.047
WTG Ellipse (161)	301876.9919	6150981.347
WTG Ellipse (162)	303770.9251	6150508.224
WTG Ellipse (166)	307425.8153	6149078.335
WTG Ellipse (168)	308959.3825	6147444.349
WTG Ellipse (170)	310863.9732	6147473.141
WTG Ellipse (172)	293755.8597	6164209.208
WTG Ellipse (176)	303661.7015	6163546.501
WTG Ellipse (178)	290038.663	6160478.426
WTG Ellipse (190)	305846.9438	6162318.115
WTG Ellipse (191)	286805.043	6154718.796
WTG Ellipse (200)	315268.2245	6154880.339

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

Kind regards

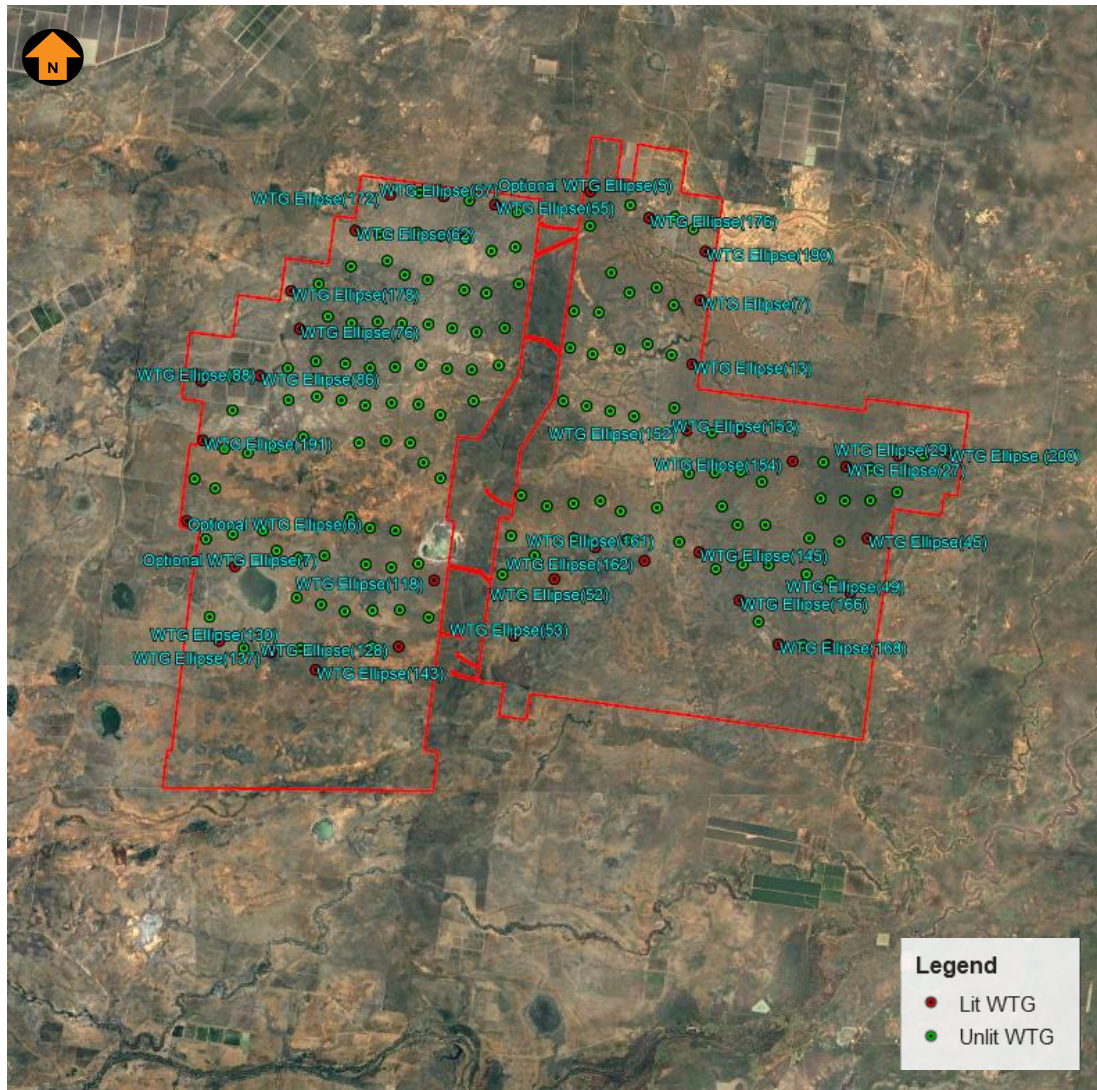


Lyn Wang

Aviation Specialist Consultant

17 July 2025

**Enclosure:** Obstacle Lighting Plan



1. Light and Shielding Specification:

Lights:

- **2 low intensity** steady red lights:
  - fixed lights showing red.
  - a horizontal beam spread that results in 360° coverage around the obstacle.
  - a minimum intensity of 200 candela (cd).
  - a vertical beam spread (to 50% of peak intensity) of 10°.
  - a vertical distribution with 50 cd minimum at +6° and +10° above the horizontal.
  - not less than 10 cd at all elevation angles between -3° and +90° above the horizontal.

Shielding:

- shielding of the downward component of obstacle lighting is permitted, and if used must be such that:
  - no more than 5% of the nominal light intensity is emitted at or below 5° below horizontal.
  - no light is emitted at or below 10° below horizontal.
- two lights must be provided on top of the generator housing in a way that allows at least one of the lights to be seen from every angle in azimuth.

Department of Defence obstacle lighting requirement:

- the frequency range of the LED light emitted must fall within the range of wavelengths 655 to 930 nanometers.

2. References

- Civil Aviation Safety Authority, *Part 139 (Aerodromes) Manual of Standards 2019*, dated 14 December 2024; Chapter 9 Division 4 Obstacle lighting (Sections 9.31, 9.32 and 9.33).
- Department of Infrastructure, Transport, Regional Development, Communications and the Arts, Australian Government, National Airport Safeguarding Framework, *Guideline D Managing the Risk of Wind Turbine Farms as Physical Obstacles to Air Navigation*, v4.1.3, 15 July 2012, paragraphs 35, 36 and 37.