

## **INDEPENDENT AIRSPACE STUDY**

### **PROPOSED GLEN INNES WIND FARM**

#### **BACKGROUND:**

This independent airspace study is to be read in conjunction with recommendations from my previous airspace report, undertaken principally for the proposed Sapphire Wind farm (report dated 23<sup>rd</sup> August 2016). CASA has subsequently advised NSW Planning that following their assessment medium red intensity hazard warning lights are to be installed around the perimeter and a number of significant wind turbines.

Environmental Property Services in their July 2017 assessment for the GIWF has stated the following:

An aviation hazard risk assessment is being currently undertaken by Ambidji, part of which includes an obstacle hazard lighting assessment, which may result in the need to install aviation hazard warning lights.

For consistency across all 3 current wind farm projects i.e White Rock, Sapphire and Glen Innes, all of which may be required by CASA to install aviation hazard lighting, it is requested that the GIWF consent condition No 25 be replaced with the following, or of similar wording:

*‘With the exception of aviation hazard lighting implemented in accordance with the requirements of this condition, no external lighting other than low intensity security night lighting is permitted on site unless otherwise agreed or directed by the NSW Planning Secretary, or as required by CASA.*

*Prior to the commencement of construction, the Proponent shall consult with CASA on the need for aviation hazard lighting in relation to wind turbines.*

*Any aviation hazard lighting shall be implemented in a manner that minimises visual intrusion to surrounding non-associated residences as far as is reasonable and feasible.”*

In remote areas i.e within 30km from certified/registered aerodromes (Glen Innes is classified as a registered aerodrome) CASR 139.365 requires the owner/proponent of a structure that will be at or above 110m AGL to inform CASA of the location and height to enable CASA to assess the likely impact of the structure on aircraft operations following an aeronautical study undertaken by suitably qualified person/s.

There are no aviation statutes or CASA regulations governing the formal treatment of Wind farms within uncontrolled airspace however the Commonwealth (DIRD) Windfarm guidelines, through its current published National Airports Safeguarding Framework (NASF) Guideline D relies on a risk identification and management approach to ensure any risks to aviation are minimised in the most effective and efficient way possible. It is not the intention to adopt an overly restrictive approach to wind energy development but rather ensure the risks are identified early and mitigation measures are implemented at an early stage.

The Aerial Agriculture Association of Australia (AAAA) National Windfarm Operating Protocols document, dated May 2014, should also be considered as they represent community and aviation industry concerns regarding agricultural use, low flying within the locale of proposed wind farms.

This independent aeronautical study has been undertaken in consideration of the NASF guidelines on Wind farms, AAAA Wind farm concerns and CASA flight rules covering tall structures in uncontrolled airspace.

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## **GLEN INNES WIND FARM AIRSERVICES ASSESSMENT:**

Airservices has advised that contrary to the recent advice given to NSW Planning they propose to take steps to amend the RWY14 Missed Approach procedure at Glen Innes Airport following an upcoming flight validation. This will result in the GIWF not impacting Glen Innes Airport. These changes will become effective in the DAPEAST 24<sup>th</sup> May 2018 issue. After this date, the proposed GIWF will have no impact on the published Glen Innes Airport approach procedures.

Airservices also have advised the GIWF will also not adversely impact the performance of Precision/Non-precision Nav Aids, HF/VHF Comms, A-SMGCS, Radar, PRM, ADS-B, WAM or Satellite/Links-unchanged.

However, the 25NM MSA NW sector will need to be raised by 200 feet to 5700 feet due to the tallest wind turbine (4639 feet AHD) located within the NW sector 5NM buffer i.e 4639' + 984' MOC = 5623' AHD (rounded up to 5700' AHD).

The published 25NM MSA is impacted by the highest wind turbines within the 3-known wind-farms (White Rocks, Sapphire and Glen Innes) as referenced in the table below:

Wind turbine data	White Rocks Wind farm	Sapphire Wind farm	Glen Innes Wind farm
Tip height AGL	150m (492 feet)	200m (657 feet)	180m (591 feet)
Hub height	89.5m	89.5m	89.5m
Rotor diameter	121m	121m	121m
No of wind turbines	109 (Stage 1 70)	75	22
Distance from GI Airport	21km SW of airport	22km west of airport	10km SW of airport
Highest wind turbine AHD	1556m (5105 feet)	1357.8m (4455 feet)	1414m (4640 feet)
25 NM MSA NW Sector	5300 feet	5300 - 5500 feet	5500 – 5700 feet
25NM MSA EAST Sector	5900 – 6200 feet	6200 feet	6200 feet

A 4<sup>th</sup> Wind farm proposed at Ben Lomond is located about 26km south of Glen Innes airport within the Guyra & Glen Innes Shire Council boundaries. No specific project details are known at this stage.

The presence of the 3 Wind farms has resulted in an increase in the Minimum Safe Altitude (MSA) aircraft are permitted to fly (based on the highest obstacle + 984 feet obstacle clearance) under visual conditions whilst en-route and/or overflying Glen Innes Airport (refer table above).

The NW sector MSA minima has had to be raised 400 feet from 5300 to 5700 feet AHD and the East sector has had to be raised by 300 feet from 5900 to 6200 feet AHD. These rises effectively increase the risk of a VFR pilot (recreation and/or otherwise), flying below the lowest available cloud base condition at the time (so that visual contact with the ground below is always maintained), to be potentially below the recently revised published minima when overflying either of the Wind farms.

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## **CASA FLIGHT RULES APPLIED TO REMOTE AREAS WITHIN 30KM OF REGULATED AIRPORTS:**

CASA 's flight rule CAR 157 (1) states all aircraft overflying any city, town or populous area is permitted to fly a minimum of 1000 feet above terrain and in other areas (mainly rural) fly at a minimum 500 feet AGL. The latter clause may not apply if through stress of weather or any other unavoidable aircraft/pilot condition it is essential the pilot maintains a lower altitude because of poor visibility, system failure, etc. Aircraft operating in the vicinity of non-towered (uncontrolled) aerodromes (i.e Glen Innes) conducting night VFR and normal IFR operations are not permitted to fly below 1000 feet above the identified highest obstacle within the area. Night VFR and IFR operations are not permitted to be undertaken unless 1000 feet minimum clearance with the highest obstacle is maintained.

VFR aircraft i.e most sports/recreation aviation pilots, agriculture operators (aerial stock mustering) and VFR trainee pilots operating from the proposed pilot training academy at Glen Innes are not permitted to fly in cloud and must remain below the cloud-base maintaining visual contact with the ground at all times. Based on CASA's minimum ground clearance requirements the impact on the 3 known wind farms are as follows:

- Aircraft overflying White Rocks wind farm may operate as low as 5700 feet (VFR day) with a 595 feet clearance to the highest turbine and as low as 6200 feet (VFR night or IFR) with 1095 feet clearance to the highest wind turbine 5105 feet (unlit, no hazard warning lighting recommended by CASA at this stage).
  - Aircraft overflying Sapphire wind farm may operate as low as 5000 feet (VFR day) or 545 feet clearance to the highest turbine and as low as 5500 feet (VFR night or IFR) with 1045 feet clearance to the highest wind turbine 4455 feet (hazard lit warning lights have been recommended by CASA).
  - Aircraft overflying the proposed Glen Innes wind farm may operate as low as 5200 feet (VFR day) or 560 feet clearance to the highest turbine and as low as 5700 feet (VFR night or IFR) with 1060 feet clearance to the highest wind turbine 4640 feet (hazard lighting requirement to be determined).
  - These flight safety clearances are exacerbated when the cloud-base is at or under 1000 feet ex-ground (likely in this elevated, mountainous country 4000 feet ex AMSL).
  - Aircraft undertaking VFR operations outside controlled airspace are legally entitled to operate at 500 feet AGL provided they maintain visual contact with the terrain and ground features at all times.
- Glen Innes Aero Club Chief Pilot and a long-standing approved student trainer has previously advised that from his experience during inclement weather conditions at Glen Innes it is not uncommon for the cloud base to be below the hill tops thus completely obscuring any wind turbines, structures, terrain etc. He also advised that from his experience including that of other pilots the only safe way to get in and out of Glen Innes in VMC during deteriorating weather would be from the west (where the wind farms are). The lowest cloud base condition which prevents VFR aircraft flying visually would normally be to the east, along the edge of the escarpment. VFR pilots travelling from western NSW returning to the East Coast in less than ideal weather are often required to turn back about 15NM (28 km) east of Glen Innes, return to the airport and stay overnight in Glen Innes.
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- During poor weather and/or in darkness the proposed Glen Innes wind farm will effectively fence Glen Innes airport in to the south-west and the escarpment to from the east. IFR aircraft will be able to navigate their way by instruments however VFR pilots operating in uncontrolled airspace may be vulnerable. These pilots approaching from the south-west may find themselves in rising terrain, low cloud bases, and now with the presence of a number of large 591 feet ex-ground wind turbines.

## **WIND FARM AIRSPACE & HAZARD WARNING LIGHTING ASSESSMENT**

Low level flight aviation activities are generally, any aircraft flying in VFR below 500 feet AGL or below the published LSALT, particularly in low visibility conditions, are potentially vulnerable and may include, but not limited to, the following operations.

- Aerial agriculture operations including aerial mustering
- Aerial overhead power-line inspections
- Low level military aviation operations
- Rural Fire fighting aircraft operations
- Helicopter search and rescue operations
- En-route VFR aircraft operations where the cloud base is between 500 and 800 feet ex ground
- Sports and recreational aviation activities i.e. ultra-lights, hand gliders, hot air balloons

The three approved Wind farms have existing or proposed wind turbines ranging between 150m (500 feet) and 200m (660 feet) ex-ground and the above aviation activities are at risk when overflying any of the Wind farms under VFR, particularly when the cloud base falls below 800 feet and sometimes when it is as low as 500 feet as can often be the case in the Glen Innes mountain ranges.

Wind farm operators should also be aware that wind turbines may create vertical and lateral turbulence i.e a wind turbine of 121m diameter may create turbulence, potentially as far as 2km downstream. The effects of wind farm turbulence on aircraft is unknown however Wind farm proponents should be cognisant of their duty of care responsibility and communicate same to aviation operators that operate in the vicinity of Wind farm/s. This requires pilots being made aware of the flying risks following briefing by representatives of aerial agriculture, sports aviation, search and rescue operators, fire fighting and general aviation operators.

CASA' s guidance advice on tall structures (AC 139-08 refers) addresses the safety of aircraft conducting low level operations which are permitted across Australia (subject to regulatory conditions/limitations) however, an inadvertent collision with a tall structure also poses a number of other community risks i.e.

- Business continuity if service becomes unavailable i.e. communications, wind energy, power supply
- Costs and inconvenience associated with any structure repairs
- Liability issues due to lack of duty of care / regulatory non-adherence
- Potential pilot death / aircraft damage / community confidence erosion

CASA determines whether a proposed wind farm and the associated wind turbines / wind monitoring towers may be either:

- (a) Hazardous to aircraft, but the risks can be mitigated through approved lighting and/or marking or
- (b) Does not present a hazard to aircraft safety
- (c) Regardless, all wind turbines and wind monitoring towers location and height must be reported for inclusion in the RAAF national database of tall structures. This is a requirement of AC 139-08 (0). Also the final surveyed height and location of obstacles must be reported to the Airservices Vertical Obstacle Database.

**Current Glen Innes airspace:**

Glen Innes airport has two published NPA procedures for IFR and a VFR visual circling approach:

- RNAV GNSS RWY 14 offset 5 DEG EAST within 10NM MSA 6100 feet
- RNAV-Z GNSS RWY 32 offset 2 DEG EAST within 10NM MSA 6100 feet
- CIRCLING CAT A/B aircraft minima 4370 feet and CAT C aircraft minima 4530 feet
- RWY 10/28 is classified as a non-instrument RWY for VFR conditions only at this stage.

**Future airspace requirements:**

Once the Training Academy is developed and operational it is likely in Y2/3 the following operational airspace design requirements will be required to cater for the projected increase in flying training demands:

- RWY 10/28 RNAV GNSS NPA incorporating a similar footprint to that for RWY 14/32 i.e initial, intermediate, final approach and missed approach (impact on Sapphire Coast and Glen Innes wind farms may need to be assessed).
- RWY 14/32 precision approach associated with an ILS installation (unlikely to impact on either of the wind farm proposals).
- Installation of an Air Traffic Service (control tower) or on-airport aerodrome radio communication service (FCS) associated with the reclassification of uncontrolled to controlled airspace (impact on Glen Innes, Sapphire Coast and White Rocks wind farm proposals may need to be assessed).

**Impact on any known aerodrome landing areas (ALA's) in the district:**

- An ALA (Paradise Station) is located off Paradise Maybole Road, Paradise south of the Gwydir Highway and west of the New England Highway (S 29 degrees 52' 40.13" E 151 degrees 28' 51.03"). This ALA is within the limits of the White Rock wind farm and should be assessed to ascertain whether the ALA's operations will be impacted by the wind farm proposal.
  - Whilst it is also acknowledged there are many private agricultural landing strips within the wind farms district the impact on their aviation safety requirements may also need to be considered.
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#### **AIRSPACE ASSESSMENT OUTCOMES:**

1. The proposed GIRA academy is projected to attain 80K annual movements by Y3 (lying somewhere between Tamworth 72K and Gold Coast 95K (Airservices 2016 calendar year total movements). By Y3 GIRA is likely to require a control tower, FCS system or similar in a controlled airspace environment.
2. The wind farm proponents have advised the maximum height of the wind turbines are:
  - White Rocks 150m (492 feet) ex-ground with highest elevation 5105 feet AMSL.
  - Sapphire Coast 200m (657 feet) ex-ground with highest elevation 4455 feet AMSL.
  - Glen Innes 180m (591 feet) ex-ground with highest elevation 4640 feet AMSL.
3. ICAO/NASF/CASA guidelines require objects 150m (492 feet) or more ex-ground (as are all turbines within the 3 wind farms), located outside the Glen Innes OLS are regarded as obstacles in airspace.
4. CASA has recommended the perimeter of the Sapphire wind and specified wind turbines farm be fitted with steady red medium intensity hazard warning lights in accordance with NASF guideline D.
5. As-built details of wind farms/turbines/wind monitoring towers must be reported to the RAAF via [ais.charting@defence.gov.au](mailto:ais.charting@defence.gov.au) and Airservices via [vod@airservicesaustralia.com](mailto:vod@airservicesaustralia.com)
6. Wind farm proponents have a duty of care responsibility to the community, agriculture aviation industry, sports and recreation pilots, aviation emergency services, GA and en-route aircraft operators to ensure over-flying aircraft are warned / protected against unnecessary collisions with tall structures.
7. Wind farm proponents are to ensure appropriate consultative mechanisms are in place to protect airspace users and operators flying in en-route airspace above or in the vicinity of their wind farms.

#### **RECOMMENDATIONS:**

- Based on the anecdotal evidence above the Glen Innes wind farm perimeter and highest wind turbines (to be determined) should be lit with steady red medium intensity hazard warning lights, similar to that recommended for the Sapphire wind farm.
- The requirement for hazard warning lighting at the White Rocks wind farm be revisited given the highest wind turbine is 5105 feet AMSL (650 feet above the highest Sapphire wind turbine). In essence all 3 wind farms should be hazard lit as a visual warning cue to all pilots overflying them.
- The Glen Innes wind turbine as-built details are forwarded to RAAF AIS and Airservices for inclusion in the respective national databases of tall obstacles.
- The Glen Innes wind farm proponent is to ensure all aircraft operators (private and commercial), pilots and training schools are made aware (newsletters, public forums, emails etc.) of the presence of wind turbines and inherent dangers of low flying in the Glen Innes district.

Peter Sullivan

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Aviation Technical Specialist Aerosafe Inspections

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