# Aerial Agricultural Association of Australia

# National Windfarm Operating Protocols

**Adopted May 2014**

## Introduction

Windfarms and their pre-construction wind monitoring towers are a direct threat to aviation safety – and especially aerial application. They also pose an economic threat to the industry where the costs of windfarm development—including those of compensation for loss of income—are externalized onto other sectors such as aerial application.

There are two distinct phases in the relationship between aerial applicators and wind farms:

1. Development approval
2. Operation once built

AAAA has a detailed policy available from its website – **www.aerialag.com.au/resourcecentre/policy** – that covers its views and the safety risks inherent in windfarm operations and the costs that are likely to be externalised onto the aerial application industry by the windfarm industry.

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

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

## Developer's Design/Build Considerations

Where possible, the developer should commit to:

- placement of turbines in straight lines
- setback of turbines at least 100 metres from any boundary
- all powerlines to be underground
- all MET towers are marked in accordance with NASAG Guidelines and notified to the local aerial applicators – see Appendix I to these Protocols

## Developer's Operational Considerations

- Wind farm locations, including any attendant MET towers, have been notified to local aerial applicators.
- The wind farm developer/operator is to develop an agreed set of protocols with the local aerial applicators for all relevant operational issues, including notification of applications.
- Wind farm operators are to stop blades during application operations and align them as required by the aerial operator.
- MET towers are marked in accordance with NASAG guidelines and notified to local aerial applicators.

## Pilot/Aircraft Operator's Operational Considerations

Once a wind farm has been built, the following protocols are to apply:

- The operator or pilot will conduct a risk assessment of the block to be treated as per usual – considering tower hazards / placement etc – including for operations that require treatment within the wind farm area – with operating at normal spray height underneath the blades to be acceptable.
- The risk assessment is to result in an aerial application management plan in accordance with the principles of an application management plan as outlined in the AAAA publication, the Aerial Application Pilots Manual. An overview of an aerial application plan is to be found at Appendix II.
- The aerial applicator is to notify the windfarm operator of application operations at least by 9 pm the night before via an agreed notification method.

## Economic compensation

The following national protocols are suggested by AAAA as a starting point for the payment of economic compensation to aerial applicators:

- Should a wind farm result in additional operational costs to the aerial applicator for treatment of an area that either neighbours or is the host property for the windfarm, then the windfarm company will compensate the aerial applicator directly for reasonably calculated additional costs.
- Such costs would include, but not be limited to:
  - Additional administration required for notification, liaison, planning
  - Additional treatment costs (additional flying time calculated at the normal charge out rate of the aircraft to be used) due to flight lines that are not the 'normal' or most efficient treatment.
  - Costs related to additional product to be applied to compensate for any increase in height or loss of accuracy of the application to avoid towers.

**Appendix I – National Airports Safeguarding Advisory Group - NASAG - Guidelines for Marking of Wind Turbines**

**See—http://www.infrastructure.gov.au/aviation/environmental/airport_safeguarding/nasf/**

**Appendix II – AAAA Aerial Application Pilots Manual – excerpts on planning.**

# Appendix I

# NASAG Guideline D

# NATIONAL AIRPORTS SAFE-GUARDING FRAMEWORK

***Wind Turbine Guidelines***

## Purpose of Guideline

This document 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.

## Why it is important

The *Principles for a National Airports Safeguarding Framework* acknowledge the importance of airports to national, state/territory and local economics, transport networks and social capital.

Wind farms can be hazardous to aviation as they are tall structures with the potential to come into conflict with low flying aircraft. Temporary and permanent wind monitoring towers can be erected in anticipation of, or in association with, wind farms and can also be hazardous to aviation, particularly given their low visibility. These structures can also affect the performance of Communications, Navigation and Surveillance equipment operated by Airservices Australia (Airservices) and the Department of Defence (Defence).

## How it should be used

Some States/Territories already have planning guidelines or polices in place and this document provides guidance for review. For those without policies in place, these Guidelines (in addition to the associated Safeguarding Framework) will provide input to new polices.

These guidelines provide general information and advice to:

- proponents of wind farms (including single wind turbines); and
- planning authorities with jurisdiction over the approval of such structures.

These guidelines also provide specific advice on measures to reduce hazards to aviation, and how to implement them.

The guidelines are intended to provide information to proponents of wind farms and planning authorities to help identify any potential safety risks posed by wind turbine and wind monitoring installations from an aviation perspective.

The guidelines rely on an approach of risk identification and management to ensure risks to aviation are minimised in the most effective and efficient manner possible. It is not the intention to adopt an overly restrictive approach to wind farm development, rather to ensure risks are identified early and mitigation measures are able to be planned and implemented at an early stage.

## Roles and Responsibilities

State/Territory and local governments are primarily responsible for land use planning in the vicinity of all airports.

Australia's 19 major airports are under Australian Government planning control and are administered under the Airports Act 1996 (the Airports Act). Planning on other airports is undertaken by State, Territory Governments and Local Governments or private operators.

Commonwealth airports are protected from tall structures in the vicinity of airports based on standards established by the International Civil Aviation Organization (ICAO). These standards have been implemented in Australia by the Airports Act 1996 and the Airports (Protection of Airspace) Regulations 1996 which apply at leased Commonwealth airports, and by the Defence (Areas Control) Regulations 1989 which apply at Defence airports.

This legislation can be used to ensure wind farms hazardous to aviation are not erected in the vicinity of Commonwealth airports. The implementation of these guidelines will have the outcome of conferring a similar level of protection to non-Commonwealth airports.

Australia is a signatory to the Convention on International Civil Aviation. Signatories are obliged to implement ICAO Standards unless they lodge a formal difference. ICAO Annex 14 specifically addresses the issue of wind turbines. In summary,

ICAO has recommended the need for lighting of wind turbines if determined to be an obstacle.

Annex 14 includes a provision for an aeronautical study as to the need, or otherwise, for marking and/or lighting. This is consistent with provisions in Australia for risk-based assessments of potential hazards to aviation safety. These guidelines are consistent with ICAO Annex 14.

## Key considerations for managing risks to aviation safety of wind turbine installations (wind farms)/wind monitoring towers

The guidelines apply to:

(a) a single wind turbine;

(b) a group of wind turbines, referred to as a wind farm, which may be spread over a relatively large area; and

(c) wind monitoring towers.

The height of a wind turbine is defined as the maximum height reached by the tip of the turbine blades at their highest point above ground level. The marking and lighting described in this document addresses aviation requirements only. For offshore wind farms, in addition to these requirements, separate lighting and marking may be required for the safety of marine navigation.

Implementation of the guidelines will have the additional benefit of being applicable in areas away from airports to address the risk posed by wind farms to air navigation in those areas.

Adoption of the guidelines will ensure that aviation safety agencies can examine and address the risk to aviation safety from proposed wind turbine farms at the planning stage. This will enable the use of wind energy to continue to grow, while protecting aviation safety.

Wind farm operators should check if proposed wind turbines and wind monitoring towers will be located near areas where low flying operations are likely to be conducted, and if so, consider their duty of care to such activities.

## GUIDELINES FOR LAND USE PLANNERS AND DEVELOPERS TO MANAGE THE RISK TO AVIATION SAFETY OF WIND TURBINE INSTALLATIONS (WIND FARMS) /WIND MONITORING TOWERS

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

CASA should be notified through the nearest CASA Regional or Field Office. Location and contact details of CASA Aerodrome Inspectors may be obtained by calling CASA on 131 757. Airservices should be notified through the Airports Relations Team on 02-6268-4111. Defence should be notified through the Defence Support Group on 02-6266-8191.

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

30 metres or more above ground level for structures within 30km of an aerodrome; or

45 metres or more above ground level for structures located elsewhere.

The contact details for the RAAF AIS are: Tel- 03-9282-5750; ais.charting@defence.gov.au.

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

***Note:*** *Obstacle Limitation Surfaces are a complex of virtual surfaces associated with an aerodrome. They are designed to protect aircraft flying in good weather conditions from colliding with tall structures. PANS-OPS surfaces are designed to protect aircraft flying in poor weather conditions from colliding with tall structures. Aerodrome operators can provide details for their particular aerodrome.*

**Consultation**

Consultation with aviation stakeholders is strongly encouraged in the early stages of planning for wind turbine developments. This should include:

- early identification of any nearby certified or registered aerodromes;
- immediate consultation with any nearby aerodrome owners;
- preliminary assessment by an aviation consultant of potential issues;
- confirmation of the extent of the OLS for any nearby aerodromes;
- registration of all wind monitoring towers on the RAAF AIS database;
- consultation with local agricultural pilots and nearby unlicensed airstrip owners; and
- consultation with CASA and Airservices.

**Risk assessment**

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 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 structure(s) 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.

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.

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 military aerodromes, Defence, may object to a proposal if it will adversely impact Communications, Navigations 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.

**Marking of wind turbines in the vicinity of an aerodrome**

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.

**Lighting of wind turbines in the vicinity of an aerodrome**

Siting of wind turbines in the vicinity of an aerodrome is strongly discouraged, as these tall structures can pose serious hazards to aircraft taking-off and landing. Where a wind turbine is proposed that will penetrate the OLS of an aerodrome, the proponent should conduct an aeronautical risk assessment. 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 should be made available to CASA to assist assessment of any potential risk to aviation safety.

CASA may determine that the proposal is:

(a) 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

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

**Lighting of wind turbines not in the vicinity of an aerodrome, with a height of 150m or more**

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

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.

**Obstacle lighting standards for wind turbines**

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.

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.

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.

**Alternatives to fixed obstacle lighting**

In some circumstances, it may be feasible to install obstacle lights that are activated by aircraft in the vicinity. This involves the use of radar to detect aircraft within a defined distance that may be at risk of colliding with the wind farm. When such an aircraft is detected, the wind farm lighting is activated. This option may allow aviation safety risks to be mitigated where obstacle lighting is recommended while minimising the visual impact of the wind farm at night.

**Marking and lighting of wind monitoring towers**

Before developing a wind farm, it is common for wind monitoring towers to be erected for anemometers and other meteorological sensing instruments to evaluate the suitability or otherwise of a site. These towers are often retained after the wind farm commences operations to provide the relevant meteorological readings. These structures 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 including aerial agricultural operations. Wind farm proponents should take appropriate steps to minimise such hazards, particularly in areas where aerial agricultural operations occur. Measures to be considered should include:

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

- a flashing strobe light during daylight hours.

**Reporting of structures less than 150m in height**
There is no requirement for CASA to be notified if a proposed wind turbine or wind monitoring tower is less than 150m in height and does not infringe the OLS of an aerodrome. However, they should still be reported for inclusion in the national database of tall structures maintained by the Royal Australian Air Force (RAAF). Information on reporting of tall structures may be found in an advisory circular issued by CASA 'AC 139-08(0) Reporting of Tall Structures'.

**Voluntary provision of obstacle lights**
CASA's regulatory regime for obstacle lighting provides an appropriate level of safety for normal aircraft operations. Certain flying operations, by their nature, involve lower than normal flying, for example aerial agricultural spraying, aerial mustering, power line inspection, helicopter operations including search and rescue, some sports aviation, and some military training. Pilots conducting such operations require special training and are required to take obstacles into account when planning and conducting low flying operations.

In making decisions regarding the marking and lighting of wind farms and wind monitoring towers, wind farm operators should take into account their duty of care to pilots and owners of low flying aircraft.

**Turbulence**
Wind farm operators should be aware that wind turbines may create turbulence which noticeable up to 16 rotor diameters from the turbine. In the case of one of the larger wind turbines with a diameter of 125 metres, turbulence may be present two kilometres downstream. At this time, the effect of this level of turbulence on aircraft in the vicinity is not known with certainty. However, wind farm operators should be conscious of their duty of care to communicate this risk to aviation operators in the vicinity of the wind farm. CASA will also raise awareness of this risk with representatives of aerial agriculture, sport aviation and general aviation.

# Appendix II

# Aerial Application Plan Guide

***AERIAL APPLICATION MANAGEMENT TOOLS***

**Application Management Plan (AMP)**
An application management plan provides the aerial applicator with a generic application management tool.

Some application management plans are developed by the client in consultation with the applicator and agronomist before the season commences. This is the case with those growers who participate in Cotton Australia's 'Best Management Practice Program'.

In some situations a pre-season meeting with each regular client will be the best way of developing such a plan.

In other cases, especially top-dressing, this may simply be impractical or unachievable, but nonetheless, every application should have a plan.

**Planning an application**
The key components of an AMP are:

**a.** recent confirmed map, with special attention paid to power lines, other hazards, dwellings, public roads, environmentally sensitive areas and susceptible crops downwind.

**b.** the map is checked against the standard application order form.

**c.** contingencies for different wind directions.

**d.** chemical label or product advice checked to ensure the application is legal and can be carried out in the current conditions.

**e.** equipment required (droplet size needed) to ensure control of drift.

**f.** other considerations such as the possibility of workers in the field, neighbours etc.

Operational planning then follows. This includes the safety issues raised in this manual, such as potential 'escape' routes, position of the sun etc.

Establish an awareness zone around every paddock – potential problems can often be some distance away.

There are CASA requirements, as well as laws in many states and on some labels, regarding mandatory buffers, no-spray zones and neighbour notification, especially around schools and dwellings.

The AMP is used in conjunction with the agricultural chemical label, the completed standard spray order form and a detailed map to ensure the application can take place safely, legally and effectively.

**An accurate map is essential**
The importance of an accurate and up-to-date map cannot be over-emphasised.

Prior warning of the existence of hazards and all other relevant information pertinent to the application is the lynch-pin of sound planning and risk management.

If, for whatever reason, you are operating without a good map you are really leaving your future to chance. Maps must be as comprehensive as possible and must be checked before each application to ensure they are a true reflection of what really exists. This can only be achieved by interrogating the client or their representative as to any changes that might affect the application.

Pilots should also consider other tools now available, such as GIS information or Google Earth to help them create a mental picture of the job and build situational awareness.

**Pre-Application Aerial Inspection**
The last opportunity to ensure safe operations is the pre-application aerial inspection, conducted from a safe height.

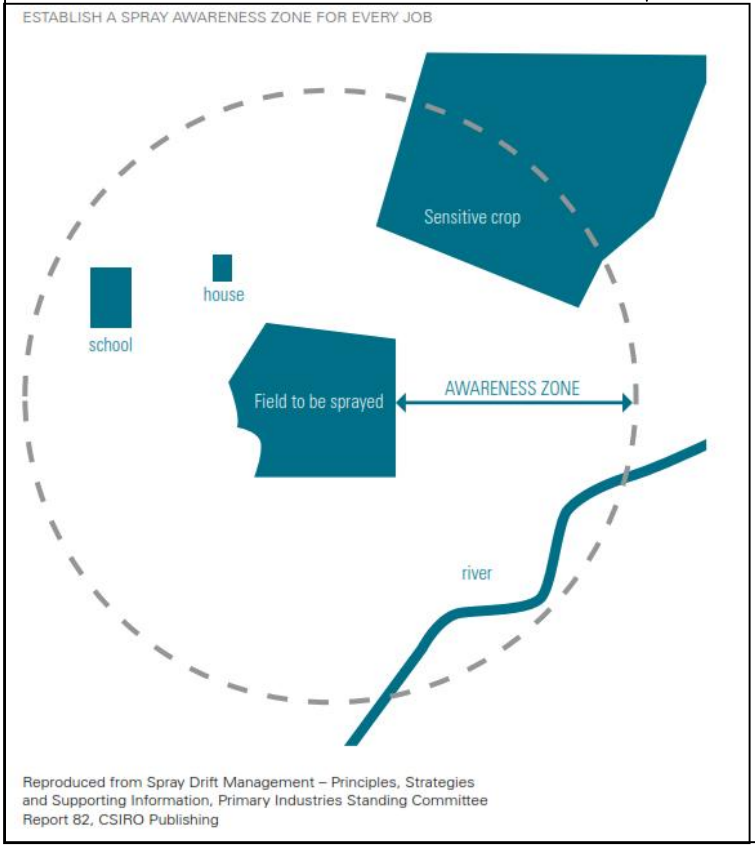
The pilot conducting the aerial inspection should confirm all hazards on the map, and then look for any additional hazards or relevant issues that did not make it onto the map. Only by constantly checking and rechecking can the conscientious application pilot be comfortable that they have taken all the necessary precautions to ensure a safe job.

**Your Key Aerial Application Checklist**
The following key aerial application checklist has been used for many years and incorporates the issues you must check before proceeding with an application task, during an application, and when returning to an application after reloading, refuelling or some other break, no matter how short.

Many of the items in 'WISHSTANDE' can be completed at the planning stage of an application, in order to free up maximum attention by the pilot. If you have already dealt with many of these issues at the planning stage, you will be better able to focus on the matters that are critical to safety during the execution phase of an application.

**W** wind direction and strength
**I** Identification of treatment area
**S** sun position and possibility of glare
**H** hazards, wires, obstruction, turbulence
**S** susceptible crops
**T** terrain, surface, slope, contour banks
**A** application equipment, alignment (gps)
**N** nuisance to stock and occupied buildings
**D** direction of treatment
**E** emergency landing areas

**EXTRA** the extra treatment area safety inspection after refuelling or reloading.

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FURTHER INFORMATION
If you would like more information on the vital and responsible role the aerial application industry plays:

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