MAY 2012

AERONAUTICAL IMPACT AND NIGHT LIGHTING ASSESSMENT

PALING YARDS WIND FARM

Prepared for Union Fenosa Wind Australia Pty Ltd

AVIATION PROJECTS

AVIATION PROJECTS

DOCUMENT CONTROL

Document Title: Aeronautical Impact and Night Lighting Assessment - Paling Yards Wind Farm

Reference: 100403-01

Release Date: 17 May 2012

Prepared by: Keith Tonkin

Reviewed by: Patrick Hill

Released by: Keith Tonkin

Revision History: Release

Revision History

Version	Description	Transmitted	Reviewed by	Date
0.1	First Draft	14 October 2011	Union Fenosa	14 February 2012
0.2	Final draft for client review	15 May 2012	Union Fenosa	16 May 2012
1.0	Final for release	17 May 2012		

COPYRIGHT AND DISCLAIMER NOTICE

TABLE OF CONTENTS

LIST OF FIGURES

LIST OF TABLES

ACRONYMS

AAAA	Aerial Agriculture Association of Australia
AGL	above ground level
AIS	Aeronautical Information Service
ALA	aeroplane landing area
ALARP	as low as reasonably practicable
A/SMGCS	Advanced Surface Movement Guidance and Control System
CAR	Civil Aviation Regulation(s) (1988)
CASA	Civil Aviation Safety Authority
CASR	Civil Aviation Safety Regulation(s) (1998)
DGRs	Director General's requirements
HF	high frequency
ICAO	International Civil Aviation Organization
MOS	Manual of Standards
OLS	obstacle limitation surface
PANS-OPS	Procedures for Air Navigation Services - Aircraft Operations
PRM	precision radar monitoring
RFS	Rural Fire Service
PYWF	Paling Yards Wind Farm
UFWA	Union Fenosa Wind Australia Pty Ltd
VHF	very high frequency

UNITS OF MEASUREMENT

ft	feet	(1ft = 0.3048 m)
km	kilometres	(1 km = 0.5399 nm)
m	metres	(1 m = 3.281 ft)
nm	nautical miles	(1 nm = 1.852 km)

EXECUTIVE SUMMARY

Introduction

Union Fenosa Wind Australia Pty Ltd (UFWA) is part of an international energy group proposing to develop a new wind farm near Paling Yards in New South Wales.

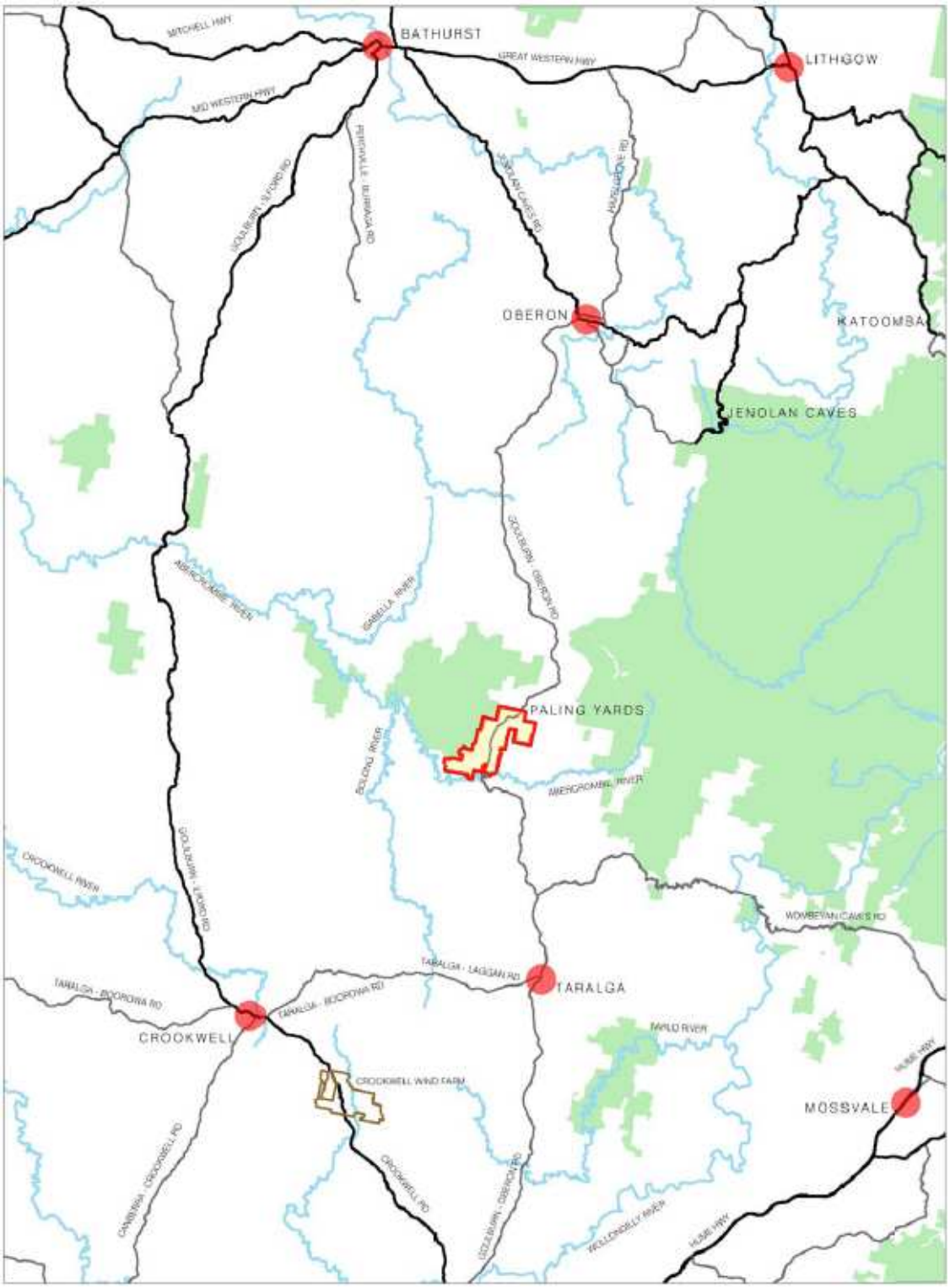
The site is located on the western extent of the Great Diving Range, 60 km south of Oberon, 60 km north of Goulburn in NSW and approximately 140 km west of Sydney.

The surrounding area consists predominantly of large rural properties and National Park with the eastern edge of the site in the proximity of the Kanangra Boyd National Park and Abercrombie National Park to the west and south. The site is situated in the Oberon Local Government Area (LGA).

The proposal will comprise a number of elements, including:

- up to 59 individual wind turbines standing up to 175 m at top of blade with a capacity of up to 4.5 MW each;
- up to 59 individual kiosks for the housing of 33 kV Transformers and 33 kV Switchgears and associated control systems to be located in the vicinity of the wind turbine towers (in some turbine models the equipment is integrated within the tower or nacelle);
- upgrades to local road infrastructure including up to six access points from Abercrombie Road;
- internal unsealed tracks for vehicle access to turbines and infrastructure;
- an underground electrical and communication cable network linking turbines to each other and the proposed substation;
- up to three wind monitoring masts fitted with various instruments such as anemometers, wind vanes, temperature gauges and potentially other electrical equipment;
- a temporary batching plant to supply concrete for the foundations of the turbines and other associated structures;
- obstacle lighting of selected turbines (if deemed necessary);
- removal of native vegetation within the site and en route to the substation (if required);
- vegetation planting to provide screening;
- wind farm and substation control room and facilities buildings;
- an electrical substation and overland connection to transmission lines;
- a connection to the Mt Piper to Bannaby 500 kV transmission line which bypasses the north and east of the site, and
- all ancillary and incidental uses and activities.

A location plan is provided in the figure below.


BATHURST
LITHGOW
OBERON
KATOOMBA
JENOLAN CAVES
PALING YARDS
TARALGA
CROOKWELL
CROOKWELL WIND FARM
MOSSVALE
MITCHELL HWY
GREAT WESTERN HWY
MID WESTERN HWY
GOULBURN - OBERON RD
ABERCROMBIE RIVER
ISABELLA RIVER
BOLONG RIVER
WIAGOMBIL RIVER
CROOKWELL RIVER
TARALGA - BOOROWA RD
WOMBEYAN CAVES RD
WILD RIVER
HUME HWY
CROOKWELL RD
WOLLONDILLY RIVER

Following receipt of the major project application for the proposed Paling Yards Wind Farm, the Director-General of the NSW Department of Planning provided Director-General's requirements (DGRs) under covering letter dated 6 May 2010 for the preparation of the Environmental Assessment.

This report, consistent with the DGRs, considers aviation aspects associated with visual amenity, hazard/risk and consultation.

UFWA has also requested assessment of cumulative impacts associated with the proposed wind farm's proximity to nearby existing and approved wind farms. This assessment is provided in the Conclusions section.

Methodology

In undertaking this task, the following activities were undertaken:

- the scope and deliverables were discussed with and agreed by the UFWA Project Manager;
- a site visit was conducted on 4 April 2011;
- a desktop review of supplied materials was conducted;
- relevant regulatory requirements and sources of information were reviewed;
- an assessment of the PANS-OPS and OLS was prepared and forwarded to Airservices Australia, Bathurst Regional Council (Bathurst Airport), Civil Aviation Safety Authority, Goulburn Mulwaree Council (Goulburn Airport), Oberon Council (Oberon aerodrome), and Upper Lachlan Shire Council (Crookwell aerodrome) for consideration;
- other stakeholders, including the Aerial Agriculture Association of Australia, Commonwealth Department of Defence and NSW Rural Fire Service were consulted in writing and/or by telephone interview as applicable; and
- a report was prepared and finalised.

Conclusions

A summary of the conclusions drawn in this report is provided for each area of consideration below.

1. Cumulative impacts

The proposed wind farm is relatively remote from other existing or approved wind farms. According to the NSW Department of Planning and Infrastructure NSW Wind Farm map dated 18 April 2011 and accessed 21 October 2011, the nearest approved wind farm is located at Taralga, some 25 km distant. For this reason it is assessed that there is no significant cumulative impact arising from nearby existing or approved wind farms.

2. Obstacle lighting and marking

The need for obstacle marking and lighting of wind turbines, wind monitoring towers and transmission lines was assessed.

a. Requirement for lighting of turbines

If the turbines extend to a height of between 110 m AGL and less than 150 m AGL, CASA has not assessed them as being hazardous objects, nor does it have specific authority to require obstacle lighting for wind farms not in the vicinity of an aerodrome, so it is concluded that there is no requirement for lighting under the provisions of MOS 139 Chapter 9.

If the turbines extend to a height of between 150 m and 175 m AGL, CASA has assessed that they are not obstacles to aviation within the vicinity of an aerodrome, and advised that it does not have any authority to regulate in respect to wind farms when the location is proposed to be away from the vicinity of an aerodrome. CASA did not undertake an aeronautical study, but encourages the proponent to undertake such a study.

As the proposed turbines will be located more than 30 km from an aerodrome but will be higher than 45 m AGL, they must be reported to RAAF AIS. This requirement was also mentioned in the letter from CASA dated 4 August 2011. This action should occur once the final layout is confirmed at the completion of the Environmental Assessment process and prior to construction.

With respect to ICAO Annex 14 Section 6.4.1:

- if the turbines have a blade tip height of less than 150 m, since CASA has determined that they are not obstacles to aviation within the vicinity of an aerodrome and has advised that it does not presently have the authority to require the lighting of obstacles that are not in the vicinity of an aerodrome then it is concluded that there is no requirement for them to be lighted; and
- if the turbines have a blade tip height of between 150 m and 175 m AGL, since CASA has not undertaken an aeronautical study, they should be considered obstacles and therefore require obstacle lighting. However, CASA also advised that it encourages proponents to undertake an aeronautical study.

In the circumstances, it is recommended that an aeronautical study of the requirement for obstacle lighting, in the form of a detailed and thorough risk assessment using internationally recognised standards, should be prepared once the final approved turbine layout and design turbine height are known.

By this time CASA may have established regulation that provides protection and risk mitigation for obstacles that are not in the vicinity of aerodromes.

b. Turbine lighting design

If lighting is required, lights are recommended for turbines 1, 5, 6, 9, 11, 15, 17, 20, 21, 23, 24, 30, 31, 35, 36, 39, 42, 44, 47, 49, 51, 52, 55, 58 and 60.

This lighting design is subject to confirmation of the final turbine layout as any changes proposed could potentially affect which turbines should be lit in accordance with the 900 m interval consideration.

c. Light characteristics

If obstacle lighting is required, installed lights should be designed according to the criteria set out in the applicable regulatory material. A summary of generally accepted design characteristics is provided below:

- two flashing red medium intensity obstacle lights should be provided;
- the light fixtures should be mounted sufficiently above the surface of the nacelle so that the lights are not obscured by the rotor hub, and at a horizontal separation to ensure an unobstructed view of at least one of the lights by a pilot approaching from any direction;
- both lights should flash simultaneously; and
- the characteristics of the obstacle lights should be in accordance with the applicable standards in MOS 139.

To ensure the ongoing availability of obstacle lights (if required), a monitoring, reporting and maintenance program will need to be established in accordance with this guidance.

d. Visual impact of night lighting

Although MOS 139 specifies a requirement for high intensity lighting for obstacles in excess of 150 m in height, the Annex 14 requirement, specifically intended for wind farms, is for medium intensity lighting. In the interest of minimising visual impact, it is therefore proposed that if obstacle lighting is required, medium intensity lighting will be used regardless of the final turbine height.

To minimise the visual impact on the environment, some shielding of the obstacle lights is permitted, provided it does not compromise their operational effectiveness.

Shielding may be provided to restrict the downward component of light to either, or both, of the following:

a) such that no more than 5% of the nominal intensity is emitted at or below 5 degrees below horizontal; and

b) such that no light is emitted at or below 10 degrees below horizontal.

Where two lights are mounted on a nacelle, dynamic shielding or light extinction of one light at a time, for the period that a blade is passing in front of the light, is permissible, providing that at all times at least one light can be seen, without interruption, from every angle of azimuth.

All obstacle lights on a wind farm should be synchronised so that they flash simultaneously.

A relatively small area on the back of each blade near the rotor hub may be treated with a different colour or surface treatment, to reduce reflection from the rotor blades of light from the obstacle lights, without compromising the daytime conspicuity of the overall turbine.

e. Marking of turbines

ICAO Annex 14 Vol 1 Section 6.4.2 recommends that the rotor blades, nacelle and upper 2/3 of the supporting mast of the wind turbines should be painted white, unless indicated by an aeronautical study.

It is generally accepted that, as an alternative to white, an off-white or light grey colour will provide sufficient contrast with the surrounding environment to maintain an acceptable level of safety while lowering visual impact to the neighbouring residents.

f. Wind monitoring towers

Consideration could be given to marking the wind monitoring towers according to the requirements set out in MOS 139 Section 8.10 Obstacle Markings; specifically:

8.10.2.6 Masts, poles and towers must be marked in contrasting bands with the darker colour at the top, as shown in Figure 8.10-3. The bands must be perpendicular to the longest dimension and have a width approximately 1/7 of the longest dimension or 30 m, whichever is less.

8.10.2.8 Wires or cable obstacles must be marked using three-dimensional coloured objects such as spheres and pyramids, etc; of a size equivalent to a cube with 600 mm sides, spaced 30 m apart.

g. Power lines

Overhead transmission lines and/or supporting poles that are located where they could adversely affect aerial application operations should be marked in accordance with MOS 139 Section 8.10 Obstacle Markings; specifically:

8.10.2.8 Wires or cable obstacles must be marked using three-dimensional coloured objects such as spheres and pyramids, etc; of a size equivalent to a cube with 600 mm sides, spaced 30 m apart.

Alternatively, consideration could be given to installing the AAAA endorsed power line marker reportedly developed in conjunction with Country Energy.

h. Future regulatory requirements and guidance

Consideration of the need for obstacle lighting and the final layout and design specification is subject to confirmation of applicable regulatory requirements and guidance. This consideration, in the form of an aeronautical study (a detailed and thorough risk assessment using internationally recognised standards) as previously described, should occur once the final layout is known and prior to installation of the lights during construction.

3. Aeronautical impacts

The proposed development does not impose any significant risk to normal flying operations provided aircraft are operated in compliance with applicable regulatory and operational control requirements and with the application of good airmanship.

a. Nearby aerodromes and aircraft landing areas

The Bell ALA remains operational, although the current aerial agriculture operator Mr Fred Fahey has said that he would not be prepared to operate fixed wing aircraft on the property once turbines are installed. Rotary wing aircraft remain a valid option for aerial agriculture operations. The Johnston ALA is considered disused.

There are a number of larger aerodromes at greater distance from the wind farm, none of which will be impacted.

b. Obstacle limitation surfaces

There will be no adverse impact by the proposed wind farm on obstacle limitation surfaces.

c. PANS-OPS surfaces

There will be no adverse impact by the proposed wind farm on PANS-OPS surfaces.

d. Aircraft operating heights

To avoid the wind farm, aircraft will have to fly at a higher altitude or divert around it.

e. Defined air traffic routes

The proposed wind farm will not affect any lowest safe altitudes (LSALTs) for air routes in the area.

f. Radar interference

There will be no adverse impact by the proposed wind farm on Defence or Airservices Australia radar systems.

g. Communications systems

There will be no adverse impact by the proposed wind farm on aviation-related communications systems.

h. Navigation aids

There will be no adverse impact by the proposed wind farm on aviation-related navigation aids.

i. Aerial application of agricultural fertilisers and pesticides

The proposed wind farm will most likely prevent fixed wing aerial agricultural operations on the wind farm site, whilst the viability of conducting these operations on properties adjacent to the wind farm would have to be assessed on an individual basis.

It is reasonable to conclude that safe aerial application operations would be possible on properties neighbouring the proposed wind farm, subject to final turbine locations, and subject to a case-by-case assessment.

The use of helicopters enables aerial application operations to be conducted in closer proximity to obstacles than would be possible with fixed wing aircraft due to their greater manoeuvrability.

j. Electric and magnetic fields

There will be no adverse impact by the proposed wind farm on aviation-related electric and magnetic fields.

k. Bushfires

Any fire fighting activities in the vicinity of the proposed wind farm by either fixed or rotary wing aircraft, including in the neighbouring national parks would need to be conducted in consideration of the location of the wind turbines and monitoring masts. To this end it is important that the location of the wind turbines and monitoring masts are made available to RFS and aerial agriculture operators.

Notwithstanding that aerial fire fighting operations will potentially be restricted in the vicinity of the proposed wind farm, there is still a valid (ground-based) means of fighting bushfires on and near the properties on which the wind farm is proposed to be located.

4. Consultation

An appropriate and justified level of consultation was undertaken with the following parties:

- Aerial Agriculture Association of Australia;
- Airservices Australia;
- Bathurst Regional Council;
- Civil Aviation Safety Authority;
- Commonwealth Department of Defence;
- Goulburn Mulwaree Council;
- NSW Rural Fire Service;
- Oberon Council;
- Upper Lachlan Shire Council; and
- the local community and landowners.

Recommendations

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

Notification of tall structures

1. Final (approved) turbine coordinates and elevations should be provided to RAAF AIS via the online vertical obstruction database: http://www.raafais.gov.au.obstr_form.htm.

Marking of turbines

2. The rotor blades, nacelle and the supporting mast of the wind turbines should be painted white, off-white or a light grey colour.

Lighting of turbines

3. If the wind turbines to be installed will have a blade tip height lower than 150 m AGL, no obstacle lighting is necessary.
4. If the wind turbines to be installed will have a blade tip height of 150 m or more AGL, obstacle lighting may be required.
5. An aeronautical study to determine the requirement for obstacle lighting, in the form of a detailed and thorough risk assessment using internationally recognised standards, should be prepared once the final approved turbine layout and design turbine height are known.
6. UFWA may consider other factors in its decision as to whether obstacle lights should be installed.
7. If lighting is required, lights are recommended for turbines 1, 5, 6, 9, 11, 15, 17, 20, 21, 23, 24, 30, 31, 35, 36, 39, 42, 44, 47, 49, 51, 52, 55, 58 and 60.
8. Obstacle lighting should be designed in accordance with the characteristics specified in ICAO Annex 14 Vol 1 Chapter 6 and MOS 139 Chapter 9, while minimising visual impact.

Marking of wind monitoring towers

9. Consideration should be given to marking the wind monitoring towers according to the requirements set out in MOS 139 Section 8.10.

Marking of electricity transmission lines

10. Overhead transmission lines and/or supporting poles that are located where they could adversely affect aerial application operations should be marked in accordance with MOS 139 Section 8.10.
11. Alternatively, consideration could be given to installing the AAAA endorsed power line marker reportedly developed in conjunction with Country Energy.

1. INTRODUCTION

1.1. Situation

Union Fenosa Wind Australia Pty Ltd (UFWA) is part of an international energy group proposing to develop a new wind farm near Paling Yards in New South Wales.

The site is located on the western extent of the Great Diving Range, 60 km south of Oberon, 60 km north of Goulburn in NSW and approximately 140 km west of Sydney.

The surrounding area consists predominantly of large rural properties and National Park with the eastern edge of the site in the proximity of the Kanangra Boyd National Park and Abercrombie National Park to the west and south. The site is situated in the Oberon Local Government Area (LGA).

The proposal will comprise a number of elements, including:

- up to 59 individual wind turbines standing up to 175 m at top of blade with a capacity of up to 4.5 MW each;
- up to 59 individual kiosks for the housing of 33 kV Transformers and 33 kV Switchgears and associated control systems to be located in the vicinity of the wind turbine towers (in some turbine models the equipment is integrated within the tower or nacelle);
- upgrades to local road infrastructure including up to six access points from Abercrombie Road;
- internal unsealed tracks for vehicle access to turbines and infrastructure;
- an underground electrical and communication cable network linking turbines to each other and the proposed substation;
- up to three wind monitoring masts fitted with various instruments such as anemometers, wind vanes, temperature gauges and potentially other electrical equipment;
- a temporary batching plant to supply concrete for the foundations of the turbines and other associated structures;
- obstacle lighting to selected turbines (if deemed necessary);
- removal of native vegetation within the site and en route to the substation (if required);
- vegetation planting to provide screening;
- wind farm and substation control room and facilities buildings;
- an electrical substation and overland connection to transmission lines;
- a connection to the Mt Piper to Bannaby 500 kV transmission line which bypasses the north and east of the site, and
- all ancillary and incidental uses and activities.

A location plan is provided at Figure 1.

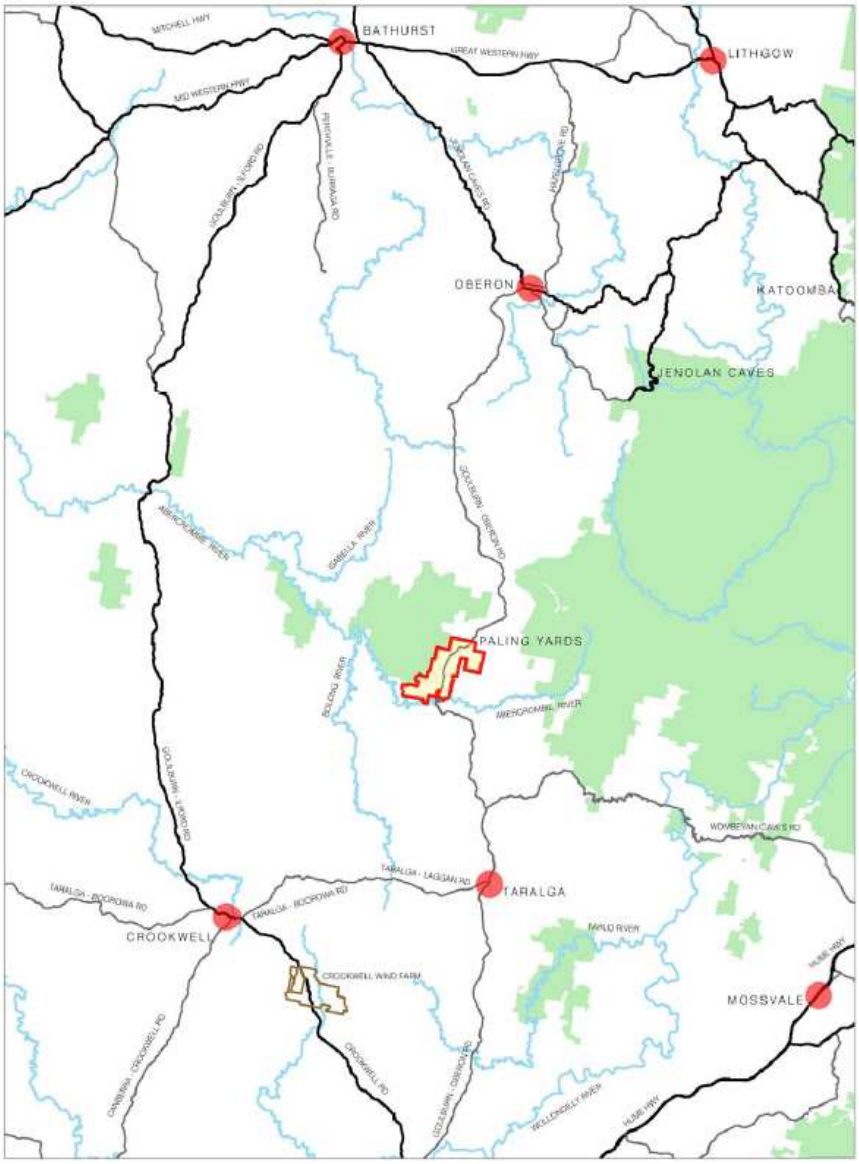


Figure 1 Location Plan

The options for location of the transmission lines are shown in Figure 2 and Figure 3. Larger scale copies of these maps are provided at **Annexure 1**.

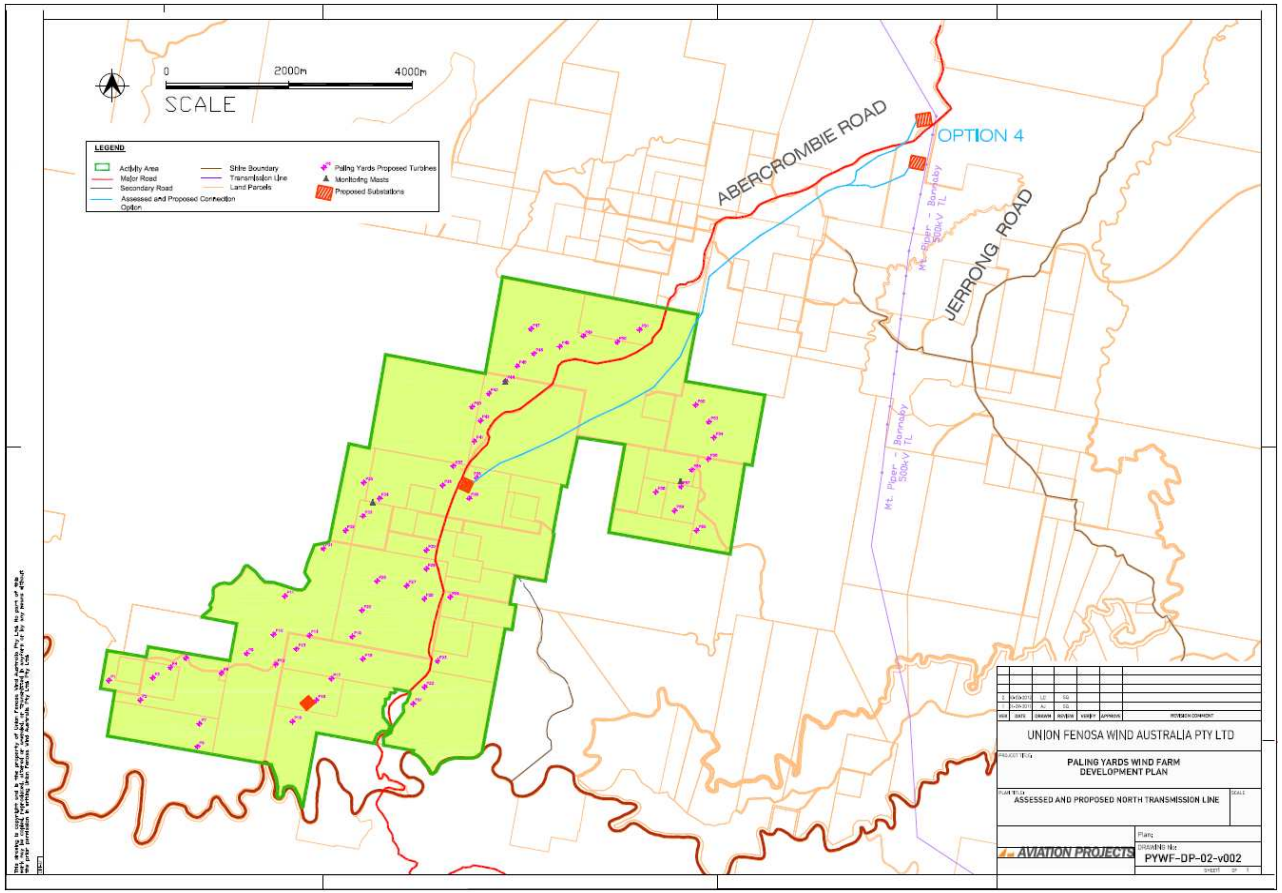


Figure 2 Assessed and proposed northern transmission line route

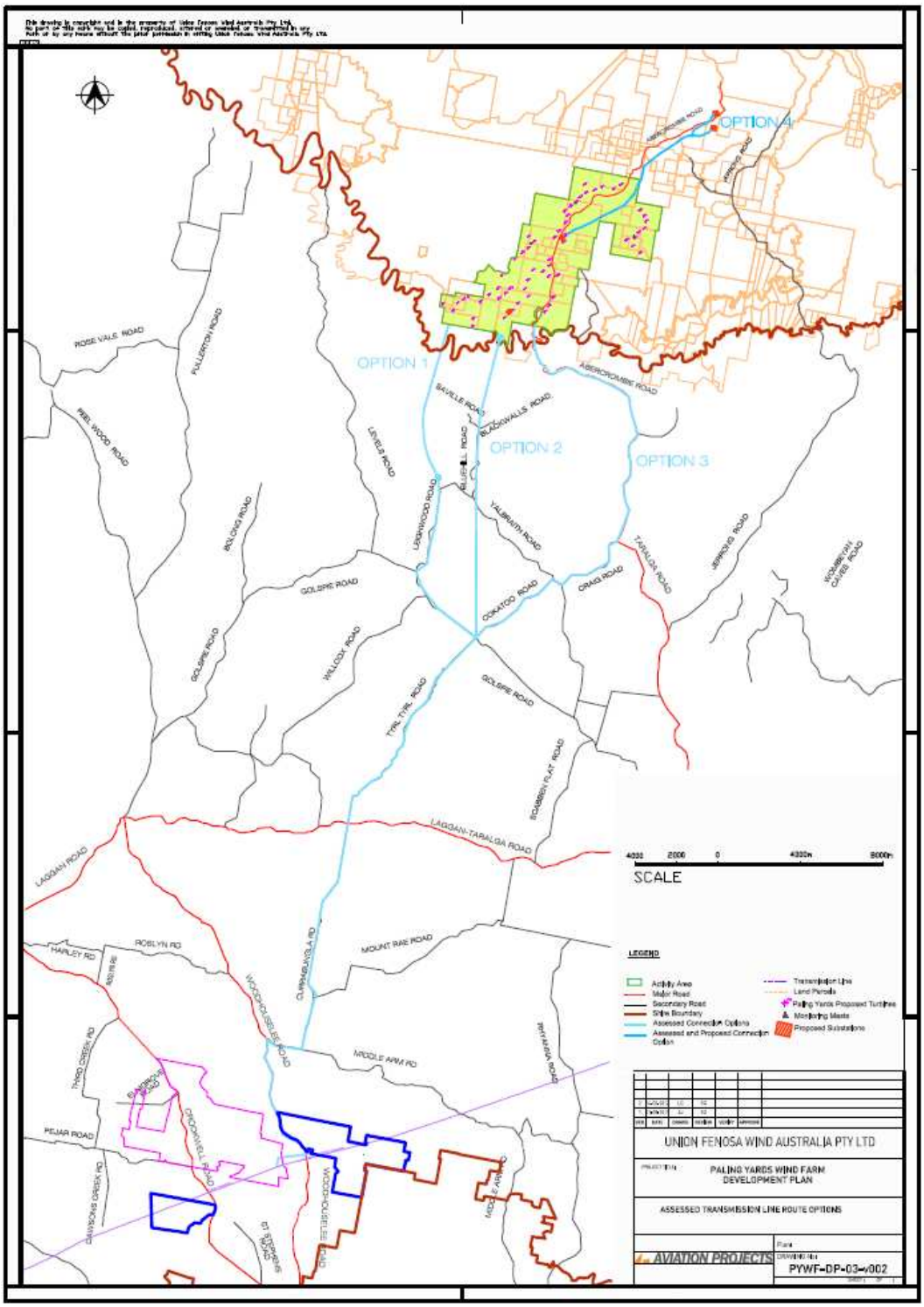


Figure 3 Assessed southern transmission line options (no longer proposed)

1.2. Director-General's Requirements (DGRs)

Following receipt of the major project application for the proposed Paling Yards Wind Farm, the Director-General of the NSW Department of Planning provided Director-General's requirements (DGRs) under covering letter dated 6 May 2010 for the preparation of the Environmental Assessment.

This report, consistent with the DGRs, considers aviation aspects associated with visual amenity, hazard/risk and consultation. The relevant provisions of the DGRs are extracted below, along with details of where the required information is contained in this report.

1.2.1. Visual Impacts

'assess the impact of ... night lighting from the wind farm,'

The impact of night lighting is discussed in the Obstacle Marking and Lighting Section 4.

1.2.2. Hazard/Risks

'Hazard/Risks– the EA must include an assessment of the potential impacts on aviation safety including the need for aviation hazard lighting considering nearby aerodromes and aircraft landing areas, defined air traffic routes, aircraft operating heights, radar interference, communication systems, and navigation aids. In addition, the EA must assess the impact of the turbines on the safe and efficient aerial application of agricultural fertilisers and pesticides in the vicinity of the turbines and transmission line[s]. Possible effects on telecommunications systems must be identified. Potential hazards and risks associated with electric and magnetic fields (EMFs) (with reference to Australian Radiation Protection and Nuclear Safety Agency standards) and bushfires must be assessed.'

The identified hazards are discussed under various headings in the Aeronautical Impacts Section 3.

1.2.3. Consultation

'The Proponent must undertake a consultation program as part of the environmental assessment process, including consultation with, but not necessarily limited to, the following parties:'

The following parties, including those listed in the DGRs, were formally consulted in the preparation of this assessment:

- Aerial Agriculture Association of Australia;
- Airservices Australia;
- Bathurst Regional Council;
- Civil Aviation Safety Authority;
- Commonwealth Department of Defence;
- Goulburn Mulwaree Council;
- NSW Rural Fire Service;
- Oberon Council;

- Upper Lachlan Shire Council; and
- the local community and landowners.

Details of the consultation activities undertaken are provided in the Consultation Section.

UFWA has also requested assessment of cumulative impacts associated with the proposed wind farm's proximity to nearby existing and approved wind farms. This assessment is provided in the Conclusions section.

1.3. Purpose of task

The purpose of this report, consistent with the DGRs, is to consider aviation aspects of the proposed Paling Yards Wind Farm associated with visual amenity, hazard/risk and consultation, as well as cumulative impacts, and provide conclusions and recommended actions.

1.4. Report structure

This report is structured around the following areas of consideration:

- Introduction;
- Stakeholder Consultation;
- Aeronautical Impacts;
- Obstacle Marking and Lighting;
- Conclusions; and
- Recommendations.

1.5. Methodology

In undertaking this task, the following activities were undertaken:

- The scope and deliverables were discussed with and agreed by the UFWA Project Manager;
- A site visit was conducted on 4 April 2011;
- A desktop review of supplied materials was conducted;
- Relevant regulatory requirements and sources of information were reviewed;
- An assessment of the PANS-OPS and OLS was prepared and forwarded to Airservices Australia, Bathurst Regional Council (Bathurst Airport), Civil Aviation Safety Authority, Goulburn Mulwaree Council (Goulburn Airport), Oberon Council (Oberon aerodrome), and Upper Lachlan Shire Council (Crookwell aerodrome) for consideration;
- Other stakeholders, including the Aerial Agriculture Association of Australia, Commonwealth Department of Defence and NSW Rural Fire Service were consulted in writing and/or by telephone interview as applicable; and
- A report was prepared and finalised.

1.6. Material provided

Material provided by UFWA for preparation of this assessment included:

- Paling Yards, DGRs with Cover Letter dated 6 May 2010;
- Paling Yards, Preliminary Environmental Assessment v5 dated 8 April 2010;
- Paling Yards, Proposed Turbine Layout (SQ);
- Paling Yards, Provisions relating to DGRs (various);
- Paling Yards, Transmission line options;
- Paling Yards, Turbine Coordinates (AJ); and
- Paling Yards, Proposed design 500 kV poles.

1.7. References

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

- Aerial Agriculture Association of Australia, Windfarm Policy and Powerlines Policy, both dated March 2011;
- Aeronautical Information Package; including AIP Book effective 25 August 2011, and En Route Supplement Australia dated 25 August 2011;
- AS/NZS ISO 31000:2009 *Risk management—Principles and guidelines*, Standards Australia;
- Civil Aviation Safety Authority, *Civil Aviation Regulations 1988 (CAR)*, as amended;
- Civil Aviation Safety Authority, *Civil Aviation Safety Regulations 1998* (CASR), First Edition January 2003 as amended;
- Civil Aviation Safety Authority, *Manual of Standards Part 139 – Aerodromes*, version 1.5 dated May 2010;
- Civil Aviation Safety Authority (Malcolm McGregor, Manager Airways and Aerodromes, Airspace and Aerodrome Regulation), letter dated 4 August 2011;
- Civil Aviation Safety Authority (Malcolm McGregor, Manager Airways and Aerodromes, Airspace and Aerodrome Regulation), dated 22 September 2011
- Environment Protection and Heritage Council, *National Wind Farm Development Guidelines DRAFT*, July 2010;
- International Civil Aviation Organization (ICAO) Doc 8168 *Procedures for Air Navigation Services—Aircraft Operations* (PANS-OPS);
- ICAO Standards and Recommended Practices, *Annex 14—Aerodromes*; and
- other references as noted.

2. STAKEHOLDER CONSULTATION

Consultation requirements were specified in the DGRs. In particular, there was a requirement to clearly describe the consultation process and indicate the issues raised by stakeholders during consultation and how these matters have been addressed.

Details and results of the consultation activities are provided in the table below.

Copies of the applicable correspondence are provided at **Annexure 5**.

Agency/Contact	Activity/Date	Response/Date	Issues Raised During Consultation	Action Proposed
Bathurst Regional Council (Bathurst Aerodrome)	1 July 2011 Letter to General Manager [Copy at Annexure 5]	26 August 2011 Telecon Richard Denyer – Manager Development Assessment No formal response to be provided.	No issues.	Nil.
Goulburn Mulwaree Council (Goulburn Aerodrome)	1 July 2011 Letter to General Manager [Copy at Annexure 5]	28 September 2011 Telecon Richard Davies – Manager Develop Control No formal response to be provided.	No issues.	Nil.
Oberon Council (Oberon Aerodrome)	1 July 2011 Letter to General Manager [Copy at Annexure 5]	26 August 2011 Telecon Gary Wallace – Director of Development No formal response to be provided.	No issues.	Nil.

Agency/Contact	Activity/Date	Response/Date	Issues Raised During Consultation	Action Proposed
Upper Lachlan Shire Council (Crookwell Aerodrome)	1 July 2011 Letter to General Manager [Copy at Annexure 5]	28 Sep 11 Telecon Phil Newham – Director of Works and Operations No formal response to be provided.	No issues.	Nil.
NSW Rural Fire Service	25 August 2011 Telephone conversation with Development Assessment and Planning Officer, NSW – Doug Stevens	25 August 2011 When asked whether the RFS would like the opportunity to respond via a letter or whether they were happy with this discussion to be representative of their views, Mr Stevens was happy with the phone discussion and stated that once the development application was submitted RFS would respond if required.	Mr Stevens considered wind farms to be an advantage to RFS operations generally, because they required a cleared area, a water supply, and provided improved access to the property. He noted that the high voltage and other transmission wires can be a problem to aircraft particularly when low flying and in low visibility conditions.	Nil.

AVIATION PROJECTS

Agency/Contact	Activity/Date	Response/Date	Issues Raised During Consultation	Action Proposed
Airservices Australia	4 June 2010 Letter to Aviation Relations Manager, Corporate and International Affairs – Steve Tattum [Copy at Annexure 5]	27 July 2011 Email from Airport Development Assistant – Carly Fiumara [copy at Annexure 5]	At a maximum height of 1221m (4006ft) AHD the proposed Wind Farm will not affect any sector or circling altitude, nor any approach or departure at any registered aerodrome in the area. It also will not affect any lowest safe altitudes (LSALTS) for air routes in the area. If applicable to the airport, no assessment was conducted in relation to any other procedures made available by another Part 173 Certified Designer. This proposed wind farm to a max height of 1221m AHD will not impact the performance of Precision/Non-Precision Nav Aids, HF/VHF Comms, A-SMGCS, Radar, PRM or Satellite/Links.	Nil.
	25 August 2011 Email to Airport Development Assistant – Carly Fiumara Query regarding certified aerodromes and Part 173 designers. [Copy at Annexure 5]	29 August 2011 Email from Airport Development Assistant – Carly Fiumara [copy at Annexure 5]	I have just sought clarification from Procedures Design regarding the language used in our reply. The second sentence should in fact read "registered or certified", so in answer to your question, yes, Paling Yards wind farm was assessed for any impacts to Bathurst Aerodrome. As for your second query, to discern whether other instrument procedures (other than those designed by Airservices) are in use, please contact Airways and Aerodromes within CASA.	Nil.
Commonwealth Department of Defence	1 July 2011 Letter to Director, Land Planning and Spatial Information [Copy at Annexure 5]	29 August 2011 Letter from Director Land Planning and Spatial Information [Copy at Annexure 5]	Defence has assessed the proposal with respect to any impact on aircraft safety, military low flying and radar interference and can advise that it has no concerns with the Paling Yards Wind Farm at this time. Defence requests reporting of the location of all turbines and wind monitoring masts to RAAF AIS, once the design is finalised (Prior to construction) and	RAAF AIS provided as constructed details of wind monitoring masts via online form and email on 30 July 2010, before consultation in July 2011.

Agency/Contact	Activity/Date	Response/Date	Issues Raised During Consultation	Action Proposed
			again when construction is complete.	Final turbine locations to be provided when known.
Civil Aviation Safety Authority	1 July 2011 Letter to Executive Manager, Airspace and Aerodrome Regulation - Peter Cromarty [Copy at Annexure 5]	4 August 2011 Letter from Manager, Airways and Aerodromes – Malcolm McGregor [Copy at Annexure 5]	Identify any certified or registered aerodromes within 30 km of the boundaries of the proposed wind farm and consult with the aerodrome operators to determine any impact on Obstacle Limitation Surfaces at such aerodromes. Identify any non-certified or non-registered aerodromes within 30 km of the boundaries of the proposed wind farm, and consult with the aerodrome operator to determine if any impact on their operations. Consult with Airservices Australia to have them assess any potential impact on instrument approach procedures at aerodromes, navigation aids, communications facilities or surveillance facilities. This should include any risks associated with electric or magnetic fields. Contact the Aerial Agricultural Association of Australia to gain comment on potential hazards to aerial application and related operations in the area. Prior to commencement of construction advise CASA of start dates and locations, heights, structures, cranes and other objects that will exceed 110	Refer to consultation with Bathurst Regional Council, Goulburn Mulwaree Shire Council, Oberon Council and Upper Lachlan Shire Council. No non-certified or non-registered aerodromes within close proximity to the proposed wind farm were assessed as being affected by the proposal. Refer to consultation with Airservices Australia. Refer to consultation with Aerial Agricultural Association of Australia. To be advised when finalised.

Agency/Contact	Activity/Date	Response/Date	Issues Raised During Consultation	Action Proposed
			m in height, so that appropriate Notices to Airmen (NOTAMs) can be issued, to warn pilots of the activities. You advise that the maximum height reached by the turbine blades is likely to be up to 175 m. Some aircraft, under certain circumstances, are permitted to fly as low as 152 m, therefore the proposed turbines could be a hazard to aircraft traversing the area. The location, extent and height of the wind farm is to be advised to RAAF Aeronautical Data Officer. At this time, CASA has no specific authority to require marking or lighting of obstacles that are not at (or in the vicinity of) an aerodrome. Notwithstanding CASA's regulatory authority, owners of tall structures which could be hazardous to aviation have a duty of care. It is CASA's view that the provision of obstacle marking and lighting is a decision for, and the responsibility of, the project proponent.	Refer to discussion on Obstacle Marking and Lighting.
	8 August 2011 Letter to Manager, Airways and Aerodromes – Malcolm McGregor Request for clarification of CASA obligations. [Copy at Annexure 5]	22 September 2011 Letter from Manager, Airways and Aerodromes – Malcolm McGregor [Copy at Annexure 5]	CASA does not propose to make a determination under CASR 139.370 in respect of the Paling Yards Wind Farm. It remains the responsibility of the wind farm to act diligently to assess and treat hazards and risks. CASA's assessment of the turbines is that they are not obstacles to aviation within the vicinity of an aerodrome. CASA does not have any authority to regulate in respect to wind farms when the location is proposed to be away from the vicinity of an aerodrome. CASA reminds proponents that this situation may change in the near term as there is some pressure for regulation to be established that provides protection and risk mitigation for obstacles that are not in the vicinity of aerodromes.	Refer to discussion on Obstacle Marking and Lighting.

Agency/Contact	Activity/Date	Response/Date	Issues Raised During Consultation	Action Proposed
			CASA has not undertaken an aeronautical study in the vicinity of the proposed Paling Yards [Wind Farm]. CASA encourages proponents to undertake such activities. CASA encourages the lighting of obstacles as a measure to reduce the risk to As Low As Reasonably Practicable (ALARP). CASA would be happy to provide more information on this approach to risk management.	A detailed aeronautical safety assessment to be completed prior to construction phase when the approved turbine layout is finalised and turbine model selected.
	30 August 2011 Email to Instrument Procedure Specialist – Martin Chalk re: instrument procedures by other (non Airservices Australia) Part 173 designers. [Copy at Annexure 5]	30 August 2011 Email from Instrument Procedure Specialist – Martin Chalk. [Copy at Annexure 5]	There are no Part 173 Certified Designers, other than Airservices Australia, with procedures in the vicinity of the proposed wind farm at Palling Yards.	Nil.
Aerial Agricultural Association of Australia **Phil Hurst**	1 July 2011 Letter to Chief Executive Officer – Phil Hurst [Copy at Annexure 5]	30 August 2011 Telecon with Phil Hurst	AAAA opposes all wind farm developments in areas of agricultural production or elevated bushfire risk – as per published policy.	Nil.

Agency/Contact	Activity/Date	Response/Date	Issues Raised During Consultation	Action Proposed
Yass Aerial Services **Ted McIntosh**	25 August 2011 Telephone conversation with Ted McIntosh (relayed through his wife)	25 August 2011 No formal response to be provided.	Conducts activities in to the area on an annual basis as required by agricultural industry. Would expect wind farm to limit aerial agricultural activity in the affected area but would have to assess on an individual basis. Properties adjacent to the wind farms would need to be assessed on an individual basis. This company does not conduct RFS fire bombing activities.	Refer to discussion on Aerial Application.
Fred Fahey Aerial Services **Fred Fahey**	25 August 2011 Telephone conversation with Fred Fahey	25 August 2011 No formal response to be provided.	Operates in to the area on an irregular basis (depending on the demand of the agricultural industry) and would expect this to remain the same in the future. The wind farm would, in all likelihood, prevent agricultural operations in that particular area. Properties adjacent to the wind farm would have to be assessed on an individual basis. FFAS operates in support of Rural Fire Service aerial fire bombing activities. Fire bombing activities are potentially more hazardous in the vicinity of the wind farm area due to the reduction in visibility from smoke and the size of the obstacles. Stated that wind farms are completely incompatible with aerial agriculture activities.	Refer to discussion on Aerial Application. Refer to discussion on Obstacle Marking and Lighting.

Agency/Contact	Activity/Date	Response/Date	Issues Raised During Consultation	Action Proposed
Property 1 – Kenneth and Margaree Maloney	25 August 2011 7 October 2011 Telephone messages left	No response	Concerned about height of turbines and flashing lights.	N/A
Property 2 – Neville Robinson	25 August 2011 Telephone message left 7 October 2011 Telecon with Neville Robinson	7 October 2011	Concerned about potential for transmission lines to impact on aerial weed spraying. Additional cost associated with manual spraying.	Nil.
Property 3 – John Fisher (Manager)	25 August 2011 Telecon with John Fisher	No formal response to be provided.	Aerial application of weed control or fertilisers on annual basis. Rotary wing for weed spraying, fixed wing for fertiliser. Transmission lines won't prevent application activities; just require reorientation of spraying runs.	Nil.
Property 4 – Neville and Kerry McIntosh	25 August 2011 Telecon with Kerry McIntosh	No formal response to be provided.	Aerial application of pest control on occasion. Transmission lines not expected to affect aerial application activities.	Nil.
Landowner 1 – Bell	6 October 2011 Telecon Richard Bell	No formal response to be provided.	Mr Bell accepts the potential impact of the wind farm on aerial application operations. Mr Fred Fahey stated he wouldn't operate on the property with wind turbines installed. Helicopters cost about 50% more to operate.	Nil.

Agency/Contact	Activity/Date	Response/Date	Issues Raised During Consultation	Action Proposed
Landowner 2 – Johnston	29 September 2011 Telecon Michael Johnston (Shaq Mohajerani UFWA)	No formal response to be provided.	Mr Johnston said the aeroplane landing area (unprepared grass strip) is used no more than once per year, and is not long enough for modern aerial application aircraft. Mr Johnston confirmed that the runway could be considered unused for the future to avoid restrictions for the turbine placements.	Nil.
	7 October 2011 Telephone conversation with Hugh Johnston.	7 October 2011	Mr Johnston reiterated the fact that Fred Fahey would not operate fixed wing aircraft on Mingary Park once the turbines were erected. Rotary wing operations were possible, but would cost more.	Nil.

3. AERONAUTICAL IMPACTS

Assessment was required according to the DGRs as follows:

> *'Hazard/Risks– the EA must include an assessment of the potential impacts on aviation safety including the need for aviation hazard lighting considering nearby aerodromes and aircraft landing areas, defined air traffic routes, aircraft operating heights, radar interference, communication systems, and navigation aids. In addition, the EA must assess the impact of the turbines on the safe and efficient aerial application of agricultural fertilisers and pesticides in the vicinity of the turbines and transmission line[s]. Possible effects on telecommunications systems must be identified. Potential hazards and risks associated with electric and magnetic fields (EMFs) (with reference to Australian Radiation Protection and Nuclear Safety Agency standards) and bushfires must be assessed.'*

3.1. Nature of flying activities conducted within the local area

Flying activities conducted within the local area surrounding the proposed wind farm include:

- general aviation—including flying training, private flying and ad-hoc charter;
- ultralights and other sports aircraft;
- fire bombing and other fire-fighting related aircraft operations;
- aerial agriculture;
- power line survey (rotary wing); and
- military low flying.

3.2. Nearby aerodromes and aircraft landing areas

The proposed wind farm is situated on two properties, owned by the Bell and Johnston families respectively. The wind farm site is bounded on the east, south and west by National Park.

Both the Bell and Johnston properties have aeroplane landing areas (ALAs) on them. These ALAs have been used for aerial agriculture and private operations for many years; however, the progressive increase in runway length required by larger aerial agricultural aircraft has rendered the Johnston ALA effectively unusable and it is now considered unused for the purpose of locating wind turbines on the property. The Bell ALA remains operational, although the current aerial agriculture operator Mr Fred Fahey has said that he would not be prepared to operate fixed wing aircraft on the property once turbines are installed. According to Mr Richard Bell, rotary wing aircraft remain a valid option for aerial agriculture operations.

There are a number of larger aerodromes at greater distance from the wind farm, none of which will be impacted. A summary of the nearest recognised aerodromes is provided in Table 1.

Table 1 Summary of nearby aerodromes

Aerodrome	*Distance/ direction from Paling Yards*	*Aerodrome Type*	*Comments*
Goulburn Airport	37 nm S (68.7 km)	Certified Civil	Goulburn Airport has instrument procedures however it is too distant from the proposed wind farm for it to be affected in any way.
NAS Nowra	60.4 nm SE (112 km)	Military / Civil	Most military operations from NAS Nowra are to the east and south of that airport. Other civil operations are also mostly coastal. NAS Nowra has instrument procedures however it is too distant from the proposed wind farm for it to be affected in any way.
Wollongong Airport	55.2 nm E (102.3 km)	Certified Civil	Wollongong Airport has instrument procedures however it is too distant from the proposed wind farm for it to be affected in any way.
Mittagong Aerodrome	39.5 nm E (73.2 km)	ALA	Mittagong Aerodrome does not have any instrument procedures and it is too distant from the proposed wind farm for it to be affected in any way.
Camden Airport	45 nm NE (83.6 km)	Registered	Camden Airport has instrument procedures however it is too distant from the proposed wind farm for it to be affected in any way.
Bathurst Airport	42.9 nm NW (79.4 km)	Certified	Bathurst Airport has instrument procedures however it is too distant from the proposed wind farm for it to be affected in any way.
RAAF Base Richmond	59.4 nm N (110 km)	Military	RAAF Base Richmond has instrument procedures however it is too distant from the proposed wind farm for it to be affected in any way.

In summary, there will be no adverse impact by the proposed wind farm on nearby aerodromes or aeroplane landing areas.

A copy of Visual Navigation Chart Sydney, effective 2 June 2011 showing the location of Bathurst Airport, Goulburn Airport, Crookwell aerodrome and the location of Paling Yards Wind Farm is provided in Figure 4 below.

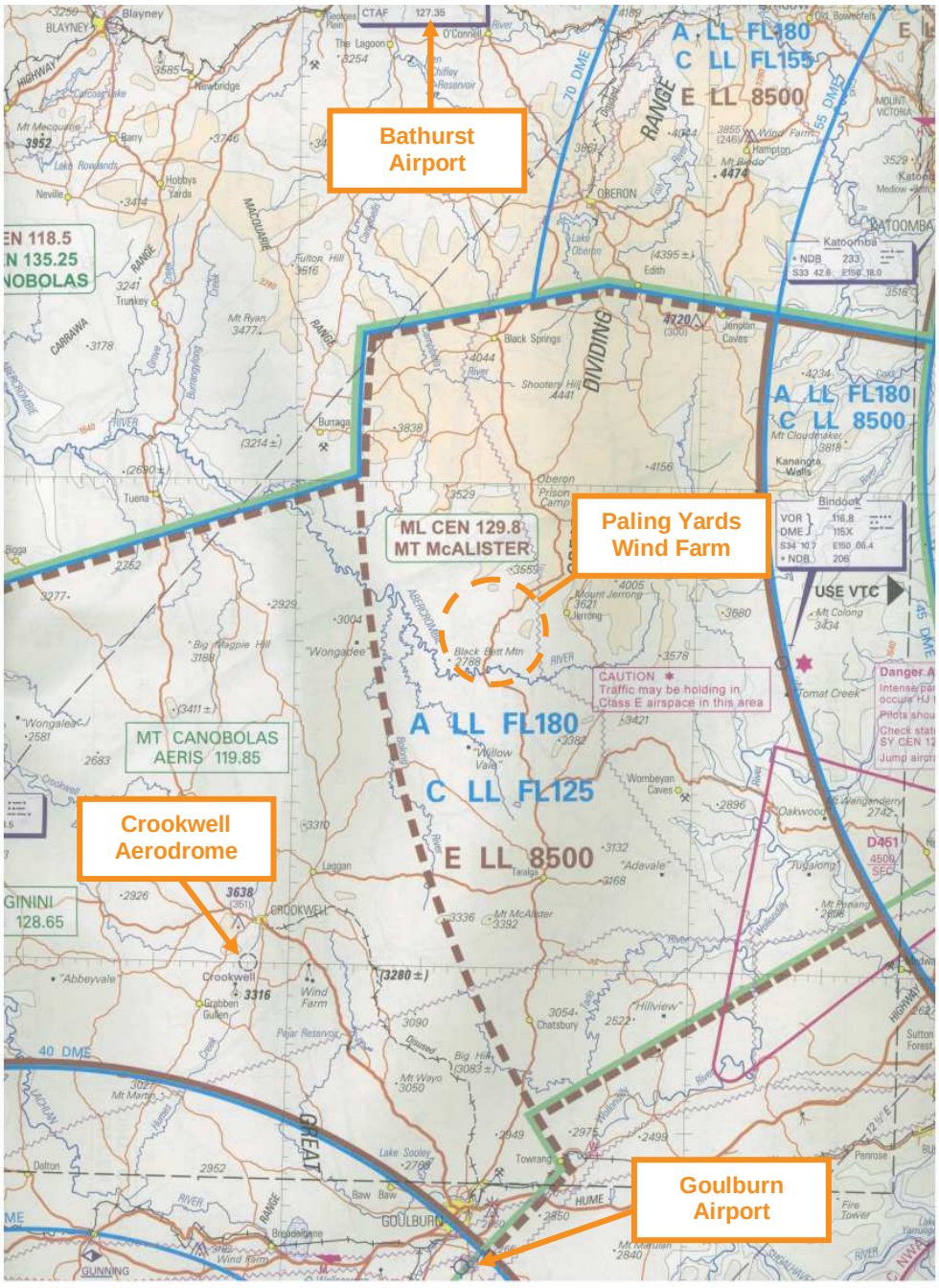


Figure 4 Visual Navigation Chart Sydney

3.3. Obstacle limitation surfaces

Obstacle limitation surfaces (OLS) are a series of surfaces that define the volume of airspace at and around an aerodrome to be kept free of obstacles in order to permit the intended aeroplane operations to be conducted safely and to prevent the aerodrome from becoming unusable by the growth of obstacles around the aerodrome (source: ICAO Doc 9774 definitions).

Strategic Airspace was engaged to assess aerodromes within 30 km of the proposed wind farm to determine whether any proposed turbines penetrated any obstacle limitation surfaces. The report *Aeronautical Impact Assessment (PANS-OPS & OLS): Paling Yards Wind Farm* provides further detailed analysis. A copy of this report is contained at **Annexure 3**.

It is assessed that there will be no adverse impact by the proposed wind farm on obstacle limitation surfaces.

3.4. PANS-OPS surfaces

Procedures for Air Navigation Services – Aircraft Operations (PANS-OPS) surfaces are a series of surfaces designed to provide an aircraft with safe clearance from obstacles when operating without external visual reference on instrument procedures while departing from or approaching an aerodrome.

Aerodromes nominated as ALAs do not have any instrument approach procedures and therefore do not have PANS-OPS surfaces. No further assessment is therefore required of those aerodromes with respect to PANS-OPS surfaces.

Assessment of impact by the proposed development was undertaken with respect to instrument procedures for Goulburn Airport, NAS Nowra, Wollongong Airport, Camden Airport, Bathurst Airport and RAAF Base Richmond — as published in the AIP Departures and Approach Procedures (DAP), effective 2 June 2011.

After considering the following aspects, it was found that the proposed wind farm will have no effect on:

- minimum sector altitudes;
- circling minima;
- instrument approaches, missed approaches and arrivals; and
- departures.

Strategic Airspace's report *Aeronautical Impact Assessment (PANS-OPS & OLS): Paling Yards Wind Farm* provides further detailed analysis.

In their responses to our written correspondence, Bathurst Shire Council, Oberon Council, Goulburn Mulwaree Council and Upper Lachlan Shire Council concurred with the Strategic Airspace report that there will be no impact by the proposed wind farm on their respective aerodromes.

Airservices Australia also stated that the proposed wind farm will not affect any sector or circling altitude, nor any approach or departure procedure at any registered or certified aerodrome in the area.

It is assessed that there will be no adverse impact by the proposed wind farm on PANS-OPS surfaces.

3.5. Aircraft operating heights

Most aircraft are required under the current regulatory framework to operate above 500 ft (152 m) above ground level (AGL), and avoid obstacles horizontally by 600 m (Civil Aviation Regulation 157 refers). Other aircraft, such as those involved in aerial agriculture and fire fighting activities, are permitted to fly at lower heights subject to strict training, licensing and operational control requirements.

When flying with visual reference to the surroundings, there is a regulatory requirement to maintain a specified horizontal visibility and clearance from cloud to ensure sufficient time is available to manoeuvre an aircraft clear of terrain and obstacles.

To avoid the wind farm, aircraft will have to fly at a higher altitude or divert around it.

3.6. Defined air traffic routes

When flying in cloud or otherwise under instrument conditions, certain altitude buffers are applied to the highest obstacle within the vicinity of the proposed operation.

Airservices Australia found that the proposed wind farm will not affect any lowest safe altitudes (LSALTs) for air routes in the area.

A copy of Australian En Route Chart L2 dated 2 June 2011 showing air routes within the vicinity of the proposed wind farm is shown in Figure 5.

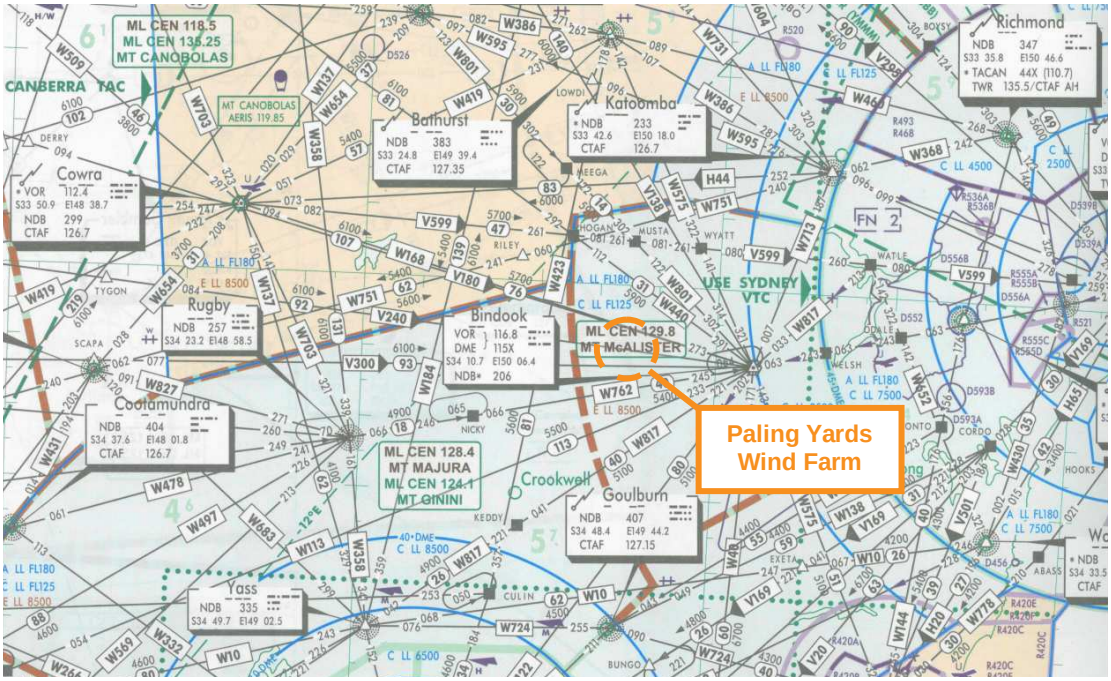


Figure 5 Air Routes

3.7. Contingency procedures

The wind farm site is outside of the extent normally considered for Engine Out procedures. Additionally, given that the site lies in and on areas of relatively high terrain, and there are many other lower escape routes for aircraft within and around the area, it is considered that the proposed development poses no impact on such contingency requirements.

3.8. Aerial fire fighting

The Rural Fire Service (RFS) Development Assessment and Planning Officer, NSW – Mr Doug Stevens considered wind farms to be an advantage to RFS operations generally, because they required a cleared area, a water supply, and provided improved access to the property.

He noted that the high voltage and other transmission wires can be a problem to aircraft particularly when low flying and in low visibility.

When conducting aerial fire fighting operations it is the responsibility of the operators to determine hazards in their areas of operation. However, the local fire authorities should have this information as a part of their bush fire management plan. Further consultation with local fire authorities will occur prior to construction of the wind farm.

3.9. Military flying

The Department of Defence assessed the proposal with respect to any impact on aircraft safety and military low flying operations and advised that it has no concerns with the Paling Yards Wind Farm at this time.

There is a requirement to notify RAAF AIS of the locations of all turbines and wind monitoring masts once the design is finalised (prior to construction) and again when construction is complete.

3.10. Radar interference

Airservices Australia advised that the proposed wind farm will not affect the performance of advanced surface movement guidance and control systems (A-SMGCS), radar or precision radar monitoring (PRM) systems.

The Department of Defence assessed the proposal with respect to possible radar interference and advised that it has no concerns with the Paling Yards Wind Farm at this time.

It is assessed that there will be no adverse impact by the proposed wind farm on Defence or Airservices Australia radar systems.

3.11. Communications systems

Airservices Australia advised that the proposed wind farm will not affect the performance of high frequency (HF) or very high frequency (VHF) communications, advanced surface movement guidance and control systems (A-SMGCS), precision radar monitoring (PRM) systems or satellite/links.

It is assessed that there will be no adverse impact by the proposed wind farm on aviation-related communications systems.

3.12. Navigation aids

Airservices Australia advised that the proposed wind farm will not impact the performance of precision/non-precision navigation aids.

It is assessed that there will be no adverse impact by the proposed wind farm on aviation-related navigation aids.

3.13. Aerial application of agricultural fertilisers and pesticides

The impact of the proposed turbines on the safe and efficient aerial application of agricultural fertilisers and pesticides in the vicinity of the turbines was assessed.

3.13.1. Aerial Agriculture Association of Australia

Several telephone discussions were conducted with the Aerial Agricultural Association of Australia (AAAA) Chief Executive Officer (CEO) Mr Phil Hurst. Mr Hurst declined to respond formally to a request for consideration of potential impacts arising from the proposed wind farm, but directed attention to the AAAA Windfarm Policy (dated March 2011) which states in part:

As a result of the overwhelming safety and economic impact of wind farms and supporting infrastructure on the sector, AAAA opposes all wind farm developments in areas of agricultural production or elevated bushfire risk.

In other areas, AAAA is also opposed to wind farm developments unless the developer is able to clearly demonstrate they have:

1. consulted honestly and in detail with local aerial application operators;

2. sought and received an independent aerial application expert opinion on the safety and economic impacts of the proposed development;

3. clearly and fairly identified that there will be no short or long term impact on the aerial application industry from either safety or economic perspectives;

4. if there is an identified impact on local aerial application operators, provided a legally binding agreement for compensation over a fair period of years for loss of income to the aerial operators affected; and

5. adequately marked any wind farm infrastructure and advised pilots of its presence.

Mr Hurst also mentioned that a tailored risk management program based on AS/NZS ISO 31000:2009 *Risk management – Principles and guidelines* had been recently developed and was in the process of being introduced. This program seeks to provide a means by which risks can be identified and treated so that an acceptable level of safety can be maintained during aerial application operations.

3.13.2. Local aerial application operators

Mr Hurst provided the names of two aerial application operators who he thought were active in the area: Fred Fahey Aerial Services (based in Cowra) and Yass Aerial Services.

Representatives from these operators stated that they operate in the Paling Yards area on an irregular (notionally annual) basis depending on the demand of the agricultural industry and would expect this to remain the same in the future.

Mr Fahey has said that he would not be prepared to operate fixed wing aircraft on the properties once turbines are installed. He also said that wind farms are completely incompatible with aerial agriculture activities.

They both stated that the wind farm would, in all likelihood, prevent aerial agricultural operations in that particular area, but that properties adjacent to the wind farm would have to be assessed on an individual basis.

3.13.3. Properties on which the wind farm will be located

Representatives of each of the owners of the properties on which the proposed wind farm is to be situated advised that aerial application of agricultural fertilisers and/or pesticides would likely be performed by rotary wing aircraft once the wind turbines were installed.

3.13.4. Neighbouring properties

Detailed consultation undertaken by UFWA revealed several land owners in the area who were concerned about the impact of the proposal on aerial agriculture operations.

These concerns related primarily to the potential impact of overhead transmission lines on aerial application activities. Details are provided in the Consultation section.

As advised by the two aerial application operators contacted, aerial application operations at these properties would need to be assessed on an individual basis. Without specific details of the intended operation, it is not possible to provide an independent expert opinion on the impact of the proposed wind farm on potential aerial application activities at these properties.

The risk assessment procedure developed by AAAA would form the basis of any independent assessment. At the time of writing, AAAA would not release the risk assessment procedure.

It should also be noted that the wind farm site is bounded on three sides by National Park.

It is reasonable to conclude that safe aerial application operations would be possible on properties neighbouring the proposed wind farm, subject to final turbine locations, and subject to a case-by-case assessment. The use of helicopters enables aerial application operations to be conducted in closer proximity to obstacles than would be possible with fixed wing aircraft due to their greater manoeuvrability.

3.14. Electric and magnetic fields

Airservices Australia advised that the proposed wind farm will not affect the performance of precision/non-precision navigation aids, HF/VHF communications, A-SMGCS, radar, PRM systems or satellite/links.

The Department of Defence assessed the proposal with respect to possible interference to Defence radars and advised that it has no concerns with the Paling Yards Wind Farm.

No other aviation-related electric or magnetic fields were identified or notified during the prescribed consultation activities.

It is assessed that there will be no adverse impact by the proposed wind farm on aviation-related electric and magnetic fields.

3.15. Bushfires

NSW RFS Development Assessment and Planning Officer Mr Doug Stevens stated that, generally, wind farms tend to provide a benefit to RFS operations, because they required a cleared area, a water supply, and provide improved access to the property.

He noted that the high voltage and other transmission wires can be a problem to aircraft particularly when low flying and in low visibility conditions.

Both fixed and rotary wing aircraft can be employed in fire fighting operations. Each type of aircraft has different manoeuvrability and operational characteristics that must be taken into account when operating near vertical obstructions such as wind farms.

Any fire fighting activities in the vicinity of the proposed wind farm by either fixed or rotary wing aircraft, including in the neighbouring national parks would need to be conducted in consideration of the location of the wind turbines and monitoring masts. To this end it is important that the location of the wind turbines and monitoring masts are made available to RFS and aerial agriculture operators.

Notwithstanding that aerial fire fighting operations will potentially be restricted in the vicinity of the proposed wind farm, there is still a valid (ground-based) means of fighting bushfires on and near the properties on which the wind farm is proposed to be located.

4. OBSTACLE MARKING AND LIGHTING

The DGRs require an assessment of the potential impacts on aviation safety including the need for aviation hazard lighting, as well as an assessment of the impact of night lighting from the wind farm.

In considering the need for aviation hazard lighting, the applicable regulatory context was determined and direct consultation with the Civil Aviation Safety Authority was undertaken.

4.1. Civil Aviation Safety Authority

The Civil Aviation Safety Authority regulates aviation activities in Australia. Applicable requirements include the Civil Aviation Regulations 1988 (CAR), Civil Aviation Safety Regulations 1998 (CASR) and associated Manuals of Standards (MOS) and other guidance material.

4.1.1. Civil Aviation Safety Regulations 1998, Part 139—*Aerodromes*

In areas remote from an aerodrome, Civil Aviation Safety Regulation (CASR) 139.365 requires the owner of a structure (or proponents of a structure) that will be 110 m or more above ground level to inform CASA. This is to allow CASA to assess the effect of the structure on aircraft operations and determine whether or not the structure will be hazardous to aircraft operations.

After being advised the details of the proposed wind farm, CASA provided the following advice in its letter dated 4 August 2011:

...You advise that the maximum height reached by the turbine blades is likely to be up to 175 m. Some aircraft, under certain circumstances, are permitted to fly as low as 152 m, therefore the proposed turbines could be a hazard to aircraft traversing the area....

At this time, CASA has no specific authority to require the marking or lighting of obstacles that are not at (or in the vicinity of) an aerodrome. Notwithstanding CASA's regulatory authority, owners of structures which could be hazardous to aviation have a duty of care. It is CASA's view that the provision of obstacle marking and lighting is a decision for, and the responsibility of, the project proponent.

Any associated requirements for obstacle marking and lighting placed on developers by planning authorities, insurers or financiers are beyond CASA's scope.

4.1.2. Manual of Standards Part 139—Aerodromes

Chapter 7 of MOS 139 sets out the standards applicable to Obstacle Restriction and Limitation. Section 7.1.5 deals with Objects Outside the OLS:

7.1.5 Objects Outside the OLS

7.1.5.1 Under CASR Part 139 any object which extends to a height of 110 m or more above local ground level must be notified to CASA.

Note: For instrument runways, obstacle monitoring includes the PANS-OPS surface which extends beyond the OLS of the aerodrome. See paragraph 7.1.1.

7.1.5.2 Any object that extends to a height of 150 m or more above local ground level must be regarded as an obstacle unless it is assessed by CASA to be otherwise.

With respect to 7.1.5.2, in its response dated 22 September 2011 to a request for clarification regarding wind turbines that extend to a height of 150 m or more AGL, CASA advised:

CASA's assessment of the 150 m turbines is that they are not obstacles to aviation within the vicinity of an aerodrome. As noted above, CASA does not have any authority to regulate in respect to wind farms when the location is proposed to be away from the vicinity of an aerodrome. CASA reminds proponents that this situation may change in the near term as there is some pressure for regulation to be established that provides protection and risk mitigation for obstacles that are not in the vicinity of aerodromes.

Chapter 9 sets out the standards applicable to Visual Aids Provided by Aerodrome Lighting.

Section 9.4.1 provides some general guidance on obstacle lighting:

9.4.1.2 In general, an object in the following situations would require to be provided with obstacle lighting unless CASA, in an aeronautical study, assesses it as being shielded by another lit object or that it is of no operational significance:

(b) outside the obstacle limitation surfaces of an aerodrome, if the object is or will be more than 110 m above ground level.

Section 9.4.2 provides guidance on Types of Obstacle Lighting and Their Use:

9.4.2.3 Medium intensity obstacle lights are to be used either alone or in combination with low intensity lights, where:

(a) the object is an extensive one;

(b) the top of the object is 45 m or more above the surrounding ground; or

(c) CASA determines that early warning to pilots of the presence of the object is desirable.

9.4.2.5 High intensity obstacle lights are flashing white lights used on obstacles that are in excess of 150 m in height.

With respect to 9.4.1.2, in its response dated 22 September 2011 to a request for clarification, CASA noted:

CASA has not undertaken an aeronautical study in the vicinity of the proposed Paling Yards. CASA encourages proponents to undertake such studies.

For turbines extending to a height of between 110 m AGL and less than 150 m AGL, CASA has not assessed them as being hazardous objects, nor does it have specific authority to require obstacle lighting for wind farms not in the vicinity of an aerodrome, so it is concluded that there is no requirement for lighting under the provisions of MOS 139 Chapter 9.

For turbines extending to a height of between 150 m and 175 m AGL, CASA has assessed that they are not obstacles to aviation within the vicinity of an aerodrome, and advised that it does not have any authority to regulate in respect to wind farms when the location is proposed to be away from the vicinity of an aerodrome. CASA did not undertake an aeronautical study, but encourages the proponent to undertake such a study.

4.1.3. Advisory Circular 139-08(0)—Reporting of Tall Structures

In Advisory Circular (AC) 139-08(0)—*Reporting of Tall Structures*, CASA provides guidance to those authorities and persons involved in the planning, approval, erection, extension or dismantling of tall structures so that they may understand the vital nature of the information they provide.

The RAAF Aeronautical Information Service (AIS) has been assigned the task of maintaining a database of tall structures, the top measurement of which is:

a) 30 metres or more above ground level—within 30 kilometres of an aerodrome; or

b) 45 metres or more above ground level elsewhere.

The purpose of notifying RAAF AIS of these structures is to enable their details to be provided in aeronautical information databases and maps/charts etc used by pilots, so that the obstacles can be avoided.

As the proposed turbines will be located more than 30 km from an aerodrome but will be higher than 45 m AGL, they must be reported to RAAF AIS. This requirement was also mentioned in the letter from CASA dated 4 August 2011. This action should occur once the final layout is confirmed at the completion of the Environmental Assessment process and prior to construction.

In response to the question 'Do the turbines of the proposed Paling Yards Wind Farm require obstacle lighting?' CASA replied:

> *...CASA does not presently have the authority to require the lighting of obstacles that are not in the vicinity of an aerodrome. This does not preclude any operator managing hazards associated with obstacles. CASA encourages the lighting of obstacles as a measure to reduce risk to As Low As Reasonably Practicable (ALARP). CASA would be happy to provide more information on this approach to risk management.*

4.2. International Civil Aviation Organization

As a contracting state to the International Civil Aviation Organization (ICAO) and signatory to the Chicago Convention on International Civil Aviation, Australia has an obligation to implement ICAO's standards and recommended practices (SARPs) as published in the various annexes to the Convention. Where these SARPs are not met, a difference must be filed.

Annex 14 to the Convention — Aerodromes, Volume 1 documents SARPs applicable to wind turbines. Section 6.4 of Annex 14 provides as follows:

6.4 Wind turbines

6.4.1 A wind turbine shall be marked and/or lighted if it is determined to be an obstacle.

Note.— See 4.3.1 and 4.3.2.

Markings

6.4.2 **Recommendation.—** *The rotor blades, nacelle and upper 2/3 of the supporting mast of wind turbines should be painted white, unless otherwise indicated by an aeronautical study.*

Lighting

6.4.3 **Recommendation.—** *When lighting is deemed necessary, medium-intensity obstacle lights should be used. In the case of a wind farm, i.e. a group of two or more wind turbines, it should be regarded as an extensive object and the lights should be installed:*

a) to identify the perimeter of the wind farm;

b) respecting the maximum spacing, in accordance with 6.3.14 [900 m], between the lights along the perimeter, unless a dedicated assessment shows that a greater spacing can be used;

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

d) so that, within a wind farm, any wind turbines of significantly higher elevation are also identified wherever they are located.

6.4.4 **Recommendation.—** *The obstacle lights should be installed on the nacelle in such a manner as to provide an unobstructed view for aircraft approaching from any direction.*

Sections 4.3.1 and 4.3.2 of Annex 14 state as follows:

4.3 Objects outside the obstacle limitation surfaces

4.3.1 ***Recommendation****.— Arrangements should be made to enable the appropriate authority to be consulted concerning proposed construction beyond the limits of the obstacle limitation surfaces that extend above a height established by that authority, in order to permit an aeronautical study of the effect of such construction on the operation of aeroplanes.*

4.3.2 ***Recommendation****.— In areas beyond the limits of the obstacle limitation surfaces, at least those objects which extend to a height of 150 m or more above ground elevation should be regarded as obstacles, unless a special aeronautical study indicates that they do not constitute a hazard to aeroplanes.*

Note.— This study may have regard to the nature of operations concerned and may distinguish between day and night operations.

ICAO Doc 9774 *Manual on Certification of Airports* defines an aeronautical study:

> *An aeronautical study is a study of an aeronautical problem to identify potential solutions and select a solution that is acceptable without degrading safety.*

With respect to Section 4.3.1, because the turbines are proposed to reach a height of greater than 110 m AGL, CASA (the appropriate authority) was consulted. In its letter dated 4 August 2011, CASA suggested that the proposed turbines could be a hazard to aircraft traversing the area, but noted that it has no specific authority to require marking or lighting of obstacles that are not at (or in the vicinity of) an aerodrome. It did not conclude that the proposed turbines would be obstacles.

Section 4.3.2 could apply if the as-constructed turbine blade tip height is 150 m or more AGL. In its response dated 22 September 2011 to a request for clarification, CASA noted:

> *CASA has not undertaken an aeronautical study in the vicinity of Paling Yards.*

With respect to ICAO Annex 14 Section 6.4.1:

- if the turbines have a blade tip height of less than 150 m, since CASA has determined that they are not obstacles to aviation within the vicinity of an aerodrome and has advised that it does not presently have the authority to require the lighting of obstacles that are not in the vicinity of an aerodrome then it is concluded that there is no requirement for them to be lighted; and
- if the turbines have a blade tip height of between 150 m and 175 m AGL, since CASA has not undertaken an aeronautical study, they should be considered obstacles and therefore require obstacle lighting. However, CASA also advised that it encourages proponents to undertake an aeronautical study.

In the circumstances, it is recommended that an aeronautical study of the requirement for obstacle lighting, in the form of a detailed and thorough risk assessment using internationally recognised standards, should be prepared once the final approved turbine layout and design turbine height are known.

By this time CASA may have established regulation that provides protection and risk mitigation for obstacles that are not in the vicinity of aerodromes.

4.3. Turbine lighting design

In the event that obstacle lighting is required, a lighting design has been prepared on the basis of the requirements set out in ICAO Annex 14 Vol 1 Chapter 6 and MOS 139 Chapter 9.

It is proposed key turbines be lit, and wherever possible these are on the perimeter at appropriate spacing and/or are significantly higher than surrounding turbines.

In addition, the lighting proposal has been based on:

- the specific configuration of the wind farm and its location in relation to surrounding facilities and features (including terrain);
- the relative elevation and proximity of each turbine in relation to others; and
- the position of turbines in relation to falling and rising terrain.

Due to the proposed configuration of the wind farm, however, not all lit turbines are within 900 m of each other—although the apparent intermediate distance (approaching from any direction) is minimised (and retained under approximately 1 nm) due to the location of intermediate lights set further back from turbines on the perimeter.

Given the minimum requirement for 5000 m visibility for flight under the visual flight rules, the lighting design should provide sufficient warning to pilots that they will be able to manoeuvre their aircraft to avoid the turbines.

If lighting is required, lights are recommended for turbines 1, 5, 6, 9, 11, 15, 17, 20, 21, 23, 24, 30, 31, 35, 36, 39, 42, 44, 47, 49, 51, 52, 55, 58 and 60, as shown in Figure 6.

This lighting design is subject to confirmation of the final turbine layout as any changes proposed could potentially affect which turbines should be lit in accordance with the 900 m interval consideration.

A graphic representation of the wind farm showing those turbines proposed to be lit along with a representation of the technical aspects of the design including 900 m range rings and highest elevation data is shown in Figure 6. A larger scale copy of the graphic is provided at **Annexure 4**.

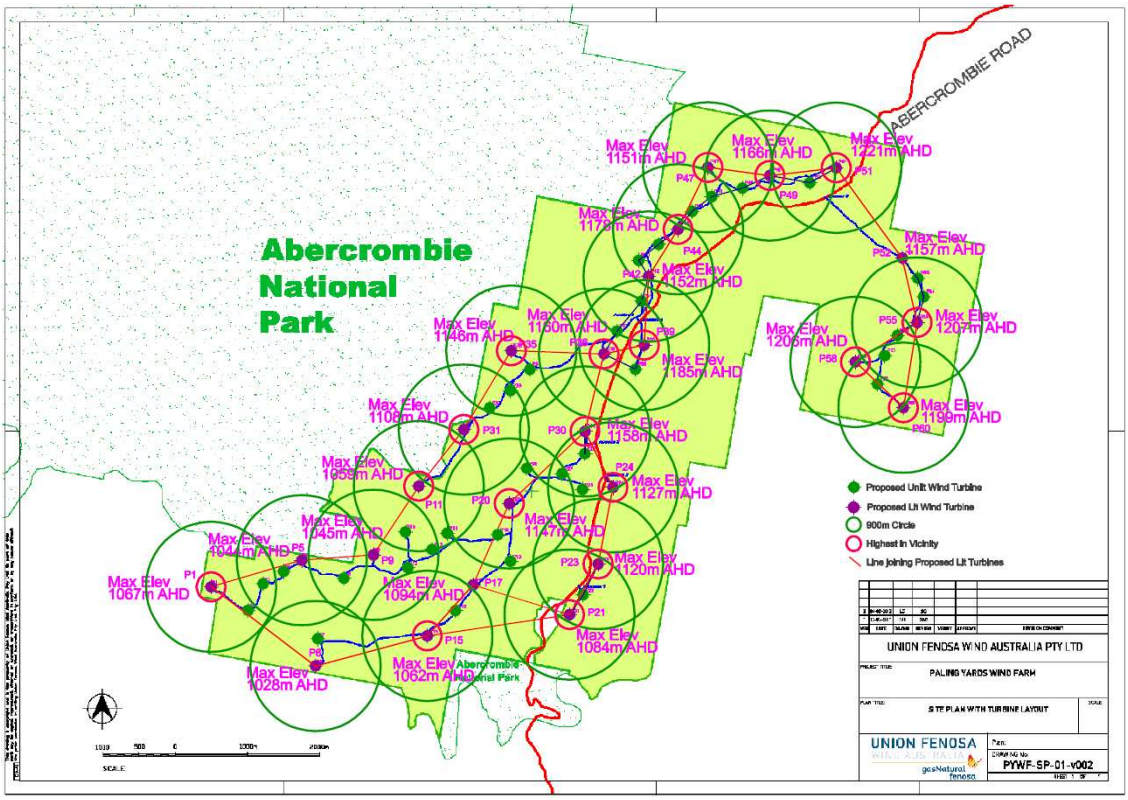


Figure 6 Recommend lighting layout

4.4. Light characteristics

If obstacle lighting is required, installed lights should be designed according to the criteria set out in the applicable regulatory material. A summary of generally accepted design characteristics is provided below:

- two flashing red medium intensity obstacle lights should be provided;
- the light fixtures should be mounted sufficiently above the surface of the nacelle so that the lights are not obscured by the rotor hub, and at a horizontal separation to ensure an unobstructed view of at least one of the lights by a pilot approaching from any direction;
- both lights should flash simultaneously; and
- the characteristics of the obstacle lights should be in accordance with the applicable standards in MOS 139.

The characteristics of medium intensity obstacle lights specified in MOS 139, Chapter 9, are provided below:

> *9.4.7 Characteristics of Medium Intensity Obstacle Lights*
>
> *9.4.7.1 Medium intensity obstacle lights are to be flashing or steady red lights or flashing white lights, visible in all directions in azimuth.*
>
> *9.4.7.2 The frequency of flashes is to be between 20 and 60 flashes per minute.*
>
> *9.4.7.3 The peak effective intensity is to be 2,000 +-25% cd with a vertical distribution as follows:*
>
> *(a) vertical beam spread is to be 3° minimum (beam spread is defined as the angle between two directions in a plane for which the intensity is equal to 50% of the lower tolerance value of the peak intensity);*
>
> *(b) at -1° elevation, the intensity is to be 50% minimum and 75% maximum of lower tolerance value of the peak intensity; and*
>
> *(c) at 0° elevation, the intensity is to be 100% minimum of the lower tolerance value of the peak intensity.*

MOS 139 Section 9.4.10 sets out the requirements for ongoing availability of obstacle lights:

> *9.4.10.4 For obstacles located outside the obstacle limitation surface area of an aerodrome, the owners of the lights need to establish a program to monitor the lights and report light failures. The reporting point for obstacle light failure is normally the nearest CASA office. When an obstacle light is unserviceable, the matter needs to be reported immediately to the relevant CASA office so that a NOTAM warning pilots of the light outage can be initiated.*

To ensure the ongoing availability of obstacle lights (if required), a monitoring, reporting and maintenance program will need to be established in accordance with this guidance.

4.5. Visual impact of night lighting

Although MOS 139 specifies a requirement for high intensity lighting for obstacles in excess of 150 m in height, the Annex 14 requirement, specifically intended for wind farms, is for medium intensity lighting. In the interest of minimising visual impact, it is therefore proposed that if obstacle lighting is required, medium intensity lighting will be used regardless of the final turbine height.

Generally accepted considerations regarding minimisation of visual impact are provided below for consideration in the aeronautical study:

> To minimise the visual impact on the environment, some shielding of the obstacle lights is permitted, provided it does not compromise their operational effectiveness.
>
> - Shielding may be provided to restrict the downward component of light to either, or both, of the following:
>
> a) such that no more than 5% of the nominal intensity is emitted at or below 5 degrees below horizontal; and
>
> b) such that no light is emitted at or below 10 degrees below horizontal.

- *Where two lights are mounted on a nacelle, dynamic shielding or light* extinction *of one light at a time, for the period that a blade is passing in front of the light, is permissible, providing that at all times at least one light can be seen, without interruption, from every angle of azimuth.*

All obstacle lights on a wind farm should be synchronised so that they flash simultaneously.

A relatively small area on the back of each blade near the rotor hub may be treated with a different colour or surface treatment, to reduce reflection from the rotor blades of light from the obstacle lights, without compromising the daytime conspicuity of the overall turbine.

4.6. Marking of turbines

ICAO Annex 14 Vol 1 Section 6.4.2 recommends that the rotor blades, nacelle and upper 2/3 of the supporting mast of the wind turbines should be painted white, unless otherwise indicated by an aeronautical study.

It is generally accepted that, as an alternative to white, an off-white or light grey colour will provide sufficient contrast with the surrounding environment to maintain an acceptable level of safety while lowering visual impact to the neighbouring residents.

4.7. Wind monitoring towers

There are three wind monitoring towers on the proposed wind farm site, 40 m, 60 m and 60 m high respectively, and either tubular or lattice construction of grey steel material. Their locations, heights and other applicable details have been advised to RAAF AIS.

They are not marked or lit, and nor is there a requirement to do so.

Consideration could be given to marking the wind monitoring towers according to the requirements set out in MOS 139 Section 8.10 Obstacle Markings; specifically:

> *8.10.2.6 Masts, poles and towers must be marked in contrasting bands with the darker colour at the top, as shown in Figure 8.10-3. The bands must be perpendicular to the longest dimension and have a width approximately 1/7 of the longest dimension or 30 m, whichever is less.*
>
> *8.10.2.8 Wires or cable obstacles must be marked using three-dimensional coloured objects such as spheres and pyramids, etc; of a size equivalent to a cube with 600 mm sides, spaced 30 m apart.*

4.8. Power lines

UFWA has advised that it will need to construct transmission power lines from the site. Two options have been assessed:

- a connection to the Mt Piper to Bannaby 500 kV transmission line which bypasses the north and east of the site; or
- a 55 km overhead transmission line connection to the approved Crookwell 2 Wind Farm substation which connects to the Yass to Bannaby 330 kV transmission line.

In consideration of the concerns raised through the stakeholder consultation process regarding the potential impact of the proposed extensive transmission lines infrastructure southbound, towards Crookwell 2 Wind

Farm substation, on aerial agricultural activities, UFWA has decided to only propose the northern transmission line route, due to the shorter length and reduced potential impacts.

The assessed transmission line locations are shown in Figure 2 and Figure 3.

The electrical reticulation lines between the turbines and the on-site substation are proposed to be located underground, and the transmission line between the on-site substation and the existing national electricity grid lines approximately 10 km away will be overhead poles. UFWA has provided an indicative drawing of options for the supporting poles, which will range in height from approximately 53.7 m to 58.7 m above the ground. An indicative drawing of the transmission line pole is shown in Figure 7.

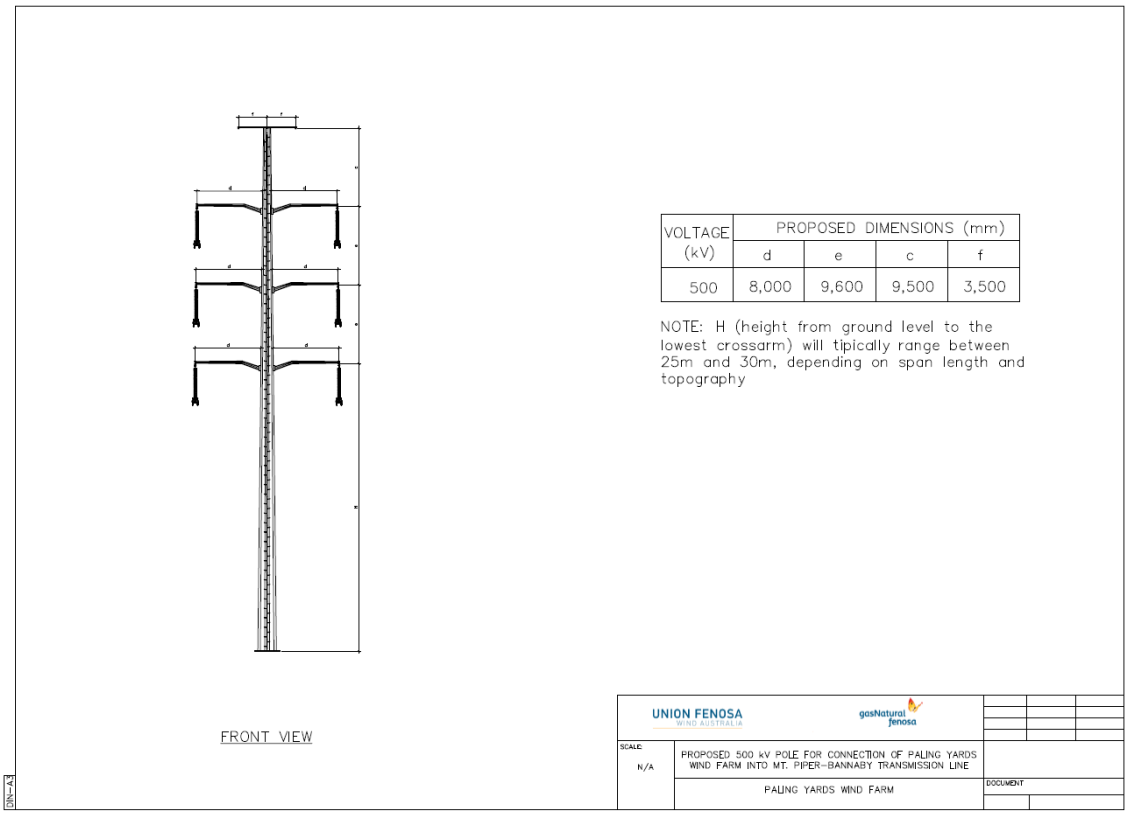


Figure 7 Indicative 500 kV transmission line pole characteristics

There is no regulatory requirement to mark or light these power poles or the transmission lines. However, several nearby land owners expressed concern about the potential impact of these transmission lines on aerial application operations.

According to the AAAA *Powerlines Policy* dated March 2011:

> *Most agricultural land in Australia is crisscrossed with powerlines and aerial application companies and pilots put enormous effort into managing these hazards safely, generally using a risk identification, assessment and management process in line with Australian Standard AS4360/ISO 3[1]000.*

The agricultural pilot curriculum mandated by CASA includes training for the safe management of powerlines and AAAA has been active in providing ongoing professional development for application pilots that includes a focus on planning, risk management and a knowledge of human factors relevant to managing powerlines in a low-level aviation environment.

AAAA runs a specific training course for aerial application pilots entitled Wire Risk Management to address these issues.

Overhead transmission lines and/or supporting poles that are located where they could adversely affect aerial application operations should be marked in accordance with MOS 139 Section 8.10 Obstacle Markings; specifically:

8.10.2.8 Wires or cable obstacles must be marked using three-dimensional coloured objects such as spheres and pyramids, etc; of a size equivalent to a cube with 600 mm sides, spaced 30 m apart.

Alternatively, consideration could be given to installing the AAAA endorsed power line marker reportedly developed in conjunction with Country Energy.

4.9. Future regulatory requirements and guidance

CASA has advised that there is some pressure for regulation to be established that provides protection and risk mitigation for obstacles that are not in the vicinity of aerodromes.

The National Airports Safeguarding Advisory Group (NASAG) has produced a draft document *Guidelines for Land Use Planners to Manage the Risk of Wind Turbine Farms as Physical Obstacles to Air Navigation* and provided it to industry for comment. The Guidelines provide guidance on marking and lighting of wind turbines.

These or any other future development or amendment of regulations or guidance could potentially affect the requirement for lighting and/or applicable design specifications.

Consideration of the need for obstacle lighting and the final layout and design specification is therefore subject to confirmation of applicable regulatory requirements and guidance. This consideration, in the form of an aeronautical study (a detailed and thorough risk assessment using internationally recognised standards) as previously described, should occur once the final layout is known and prior to installation of the lights during construction.

5. CONCLUSIONS

This assessment, consistent with the DGRs, considered aviation aspects associated with cumulative impact, visual amenity, hazard/risk and consultation.

UFWA has also requested assessment of cumulative impacts associated with the proposed wind farm's proximity to nearby existing and approved wind farms.

A summary of the conclusions drawn in this report is provided for each area of consideration below.

5.1. Cumulative impacts

The proposed wind farm is relatively remote from other existing or approved wind farms. According to the NSW Department of Planning and Infrastructure NSW Wind Farm map dated 18 April 2011 and accessed 21 October 2011, the nearest approved wind farm is located at Taralga, some 25 km distant. For this reason it is assessed that there is no significant cumulative impact arising from nearby existing or approved wind farms.

5.2. Obstacle lighting and marking

The need for obstacle marking and lighting of wind turbines, wind monitoring towers and transmission lines was assessed.

5.2.1. Requirement for lighting of turbines

If the turbines extend to a height of between 110 m AGL and less than 150 m AGL, CASA has not assessed them as being hazardous objects, nor does it have specific authority to require obstacle lighting for wind farms not in the vicinity of an aerodrome, so it is concluded that there is no requirement for lighting under the provisions of MOS 139 Chapter 9.

If the turbines extend to a height of between 150 m and 175 m AGL, CASA has assessed that they are not obstacles to aviation within the vicinity of an aerodrome, and advised that it does not have any authority to regulate in respect to wind farms when the location is proposed to be away from the vicinity of an aerodrome. CASA did not undertake an aeronautical study, but encourages the proponent to undertake such a study.

As the proposed turbines will be located more than 30 km from an aerodrome but will be higher than 45 m AGL, they must be reported to RAAF AIS. This requirement was also mentioned in the letter from CASA dated 4 August 2011. This action should occur once the final layout is confirmed at the completion of the Environmental Assessment process and prior to construction.

With respect to ICAO Annex 14 Section 6.4.1:

- if the turbines have a blade tip height of less than 150 m, since CASA has determined that they are not obstacles to aviation within the vicinity of an aerodrome and has advised that it does not presently have the authority to require the lighting of obstacles that are not in the vicinity of an aerodrome then it is concluded that there is no requirement for them to be lighted; and
- if the turbines have a blade tip height of between 150 m and 175 m AGL, since CASA has not undertaken an aeronautical study, they should be considered obstacles and therefore require

obstacle lighting. However, CASA also advised that it encourages proponents to undertake an aeronautical study.

In the circumstances, it is recommended that an aeronautical study of the requirement for obstacle lighting, in the form of a detailed and thorough risk assessment using internationally recognised standards, should be prepared once the final approved turbine layout and design turbine height are known.

By this time CASA may have established regulation that provides protection and risk mitigation for obstacles that are not in the vicinity of aerodromes.

5.2.2. Turbine lighting design

If lighting is required, lights are recommended for turbines 1, 5, 6, 9, 11, 15, 17, 20, 21, 23, 24, 30, 31, 35, 36, 39, 42, 44, 47, 49, 51, 52, 55, 58 and 60.

This lighting design is subject to confirmation of the final turbine layout as any changes proposed could potentially affect which turbines should be lit in accordance with the 900 m interval consideration.

5.2.3. Light characteristics

If obstacle lighting is required, installed lights should be designed according to the criteria set out in the applicable regulatory material. A summary of generally accepted design characteristics is provided below:

- two flashing red medium intensity obstacle lights should be provided;
- the light fixtures should be mounted sufficiently above the surface of the nacelle so that the lights are not obscured by the rotor hub, and at a horizontal separation to ensure an unobstructed view of at least one of the lights by a pilot approaching from any direction;
- both lights should flash simultaneously; and
- the characteristics of the obstacle lights should be in accordance with the applicable standards in MOS 139.

To ensure the ongoing availability of obstacle lights (if required), a monitoring, reporting and maintenance program will need to be established in accordance with this guidance.

5.2.4. Visual impact of night lighting

Although MOS 139 specifies a requirement for high intensity lighting for obstacles in excess of 150 m in height, the Annex 14 requirement, specifically intended for wind farms, is for medium intensity lighting. In the interest of minimising visual impact, it is therefore proposed that if obstacle lighting is required, medium intensity lighting will be used regardless of the final turbine height.

To minimise the visual impact on the environment, some shielding of the obstacle lights is permitted, provided it does not compromise their operational effectiveness.

Shielding may be provided to restrict the downward component of light to either, or both, of the following:

a) such that no more than 5% of the nominal intensity is emitted at or below 5 degrees below horizontal; and

b) such that no light is emitted at or below 10 degrees below horizontal.

Where two lights are mounted on a nacelle, dynamic shielding or light extinction of one light at a time, for the period that a blade is passing in front of the light, is permissible, providing that at all times at least one light can be seen, without interruption, from every angle of azimuth.

All obstacle lights on a wind farm should be synchronised so that they flash simultaneously.

A relatively small area on the back of each blade near the rotor hub may be treated with a different colour or surface treatment, to reduce reflection from the rotor blades of light from the obstacle lights, without compromising the daytime conspicuity of the overall turbine.

5.2.5. Marking of turbines

ICAO Annex 14 Vol 1 Section 6.4.2 recommends that the rotor blades, nacelle and upper 2/3 of the supporting mast of the wind turbines should be painted white, unless indicated by an aeronautical study.

It is generally accepted that, as an alternative to white, an off-white or light grey colour will provide sufficient contrast with the surrounding environment to maintain an acceptable level of safety while lowering visual impact to the neighbouring residents.

5.2.6. Wind monitoring towers

Consideration could be given to marking the wind monitoring towers according to the requirements set out in MOS 139 Section 8.10 Obstacle Markings; specifically:

8.10.2.6 Masts, poles and towers must be marked in contrasting bands with the darker colour at the top, as shown in Figure 8.10-3. The bands must be perpendicular to the longest dimension and have a width approximately 1/7 of the longest dimension or 30 m, whichever is less.

8.10.2.8 Wires or cable obstacles must be marked using three-dimensional coloured objects such as spheres and pyramids, etc; of a size equivalent to a cube with 600 mm sides, spaced 30 m apart.

5.2.7. Power lines

Overhead transmission lines and/or supporting poles that are located where they could adversely affect aerial application operations should be marked in accordance with MOS 139 Section 8.10 Obstacle Markings; specifically:

8.10.2.8 Wires or cable obstacles must be marked using three-dimensional coloured objects such as spheres and pyramids, etc; of a size equivalent to a cube with 600 mm sides, spaced 30 m apart.

Alternatively, consideration could be given to installing the AAAA endorsed power line marker reportedly developed in conjunction with Country Energy.

5.2.8. Future regulatory requirements and guidance

Consideration of the need for obstacle lighting and the final layout and design specification is subject to confirmation of applicable regulatory requirements and guidance. This consideration, in the form of

an aeronautical study (a detailed and thorough risk assessment using internationally recognised standards) as previously described, should occur once the final layout is known and prior to installation of the lights during construction.

5.3. Aeronautical impacts

The proposed development does not impose any significant risk to normal flying operations provided aircraft are operated in compliance with applicable regulatory and operational control requirements and with the application of good airmanship.

5.3.1. Nearby aerodromes and aircraft landing areas

The Bell ALA remains operational, although the current aerial agriculture operator Mr Fred Fahey has said that he would not be prepared to operate fixed wing aircraft on the property once turbines are installed. Rotary wing aircraft remain a valid option for aerial agriculture operations. The Johnston ALA is considered disused.

There are a number of larger aerodromes at greater distance from the wind farm, none of which will be impacted.

5.3.2. Obstacle limitation surfaces

There will be no adverse impact by the proposed wind farm on obstacle limitation surfaces.

5.3.3. PANS-OPS surfaces

There will be no adverse impact by the proposed wind farm on PANS-OPS surfaces.

5.3.4. Aircraft operating heights

To avoid the wind farm, aircraft will have to fly at a higher altitude or divert around it.

5.3.5. Defined air traffic routes

The proposed wind farm will not affect any lowest safe altitudes (LSALTs) for air routes in the area.

5.3.6. Radar interference

There will be no adverse impact by the proposed wind farm on Defence or Airservices Australia radar systems.

5.3.7. Communications systems

There will be no adverse impact by the proposed wind farm on aviation-related communications systems.

5.3.8. Navigation aids

There will be no adverse impact by the proposed wind farm on aviation-related navigation aids.

5.3.9. Aerial application of agricultural fertilisers and pesticides

The proposed wind farm will most likely prevent fixed wing aerial agricultural operations on the wind farm site, whilst the viability of conducting these operations on properties adjacent to the wind farm would have to be assessed on an individual basis.

It is reasonable to conclude that safe aerial application operations would be possible on properties neighbouring the proposed wind farm, subject to final turbine locations, and subject to a case-by-case assessment.

The use of helicopters enables aerial application operations to be conducted in closer proximity to obstacles than would be possible with fixed wing aircraft due to their greater manoeuvrability.

5.3.10. Electric and magnetic fields

There will be no adverse impact by the proposed wind farm on aviation-related electric and magnetic fields.

5.3.11. Bushfires

Any fire fighting activities in the vicinity of the proposed wind farm by either fixed or rotary wing aircraft, including in the neighbouring national parks would need to be conducted in consideration of the location of the wind turbines and monitoring masts. To this end it is important that the location of the wind turbines and monitoring masts are made available to RFS and aerial agriculture operators.

Notwithstanding that aerial fire fighting operations will potentially be restricted in the vicinity of the proposed wind farm, there is still a valid (ground-based) means of fighting bushfires on and near the properties on which the wind farm is proposed to be located.

5.4. Consultation

An appropriate and justified level of consultation was undertaken with the following parties:

- Aerial Agriculture Association of Australia;
- Airservices Australia;
- Bathurst Regional Council;
- Civil Aviation Safety Authority;
- Commonwealth Department of Defence;
- Goulburn Mulwaree Council;
- NSW Rural Fire Service;
- Oberon Council;
- Upper Lachlan Shire Council; and
- the local community and landowners.

6. RECOMMENDATIONS

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

Notification of tall structures

1. Final (approved) turbine coordinates and elevations should be provided to RAAF AIS via the online vertical obstruction database: http://www.raafais.gov.au.obstr_form.htm.

Marking of turbines

2. The rotor blades, nacelle and the supporting mast of the wind turbines should be painted white, off-white or a light grey colour.

Lighting of turbines

3. If the wind turbines to be installed will have a blade tip height lower than 150 m AGL, no obstacle lighting is necessary.
4. If the wind turbines to be installed will have a blade tip height of 150 m or more AGL, obstacle lighting may be required.
5. An aeronautical study to determine the requirement for obstacle lighting, in the form of a detailed and thorough risk assessment using internationally recognised standards, should be prepared once the final approved turbine layout and design turbine height are known.
6. UFWA may consider other factors in its decision as to whether obstacle lights should be installed.
7. If lighting is required, lights are recommended for turbines 1, 5, 6, 9, 11, 15, 17, 20, 21, 23, 24, 30, 31, 35, 36, 39, 42, 44, 47, 49, 51, 52, 55, 58 and 60.
8. Obstacle lighting should be designed in accordance with the characteristics specified in ICAO Annex 14 Vol 1 Chapter 6 and MOS 139 Chapter 9, while minimising visual impact.

Marking of wind monitoring towers

9. Consideration should be given to marking the wind monitoring towers according to the requirements set out in MOS 139 Section 8.10.

Marking of electricity transmission lines

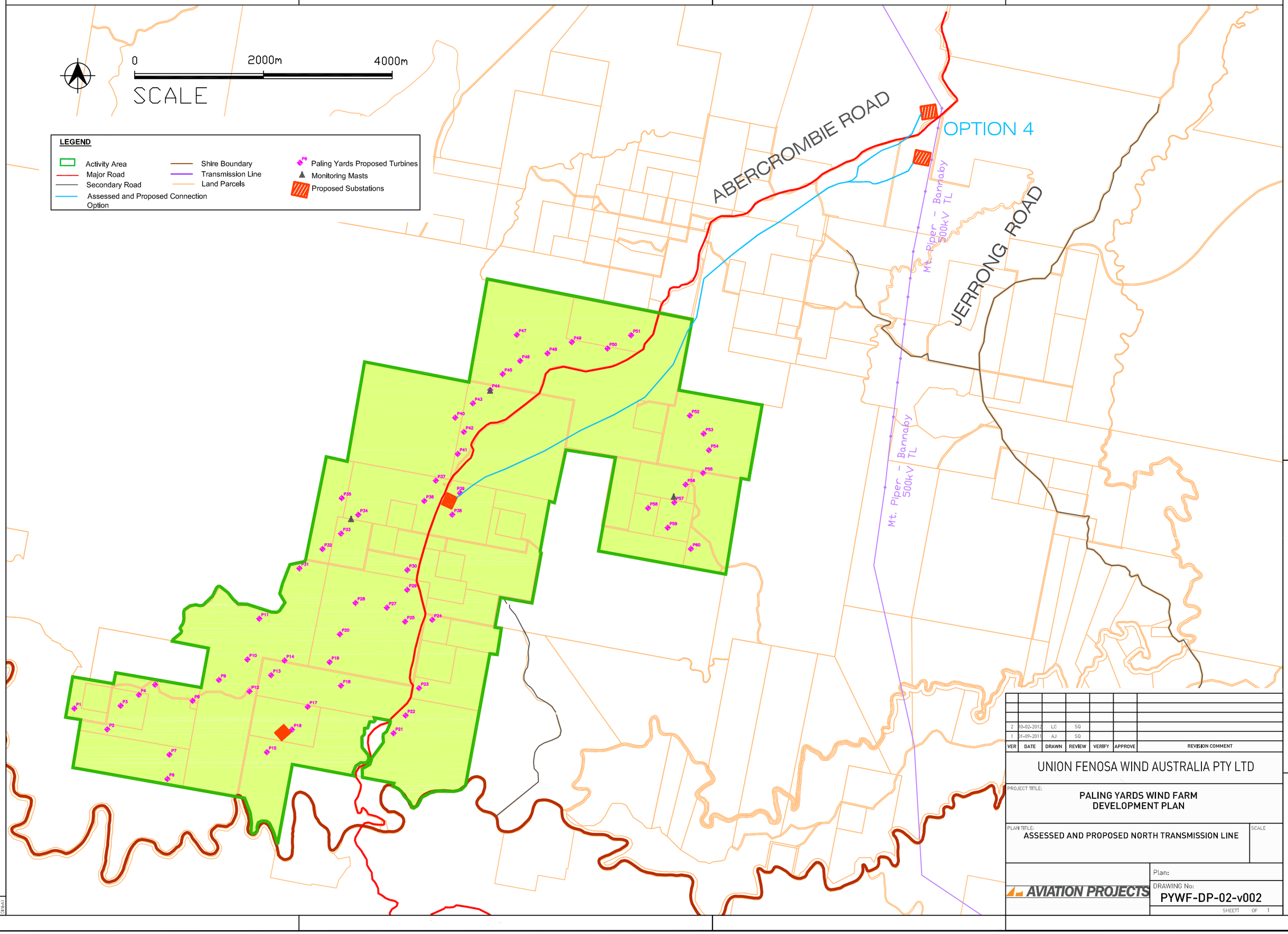
10. Overhead transmission lines and/or supporting poles that are located where they could adversely affect aerial application operations should be marked in accordance with MOS 139 Section 8.10.
11. Alternatively, consideration could be given to installing the AAAA endorsed power line marker reportedly developed in conjunction with Country Energy.

ANNEXURES

1. Site Plans
2. Turbine Coordinates
3. PANS-OPS and OLS Report
4. Obstacle Lighting Design
5. Correspondence

Annexure 1 Site Plans

1. Assessed and Proposed North Transmission Line Option
2. Assessed (and no longer proposed) South Transmission Line Options



VER	DATE	DRAWN	REVIEW	VERIFY	APPROVE	REVISION COMMENT
2	10-02-2012	LC	SQ			
1	01-09-2011	AJ	SQ			

UNION FENOSA WIND AUSTRALIA PTY LTD

PROJECT TITLE:
PALING YARDS WIND FARM
DEVELOPMENT PLAN

PLAN TITLE:
ASSESSED AND PROPOSED NORTH TRANSMISSION LINE

SCALE

Plan:

AVIATION PROJECTS

DRAWING No:
PYWF-DP-02-v002

SHEET 1 OF 1

DIN-A3

OPTION 1
OPTION 2
OPTION 3
OPTION 4

ABERCROMBIE ROAD
JERRONG ROAD
ROSE VALE ROAD
FULLERTON ROAD
PEEL WOOD ROAD
LEVELS ROAD
SAVILLE ROAD
BLUEHILL ROAD
BLACKWALLS ROAD
ABERCROMBIE ROAD
BOLONG ROAD
LEIGHWOOD ROAD
YALBRAITH ROAD
GOLSPIE ROAD
COKATOO ROAD
CRAIG ROAD
TARALGA ROAD
JERRONG ROAD
WOMBEYAN CAVES ROAD
GOLSPIE ROAD
WILLCOX ROAD
TYRL TYRL ROAD
GOLSPIE ROAD
SCABBEN FLAT ROAD
LAGGAN-TARALGA ROAD
LAGGAN ROAD
HARLEY RD
ROSLYN RD
ROSLYN RD
WOODHOUSELEE ROAD
CURRABUNGLA RD
MOUNT RAE ROAD
THIRD CREEK RD
ELMGROVE ROAD
CROOKWELL ROAD
MIDDLE ARM RD
RHYANNA ROAD
PEJAR ROAD
DAWSONS CREEK RD
ST STEPHENS ROAD
WOODHOUSELEE ROAD
MIDDLE ARM RD

4000 2000 0 4000m 8000m
SCALE

LEGEND

- Activity Area
- Major Road
- Secondary Road
- Shire Boundary
- Assessed Connection Options
- Assessed and Proposed Connection Option
- Transmission Line
- Land Parcels
- Paling Yards Proposed Turbines
- Monitoring Masts
- Proposed Substations

VER	DATE	DRAWN	REVIEW	VERIFY	APPROVE
2	14-02-2012	LC	SQ		
1	01-09-2011	AJ	SQ		

UNION FENOSA WIND AUSTRALIA PTY LTD

PROJECT TITLE:
PALING YARDS WIND FARM
DEVELOPMENT PLAN

ASSESSED TRANSMISSION LINE ROUTE OPTIONS

AVIATION PROJECTS

Plan:
DRAWING No:
PYWF-DP-03-v002
SHEET 1 OF 1

Annexure 2 – Turbine Coordinates

Point	Feature	Easting	Northing	Base Elev m	Top Elev m	Latitude	Longitude
P1	Wind Turbine	747801.12	6214761.19	892	1067	34 10 43.4S	149 41 19.0E
P2	Wind Turbine	748312.15	6214436.95	876	1051	34 10 53.4S	149 41 39.3E
P3	Wind Turbine	748519.70	6214803.26	862	1037	34 10 41.4S	149 41 47.0E
P4	Wind Turbine	748803.60	6214973.12	865	1040	34 10 35.6S	149 41 57.9E
P5	Wind Turbine	749054.78	6215129.11	869	1044	34 10 30.3S	149 42 07.6E
P6	Wind Turbine	749245.34	6213666.85	853	1028	34 11 17.6S	149 42 16.5E
P7	Wind Turbine	749277.89	6214044.19	866	1041	34 11 05.3S	149 42 17.4E
P8	Wind Turbine	749637.93	6214879.49	869	1044	34 10 37.9S	149 42 30.6E
P9	Wind Turbine	750045.99	6215202.86	870	1045	34 10 27.1S	149 42 46.2E
P10	Wind Turbine	750487.73	6215520.35	877	1052	34 10 16.4S	149 43 03.1E
P11	Wind Turbine	750672.77	6216152.60	884	1059	34 09 55.8S	149 43 09.6E
P12	Wind Turbine	750521.21	6215025.33	911	1086	34 10 32.4S	149 43 04.9E
P13	Wind Turbine	750856.37	6215277.14	903	1078	34 10 24.0S	149 43 17.7E
P14	Wind Turbine	751065.13	6215503.43	903	1078	34 10 16.5S	149 43 25.6E
P15	Wind Turbine	750790.66	6214083.06	887	1062	34 11 02.8S	149 43 16.4E
P16	Wind Turbine	751180.75	6214432.91	898	1073	34 10 51.1S	149 43 31.3E
P17	Wind Turbine	751425.00	6214787.11	919	1094	34 10 39.4S	149 43 40.4E
P18	Wind Turbine	751941.69	6215114.62	941	1116	34 10 28.3S	149 44 00.2E
P19	Wind Turbine	751765.12	6215480.35	943	1118	34 10 16.6S	149 43 53.0E
P20	Wind Turbine	751924.43	6215913.25	972	1147	34 10 02.4S	149 43 58.7E
P21	Wind Turbine	752758.57	6214376.75	909	1084	34 10 51.5S	149 44 32.9E
P22	Wind Turbine	752945.24	6214652.27	924	1099	34 10 42.4S	149 44 39.9E
P23	Wind Turbine	753153.94	6215076.51	945	1120	34 10 28.5S	149 44 47.6E
P24	Wind Turbine	753358.95	6216136.19	952	1127	34 09 54.0S	149 44 54.5E
P25	Wind Turbine	752936.95	6216108.06	959	1134	34 09 55.2S	149 44 38.0E
P26	Removed	n/a	n/a	n/a	n/a	n/a	n/a

P27	Wind Turbine	752654.50	6216324.83	977	1152	34 09 48.5S	149 44 26.8E
P28	Wind Turbine	752167.15	6216398.80	972	1147	34 09 46.5S	149 44 07.7E
P29	Wind Turbine	752969.48	6216601.43	971	1146	34 09 39.2S	149 44 38.8E
P30	Wind Turbine	752971.37	6216909.14	983	1158	34 09 29.2S	149 44 38.5E
P31	Wind Turbine	751295.48	6216935.08	933	1108	34 09 29.8S	149 43 33.1E
P32	Wind Turbine	751654.02	6217233.66	956	1131	34 09 19.8S	149 43 46.8E
P33	Wind Turbine	751942.30	6217474.14	976	1151	34 09 11.8S	149 43 57.8E
P34	Wind Turbine	752209.40	6217766.32	994	1169	34 09 02.1S	149 44 07.9E
P35	Wind Turbine	751952.91	6218024.61	971	1146	34 08 53.9S	149 43 57.6E
P36	Wind Turbine	753234.49	6217980.31	985	1160	34 08 54.3S	149 44 47.7E
P37	Wind Turbine	753414.26	6218295.67	1001	1176	34 08 43.9S	149 44 54.4E
P38	Wind Turbine	753669.52	6217768.20	1000	1175	34 09 00.8S	149 45 04.9E
P39	Wind Turbine	753790.39	6218102.49	1010	1185	34 08 49.8S	149 45 09.2E
P40	Wind Turbine	753715.79	6219273.15	993	1168	34 08 11.9S	149 45 05.1E
P41	Wind Turbine	753755.52	6218710.05	1005	1180	34 08 30.1S	149 45 07.2E
P42	Wind Turbine	753850.54	6219051.06	977	1152	34 08 19.0S	149 45 10.6E
P43	Wind Turbine	753989.92	6219495.01	991	1166	34 08 04.5S	149 45 15.5E
P44	Wind Turbine	754258.21	6219702.61	1003	1178	34 07 57.5S	149 45 25.8E
P45	Wind Turbine	754452.80	6219949.71	983	1158	34 07 49.3S	149 45 33.1E
P46	Wind Turbine	754723.69	6220153.76	972	1147	34 07 42.5S	149 45 43.5E
P47	Wind Turbine	754672.54	6220558.81	976	1151	34 07 29.4S	149 45 41.0E
P48	Wind Turbine	755148.59	6220270.48	968	1143	34 07 38.3S	149 45 59.9E
P49	Wind Turbine	755526.92	6220445.70	991	1166	34 07 32.3S	149 46 14.5E
P50	Wind Turbine	756080.37	6220346.27	1038	1213	34 07 35.0S	149 46 36.2E
P51	Wind Turbine	756446.50	6220552.20	1046	1221	34 07 28.0S	149 46 50.2E
P52	Wind Turbine	757359.69	6219304.77	982	1157	34 08 07.7S	149 47 27.2E
P53	Wind Turbine	757574.56	6219024.68	1009	1184	34 08 16.6S	149 47 35.8E
P54	Wind Turbine	757655.77	6218768.36	1018	1193	34 08 24.8S	149 47 39.3E
P55	Wind Turbine	757564.51	6218414.10	1032	1207	34 08 36.4S	149 47 36.1E
P56	Wind Turbine	757293.24	6218234.95	1022	1197	34 08 42.4S	149 47 25.7E

P57	Wind Turbine	757116.83	6217956.78	1042	1217	34 08 51.6S	149 47 19.1E
P58	Wind Turbine	756710.89	6217869.76	1031	1206	34 08 54.8S	149 47 03.4E
P59	Wind Turbine	757015.67	6217565.13	1026	1201	34 09 04.4S	149 47 15.6E
P60	Wind Turbine	757375.27	6217236.88	1024	1199	34 09 14.7S	149 47 30.0E

Annexure 3 – PANS-OPS and OLS Report

1. Aeronautical Impact Assessment (PANS-OPS and OLS): Paling Yards Wind Farm, Doc v1.2 Final Report dated 1 July 2011.

For

Development Proponent

UNION FENOSA

Union Fenosa Wind Australia

Pty Limited

Aeronautical Impact Assessment (PANS-OPS & OLS): Paling Yards Wind Farm

(Doc v1.2) FINAL REPORT

1 July 2011

By

strategic airspace

Prepared by Consultants:-

Strategic Airspace Pty Limited
ABN: 60 097 857 415

PO Box 774, Potts Point NSW 1335
Australia

Tel: +61.2.9380.9777
Fax: +61.2.9380.9788

Email - Attn: John.McCarthy@StrategicAirspace.com

Developer:

Level5, 8 Help St, Chatswood NSW 2067
Australia

Tel: +61.2.9419.4933
Fax: +61.2.9419.3498

Email - Attn: Shaq Mohajerani:
shaq.mohajerani@unionfenosa.com.au

Document Control

Document Number: **11.004-001** *Version:* **(Doc v1.2) FINAL REPORT**

Document Title: Aeronautical Impact Assessment (PANS-OPS & OLS): Paling Yards Wind Farm

Purpose / Abstract: *This report forms the basis of the development height application by the proponent, Union Fenosa Wind Australia Pty Ltd, and provides an aeronautical assessment as supporting material for consideration of the application by the authorities as part of the evaluation process. The scope of this study is limited to the assessment of OLS and PANS-OPS under CASRs MOS Part 139 and MOS Part 173.*

Contract: Aviation Projects *StratAir Ref:* 11.004

Change History

Version	*Versn Date*	*Version By*	*QA By*	*Version / Change Description*
1.0 Final Draft	23-Jun-11	J. McCarthy	C. Pak-Poy	Draft Final Report
1.1	28-Jun-11	J. McCarthy	C. Pak-Poy	With minor amendments
1.2 Final	01-Jul-11	J. McCarthy	C. Pak-Poy	Final for release

Distribution Control

Legend:				
	Uncont	Uncontrolled Document		
	Client	Union Fenosa	*StratAir*	Strategic Airspace
	APT	YBGL – Goulburn Airport	*AsA*	Airservices Australia
	CASA	Civil Aviation Safety Authority	*DITRDLG*	Department of Infrastructure

Issue Version	*Issue Date*	*Issue Purpose / Description*	*Copy No*	*Copy Recipient*
1.0	23-Jun-11	Distribution to client	1 Uncont	StratAir File, Aviation Projects
1.1	28-Jun-11	Distribution to client		StratAir File, Aviation Projects
1.2	04-Jul-11	Distribution to Client		StratAir File, Aviation Projects, Union Fenosa Wind Australia

Contents

APPENDICES

1. Introduction & Executive Summary

Strategic Airspace has prepared this report to supplement the Aviation Projects aeronautical assessment report for the proposed Paling Yards Wind Farm – a development of the Union Fenosa group.

As required by the brief, this report focuses on potential impact of the development in relation to PANS-OPS instrument flight procedures (IFP) and Obstacle Limitation Surfaces (OLS) that relate to any nearby aerodrome.

The proposed Paling Yards Wind Farm development — comprising 60 wind turbines of up to 175m AGL — straddles the Goulburn Oberon Road north of Taralga and is located north of Goulburn Airport at a distance of approximately 69km (37NM).

The closest aerodrome with instrument approaches is Goulburn Airport which is 37NM (approximately 69km) from the nearest proposed wind turbine. No aerodromes with instrument approaches or departures are close enough the proposed site to affect any PANS-OPS or OLS surface. (See Table 2.1 below).

The methodology applied to the preparation of this report focuses on the consideration of the influence of the development on existing:

- the Obstacle Limitation Surfaces (OLS); and
- the Procedures for Air Navigation Services - Aircraft Operations (PANS-OPS) surfaces.

However, as there are no relevant airports close enough to be affected, therefore, no OLS or PANS-OPS analysis is necessary. That is, the proposed wind farm will not have any effect on any instrument procedures at any airport.

- The proposed **development will not have any direct impact on approach or departure operations at any nearby aerodrome**. It may however have an impact on visual operations in the vicinity of the wind farm – this is outside the scope of this study.
- Subject to development approval:
  - A separate approval may be required for the use of temporary cranes for construction, where the cranes will be higher than the maximum elevation of all turbines proposed; and
  - CASA and the RAAF AIS will have to be informed of the as-constructed details of temporary cranes during construction and thence each installed permanent wind turbine pursuant to AC 139-08(0) Reporting of Tall Structures.

Therefore, based on the scope of this assessment and the provisions of the relevant aviation regulations, there appears to be no impediment to the height approval of the development of the site as proposed, following examination of the application by the Civil Aviation Safety Authority and Airservices Australia.

2. Background & Site Description

The proposed Paling Yards Wind Farm development comprises 60 wind turbines of up to 175m above ground. The proposed site is in a remote area surrounded by the Abercrombie National Park. It straddles the Goulburn Oberon Road north of Taralga and is located north of Goulburn Airport (the nearest registered airport) at a distance of approximately 68.7km (37.1NM) from the Goulburn NDB to southern most wind turbine. The nearest aerodromes or landing strips are listed in the following table.

Table 2-1: Summary of Nearby Aerodromes

Name	*Distance from PalingYards*	*Type of Aerodrome*	*Comments*
Goulburn Airport	37NM S (68.7km)	Certified Civil	Goulburn Airport has instrument procedures however it is too distant from the proposed wind farm for it to be affected in any way.
Nowra Navy Base	60.4NM SE (112km)	Military / Civil	Most military operations from Nowra aerodrome are to the east and south of that airport. Other civil operations are also mostly coastal. Nowra Airport has instrument procedures however it is too distant from the proposed wind farm for it to be affected in any way.
Wollongong Airport	55.2NM E (102.3km)	Certified Civil	Wollongong Airport has instrument procedures however it is too distant from the proposed wind farm for it to be affected in any way.
Mittagong Aerodrome	39.5NM E (73.2km)	Unregistered	Mittagong Airport is uncertified does not have any instrument procedures however it is too distant from the proposed wind farm for it to be affected in any way.
Camden Airport	45NM NE (83.6km)	ALA	Camden Airport has instrument procedures however it is too distant from the proposed wind farm for it to be affected in any way.
Bathurst Airport	42.9NM NW (79.4km)	ALA	Bathurst Airport has instrument procedures however it is too distant from the proposed wind farm for it to be affected in any way.
Richmond RAAF Base	59.4NM N (110km)	ALA	Richmond Airport has instrument procedures however it is too distant from the proposed wind farm for it to be affected in any way.

Wind turbine details are contained in Appendix 3 — Development Plan in Context & Wind Turbine Coordinates.

3. Analysis of Obstacle Limitation Surfaces (OLS)

The analysis of the proposed development in relation to the Obstacle Limitation Surfaces (OLS) and any relief that may be provided by shielding of the development by existing obstacles was conducted with reference to the CASA Standards for Obstacle Restriction and Limitation[1] — part of CASR MOS Part 139.

Analysis has determined that the proposed development has NO IMPACT on the OLS of any nearby aerodrome.

1 CASA Manual of Standards Part 139 — Aerodromes, Chapter 7 Obstacle Restriction and Limitation, http://www.casa.gov.au/rules/1998casr/139/139m07.pdf

4. Analysis of PANS-OPS Surfaces

Assessment of impact by the proposed development plan was undertaken with respect to instrument procedures for Goulburn Airport (YGLB) — as published in the AIP Departures & Approach Procedures (DAP), Amendment 127, Effective 02-Jun-2011.

4.1 Minimum Sector Altitudes

The proposed wind farm will not have any effect upon any MSA for any aerodrome in the vicinity of Paling Yards.

4.2 Circling Areas

The proposed wind farm will not have any effect upon any Circling Area for any aerodrome in the vicinity of Paling Yards.

4.3 Approach, Missed Approach and Arrivals

The proposed wind farm will not have any effect upon any approach, missed approach or arrival for any aerodrome in the vicinity of Paling Yards.

4.4 Departures

The proposed wind farm will not have any effect upon any departures from any aerodrome in the vicinity of Paling Yards.

4.5 Contingency Procedures

The proposed wind farm will not have any effect upon any contingency procedure for any aerodrome in the vicinity of Paling Yards.

5. Other Issues

5.1 Navigation Aids

The proposed wind farm will not have any effect on any navigation aid in the vicinity of Paling Yards.

5.2 Radar Interference & Shadowing

In consideration of the proposed development height, location and distance from radar and associated control zones, it is considered that the development will be considered approvable by Airservices Australia.

5.3 Minimum Enroute & Minimum Vector Altitudes

It is considered that the proposed maximum elevation of the turbines in this development will not affect the minimum altitudes associated with published routes.

There are no minimum vector altitudes in the vicinity of Paling Yards so these are not an issue.

APPENDIX 1 — PROJECT RESOURCES

THE PROJECT TEAM

The consultants involved in the preparation of this report for the Strategic Airspace comprise personnel with extensive experience in and knowledge of PANS-OPS procedure design criteria and its application in Australia under MOS Part 173 as well as ICAO Annex 14 and Obstacle Limitation Surfaces under MOS Part 139.

DATA

Aerodrome, instrument flight procedure and waypoint data were sourced from the Airservices AIP, including ERSA, DAH and DAP, Effective 03-Jun-2010.

The wind turbine and monitoring mast coordinates, plus background mapping and 1m topographic contour data was provided by the proponent, Union Fenosa.

Additional digital terrain model (DTM) data sourced from SRTM v2.1, formatted as DTED Level 1, was also used for 3D analysis of terrain by software.

The 1m topographic data and the DTM data were compared and found to be consistent within a maximum vertical variation of approximately 2m.

The consultants generated all other graphic data as part of their 3D aeronautical analyses.

SOFTWARE TOOLS USED

Strategic Airspace's ***PANSops Designer*** and ***OLSplanner*** were used for analysis and design of sample procedures. Copyright of any images produced from this software, included herein or provided separately, remains with Strategic Airspace. Permission isgranted to the project client - the proponent, Union Fenosa Wind Australia Pty Ltd – to use these as deemed necessary in relation to the subject matter of this report and the overall objectives of this project.

APPENDIX 2 — ABBREVIATIONS

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

Abbreviation	*Meaning*
AC	Advisory Circular (document supporting CAR 1998)
AD	Aerodrome
AGL	Above Ground Local (Height)
AHD	Australian Height Datum
AHT	Aircraft Height
AIP	Aeronautical Information Publication
Airports Act	Airports Act 1996, as amended
AIS	Aeronautical Information Services
Alt	Altitude
AMSL	Above Minimum Sea Level
ANEF	Australian Noise Exposure Forecast
ANSP	Airspace and Navigation Service Provider
APARs, or A(PofA)R	Airports (Protection of Airspace) Regulations, 1996 as amended
ARP	Aerodrome Reference Point
AsA	Airservices Australia
ATC	Air Traffic Control(ler)
ATM	Air Traffic Management
CAO	Civil Aviation Order
CAR	Civil Aviation Regulation
CASA	Civil Aviation Safety Authority
CASR	Civil Aviation Safety Regulation
DAH	Designated Airspace Handbook (published by AsA)
DAP	Departure and Approach Procedures (published by AsA)
DIT	Department of Infrastructure and Transport
Doc nn	ICAO Document Number nn
DoD	Department of Defence
ELEV	Elevation (above mean sea level)
ENE	East North East
ERSA	EnRoute Supplement Australia
Ft	Feet
ICAO	International Civil Aviation Organisation
IFP	Instrument Flight Procedure
IFR	Instrument Flight Rules
IHS	Inner Horizontal Surface, an Obstacle Limitation Surface
IMC	Instrument Meteorological Conditions
Km	Kilometres
Kt	Knot (one nautical mile per hour)
LAT	Latitude
LONG	Longitude
LSALT	Lowest Safe ALTitude
M	Metres
MGA94	Map Grid Australia 1994
MOS	Manual Of Standards, published by CASA
MVA	Minimum Vector Altitude
NE	North East
NM	Nautical Mile (= 1.852 km)
NNE	North North East
OAR	Office of Airspace Regulation

Abbreviation	*Meaning*
OCA	Obstacle Clearance Altitude (in this case, in AMSL)
OCH	Obstacle Clearance Height
OHS	Outer Horizontal Surface, an Obstacle Limitation Surface
OLS	Obstacle Limitation Surface
PANS-OPS	Procedures for Air Navigation – Operations, ICAO Doc 8168
RAAF	Royal Australian Air Force
RL	Relative Level
RWY	Runway
SID	Standard Instrument Departure
STAR	STandard ARrival
TAR	Terminal Approach Radar
THR	THReshold (of Runway)
VFR	Visual Flight Rules
VMC	Visual Meteorological Conditions

APPENDIX 3 — DEVELOPMENT PLAN IN CONTEXT & WIND TURBINE COORDINATES

COORDINATES & ELEVATIONS OF PROPOSED TURBINES

The data provided in the table below are based on data provided by the developer. WGS84 geographic coordinates were calculated from the MGA94 UTM Easting and Northing coordinates provided. Maximum Elevations for each feature is based on the ground elevation provided and the maximum feature height AGL.

Source data files were:

- 20110314 – Paling Yards, Turbine Coordinates (AJ).xls

Table 5-1: Paling Yards Turbine Coordinates & Elevations

Point	Feature	Easting	Northing	Base Elev m GND	Top Elev m AMSL	Latitude	Longitude
P1	Wind Turbine	747801.12	6214761.19	892	1067	341 04 3.4S	149 41 19.0E
P2	Wind Turbine	748312.15	6214436.95	876	1051	34 10 53.4S	149 41 39.3E
P3	Wind Turbine	748519.70	6214803.26	862	1037	34 10 41.4S	149 41 47.0E
P4	Wind Turbine	748803.60	6214973.12	865	1040	34 10 35.6S	149 41 57.9E
P5	Wind Turbine	749054.78	6215129.11	869	1044	34 10 30.3S	149 42 07.6E
P6	Wind Turbine	749245.34	6213666.85	853	1028	34 11 17.6S	149 42 16.5E
P7	Wind Turbine	749277.89	6214044.19	866	1041	34 11 05.3S	149 42 17.4E
P8	Wind Turbine	749637.93	6214879.49	869	1044	34 10 37.9S	149 42 30.6E
P9	Wind Turbine	750045.99	6215202.86	870	1045	34 10 27.1S	149 42 46.2E
P10	Wind Turbine	750487.73	6215520.35	877	1052	34 10 16.4S	149 43 03.1E
P11	Wind Turbine	750672.77	6216152.60	884	1059	34 09 55.8S	149 43 09.6E
P12	Wind Turbine	750521.21	6215025.33	911	1086	34 10 32.4S	149 43 04.9E
P13	Wind Turbine	750856.37	6215277.14	903	1078	34 10 24.0S	149 43 17.7E
P14	Wind Turbine	751065.13	6215503.43	903	1078	34 10 16.5S	149 43 25.6E
P15	Wind Turbine	750790.66	6214083.06	887	1062	34 11 02.8S	149 43 16.4E
P16	Wind Turbine	751180.75	6214432.91	898	1073	34 10 51.1S	149 43 31.3E
P17	Wind Turbine	751425.00	6214787.11	919	1094	34 10 39.4S	149 43 40.4E
P18	Wind Turbine	751941.69	6215114.62	941	1116	34 10 28.3S	149 44 00.2E
P19	Wind Turbine	751765.12	6215480.35	943	1118	34 10 16.6S	149 43 53.0E
P20	Wind Turbine	751924.43	6215913.25	972	1147	34 10 02.4S	149 43 58.7E
P21	Wind Turbine	752758.57	6214376.75	909	1084	34 10 51.5S	149 44 32.9E
P22	Wind Turbine	752945.24	6214652.27	924	1099	34 10 42.4S	149 44 39.9E
P23	Wind Turbine	753153.94	6215076.51	945	1120	34 10 28.5S	149 44 47.6E
P24	Wind Turbine	753358.95	6216136.19	952	1127	34 09 54.0S	149 44 54.5E
P25	Wind Turbine	752936.95	6216108.06	959	1134	34 09 55.2S	149 44 38.0E
P26	Wind Turbine	752233.60	6216086.08	964	1139	34 09 56.6S	149 44 10.6E
P27	Wind Turbine	752654.50	6216324.83	977	1152	34 09 48.5S	149 44 26.8E
P28	Wind Turbine	752167.15	6216398.80	972	1147	34 09 46.5S	149 44 07.7E
P29	Wind Turbine	752969.48	6216601.43	971	1146	34 09 39.2S	149 44 38.8E

Point	Feature	Easting	Northing	Base Elev m GND	Top Elev m AMSL	Latitude	Longitude
P30	Wind Turbine	752971.37	6216909.14	983	1158	34 09 29.2S	149 44 38.5E
P31	Wind Turbine	751295.48	6216935.08	933	1108	34 09 29.8S	149 43 33.1E
P32	Wind Turbine	751654.02	6217233.66	956	1131	34 09 19.8S	149 43 46.8E
P33	Wind Turbine	751942.30	6217474.14	976	1151	34 09 11.8S	149 43 57.8E
P34	Wind Turbine	752209.40	6217766.32	994	1169	34 09 02.1S	149 44 07.9E
P35	Wind Turbine	751952.91	6218024.61	971	1146	34 08 53.9S	149 43 57.6E
P36	Wind Turbine	753234.49	6217980.31	985	1160	34 08 54.3S	149 44 47.7E
P37	Wind Turbine	753414.26	6218295.67	1001	1176	34 08 43.9S	149 44 54.4E
P38	Wind Turbine	753669.52	6217768.20	1000	1175	34 09 00.8S	149 45 04.9E
P39	Wind Turbine	753790.39	6218102.49	1010	1185	34 08 49.8S	149 45 09.2E
P40	Wind Turbine	753715.79	6219273.15	993	1168	34 08 11.9S	149 45 05.1E
P41	Wind Turbine	753755.52	6218710.05	1005	1180	34 08 30.1S	149 45 07.2E
P42	Wind Turbine	753850.54	6219051.06	977	1152	34 08 19.0S	149 45 10.6E
P43	Wind Turbine	753989.92	6219495.01	991	1166	34 08 04.5S	149 45 15.5E
P44	Wind Turbine	754258.21	6219702.61	1003	1178	34 07 57.5S	149 45 25.8E
P45	Wind Turbine	754452.80	6219949.71	983	1158	34 07 49.3S	149 45 33.1E
P46	Wind Turbine	754723.69	6220153.76	972	1147	34 07 42.5S	149 45 43.5E
P47	Wind Turbine	754672.54	6220558.81	976	1151	34 07 29.4S	149 45 41.0E
P48	Wind Turbine	755148.59	6220270.48	968	1143	34 07 38.3S	149 45 59.9E
P49	Wind Turbine	755526.92	6220445.70	991	1166	34 07 32.3S	149 46 14.5E
P50	Wind Turbine	756080.37	6220346.27	1038	1213	34 07 35.0S	149 46 36.2E
P51	Wind Turbine	756446.50	6220552.20	1046	1221	34 07 28.0S	149 46 50.2E
P52	Wind Turbine	757359.69	6219304.77	982	1157	34 08 07.7S	149 47 27.2E
P53	Wind Turbine	757574.56	6219024.68	1009	1184	34 08 16.6S	149 47 35.8E
P54	Wind Turbine	757655.77	6218768.36	1018	1193	34 08 24.8S	149 47 39.3E
P55	Wind Turbine	757564.51	6218414.10	1032	1207	34 08 36.4S	149 47 36.1E
P56	Wind Turbine	757293.24	6218234.95	1022	1197	34 08 42.4S	149 47 25.7E
P57	Wind Turbine	757116.83	6217956.78	1042	1217	34 08 51.6S	149 47 19.1E
P58	Wind Turbine	756710.89	6217869.76	1031	1206	34 08 54.8S	149 47 03.4E
P59	Wind Turbine	757015.67	6217565.13	1026	1201	34 09 04.4S	149 47 15.6E
P60	Wind Turbine	757375.27	6217236.88	1024	1199	34 09 14.7S	149 47 30.0E

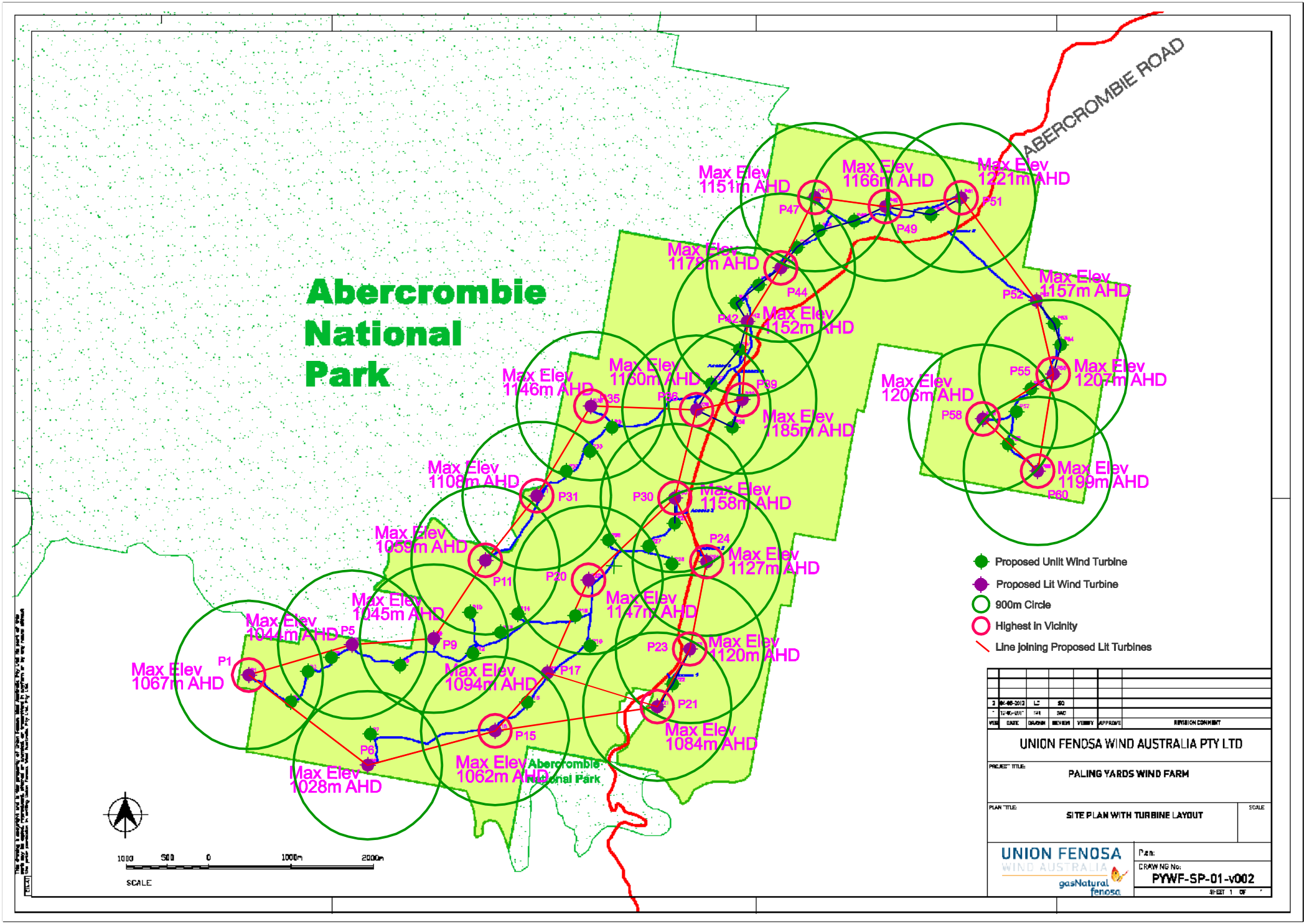
APPENDIX 4 — PANS-OPS ANALYSIS

Analysis of the extent and relevance of PANS-OPS protection areas and minimum obstacle clearance altitudes for current procedures — Airservices Australia DAP Am 127, Effective 02-Jun-2011 — was also conducted using the *PANSops Designer* software tool.

The entire development area is outside (laterally separated from) the protection areas for all PANS-OPS procedures at all nearby aerodromes.

Annexure 4 – Obstacle Lighting Design

1. Paling Yards Wind Farm Site Plan with Turbine Layout



Annexure 5 – Correspondence

1. From Aviation Projects Pty Ltd (APPL) to Aerial Agricultural Association of Australia dated 1 July 2011
2. From APPL to Airservices Australia dated 4 July 2011
3. From Airservices Australia to APPL dated 30 August 2011 (includes request for clarification of original response dated 25 August 2011 and request for clarification regarding Part 173 Certified Designers dated 30 August 2011)
4. From APPL to Civil Aviation Safety Authority (CASA) dated 1 July 2011
5. From CASA to APPL dated 4 August 2011
6. From APPL to CASA dated 8 August 2011
7. From CASA to APPL dated 22 September 2011
8. From APPL to Commonwealth Department of Defence dated 1 July 2011
9. From Commonwealth Department of Defence to APPL dated 29 August 2011
10. From APPL to Bathurst Shire Council dated 1 July 2011
11. From APPL to Oberon Council dated 25 August 2011 (letter dated 1 July 2011 attached)
12. From APPL to Goulburn Mulwaree Council dated 28 September 2011
13. From Goulburn Mulwaree Council to APPL dated 29 September 2011
14. From APPL to Upper Lachlan Shire Council dated 28 September 2011

AVIATION PROJECTS

Chief Executive Officer
Aerial Agricultural Association of Australia
PO Box 353
MITCHELL ACT 2911

Our ref: 100403-02/1

Dear Sir/Madam,

Re: Proposed Paling Yards Wind Farm – aviation issues

Union Fenosa Wind Australia Pty Ltd (UFWA) is part of an international energy group proposing to develop a new wind farm near Paling Yards in NSW, and seeks to inform the Aerial Agricultural Association of Australia of the proposal for the purpose of seeking feedback on a number of important issues.

The site is located on the western extent of the Great Diving Range, 60 km south of Oberon, 60 km north of Goulburn in NSW and approximately 140 km west of Sydney.

The surrounding area consists predominantly of large rural properties and National Park with the eastern edge of the site bordered by Kanangra Boyd National Park and Abercrombie National Park to the west and south. The site is situated in the Oberon Local Government Area (LGA).

The proposal will comprise a number of elements, including:

- up to 60 individual wind turbines standing up to 175 m at top of blade top with a capacity of up to 3.4MW each;
- up to 60 individual kiosks for the housing of 33 kV Transformers and 33 kV Switchgears and associated control systems to be located in the vicinity of the wind turbine towers (in some turbine models the equipment is integrated within the tower or nacelle);
- upgrades to local road infrastructure including up to six access points from Abercrombie Road;
- internal unsealed tracks for vehicle access to turbines and infrastructure;
- an underground electrical and communication cable network linking turbines to each other and the proposed substation;
- up to three wind monitoring masts fitted with various instruments such as anemometers, wind vanes, temperature gauges and potentially other electrical equipment;
- a temporary batching plant to supply concrete for the foundations of the turbines and other associated structures;
- obstacle lighting to selected turbines (if deemed necessary);
- removal of native vegetation within the site and en route to the substation (if required);
- vegetation planting to provide screening;
- wind farm and substation control room and facilities buildings;

*AVIATION PROJECTS Pty Ltd / **ABN** 88 127 760 267*
***Mobile** 0417 631 681 / **Phone** 07 3117 9608 / **Fax** 07 3374 3562*
***Street** 2/43 Upper Brookfield Road, Brookfield Qld 4069*
***Web** www.aviationprojects.com.au*

- an electrical substation and overland connection to transmission lines;
- a connection to the Mt Piper to Bannaby 500 kV transmission line witch bypasses the East of the site, or a 55 km overhead transmission line connection to the approved Crookwell 2 Wind Farm substation which connects to the Yass to Bannaby 330 kV transmission line; and
- all ancillary and incidental uses and activities.

UFWA is currently applying to the NSW Department of Planning for approval of the project. Having recently received the Director General's Requirements following consideration of a Preliminary Environmental Assessment, UFWA is undertaking stakeholder engagement and consultation activities in order to understand and address concerns to inform a final design which will be included in the final Environmental Assessment (EA). Once lodged, the EA will be assessed by the Department of Planning. This assessment will include a period of public exhibition where interested stakeholders will be invited to make a submission to the Department about the project.

On behalf of UFWA, Aviation Projects seeks the Aerial Agricultural Association's position in relation to the proposed development, with specific reference to the following issues as required by the Director General of Planning's Requirements:

1. Potential impacts on aviation safety considering:
    a. nearby aerodromes and aircraft landing areas;
    b. defined air traffic routes;
    c. aircraft operating heights;
    d. radar interference;
    e. communication systems; and
    f. navigation aids;
2. The impact of the turbines on the safe and efficient aerial application of agricultural fertilisers and pesticides in the vicinity of the turbines;
3. Potential hazards and risks associated with electric and magnetic fields; and
4. Marking and lighting of wind farms.

The location of Paling Yards Wind Farm is shown in the **attached** Proposed Turbine Layout plan.

Further information on the proposal is available on the project website:

http://www.unionfenosa.com.au/project_py.htm

If you require clarification on the contents of this correspondence, please contact the undersigned direct on 0417 631 681 or via email ktonkin@aviationprojects.com.au.

Yours sincerely,

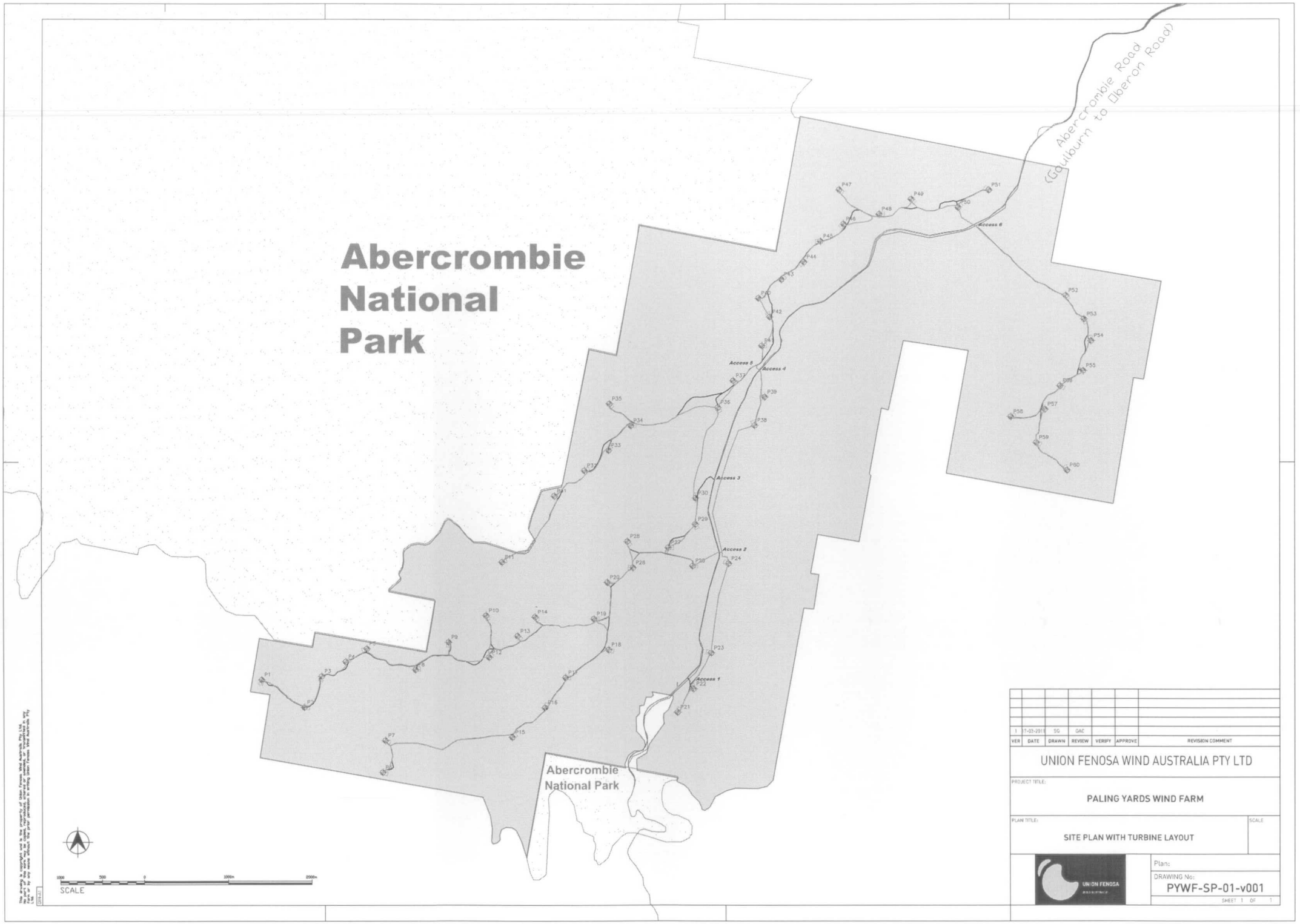
Keith Tonkin

Managing Director

1 July 2011

Enclosures:

1. 20110317 – Paling Yards, Proposed Turbine Layout (SQ)



DRAFT

VER	DATE	DRAWN	REVIEW	VERIFY	APPROVE	REVISION COMMENT
1	27-03-2015	SG	GAC			

UNION FENOSA WIND AUSTRALIA PTY LTD

PROJECT TITLE:

PALING YARDS WIND FARM

PLAN TITLE:

SITE PLAN WITH TURBINE LAYOUT

SCALE

Plan:

DRAWING No:

PYWF-SP-01-v001

SHEET 1 OF 1

Keith Tonkin

From: Keith Tonkin [ktonkin@aviationprojects.com.au]
Sent: Monday, 4 July 2011 1:39 PM
To: 'steve.tattam@airservicesaustralia.com'
Cc: 'joseph.doherty@airservicesaustralia.com'; 'Shaq Mohajerani'; 'andrea.jou@unionfenosa.com.au'; 'lucia.calvo@unionfenosa.com.au'
Subject: Paling Yards Wind Farm - request for assessment of aviation impacts
Attachments: 100403-03.1 Paling Yards Wind Farm - letter to Airservices Australia v1.0 110701.pdf; 20110317 - Paling Yards, Proposed Turbine Layout (SQ).pdf; 1106-PalingYards-AeroImpactAnalysis-Report_v1.2.pdf; 20110314 - Paling Yards, Turbine Coordinates (AJ)-reformatted.xlsx

Dear Steve,

Find attached a request for an assessment of the potential aviation impacts of the proposed Paling Yards Wind Farm.

Attachments:

1. 100403-03.1 - Letter to Airservices Australia
2. 20110317 – Paling Yards, Proposed Turbine Layout (SQ)
3. Aeronautical Impact Assessment (PANS-OPS and OLS): Paling Yards Wind Farm
4. Turbine locations and AHD data

Regards

Keith Tonkin MBA (Aviation Management), CPRM
Managing Director

Mobile +61 417 631 681
Phone +61 7 3117 9608
Fax +61 7 3374 3562
Street 2/43 Upper Brookfield Rd, Brookfield Qld 4069
Web www.aviationprojects.com.au

AVIATION PROJECTS

SAFE, SECURE, EFFICIENT AND SUSTAINABLE
Solutions for the Aviation Industry

AVIATION PROJECTS Pty Ltd / ABN 88 127 760 267

AVIATION PROJECTS

Mr Steve Tattam
Senior Advisor
Airport Relations NSW
Airservices Australia
GPO Box 367
Canberra ACT 2601

Our ref: 100403-03/1

Dear Steve,

Re: Proposed Paling Yards Wind Farm – aviation issues

Union Fenosa Wind Australia Pty Ltd (UFWA) is part of an international energy group proposing to develop a new wind farm near Paling Yards in NSW, and seeks to inform Airservices Australia of the proposal for the purpose of seeking feedback on a number of important issues.

The site is located on the western extent of the Great Diving Range, 60 km south of Oberon, 60 km north of Goulburn in NSW and approximately 140 km west of Sydney.

The surrounding area consists predominantly of large rural properties and National Park with the eastern edge of the site bordered by Kanangra Boyd National Park and Abercrombie National Park to the west and south. The site is situated in the Oberon Local Government Area (LGA).

The proposal will comprise a number of elements, including:

- up to 60 individual wind turbines standing up to 175 m at top of blade top with a capacity of up to 3.4MW each;
- up to 60 individual kiosks for the housing of 33 kV Transformers and 33 kV Switchgears and associated control systems to be located in the vicinity of the wind turbine towers (in some turbine models the equipment is integrated within the tower or nacelle);
- upgrades to local road infrastructure including up to six access points from Abercrombie Road;
- internal unsealed tracks for vehicle access to turbines and infrastructure;
- an underground electrical and communication cable network linking turbines to each other and the proposed substation;
- up to three wind monitoring masts fitted with various instruments such as anemometers, wind vanes, temperature gauges and potentially other electrical equipment;
- a temporary batching plant to supply concrete for the foundations of the turbines and other associated structures;
- obstacle lighting to selected turbines (if deemed necessary);
- removal of native vegetation within the site and en route to the substation (if required);

*AVIATION PROJECTS Pty Ltd / **ABN** 88 127 760 267*
***Mobile** 0417 631 681 / **Phone** 07 3117 9608 / **Fax** 07 3374 3562*
***Street** 2/43 Upper Brookfield Road, Brookfield Qld 4069*
***Web** www.aviationprojects.com.au*

- vegetation planting to provide screening;
- wind farm and substation control room and facilities buildings;
- an electrical substation and overland connection to transmission lines;
- a connection to the Mt Piper to Bannaby 500 kV transmission line witch bypasses the East of the site, or a 55 km overhead transmission line connection to the approved Crookwell 2 Wind Farm substation which connects to the Yass to Bannaby 330 kV transmission line; and
- all ancillary and incidental uses and activities.

UFWA is currently applying to the NSW Department of Planning for approval of the project. Having recently received the Director General's Requirements following consideration of a Preliminary Environmental Assessment, UFWA is undertaking stakeholder engagement and consultation activities in order to understand and address concerns to inform a final design which will be included in the final Environmental Assessment (EA). Once lodged, the EA will be assessed by the Department of Planning. This assessment will include a period of public exhibition where interested stakeholders will be invited to make a submission to the Department about the project.

On behalf of UFWA, Aviation Projects seeks Airservices Australia's position in relation to the proposed development, with specific reference to the following issues as required by the Director General of Planning's Requirements:

1. Potential impacts on aviation safety considering:
    a. nearby aerodromes and aircraft landing areas;
    b. defined air traffic routes;
    c. aircraft operating heights;
    d. radar interference;
    e. communication systems; and
    f. navigation aids;
2. Potential hazards and risks associated with electric and magnetic fields; and
3. Marking and lighting of wind farms.

The location of Paling Yards Wind Farm is shown in the **attached** Proposed Turbine Layout plan.

Proposed turbine locations and AHD data are provided in the **attached** spreadsheet.

To assist with Airservices Australia's deliberations, a preliminary assessment of the PANS-OPS and obstacle limitation surfaces potentially affected by the proposed wind farm has been prepared. Find **attached** a report prepared by Strategic Airspace which concludes that the proposed development will not have any direct impact on approach or departure operations at any nearby aerodrome.

Further information on the proposal is available on the project website:

http://www.unionfenosa.com.au/project_py.htm

If you require clarification on the contents of this correspondence, please contact the undersigned direct on 0417 631 681 or via email ktonkin@aviationprojects.com.au.

Yours sincerely,

Keith Tonkin

Managing Director

1 July 2011

Enclosures:

1. 20110317 – Paling Yards, Proposed Turbine Layout (SQ)
2. Aeronautical Impact Assessment (PANS-OPS and OLS): Paling Yards Wind Farm
3. Turbine locations and AHD data

Keith Tonkin

From: CHALK, MARTIN [Martin.Chalk@casa.gov.au]
Sent: Tuesday, 30 August 2011 1:46 PM
To: Keith Tonkin
Subject: RE: Paling Yards Wind Farm - request for assessment of aviation impacts [SEC=UNCLASSIFIED]

Dear Keith,

There are no Part 173 Certified Designers, other than Airservices Australia, with procedures in the vicinity of the proposed wind farm at Palling Yards.

Regards,

Martin Chalk
Instrument Procedure Specialist
Civil Aviation Safety Authority

From: Keith Tonkin [mailto:ktonkin@aviationprojects.com.au]
Sent: Tuesday, 30 August 2011 13:00
To: CHALK, MARTIN
Cc: 'Mike Gahan'
Subject: FW: Paling Yards Wind Farm - request for assessment of aviation impacts

Dear Martin,

Would you please confirm that there are no instrument procedures designed by Part 173 Certified Designers (other than those designed by Airservices Australia) that will be affected by the proposed Paling Yards Wind Farm.

Best regards,

Keith Tonkin MBA (Aviation Management), CPRM
Managing Director

Mobile +61 417 631 681
Phone +61 7 3117 9608
Fax +61 7 3374 3562
Street 2/43 Upper Brookfield Rd, Brookfield Qld 4069
Web www.aviationprojects.com.au

AVIATION PROJECTS

SAFE, SECURE, EFFICIENT AND SUSTAINABLE
Solutions for the Aviation Industry

AVIATION PROJECTS Pty Ltd / ABN 88 127 760 267

From: Fiumara, Carly [mailto:carly.fiumara@AirservicesAustralia.com]
Sent: Monday, 29 August 2011 5:02 PM
To: Keith Tonkin
Subject: RE: Paling Yards Wind Farm - request for assessment of aviation impacts

Hi Keith,

Apologies for the late reply, only working 3 days means I have a big email train to get through on Mondays...

I have just sought clarification from Procedures Design regarding the language used in our reply. The second sentence should infact read "registered *or certified*", so in answer to your question, yes, Paling Yards wind farm was assessed for any impacts to Bathurst Aerodrome.

As for your second query, to discern whether other instrument procedures (other than those designed by Airservices) are in use, please contact Airways and Aerodromes within CASA.

I hope this helps? Please call if you have any more questions.

Kind regards

Carly

From: Keith Tonkin [mailto:ktonkin@aviationprojects.com.au]
Sent: Thursday, 25 August 2011 1:52 PM
To: Fiumara, Carly
Cc: Tattam, Steve; 'Mike Gahan'
Subject: RE: Paling Yards Wind Farm - request for assessment of aviation impacts

Hi Carly,

In your second sentence you mention only registered aerodromes. Does that mean that certified aerodromes (Bathurst for instance) haven't been assessed?

Also, how do we ascertain which instrument procedures have been made available by other Part 173 Certified Designers?

Keith Tonkin MBA (Aviation Management), CPRM
Managing Director

Mobile +61 417 631 681
Phone +61 7 3117 9608
Fax +61 7 3374 3562
Street 2/43 Upper Brookfield Rd, Brookfield Qld 4069
Web www.aviationprojects.com.au

AVIATION PROJECTS

SAFE, SECURE, EFFICIENT AND SUSTAINABLE
Solutions for the Aviation Industry

AVIATION PROJECTS Pty Ltd / ABN 88 127 760 267

From: Fiumara, Carly [mailto:carly.fiumara@AirservicesAustralia.com]
Sent: Wednesday, 27 July 2011 10:20 AM
To: ktonkin@aviationprojects.com.au
Subject: Paling Yards Wind Farm - request for assessment of aviation impacts

Hi Keith,

I refer to the email (below) you sent Steve Tattam requesting Airservices assessment of the Paling Yards wind farm.

At a maximum height of 1221m (4006ft) AHD the proposed Wind Farm will not affect any sector or circling altitude, nor any approach or departure at any registered aerodrome in the area. It also will not affect any lowest safe altitudes (LSALTS) for air routes in the area.

If applicable to the airport, no assessment was conducted in relation to any other procedures made available by another Part 173 Certified Designer.

This proposed wind farm to a max height of 1221m AHD will not impact the performance of Precision/Non-Precision Nav Aids, HF/VHF Comms, A-SMGCS, Radar, PRM or Satellite/Links.

Kind regards

Carly

Carly Fiumara
Airport Development Assistant
Airport Relations, Corporate & International Affairs
☎ +61 02 6268 4725
carly.fiumara@airservicesaustralia.com

From: Keith Tonkin [mailto:ktonkin@aviationprojects.com.au]
Sent: Monday, 4 July 2011 1:39 PM
To: Tattam, Steve
Cc: Doherty, Joe; 'Shaq Mohajerani'; andrea.jou@unionfenosa.com.au; lucia.calvo@unionfenosa.com.au
Subject: Paling Yards Wind Farm - request for assessment of aviation impacts

Dear Steve,

Find attached a request for an assessment of the potential aviation impacts of the proposed Paling Yards Wind Farm.

Attachments:

1. 100403-03.1 - Letter to Airservices Australia
2. 20110317 – Paling Yards, Proposed Turbine Layout (SQ)
3. Aeronautical Impact Assessment (PANS-OPS and OLS): Paling Yards Wind Farm
4. Turbine locations and AHD data

Regards

Keith Tonkin MBA (Aviation Management), CPRM
Managing Director

Mobile +61 417 631 681
Phone +61 7 3117 9608
Fax +61 7 3374 3562
Street 2/43 Upper Brookfield Rd, Brookfield Qld 4069
Web www.aviationprojects.com.au

AVIATION PROJECTS

AVIATION PROJECTS

Mr Peter Cromarty
Executive Manager
Airspace and Aerodrome Regulation
Civil Aviation Safety Authority
PO Box 2005
Canberra ACT 2601

Our ref: 100403-04/1

Dear Mr Cromarty,

Re: Proposed Paling Yards Wind Farm – aviation issues

Union Fenosa Wind Australia Pty Ltd (UFWA) is part of an international energy group proposing to develop a new wind farm near Paling Yards in NSW, and seeks to inform the Civil Aviation Safety Authority of the proposal for the purpose of seeking feedback on a number of important issues.

The site is located on the western extent of the Great Diving Range, 60 km south of Oberon, 60 km north of Goulburn in NSW and approximately 140 km west of Sydney.

The surrounding area consists predominantly of large rural properties and National Park with the eastern edge of the site bordered by Kanangra Boyd National Park and Abercrombie National Park to the west and south. The site is situated in the Oberon Local Government Area (LGA).

The proposal will comprise a number of elements, including:

- up to 60 individual wind turbines standing up to 175 m at top of blade top with a capacity of up to 3.4MW each;
- up to 60 individual kiosks for the housing of 33 kV Transformers and 33 kV Switchgears and associated control systems to be located in the vicinity of the wind turbine towers (in some turbine models the equipment is integrated within the tower or nacelle);
- upgrades to local road infrastructure including up to six access points from Abercrombie Road;
- internal unsealed tracks for vehicle access to turbines and infrastructure;
- an underground electrical and communication cable network linking turbines to each other and the proposed substation;
- up to three wind monitoring masts fitted with various instruments such as anemometers, wind vanes, temperature gauges and potentially other electrical equipment;
- a temporary batching plant to supply concrete for the foundations of the turbines and other associated structures;
- obstacle lighting to selected turbines (if deemed necessary);
- removal of native vegetation within the site and en route to the substation (if required);

*AVIATION PROJECTS Pty Ltd / **ABN** 88 127 760 267*
***Mobile** 0417 631 681 / **Phone** 07 3117 9608 / **Fax** 07 3374 3562*
***Street** 2/43 Upper Brookfield Road, Brookfield Qld 4069*
***Web** www.aviationprojects.com.au*

- vegetation planting to provide screening;
- wind farm and substation control room and facilities buildings;
- an electrical substation and overland connection to transmission lines;
- a connection to the Mt Piper to Bannaby 500 kV transmission line witch bypasses the East of the site, or a 55 km overhead transmission line connection to the approved Crookwell 2 Wind Farm substation which connects to the Yass to Bannaby 330 kV transmission line; and
- all ancillary and incidental uses and activities.

UFWA is currently applying to the NSW Department of Planning for approval of the project. Having recently received the Director General's Requirements following consideration of a Preliminary Environmental Assessment, UFWA is undertaking stakeholder engagement and consultation activities in order to understand and address concerns to inform a final design which will be included in the final Environmental Assessment (EA). Once lodged, the EA will be assessed by the Department of Planning. This assessment will include a period of public exhibition where interested stakeholders will be invited to make a submission to the Department about the project.

On behalf of UFWA, Aviation Projects seeks Airservices Australia's position in relation to the proposed development, with specific reference to the following issues as required by the Director General of Planning's Requirements:

1. Potential impacts on aviation safety considering:
    a. nearby aerodromes and aircraft landing areas;
    b. defined air traffic routes;
    c. aircraft operating heights;
    d. radar interference;
    e. communication systems; and
    f. navigation aids;
2. The impact of the turbines on the safe and efficient aerial application of agricultural fertilisers and pesticides in the vicinity of the turbines;
3. Potential hazards and risks associated with electric and magnetic fields; and
4. Marking and lighting of wind farms.

The location of Paling Yards Wind Farm is shown in the **attached** Proposed Turbine Layout plan.

Further information on the proposal is available on the project website:

http://www.unionfenosa.com.au/project_py.htm

If you require clarification on the contents of this correspondence, please contact the undersigned direct on 0417 631 681 or via email ktonkin@aviationprojects.com.au.

Yours sincerely,

Keith Tonkin

Managing Director

1 July 2011

Enclosure:

1. 20110317 – Paling Yards, Proposed Turbine Layout (SQ)

Australian Government

Civil Aviation Safety Authority

AIRSPACE AND AERODROME REGULATION

Trim Ref: GI11/922

4 August 2011

Mr Keith Tonkin
Managing Director
Aviation Projects Pty Ltd
2/43 Upper Brookfield Road
BROOKFIELD QLD 4069

Email: ktonkin@aviationprojects.com.au

Dear Mr Tonkin

I refer to your letter of 1 July 2011 addressed to Mr Peter Cromarty, Executive Manager, Airspace and Aerodrome Regulation, Civil Aviation Safety Authority (CASA) regarding the proposed Paling Yards Wind Farm.

I am advised you should undertake the following consultation to assess the potential hazard posed to aviation by the proposed development:

- Identify any certified or registered aerodromes within 30 km of the boundaries of the proposed wind farm and consult with the aerodrome operator to determine any impact on Obstacle Limitation Surfaces (OLS) at such aerodromes. Penetration of these surfaces is likely to pose a hazard to normal aviation operations at the aerodrome.

- Identify any non-certified or non-registered aerodromes within 30 km of the boundaries of the proposed wind farm, and consult with the aerodrome operator to determine any impact on their operations.

- Consult with Airservices Australia regarding assessment of any potential impact on instrument approach procedures at aerodromes, navigational aids, communications facilities or surveillance facilities. This should include any risks associated with electric and magnetic fields.

- Contact the Aerial Agriculture Association of Australia (02 6241 2100 - Mr Phil Hurst) to gain comment on the potential hazards to aerial application and related operations in the area.

- Prior to commencement of construction advise CASA of start dates and locations, heights, structures, cranes and other objects that will exceed 110 m in height, so that appropriate Notices to Airmen (NOTAMs) can be issued, to warn

pilots of the activities. You advise that the maximum height reached by the turbine blades is likely to be up to 175 m. Some aircraft, under certain circumstances, are permitted to fly as low as 152 m, therefore the proposed turbines could be a hazard to aircraft traversing the area.

- The location, extent and height of the wind farm is to be advised to the RAAF Aeronautical Data Officer. Guidance on providing this advice is available in CASA's Advisory Circular AC 139-08(0) Reporting of Tall Structures available at http://www.casa.gov.au/wcmswr/_assets/main/rules/1998casr/139/139c08.pdf.

At this time, CASA has no specific authority to require marking or lighting of obstacles that are not at (or in the vicinity of) an aerodrome. Not withstanding CASA's regulatory authority, owners of structures which could be hazardous to aviation have a duty of care. It is CASA's view that the provision of obstacle marking and lighting is a decision for, and the responsibility of, the project proponent.

Any associated requirements for obstacle marking and lighting placed on developers by planning authorities, insurers or financiers are beyond CASA's scope.

I trust the above information is of assistance.

Yours sincerely

Malcolm McGregor
Manager, Airways and Aerodromes
Airspace and Aerodrome Regulation

AVIATION PROJECTS

Mr Malcolm McGregor
Manager, Airways and Aerodromes
Airspace and Aerodrome Regulation
Civil Aviation Safety Authority
PO Box 2005
Canberra ACT 2601

Our ref: 100403-04/2
Your ref: GI11/922

Dear Mr McGregor,

Re: Proposed Paling Yards Wind Farm – clarification of obstacle lighting requirements

I refer to your letter dated 4 August 2011 written in response to our request for the Civil Aviation Safety Authority's (CASA) assessment of potential impacts arising from the proposed Paling Yards Wind Farm.

In your letter, you advised that:

> *Some aircraft, under certain circumstances, are permitted to fly as low as 152 m, therefore the proposed turbines could be a hazard to aircraft traversing the area.*

Further, you advised that:

> *At this time, CASA has no specific authority to require marking or lighting of obstacles that are not at (or in the vicinity of) an aerodrome. Not withstanding CASA's regulatory authority, owners of structures which could be hazardous to aviation have a duty of care. It is CASA's view that the provision of obstacle marking and lighting is a decision for, and the responsibility of, the project proponent.*
>
> *Any associated requirements for obstacle marking and lighting placed on developers by planning authorities, insurers or financiers are beyond CASA's scope.*

So that we can properly understand the decision that is required to be made, we request further clarification of CASA's disposition towards the lighting of wind turbines with a blade tip height greater than 150 m above ground level (AGL) that are not in the vicinity of an aerodrome. Reference is drawn to Civil Aviation Safety Regulations Part 139 – *Aerodromes*, Manual of Standards Part 139 – *Aerodromes* and ICAO Annex 14 – *Aerodromes*.

Civil Aviation Safety Regulations 1998 (CASR) Part 139 – Aerodromes

CASR 139.370 Hazardous objects etc

(1) CASA may determine, in writing, that:

(a) an obstacle, or any proposed development or other proposed construction that is likely to create an obstacle; or

(b) a building or structure the top of which is 110 metres or more above ground level; or

(c) a proposed building or structure the top of which will be 110 metres or more above ground level;

*AVIATION PROJECTS Pty Ltd / **ABN** 88 127 760 267*
***Mobile** 0417 631 681 / **Phone** 07 3117 9608 / **Fax** 07 3374 3562*
***Street** 2/43 Upper Brookfield Road, Brookfield Qld 4069*
***Web** www.aviationprojects.com.au*

is, or will be, a hazardous object because of its location, height or lack of marking or lighting.

Manual of Standards (MOS) Part 139 – Aerodromes

7.1.5.2 Any object that extends to a height of 150 m or more above local ground level must be regarded as an obstacle unless it is assessed by CASA to be otherwise.

7.1.6.3 (a) CASA may direct that obstacles be marked and or lit and may impose operational restrictions on the aerodrome as a result of an obstacle.

9.4.1.2 In general, an object in the following situations would require to be provided with obstacle lighting unless CASA, in an aeronautical study, assesses it as being shielded by another lit object or that it is of no operational significance:

(a)...

(b) outside the obstacle limitation surfaces of an aerodrome, if the object is or will be more than 110 m above ground level.

ICAO Annex 14 – Aerodromes

ICAO Annex 14 sets out standards and recommended practices relating to obstacle lighting of wind turbines. Relevant sections are provided below.

6.4 Wind turbines

6.4.1 A wind turbine shall be marked and/or lighted if it is determined to be an obstacle.

Note – see 4.3.1 and 4.3.2

4.3.2 Recommendation.— In areas beyond the limits of the obstacle limitation surfaces, at least those objects which extend to a height of 150 m or more above ground elevation should be regarded as obstacles, unless a special aeronautical study indicates that they do not constitute a hazard to aeroplanes.

Markings

6.4.2 Recommendation – *The rotor blades, nacelle and upper 2/3 of the supporting mast of wind turbines should be painted white, unless otherwise indicated by an aeronautical study.*

Lighting

6.4.3 Recommendation – *When lighting is deemed necessary, medium intensity obstacle lights should be used. In the case of a wind farm, i.e. group of two or more wind turbines it should be regarded as an extensive object and the lights should be installed:*

a) to identify the perimeter of the wind farm;

b) respecting the maximum spacing, in accordance with 6.3.14, between the lights along the perimeter, unless a dedicated assessment shows that a greater spacing can be used;

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

d) so that, within a wind farm, any wind turbines of significantly higher elevation are also identified wherever they are located.

6.4.4 Recommendation – *The obstacle lights should be installed on the nacelle in such a manner as to provide an unobstructed view for aircraft approaching from any direction.*

Clarification required

We seek clarification of the following issues:

1. With respect to CASR 139.370, will the turbines of the proposed Paling Yards Wind Farm be hazardous objects because of their location, height or lack of marking or lighting?
2. With respect to MOS 139 section 7.1.5.2, if the turbines of the proposed Paling Yards Wind Farm extend to a height of 150 m or more above ground level, has CASA assessed them not to be obstacles?
3. With respect to MOS 139 section 9.4.1.2, has CASA, in an aeronautical study, assessed the turbines of the proposed Paling Yards Wind Farm as being of no operational significance?
4. With respect to the identified Annex 14 standards and recommended practices, as there have been no differences filed with ICAO and notified in the Aeronautical Information Package (AIP), we assume CASA will be applying those standards and recommended practices; therefore:
    a. Recommendation 4.3.2 – has CASA undertaken a special aeronautical study that indicates that the turbines of the proposed Paling Yards Wind Farm do not constitute a hazard to an aeroplane and therefore are not considered obstacles?
    b. Standard 6.4.1 – if CASA has not determined that the turbines of the proposed Paling Yards Wind Farm are not obstacles, will obstacle lighting be required?
5. Do the the turbines of the proposed Paling Yards Wind Farm require obstacle lighting?

I look forward to receiving your response and thank you in advance for your consideration of these important issues.

If you require clarification on the contents of this correspondence, please contact the undersigned direct on 0417 631 681 or via email ktonkin@aviationprojects.com.au.

Yours sincerely,

Keith Tonkin

Managing Director

8 August 2011

Australian Government
Civil Aviation Safety Authority

AIRSPACE AND AERODROME REGULATION
File Ref: GI11/922

22 September 2011

Mr Keith Tonkin
Managing Director
Aviation Projects Pty Ltd
2/43 Upper Brookfield Road
BROOKFIELD QLD 4069

Dear Mr Tonkin

Re: Proposed Paling Yards Wind Farm – clarification of obstacle lighting requirements

Thank you for your email on 7 September 2011 and your previous correspondence associated with the proposal to build a wind farm at Palings Yard.

CASA notes your willingness to meet to discuss issues associated with the proposed Palings Wind Farm. CASA also notes your preference for a formal response. Please find CASA's response below.

1. With respect to CASR 139.370, will the turbines of the proposed Paling Yards Wind Farm be hazardous objects because of their location, height or lack of marking or lighting?
There is significant doubt as to CASA's power to make a determination under CASR 139.370 in respect of obstacles not in the vicinity of an aerodrome. On that basis, CASA does not propose to make a determination under CASR 139.370 in respect of the Paling Yards Wind Farm. I would advise however, that in reviewing your proposal, CASA did not identify any additional hazards posed by the turbines at the Palings Yard Wind Farm other than the potential hazards to low level flying. In this regard, it is important to note that, through pressure of unforeseen weather conditions, pilots may occasionally be forced to fly at heights less than the minimum heights specified in the Civil Aviation Regulations (generally 500 feet AGL). You are reminded that it remains the responsibility of the operator of a wind farm to act diligently to assess and treat hazards and risks.

2. With respect to MOS 139 section 7.1.5.2, if the turbines of the proposed Paling Yards Wind Farm extend to a height of 150 m or more above ground level, has CASA assessed them not to be obstacles?
CASA's assessment of the 150m turbines is that they are not obstacles to aviation within the vicinity of an aerodrome. As noted above, CASA does not have any authority to regulate in respect to wind farms when the location is proposed to be away from the

vicinity of an aerodrome. CASA reminds proponents that this situation may change in the near term as there is some pressure for regulation to be established that provides protection and risk mitigation for obstacles that are not in the vicinity of aerodromes.

3. With respect to MOS 139 section 9.4.1.2, has CASA, in an aeronautical study, assessed the turbines of the proposed Paling Yards Wind Farm as being of no operational significance?
CASA has not undertaken an aeronautical study in the vicinity of the proposed Paling Yards. CASA encourages proponents to undertake such studies.

4. With respect to the identified Annex 14 standards and recommended practices, as there have been no differences filed with ICAO and notified in the Aeronautical Information Package (AIP), we assume CASA will be applying those standards and recommended practices; therefore:

a. **Recommendation 4.3.2 – has CASA undertaken a special aeronautical study that indicates that the turbines of the proposed Paling Yards Wind Farm do not constitute a hazard to an aeroplane and therefore are not considered obstacles?**
As noted in 3. above, CASA has not undertaken an aeronautical study in the vicinity of Paling Yards.

b. **Standard 6.4.1 – if CASA has not determined that the turbines of the proposed Paling Yards**
Wind Farm are not obstacles, will obstacle lighting be required?

As noted above, CASA does not presently have the authority to require the lighting of obstacles that are not in the vicinity of an aerodrome. This does not preclude any operator managing hazards associated with obstacles. CASA encourages the lighting of obstacles as a measure to reduce risk to As Low As Reasonably Practicable (ALARP). CASA would be happy to provide more information on this approach to risk management.

5. Do the turbines of the proposed Paling Yards Wind Farm require obstacle lighting?
See my answer to 4b. above.

If you have any further concerns, please do not hesitate to contact me.

Yours sincerely

for:
Malcolm McGregor
Manager Airways & Aerodromes
Airspace and Aerodrome Regulation

AVIATION PROJECTS

Director
Land Planning and Spatial Information
Estate Planning Branch
Brindabella Business Park BP3-1-B110
Department of Defence
Canberra ACT 2600

Our ref: 100403-05/1

Dear Sir,

Re: Proposed Paling Yards Wind Farm – aviation issues

Union Fenosa Wind Australia Pty Ltd (UFWA) is part of an international energy group proposing to develop a new wind farm near Paling Yards in NSW, and seeks to inform the Department of Defence of the proposal for the purpose of seeking feedback on a number of important issues.

The site is located on the western extent of the Great Diving Range, 60 km south of Oberon, 60 km north of Goulburn in NSW and approximately 140 km west of Sydney.

The surrounding area consists predominantly of large rural properties and National Park with the eastern edge of the site bordered by Kanangra Boyd National Park and Abercrombie National Park to the west and south. The site is situated in the Oberon Local Government Area (LGA).

The proposal will comprise a number of elements, including:

- up to 60 individual wind turbines standing up to 175 m at top of blade top with a capacity of up to 3.4MW each;
- up to 60 individual kiosks for the housing of 33 kV Transformers and 33 kV Switchgears and associated control systems to be located in the vicinity of the wind turbine towers (in some turbine models the equipment is integrated within the tower or nacelle);
- upgrades to local road infrastructure including up to six access points from Abercrombie Road;
- internal unsealed tracks for vehicle access to turbines and infrastructure;
- an underground electrical and communication cable network linking turbines to each other and the proposed substation;
- up to three wind monitoring masts fitted with various instruments such as anemometers, wind vanes, temperature gauges and potentially other electrical equipment;
- a temporary batching plant to supply concrete for the foundations of the turbines and other associated structures;
- obstacle lighting to selected turbines (if deemed necessary);
- removal of native vegetation within the site and en route to the substation (if required);

*AVIATION PROJECTS Pty Ltd / **ABN** 88 127 760 267*
***Mobile** 0417 631 681 / **Phone** 07 3117 9608 / **Fax** 07 3374 3562*
***Street** 2/43 Upper Brookfield Road, Brookfield Qld 4069*
***Web** www.aviationprojects.com.au*

- vegetation planting to provide screening;
- wind farm and substation control room and facilities buildings;
- an electrical substation and overland connection to transmission lines;
- a connection to the Mt Piper to Bannaby 500 kV transmission line witch bypasses the East of the site, or a 55 km overhead transmission line connection to the approved Crookwell 2 Wind Farm substation which connects to the Yass to Bannaby 330 kV transmission line; and
- all ancillary and incidental uses and activities.

UFWA is currently applying to the NSW Department of Planning for approval of the project. Having recently received the Director General's Requirements following consideration of a Preliminary Environmental Assessment, UFWA is undertaking stakeholder engagement and consultation activities in order to understand and address concerns to inform a final design which will be included in the final Environmental Assessment (EA). Once lodged, the EA will be assessed by the Department of Planning. This assessment will include a period of public exhibition where interested stakeholders will be invited to make a submission to the Department about the project.

On behalf of UFWA, Aviation Projects seeks Dept of Defence's position in relation to the proposed development, with specific reference to the following issues as required by the Director General of Planning's Requirements:

1. Potential impacts on aviation safety considering:
    a. nearby aerodromes and aircraft landing areas;
    b. defined air traffic routes;
    c. aircraft operating heights;
    d. radar interference;
    e. communication systems; and
    f. navigation aids;
2. Potential hazards and risks associated with electric and magnetic fields; and
3. Marking and lighting of wind farms.

The location of Paling Yards Wind Farm is shown in the **attached** Proposed Turbine Layout plan.

Further information on the proposal is available on the project website:

http://www.unionfenosa.com.au/project_py.htm

If you require clarification on the contents of this correspondence, please contact the undersigned direct on 0417 631 681 or via email ktonkin@aviationprojects.com.au.

Yours sincerely,

Keith Tonkin

Managing Director

1 July 2011

Enclosure:

1. 20110317 – Paling Yards, Proposed Turbine Layout (SQ)

Australian Government

Department of Defence
Defence Support Group

AF8351978
ELP/OUT/2011/126

Mr Keith Tonkin
Aviation Projects
Lot 2, 43 Upper Brookfield Rd
Brookfield, QLD, 4069

Dear Mr Tonkin

RE: PROPOSED PALING YARDS WIND FARM

Thank you for referring the abovementioned wind energy project to the Department of Defence (Defence) for comment. Defence understands that this wind farm will consist of 60 wind turbines up to 175m high and three wind monitoring masts located north of Goulburn, NSW. Defence is also aware that a 55km overhead line to the Crookwell 2 wind farm to the south-west may also be constructed.

As tall structures, wind farms can have the potential to pose a number of concerns for Defence, particularly with regard to aircraft safety, military low flying and radar interference. Defence has assessed the information you provided with respect to these issues and can advise that it has no concerns with the Paling Yards Wind Farm at this time.

The above notwithstanding, as wind turbines and wind monitoring masts meet the definition of a tall structure (i.e. taller than 30m above ground level) Defence requests that you report the location of all turbines and wind monitoring masts to RAAF Aeronautical Information Services (RAAF AIS). This may be done via the online form located on the RAAF AIS website at http://www.raafais.gov.au/obstr_form.htm. This should be done once the design is finalised (prior to construction) and again when construction is complete.

Finally, I ask that Defence be further consulted if the wind farm design changes (e.g. increase in turbine height, changes to the boundaries, etc) to ensure that any modification do not adversely affect Defence. This may be done via the notification provisions of the NSW planning process.

Should you wish to discuss the content of this advice further, please contact Brenin Presswell, Executive Officer, Land Planning on (02) 6266 8138 or by email at brenin.presswell@defence.gov.au.

Yours sincerely

John Kerwan
Director Land Planning & Spatial Information
Department of Defence
BP3-1-A052
Brindabella Park
Canberra ACT 2600

29 August 2011

AVIATION PROJECTS

General Manager
Bathurst Regional Council
PMB 17
Bathurst NSW 2795

Our ref: 100403-09/1

Dear Sir/Madam,

Re: Proposed Paling Yards Wind Farm – aviation issues

Union Fenosa Wind Australia Pty Ltd (UFWA) is part of an international energy group proposing to develop a new wind farm near Paling Yards in NSW, and seeks to inform Bathurst Regional Council of the proposal for the purpose of seeking feedback on a number of important issues.

The site is located on the western extent of the Great Diving Range, 60 km south of Oberon, 60 km north of Goulburn in NSW and approximately 140 km west of Sydney.

The surrounding area consists predominantly of large rural properties and National Park with the eastern edge of the site bordered by Kanangra Boyd National Park and Abercrombie National Park to the west and south. The site is situated in the Oberon Local Government Area (LGA).

The proposal will comprise a number of elements, including:

- up to 60 individual wind turbines standing up to 175 m at top of blade top with a capacity of up to 3.4MW each;
- up to 60 individual kiosks for the housing of 33 kV Transformers and 33 kV Switchgears and associated control systems to be located in the vicinity of the wind turbine towers (in some turbine models the equipment is integrated within the tower or nacelle);
- upgrades to local road infrastructure including up to six access points from Abercrombie Road;
- internal unsealed tracks for vehicle access to turbines and infrastructure;
- an underground electrical and communication cable network linking turbines to each other and the proposed substation;
- up to three wind monitoring masts fitted with various instruments such as anemometers, wind vanes, temperature gauges and potentially other electrical equipment;
- a temporary batching plant to supply concrete for the foundations of the turbines and other associated structures;
- obstacle lighting to selected turbines (if deemed necessary);
- removal of native vegetation within the site and en route to the substation (if required);
- vegetation planting to provide screening;

AVIATION PROJECTS Pty Ltd / **ABN** 88 127 760 267
Mobile 0417 631 681 / **Phone** 07 3117 9608 / **Fax** 07 3374 3562
Street 2/43 Upper Brookfield Road, Brookfield Qld 4069
Web www.aviationprojects.com.au

- wind farm and substation control room and facilities buildings;
- an electrical substation and overland connection to transmission lines;
- a connection to the Mt Piper to Bannaby 500 kV transmission line witch bypasses the East of the site, or a 55 km overhead transmission line connection to the approved Crookwell 2 Wind Farm substation which connects to the Yass to Bannaby 330 kV transmission line; and
- all ancillary and incidental uses and activities.

UFWA is currently applying to the NSW Department of Planning for approval of the project. Having recently received the Director General's Requirements following consideration of a Preliminary Environmental Assessment, UFWA is undertaking stakeholder engagement and consultation activities in order to understand and address concerns to inform a final design which will be included in the final Environmental Assessment (EA). Once lodged, the EA will be assessed by the Department of Planning. This assessment will include a period of public exhibition where interested stakeholders will be invited to make a submission to the Department about the project.

On behalf of UFWA, Aviation Projects seeks the Aerial Agricultural Association's position in relation to the proposed development, with specific reference to the following issues as required by the Director General of Planning's Requirements:

1. Potential impacts on aviation safety considering:
    a. nearby aerodromes and aircraft landing areas;
    b. defined air traffic routes;
    c. aircraft operating heights;
    d. radar interference;
    e. communication systems; and
    f. navigation aids;
2. Potential hazards and risks associated with electric and magnetic fields; and
3. Marking and lighting of wind farms.

The location of Paling Yards Wind Farm is shown in the **attached** Proposed Turbine Layout plan.

To assist your deliberations, a preliminary assessment of the PANS-OPS and obstacle limitation surfaces potentially affected by the proposed wind farm has been prepared. Find **attached** a report prepared by Strategic Airspace which concludes that the proposed development will not have any direct impact on approach or departure operations at any nearby aerodrome.

Further information on the proposal is available on the project website:

http://www.unionfenosa.com.au/project_py.htm

If you require clarification on the contents of this correspondence, please contact the undersigned direct on 0417 631 681 or via email ktonkin@aviationprojects.com.au.

Yours sincerely,

Keith Tonkin

Managing Director

1 July 2011

Enclosures:

1. 20110317 – Paling Yards, Proposed Turbine Layout (SQ)
2. Aeronautical Impact Assessment (PANS-OPS and OLS): Paling Yards Wind Farm
3. Turbine locations and AHD data

Keith Tonkin

From: Keith Tonkin [ktonkin@aviationprojects.com.au]
Sent: Thursday, 25 August 2011 1:22 PM
To: 'janet@oberon.nsw.gov.au'
Cc: 'council@oberon.nsw.gov.au'; 'Patrick Hill'
Subject: Paling Yards Wind Farm - request for assessment of aviation impacts
Attachments: 20110317 - Paling Yards, Proposed Turbine Layout (SQ).pdf; 1106-PalingYards-AeroImpactAnalysis-Report_v1.2.pdf; 20110314 - Paling Yards, Turbine Coordinates (AJ)-reformatted.xlsx; 100403-10.1 Paling Yards Wind Farm - letter to Oberon Council v1.0 110825.pdf

Dear General Manager,

Find attached a request for consideration of the potential aviation impacts of the proposed Paling Yards Wind Farm.

Attachments:

1. 100403-10.1 - Letter to Oberon Council
2. Location Plan Crookwell 3 Wind Farm
3. Aeronautical Impact Assessment (PANS-OPS and OLS): Paling Yards Wind Farm
4. Turbine locations and AHD data

Keith Tonkin MBA (Aviation Management), CPRM
Managing Director

Mobile +61 417 631 681
Phone +61 7 3117 9608
Fax +61 7 3374 3562
Street 2/43 Upper Brookfield Rd, Brookfield Qld 4069
Web www.aviationprojects.com.au

AVIATION PROJECTS

SAFE, SECURE, EFFICIENT AND SUSTAINABLE
Solutions for the Aviation Industry

AVIATION PROJECTS Pty Ltd / ABN 88 127 760 267

AVIATION PROJECTS

General Manager
Oberon Council
PO Box 84
Oberon NSW 2787

Via email: council@oberon.nsw.gov.au

Our ref: 100403-10/1

Dear Sir/Madam,

Re: Proposed Paling Yards Wind Farm – aviation issues

Union Fenosa Wind Australia Pty Ltd (UFWA) is part of an international energy group proposing to develop a new wind farm near Paling Yards in NSW, and seeks to inform Oberon Council of the proposal for the purpose of seeking feedback on a number of important issues.

The site is located on the western extent of the Great Diving Range, 60 km south of Oberon, 60 km north of Goulburn in NSW and approximately 140 km west of Sydney.

The surrounding area consists predominantly of large rural properties and National Park with the eastern edge of the site bordered by Kanangra Boyd National Park and Abercrombie National Park to the west and south. The site is situated in the Oberon Local Government Area (LGA).

The proposal will comprise a number of elements, including:

- up to 60 individual wind turbines standing up to 175 m at top of blade top with a capacity of up to 3.4MW each;
- up to 60 individual kiosks for the housing of 33 kV Transformers and 33 kV Switchgears and associated control systems to be located in the vicinity of the wind turbine towers (in some turbine models the equipment is integrated within the tower or nacelle);
- upgrades to local road infrastructure including up to six access points from Abercrombie Road;
- internal unsealed tracks for vehicle access to turbines and infrastructure;
- an underground electrical and communication cable network linking turbines to each other and the proposed substation;
- up to three wind monitoring masts fitted with various instruments such as anemometers, wind vanes, temperature gauges and potentially other electrical equipment;
- a temporary batching plant to supply concrete for the foundations of the turbines and other associated structures;
- obstacle lighting to selected turbines (if deemed necessary);
- removal of native vegetation within the site and en route to the substation (if required);

*AVIATION PROJECTS Pty Ltd / **ABN** 88 127 760 267*
***Mobile** 0417 631 681 / **Phone** 07 3117 9608 / **Fax** 07 3374 3562*
***Street** 2/43 Upper Brookfield Road, Brookfield Qld 4069*
***Web** www.aviationprojects.com.au*

- vegetation planting to provide screening;
- wind farm and substation control room and facilities buildings;
- an electrical substation and overland connection to transmission lines;
- a connection to the Mt Piper to Bannaby 500 kV transmission line witch bypasses the East of the site, or a 55 km overhead transmission line connection to the approved Crookwell 2 Wind Farm substation which connects to the Yass to Bannaby 330 kV transmission line; and
- all ancillary and incidental uses and activities.

UFWA is currently applying to the NSW Department of Planning for approval of the project. Having recently received the Director General's Requirements following consideration of a Preliminary Environmental Assessment, UFWA is undertaking stakeholder engagement and consultation activities in order to understand and address concerns to inform a final design which will be included in the final Environmental Assessment (EA). Once lodged, the EA will be assessed by the Department of Planning. This assessment will include a period of public exhibition where interested stakeholders will be invited to make a submission to the Department about the project.

On behalf of UFWA, Aviation Projects seeks Oberon Council's position in relation to the proposed development, with specific reference to the following issues as required by the Director General of Planning's Requirements:

1. Potential impacts on aviation safety considering:
    a. nearby aerodromes and aircraft landing areas;
    b. defined air traffic routes;
    c. aircraft operating heights;
    d. radar interference;
    e. communication systems; and
    f. navigation aids;
2. Potential hazards and risks associated with electric and magnetic fields; and
3. Marking and lighting of wind farms.

The location of Paling Yards Wind Farm is shown in the **attached** Proposed Turbine Layout plan.

Proposed turbine locations and AHD data are provided in the **attached** spreadsheet.

To assist your deliberations, a preliminary assessment of the PANS-OPS and obstacle limitation surfaces potentially affected by the proposed wind farm has been prepared. Find **attached** a report prepared by Strategic Airspace which concludes that the proposed development will not have any direct impact on approach or departure operations at any nearby aerodrome.

Further information on the proposal is available on the project website:

http://www.unionfenosa.com.au/project_py.htm

If you require clarification on the contents of this correspondence, please contact the undersigned direct on 0417 631 681 or via email ktonkin@aviationprojects.com.au.

Yours sincerely,

Keith Tonkin

Managing Director

1 July 2011

Enclosures:

1. 20110317 – Paling Yards, Proposed Turbine Layout (SQ)
2. Aeronautical Impact Assessment (PANS-OPS and OLS): Paling Yards Wind Farm
3. Turbine locations and AHD data

AVIATION PROJECTS

General Manager
Goulburn Mulwaree Council
Locked Bag 22
Goulburn NSW 2580

Our ref: 100403-08/1

By email: council@goulburn.nsw.gov.au

Dear Sir/Madam,

Re: Proposed Paling Yards Wind Farm – aviation issues

Union Fenosa Wind Australia Pty Ltd (UFWA) is part of an international energy group proposing to develop a new wind farm near Paling Yards in NSW, and seeks to inform Goulburn Mulwaree Council of the proposal for the purpose of seeking feedback on a number of important issues.

The site is located on the western extent of the Great Diving Range, 60 km south of Oberon, 60 km north of Goulburn in NSW and approximately 140 km west of Sydney.

The surrounding area consists predominantly of large rural properties and National Park with the eastern edge of the site bordered by Kanangra Boyd National Park and Abercrombie National Park to the west and south. The site is situated in the Oberon Local Government Area (LGA).

The proposal will comprise a number of elements, including:

- up to 60 individual wind turbines standing up to 175 m at top of blade top with a capacity of up to 3.4MW each;
- up to 60 individual kiosks for the housing of 33 kV Transformers and 33 kV Switchgears and associated control systems to be located in the vicinity of the wind turbine towers (in some turbine models the equipment is integrated within the tower or nacelle);
- upgrades to local road infrastructure including up to six access points from Abercrombie Road;
- internal unsealed tracks for vehicle access to turbines and infrastructure;
- an underground electrical and communication cable network linking turbines to each other and the proposed substation;
- up to three wind monitoring masts fitted with various instruments such as anemometers, wind vanes, temperature gauges and potentially other electrical equipment;
- a temporary batching plant to supply concrete for the foundations of the turbines and other associated structures;
- obstacle lighting to selected turbines (if deemed necessary);
- removal of native vegetation within the site and en route to the substation (if required);

AVIATION PROJECTS Pty Ltd / **ABN** 88 127 760 267
Mobile 0417 631 681 / **Phone** 07 3117 9608 / **Fax** 07 3374 3562
Street 2/43 Upper Brookfield Road, Brookfield Qld 4069
Web www.aviationprojects.com.au

- vegetation planting to provide screening;
- wind farm and substation control room and facilities buildings;
- an electrical substation and overland connection to transmission lines;
- a connection to the Mt Piper to Bannaby 500 kV transmission line witch bypasses the East of the site, or a 55 km overhead transmission line connection to the approved Crookwell 2 Wind Farm substation which connects to the Yass to Bannaby 330 kV transmission line; and
- all ancillary and incidental uses and activities.

UFWA is currently applying to the NSW Department of Planning for approval of the project. Having recently received the Director General's Requirements following consideration of a Preliminary Environmental Assessment, UFWA is undertaking stakeholder engagement and consultation activities in order to understand and address concerns to inform a final design which will be included in the final Environmental Assessment (EA). Once lodged, the EA will be assessed by the Department of Planning. This assessment will include a period of public exhibition where interested stakeholders will be invited to make a submission to the Department about the project.

On behalf of UFWA, Aviation Projects seeks Goulburn Mulwaree Council's position in relation to the proposed development, with specific reference to the following issues as required by the Director General of Planning's Requirements:

1. Potential impacts on aviation safety considering:
    a. nearby aerodromes and aircraft landing areas;
    b. defined air traffic routes;
    c. aircraft operating heights;
    d. radar interference;
    e. communication systems; and
    f. navigation aids;
2. Potential hazards and risks associated with electric and magnetic fields; and
3. Marking and lighting of wind farms.

The location of Paling Yards Wind Farm is shown in the **attached** Proposed Turbine Layout plan.

To assist your deliberations, a preliminary assessment of the PANS-OPS and obstacle limitation surfaces potentially affected by the proposed wind farm has been prepared. Find **attached** a report prepared by Strategic Airspace which concludes that the proposed development will not have any direct impact on approach or departure operations at any nearby aerodrome.

Further information on the proposal is available on the project website:

http://www.unionfenosa.com.au/project_py.htm

If you require clarification on the contents of this correspondence, please contact the undersigned direct on 0417 631 681 or via email ktonkin@aviationprojects.com.au.

Yours sincerely,

Keith Tonkin

Managing Director

28 September 2011

Enclosures:

1. 20110317 – Paling Yards, Proposed Turbine Layout (SQ)
2. Aeronautical Impact Assessment (PANS-OPS and OLS): Paling Yards Wind Farm
3. Turbine locations and AHD data

Keith Tonkin

From: Richard Davies [Richard.Davies@goulburn.nsw.gov.au]
Sent: Thursday, 29 September 2011 8:44 AM
To: Keith Tonkin
Subject: RE: Paling Yards Wind Farm - request for assessment of aviation impacts [Scanned] [Spam score:8%]

Hi Keith,

As suspected, after discussion with other relevant Council officers, GMC does not have any objections or requirements for the Paling Yards wind farm in relation to the Goulburn Airport or its operations.

Regards,

Richard Davies
Manager Development Control

Goulburn Mulwaree Council
Locked Bag 22
Goulburn NSW 2580

ph: (02) 4823 4444
fax: 4822 7999
e: richard.davies@goulburn.nsw.gov.au

From: Keith Tonkin [mailto:ktonkin@aviationprojects.com.au]
Sent: Wednesday, 28 September 2011 11:37 AM
To: Richard Davies
Subject: FW: Paling Yards Wind Farm - request for assessment of aviation impacts [Scanned][Spam score:8%]

Dear Richard,

Thank you for taking the time to consider our request for assessment, which was the subject of our initial correspondence dated 4 July 2011, copied below.

As discussed in our telephone conversation this morning, we note that our original letter was addressed to Goulburn Mulwaree Council, but incorrectly referred to the Aerial Agricultural Association in the final paragraph. This was a typographical error and we apologise for any confusion caused.

For your records, please find attached an amended version of the correspondence correctly noting Goulburn Mulwaree Council as the intended agency.

In any case, we note that Goulburn Airport is approximately 68 km from the proposed wind farm, and it is your assessment that Goulburn Mulwaree Council is unlikely to have an issue with potential impacts on aviation safety arising from the proposed wind farm.

We will proceed on this basis unless we hear otherwise.

If you wish to discuss this matter any further or provide additional feedback, please contact me at this email address or on 0417 631 681.

Best regards,

Keith Tonkin MBA (Aviation Management), CPRM
Managing Director

Mobile +61 417 631 681
Phone +61 7 3117 9608
Fax +61 7 3374 3562
Street 2/43 Upper Brookfield Rd, Brookfield Qld 4069

Web www.aviationprojects.com.au

AVIATION PROJECTS

SAFE, SECURE, EFFICIENT AND SUSTAINABLE
Solutions for the Aviation Industry

AVIATION PROJECTS Pty Ltd / ABN 88 127 760 267

From: Keith Tonkin [mailto:ktonkin@aviationprojects.com.au]
Sent: Monday, 4 July 2011 1:40 PM
To: 'council@goulburn.nsw.gov.au'
Subject: Paling Yards Wind Farm - request for assessment of aviation impacts

Dear General Manager,

Find attached a request for consideration of the potential aviation impacts of the proposed Paling Yards Wind Farm.

Attachments:

1. 100403-08.1 - Letter to Goulburn Mulwaree Council
2. Location Plan Crookwell 3 Wind Farm
3. Aeronautical Impact Assessment (PANS-OPS and OLS): Paling Yards Wind Farm
4. Turbine locations and AHD data

Keith Tonkin MBA (Aviation Management), CPRM
Managing Director

Mobile +61 417 631 681
Phone +61 7 3117 9608
Fax +61 7 3374 3562
Street 2/43 Upper Brookfield Rd, Brookfield Qld 4069
Web www.aviationprojects.com.au

AVIATION PROJECTS

SAFE, SECURE, EFFICIENT AND SUSTAINABLE
Solutions for the Aviation Industry

AVIATION PROJECTS Pty Ltd / ABN 88 127 760 267

Keith Tonkin

From: Keith Tonkin [ktonkin@aviationprojects.com.au]
Sent: Wednesday, 28 September 2011 11:20 AM
To: 'tdodson@upperlachlan.nsw.gov.au'
Cc: 'Shaq Mohajerani'; 'lucia.calvo@unionfenosa.com.au'; 'andrea.jou@unionfenosa.com.au'
Subject: Paling Yards Wind Farm - request for assessment of aviation impacts
Attachments: 100403-07.1 Paling Yards Wind Farm - letter to Upper Lachlan Shire Council v1.0 110928.pdf; 20110317 - Paling Yards, Proposed Turbine Layout (SQ).pdf

Dear Tina,

In early July we addressed correspondence regarding the proposed Paling Yards Wind Farm to the General Manager, seeking Upper Lachlan Shire Council's assessment of potential aviation impacts. We have called a number of times and left messages requesting Upper Lachlan Shire Council's response to this correspondence.

Having just spoken with Phil Newham, Director of Works and Operations, we note that the letter was addressed to Upper Lachlan Shire Council, but incorrectly referred to the Aerial Agricultural Association in the final paragraph. This was a typographical error and we apologise for any confusion caused.

For your records, please find attached an amended version of the correspondence correctly noting Upper Lachlan Shire Council as the intended agency.

In any case, as advised by Phil Newham in our telephone conversation this morning, we note that Upper Lachlan Shire Council has no issue with potential impacts on aviation safety arising from the proposed wind farm.

If you wish to discuss this matter any further, please contact me at this email address or on 0417 631 681.

Regards,

Keith Tonkin MBA (Aviation Management), CPRM
Managing Director

Mobile +61 417 631 681
Phone +61 7 3117 9608
Fax +61 7 3374 3562
Street 2/43 Upper Brookfield Rd, Brookfield Qld 4069
Web www.aviationprojects.com.au

AVIATION PROJECTS

SAFE, SECURE, EFFICIENT AND SUSTAINABLE
Solutions for the Aviation Industry

AVIATION PROJECTS Pty Ltd / ABN 88 127 760 267

AVIATION PROJECTS

General Manager
Upper Lachlan Shire Council
PO Box 10
CROOKWELL NSW 2583

Our ref: 100403-07/1

Dear Sir/Madam,

Re: Proposed Paling Yards Wind Farm – aviation issues

Union Fenosa Wind Australia Pty Ltd (UFWA) is part of an international energy group proposing to develop a new wind farm near Paling Yards in NSW, and seeks to inform Upper Lachlan Shire Council of the proposal for the purpose of seeking feedback on a number of important issues.

The site is located on the western extent of the Great Diving Range, 60 km south of Oberon, 60 km north of Goulburn in NSW and approximately 140 km west of Sydney.

The surrounding area consists predominantly of large rural properties and National Park with the eastern edge of the site bordered by Kanangra Boyd National Park and Abercrombie National Park to the west and south. The site is situated in the Oberon Local Government Area (LGA).

The proposal will comprise a number of elements, including:

- up to 60 individual wind turbines standing up to 175 m at top of blade top with a capacity of up to 3.4MW each;
- up to 60 individual kiosks for the housing of 33 kV Transformers and 33 kV Switchgears and associated control systems to be located in the vicinity of the wind turbine towers (in some turbine models the equipment is integrated within the tower or nacelle);
- upgrades to local road infrastructure including up to six access points from Abercrombie Road;
- internal unsealed tracks for vehicle access to turbines and infrastructure;
- an underground electrical and communication cable network linking turbines to each other and the proposed substation;
- up to three wind monitoring masts fitted with various instruments such as anemometers, wind vanes, temperature gauges and potentially other electrical equipment;
- a temporary batching plant to supply concrete for the foundations of the turbines and other associated structures;
- obstacle lighting to selected turbines (if deemed necessary);
- removal of native vegetation within the site and en route to the substation (if required);
- vegetation planting to provide screening;
- wind farm and substation control room and facilities buildings;

AVIATION PROJECTS Pty Ltd / **ABN** 88 127 760 267
Mobile 0417 631 681 / **Phone** 07 3117 9608 / **Fax** 07 3374 3562
Street 2/43 Upper Brookfield Road, Brookfield Qld 4069
Web www.aviationprojects.com.au

- an electrical substation and overland connection to transmission lines;
- a connection to the Mt Piper to Bannaby 500 kV transmission line witch bypasses the East of the site, or a 55 km overhead transmission line connection to the approved Crookwell 2 Wind Farm substation which connects to the Yass to Bannaby 330 kV transmission line; and
- all ancillary and incidental uses and activities.

UFWA is currently applying to the NSW Department of Planning for approval of the project. Having recently received the Director General's Requirements following consideration of a Preliminary Environmental Assessment, UFWA is undertaking stakeholder engagement and consultation activities in order to understand and address concerns to inform a final design which will be included in the final Environmental Assessment (EA). Once lodged, the EA will be assessed by the Department of Planning. This assessment will include a period of public exhibition where interested stakeholders will be invited to make a submission to the Department about the project.

On behalf of UFWA, Aviation Projects seeks Upper Lachlan Shire Council's position in relation to the proposed development, with specific reference to the following issues as required by the Director General of Planning's Requirements:

1. Potential impacts on aviation safety considering:
    a. nearby aerodromes and aircraft landing areas;
    b. defined air traffic routes;
    c. aircraft operating heights;
    d. radar interference;
    e. communication systems; and
    f. navigation aids;
2. Potential hazards and risks associated with electric and magnetic fields; and
3. Marking and lighting of wind farms.

The location of Paling Yards Wind Farm is shown in the **attached** Proposed Turbine Layout plan.

Further information on the proposal is available on the project website:

http://www.unionfenosa.com.au/project_py.htm

If you require clarification on the contents of this correspondence, please contact the undersigned direct on 0417 631 681 or via email ktonkin@aviationprojects.com.au.

Yours sincerely,

Keith Tonkin

Managing Director

28 September 2011

Enclosures:

1. 20110317 – Paling Yards, Proposed Turbine Layout (SQ)

AVIATION PROJECTS

AVIATION PROJECTS Pty Ltd / ABN 88 127 760 267

Mobile 0417 631 681 / Phone 07 3117 9608 / Fax 07 3374 3562 /
Street 2/43 Upper Brookfield Road, Brookfield Qld 4069 / Web www.aviationprojects.com.au