

3.5 Aviation hazard assessment



Proposed Gullen Range Wind Farm

An assessment of
compliance requirements
and operational impacts on
Crookwell and Ashwell
Airstrips



Aviation Projects

(07) 3374 3564 T

0417 631 681 M

enquiries@aviationprojects.com.au E

www.aviationprojects.com.au W

2/43 Upper Brookfield Road A

Brookfield QLD 4069

ABN: 77126018539

Revision History

Revision	Description	Author	Date of Issue
0.2	Initial Draft	Keith Tonkin	14 Jan 08
0.3	Incorporate client comments	Keith Tonkin	23 Jan 08
0.4	Revised turbine layout	Keith Tonkin	5 Feb 08
0.5	Revised turbine layout	Keith Tonkin	10 Mar 08
1.0	Adequacy Review	Keith Tonkin	27 May 08

Distribution List

Copy No	Position	Means
1	Epuron	Electronic Copy

List of Effective Pages

Section	Pages	Description	Date of Issue
Front Matter	I - VI		14 Jan 08
Assessment	1-14	Sections 1-5	14 Jan 08
Appendix A	1	Site Overview	14 Jan 08
Appendix B	1	Location of Surrounding Windfarms	14 Jan 08
Appendix C	1	Crookwell Airstrip Inner Horizontal Surface	14 Jan 08
Appendix D	1	Crookwell Airstrip Generic Circuit Diagram	14 Jan 08
Appendix E	1	Ashwell Airstrip Generic Circuit Diagram	14 Jan 08

Author Details

Prepared for:
Epuron Pty Ltd

Prepared by:
Mr Keith Tonkin
Managing Director
Aviation Projects Pty Ltd

Copyright and Disclaimer Notice

This document and the information contained herein should be treated as commercial-in-confidence. No part of this work may be reproduced or copied in any form or by any means (graphic, electronic or mechanical, including photocopying, recording, taping or information retrieval system) or otherwise disclosed to any other party whatsoever, without the prior written consent of Aviation Projects.

This report has been prepared for the benefit solely of Epuron Pty Ltd, and is not to be relied upon by any other person or entity without the prior written consent of Aviation Projects Pty Ltd.

© Aviation Projects Pty Ltd, 2008. All rights reserved.

Acknowledgements

The following people significantly contributed to the preparation of this report, and are acknowledged for their valuable input:

- Mr Simon Davey – Epuron
- Mr Chris Loty - Epuron

Table of Contents

Introduction

Revision History	I
Distribution List	I
List of Effective Pages	I
Author Details	I
Copyright and Disclaimer Notice	II
Acknowledgements.....	II
Table of Contents	III
Compliance	V
Crookwell Airstrip.....	VI
Ashwell Airstrip	VI
1.1 Appreciation of Task	1
1.2 Methodology	1
1.3 Responsibilities	2
1.4 Report Structure	2
2.1 Stakeholders	3
2.2 Epuron Pty Ltd.....	3
2.3 Upper Lachlan Shire.....	3
2.4 Crookwell Airstrip	4
2.5 Ashwell Airstrip.....	4
2.6 Operators/Users.....	4
3.1 Crookwell Airstrip Physical Characteristics	5
3.2 Ashwell Airstrip Physical Characteristics.....	5
3.3 Topography and Terrain	6
3.4 Civil Aviation Safety Regulations and Manual of Standards 139 – Aerodromes.....	6
3.5 Standard circuit flight path	7
3.6 Take-off Performance Data.....	7
3.7 Generic circuit flight path	8

3.8	Local Procedures and Issues	8
3.9	Obstacle Visibility and Clearance	9
4.1	Lighting	12
4.2	RAAF Aeronautical Information Service Obstruction Database	12
5.1	Wind turbines	13
5.1.1.	Lighting	13
5.1.2.	Notification of wind turbine locations to relevant authorities ...	13
5.2	Crookwell Airstrip	13
5.2.1.	Review and Update Operational Procedures	13
5.3	Ashwell Airstrip	14
5.3.1.	Update Operational Procedures	14
5.3.2.	Instrument procedure design	14
5.4	Communication Strategy	14
5.4.1.	Operational information to the flying community	14

Executive Summary

Epuron Pty Ltd (Epuron) proposes to construct and operate a wind farm on the Gullen Range south of Crookwell in New South Wales. The proposal is subject to assessment under Part 3A of the NSW Environmental Planning and Assessment Act 1979.

This report addresses the issue of aviation activities around the wind farm site and the major items for consideration in this report include:

- Compliance of the wind farm proposal with the aviation regulations
- Operational safety of aircraft using the Crookwell airstrip
- Low visibility, poor weather operations
- The operability of fire fighting aircraft from the Crookwell airstrip
- The impact of the proposal on the “Ashwell” airstrip

Compliance

1. Lighting and CASA requirements

Lighting as required by CASA in the *Manual of Standards 139 – Aerodromes* and *Advisory Circular 139-18(0) Obstacle Marking and Lighting of Wind Farms* and subsequent revisions will need to be installed if the wind turbines once constructed are greater than 110m in height.

It is not normal practice to design and implement measures to mitigate risk arising from non-compliance with statutory requirements, and therefore it is reasonable to conclude that compliance with CASA directions relating to marking and lighting of wind turbines will adequately address concerns relating to the risk of collision with the wind turbines under low visibility conditions.

Accordingly Epuron will have to provide CASA with a plan showing the location and layout of the proposed wind farm, showing terrain contours at the site. Further dialogue with CASA will be required to confirm the number and location of turbines that will require obstacle lighting as explained in AC 139-18(0).

2. Department of Defence

Epuron have to provide to RAAF Aeronautical Information Service (AIS) the location and height details once the final position of the wind turbines have been determined and before construction commences. After construction is complete, “as constructed” details should also be provided to AIS.

3. Obstacle Avoidance

There is no reason why the installation of the wind turbines as proposed will prevent diligent and competent aircraft operators from complying with obstacle clearance requirements.

Civil Aviation Regulations 1988 clearly state that obstacle clearance requirements do not apply if an aircraft is flying in the course of actually taking off or landing at an aerodrome. Notwithstanding this observation, obstacle clearance of 600m

horizontally can be achieved while conducting a circuit from the western runway at Crookwell airstrip by turning before the ridgeline to the west and joining a standard downwind leg.

Crookwell Airstrip

Crookwell airstrip is located in a low lying area to the south of Crookwell Township. It is bounded to the east by a road, and by a ridge line approximately 2000m to the west that limits take off climb performance for departures to the west.

Crookwell airstrip has several obstacles that infringe the transitional surface, including very large trees to the north of the western end of the airstrip, while the ridgeline to the west of the runway infringes the inner horizontal surface which extends 2000m at a height of 45m above airfield elevation.

Crookwell airstrip therefore does not comply with the *CASA Manual of Standards 139 - Aerodromes* obstacle limitation surface requirements.

The proximity of the ridgeline to the west of the runway anecdotally imposes limitations on takeoff climb performance, which has necessitated the development of local procedures to ensure safe flying operations.

A standard circuit will be technically possible from either runway (notwithstanding aircraft performance limitations) with no additional limitations caused by the construction of wind turbines in the proposed locations.

There is no reason why an aircraft, including fire fighting and other emergency aircraft, would not be able to continue to safely take off and/or land at Crookwell airstrip if the wind farm is constructed as proposed.

Ashwell Airstrip

Ashwell airstrip is located in the vicinity of Gurrundah approximately 4km to the west of the southern section of the wind farm site. The Ashwell airstrip lies in an area between ridgelines approximately 3000m to the east and west.

A standard circuit will be technically possible from either runway (notwithstanding aircraft performance limitations) with no additional limitations caused by the construction of wind turbines in the proposed locations.

There were no significant issues relating to aircraft operations under current conditions; however the airstrip owner indicated that one or more of the proposed wind turbines might impinge on the future design and implementation of GPS-based instrument approach procedures. No assessment of the impact of turbines on an instrument approach can be made until a certified procedure designer has developed the instrument approach design and procedures for the airstrip.

1. Task Overview

1.1 Appreciation of Task

1.1.1. Client overview

Epuron Pty Ltd proposes to develop a wind farm for the purpose of electricity generation on the Gullen Range, approximately 25km north-west of Goulburn, New South Wales.

Following a Planning Focus Meeting that was held on 15 Aug 07, several stakeholders including Dept of Defence and Civil Aviation Safety Authority raised concerns and/or advised of regulatory requirements related to safe flying operations. Concern was also expressed by several aircraft operators about the impact of some wind turbines in the proposed development on safe operations to and from the airstrips at Crookwell and Ashwell and on aircraft transiting the area in low visibility conditions such as low cloud, rain and/or haze.

1.1.2. Objectives

The objectives of this report are to:

- Assess the compliance of the wind farm proposal with the aviation regulations
- Review the wind farm proposal in terms of operational safety of the aircraft using the Crookwell airstrip and provide any recommendations
- Review the wind farm proposal in terms of low visibility, poor weather operations and provide recommendations and comment on the need for lighting
- Review the operability of fire fighting aircraft from the Crookwell airstrip in relation to the proposal
- Review and comment on the impact of the proposal on the “Ashwell” airstrip

1.1.3. Site overview

A plan view of the site under consideration is shown at Appendix A. Note the location of Crookwell and Ashwell airstrips and the proposed wind farm development. The location of other windfarms in the surrounding area is indicated at Appendix B.

1.2 Methodology

The following activities, in chronological order, were undertaken during the preparation of this report:

- Review of documentation provided by Epuron
- Site visit to the proposed wind farm development on 18 Dec 07, including a physical inspection of Crookwell airstrip and a drive-by of Ashwell airstrip
- Consultation with key stakeholders

- Analysis of derived information and review of relevant statutory requirements

1.2.1. Consultation

Telephone interviews and email correspondence were undertaken with key stakeholders as outlined in the relevant section of this report.

1.2.2. Limitations

The following limitations impacted on the conduct of the study:

- There was no evidence regarding the frequency and type of operation at Crookwell airstrip made available to the author
- The author did not physically inspect the Ashwell airstrip during the site visit

1.2.3. Information and References

Information used for this assessment was current as at 08 January 2008, and includes the following documents or sources:

- Civil Aviation Safety Authority, *Civil Aviation Safety Regulations 1988*
- Civil Aviation Safety Authority, *Manual of Standards – 139 Aerodromes*
- Airservices Australia, *Aeronautical Information Publication (AIP)*
- Other references as footnoted
- Civil Aviation Safety Authority, www.casa.gov.au
- Airservices Australia, www.airservicesaustralia.com

1.3 Responsibilities

Responsibilities assumed during the conduct of this assessment were as follows:

1.3.1. Epuron

- Provide all relevant information and advice necessary to prepare an assessment in accordance with the stated objectives and guidance provided.

1.3.2. Aviation Projects

- Conduct and report on an assessment as directed by Epuron for submission with the Development Application for the proposed wind farm.

1.4 Report Structure

This report is structured around three main areas of consideration – stakeholder analysis, technical and operational analysis and compliance requirements, within which each airstrip is assessed against relevant criteria. These sections are followed by recommendations and supporting appendices.

2. Stakeholder Analysis

2.1 Stakeholders

The following organisations, groups or individuals are stakeholders of the outcomes of this assessment:

- Epuron Pty Ltd
- Upper Lachlan Shire Council and communities surrounding the proposed development
- Mr Jim Hutson – Crookwell Airstrip
- Mr Stephen Friend – Ashwell Station
- Operators and users of the airstrips and itinerant aviation operations in the vicinity of the wind farm.

2.2 Epuron Pty Ltd

Epuron Pty Ltd (Epuron) proposes to seek planning approval to construct and operate a wind farm on the Gullen Range south of Crookwell in New South Wales. The proposal is subject to assessment under Part 3A of the NSW Environmental Planning and Assessment Act 1979.

2.3 Upper Lachlan Shire

The proposed wind farm is located within the Upper Lachlan Shire Local Government Area. The Council offices are located in three towns, including Crookwell.

The Crookwell airstrip is located on land owned by the Upper Lachlan Shire Council and they are considered the Operators of the airstrip.

Mr Alan Lawrence from the Crookwell office of the Council as the Director responsible provides advice to the Council on operational matters regarding the Crookwell airstrip, and provided the following information:

- There are no long term plans for the airstrip at Crookwell
- There is no active management program, but funds are budgeted for maintenance
- There are no landing fees imposed
- Council provides public liability insurance cover for activities on the airstrip, but on the information sheet it provides for airstrip users, it “*expressly makes no warrants as to the condition and state of maintenance of the aerodrome or of the suitability of the aerodrome for an operation*”. The information sheet is annotated by hand “*Land at own risk*”.¹

¹ Crookwell Aerodrome Information Sheet provided on 19 Dec 07

2.4 Crookwell Airstrip

Mr Jim Hutson lives on land adjoining and enjoys access to and use of the Crookwell airstrip. He has a hangar with direct access to the airstrip in which he houses a privately owned agricultural aircraft. It is also understood that he has his house on the market with the intention of using the sale proceeds to fund the construction of additional hangars along the airstrip.

Mr Huston is strongly opposed to the installation of the wind turbines on the northern end of the Gullen Range, as he feels that they will impinge on safe operations at the airstrip. He stated that it was his opinion that they should not be closer than 3000m from the airstrip at a minimum.

Mr Hutson was also of the view that the wind turbines would pose a safety hazard to aircraft attempting to cross the ranges in low visibility conditions such as heavy rain and low cloud.

2.5 Ashwell Airstrip

Mr Stephen Friend owns and operates an aircraft from an airstrip at Ashwell Station to the west of the proposed site of the southern group of wind turbines. He was of the view that the wind turbines would not necessarily impinge upon operations at his airstrip in the short term, but in the future might inhibit the design of a GPS-based instrument approach. He nominated one wind turbine (POM-19) from the proposed layout that should be removed so as to provide for the opportunity to design and have certified such an instrument approach.

Mr Friend also expressed concern about the vertical extent and visibility of the wind turbines in conditions of low cloud and rain, especially for people trying to cross the range at low level.

2.6 Operators/Users

There are two aircraft parked in hangars adjoining Crookwell airstrip. These aircraft are used relatively infrequently. There is one aircraft, which is used relatively infrequently, parked at Ashwell airstrip.

Other aircraft that anecdotally use the airstrip/s or operate in the vicinity of the proposed wind farm include:

- Flying training schools from Bankstown use the airstrip/s to practise outfield or forced landings
- Fire fighting aircraft
- Aerial agricultural aircraft
- Government and private charter
- Itinerant aircraft transiting the area

None of the aircraft operators that use Crookwell airstrip except Mr Hutson were consulted in relation to this matter. Mr Stephen Friend of Ashwell Station was consulted.

3. Technical and Operational Analysis

3.1 Crookwell Airstrip Physical Characteristics²

Elevation: 2950ft AMSL

3.1.1. Runway

Runway characteristics are as follows:

- Length: 915m
- Orientation: 09/27
- Slope: Downhill to west
- Surface: Grassed, compacted natural soil

3.1.2. Obstacles

The following obstacles were noted:

- Tall trees to the north of the western end of the runway
- Ridge line to western end of runway
- Ridgeline and powerlines to eastern end of runway

3.1.3. Prevailing Wind

According to Information provided by Epuron, the prevailing wind is from the northwest and west.³

3.2 Ashwell Airstrip Physical Characteristics⁴

Elevation: 2695ft AMSL

3.2.1. Runway

Runway characteristics are as follows:

- Length: 750m
- Orientation: 07/25
- Slope: not indicated
- Surface: Unsealed - Grass

3.2.2. Obstacles

High tension wires north of the field.

3.2.3. Prevailing Wind

According to Information provided by Epuron, the prevailing wind is from the northwest and west.⁵

² Crookwell Aerodrome Information Sheet provided by Council on 19 Dec 07

³ Fig 5.4 Predicted long-term wind rose for Bannister at 65m

⁴ FlightAce entry for Ashwell Station dated 1 July 2007

⁵ Fig 5.4 Predicted long-term wind rose for Bannister at 65m

3.3 Topography and Terrain

3.3.1. Crookwell

Crookwell airstrip is located in a low lying area to the south of Crookwell township. It is bounded to the east by a road, and by a ridge line approximately 2000m to the west that limits take off climb performance for departures to the west.

3.3.2. Ashwell

Ashwell airstrip is located in a low lying area between ridgelines approximately 3000m to the east and west.

3.4 Civil Aviation Safety Regulations and Manual of Standards 139 – Aerodromes

Chapter 13 of the Civil Aviation Safety Authority (CASA) Manual of Standards 139 (MOS) sets out standards for aerodromes intended for small aeroplanes conducting air transport operations under CASR 121B. These are the highest standards likely to be applicable to operations at the airstrips under consideration and were therefore used as the standard for this assessment.

It is important to note that, unless an aerodrome is Registered or Certified, which neither of these airstrips is; CASA does not regulate the aerodrome operator. There is therefore no current requirement for the airport to conform to the Manual of Standards 139.

While the obstacle limitation surfaces for the two airstrips were not physically surveyed, a visual observation was made during the site visit, and an analysis was conducted using GIS data provided by Epuron.

3.4.1. Crookwell

Crookwell airstrip has several obstacles that infringe the transitional surface, including very large trees to the north of the western end of the airstrip, while the ridgeline to the west of the runway infringes the inner horizontal surface which extends 2000m at a height of 45m above airfield elevation.

The proximity of the ridgeline to the west of the runway anecdotally imposes limitations on takeoff climb performance.

See Appendix C for a plan view of the inner horizontal surface (2000m radius) at a height of 45m, noting that contours above 950m on the ridgeline to the west of the runway infringe the surface as indicated by the shaded area.

Crookwell airstrip therefore does not comply with the MOS 139 obstacle limitation surface requirements.

3.4.2. Ashwell

Ashwell airstrip was not surveyed for compliance with obstacle limitation surface requirements as there was no objection to the location of the wind farm creating obstacles within the immediate vicinity of the airstrip.

The issue of individual wind turbines impacting on the design of future instrument approach procedures for the airstrip is a relatively complex matter. For certified and registered airports, the requirement for instrument approach design is regulated by CASA under Part 173 (Instrument Procedure Design) of the Civil Aviation Safety Regulations including:

- the qualifications and training required for persons engaged in instrument flight procedure design;
- the procedures to be used by organisations in the conduct of design work; and
- provisions for on-going maintenance of procedures.

In the event that the airstrip operator wishes to proceed with developing an instrument approach, a certified procedure designer would need to conduct a specific assessment of the requirements relating to the design, implementation and validation of instrument procedures. This assessment is a technically onerous task outside the reasonable scope of this report, and is the responsibility of the operator.

If instrument approach procedures are developed, the impact of turbine locations on instrument approaches can be assessed. At the time of writing this report, no procedures had been developed and therefore the report does not assess the impact of turbines on the future development of instrument approaches. However it is noted that the location of turbines will need to be considered in the development of any such procedures and may even preclude the establishment of instrument approach procedures.

3.5 Standard circuit flight path

A circuit is the term used to describe the flight path of an aircraft that takes off into wind (upwind), turns left or right (the convention is left) crosswind and downwind through 180 degrees, flies parallel to and past the runway, turns left (or right) again (base), aligns with the runway (final) and lands or takes off again.

According to Aeronautical Information Publication (AIP)⁶, a standard circuit has the following requirements:

- Left-hand circuits must normally be made. Right-hand circuit requirements are listed in ERSA
- Pilots remaining in the circuit should climb to within 300FT of circuit height before turning crosswind
- A normal downwind spacing of approximately 1/2 - 3/4 of a Nautical Mile from the runway is recommended for most single engine piston aircraft operations
- Pilots are encouraged to turn on aircraft landing lights, anti-collision lights and strobe lights, where fitted, when in the vicinity of a non-towered aerodrome, until the aircraft has landed
- When operating at non-towered aerodromes, the following circuit heights are recommended: typically single engine piston, 1000FT AGL
- The aircraft should arrive on final not closer than 500m from the landing threshold

3.6 Take-off Performance Data

To conduct an analysis of the impact of the proposed location of the wind turbines on aircraft performance during operations to and from the subject airstrips, the flight path derived from a representative aircraft has been plotted on an aerial plan of the area. The Cessna 152 is reasonably limited in performance and was chosen to

⁶ Aeronautical Information Publication ENR General Rules and Procedures Section 57

conservatively represent the type of performance that could be expected of aircraft operating at these airstrips. The take-off performance data applicable to a Cessna 152 was derived for the following conditions⁷:

- Flaps up
- Full throttle
- Standard temperature+20
- Nil wind

Weight	Pressure altitude	Temperature	Climb speed	Rate of climb	Time	Distance
757kg	1000ft	ISA+20	66 KIAS	675fpm	1.2 min	2.4nm

3.7 Generic circuit flight path

Using the standard circuit requirements and take-off performance data outlined above, a generic circuit flight path can be generated. This generic flight path for a circuit at Crookwell is presented in Appendix D. Note that the flight path is approximately 361m horizontally from the nearest proposed wind turbine. The generic flight path for a circuit at Ashwell airstrip is shown at Appendix E.

A standard circuit will be technically possible from either runway (notwithstanding aircraft performance limitations) at each airstrip under consideration with no additional limitations caused by the construction of wind turbines in the proposed locations.

Accordingly it is concluded that there is no reason why an aircraft, including fire fighting aircraft, would not be able to safely take off and/or land at Crookwell airstrip if the wind farm is constructed as proposed.

3.8 Local Procedures and Issues

3.8.1. Crookwell

Due to the close proximity of a ridgeline to the west of the airstrip, local procedures have been developed to provide a margin of safety during takeoff. Mr Jim Hutson outlined these procedures as follows:

- With a south westerly wind, a right turn after takeoff should not be conducted as lee rotors off the ridgeline might degrade aircraft performance to the point of ground impact. Pilots should conduct a slight left turn to cross the ridgeline through the saddle to the left of runway centreline for departures to the west, or turn left prior to reaching the ridgeline for all other departures.
- With a westerly or north westerly wind, conduct a slight left turn to cross the ridgeline through the saddle to the left of runway centreline for departures to the west, turn left prior to reaching the ridgeline for departures to the south or turn right prior to reaching the ridgeline for departures to the east and north.

⁷ Cessna 152 Pilot Operating Handbook 1 Jul 78, Section 5 Performance

- With an easterly wind, consideration should be given to the impact of the ridgeline to the north east on takeoff performance.

This local knowledge should ideally be formalised and provided to airstrip users on the briefing sheet provided by Council, or in other operational information references such as those provided by Aircraft Operators and Owners Association or FlightAce.

3.8.2. Ashwell

There were no significant issues relating to aircraft operations under current conditions; however the airstrip owner indicated that one or more of the proposed wind turbines may impinge on the future design and implementation of GPS-based instrument approach procedures. This issue discussed in more detail in 3.4.2.

3.9 Obstacle Visibility and Clearance

3.9.1. Wind turbine visibility

Anecdotal evidence showed that the area under consideration is a corridor used for the safe passage of aircraft operating under Visual Flight Rules to transit from either side of the Great Dividing Range to the other.

According to Aeronautical Information Publication (AIP) the meteorological conditions required for visual flight in class G airspace at or below 3,000FT AMSL or 1,000 FT AGL whichever is the higher are: 5000m visibility, clear of clouds and in sight of ground or water.⁸

The Visual Flight Rules obstacle clearance requirements in class G airspace below 3000ft is 500ft above ground level (agl) over unpopulated area and 1000ft agl over populated area.

Note that the tallest proposed wind turbine option will be approximately 135m at the tip of the blade at the highest point, which equates to approximately 443ft. Any aircraft operating at 500ft above ground level should be able to see the entire wind turbine.

Under low visibility conditions such as low cloud, rain or haze, aircraft sometimes need to descend to lower than normal through stress of weather to maintain the required forward visibility and avoid obstacles. Concern was expressed that under such conditions pilots would not be able to see the wind turbines and might collide with them.

On the wind turbines that require lighting, CASA directs that the light is to be installed on top of the nacelle, which will be approximately 85m above the ground, equating to approximately 280ft. This is significantly lower than the height required for safe flying operations (500ft agl) and under most circumstances should provide sufficient margin of safety over normal conditions.

Mr Byron Sullivan of the Civil Aviation Safety Authority was consulted on this matter, and it is the opinion of CASA as the regulator that white wind turbines such as those proposed and already in established wind farms, subject to lighting in accordance with relevant regulatory requirements, would be sufficiently visible to prevent collision under such low visibility conditions.

It is worth noting that there are several other wind farms in the area both constructed and proposed, and that they all impose similar restrictions on aircraft transiting the area.

⁸ Aeronautical Information Publication ENR 1.2

It is not normal practice to design and implement measures to mitigate risk arising from non-compliance with statutory requirements, and therefore it is reasonable to accept that compliance with CASA directions relating to marking and lighting of wind turbines (to be examined in a subsequent section) will adequately address the concerns relating to the risk of collision with the wind turbines.

3.9.2. Obstacle clearance at Crookwell

There is concern that the wind turbines proposed to be constructed at the northern end of the range will be too close to the Crookwell airstrip to permit safe operations and therefore the airstrip will need to be closed down.

Civil Aviation Regulations 157 states the following:⁹

(1) The pilot in command of an aircraft must not fly the aircraft over:

- (a) any city, town or populous area, at a height lower than 1000 feet; or
- (b) any other area at a height lower than 500 feet.

A height specified in subregulation (1) is the height above the highest point of the terrain, and any object on it, within a radius of:

- (a) in the case of an aircraft other than a helicopter—600 metres; from a point on the terrain vertically below the aircraft.

(4) Subregulation (1) does not apply if:

(a) through stress of weather or any other unavoidable cause it is essential that a lower height be maintained; or

(b) the aircraft is engaged in private operations or aerial work operations, being operations that require low flying, and the owner or operator of the aircraft has received from CASA either a general permit for all flights or a specific permit for the particular flight to be made at a lower height while engaged in such operations; or

(c) the pilot of the aircraft is engaged in flying training and flies over a part of a flying training area in respect of which low flying is authorised by CASA under subregulation 141 (1); or

(d) the pilot of the aircraft is engaged in a baulked approach procedure, or the practice of such procedure under the supervision of a flight instructor or a check pilot; or

(e) the aircraft is flying in the course of actually taking-off or landing at an aerodrome; or

(f) the pilot of the aircraft is engaged in:

- (i) a search; or
- (ii) a rescue; or
- (iii) dropping supplies;

in a search and rescue operation; or

⁹ Civil Aviation Regulations 1988 Reg 157 Low Flying

(g) the aircraft is a helicopter:

(i) operated by, or for the purposes of, the Australian Federal Police or the police force of a State or Territory; and

(ii) engaged in law enforcement operations; or

(h) the pilot of the aircraft is engaged in an operation which requires the dropping of packages or other articles or substances in accordance with directions issued by CASA.

It is clearly stated in point 4 (e) above that obstacle clearance requirements do not apply if the aircraft is flying in the course of actually taking off or landing at an aerodrome.

Notwithstanding this observation, it can be seen from the circuit diagram at Appendix D that an obstacle clearance of 600m horizontally can be achieved while conducting a circuit from the western runway at Crookwell airstrip by turning before the ridgeline to the west and joining a standard downwind leg.

There is no reason why the installation of the wind turbines as proposed will prevent diligent and competent aircraft operators from complying with obstacle clearance requirements.

4. Compliance Requirements

4.1 Lighting

The Civil Aviation Safety Authority outlines the requirements for Obstacle Marking and Lighting of Wind Farms in Advisory Circular 1390-18(0).

In accordance with the Advisory Circular, Epuron has notified CASA of the proposed development and received advice from Mr Frank Leonardi and Mr Byron Sullivan in response.

Lighting as required by CASA in the Manual of Standards 139 – Aerodromes and Advisory Circular 139-18(0) and subsequent revisions will need to be installed if the wind turbines are greater than 110m in height.

Epuron will also have to provide CASA with a plan showing the location and layout of the proposed wind farm, showing terrain contours at the site. Further dialogue with CASA will be required to confirm the number and location of turbines that will require obstacle lighting as explained in AC 139-18(0). Epuron intends to install lighting as required by CASA and has indicated that any lighting solutions will be designed to minimise visual impacts on local residents to the extent possible.

4.2 RAAF Aeronautical Information Service Obstruction Database

Epuron has written to the Department of Defence and in response was requested to provide to RAAF Aeronautical Information Service (AIS) the location and height details once the final position of the wind turbines have been determined and before construction commences. After construction is complete, “as constructed” details should also be provided to AIS.

5. Recommendations

On the assumption that the wind turbines are installed as proposed, the following recommendations are made:

5.1 Wind turbines

5.1.1. Lighting

- If the wind turbines to be constructed are greater than 110m in height, install lighting as required by CASA in the Manual of Standards 139 – Aerodromes and Advisory Circular 139-18(0) *Obstacle Marking and Lighting of Wind Farms* and subsequent revisions

5.1.2. Notification of wind turbine locations to relevant authorities

- Provide to RAAF Aeronautical Information Service (AIS) the location and height details once the final position of the wind turbines have been determined and before construction commences. After construction is complete, “as constructed” details should also be provided to AIS.
- Provide CASA with a plan showing the location and layout of the proposed wind farm, showing terrain contours at the site and identify which of the turbines will be provided with obstacle lighting as explained in AC 139-18(0).

5.2 Crookwell Airstrip

5.2.1. Review and Update Operational Procedures

- Consider formalising guidance to airstrip users regarding takeoff and landing procedures giving due consideration to the location of wind turbines and other obstacles, surrounding terrain, aircraft performance, prevailing conditions, runway physical characteristics, regulatory requirements and any other operational limitations.
- Update the Upper Lachlan Shire Council's Information Sheet for Crookwell Airstrip to include reference to the location of wind turbines in close proximity to the airstrip
- Notify known users of the airstrip of the location of the wind turbines and any changes to operational procedures
- Notify other operational information providers such as the Aircraft Owners and Operators Association and Flight Ace of the location of wind turbines in close proximity to the airstrip

5.3 Ashwell Airstrip

5.3.1. Update Operational Procedures

- Notify known users of the airstrip of the location of the wind turbines and any relevant to change to operational procedures
- Notify other operational information providers such as the Aircraft Owners and Operators Association and Flight Ace of the location of wind turbines in close proximity to the airstrip

5.3.2. Instrument procedure design

- To properly determine if any wind turbines will impact on the future design and implementation of instrument approach procedures, the airstrip owner should provide designs for instrument approaches that can then allow the proposed turbine locations to be assessed.

5.4 Communication Strategy

5.4.1. Operational information to the flying community

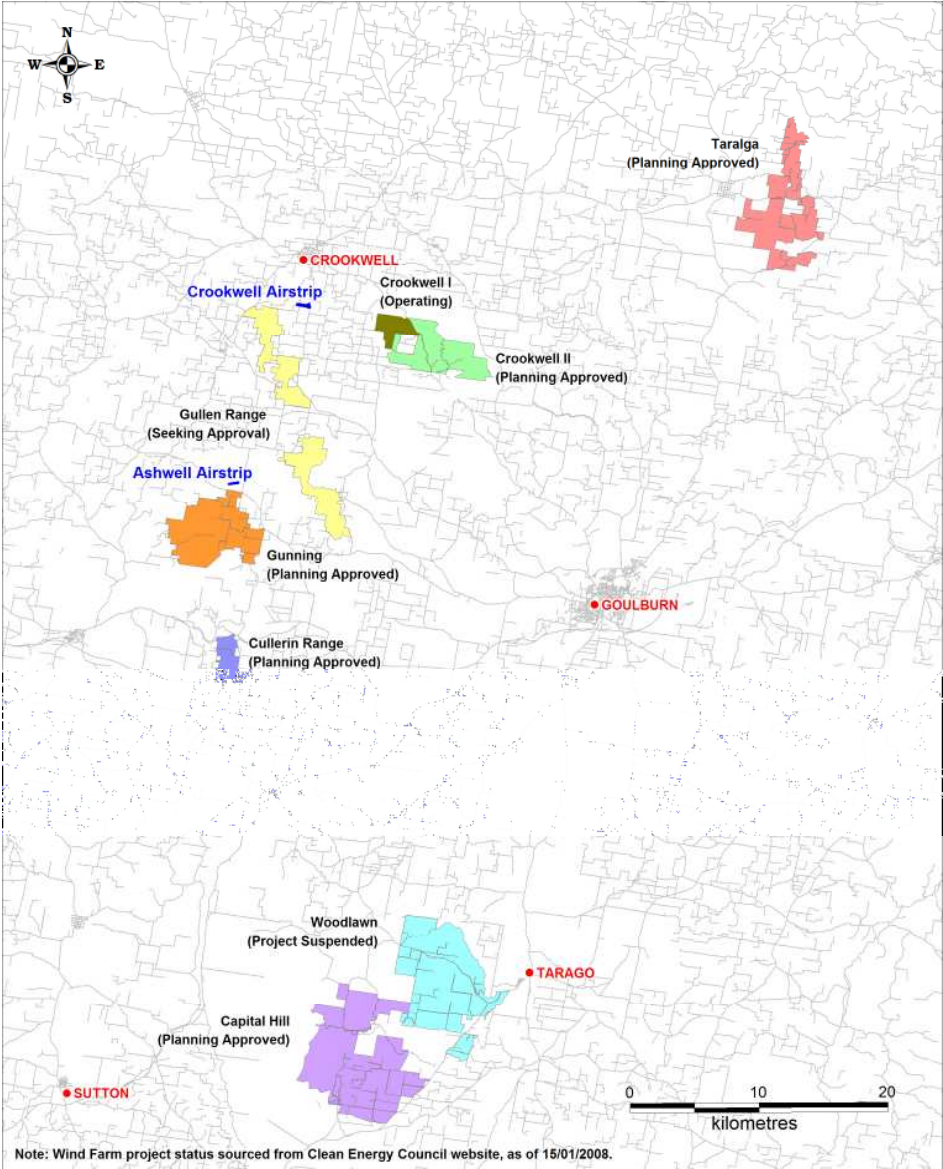
- There are limited means of providing timely operational information to the aviation community regarding non-regulated airstrip operators such as Crookwell and Ashwell. Once the starting date for construction is known, it is recommended that a briefing sheet including a description and an aerial view of the proposed development, expected construction times, extent of the development, lighting, likely operational impacts and contact details of the developer are distributed by as many means and as widely as possible, including newspaper articles, industry magazines, websites etc.

Appendices

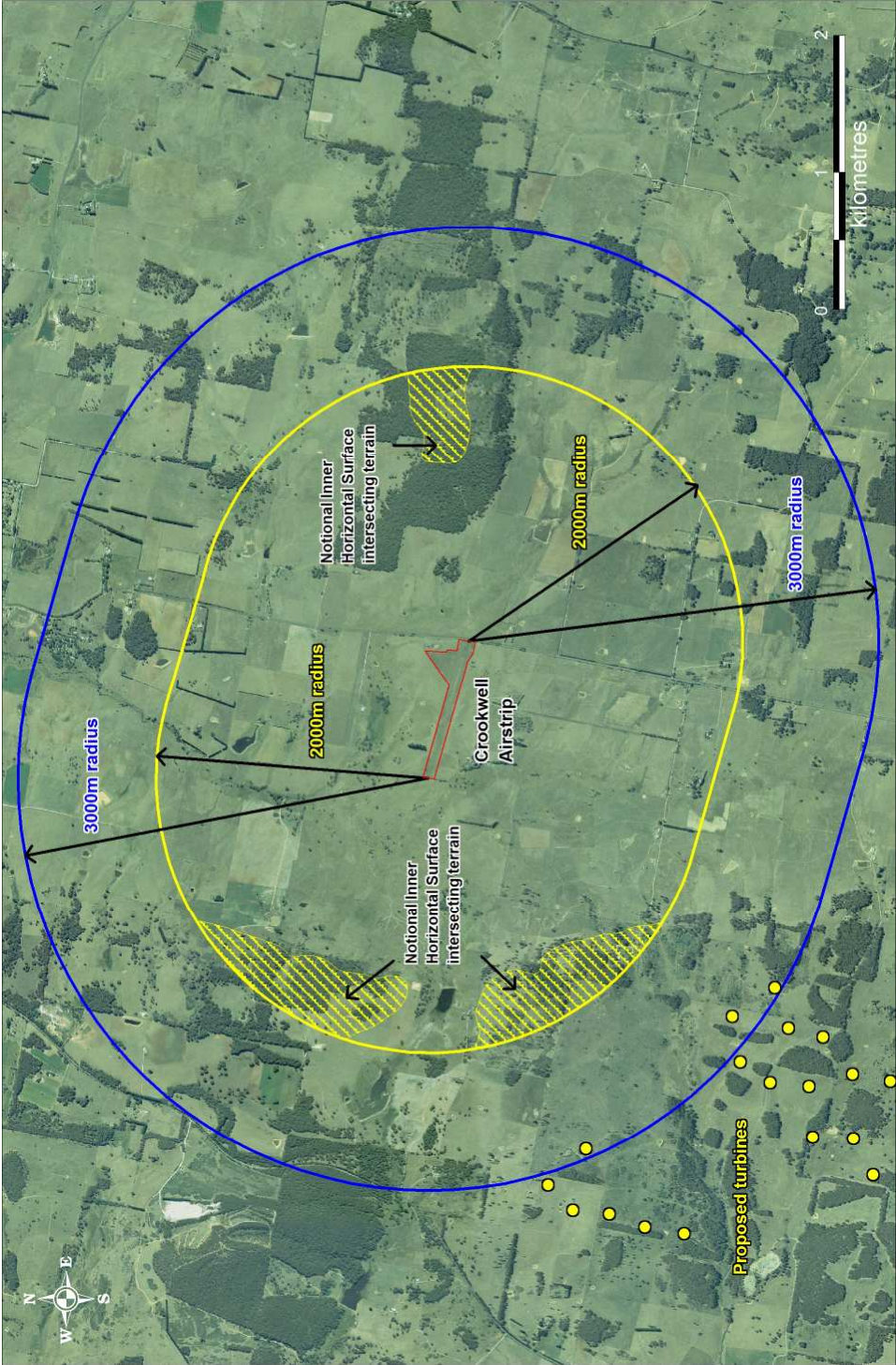
Site Overview



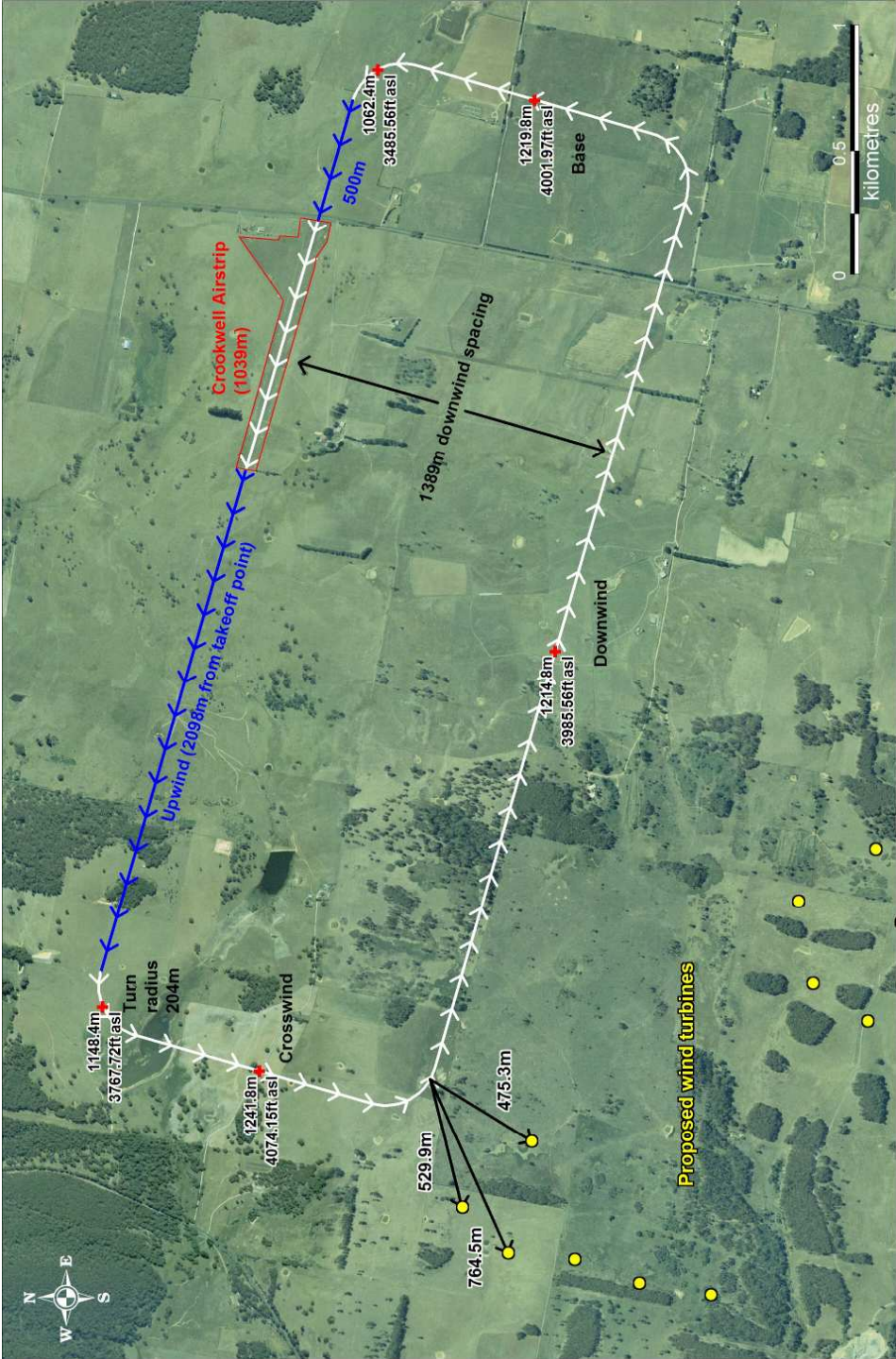
Location of Surrounding Windfarms



Crookwell Airstrip Inner Horizontal Surface



Crookwell Airstrip Generic Circuit Diagram



Ashwell Airstrip Generic Circuit Diagram

