SUPPLEMENTARY REPORT

AERONAUTICAL IMPACT ASSESSMENT

AVIATION IMPACT STATEMENT

QUALITATIVE RISK ASSESSMENT

AND

OBSTACLE LIGHTING REVIEW

SAPPHIRE WIND FARM

J0466

Copy No.: 1.1

To be read in conjunction with the Final Report

Report to:

CWP Renewables Pty Ltd

6 April 2016

AMBIDJI
AIR TRANSPORT INNOVATION

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A.C.N. 053 868 778

Melbourne, Australia

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EXECUTIVE SUMMARY

Supplementary to the original report CWP Energy has requested that Ambidji give further consideration to the proposed flying training school at Glen Innes aerodrome.

This report is supplementary to, and must be read in conjunction with, Ambidjiôs *Final Report - Aeronautical Impact Assessment, Aviation Impact Statement, Qualitative Risk Assessment and Obstacle Lighting Review - Sapphire Wind Farm dated 23 February 2016* (The original report).

A desktop analysis of the available information was conducted to further the Qualitative Risk Assessment conducted in the original report.

A Development Application, number DA 09/12-13, submitted by Australia Asia Flight Training Pty Ltd for the development of an ñeducational establishmentò comprising aviation training college, incorporating accommodation, teaching facilities, dining and recreational facilities in association with Glen Innes Aerodrome facility, and 3 lot subdivision was approved on 12 December 2012.

From information gathered, this college will eventually cater for 600 students seeking airline entry standard flying training. Such training will commence with ab-initio trainees learning to fly and finish with pilots holding CASA approved airline standard licences. It is envisaged that up to 40 aircraft will be required to service this training load. Additional aerodrome works, such as sealing runway 10/28, the addition of parallel taxiways, hard stand and hangar facilities have been proposed. The Director of Glen Innes Regional Airport is anticipating aircraft movements of 100,000 per annum at full operation of the flying school.

The Sapphire Wind Farm is sufficiently distant from the Glen Innes aerodrome to not affect the safe operation of aircraft at, into or out of its existing runways. The location and height of the wind turbines will be marked on the aeronautical charts used by pilots for planning flight purposes, so they can plan to fly on tracks and at heights that avoid the obstacles. Once the 25nm Minimum Safe Altitude is raised from 5,300ft to 5,500ft none of the prescribed airspace associated with the 4 published Instrument Departure and Approach Procedures will be impacted. Aircraft operating to the Visual Flight Rules will be able to see the turbines and fly accordingly. Aircraft operating to the Instrument Flight Rules will be above the Lowest Safe Altitude or Minimum Safe Altitude and within the prescribed airspace associated with the published instrument approaches. There are existing unlit obstacles, of significant height approximately 10nm to the south of the aerodrome. These range up to 5106ft AHD. There are terrain spot heights up to 4554ft in the same area.

The Glen Innes circuit area, even at 5nm radius for high performance jet aircraft is sufficiently distant from the Sapphire Wind Farm to ensure safe aircraft operations.

Given that the Sapphire Wind Farm is beyond the vicinity of the Glen Innes aerodrome the CASA regulations of Part 139 ï Aerodromes are not applicable. As was the case in 2009 when CASA withdrew Advisory Circular 139-18(0) ï Obstacle Marking of Wind Farms there is a question as to the legality of CASA mandating aviation obstacle lighting on tall structures

beyond the Obstacle Limitation Surface of a registered or certified aerodrome. The National Airports Safeguarding Framework (NASF), which is again focused on airports, requires a risk assessment to be undertaken to ascertain the hazard to aircraft safety posed by a wind farm. If the assessed risk is HIGH the wind farm should not be built, MEDIUM risk can be mitigated by marking and/or lighting, whilst a LOW risk indicates that no mitigation is required as it is not a hazard to aircraft safety.

CASA, if consulted by the Planning Authority, may recommend the installation of obstacle lighting; however to do so they would need to provide evidence from a risk assessment to demonstrate the need.

It is often stated that aircraft flown in accordance with the VFR can legally fly at 500 feet above the ground. This ñfactòis from Regulation 157 ï Low Flying of the Civil Aviation Regulations 1988 (CAR) Part 11, Division 2 Flight Rules. This regulation is often selectively quoted to indicate that an aircraft can fly at 500ft above the ground, when in fact the requirement is 500ft above the highest point of the ground **and any object on it**.

As far as the flying training at Glen Innes is concerned the Sapphire Wind Farm is sufficiently distant from the aerodrome to not be a hazard to aircraft safety, does not require aviation obstacle lighting and will just be another obstacle, along with hills, powerlines and communications towers, for the trainee pilots to consider. There are a number of highways and major roads in the area that provide good visual reference to guide VFR pilots to Glen Innes.

1. INTRODUCTION

Supplementary to the original report CWP Energy has requested that further consideration be given to the proposed flying training school at Glen Innes aerodrome.

> *"The college will include serviced accommodation, active and quiet leisure, classrooms, operations facilities and simulation bays. The second runway will be sealed to 1,200m and parallel sealed taxiways will be constructed in addition to new hardstands for up to 40 aircraft and hangars and refuelling facilities for JET A1 and Avgas."*[1]

2. SCOPE

To access the available information about the proposed Glen Innes flying training school and assess any impact the Sapphire Wind Farm may have on its operation.

3. METHOD

Conduct a desktop analysis of the information available about the proposed flying training school at Glen Innes airport in relation to any impact the Sapphire Wind Farm may have on its operation.

4. ANALYSIS

4.1 Available Information

Glen Innes Severn Council, as part of the Joint Regional Planning Panel (JRPP), approved Development Application number 9/12-13 by Australia Asia Flight Training Pty Ltd for the development of an ñeducational establishmentò comprising aviation training college, incorporating accommodation, teaching facilities, dining and recreational facilities in association with Glen Innes Aerodrome facility, and 3 lot subdivision[2]. This application was approved on 12 December 20112. The development is to be constructed in four stages; stage 1 - 30 accommodation units and all other infrastructure, stage 2 ï 18 accommodation units and the demolition of the caretakerôs residence and workshop/storage shed, stage 3 ï 18 accommodation units, and stage 4 ï 37 accommodation units.

[1] Wikipedia, Glen Innes Airport, page last modified 21 June 2015; https://en.wikipedia.org/wiki/Glen_Innes_Airport Accessed 31 March 2016

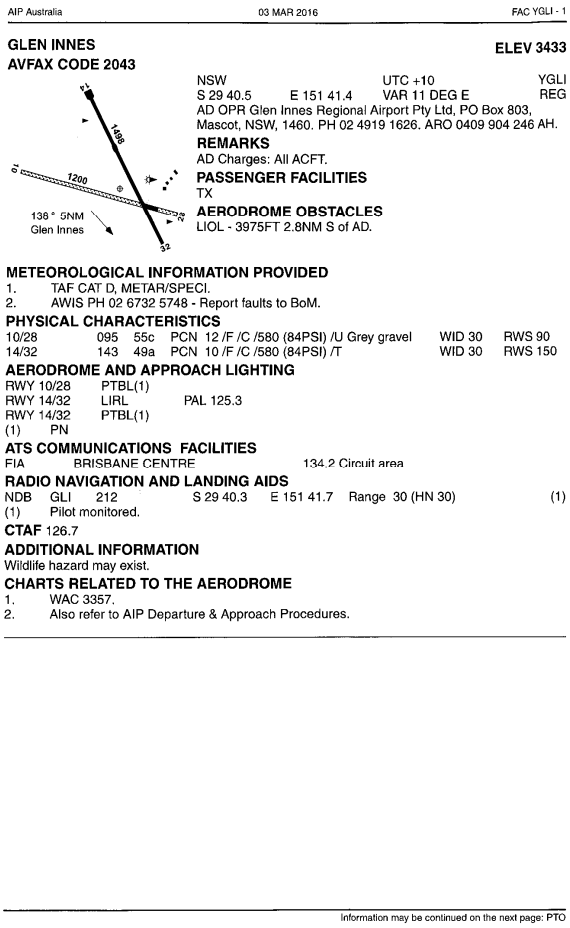
[2] Notice of Determination of a Development Application DA 09/12-13, Glen Innes Severn Council, 12 December 2012

A supplementary report to the JRPP for DA 9/12-13, dated 20 November 2012 has some additional information regarding facilities that are not evident in the determination report. These include the commencement with 100 students and developing over a five year period; a control tower, hangar and hardstand area for aircraft parking, as well as above ground aviation fuel storage units.

The Wikipedia entry cited above indicates that the existing gravel runway, RWY 10/28, will be sealed for a length of 1200m as well as the construction of sealed parallel taxiways and hardstands for up to 40 aircraft.

4.2 Glen Innes Aerodrome

The Australian Aeronautical Information Publication En-Route Supplement Australia (ERSA) publishes the information regarding Glen Innes aerodrome as shown in figure 4.2.1 below.



AIP Australia 03 MAR 2016 FAC YGLI - 1

GLEN INNES **ELEV 3433**
AVFAX CODE 2043

NSW UTC +10 YGLI
S 29 40.5 E 151 41.4 VAR 11 DEG E REG
AD OPR Glen Innes Regional Airport Pty Ltd, PO Box 803, Mascot, NSW, 1460. PH 02 4919 1626. ARO 0409 904 246 AH.

REMARKS
AD Charges: All ACFT.

PASSENGER FACILITIES
TX

AERODROME OBSTACLES
LIOL - 3975FT 2.8NM S of AD.

METEOROLOGICAL INFORMATION PROVIDED
1. TAF CAT D, METAR/SPECI.
2. AWIS PH 02 6732 5748 - Report faults to BoM.

PHYSICAL CHARACTERISTICS

10/28	095	55c	PCN 12 /F /C /580 (84PSI) /U Grey gravel	WID 30	RWS 90
14/32	143	49a	PCN 10 /F /C /580 (84PSI) /T	WID 30	RWS 150

AERODROME AND APPROACH LIGHTING
RWY 10/28 PTBL(1)
RWY 14/32 LIRL PAL 125.3
RWY 14/32 PTBL(1)
(1) PN

ATS COMMUNICATIONS FACILITIES
FIA BRISBANE CENTRE 134.2 Circuit area

RADIO NAVIGATION AND LANDING AIDS
NDB GLI 212 S 29 40.3 E 151 41.7 Range 30 (HN 30) (1)
(1) Pilot monitored.

CTAF 126.7

ADDITIONAL INFORMATION
Wildlife hazard may exist.

CHARTS RELATED TO THE AERODROME
1. WAC 3357.
2. Also refer to AIP Departure & Approach Procedures.

Information may be continued on the next page: PTO

Figure 4.2.1 – Glen Innes ERSA Entry

The aerodrome elevation is 3433ft above the Australian Height Datum (AHD).

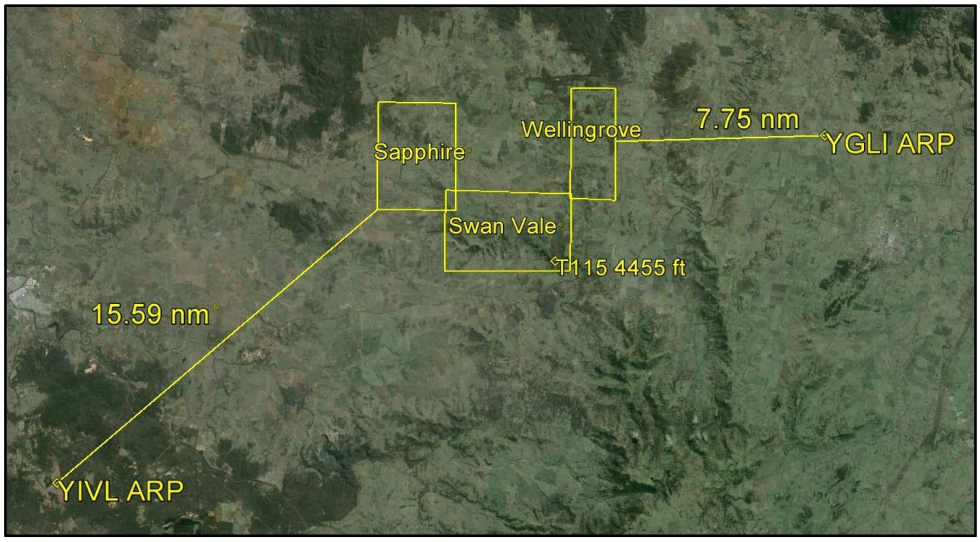


Figure 4.2.2 – Sapphire Wind Farm relative to YGLI and YIVL

The Sapphire Wind Farm is 14.35km (7.75nm) from the Glen Innes aerodrome reference point. This puts the wind farm beyond the Obstacle Limitation Surface (OLS) for the aerodrome.

The closest wind farm boundary is 1.1km (0.6nm) south west of the extended RWY28 centreline at 13.85km (7.5nm) from the runway threshold. The extended centrelines for the other runways track away from the Sapphire Wind Farm. The wind farm is well beyond the standard circuit areas for both runways.

Glen Innes has four Instrument Approach Procedures, all associated with runway 14/32 which is the only runway currently sealed and equipped with lights. They are:

- GNSS ARRIVAL
- RNAV (GNSS) RWY 14
- RNAV (GNSS) RWY 32
- NDB RWY 14

Refer to Section 4.6.2 of the *Final Report - Aeronautical Impact Assessment, Aviation Impact Statement, Qualitative Risk Assessment and Obstacle Lighting Review - Sapphire Wind Farm dated 23 February 2016* (original report) for the detailed analysis of the impact of the Sapphire Wind Farm on these instrument approaches.

There is a published Minimum Safe Altitude (MSA) for these instrument procedures.

The MSA in the Sector over the Sapphire Wind Farm is 5300ft within 25nm of the GLI

NDB and is 6100ft within 10nm. The Sapphire Wind Farm is impacted by the 25nm and 10nm MSA.

When the Minimum Obstacle Clearance of 1000ft is applied to the highest tip AHD of 4455ft, the result is 5455ft. This height will penetrate the 25nm MSA by 155ft.

As the 10nm MSA is 6100ft, and the altitude at the IF for the RWY 14 NDB approach is 6100ft, aircraft would be required to be no lower than 6100ft within 10nm. It is considered that the increase in the 25nm MSA to 5500ft will have minimal impact on flight operations.

Airservices Australia advise that to accommodate a maximum tip height of 1357.8m (4455ft) AHD in the *Swan Vale cluster* the Glen Innes aerodrome 25nm MSA in the NW sector will need to be raised from 5300ft to 5500ft. A permanent NOTAM would be required to implement this increase[3].

A request has been made to the operator of Glen Innes aerodrome seeking agreement to raise the MSA in the NW sector from 5300ft to 5500ft.

The Sapphire Wind Farm does not impact on any of the published Departure and Approach Procedures at Glen Innes aerodrome.

Night Visual Flight Rules operations are also governed by published LSALT. Descent into an aerodrome for VFR at night operations does not normally proceed below the LSALT/MSA until the aircraft is within 3nm from the aerodrome and in VMC. Assuming the 25nm MSA for YGLI is raised to 5500ft above the wind farm, night VFR operations will not be impacted.

The Sapphire Wind Farm is sufficiently distant from Glen Innes aerodrome to not be of operational significance and is not considered to be a hazard to aircraft safety. Since the assessed risk to aircraft safety is LOW there is no mitigation required, therefore the Sapphire Wind Farm does not require aviation obstacle lighting.

The Instrument Approach Procedure for Glen Innes Runway 14 NDB Approach (figure 4.2.3 below) depicts existing significant unlit obstacles up to 5106ft AHD approximately 10nm south of the aerodrome as well as terrain spot heights of 4554ft in the same area.

[3] Sapphire Wind Farm AIS, AIA, QRA and OLR, Ambidji Report 23 February 2016

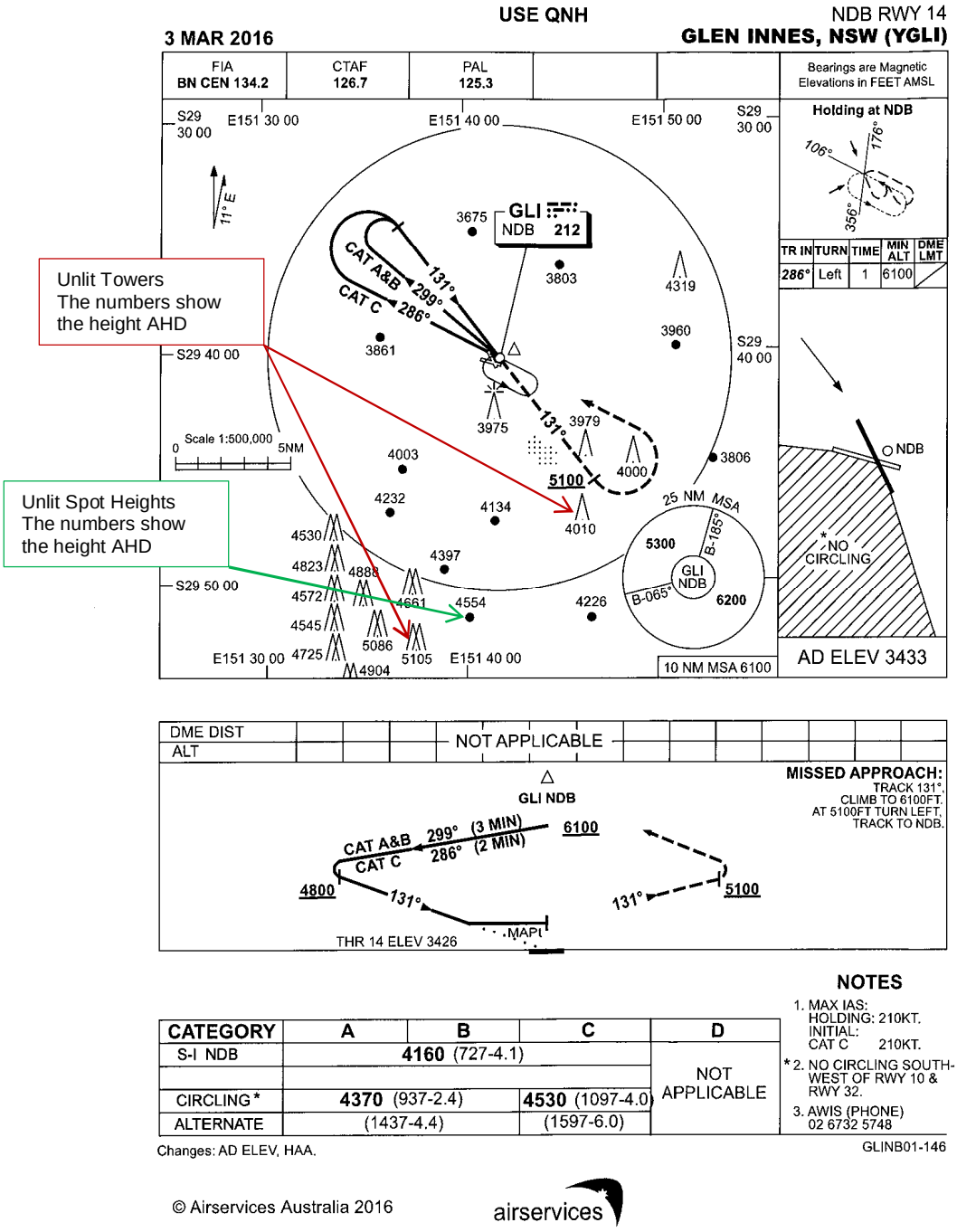


Figure 4.2.3 – YGLI NDB RWY14

4.3 Visual Flight Rules

The following information regarding Visual Flight Rules is provided to inform the readers of this report who may not be trained pilots. The Visual Flight Rules Regulations are shown at Appendix B.

It is often stated that aircraft flown in accordance with the VFR can legally fly at 500 feet above the ground. This ñfactòis taken from Civil Aviation Regulations 1988 (CAR) Part 11, Division 2 Flight Rules, Regulation 157 ï Low Flying.

This regulation is often selectively quoted to indicate that an aircraft can fly at 500ft above the ground, when in fact it is 500ft above the highest point of the ground **and any object on it**. If the wind turbine tip is 625ft above the ground an aircraft must be 500ft above the tip, which is 625 + 500 = 1125ft above the ground. The highest turbine tip in the Sapphire wind farm is 4455ft above the Australian Height Datum (AHD). For a VFR aircraft to comply with CAR 157 it would need to be at a height of 4455 + 500 = 4955ft AHD. For aviation purposes height above AHD is known as altitude. Consequently a VFR aircraft would need to be flying at an altitude of 5000ft over the wind turbines to comply with this regulation.

The primary regulation for Visual Flight Rules is CAR 171 ï VFR Flight, which at subregulation 2) states ñWhere an aircraft cannot be flown in accordance with the Visual Flight Rules, the pilot in command shall comply with the Instrument Flight Rules contained in Division 4 of this Part, or land at the nearest suitable aerodrome.ò

4.4 Flying Training

Ab-initio flying training is conducted in accordance with the Visual Flight Rules (VFR) and in Visual Meteorological Conditions (VMC). As the name implies such flying is conducted by visual reference to the ground or water, at a prescribed distance clear of cloud, with a specified visibility range and a minimum height above the terrain or highest obstacle thereon.

Advanced flying training introduces instrument flying which is conducted in accordance with the Instrument Flight Rules (IFR) allowing flight at night and in cloud. IFR flight is protected by Lowest Safe Altitudes (LSALT) and prescribed airspace associated with published Departure and Approach Procedures (DAP). IFR flight utilises terrestrial radio navigation aids (Navaids) and Global Navigation Satellite System (GNSS) equipment to guide the aircraft at suitably equipped aerodromes. Where there are no published DAP at an aerodrome IFR flight must revert to VFR flight and be able to see the aerodrome prior to descending below the prescribed airspace. VFR at Night is also governed by LSALT and visual reference to the aerodrome for approach and landing.

Activity generated by the Glen Innes flying school will be initially circuit area training where the students learn and practice the techniques of aircraft ground handling, take-off and landing within sight of the aerodrome. Progressively students practice emergency procedures such as engine failure, forced landing, dealing with aerodynamic

stall and abnormal aircraft attitude recovery. These activities are conducted in specific airspace near the aerodrome, but clear of the circuit area over suitable terrain that is open, flat and clear of obstacles such as trees, powerlines and buildings. Once students have mastered the control of the aircraft they learn to plan and navigate aircraft flights on progressively more complex tasks to achieve the competency required for the granting of a private pilotôs licence. All of this training is conducted as VFR flight.

The Glen Innes flying school will cater for advanced flying training into multi-engine aircraft and Instrument Flying in accordance with the Instrument Flight Rules. IFR training is conducted in suitably equipped aircraft and utilises the published instrument departure and approach procedures for the aerodrome. Consequently these aircraft will operate above the LSALT and MSA associated with the relevant approach procedure.

4.5 Circuit Area Operations

The Glen Innes aerodrome is at an elevation of 3433ft AHD. Aerodrome Traffic Circuit heights are measured above the aerodrome elevation. The circuit direction at Glen Innes is a standard left hand pattern[4]. Standard traffic circuit pattern dimensions are dependent on aircraft approach category. High performance aircraft, large turbo-prop or medium jet passenger aircraft operate at a circuit speed over 150 knots and use a larger circuit pattern which is generally no more than 5nm radius at a height of 1500ft above the aerodrome elevation. Most general aviation aircraft use a circuit speed between 55 and 150kts, a circuit radius of no more than 3nm at a height of 1000ft above the aerodrome elevation. Low performance aircraft such as ultralights, trikes, powered parachutes and small fixed wing aircraft operate at a circuit speed below 55kts at a height of 500ft above the aerodrome elevation. From diagrams associated with noise abatement requirements, the depicted circuit patterns for training at Glen Innes will not extend beyond 1.7nm (3km) from the aerodrome. See appendix A.

The circuit patterns at Glen Innes aerodrome, even for high performance aircraft using a 5nm radius, are clear of the Sapphire Wind Farm.

For VFR aircraft departing the Glen Innes circuit the wind turbines will be highly visible due to their contrasting colour and size. For aircraft departing IFR or VFR at night the flight rules applicable ensure the aircraft climbs and tracks to remain clear of obstacles, including terrain and turbines.

4.6 Future Airport Development

Future development of the aerodrome must consider existing obstacles as part of the design process. Any future instrument approach and departure procedures such as an Instrument Landing System (ILS) or Required Navigation Performance (RNP) approaches for new or extended runways must be designed to ensure obstacle clearance is maintained in accordance with ICAO Annexe 14 PANS-OPS criteria.

[4] CAAP 166 ï 1(3) Operations on the Vicinity of non-controlled aerodromes, August 2014, Figure 3.

Ambidji notes that the áapproved development plansô JRPP DA09/12-13 refer to the construction of buildings and carparks and a section governing noise abatement and permitted hours of operation. There is no reference to aerodrome manoeuvring area (runways, taxiways, and hardstands) modification or construction other than at condition 44[5]

> ñAll facilities and works at Glen Innes Aerodrome are to comply with the Manual of Standards Part 139 Ï Aerodromes, made under Part 139 of the Civil Aviation Safety Regulations 1998.
>
> Note: It is a requirement under this manual to prepare and communicate a Method of Working Plan (MWOP) prior to the commencement of any works.
>
> *Reason: To ensure that all facilities meet accepted safety standards, and that works are performed in a safe manner and communicated to pilots and other interested parties."*

Aerodrome capacity, the number of aircraft able to land and take-off in a given time, is determined primarily by the facilities available on the ground, particularly the ability for aircraft to enter and leave the active runway quickly via appropriately located taxiways. Noise abatement procedures also have an impact on aerodrome capacity.

4.7 Obstacle Lighting

The hazard to aircraft safety assessed in the Qualitative Risk Assessment (refer section 5 of the original report) does not change with the inclusion of a flying training facility at Glen Innes. Whilst there may be an increase in aircraft movements, the regulations governing flying, including pilot training, provide the necessary mitigation by ensuring aircraft remain clear of the turbines. Aviation Obstacle Lighting is not required. Refer to Section 6.3 of the original report.

4.8 CASA Consultation

The National Airports Safeguarding Framework - Guideline D recommends that turbines over 150m AGL built within 30km (16.2nm) of a certified or registered aerodrome be notified to CASA. The Sapphire Wind Farm is within 30km of the registered Glen Innes aerodrome.

CASA issued Advisory Circular AC139-18(0) *Obstacle Marking of Wind Farms* in July 2007. CASA withdrew this AC in October 2008 after consideration of its legality and complaints to CASAôs Industry Complaints Commissioner.

[5] Notice of Determination of a Development Application DA 09/12-13, Glen Innes Severn Council, 12 December 2012

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APPENDIX A

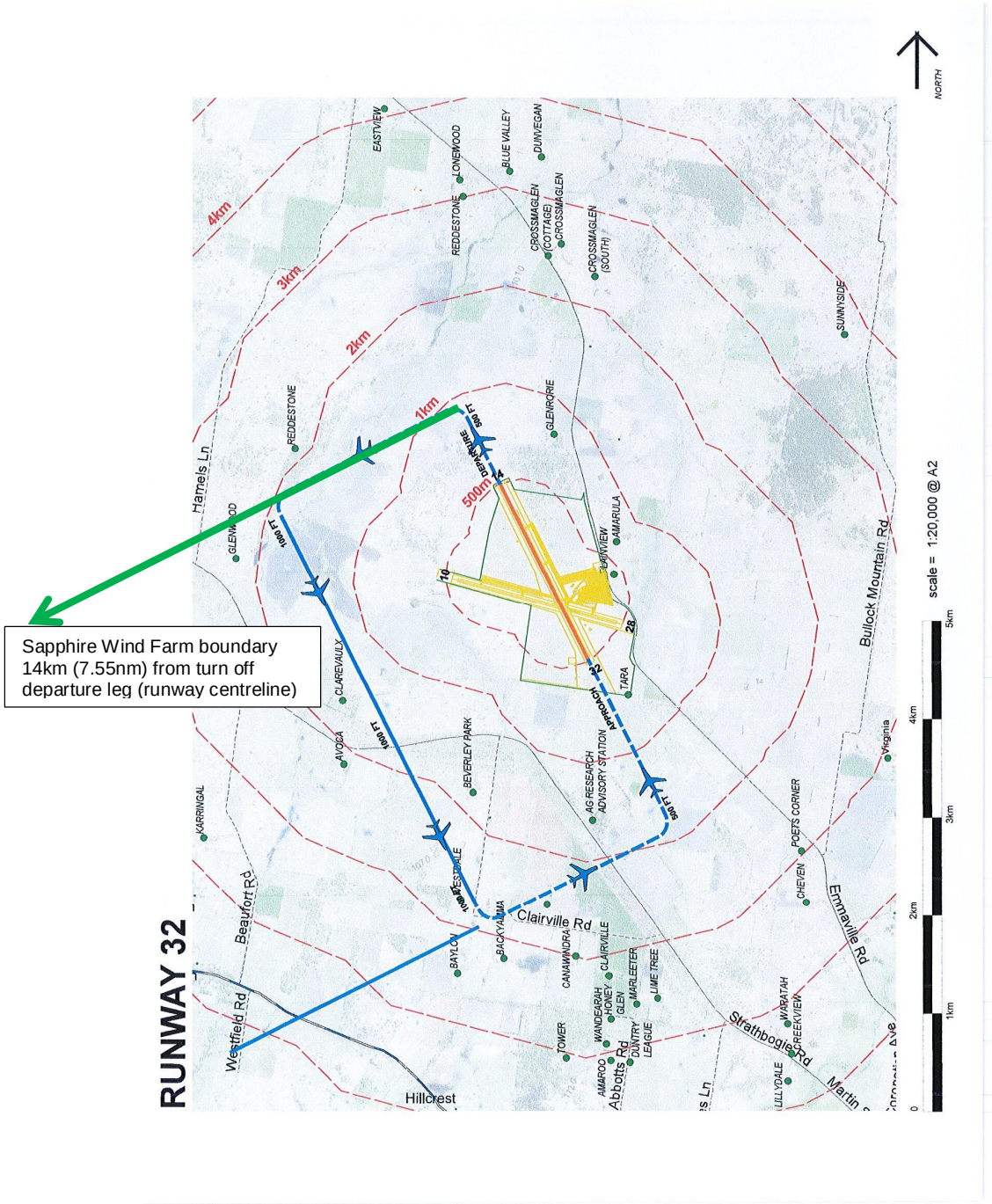
Glen Innes Regional Airport

Circuit Area Diagrams

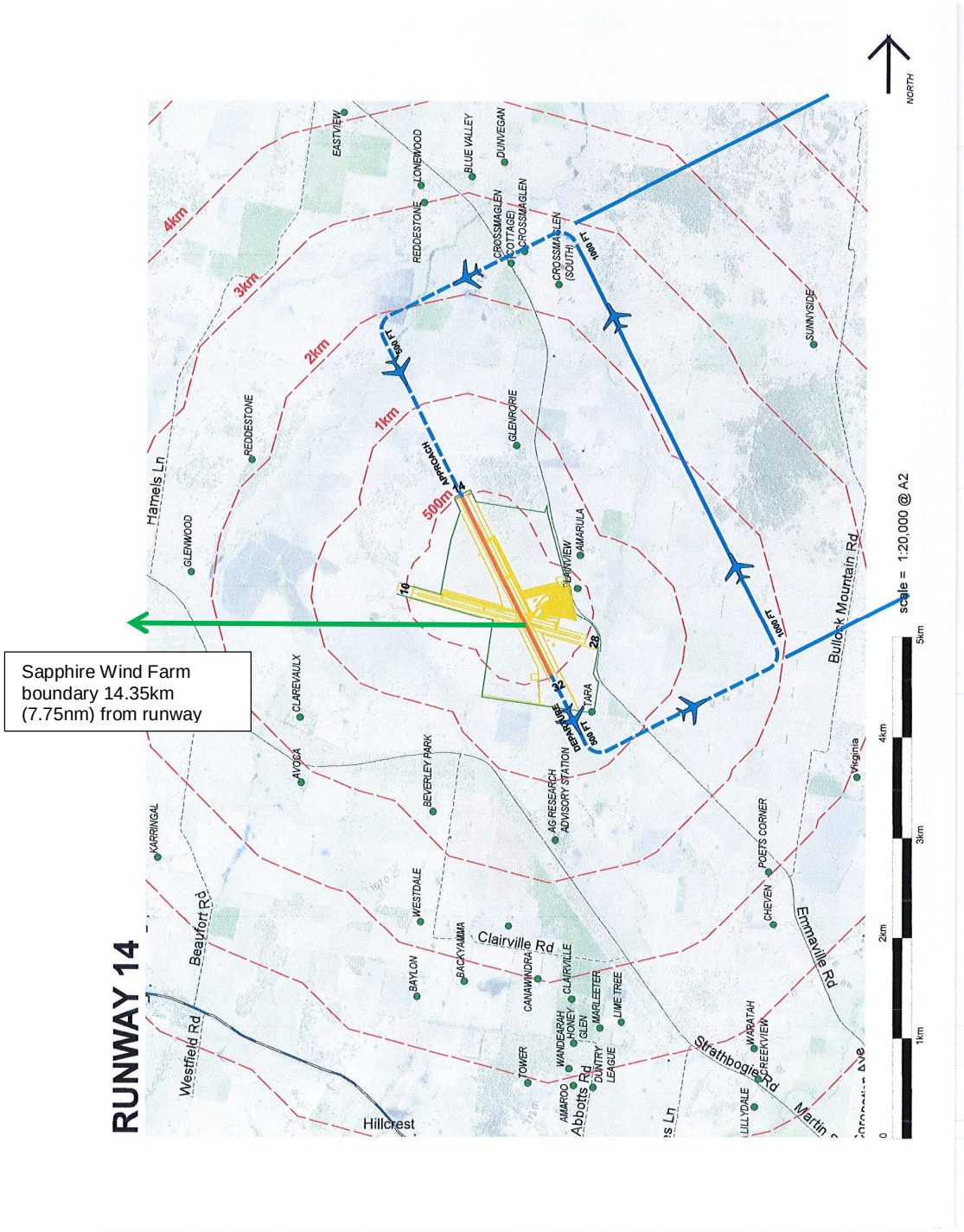
And

Noise Monitor Receptor Locations

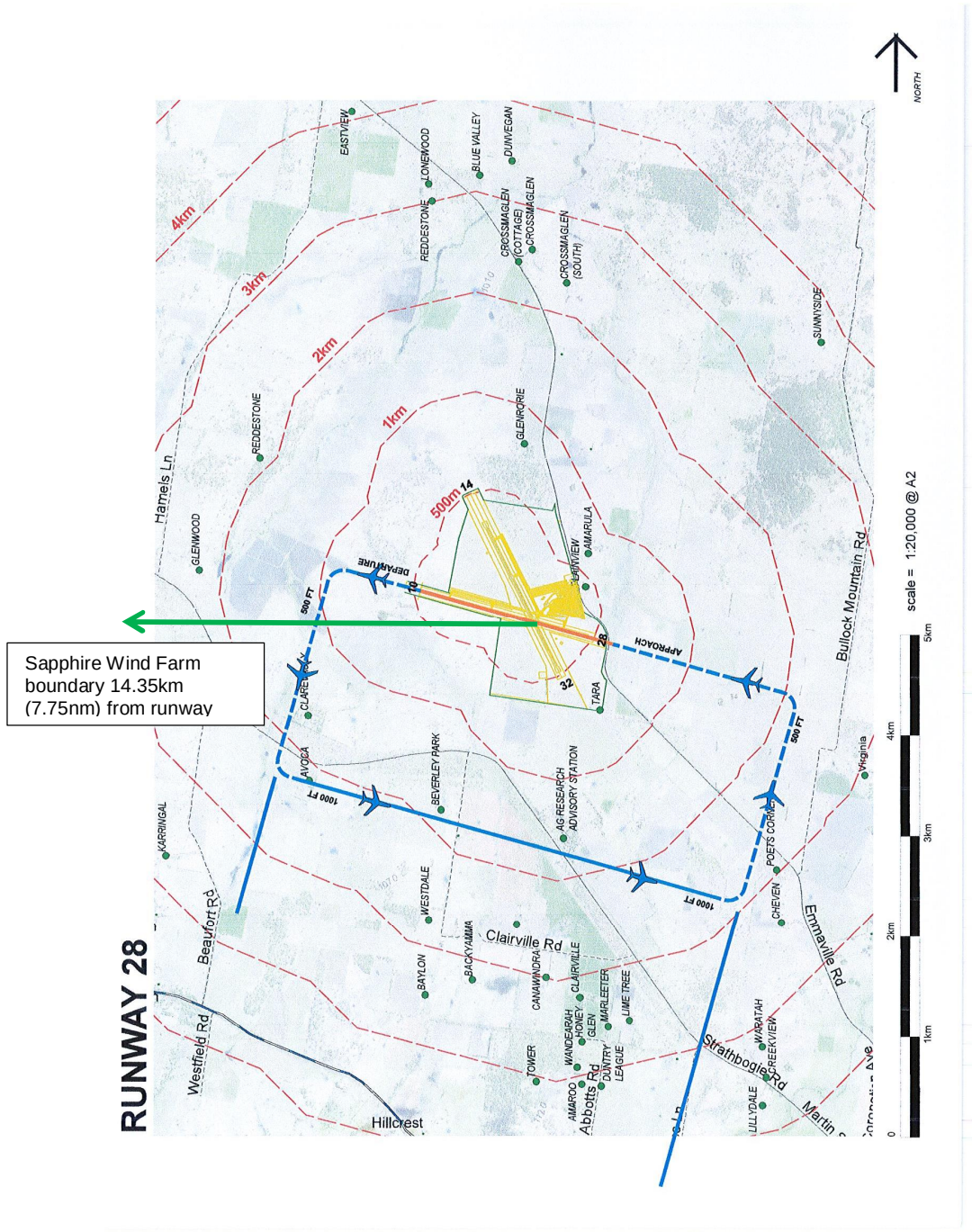
Runway 32


Sapphire Wind Farm boundary
14km (7.55nm) from turn off
departure leg (runway centreline)
RUNWAY 32
NORTH
scale = 1:20,000 @ A2
4km
3km
2km
1km
500m
1000 FT
500 FT
Departure
Approach
Clairville Rd
Bullock Mountain Rd
Emmaville Rd
Strathbogie Rd
Beaufort Rd
Westfield Rd
Abbotts Rd
Hillcrest
Hamels Ln
EASTVIEW
LONEWOOD
BLUE VALLEY
DUNVEGAN
REDDESTONE
CROSSMAGLEN (COTTAGE)
CROSSMAGLEN
CROSSMAGLEN (SOUTH)
SUNNYSIDE
GLENRORIE
AMARULA
TARA
CLAREVAULX
AVOCA
BEVERLEY PARK
AG RESEARCH ADVISORY STATION
KARRINGAL
BAYLON
BACKYAMMA
CANAWINDRA
CLAIRVILLE
MARLEETER
LIME TREE
WANDERAH
HONEY GLEN
TOWER
DUNTRY LEAGUE
AMAROO
POETS CORNER
CHEVEN
WARATAH
CREEKVIEW
LILLYDALE
Virginia

Runway 14


RUNWAY 14
Sapphire Wind Farm boundary 14.35km (7.75nm) from runway
4km
3km
2km
1km
500m
1000 FT
500 FT
APPROACH
DEPARTURE
10
28
NORTH
scale = 1:20,000 @ A2
Hamels Ln
Beaufort Rd
Westfield Rd
Clairville Rd
Abbotts Rd
Strathbogie Rd
Emmaville Rd
Bullock Mountain Rd
Martin
Hillcrest
EASTVIEW
LONEWOOD
BLUE VALLEY
DUNVEGAN
REDDESTONE
CROSSMAGLEN COTTAGE
CROSSMAGLEN
CROSSMAGLEN (SOUTH)
SUNNYSIDE
GLENROBIE
GLENWOOD
AMARULA
FAIRVIEW
TARA
CLAREVAULX
AVOCA
BEVERLEY PARK
AG RESEARCH ADVISORY STATION
KARRINGAL
WESTDALE
BAYLON
BACKYAMMA
CANAWINDRA
CLAIRVILLE
MARLEEFER
LIME TREE
WANDERAH
GLEN
DUNTRY LEAGUE
TOWER
AMAROO
POETS CORNER
CHEVEN
WARATAH
GREENVIEW
LILLYDALE
Virginia

Runway 28


Sapphire Wind Farm boundary 14.35km (7.75nm) from runway
RUNWAY 28
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scale = 1:20,000 @ A2
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1km
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DEPARTURE
Hamels Ln
Bullock Mountain Rd
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SUNNYSIDE
GLENROHE
GLENWOOD
CLAREVIEW
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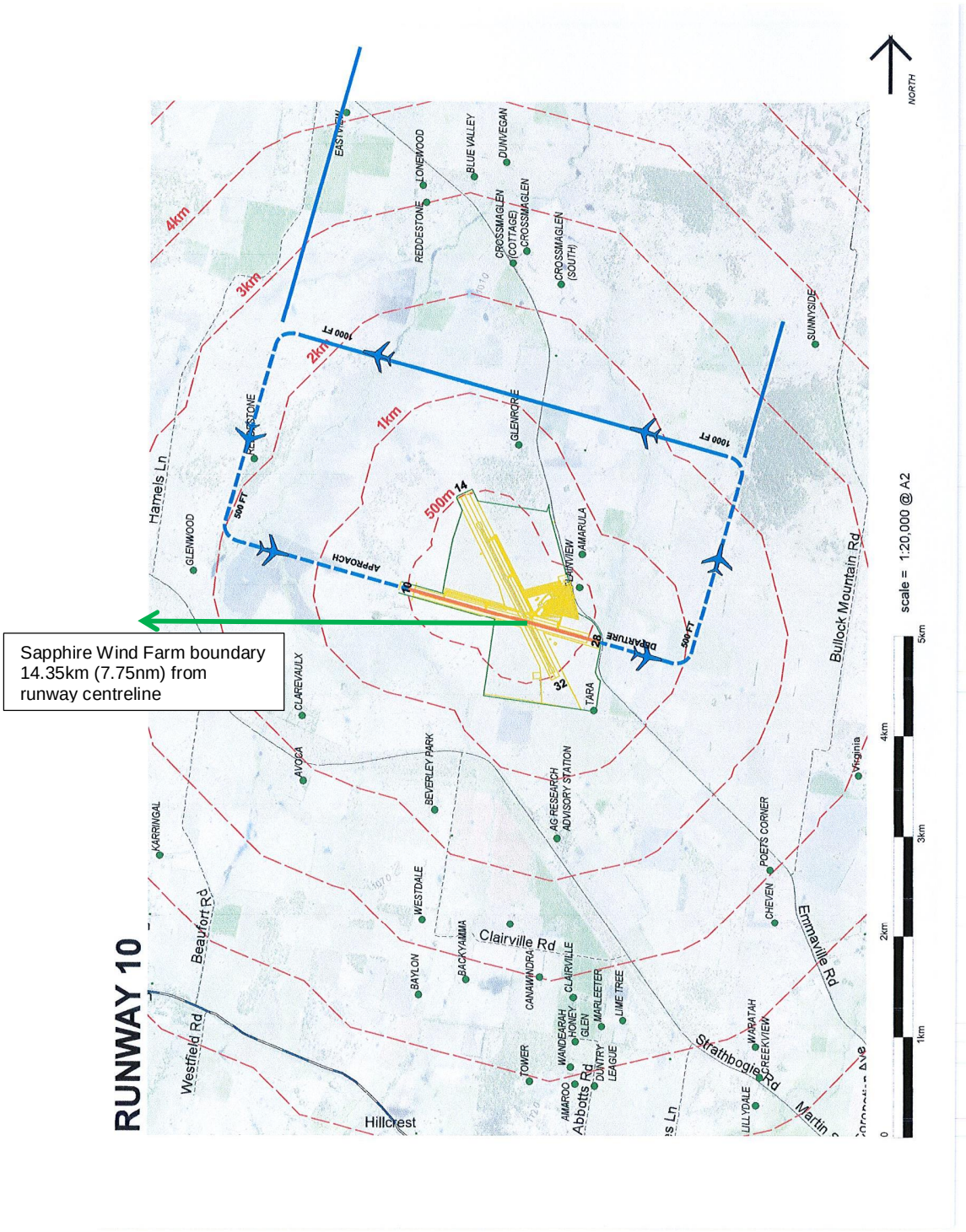
WANDERAH
HONEY GLEN
TOWER
AMAROO
DUNTRY LEAGUE
POETS CORNER
CHEVEN
WARATAH
CREEKVIEW
LILLYDALE
Virginia

Runway 10


Sapphire Wind Farm boundary
14.35km (7.75nm) from
runway centreline
RUNWAY 10
NORTH
scale = 1:20,000 @ A2
4km
3km
2km
1km
500m
1000 FT
500 FT
APPROACH
DEPARTURE
14
32
Hamels Ln
Bullock Mountain Rd
Beaufort Rd
Westfield Rd
Clairville Rd
Ermaville Rd
Strathbogie Rd
Abbotts Rd
Hillcrest
EASTVIEW
LONEWOOD
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CANAWINDRA
CLAIRVILLE
MARLEETER
LIME TREE
WANDEARAH
HONEY GLEN
DUNTRY LEAGUE
TOWER
AMAROO
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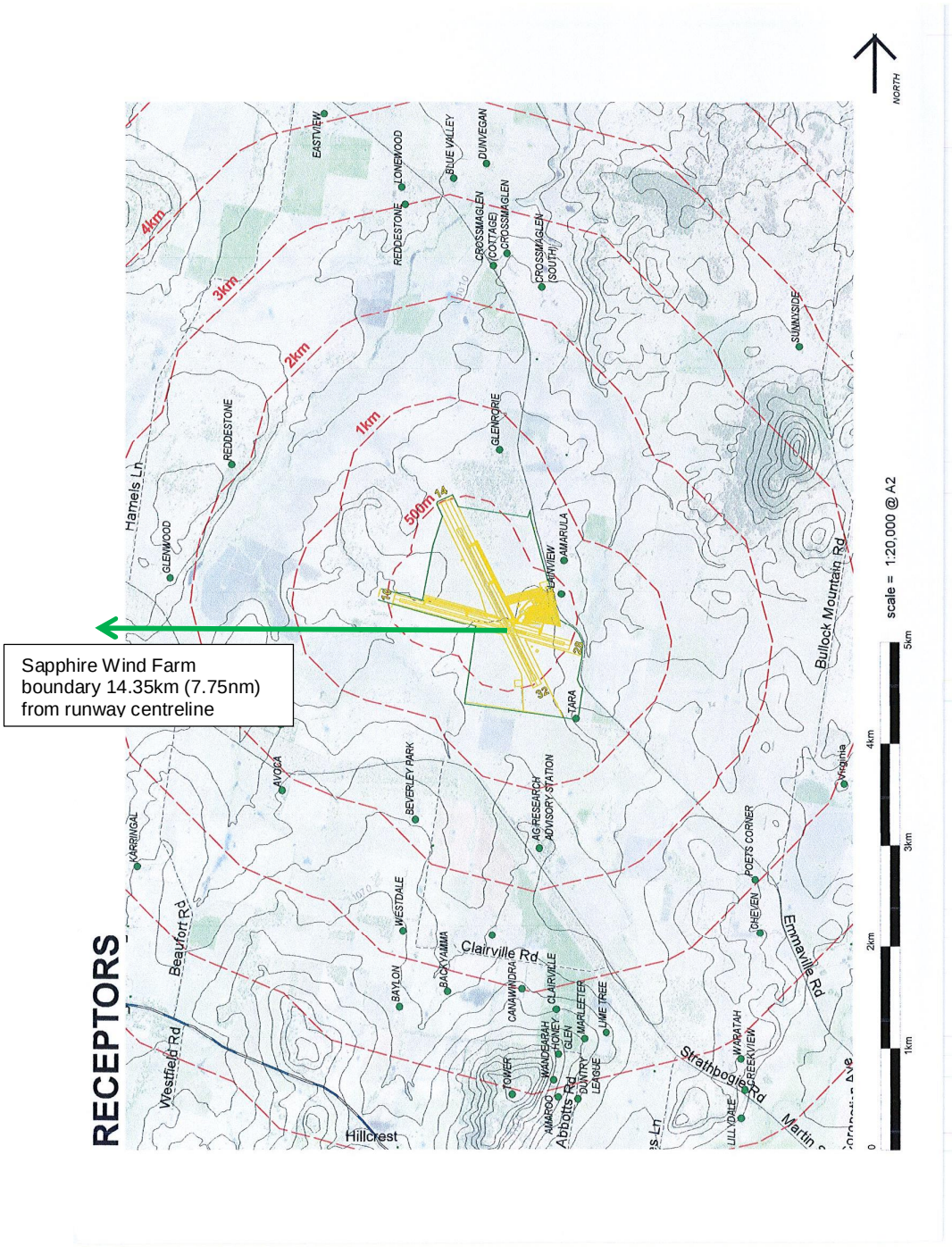
CHEVIEN
WARATAH
CREEKVIEW
LILLYDALE
Virginia

Noise Receptors



APPENDIX B

Civil Aviation Regulations (1988)

Part 12 Division 3

Visual Flight Rules

Appendix B

Visual Flight Rules

CAR 157 Low Flying[6]

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 1000ft; or

   b. Any other area at a height lower than 500ft.

   Penalty 50 penalty units

2) An offence against subregulation 1) is an offence of strict liability

3) 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 ï 600 metres; or

   b. In the case of a helicopter ï 300 metres;

   from a point on the terrain vertically below the aircraft.

   3A) Paragraph 1) a) does not apply in respect of a helicopter flying at a designated altitude with an access lane details of which have been published in the AIP or NOTAMs for use by helicopters arriving or departing from a specified place.

4) Subregulation 1) does not apply if:

   a. Through the 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 receiving flight training in low-level operations or aerial applications operations within the meaning of Part 61 of CASR; 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

[6] https://www.legislation.gov.au/Details/F2015C00993/Html/Volume_3#_Toc438213033 last accessed 1 April 2016.

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

g. The aircraft is a helicopter:

   i. Operated by, of 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.

Subregulation 4) a) provides for the pilot, who through poor airmanship has ópressed onô into marginal VMC, to extricate themselves from an unsafe situation. Refer to CAR 171 subregulation 2) below for what a pilot is required to do if they cannot proceed in accordance with the VFR.

The Visual Flight Rules are shown in Civil Aviation Regulations 1988 (CAR) Part 12 Division 3[7].

CAR 171 VFR flight

1) A flight conducted in accordance with the provisions of this Division is classed as a flight under the Visual Flight Rules.

2) Where an aircraft cannot be flown in accordance with the Visual Flight Rules, the pilot in command shall comply with the Instrument Flight Rules contained in Division 4 of this Part, or land at the nearest suitable aerodrome.

   Penalty 25 penalty points

3) An offence against sub regulation 2) is an offence of strict liability.

CAR 172 Flight Visibility and Distance from Cloud

1) The pilot in command of an aircraft must not conduct a VFR flight at a height of,

[7] https://www.legislation.gov.au/Details/F2015C00993/Html/Volume_3#_Toc438213061 last accessed 1 April 2016.

or less than 2000ft above ground or water if:

a. The pilot is not able to navigate by reference to the ground or water; and

b. CASA has not directed that the flight may be conducted at a height of 2000ft or less.

Penalty 50 penalty points.

2) Subject to subregulation 4), the pilot in command must not conduct a VFR flight if:

a. The flight visibility during that flight is not equal to or greater than the applicable distance determined by CASA; and

b. The vertical and horizontal distances from cloud are not equal to or greater than the applicable distances determined by CASA

Penalty 50 penalty points.

2AA) An offence against subregulation 1) or 2) is an offence of strict liability.

2A) CASA may determine applicable distances for the purpose of subregulation 2)

2B) CASA must notify the distances determined under subregulation 2A) in AIP or NOTAMS

3) When determining applicable distances, CASA may do so by reference to class of airspace

4) In spite of subregulation 2) the pilot in command of an aircraft may conduct a special VFR flight if:

a. Air traffic control gives permission for the flight; and

b. The flight is conducted in accordance with any special conditions to which the permission is subject,

5) In this regulation: *special VFR flight* means a VFR flight:

a. Conducted in a control zone; or

b. Conducted in a control area next to a control zone for the purpose of entering or leaving the zone;

When the flight visibility or distances from cloud are less that the applicable distances determined under subregulation 2).

174B VFR flights at night

2) The pilot in command of an aircraft must not fly the aircraft at night under the VFR at a height of less than 1000ft above the highest obstacle located within 10nm of the aircraft in flight if it is not necessary for take-off or landing.

Penalty 25 penalty points

3) The pilot in command of a single engine aircraft must not fly the aircraft at night under the VFR if the flight is not one of the following operations:

a. Private operations;

b. Aerial work operations;

c. Charter operations that do not involve the carrying of passengers for hire or reward;

d. Charter operations that involve the carrying of passengers fro hireor reward if:

i. The operator is approved in writing by CASA to conduct he operations; and

ii. The operations are conducted in a turbine powered aeroplane approved in writing by CASA for the operations.

Penalty 25 penalty points

4) An offence against subregulation 1) or 2) is an offence of strict liability

5) It is a defence to a prosecution under subregulation 1) if CASA gave permission for the flight.

APPENDIX C

Glossary of Terms and Abbreviations

APPENDIX G

AERONAUTICAL STUDY GLOSSARY

To facilitate the understanding of aviation terminology used in this report, the following is a glossary of terms and acronyms that are commonly used in aeronautical impact assessments and similar aeronautical studies. A full list of terms and abbreviations used in this report is included in this Appendix. It should be noted that, within aviation, the International standard unit for altitude is feet (ft.) and distance is nautical mile (nm).

AC (Advisory Circulars) are issued by CASA and are intended to provide recommendations and guidance to illustrate a means, but not necessarily the only means, of complying with the *Regulations*.

Aeronautical study is a tool used to review aerodrome and airspace processes and procedures to ensure that safety criteria are appropriate.

AHD (Australian Height Datum) is the datum to which all vertical control for mapping is to be referred. The datum surface is that which passes through mean sea level at the 30 tide gauges and through points at zero AHD height vertically below the other basic junction points.

AIP (Aeronautical Information Publication) is a publication promulgated to provide operators with aeronautical information of a lasting character essential to air navigation. It contains details of regulations, procedures and other information pertinent to flying and operation of aircraft. In Australia, the AIP may be issued by CASA or Airservices Australia.

Air routes exist between navigation aid equipped aerodromes or waypoints to facilitate the regular and safe flow of aircraft operating under Instrument Flight Rules (IFR).

Airservices Australia is the Australian government-owned corporation providing safe and environmentally sound air traffic management and related airside services to the aviation industry.

Altitude is the vertical distance of a level, a point or an object, considered as a point, measured from mean sea level.

AMSL (Above Mean Sea Level) is the elevation (on the ground) or altitude (in the air) of any object, relative to the average sea level datum. In aviation, the ellipsoid known as World Geodetic System 84 (WGS 84) is the datum used to define mean sea level.

ATC (Air Traffic Control) service is a service provided for the purpose of:

a. preventing collisions:

   1. between aircraft; and

   2. on the manoeuvring area between aircraft, vehicles and obstructions; and

b. expediting and maintaining an orderly flow of air traffic.

CASA (Civil Aviation Safety Authority) is the Australian government authority responsible under the *Civil Aviation Act 1988* for developing and promulgating appropriate, clear and concise aviation safety standards. As Australia is a signatory to the ICAO *Chicago*

Convention, CASA adopts the standards and recommended practices established by ICAO, except where a difference has been notified.

CASR (Civil Aviation Safety Regulations) are promulgated by CASA and establish the regulatory framework *(Regulations)* within which all service providers must operate.

Civil Aviation Act 1988 (the Act) establishes the CASA with functions relating to civil aviation, in particular the safety of civil aviation and for related purposes.

ICAO (International Civil Aviation Organization) is an agency of the United Nations which codifies the principles and techniques of international air navigation and fosters the planning and development of international air transport to ensure safe and orderly growth. The ICAO Council adopts standards and recommended practices concerning air navigation, its infrastructure, flight inspection, prevention of unlawful interference, and facilitation of border-crossing procedures for international civil aviation. In addition, the ICAO defines the protocols for air accident investigation followed by transport safety authorities in countries signatory to the Convention on International Civil Aviation, commonly known as the *Chicago Convention*. Australia is a signatory to the *Chicago Convention.*

IFR (Instrument Flight Rules) are rules applicable to the conduct of flight under IMC. IFR is established to govern flight under conditions in which flight by outside visual reference is not safe. IFR flight depends upon flying by reference to instruments in the flight deck, and navigation is accomplished by reference to electronic signals. It is also referred to as, ña term used by pilots and controllers to indicate the type of flight plan an aircraft is flying,òsuch as an IFR or VFR flight plan.

IMC (Instrument Meteorological Conditions) are meteorological conditions expressed in terms of visibility, distance from cloud and ceiling, less than the minimum specified for visual meteorological conditions.

LSALT (Lowest Safe Altitudes) are published for each low level air route segment. Their purpose is to allow pilots of aircraft that suffer a system failure to descend to the LSALT to ensure terrain or obstacle clearance in IMC where the pilot cannot see the terrain or obstacles due to cloud or poor visibility conditions. It is an altitude that is at least 1,000 feet above any obstacle or terrain within a defined safety buffer region around a particular route that a pilot might fly.

MOS (Manual of Standards) comprises specifications *(Standards)* prescribed by CASA, of uniform application, determined to be necessary for the safety of air navigation.

NASAG (National Airports Safeguarding Advisory Group) set up in May 2010 to implement the Australian Governmentôs National Aviation Policy White Paper, *Flight Path to the Future* initiatives relating to safeguarding airports and surrounding communities from inappropriate development. NASAG comprises representatives from state and territory planning and transport departments, the Civil Aviation Safety Authority (CASA), Airservices Australia, the Department of Defence and the Australian Local Government Association (ALGA) and is chaired by the Department of Infrastructure and Regional Development (DIRD).

NASF (National Airports Safeguarding Framework) is the set of guidelines, adopted in July 2012, developed by NASAG to safeguard airports and surrounding communities.

NOTAMs (Notices to Airmen) are notices issued by the NOTAM office containing information or instruction concerning the establishment, condition or change in any aeronautical facility, service, procedure or hazard, the timely knowledge of which is essential to persons concerned with flight operations.

Obstacles - All fixed (whether temporary or permanent) and mobile objects, or parts thereof, that are located on an area intended for the surface movement of aircraft or that extend above a defined surface intended to protect aircraft in flight.

OLS (Obstacle Limitation Surfaces) are a series of planes associated with each runway at an aerodrome that defines the desirable limits to which objects may project into the airspace around the aerodrome so that aircraft operations may be conducted safely.

PANS-OPS (Procedures for Air Navigation Services - Aircraft Operations) is an Air Traffic Control term denominating rules for designing instrument approach and departure procedures. Such procedures are used to allow aircraft to land and take off under Instrument Meteorological Conditions (IMC) or Instrument Flight Rules (IFR). ICAO document 8168-OPS/611 (volumes 1 and 2) outlines the principles for airspace protection and procedure design which all ICAO signatory states must adhere to. The regulatory material surrounding PANS-OPS may vary from country to country.

PANS-OPS Surfaces - Similar to an Obstacle Limitation Surface, the PANS-OPS protection surfaces are imaginary surfaces in space which guarantee the aircraft a certain minimum obstacle clearance. These surfaces may be used as a tool for local governments in assessing building development. Where buildings may (under certain circumstances) be permitted to penetrate the OLS, they cannot be permitted to penetrate any PANS-OPS surface, because the purpose of these surfaces is to guarantee pilots operating under IMC an obstacle free descent path for a given approach.

Prescribed airspace is an airspace specified in, or ascertained in accordance with, the Regulations, where it is in the interests of the safety, efficiency or regularity of existing or future air transport operations into or out of an airport for the airspace to be protected. The prescribed airspace for an airport is the airspace above any part of either an OLS or a PANS OPS surface for the airport and airspace declared in a declaration relating to the airport.

Regulations (Civil Aviation Safety Regulations)

VFR (Visual Flight Rules) are rules applicable to the conduct of flight under VMC. VFR allow a pilot to operate an aircraft in weather conditions generally clear enough to allow the pilot to maintain visual contact with the terrain and to see where the aircraft is going. Specifically, the weather must be better than basic VFR weather minima. If the weather is worse than VFR minima, pilots are required to use instrument flight rules.

VMC (Visual Meteorological Conditions) are meteorological conditions expressed in terms of visibility, distance from cloud and ceiling, equal or better than specified minima

ABBREVIATIONS

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

Abbreviation	Meaning
AC	Advisory Circular (document support CASR 1998)
ACFT	Aircraft
AD	Aerodrome
AHD	Australian Height Datum
AHT	Aircraft height
AIP	Aeronautical Information Publication
Airports Act	Airports Act 1996, as amended
AIS	Aeronautical Information Service
ALA	Aircraft Landing Area
Alt	Altitude
AMSL	Above Minimum Sea Level
A(PofA)R	Airports (Protection of Airspace) Regulations, 1996 as amended
APARs	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
Cat	Category
DAP	Departure and Approach Procedures (charts published by AsA)
DER	Departure End of (the) Runway
DEVELMT	Development
DME	Distance Measuring Equipment
Doc nn	ICAO Document Number nn
DIRD	Department of Infrastructure and Regional Development. (Formerly Department of Infrastructure and Transport)
DoIT	Department of Infrastructure and Transport. Also called ñInfrastructureò (Formerly Department of Infrastructure, Transport, Regional Development and Local Government (DITRDLG) and previously the Department of Transport and Regional Services (DoTARS))
DITRDLG	See DoIT above
DOTARS	See DITRDLG above
ELEV	Elevation (above mean sea level)
ENE	East North East
ERSA	Enroute Supplement Australia
FAF	Final Approach Fix

Abbreviation	Meaning
FAP	Final Approach Point
ft	feet
GA	General Aviation
GNSS	Global Navigation Satellite System
GP	Glide Path
IAS	Indicated Airspeed
ICAO	International Civil Aviation Organisation
IFR	Instrument Flight Rules
IHS	Inner Horizontal Surface, an Obstacle Limitation Surface
ILS	Instrument Landing System
ISA	International Standard Atmosphere
km	kilometres
kt	Knot (one nautical mile per hour)
LAT	Latitude
LLZ	Localizer
LONG	Longitude
LSALT	Lowest Safe Altitude
m	metres
MAPt	Missed Approach Point
MDA	Minimum Descent Altitude
MGA94	Map Grid Australia 1994
MOC	Minimum Obstacle Clearance
MOS	Manual of Standards, published by CASA
MSA	Minimum Sector Altitude
SSR	Monopulse Secondary Surveillance Radar
MVA	Minimum Vector Altitude
NASAG	National Airports Safeguarding Advisory Group
NASF	National Airports Safeguarding Framework
NDB	Non Directional Beacon
NE	North East
NM or nm	Nautical Mile (= 1.852 km)
nnDME	Distance from the DME (in nautical miles)
NNE	North North East
NOTAM	NOtice To AirMen
OAS	Obstacle Assessment Surface
OCA	Obstacle Clearance Altitude
OCH	Obstacle Clearance Height
OHS	Outer Horizontal Surface
OIS	Obstacle Identification Surface
OLS	Obstacle Limitation Surface
PANS-OPS	Procedures for Air Navigation Services ï Aircraft Operations, ICAO Doc 8168
PRM	Precision Runway Monitor

Abbreviation	Meaning
PROC	Procedure
PSR	Primary Surveillance Radar
QNH	An altimeter setting relative to height above mean sea level
Rnnn	Restricted Airspace ï promulgated in AIP as R with 3 numbers
REF	Reference
RL	Relative Level
RNAV	aRea NAVigation
RNP	Required Navigation Performance
RPA	Rules and Practices for Aerodromes ð replaced by the MOS Part 139 ð Aerodromes
RPT	Regular Public Transport
RWY	Runway
SFC	Surface
SID	Standard Instrument Departure
SOC	Start Of Climb
SSR	Secondary Surveillance Radar
STAR	Standard ARrival
TAR	Terminal Area Radar
TAS	True Air Speed
THR	Threshold (Runway)
TNA	Turn Altitude
TODA	Take-Off Distance Available
VFR	Visual Flight Rules
V_n	aircraft critical Velocity reference
VOR	Very high frequency Omni directional Range