

FINAL REPORT

TWIN HILLS WIND FARM

AVIATION IMPACT STATEMENT

CCP79

2 March 2026



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EXECUTIVE SUMMARY

Twin Hills Wind Farm Pty. Ltd. has requested Chiron Aviation Consultants provide an Aviation Impact Statement (AIS) for the proposed Twin Hills Wind Farm in Western Australia. The Twin Hills Wind Farm (THWF) is located between the towns of Eneabba, Arrowsmith East and Kadathinni and is approximately 60nm (113km) south southeast of Geraldton.

The proposed wind farm will comprise of up to 93 turbines with a tip height of up to 300m Above Ground Level (AGL).

There are no certified aerodromes within 30nm (56km) of the boundary of the THWF

There are several known uncertified aerodromes within 16nm (30km) of the wind farm. These are Carnamah (YCNH) – 17.26nm (31.97km) east of turbine T93, Eneabba (YEED) – 11.46nm (21.23km) southwest of turbine T4 and Three Springs ALA – 16.66nm (30.86km) northeast of turbine T93.

The AIS concluded that the THWF will not impact upon the following:

- The Obstacle Limitation Surface (OLS) surfaces of any certified aerodrome;
- The Procedures for Air Navigations Services – Aircraft Operations (PANS-OPS) surfaces associated with the Instrument Approach Procedures;
- The performance of Navigation Aids and Communication Facilities; or
- The performance of any surveillance radars.

The AIS concluded that the THWF will impact on the GRID, Z41 and H16 LSALT , requiring it to be raised from 2800ft to 3000ft.

Airservices Australia assessment WA-WF-088 advises that the THWF will not impact any PANS-OPS instrument approach surfaces or civil ATC communications, navigation or surveillance facilities. The LSALT's will need to be raised from 2800ft to 3000ft.



1. INTRODUCTION

Twin Hills Wind Farm Pty. Ltd. has requested Chiron Aviation Consultants undertake an Aviation Impact Statement for the proposed Twin Hills Wind Farm in Western Australia.

1.1 Location

The Twin Hills Wind Farm (THWF) is located between the towns of Eneabba, Arrowsmith East and Kadathinni and is approximately 60nm (113km) South southeast of Geraldton. Refer to Figure 1 below.

The proposed wind farm will comprise of up to 93 turbines with a tip height of up to 300m Above Ground Level (AGL).

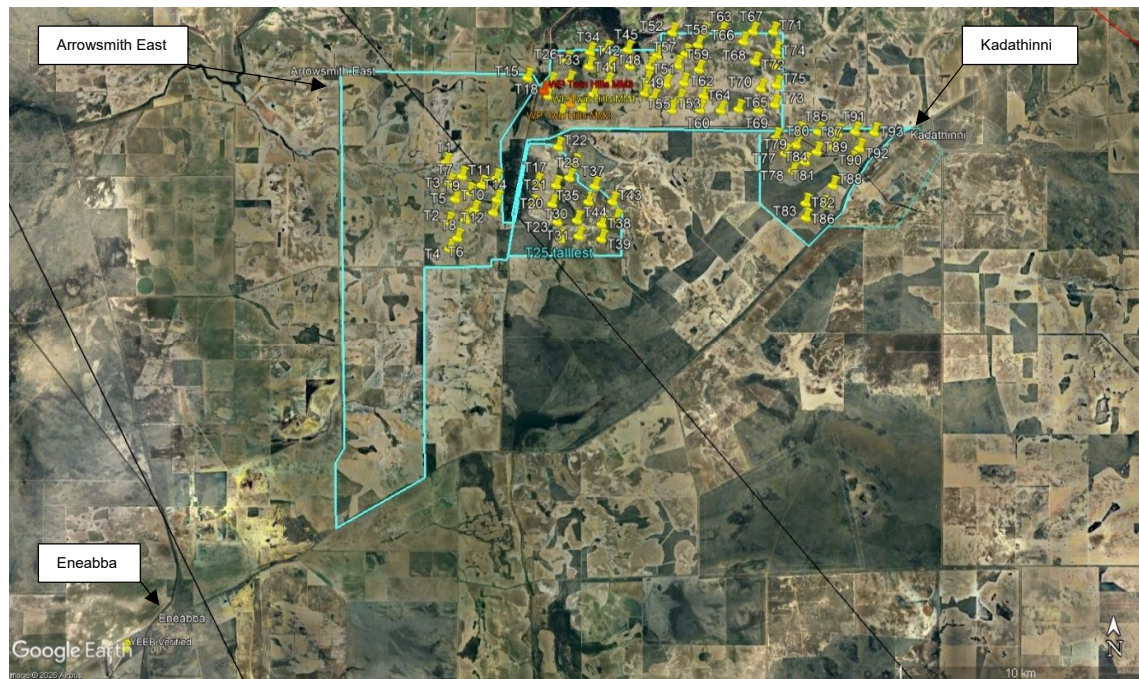


Figure 1 – Twin Hills Wind Farm Location¹.

¹ Google Earth image September 2025



1.2 Aerodromes and Airstrips

Aerodromes fall into three categories:

- Military or Joint (combined military and civilian)
- Certified and
- Uncertified

A Military aerodrome is operated by the Department of Defence and is suitable for the operation of military aircraft. A Joint User aerodrome is a Military aerodrome used by both military and civilian aircraft, for example Darwin International and Townsville International Airports.

A Certified aerodrome is regulated under Civil Aviation Safety Regulation (CASR) 139.030. An aerodrome with a published instrument flight procedure must be regulated.

An Uncertified aerodrome is any other aerodrome, Aeroplane Landing Area (ALA) or airstrip. These range in capability and size from having a sealed runway with lighting capable of accommodating corporate jet aircraft to a grass paddock that is smooth enough to land a single engine light aircraft or a purpose built aerial agricultural aircraft.

Military, Joint and Certified aerodromes are listed in the Aeronautical Information Publication² (AIP) and are subject to a NOTAM³ service that provides the aviation industry with current information on the status of the aerodrome facilities. This information is held in the public domain, is available through aeronautical publications and charts and is kept current by mandatory reporting requirements.

Uncertified aerodromes are not required to be listed in the AIP, although many are, so information about them is not necessarily held in the public domain, may not be available through aeronautical publications and charts and is not required to be reported. Where Uncertified aerodrome information is published in the AIP EnRoute Supplement Australia (ERSA)⁴ it is clearly annotated that a *full NOTAM service is not available*.

The AIP Designated Airspace Handbook (DAH)⁵, at Section 20, lists *Aeroplane Landing Areas (ALA) without an ERSA entry – verified*. This listing of verified ALA indicates that Aircservices Australia have a registered responsible person providing verified information about the ALA. These verified ALA are also depicted on AIP Charts.

ALA can come into use and fall out of use without any formal notification to CASA or any other authority. Airstrips that appear on survey maps often no longer exist; others exist but do not feature on maps. Similarly, a grass paddock used as an ALA is not usually discernable on satellite mapping services such as Google Earth.

Military, Joint and Certified aerodromes usually have Obstacle Limitation Surfaces

² AIP, a mandatory worldwide distribution system for the promulgation of aviation rules, procedures, and information

³ NOTAM (Notice to Airmen); a mandatory reporting service to keep aerodrome and airways information current and available to the aviation industry worldwide

⁴ ERSA, part of the AIP that lists aerodrome information in accordance with standards and legislative requirements to ensure integrity.

⁵ DAH, part of the AIP that lists the pertinent details of Australian airspace, and aerodromes



(OLS) and Procedures for Air Navigation Services – Aircraft Operations (PANS-OPS) surfaces prescribed to protect the airspace associated with published instrument approach and landing procedures. An uncertified aerodrome cannot have a published instrument approach and landing procedure so does not have associated PANS-OPS protected airspace. An uncertified aerodrome is not regulated by CASR Part 139 and therefore is not protected by an OLS. All operations into uncertified aerodromes [ALA], therefore, must be conducted in accordance with the Visual Flight Rules (VFR) and in Visual Meteorological Conditions (VMC).

1.3 Aerodromes in the Area

There are no Certified Aerodromes within 30nm (56km) of the THWF.

There are Uncertified Aerodromes (ALA) at:

- Carnamah (YCNH) – 17.26nm (31.97km) east of turbine T93,
- Eneabba (YEEB) – 11.46nm (21.23km) southwest of turbine T4 and
- Three Springs ALA – 16.66nm (30.86km) northeast of turbine T93.

1.4 Air Routes in the Area

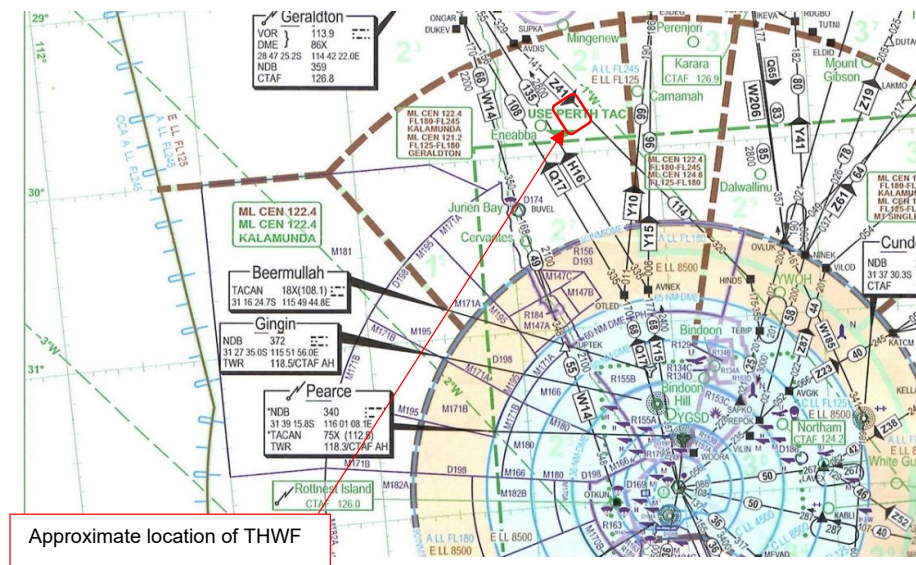


Figure 2 – Nearby Air Routes⁶

The THWF sits below two air routes [Z41&H16] as shown in Figure 2 above.

⁶ AIP ERC L8, dated 12 June 2025



1.5 Airspace

The THWF is in Class G airspace with Class E airspace above having a lower limit of FL125 (12,500ft).

Class G airspace is non-controlled airspace where aircraft operate without an Air Traffic Control (ATC) clearance and the Pilot in Command is responsible for ensuring separation with other aircraft. Aircraft may operate in accordance with both Instrument Flight Rules (IFR) and Visual Flight Rules (VFR) within Class G airspace.

Class E airspace is controlled airspace open to both IFR and VFR flights. IFR aircraft must have an ATC clearance and communicate with the ATC Centre.

A Control Area (CTA) is defined as a “controlled airspace extending upwards from a specified limit above the earth.”⁷

Within Class G airspace an aircraft flying in accordance with the Visual Flight Rules (VFR) away from a populous area is, when flying below 3000ft, required by Civil Aviation Safety Regulation (CASR) 91.267 to remain at 500ft above the highest point of the terrain and any obstacle on it within a radius of 300m from a point on the terrain directly below the aircraft. For a wind farm this equates to 500ft above the tallest turbine tip height, which for the THWF this is $984 + 500 = 1484\text{ft}$ Above Ground Level (AGL).

There is no Special Use, Prohibited, Restricted or Danger (PRD) areas, nor published flying training areas in the vicinity of the THWF.

⁷ AIP Enroute, ENR 1.4 – 3, dated 12 June 2025,



2. SCOPE

To meet the requirements of Twin Hills Wind Farm Pty Ltd, the study required Chiron Aviation Consultants to examine the THWF development in relation to any impacts on aviation activity in the area and undertake the following tasks.

2.1 Aviation Impact Statement

Airservices Australia (AsA) requires that all developers of proposed wind farms prepare an Aviation Impact Statement and submit this to AsA for evaluation and consideration.

The AIS required the following tasks to be undertaken: -

- Provide the coordinates and elevations of the Obstacles and associated topographical drawings;
- Specify all registered and certified aerodromes within 30nm (55.6km):
 - Nominate all instrument approach and landing procedures;
 - Confirm that the obstacles do not penetrate the Annex 14 OLS;
 - Confirm that the obstacles do not penetrate the PANS-OPS;
- Specify any published air routes over or near the obstacles
- Specify the airspace classification of the airspace surrounding the development
- Investigate any impact on aviation Communications, Navigation and Surveillance (CNS) facilities

Details of Aerodromes, OLS, PANS-OPS procedures, Lowest Safe Altitudes, Navigation and Airspace Surveillance facilities were obtained from the Australian Aeronautical Information Publications (AIP), AsA sources and CASA publications.



3. METHODOLOGY

To meet Airservices Australia requirements for an Aviation Impact Statement the following methodology was used: -

- The obstacle (turbines and meteorological masts) coordinates and elevations were listed to the requisite accuracy and associated drawings and charts were obtained;
- The AIP was reviewed to determine;
 - All certified and military/joint aerodromes located within 30nm (55.6km) of the wind farm
 - Any associated Instrument Departure and Approach Procedures (DAP);
 - The extent of the OLS and PANS-OPS surfaces for the identified DAP;
 - Published air routes located over or near the wind farm;
 - The classification of the airspace surrounding the wind farm;
- Ascertain the locations of CNS facilities that may be impacted and analyse the impact on;
 - Communications facilities;
 - Navigation facilities;
 - Surveillance facilities (in accordance with EUROCONTROL Guidelines); and
- Compile a report for review by Airservices Australia and the Department of Defence.



4. AVIATION IMPACT STATEMENT

The Aviation Impact Statement meets the requirements of Airservices Australia for their assessment of the THWF potential impact on the items listed in Section 2.1 above. The AIS is submitted to both Airservices Australia and the Department of Defence for assessment in relation to civil and military facilities. Airservices Australia provides a copy of the AIS and their assessment to the Civil Aviation Safety Authority (CASA).

4.1 Location

As noted in section 1.1 above the THWF is located between the towns of Eneabba, Arrowsmith East and Kadathinni and is approximately 60nm (113km) South southeast of Geraldton.

4.2 Obstacles

The THWF will comprise up to 93 turbines with a tip height of up to 300m AGL. The tallest turbine is T25 at 593.9m (1947.99ft) AHD. Rounded up this gives a tip height of 1948ft; add the Minimum Obstacle Clearance (MOC) of 1000ft gives a height of 2948ft rounded up to the nearest hundred the LSALT over the THWF is 3000ft.

The turbine locations and elevations are shown at Appendix A.



4.3 Drawings

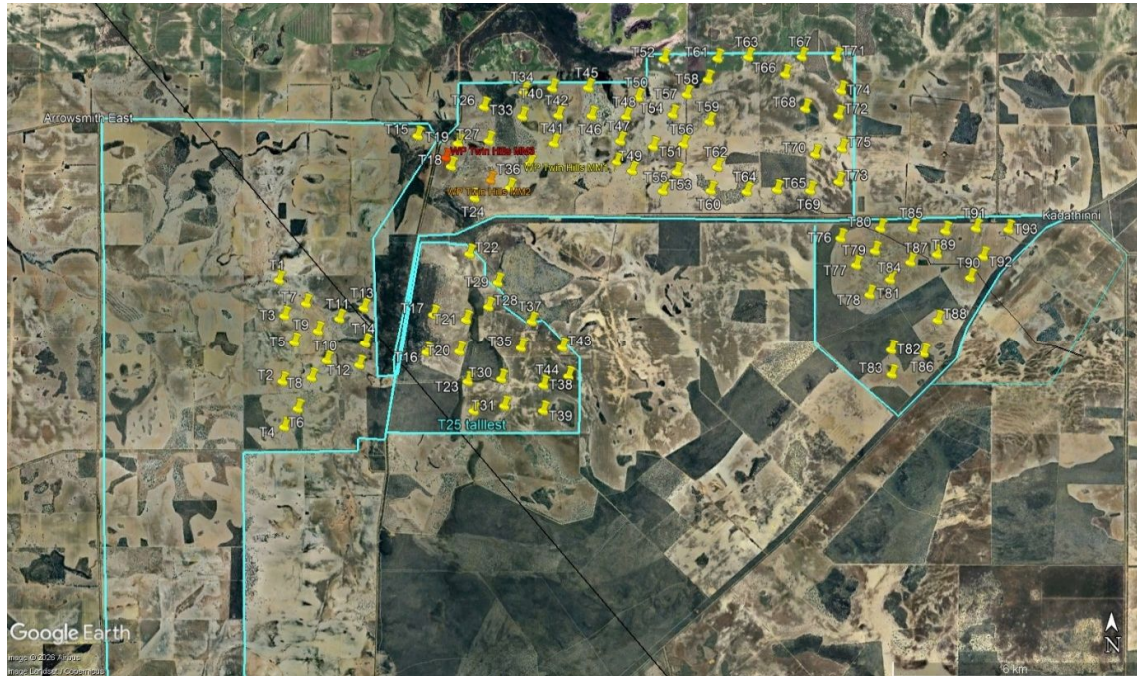


Figure 3 – Location of Twin Hills Wind Farm Turbines⁸

4.4 Aerodromes within 30nm

There are no Certified Aerodromes within 30nm (56km) of the proposed THWF.

4.4.1 Uncertified aerodromes and airstrips within 16nm

The Carnamah (YCNH) Uncertified Aerodrome [verified] is 17.26nm (31.97km) east of the THWF. YCNH has two runways; RWY10/28 - 900m natural surface and RWY16/34 – 500m natural surface. Both runways appear to be graded sections of a larger paddock.

The THWF will not affect operations at YCNH as it is considered sufficiently distant, at 17.26nm, which is well beyond the circuit area of 3nm (5.6km). There are no details for this uncertified aerodrome listed in ERSA.

The Eneabba (YEEB) Uncertified Aerodrome [verified] is 11.46nm (21.23km) southwest of the THWF. YEEB has a 1300m natural surface runway with a RWY03/21 orientation.

The THWF does not affect operations at YEEB as it is considered sufficiently distant, at 11.45nm, which is beyond the circuit area of 3nm (5.6km). There are no details for this uncertified aerodrome listed in ERSA.

⁸ Google Earth image September 2025; data supplied by THWF Pty Ltd.



The Three Springs Aeroplane Landing Area is 16.7nm (30.86km) northeast of the THWF. The ALA has a 950m natural surface runway with a RWY18/36 orientation. There are no details for this ALA listed in ERSA or the DAH.

The THWF does not affect operations at the Three Springs ALA as it is considered sufficiently distant, at 16.7nm (30.86km), which is beyond the circuit area of 3nm (5.6km).

4.5 Air Routes and Lowest Safe Altitudes

The significant published air routes in the vicinity of the THWF and their LSALT are shown in Table 1 and Figure 4 below.

Route	Segment	LSALT
GRID		2800
Z41	HINDS/AVDIS	2800
H16	AVNEX/GER	2800

Table 1 – Published LSALT

The tallest proposed turbine tip is T25 at 593.9m (1947.99ft) AHD. The LSALT over the THWF is 3000ft, which is above the published LSALT as shown in Table 1 and depicted in Figure 2.

The tallest THWF turbine penetrates the published LSALT, requiring them to be raised to 3000ft.

4.6 Airspace

The THWF is in Class G airspace below Class E airspace with a lower limit of FL125.

There are no Prohibited, Restricted or Danger Areas (PRD) within the vicinity of the THWF.

There are no published flying training areas in the vicinity of the THWF.

4.7 Communications, Navigation and Surveillance

Wind turbines by their size and construction may cause interference to air traffic control communications, navigation and surveillance (CNS) facilities. Airservices Australia (AsA) recommends the use of the *EuroControl Guidelines on How to Assess the Potential Impact of Wind Turbines on Surveillance Sensors*.

The CASR Part 139 Manual of Standards – Aerodromes, Chapter 11, sets out the general requirements for navigation aid sites and air traffic control (ATC) facilities, including the clearance planes for planned and existing facilities.



4.7.1 Communications

There are Airservices Australia ATC communications facilities at Geraldton, 62nm to the Northwest and Mt Singleton, 91nm to the East of the THWF. The THWF will have no impact on the operations of these facilities.

4.7.2 Navigation

The nearest ground based navigation aid is the Non Directional Beacon (NDB) at YGEL. This NDB has a range of 100nm by day and 80nm by night. An NDB is a low frequency (359 kHz) radio transmitter and will not be affected by the THWF turbines some 62nm distant.

4.7.3 Surveillance

The nearest civil aviation surveillance facility is a Primary Surveillance Radar (PSR) at Eclipse Hill, 102nm south. This radar may be a combined civil/military installation. There are both PSR and SSR radar at Perth and Kalamunda some 140nm south of the THWF.

The applicable document, as referred to on the Airservices website, is the Eurocontrol Guidelines *“How to Assess the Potential Impact of Wind Turbines on Surveillance Sensors”* edition 1.2, September 2014 (EUROCONTROL-GUID-130).



This guideline nominates the following four zones (shown below) and the associated level of assessment for PSR installations.

Zone	Zone 1	Zone 2	Zone 3	Zone 4
Description	0 – 500m	500m - 15km and in radar line of sight	Further than 15km but within maximum instrumented range and in line of sight	Anywhere within maximum instrumented range but not in line of sight or outside the maximum instrumented range
Assessment Requirements	Safeguarding	Detailed assessment	Simple assessment	No assessment

The Primary Surveillance Radar at Eclipse Hill is 102nm (189km) south of the THWF. The height of this radar antenna is not known, however the turbine tip height of 599.7m (1968ft) AHD may be within the line of sight, indicating a simple assessment is required. Similarly the PSR at Kalamunda is 142nm (263km) south southeast of the THWF and may be within the line of site, indicating a simple assessment is required.

The guideline nominates the following three zones (shown below) for the assessment of SSR.

Zone	Zone 1	Zone 2	Zone 4
Description	0 – 500m	500m – 16km but within maximum instrumented range and in radar line of sight	Further than 16km or not in radar line of sight
Assessment Requirements	Safeguarding	Detailed Assessment	No assessment

Note: There is no Zone 3 for SSR

The Eclipse Hill SSR, at 184km (99nm) Northeast is well beyond the 16km distance, therefore no assessment is required.

The THWF may be the line of site of both the Eclipse Hill and Kalamunda radars and will require a simple assessment.

Airservices Australia and the Department of Defence (RAAF Pearce) will undertake these simple assessments.



4.8 Airservices Assessment

Airservices Australia has assessed the THWF and finds it will not affect any ICAO PANS-OPS instrument approach or departure procedures nor any CNS facilities.

The THWF will require the GRID LSALT and that of air routes Z41 and H16 to be increased by 200ft to 3000ft AHD.

See Appendix B for the Airservices assessment WA-WF-088

4.9 AIS Conclusions

The AIS concluded that the THWF will not impact upon the following:

- The OLS surfaces of any certified aerodrome;
- The PANS-OPS surfaces associated with the Instrument Approach Procedures at any certified aerodrome.
- The performance of Navigation Aids and Communication Facilities.

The THWF will require the following changes to the published LSALT

Route	Segment	LSALT	Amend LSALT
GRID		2800	3000
Z41	HINDS/AVDIS	2800	3000
H16	AVNEX/GER	2800	3000

Table 2- LSALT changes

The THWF will require a simple assessment of the surveillance radars at Eclipse Hill and Kalamunda to be undertaken by Airservices Australia and the Department of Defence (RAAF Pearce).



APPENDIX A

Twin Hills Wind Farm Turbine Locations and Heights TWH_V162-6.8_v062



APPENDIX A

WTG_ID	Easting	Southing	Base elevation [m AHD]	Tip height [m AGL]	Latitude [DD]	Longitude [DD]	Latitude [DMS]	Longitude [DMS]	Tip Height [m AHD]	Tip Height [ft AHD]	LSALT
T1	343661	6718702	160	300	-29.65184391	115.3847518	29°39'06.64" S	115°23'05.11" E	460	1508.8	2600
T10	344866	6716753	190.6	300	-29.66957444	115.3969089	29°40'10.47" S	115°23'48.87" E	490.6	1609.168	2700
T11	345181	6717786	172.6	300	-29.6603331	115.400041	29°39'37.20" S	115°24'00.15" E	472.6	1550.128	2600
T12	345661	6716657	187	300	-29.67054119	115.4051085	29°40'13.95" S	115°24'18.39" E	487	1597.36	2600
T13	345748	6718051	180	300	-29.65797309	115.4062058	29°39'28.70" S	115°24'22.34" E	480	1574.4	2600
T14	345797	6717191	190	300	-29.66573846	115.4065912	29°39'56.66" S	115°24'23.73" E	490	1607.2	2700
T15	347003	6722234	190	300	-29.62039301	115.4197621	29°37'13.41" S	115°25'11.14" E	490	1607.2	2700
T16	347308	6716991	233.8	300	-29.66773185	115.4221745	29°40'03.83" S	115°25'19.83" E	533.8	1750.864	2800
T17	347454	6717912	231.1	300	-29.65944035	115.4238139	29°39'33.99" S	115°25'25.73" E	531.1	1742.008	2800
T18	347834	6721500	220	300	-29.6271178	115.4282381	29°37'37.62" S	115°25'41.66" E	520	1705.6	2800
T19	347993	6722058	220	300	-29.62210222	115.4299595	29°37'19.57" S	115°25'47.85" E	520	1705.6	2800
T2	343803	6716231	230	300	-29.67415131	115.385857	29°40'26.94" S	115°23'09.09" E	530	1738.4	2800
T20	348102	6717025	245.4	300	-29.66752378	115.4303843	29°40'03.09" S	115°25'49.38" E	545.4	1788.912	2800
T21	348255	6717798	259.7	300	-29.66056583	115.4320671	29°39'38.04" S	115°25'55.44" E	559.7	1835.816	2900
T22	348312	6719394	240	300	-29.64617115	115.4328826	29°38'46.22" S	115°25'58.38" E	540	1771.2	2800
T23	348322	6716294	291.4	300	-29.67414188	115.4325481	29°40'26.91" S	115°25'57.17" E	591.4	1939.792	3000
T24	348420	6720746	220.7	300	-29.63399227	115.4341896	29°38'02.37" S	115°26'03.08" E	520.7	1707.896	2800
T25	348473	6715584	293.9	300	-29.68056446	115.434009	29°40'50.03" S	115°26'02.43" E	593.9	1947.992	3000
T26	348618	6722949	230	300	-29.61414007	115.4365371	29°36'50.90" S	115°26'11.53" E	530	1738.4	2800
T27	348744	6722133	220	300	-29.62151715	115.4377244	29°37'17.46" S	115°26'15.81" E	520	1705.6	2800
T28	348796	6718120	280	300	-29.65772935	115.4377063	29°39'27.83" S	115°26'15.74" E	580	1902.4	3000
T29	349013	6718707	275.5	300	-29.65245581	115.4400217	29°39'08.84" S	115°26'24.08" E	575.5	1887.64	2900



WTG_ID	Easting	Southing	Base elevation [m AHD]	Tip height [m AGL]	Latitude [DD]	Longitude [DD]	Latitude [DMS]	Longitude [DMS]	Tip Height [m AHD]	Tip Height [ft AHD]	LSALT
T3	343818	6717834	190	300	-29.6596935	115.3862399	29°39'34.90" S	115°23'10.46" E	490	1607.2	2700
T30	349135	6716367	290	300	-29.67358445	115.4409623	29°40'24.90" S	115°26'27.46" E	590	1935.2	3000
T31	349216	6715715	286.8	300	-29.67947924	115.4417062	29°40'46.13" S	115°26'30.14" E	586.8	1924.704	3000
T32	349275	6721000	255.3	300	-29.63180329	115.4430501	29°37'54.49" S	115°26'34.98" E	555.3	1821.384	2900
T33	349553	6722721	249.8	300	-29.61630673	115.4461555	29°36'58.70" S	115°26'46.16" E	549.8	1803.344	2900
T34	349585	6723317	243.6	300	-29.6109359	115.4465743	29°36'39.37" S	115°26'47.67" E	543.6	1783.008	2800
T35	349601	6717130	290	300	-29.6667589	115.4458793	29°40'00.33" S	115°26'45.17" E	590	1935.2	3000
T36	349748	6721580	254.6	300	-29.62662791	115.4480148	29°37'35.86" S	115°26'52.85" E	554.6	1819.088	2900
T37	349853	6717781	290	300	-29.66091206	115.4485772	29°39'39.28" S	115°26'54.88" E	590	1935.2	3000
T38	350159	6716228	272.8	300	-29.6749604	115.451518	29°40'29.86" S	115°27'05.46" E	572.8	1878.784	2900
T39	350160	6715613	280	300	-29.68051033	115.4514482	29°40'49.84" S	115°27'05.21" E	580	1902.4	3000
T4	343863	6715127	237.1	300	-29.6841212	115.3863149	29°41'02.84" S	115°23'10.73" E	537.1	1761.688	2800
T40	350272	6723416	230.4	300	-29.61012429	115.4536802	29°36'36.45" S	115°27'13.25" E	530.4	1739.712	2800
T41	350331	6722080	260	300	-29.62219022	115.4540999	29°37'19.88" S	115°27'14.76" E	560	1836.8	2900
T42	350429	6722763	243.4	300	-29.61603718	115.4552097	29°36'57.73" S	115°27'18.75" E	543.4	1782.352	2800
T43	350605	6717155	286.6	300	-29.666649	115.4562541	29°39'59.94" S	115°27'22.51" E	586.6	1924.048	3000
T44	350763	6716456	271.5	300	-29.67298007	115.45779	29°40'22.73" S	115°27'28.04" E	571.5	1874.52	2900
T45	351150	6723445	222.3	300	-29.60997316	115.4627461	29°36'35.90" S	115°27'45.89" E	522.3	1713.144	2800
T46	351240	6722764	234.6	300	-29.61612541	115.4635834	29°36'58.05" S	115°27'48.90" E	534.6	1753.488	2800
T47	351943	6722161	258.9	300	-29.62164949	115.4707598	29°37'17.94" S	115°28'14.74" E	558.9	1833.192	2900
T48	352078	6722749	240	300	-29.61636067	115.4722338	29°36'58.90" S	115°28'20.04" E	540	1771.2	2800
T49	352240	6721445	273.3	300	-29.62814449	115.4737292	29°37'41.32" S	115°28'25.42" E	573.3	1880.424	2900
T5	344074	6717187	206.9	300	-29.6655637	115.3887918	29°39'56.03" S	115°23'19.65" E	506.9	1662.632	2700



WTG_ID	Easting	Southing	Base elevation [m AHD]	Tip height [m AGL]	Latitude [DD]	Longitude [DD]	Latitude [DMS]	Longitude [DMS]	Tip Height [m AHD]	Tip Height [ft AHD]	LSALT
T50	352361	6723223	230.5	300	-29.61211448	115.4752249	29°36'43.61" S	115°28'30.81" E	530.5	1740.04	2800
T51	352744	6722037	268.5	300	-29.6228633	115.4790139	29°37'22.31" S	115°28'44.45" E	568.5	1864.68	2900
T52	352984	6724173	227.3	300	-29.6036208	115.4817809	29°36'13.03" S	115°28'54.41" E	527.3	1729.544	2800
T53	352992	6720967	280.7	300	-29.63254612	115.4814299	29°37'57.17" S	115°28'53.15" E	580.7	1904.696	3000
T54	353212	6722820	250	300	-29.6158587	115.4839509	29°36'57.09" S	115°29'02.22" E	550	1804	2900
T55	353325	6721425	290	300	-29.6284534	115.4849306	29°37'42.43" S	115°29'05.75" E	590	1935.2	3000
T56	353480	6722101	266.4	300	-29.62237283	115.4866223	29°37'20.54" S	115°29'11.84" E	566.4	1857.792	2900
T57	353546	6723309	245.1	300	-29.6114837	115.487465	29°36'41.34" S	115°29'14.87" E	545.1	1787.928	2800
T58	354055	6723672	253.9	300	-29.60826688	115.4927706	29°36'29.76" S	115°29'33.97" E	553.9	1816.792	2900
T59	354105	6722656	269.9	300	-29.61743523	115.4931509	29°37'02.77" S	115°29'35.34" E	569.9	1869.272	2900
T6	344187	6715574	238.5	300	-29.68012431	115.3897342	29°40'48.45" S	115°23'23.04" E	538.5	1766.28	2800
T60	354156	6720993	290	300	-29.632446	115.4934588	29°37'56.81" S	115°29'36.45" E	590	1935.2	3000
T61	354283	6724185	260	300	-29.60366381	115.4951902	29°36'13.19" S	115°29'42.68" E	560	1836.8	2900
T62	354312	6721561	290	300	-29.62734344	115.495138	29°37'38.44" S	115°29'42.50" E	590	1935.2	3000
T63	355029	6724228	267.8	300	-29.60336262	115.5029016	29°36'12.11" S	115°30'10.45" E	567.8	1862.384	2900
T64	355032	6720978	274.3	300	-29.63268859	115.5024946	29°37'57.68" S	115°30'08.98" E	574.3	1883.704	2900
T65	355767	6721042	280	300	-29.63219623	115.5100976	29°37'55.91" S	115°30'36.35" E	580	1902.4	3000
T66	355931	6723825	280	300	-29.60710845	115.5121547	29°36'25.59" S	115°30'43.76" E	580	1902.4	3000
T67	356324	6724248	288.5	300	-29.60332993	115.5162685	29°36'11.99" S	115°30'58.57" E	588.5	1930.28	3000
T68	356430	6723003	275.1	300	-29.61457896	115.5172029	29°36'52.48" S	115°31'01.93" E	575.1	1886.328	2900
T69	356582	6721032	260	300	-29.63237806	115.5185128	29°37'56.56" S	115°31'06.65" E	560	1836.8	2900
T7	344334	6718141	169.4	300	-29.65698844	115.3916149	29°39'25.16" S	115°23'29.81" E	469.4	1539.632	2600
T70	356684	6721905	277.6	300	-29.62451452	115.5196807	29°37'28.25" S	115°31'10.85" E	577.6	1894.528	2900



WTG_ID	Easting	Southing	Base elevation [m AHD]	Tip height [m AGL]	Latitude [DD]	Longitude [DD]	Latitude [DMS]	Longitude [DMS]	Tip Height [m AHD]	Tip Height [ft AHD]	LSALT
T71	357168	6724249	280	300	-29.60342232	115.5249866	29°36'12.32" S	115°31'29.95" E	580	1902.4	3000
T72	357246	6722858	260	300	-29.61598287	115.5256114	29°36'57.54" S	115°31'32.20" E	560	1836.8	2900
T73	357266	6721252	270	300	-29.6304729	115.5256048	29°37'49.70" S	115°31'32.18" E	570	1869.6	2900
T74	357300	6723451	270	300	-29.61063714	115.5262446	29°36'38.29" S	115°31'34.48" E	570	1869.6	2900
T75	357336	6719895	260	300	-29.62322289	115.5264282	29°37'23.60" S	115°31'35.14" E	560	1836.8	2900
T76	357336	6722056	260	300	-29.64272394	115.5261493	29°38'33.81" S	115°31'34.14" E	560	1836.8	2900
T77	357718	6719249	277.5	300	-29.64859603	115.53001	29°38'54.95" S	115°31'48.04" E	577.5	1894.2	2900
T78	358058	6718540	262.7	300	-29.65503161	115.533429	29°39'18.11" S	115°32'00.34" E	562.7	1845.656	2900
T79	358168	6719599	290	300	-29.64548974	115.5347036	29°38'43.76" S	115°32'04.93" E	590	1935.2	3000
T8	344507	6716329	214.4	300	-29.67335972	115.3931439	29°40'24.09" S	115°23'35.32" E	514.4	1687.232	2700
T80	358298	6720145	264.8	300	-29.64057848	115.5361176	29°38'26.08" S	115°32'10.02" E	564.8	1852.544	2900
T81	358548	6718912	269.9	300	-29.65173127	115.5385389	29°39'06.23" S	115°32'18.74" E	569.9	1869.272	2900
T82	358600	6717206	274.6	300	-29.66712895	115.5388536	29°40'01.66" S	115°32'19.87" E	574.6	1884.688	2900
T83	358615	6716609	288.5	300	-29.67251686	115.5389307	29°40'21.06" S	115°32'20.15" E	588.5	1930.28	3000
T84	359039	6719336	271.1	300	-29.64796169	115.5436655	29°38'52.66" S	115°32'37.20" E	571.1	1873.208	2900
T85	359079	6720159	290	300	-29.64054093	115.5441884	29°38'25.95" S	115°32'39.08" E	590	1935.2	3000
T86	359388	6717131	280	300	-29.66789512	115.5469844	29°40'04.42" S	115°32'49.14" E	580	1902.4	3000
T87	359681	6719535	267.4	300	-29.6462395	115.5503182	29°38'46.46" S	115°33'01.15" E	567.4	1861.072	2900
T88	359718	6717949	280	300	-29.66055232	115.5504994	29°39'37.99" S	115°33'01.80" E	580	1902.4	3000
T89	359881	6720103	273	300	-29.641138	115.5524602	29°38'28.10" S	115°33'08.86" E	573	1879.44	2900
T9	344638	6717475	187.9	300	-29.66303511	115.3946604	29°39'46.93" S	115°23'40.78" E	487.9	1600.312	2600
T90	360498	6718982	263.5	300	-29.65132402	115.5586914	29°39'04.77" S	115°33'31.29" E	563.5	1848.28	2900
T91	360615	6720178	281.9	300	-29.64054032	115.5600507	29°38'25.95" S	115°33'36.18" E	581.9	1908.632	3000



WTG_ID	Easting	Southing	Base elevation [m AHD]	Tip height [m AGL]	Latitude [DD]	Longitude [DD]	Latitude [DMS]	Longitude [DMS]	Tip Height [m AHD]	Tip Height [ft AHD]	LSALT
T92	360801	6719502	273.7	300	-29.64665856	115.5618893	29°38'47.97" S	115°33'42.80" E	573.7	1881.736	2900
T93	361400	6720158	289.9	300	-29.64081213	115.5681568	29°38'26.92" S	115°34'05.36" E	589.9	1934.872	3000

Turbine T25 is the tallest tip height AHD



APPENDIX B

Airservices Australia Assessment



APPENDIX B

ian.jennings@netspace.net.au

From: Airport Developments <Airport.Developments@AirservicesAustralia.com>
Sent: Monday, 10 November 2025 10:07 AM
To: 'ian.jennings@netspace.net.au'
Cc: Julian Da Silva; Engineering Development Applications; Airspace Protection; Vertical Obstruction Data
Subject: Airservices response: WA-WF-088 - Twin Hills Wind Farm - AIS
Attachments: WA-WF-088 - near Geraldton.pdf

OFFICIAL

Good morning,

I refer to your request for an Airservices assessment of the proposed activity near Geraldton, WA.

Airspace Procedures

With respect to procedures designed by Airservices in accordance with ICAO PANS-OPS and Doc 9905, at a maximum height of 599.7m/1968ft AHD the wind farm will not affect any sector or circling altitude, nor any instrument approach or departure procedure at any aerodrome.

Note: Procedures not designed by Airservices at any aerodrome were not considered in this assessment.

Grid lowest safe altitude (LSALT)

The proposed activity will penetrate the current Airservices-designed Grid LSALT as per the attached VOD assessment.

Please advise the Vertical Obstacle Data (VOD) team at VOD@airservicesaustralia.com of any need to increase Grid LSALT heights at least two (2) weeks before construction commencing by supplying the below information:

- Approved wind turbine locations
- Elevations at the top of the highest point of the turbine in metres AHD
- A copy of this email

Communications/Navigation/Surveillance (CNS) Facilities

We have assessed the proposed activity to the above specified height for any impacts to Airservices Precision/Non-Precision Navigation Aids, Anemometers, HF/VHF/UHF Communications, A-SMGCS, Radar, PRM, ADS-B, WAM or Satellite/Links and have no objections to it proceeding, unless otherwise advised.

Note: Meteorological instruments not owned by Airservices were not considered in this assessment. In accordance with Part 139 (Aerodromes) Manual of Standards, Chapter 19, we recommend consulting with the Bureau of Meteorology (the Bureau) to ensure that the proposed activity does not adversely affect their equipment. The Bureau can be contacted at airport.developments@bom.gov.au



Air Traffic Control (ATC) Operations

There are no additional instructions/concerns from ATC.

Summary

The proposed activity does not impact Airservices operations or facilities at any aerodrome.

Vertical Obstacle Notification

As this proposed activity is more than 30m (99ft) AGL, please follow the below notification process:

1. Complete the Vertical Obstacle Notification Form: [ATS-FORM-0085_Vertical Obstruction Data Form.pdf \(airservicesaustralia.com\)](#)
2. Submit completed form to: VOD@airservicesaustralia.com as soon as the development reaches the maximum height.

For further information regarding the reporting of tall structures, please contact the VOD team:

- Email - VOD@airservicesaustralia.com
- Or refer to: [Civil Aviation Safety Regulation Part 175 — Airservices and You - Airservices \(airservicesaustralia.com\)](#)

Thanks and Regards,
Kwanele Diallo
AIS Data & Airspace Development Protection Specialist
Airservices Australia
Phone: 0436 325 205
Email: Kwanele.diallo@airservicesaustralia.com



I acknowledge Aboriginal and Torres Strait Islander peoples as the traditional custodians of country throughout Australia where we live, learn and work.



AsA WA-WF-088 page 2



APPENDIX C

Department of Defence Assessment



APPENDIX C

Not assessed as of 2 March 2026



APPENDIX D

Glossary of Terms And Abbreviations



APPENDIX D

Glossary of Terms and Abbreviations

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 as an Appendix.

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 are 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, “a term used by pilots and controllers to indicate the type of flight plan an aircraft is flying,” such 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 Government's 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 Transport (DoIT).

NASF (National Airports Safeguarding Framework) is the published guidelines from the NASAG.

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
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
APARs	Airports (Protection of Airspace) Regulations, 1996 as amended
ARP	Aerodrome Reference Point
AsA	Airservices Australia
ATC	Air Traffic Control(ler)
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)
DME	Distance Measuring Equipment
ELEV	Elevation (above mean sea level)
ENE	East Northeast
ERSA	Enroute Supplement Australia
FAF	Final Approach Fix
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
ILS	Instrument Landing System
km	kilometres
kt	Knot (one nautical mile per hour)
LAT	Latitude
LONG	Longitude
LSALT	Lowest Safe Altitude



Abbreviation	Meaning
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
NASF	National Airports Safeguarding Framework
NDB	Non Directional Beacon
NE	Northeast
NM or nm	Nautical Mile (= 1.852 km)
NNE	Northeast
NOTAM	NOtice To AirMen
OLS	Obstacle Limitation Surface
PANS-OPS	Procedures for Air Navigation Services – Aircraft Operations, ICAO Doc 8168
PSR	Primary Surveillance Radar
Rnnn	Restricted Airspace – promulgated in AIP as R with 3 numbers
RNAV	aRea NAVigation
RNP	Required Navigation Performance
RPT	Regular Public Transport
RWY	Runway
SFC	Surface
SID	Standard Instrument Departure
SSR	Secondary Surveillance Radar
TAR	Terminal Area Radar
TODA	Take-Off Distance Available
VFR	Visual Flight Rules
V _n	aircraft critical Velocity reference
VOR	Very high frequency Omni directional Range