Transgrid

People. Power. Possibilities.

HumeLink

Aviation Impact Statement

EIS Technical Report 14

AVIATION IMPACT STATEMENT

HUMELINK

Prepared for Transgrid

June 2023

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ACRONYMS

AAAA	Aerial Application Association of Australia
AC	Advisory Circular
AGL	above ground level
AHD	Australian Height Datum
AIA	aviation impact assessment
AIP	Aeronautical Information Publication
AIS	Aviation Impact Statement
ALA	aircraft landing area
AMSL	above mean sea level
ARP	Aerodrome reference point
AS	Australian Standards
ATC	Air traffic control
CAAP	Civil Aviation Advisory Publications
CASA	Civil Aviation Safety Authority
CASR	Civil Aviation Safety Regulations 1998
DME	distance measuring equipment
DPE	Department of Planning and Environment
ERSA	En Route Supplement Australia
GNSS	global navigation satellite system
HLS	helicopter landing pads
IAP	instrument approach procedures
ICAO	International Civil Aviation Organization
IFR	instrument flight rules
LGA	local government area
LSALT	lowest safe altitude
MOS	Manual of Standards
MSA	minimum sector altitude
MTOW	maximum take-off weight

NASF	National Airports Safeguarding Framework
NDB	non-directional radio beacon
OLS	obstacle limitation surface
PANS-OPS	Procedures for Air Navigation Services - Aircraft Operations
RFDS	Royal Flying Doctor Service
RSR	route surveillance radar
RWY	runway
VFR	visual flight rules
VOR	VHF omni-directional radio range
VMC	visual meteorological conditions

UNITS OF MEASUREMENT

feet	(1 foot = 0.3048 m)
kilometres	(1 kilometre = 0.5399 nautical miles)
metres	(1 metre = 3.281 feet)
nautical miles	(1 nautical mile = 1.852 kilometres)

DEFINITIONS

Term	*Definition*
Aerodrome Aircraft landing area (ALA)	A defined area on land or water (including any buildings, installations, and equipment) intended to be used either wholly or in part for the arrival, departure, and surface movement of aircraft.
Aerodrome facilities	Physical things at an aerodrome which could include: a. the physical characteristics of any movement area including runways, taxiways, taxi lanes, shoulders, aprons, primary and secondary parking positions, runway strips and taxiway strips b. infrastructure, structures, equipment, earthing points, cables, lighting, signage, markings, visual approach slope indicators.
Aerodrome reference point (ARP)	The designated geographical location of an aerodrome.
Aeronautical Information Publication (AIP)	Details of regulations, procedures, and other information pertinent to the operation of aircraft
Aeronautical Information Publication En-route Supplement Australia (AIP ERSA)	Contains information vital for planning a flight and for the pilot in flight as well as pictorial presentations of all certified aerodromes. Other aerodromes, also known as Aircraft Landing Areas (ALA) may be included in ERSA with limited information.
Ancillary infrastructure	Supporting infrastructure for: • construction (temporary) e.g., compounds, batching plants etc. • operational (permanent) e.g., operations and maintenance facilities, access tracks etc.
Civil Aviation Safety Regulations 1998 (CASR)	Contain the mandatory requirements in relation to airworthiness, operational, licensing, enforcement.
Class G airspace	A category of airspace in which an ATC separation service is not provided, i.e., uncontrolled airspace.
Instrument meteorological conditions	Meteorological conditions expressed in terms of visibility, distance from cloud, and ceiling, less than the minimum specified for visual meteorological conditions.

Term	*Definition*
Manual of Standards (MOS)	The means CASA uses in meeting its responsibilities under the Act for promulgating aviation safety standards
National Airports Safeguarding Framework (NASF)	Framework has the objective of developing a consistent and effective national framework to safeguard both airports and communities from inappropriate on and off airport developments.
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.
Project footprint	The area that would be directly affected by the construction and operation of the project. It includes the location of project infrastructure, the area that would be directly disturbed during construction and any easement required during operation (i.e. the combined construction footprint and operational footprint).
Runway	A defined rectangular area on a land aerodrome prepared for the landing and take-off of aircraft.
Runway strip	A defined area including the runway and stopway, if provided, intended: a. to reduce the risk of damage to aircraft running off a runway b. to protect aircraft flying over it during take-off or landing operations.
Safety management system	A systematic approach to managing safety, including organisational structures, accountabilities, policies and procedures.
The project	The construction and operation of high voltage transmission lines and associated infrastructure between Wagga Wagga, Bannaby and Maragle, collectively referred to as HumeLink.
Transmission line route	The location of the transmission line structures along the middle of the transmission line easement.
Transport routes	Public roads that are to be used for delivery of plant and equipment

EXECUTIVE SUMMARY

Introduction

Transgrid proposes to increase the energy network capacity in southern NSW through the development of new high-voltage transmission lines and associated infrastructure between Wagga Wagga, Bannaby and Maragle.

The project is collectively referred to as HumeLink. The primary purpose of HumeLink is to expand the capacity of the electricity network in order to increase electricity transfer to customers across NSW and the ACT.

HumeLink is a priority project for the Australian Energy Market Operator (AEMO) and the Federal and NSW Governments.

Aviation impact assessment

Aviation Projects has been engaged to prepare an aviation impact statement (AIS) that responds to the aviation impact components of the NSW Planning Secretary's Environmental Assessment Requirements (SEARs) for the project.

The HumeLink project footprint is wholly contained within uncontrolled airspace (Class G) and is situated outside any Special Use Airspace. The project is outside the clearance zones associated aviation navigation aids, radar systems and communication facilities.

The aviation impact assessment concluded that:

- several of the proposed transmission line structures would infringe the Outer Horizontal Surface of the Obstacle Limitation Surfaces (OLS) of 367 metres Australian Height Datum (AHD) at Wagga Wagga Airport by up to 40.1 metres (See Table 7)
- temporary construction cranes above the transmission line structures would infringe the OLS by the height of the cranes above the structures
- transmission line structures and associated temporary construction cranes would not infringe the OLS at the other certified airports - Goulburn Airport and Tumut Airport
- cranes would infringe PANS-OPS surface associated with the missed approach segment of the Wagga Wagga Very High Frequency (VHF) omni-directional radio range runway 23 (VOR RWY 23) procedure and the final approach segment of the Wagga Wagga VOR RWY 05 procedure. Management of the crane operation, in conjunction with Wagga Wagga Airport management, should allow the cranes to proceed without impact to aircraft operations
- of the 35 aircraft landing areas (ALAs) and four helicopter landing sites (HLS) identified within three nautical miles of the project footprint, the proposed transmission line is likely to create a major impact to four of the ALAs. The nature of the terrain should enable other nearby locations to be used as an ALA, or there are other nearby ALAs that would allow aircraft operations
- the proposed transmission line structures are unlikely to create an adverse impact to firefighting and emergency evacuation flight operations when the recommended risk management process is carried out by the pilot and landowner whose property has the transmission line overhead or is immediately adjacent to the proposed transmission line
- the construction and operation of the project would not have an impact on designated air routes

- the construction and operation of the project would not have an impact on the relevant Grid lowest safe altitude (Grid LSALT)
- the construction and operation of the project can be compatible with aerial application flight operations when the recommended risk management process is carried out by the pilot and landowner whose property has the transmission line overhead and immediately adjacent to the proposed transmission line.

Key recommendations

Key recommendations resulting from this AIS are provided below.

1. The concept design of the transmission line structures with coordinates and elevations should be provided to Airservices Australia once the concept design is confirmed, using the following email address: vod@airservicesaustralia.com. Note also that:
    a. Airservices Australia has been assigned the task of maintaining a database of tall structures, the top measurement of which is:
        i. 30 metres or more above ground level—within 30 kilometres of an aerodrome; or
        ii. 45 metres or more above ground level elsewhere.
    b. The purpose of notifying Airservices Australia of these structures is to enable their details to be provided in aeronautical information databases and maps/charts etc used by pilots, so that the obstacles can be avoided.
    c. The notification to Airservices Australia should be made as early as possible following the concept design of the project for the preliminary design. Aeronautical charts are updated twice per year, in June and December, with cut off dates approximately six months prior. The Amendment Cycle is available at https://www.airservicesaustralia.com/industry-info/aeronautical-information-management/document-amendment-calendar/.
    d. Further notification is to occur if the finalised design of the project alters the details supplied to Airservices Australia.
2. The concept design for the transmission line structure coordinates and elevations should be provided to Department of Defence, using the following email address: land.planning@defence.gov.au. Further notification is to occur if the finalised design of the project alters the details supplied to the Department of Defence.
3. Following the finalised design of the project, Transgrid will provide relevant details of the proposed transmission line to the ALA owners along the confirmed transmission line, to enable them to consider the potential impact of the transmission structures and power lines on flight operations from their property.
4. To facilitate the flight planning of aerial application operators conducting flight operations on any property near to the proposed transmission line, details of the project, including location and height information of the finalised design of the transmission line and structures would be provided to landowners. This is so that, when asked for hazard information on their property, the landowner may provide the aerial application pilot with all relevant information.
5. Obstacle lighting and marking of the transmission line structures is not considered required outside of the lateral limits of the Wagga Wagga Airport OLS, however, this would need to be confirmed by CASA.

The provision of markers on cables and structures within three nautical miles of the project footprint should be discussed with the appropriate stakeholders.

6. Approval to operate construction cranes in this area must be obtained from the Wagga Wagga Airport Manager in advance of the proposed activity. Transgrid will provide the airport manager with details of the crane operations at least seven days prior to their commencement to enable notification to aircraft planning to operate in the area via the Notice to Airmen (NOTAM) procedure.

1. INTRODUCTION

1.1. Overview

The Australian energy landscape is transitioning to a greater mix of low-emission renewable energy sources, such as wind and solar. To support this transition, meet our future energy demands and connect Australian communities and businesses to these lower cost energy sources, the national electricity grid needs to evolve.

Transgrid proposes to increase the energy network capacity in southern New South Wales (NSW) through the development of around 360 kilometres of new 500 kilovolt (kV) high voltage transmission lines and associated infrastructure between Wagga Wagga, Bannaby and Maragle. This project is collectively referred to as HumeLink. The project would be located across five Local Government Areas (LGAs) including Wagga Wagga City, Snowy Valleys, Cootamundra-Gundagai Regional, Upper Lachlan Shire and Yass Valley. The location of the project is shown on Figure 1.

HumeLink would involve construction of a new substation east of Wagga Wagga as well as connection to existing substations at Wagga Wagga and Bannaby and a future substation at Maragle in the Snowy Mountains (referred to as the future Maragle 500 kV substation). The future Maragle 500 kV substation is subject to a separate major project assessment and approval (reference SSI-9717, EPBC 2018/836).

The project would deliver a cheaper, more reliable and more sustainable grid by increasing the amount of renewable energy that can be delivered across the national electricity grid, helping to transition Australia to a low carbon future. It would achieve this by supporting the transfer of energy from existing renewable generation as well as facilitate development of new renewable generation in the Wagga Wagga and Tumut Renewable Energy Zones (REZs). The project would provide the required support for the network in southern NSW, allowing for the increase in transfer capacity between new renewable generation sources and the State's demand centres of Sydney, Newcastle and Wollongong. The project would also improve the efficiency and reliability of the current energy transfer in this part of the network.

Furthermore, HumeLink would form a key part of the transmission line infrastructure that supports the transfer of energy within the National Electricity Market (NEM) by connecting with other major interconnectors. The NEM incorporates around 40,000 kilometres of transmission lines across Queensland (QLD), NSW, Australian Capital Territory (ACT), Victoria (VIC), South Australia (SA) and Tasmania (TAS).

Construction of the project is targeted to commence in 2024, subject to the required planning and regulatory approvals. Once construction has commenced, the project is estimated to take approximately 2.5 years to build and would become operational by the end of 2026.

AVIATION PROJECTS

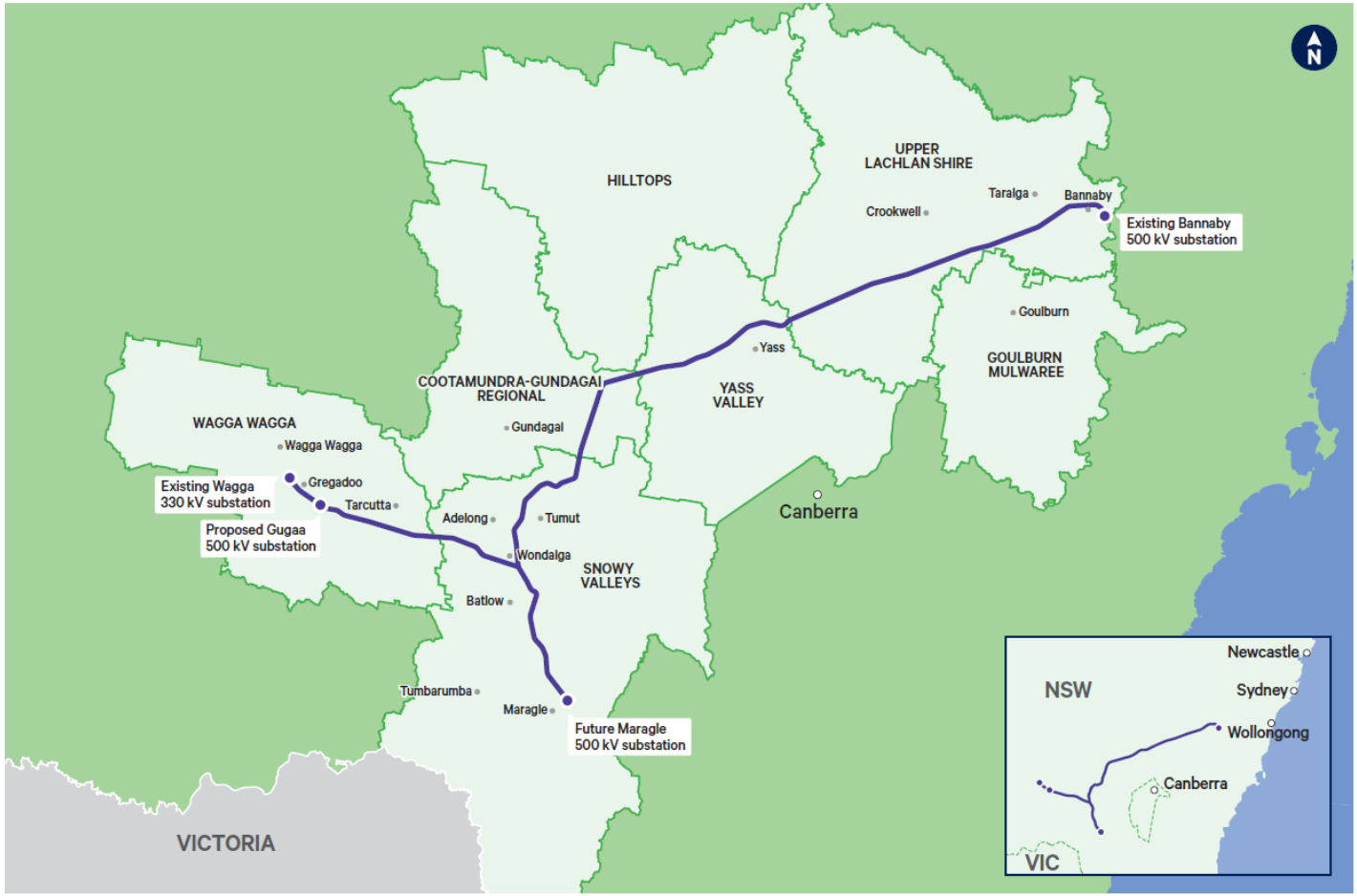

Figure 1 Location of project

The project includes the following key components (refer to Figure 2 and Figure 3):

- construction and operation of around 360 kilometres of new double circuit 500 kilovolt (kV) transmission lines and associated infrastructure between Wagga Wagga, Bannaby and Maragle
- construction of a new 500/330 kV substation at Gregadoo (Gugaa 500 kV substation) approximately 11 kilometres south-east of the existing Wagga 330/132 kV substation (Wagga 330 kV substation)
- demolition and rebuild of a small section of Line 51 (around two kilometres in length) as a double circuit 330 kV transmission line connecting into the Wagga 330 kV substation
- modification of the existing Wagga 330 kV substation and Bannaby 500/330 kV substation (Bannaby 500 kV substation) to accommodate the new transmission line connections
- connection of transmission lines to the future Maragle 500/330 kV substation (Maragle 500 kV substation, approved under the Snowy 2.0 Transmission Connection Project (SSI-9717))
- provision of one optical repeater telecommunications hut and associated connections to existing local electrical infrastructure
- establishment of new and/or upgraded temporary and permanent access tracks
- ancillary works required for construction of the project such as construction compounds, worker accommodation facilities, utility connections and/or relocations, brake and winch sites, and helipad/helicopter support facilities.

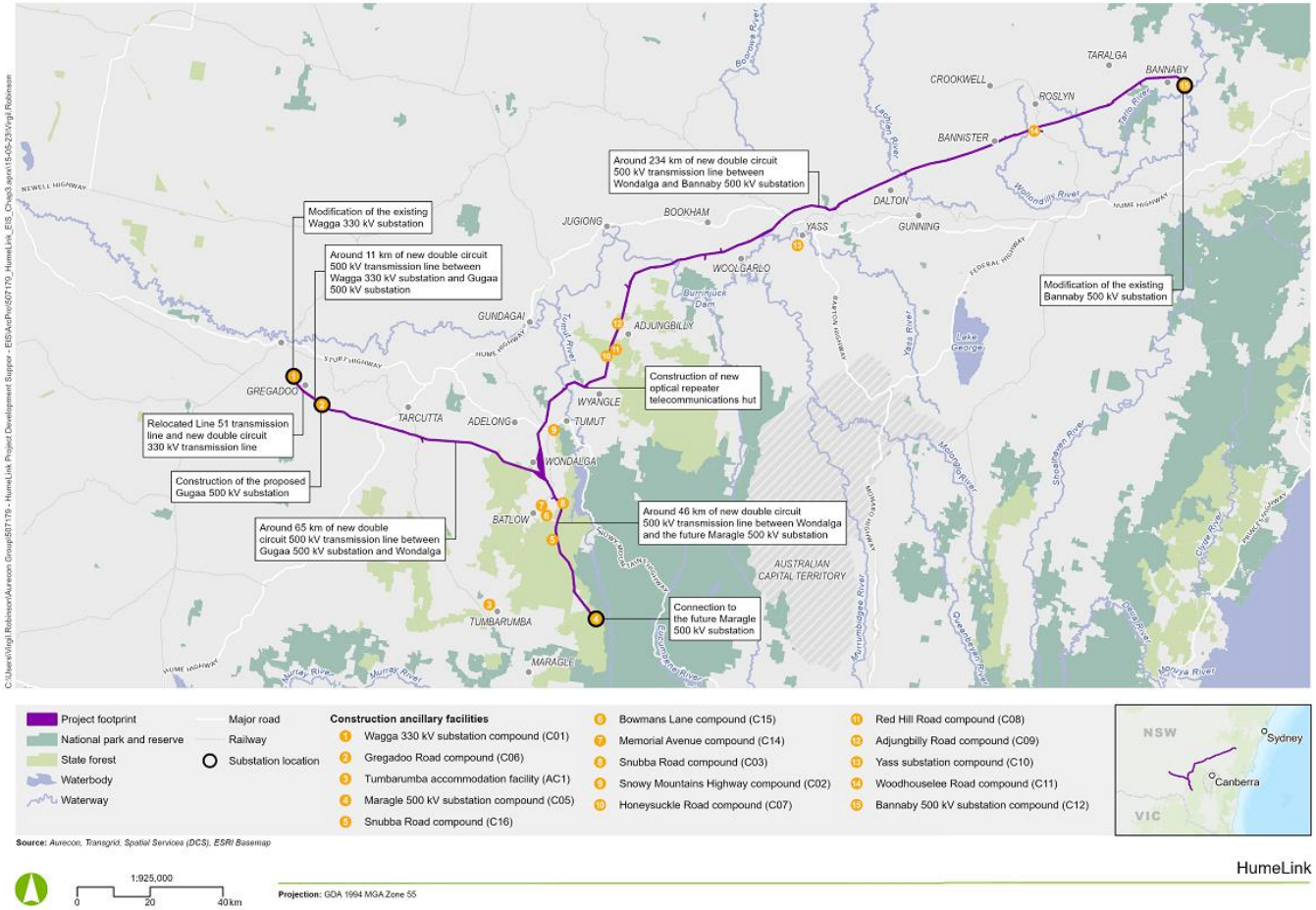

Figure 2 Key components of the project

Transmission line structures

The 500 kV transmission lines would be supported on a series of free-standing steel lattice structures that would range between 50 metres up to a maximum of 76 metres in height and generally spaced between 300 to 600 metres apart. The typical transmission line structure height would be around 60 metres. Earth wire and communications cables would be co-located on the transmission line structures.

In order to facilitate the construction of the new line south of Wagga 330 kV substation, approximately two kilometres of an existing 330 kV single circuit transmission line (Line 51) would need to be rebuilt as a double circuit 330 kV line. These structures would range between 24 and 50 metres in height and have a typical height of 40 metres.

Indicative configurations of transmission line structures that may be used as part of the project are shown in Figure 3. The type and arrangement of the structures would be refined during detailed design.

Cranes to be used for the construction of the transmission line structures are proposed at a maximum height of 91 metres above ground level (AGL).

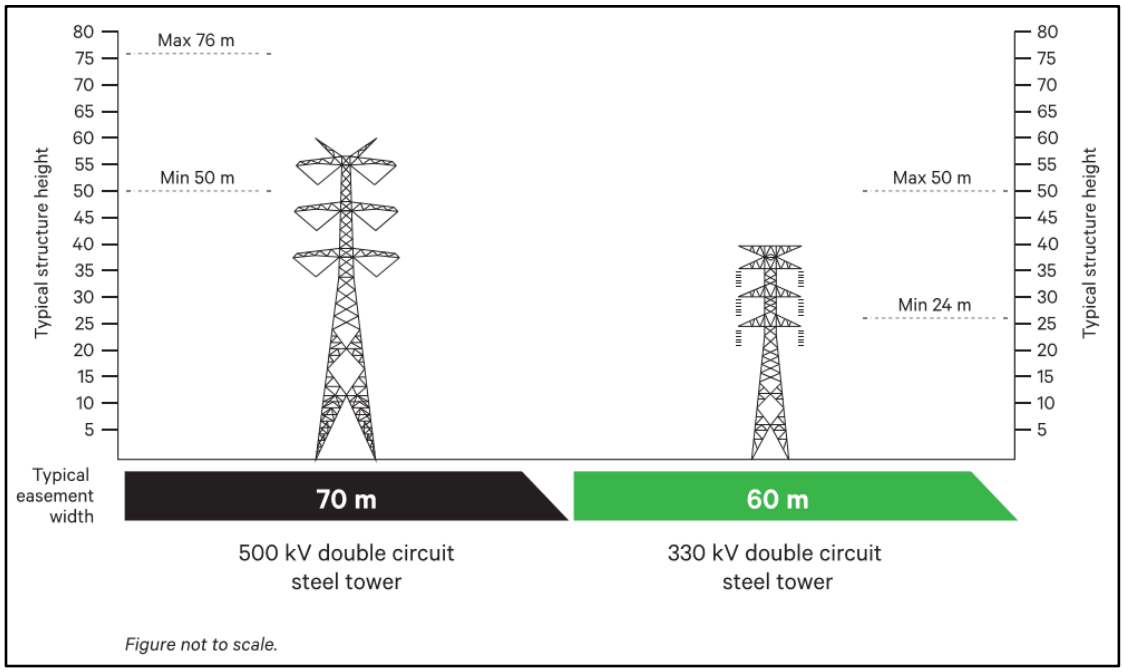

Figure 3 Indicative transmission line structures

1.2. Purpose and scope

The purpose and scope of work is to prepare an Aviation Impact Statement (AIS) to support the Environmental Impact Statement being prepared for the project. It responds directly to the SEARs.

1.2.1. Secretary's environmental assessment requirements

The SEARs were issued on 14 March 2022. The requirements specific to aviation safety, and where these requirements are assessed in this report, are outlined in Table 1.

Table 1 SEARS references

SEARs	*Where addressed*
Assess potential impacts on aviation safety, including defined air traffic routes, aircraft operating heights, approach / departure procedures, radar interference, communication systems, navigation aids, emergency helicopter access, aerial baiting and culling in the National Parks, safe and efficient aerial application of agricultural fertilisers and pesticides.	• defined air traffic routes – Section 3.5 • aircraft operating heights – Sections 2.3 and 3.5 • approach / departure procedures – Section 3.2 • radar interference, communication systems, navigation aids – Section 3.6 and 3.7 • emergency helicopter access – Sections 2.11, 2.12 and 3.9 • aerial baiting and culling in the National Parks – Section 2.10 • safe and efficient aerial application of agricultural fertilisers and pesticides – Section 2.9
Identify aerodromes within 30 km of the transmission line and consider the impact to nearby aerodromes and aircraft landing areas	Section 3.1 and 3.4
Address impacts on obstacle limitation surfaces.	Section 3.3

1.3. Methodology

This AIS has been prepared in accordance with the following methodology:

1. review the project and establish the appropriate compliance framework
2. assess the Obstacle Limitation Surfaces (OLS) and Procedures for Air Navigation Services - Aircraft Operations (PANS-OPS) surfaces associated with certified aerodromes within the project footprint
3. assess any potential infringements to the OLS and PANS-OPS surfaces
4. assess any potential infringements into air route protection surfaces
5. assess likely impacts of the project on aeronautical navigation aids and air traffic control surveillance systems

6. identify relevant civil aviation safety requirements/standards with respect to existing aerodrome conditions and whether these standards are met, especially in relation to whether obstacle lighting may or may not be required
7. assess low level flight operations including agricultural spraying operations, aerial baiting and culling, and aerial firefighting in the area
8. consultation with airports and aircraft operating agencies, including Defence, Royal Flying Doctor Service (RFDS), NSW National Parks and Wildlife Service, Ambulance Service of NSW and NSW Police Air Wing
9. provide recommendations to minimise impacts and ensure aviation safety is maintained throughout the construction and operation of the project.

This AIS will be provided to the airport manager at Wagga Wagga Airport, Tumut Airport and Goulburn Airport to confirm the findings of this report. The Airport Manager is responsible for engagement with CASA on the matters identified in this report.

1.3.1 Legislation and guidelines

The assessment was undertaken in consideration to the following:

- Airservices Australia guidance regarding the content of the Aviation Impact Statement
- Civil Aviation Regulations 1988
- Civil Aviation Safety Regulations 1998 (CASR)
- CASR Part 139 Manual of Standards - Aerodromes
- CASR Part 173 Manual of Standards – Standards applicable to Instrument Flight Procedure Design
- National Airports Safeguarding Framework (NASF) Guideline F: Managing the Risk of Intrusions into the Protected Operational Airspace of Airports
- NSW DPIE SEARS issued 14 March 2022.

1.3.2 Assumptions

The AIS includes the details of the currently available OLS and PANS-OPS surfaces at the relevant airports published in the Aeronautical Information Publication (AIP) effective 16 June 2022 and 8 September 2022.

The Wagga Wagga Airport Masterplan 2010 includes a Future Obstacle Limitation Surface. This OLS is no longer a ‘future OLS’ due to the implementation of the Runway 23 Instrument Landing System which requires an Outer Horizontal Surface under CASR 1998 Part 139 Manual of Standards.

This aviation impact assessment (AIA) will be used during the consultation phase to local stakeholders, aircraft operating agencies and emergency services operators.

2. ASSESSMENT CONTEXT

2.1. National Airports Safeguarding Framework

The National Airports Safeguarding Advisory Group was established by the Commonwealth Department of Infrastructure and Transport to develop a national land use planning framework called the National Airports Safeguarding Framework (NASF). The purpose of this framework is to enhance the current and future safety, viability, and growth of aviation operations at Australian airports through:

- the implementation of best practice in relation to land use assessment and decision making in the vicinity of airports
- assurance of community safety and amenity near airports
- better understanding and recognition of aviation safety requirements and aircraft noise impacts in land use and related planning decisions
- the provision of greater certainty and clarity for developers and landowners
- improvements to regulatory certainty and efficiency
- the publication and dissemination of information on best practice in land use and related planning that supports the safe and efficient operation of airports.

NASF Guideline F: *Managing the Risk of Intrusions into the Protected Operations Airspace of Airports* provides guidance to State/Territory and local government decision makers as well as airport operators to jointly address the issue of intrusions into the operational airspace of airports by tall structures, such as buildings and cranes, as well as trees in the vicinity of airports.

The AIA will have regard to all potential aviation activities within the vicinity of the project footprint including recreation, commercial, civil (including for agricultural purposes) and military operations.

The AIA identifies high level risks, risk mitigation measures and development constraints that are likely to be applicable to aviation safety.

2.2. Aircraft operations at uncontrolled aerodromes

An uncontrolled aerodrome is not provided with an Air Traffic Control service.

There are several uncontrolled aerodromes (including aircraft landing areas (ALAs)) in the area surrounding the HumeLink project footprint.

International Civil Aviation Organisation (ICAO) and CASA definition of aerodrome is generic to all types of areas that are suitable for the arrival, departure and surface movement of aircraft. In Australia those aerodromes that are not certified are called non-certified aerodromes and can include an ALA that is just a mown paddock on private or council property, or it can be equipped with a fully sealed runway(s). Advisory Circulars (ACs) provide advice and guidance from CASA to illustrate a means, but not necessarily the only means, of complying with the regulations, or to explain the regulatory requirements.

For aircraft that are arriving at the certified airports with instrument approach procedures, in poor weather conditions where the pilot cannot necessarily maintain visual contact with the ground or water, the PANS-OPS

surfaces protect them from obstacles and terrain that they cannot necessarily see to avoid, by specifying a vertical margin between the terrain or obstacle.

For aircraft that are arriving in good weather conditions, and not conducting an instrument approach procedure, the pilots must comply with the visual flight rules (VFR) and conduct a conventional circuit pattern.

A conventional circuit pattern and heights are provided in AC 91-10 v1.1 *Operations in the vicinity of non-controlled aerodromes*, effective November 2021. The standard circuit consists of a series of flight paths known as legs when departing, arriving or when conducting circuit practice. Illustrations of the standard aerodrome traffic circuit procedures, sourced from AC 91-10, are provided in Figure 4 and Figure 5.

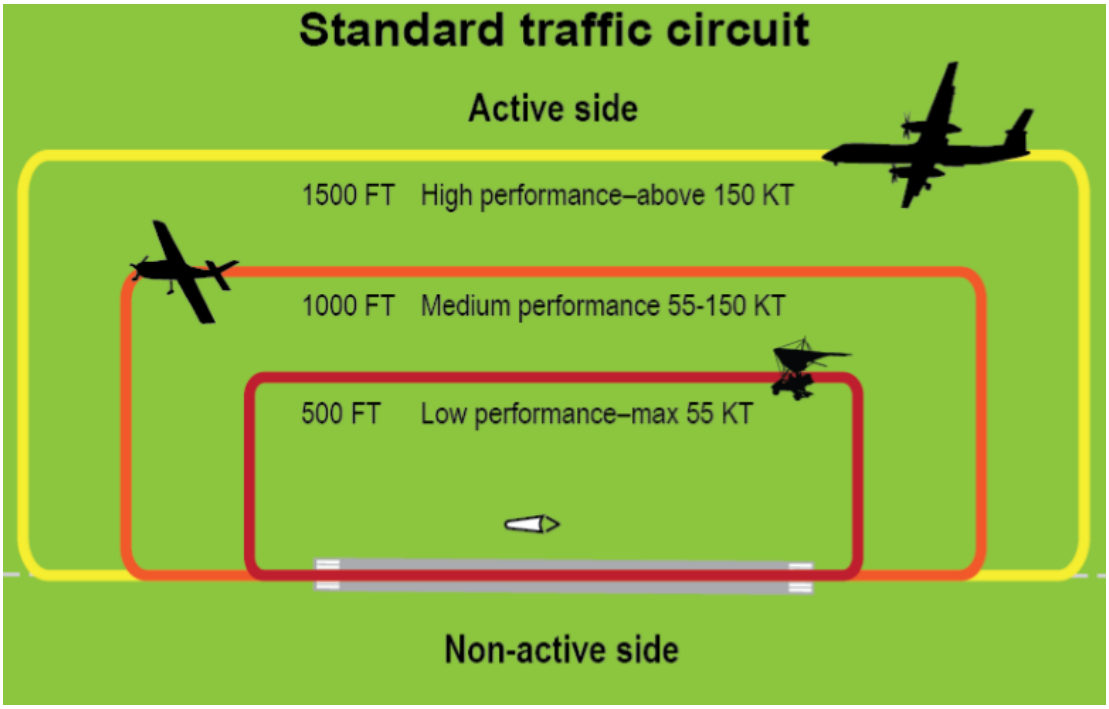

Figure 4 Lateral and vertical separation in the standard aerodrome traffic circuit

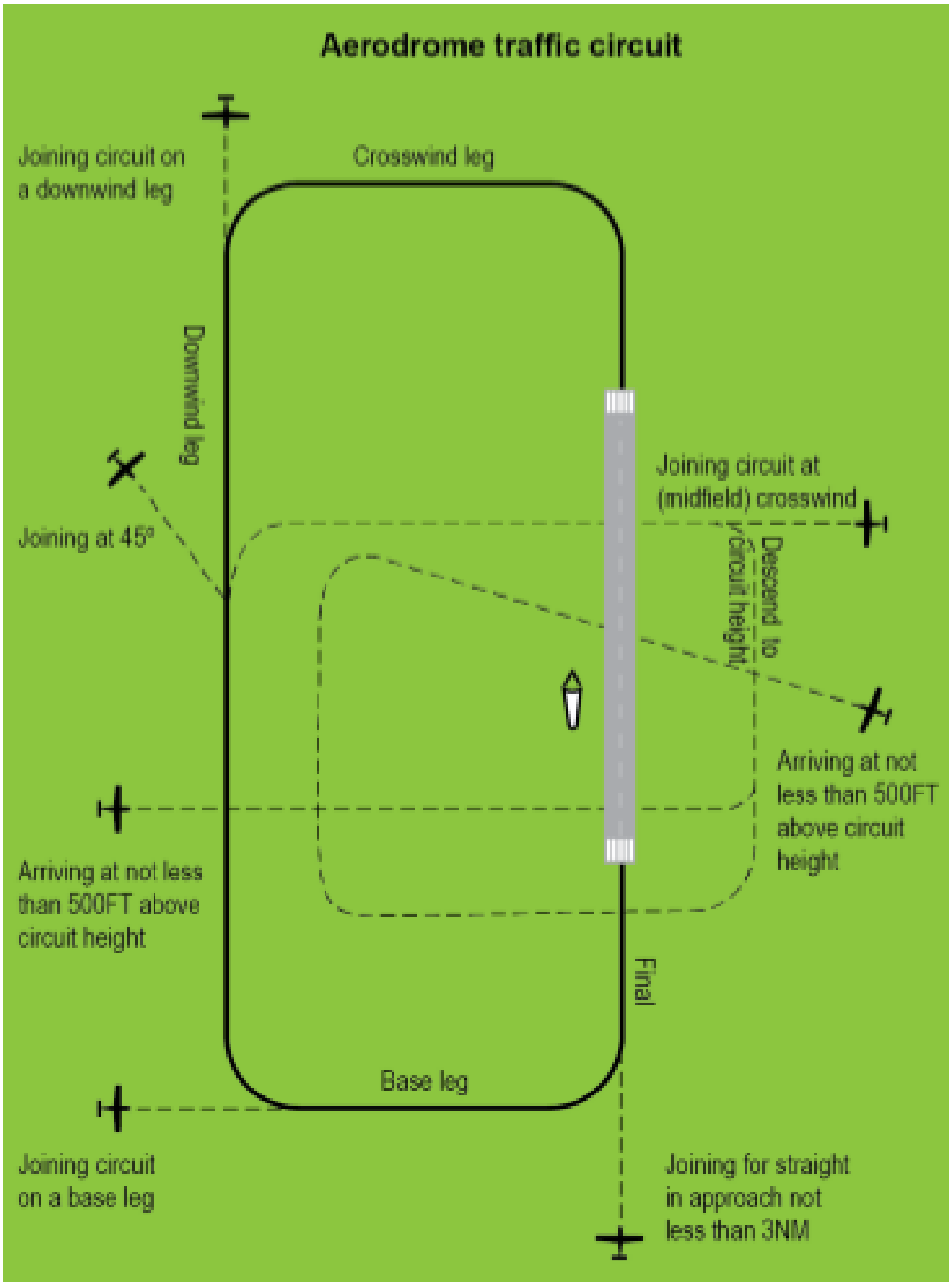

Figure 5 Aerodrome standard traffic circuit, showing arrival and joining procedures

AC 91-10 v1.1. paragraph 7.10 makes reference to a distance that is "normally" well outside the circuit area and where no traffic conflict exists, which is at least 3 nautical miles (5556 metres). The paragraph is reproduced below:

> *7.10 Departing the circuit area*
>
> *7.10.1 Aircraft should depart the aerodrome circuit area by extending one of the standard circuit legs or climbing to depart overhead. However, the aircraft should not execute a turn to fly against the circuit direction unless the aircraft is well outside the circuit area and no traffic conflict exists. This will normally be at least 3 NM from the departure end of the runway but may be less for aircraft with high climb performance. In all cases, the distance should be based on the pilot's awareness of traffic and the ability of the aircraft to climb above and clear of the circuit area.*

2.3. Rules of flight

Visual flight during daylight hours

The project is wholly located within Class G airspace and does not enter Special Use Airspace published in the AIP.

According to the AIP, the meteorological conditions required for visual flight during daylight hours in the Class G airspace at or below 3000 feet above mean sea level (AMSL) or 1000 feet above ground level (AGL), whichever is the higher of flight visibility at least 5000 metres, clear of clouds and in sight of ground or water for fixed wing aircraft.

For helicopters operating below 700 feet over land, the flight visibility must be at least 800 metres, clear of clouds, by day, at a speed that allows the pilot to see obstructions or other traffic in sufficient time to avoid a collision and, if not more than 10 nautical miles from an aerodrome, provided with an instrument approach procedure (IAP) in a way that ensures the flight maintains a separation of at least 500 feet vertically from any aircraft that is less than 10 nautical miles from the aerodrome that is conducting an instrument flight rules (IFR) operation.

Regulation 91.267 of CASR (Minimum height rules—other areas) prescribes the minimum height for flight. Generally speaking, and unless otherwise approved, aircraft are restricted to a minimum height of 500 feet AGL above the highest point of the terrain and any object on it within a radius of 300 metres in visual flight during the day when not in the vicinity of built-up areas, and 1000 feet AGL over built up areas (within a horizontal radius of 300 metres of the point on the ground or water immediately below the aeroplane or helicopter).

These height restrictions do not apply if, through stress of weather or any other unavoidable cause, it is essential that a lower height be maintained.

Flights below these height restrictions are also permitted in certain other circumstances.

SEARS Assessment

The HumeLink project, with transmission line structures up to a maximum height of 76 metres AGL will not impact upon flight operations operating in accordance with the requirements of regulation 91.267 of CASR.

Visual flight at night

Regulation 91.277 of the CASR, requires that the pilot in command of an aircraft flying VFR flights at night must not fly below the following heights (unless during take-off and landing operations, within three nautical miles of an aerodrome, or with an air traffic control clearance):

- the published lowest safe altitude for the route or route segment (if any)
- the minimum sector altitude published in the authorised aeronautical information for the flight (if any)
- the lowest safe altitude for the route or route segment
- 1,000 feet above the highest obstacle on the ground or water within 10 nautical miles ahead of, and to either side of, the aircraft at that point on the route or route segment
- the lowest altitude for the route or route segment calculated in accordance with a method prescribed by the CASR Part 91 Manual of Standards.

SEARS Assessment

The HumeLink project, with transmission line structures up to a maximum height of 76 metres AGL will not impact upon flight operations operating in accordance with the requirements of regulation 91.267 of CASR.

Instrument Flight Rules (day or night)

According to CASR Part 91, flight under the IFR requires an aircraft to be operated at a height clear of obstacles that is calculated according to an approved method in accordance with the PANS-OPS design criteria and CASR Part 173.

Obstacle lights on structures not within the vicinity of an aerodrome are effectively redundant to an aircraft being operated under the IFR due to the amount of cloud or reduced flight visibility that can preclude the pilot being able to see the lights, terrain and obstacles.

SEARS Assessment

The HumeLink project, with transmission line structures up to a maximum height of 76 metres AGL will not impact upon flight operations operating in accordance with the requirements of the Instrument Flight Rules.

2.4. Aircraft operations in the area

Flying training may be conducted under either the IFR or VFR. Other general aviation operations under either IFR or VFR are also likely to be conducted at various aerodromes in the area. Recreational aircraft flight operations are conducted in visual meteorological conditions (VMC) by day only.

In VMC, the transmission line structures are shown on appropriate aeronautical charts to allow pilots to consider the impact upon their flight operations in the area around the transmission line. It is also expected that the transmission line structures would be sufficiently visually conspicuous to pilots conducting VFR operations within the vicinity of the project to enable appropriate obstacle avoidance manoeuvring. Briefings and detailed risk management action by aerial application pilots enable them to be aware of a potential hazard and plan their flight accordingly.

IFR and night VFR (which are required to conform to IFR applicable altitude requirements) aircraft operations are addressed in Section 3.

The inclusion of the transmission line on aeronautical charts, via the Airservices Australia's Aeronautical Database, provides pilots with visual information about the presence of transmission lines in the area of their intended flight operation. Figure 6, sourced from Airservices Australia Aeronautical Information Package, shows an example of an aeronautical chart used by aircrafts flying in Class G airspace.

SEARS Assessment

The HumeLink project, with transmission line structures up to a maximum height of 76 metres AGL will not impact upon flight training operations operating in accordance with the requirements of regulation 91.267 of CASR, or during emergency landing practice as the transmission line structures will be clearly marked on aeronautical charts and visible to the pilot(s) in sufficient time to enable them to avoid the structures and lines.

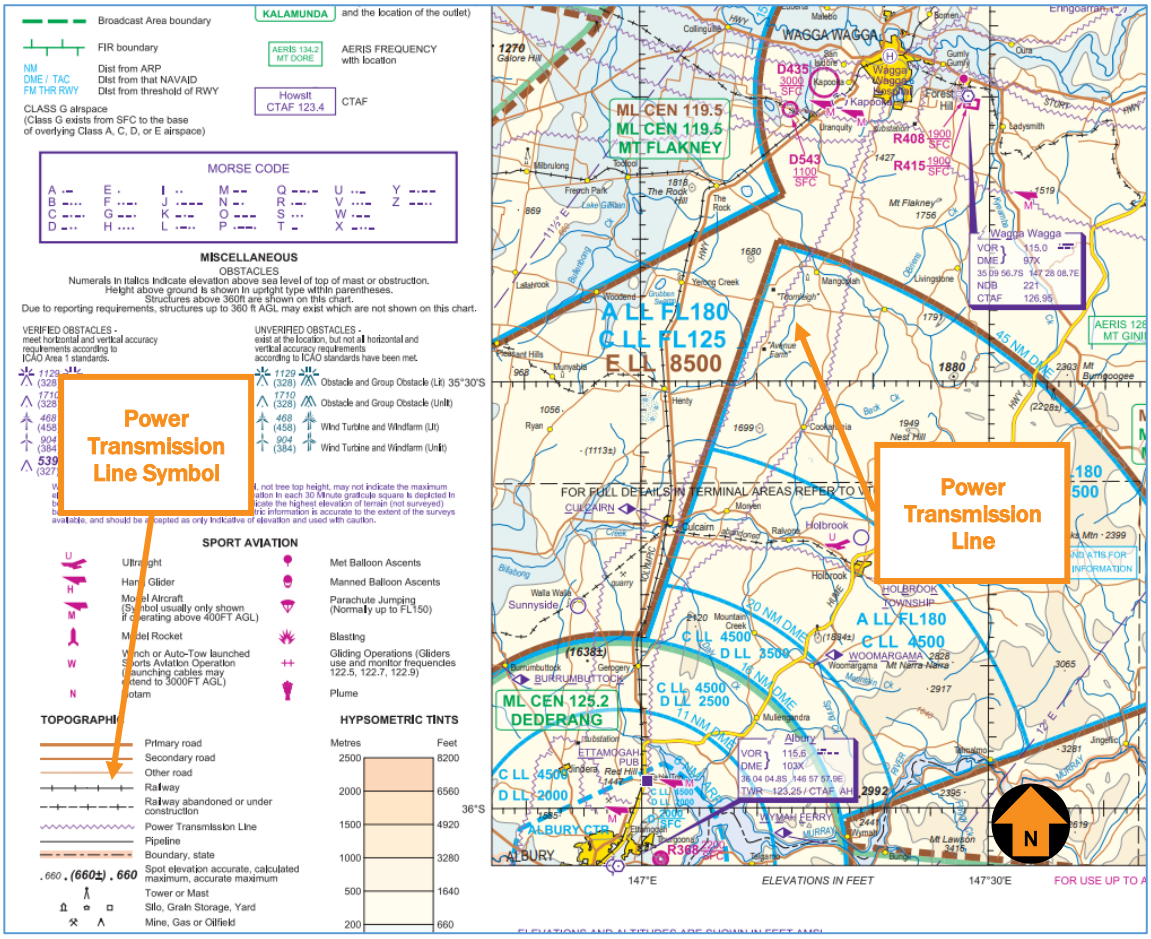

Figure 6 Typical visual navigation chart, with power transmission line symbols

2.5. Powerline Safety Program

The Aerial Application Association of Australia (AAAA) has initiated a Powerline Safety Program and identified that *"powerlines have been a significant safety issue since the electrification of rural areas and wirestrikes have been a major threat to aerial application since the late 1940s when the industry began in Australia.*

While training and ongoing professional development play a significant role in preparing pilots to manage the risks associated with low level operations around powerlines, there are two key initiatives that can support and improve safety for the sector:

- *The provision of mapping information on powerline networks*
- *The marking of powerlines.*

Over recent years, AAAA has worked to reshape the Australian Standard on the marking of powerlines (AS 3891 Parts 1 & 2), has developed and delivered world-leading human factor training courses, and has worked with powerline companies to develop mapping and marking systems and make them available to pilots and business owners.

AAAA has now launched its Powerline Safety Program that aims to encourage and facilitate power companies improving aviation safety and provide a way of both aviation businesses and rural landholders engaging in meaningful safety actions to improve safety.

Wirestrikes account for approximately 57% of all aerial application accidents/incidents. While this is only a fraction of the total safety problem surrounding contact between all vehicles and farm implements with power infrastructure, it is a significant cost to the industry and a personal impact on pilots involved in wirestrikes.

AAAA acknowledges that not all aerial application companies will be able to participate in the program due to the following practical restrictions that are not under the control of the company or AAAA:

- *Availability of energy network mapping that is region specific, clean data that is easily uploadable, useable and updateable. Availability is entirely dependent on energy companies providing the mapping in the same or similar way as Essential Energy already does*
- *Availability of an energy company marking request and action system similar to Essential Energy's system. There are a range of contributing elements including the Australian Standard rewrite, availability of good markers, and a reasonable price for fitting and installation.*

Those States/Territories and energy companies that are unable to deliver the two requirements above will not be able to participate in the program, but AAAA will seek to work with them to achieve these relatively straight forward requirements.

Currently, Essential Energy in NSW is fully compliant, Ergon Energy in Queensland is working on achieving these systems and has advised it already has a marking system in place, but further work is required on simplifying access and the provision of mapping."[1]

The provision of the transmission line structure locations to Airservices Australia will ensure that they are marked on aeronautical charts, enabling pilots to be aware of them and to be compliant with a key AAAA initiative. Similarly, the provision of the data to Department of Defence will ensure that their low-level charts

[1] AAAA Powerline Safety Program www.aaaa.org/aaaa-powerliine-safety-program/

include transmission line structure locations and that the military pilots are aware of them when planning and conducting low level flight operations.

2.6. Passenger transport operations

Scheduled and non-scheduled passenger transport operations are generally operated conducted under the IFR throughout the area encompassed by the proposed and existing transmission line route.

Scheduled passenger transport services regularly operate into Wagga Wagga Airport from Canberra, Melbourne, and Sydney.

There are currently no scheduled passenger transport service operating into Tumut and Goulburn Airports. Any future passenger transport flights will be required to operate to the IFR and will be protected from the proposed HumeLink transmission line by the margins prescribed in the PANS-OSPS criteria.

Scenic and adventure flights operating to VFR may also operate in the area. All certified airports in Australia may support non-scheduled passenger transport operations.

2.7. Private operations

Private operations are regularly conducted throughout the area surrounding the proposed and existing transmission line route. They are generally conducted under day or night VFR, with some IFR.

2.8. Military operations

Wagga Wagga Airport is co-located with an Australian Defence Force apprentice training school. Military aircraft of various types regularly visit Wagga Wagga Airport, all of which comply with the IFR or the VFR, depending on weather conditions and type of operation of the aircraft. For their operations at Wagga Wagga Airport, they operate essentially the same as a civilian aircraft.

There may be some high-speed low-level military jet aircraft and helicopter operations conducted in the area along the transmission line route. Detailed planning of these flights will include a review of obstacles along the planned route. The existing transmission line is shown on aeronautical charts as will the proposed transmission line.

The proposed transmission line route is clear of all Special Use Airspace that is reserved for military flying training operations.

2.9. Aerial application operations

Aerial application operations include activities such as fertiliser, pest and crop spraying. These are generally conducted under day VFR below 500 feet AGL, usually between 6.5 feet (2 m) and 100 feet (30.5 m) AGL.

Aerial application operations are conducted from various airstrips located on farmlands throughout the area.

Due to the nature of the operations, aerial agriculture pilots are subject to rigorous training and assessment requirements to obtain and maintain their licence to conduct these low level flight operations.

The Aerial Application Association of Australia (AAAA) has a formal risk management program which is recommended for use by its members.

The pre-spray risk assessment involves the consideration of:

- wind direction and strength
- airstrip length
- load
- dump point
- identification of power lines
- power line height
- rising terrain
- other hazards inside or outside the paddock. (Source: Aerial Application Pilots Manual, Section 4, page 57)

The inclusion of the transmission line on aeronautical charts will enable the pilots conducting an aerial application flight operation to be aware of the presence of the transmission line and consider its impact during the planning of their low-level flights. When combined with the briefing carried out with the landowner prior to any such flights, and the AAAA formal risk management program, the pilot will have the best possible knowledge about the obstacle environment around the intended flight(s). These briefings are no different to current practices associated with low-level flights near large transmission lines.

SEARS Assessment

The HumeLink project, with transmission line structures up to a maximum height of 76 metres AGL will not impact upon flight operations beyond that already experienced at other transmission lines around Australia.

2.10. Aerial baiting operations in National Parks

Aerial baiting operations in National Parks are generally undertaken in helicopters which are able to operate in closer proximity to obstacles and at lower speeds than fixed wing aircraft. The helicopter also enables precise delivery of the baits to the required target area.

Due to the inherent nature of helicopter operations, it is unlikely that the transmission line will have an adverse impact on aerial baiting flight operations, especially when considering that the transmission line will be published on aeronautical charts, allowing the pilot to be aware of the location of the transmission line.

SEARS Assessment

The HumeLink project, with transmission line structures up to a maximum height of 76 metres AGL will not impact upon flight operations beyond that already experienced at other transmission lines around Australia.

Consultation was undertaken with the NSW National Parks and Wildlife Service. The results are summarised in Section 4.

2.11. Emergency services - Royal Flying Doctor Service/Air Ambulance

Royal Flying Doctor Service (RFDS)/ Air Ambulance and other emergency services operations are generally conducted under the IFR, except when arriving or departing a destination that is not serviced by instrument approach aids or procedures.

Most emergency aviation services organisations have formal risk management programs to assess the risks associated with their operations and implement applicable treatments to ensure an acceptable level of safety can be maintained.

For example, pilots and crew require specific training and approvals, additional equipment is installed in the aircraft, and special procedures are developed.

If a helicopter emergency medical service is required at a location other than an aerodrome, ALA or helicopter landing site, the pilot will engage with local emergency services personnel and/or landowners to discover what local hazards are in the vicinity of the proposed landing site and take appropriate mitigation action.

SEARS Assessment

The HumeLink project, with transmission line structures up to a maximum height of 76 metres AGL will not impact upon emergency services flight operations.

Consultation was undertaken with the RFDS and other emergency services operators. The results are summarised in Section 4.

2.12. Aerial firefighting and police operations

Previous feedback from NSW Rural Fire Service (RFS) and Police indicates that each operation is considered on its merits and local environment conditions relevant to each operation.

The pilots are specially trained for such operations and each operation is subject to a detailed risk assessment in accordance with CASA guidelines and RFS or Police risk management policy.

The transmission line will be included on aeronautical charts to enable pilots planning to operate in the area to be aware of them.

SEARS Assessment

The HumeLink project, with transmission line structures up to a maximum height of 76 metres AGL will not impact upon aerial firefighting operations.

NSW RFS was invited to provide feedback but did not provide a response.

3. AVIATION IMPACT STATEMENT

This AIS was prepared based on the following information:

- AIP effective 16 June 2022 and 8 September 2022
- National Maps GIS system (www.nationalmap.gov.au)
- OzRunways aeronautical program
- Google Earth
- Information received from Transgrid.

3.1. Certified aerodromes

Certified aerodromes are defined under CASR Part 139.

> *An aerodrome that has an aerodrome certificate is a certified aerodrome. The operator of a certified aerodrome must meet certain requirements for operating and maintaining the aerodrome. (CASR 139.001)*

Table 2 details the certified aerodromes that are located within 30 nautical miles (55.56 kilometres) of the project footprint, as required by CASA. PANS-OPS surfaces exist out to a radius of 30 nautical miles from a certified aerodrome that has published instrument approach procedures.

PANS-OPS and OLS assessments are provided in Section 3.2 and 3.3, respectively.

Table 2 Certified Aerodromes within 30 nautical miles

Certified aerodrome	*Distance from the project footprint (km)*	*OLS overhead the transmission line*	*PANS-OPS Surface overhead the transmission line*
Goulburn	29	No	Yes
Tumut	4.7	No	Yes
Wagga Wagga	7.5	Yes	Yes

3.2. PANS-OPS assessments

Some certified aerodromes have been provided with instrument approach procedures (IAPs) that guide suitably equipped aircraft to the runway in the event that weather conditions preclude the pilot from maintaining visual contact with ground or water until close to the runway. The IAPs provide a prescribed minimum obstacle clearance (MOC) above terrain and obstacles within a lateral tolerance either side of the IAPs nominal flight path.

The specifications for the IAPs are prescribed in International Civil Aviation Organisation (ICAO) *Document 8168 – Procedures for Air Navigation Services - Aircraft Operations* and within CASR Part 173 Manual of Standards (MOS) for Australian specific criteria.

PANS-OPS assessments were undertaken on the proposed HumeLink transmission line structures, assumed to be located on maximum terrain elevations (derived from Google Earth), and based the lateral area of each IAP, to determine whether the transmission line structures, and construction cranes would infringe any PANS-OPS surfaces of certified aerodromes within the project footprint.

The PANS-OPS assessments were based on the AIP effective 16 June 2022 and 8 September 2022.

The assessments and results for the PANS-OPS surfaces for Goulburn, Tumut and Wagga Wagga airports are detailed in Table 3, Table 4 and Table 5, respectively.

SEARS Assessment

The HumeLink project, with transmission line structures up to a maximum height of 76 metres AGL will not impact upon the PANS-OPS surfaces of the certified airports at Goulburn, Tumut and Wagga Wagga.

3.2.1. Goulburn Airport

Goulburn Airport is located approximately 29 kilometres (15 nautical miles (nm)) south of the proposed transmission line project footprint. It is an uncontrolled aerodrome located in Class G airspace (uncontrolled).

Table 3 Goulburn Airport PANS-OPS Assessment

IAP Title	*Lowest PANS-OPS Surface Elevation (m AHD)*	*Highest relevant transmission line structure (m AHD)*	*Result*
25 nm Minimum Safe Altitude (MSA)	1097	950 m terrain + 76 m structure = 1026	No Infringement
10 nm MSA	Outside lateral protection area	N/A	No Infringement
DME-GNSS Arrival	1158	950 m terrain + 76 m structure = 1026	No Infringement
RNAV-Z (GNSS) RWY 04 (missed approach area)	Outside lateral protection area	N/A	No Infringement
RNAV-Z (GNSS) RWY 22	Outside lateral protection area	N/A	No Infringement
RNAV-Z (GNSS) RWY 22 (Holding at GZBNE waypoint)	1127	950 m terrain + 76 m structure = 1026	No Infringement
NDB-A	Outside lateral protection area	N/A	No Infringement
Circling Procedure (CAT C)	Outside lateral protection area (4.2 nm)	N/A	No Infringement

Figure 7 provides details of the extent of the 25 nautical miles minimum safe altitude and the 10 nautical miles minimum safe altitude for Goulburn Airport.

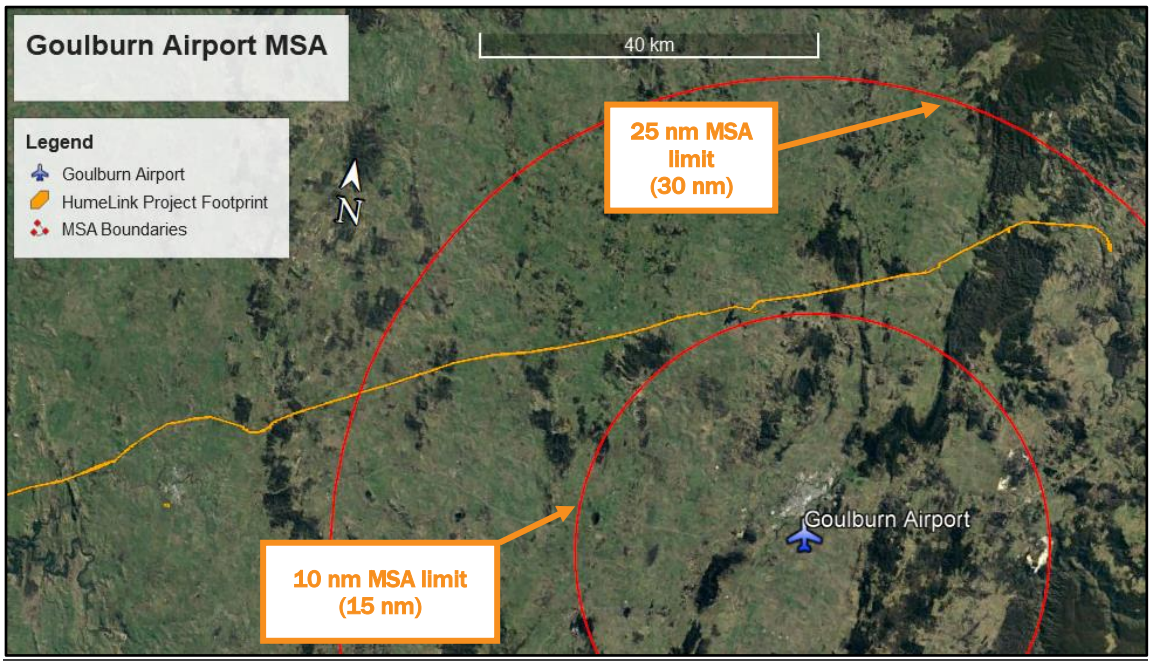

Figure 7 Goulburn Airport MSA boundaries

The proposed transmission line structures do not infringe the PANS-OPS surfaces at Goulburn Airport.

The proposed transmission line structures would not have an impact upon flight operations at Goulburn Airport.

3.2.2. Tumut Airport

Tumut Airport is located approximately 4.71 kilometres (2.5 nautical miles) from the proposed transmission line route. It is an uncontrolled aerodrome located in Class G airspace.

Table 4 Tumut Airport PANS-OPS Assessment

IAP Title	*Lowest PANS-OPS surface elevation (m AHD)*	*Highest relevant transmission line structure (m AHD)*	*Result*
25 nm MSA	1798	1210 m terrain + 76 m structure = 1286	No Infringement
10 nm MSA	1463	845 m terrain + 76 m structure = 921	No Infringement
RNAV-S (GNSS) Missed Approach	700	510 m terrain + 76 m structure= 586	No Infringement
RNAV-S (GNSS) Holding at TMUSB Waypoint	1798	1210 m terrain + 76 m structure = 1286	No Infringement
Circling Procedure (CAT B)	618	265 m terrain + 76 m structure= 341	No Infringement

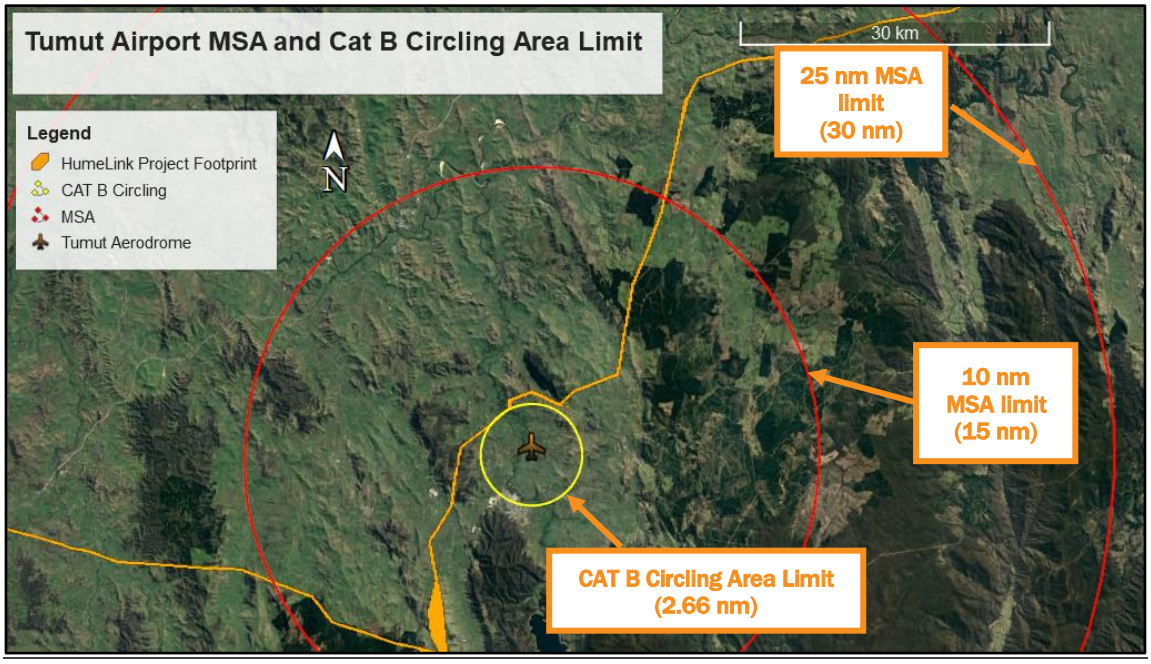

Figure 8 Tumut Aerodrome MSA and Category B circling area boundaries

The proposed transmission line structures do not infringe on the PANS-OPS surfaces at Tumut Airport.

The proposed transmission line structures and construction cranes approximately 15 metres above the transmission line structure would not have an impact upon flight operations at Tumut Airport.

No further action is required.

3.2.3. Wagga Wagga Airport

Wagga Wagga Airport is located approximately 7.5 kilometres (4.1 nautical miles) north-east of the Wagga Wagga sub-station. It is an uncontrolled aerodrome located in Class G airspace (uncontrolled).

Future expansions of the runways at Wagga Wagga Airport will change the lateral and vertical limits of both the OLS and the instrument approach procedures. If such an expansion is approved, the procedures are expected to take into account existing terrain and infrastructure, including the HumeLink project.

Table 5 Wagga Wagga Airport PANS-OPS assessment (Transmission Line Structures)

Procedure title	*Lowest PANS-OPS surface elevation (m AHD)*	*Highest relevant transmission line structure (m AHD)*	*Result*
25 nm MSA	975	700 m terrain + 76 m structure = 776	No Infringement
10 nm MSA	609	350 m terrain + 76 m structure = 426	No Infringement
DME-GNSS Arrival	609	340 m terrain + 76 m structure =416	No Infringement
RNAV-Z (GNSS) RWY 05	348	250 m terrain + 76 m structure = 326	No Infringement
RNAV-Z (GNSS) RWY 23 (missed approach area)	539	300 m terrain + 76 m structure = 376	No Infringement
RNAV (GNSS) Holding at all waypoints	975	700 m terrain + 76 m structure = 776	No Infringement
ILS-Y or LOC-Y RWY 23 ILS-Z or LOC-Z RWY23 (missed approach area)	412	300 m terrain + 76 m structure = 376	No Infringement
NDB-A or VOR-A (missed approach area)	N/A	PANS-OPS surface not above transmission line	No Infringement
Holding at WG VOR or WG NDB for VOR or NDB procedure	609	340 m terrain + 76 m structure = 416	No Infringement
VOR RWY 05	382	300 m terrain + 76 m structure = 376	No Infringement
VOR RWY 23 (missed approach area)	521	300 m terrain + 76 m structure = 376	No Infringement

Procedure title	*Lowest PANS-OPS surface elevation (m AHD)*	*Highest relevant transmission line structure (m AHD)*	*Result*
Circling Procedure (CAT ABCD)	N/A. Outside lateral protection area.	No circling in sector south of RWY 05/23 and RWY 12/30 beyond 3.5 nautical miles.	No Infringement

Figure 9 details the 10 nautical miles minimum safe altitude, 25 nautical miles minimum safe altitude and Category D circling boundaries.

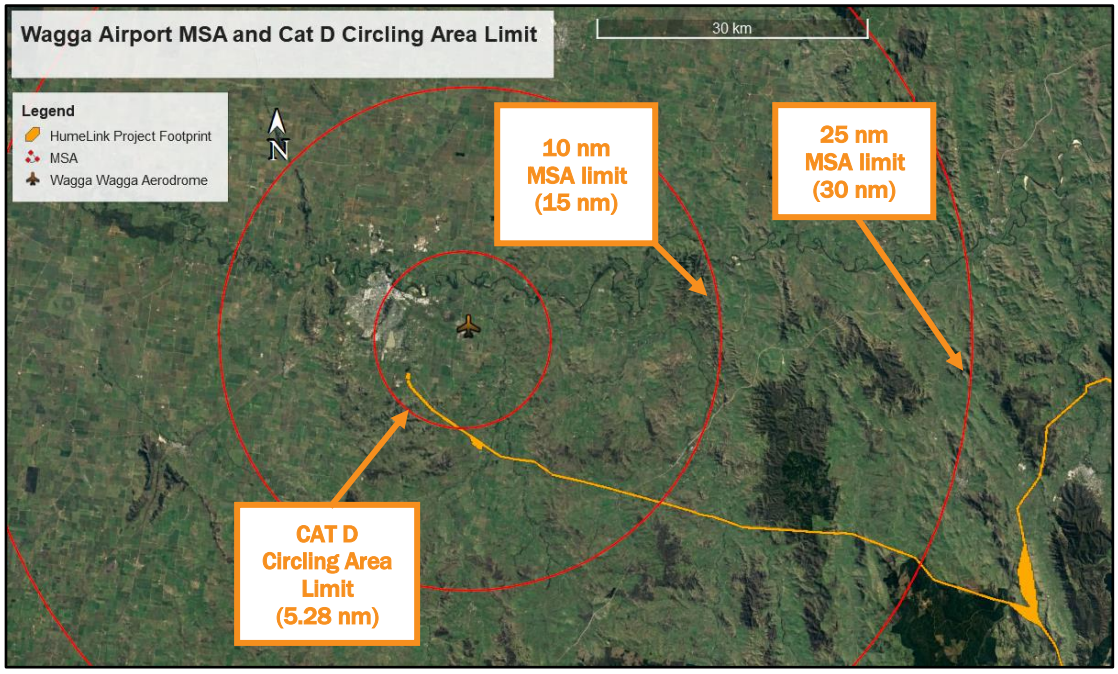

Figure 9 Wagga Wagga Airport MSA boundaries and Category D Circling area

Temporary construction cranes associated with the transmission line structures could infringe the PANS-OPS missed approach surface for the VOR RWY 23 and the final approach surface for the VOR RWY 05 by approximately nine metres.

Approval to operate construction cranes in this area must be obtained from the Wagga Wagga Airport Manager in advance of the proposed activity. Transgrid will provide the airport manager with details of the crane operations at least seven days prior to their commencement to enable notification to aircraft planning to operate in the area via the Notice to Airmen (NOTAM) procedure. This approval would be dependent on fine weather that would not require the VOR RWY 05 or VOR RWY 23 procedure to be used.

Construction cranes within the Wagga Wagga 330 kV substation (with a maximum height of 91 metres AGL) would not infringe the PANS-OPS surfaces of the VOR RWY 23 procedure at Wagga Wagga Airport.

The area of the approach procedures that could be infringed by the cranes is detailed in Figure 10.

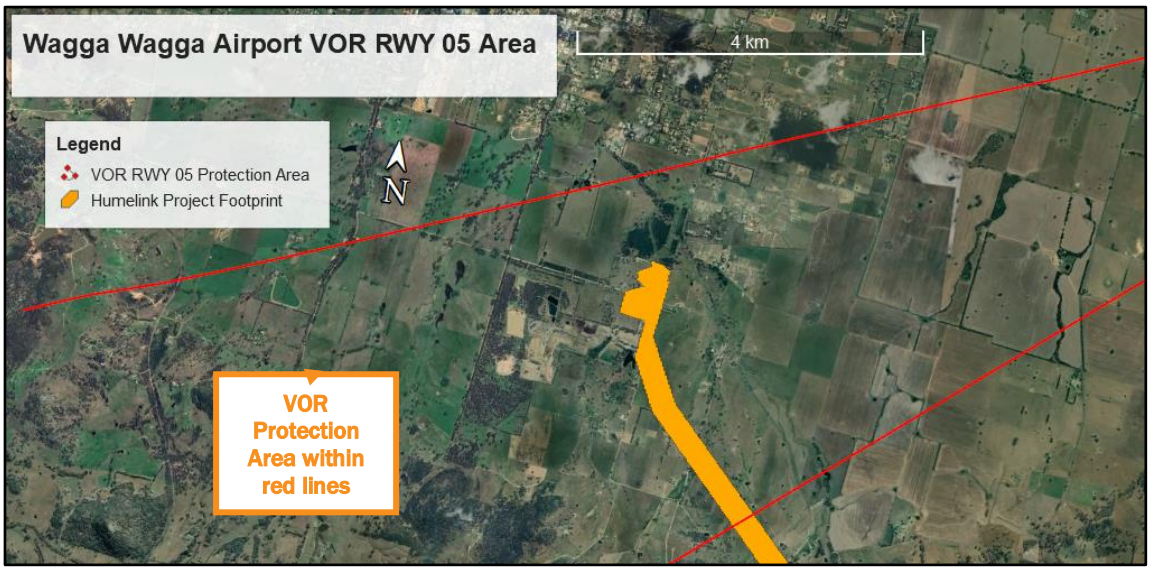

Figure 10 Wagga Wagga VOR protection area

The proposed transmission line structures would not infringe the PANS-OPS surfaces at Wagga Wagga Airport.

The temporary construction cranes associated with the transmission line structures within the PANS-OPS missed approach segment of the VOR RWY 23 procedure and the VOR RWY 05 procedure would infringe this surface by approximately nine metres. Approval to operate the cranes to the height required may be available from the Wagga Wagga Airport Manager on days when the weather or aerodrome usage is suitable.

The proposed transmission line structures would not have an impact upon flight operations at Wagga Wagga Airport.

3.3. Obstacle Limitation Surfaces

The extent of OLS at certified aerodromes depends on the code number allocated to the relevant runway, which is determined by the type of operations (VFR or IFR) using the runway and the length of the runway.

CASR Part 139 MOS details the specifications for the OLS. Table 6 details the dimensions and the assessment result for the OLS at each aerodrome/airport.

Table 6 OLS Assessment

Airport/Aerodrome	*Largest relevant OLS dimension (m)*	*Assessment relevant to transmission line*
Goulburn	5.2 km radius from runway ends	Beyond OLS limit. No Infringement
Tumut	4.7 km radius from runway ends	Beyond OLS limit. No Infringement
Wagga Wagga	15 km radius of aerodrome reference point (ARP)	Within OLS lateral limits. OLS surface 367 m AHD, highest terrain within area = 325 m + 76 m = 401 m AHD (416 m for cranes) 34 m infringement of outer horizontal surface (49 m for cranes). (See Table 7)

The location of the project footprint in relation to the OLS at Goulburn, Tumut and Wagga Wagga Airports are shown in Figure 11, Figure 12 and Figure 13, respectively.

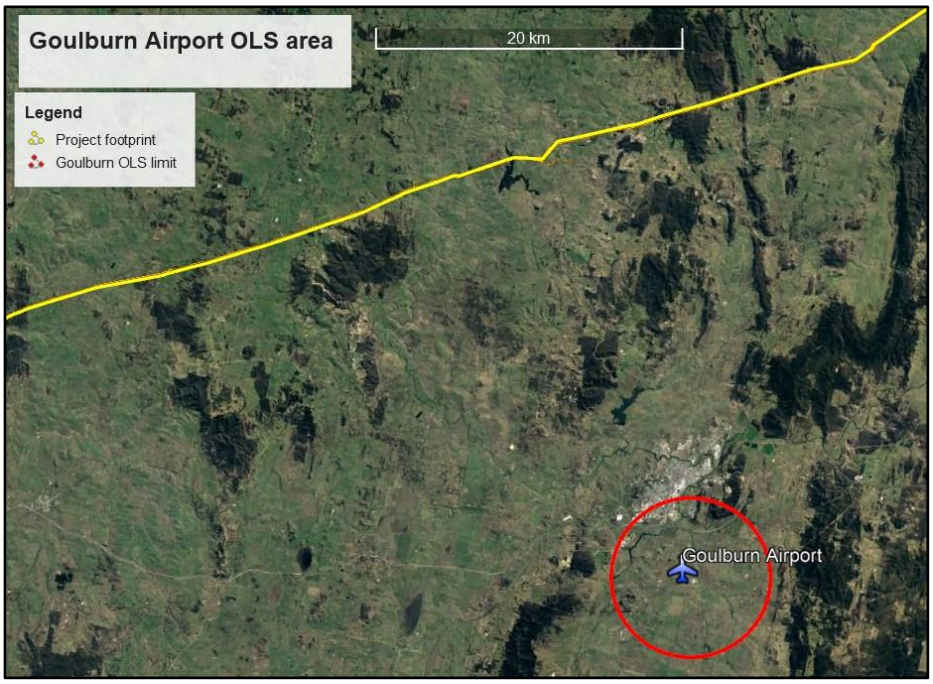

Figure 11 Goulburn Airport OLS

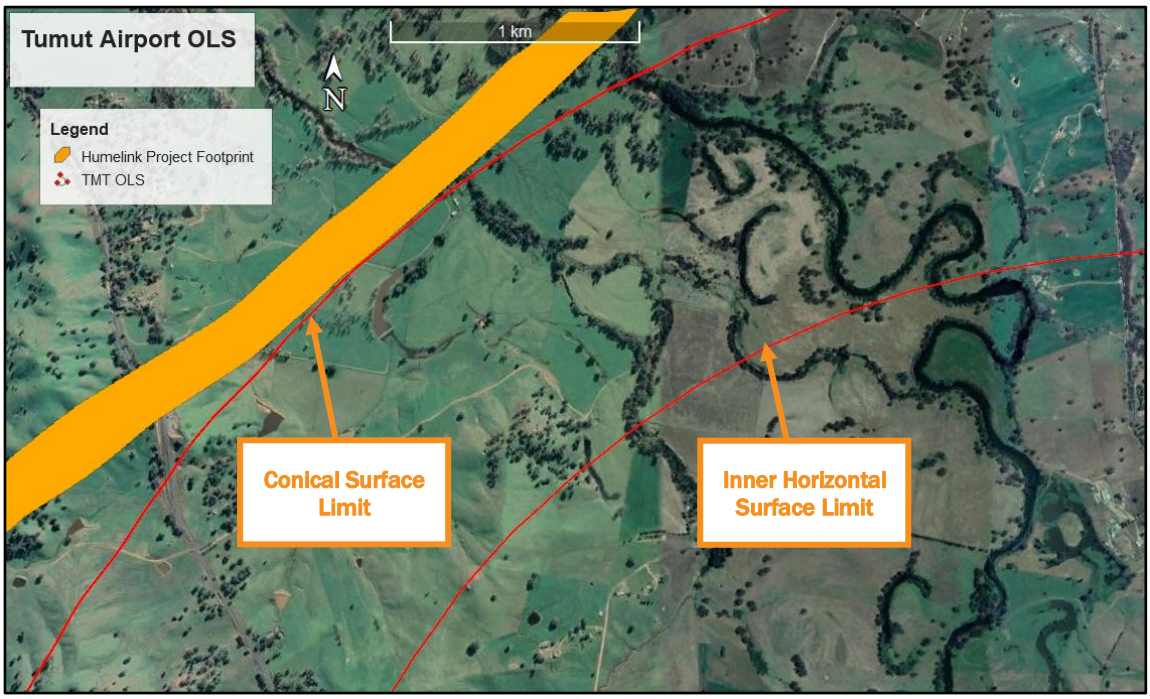

Figure 12 Tumut Airport OLS limits

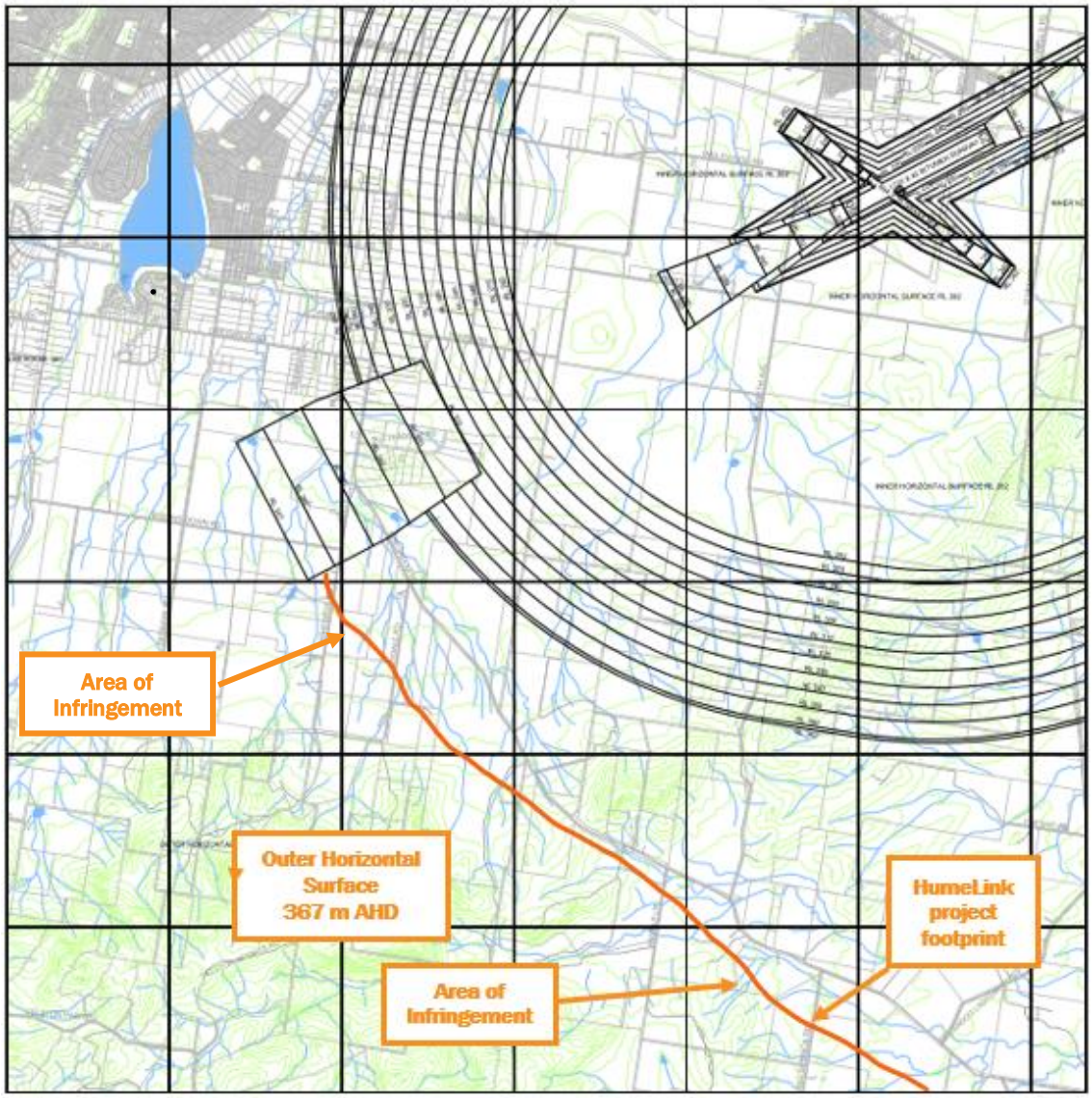

Figure 13 Wagga Wagga Airport OLS Effective 2013

The OLS drawing for Wagga Wagga Airport was sourced from Airport Survey Consultants/Wagga Wagga Airport.

Transgrid provided details of the transmission line structures located within the Outer Horizontal Surface (OHS) of the Wagga Wagga Airport OLS to enable an assessment of the impact to the OHS to be determined.

Figure 14 shows project footprint within the OHS. Transmission line structures between the Wagga 330 kV substation and Gugaa 500 kV substation.

Table 7 details the indicative infringements of transmission line structures upon the OHS.

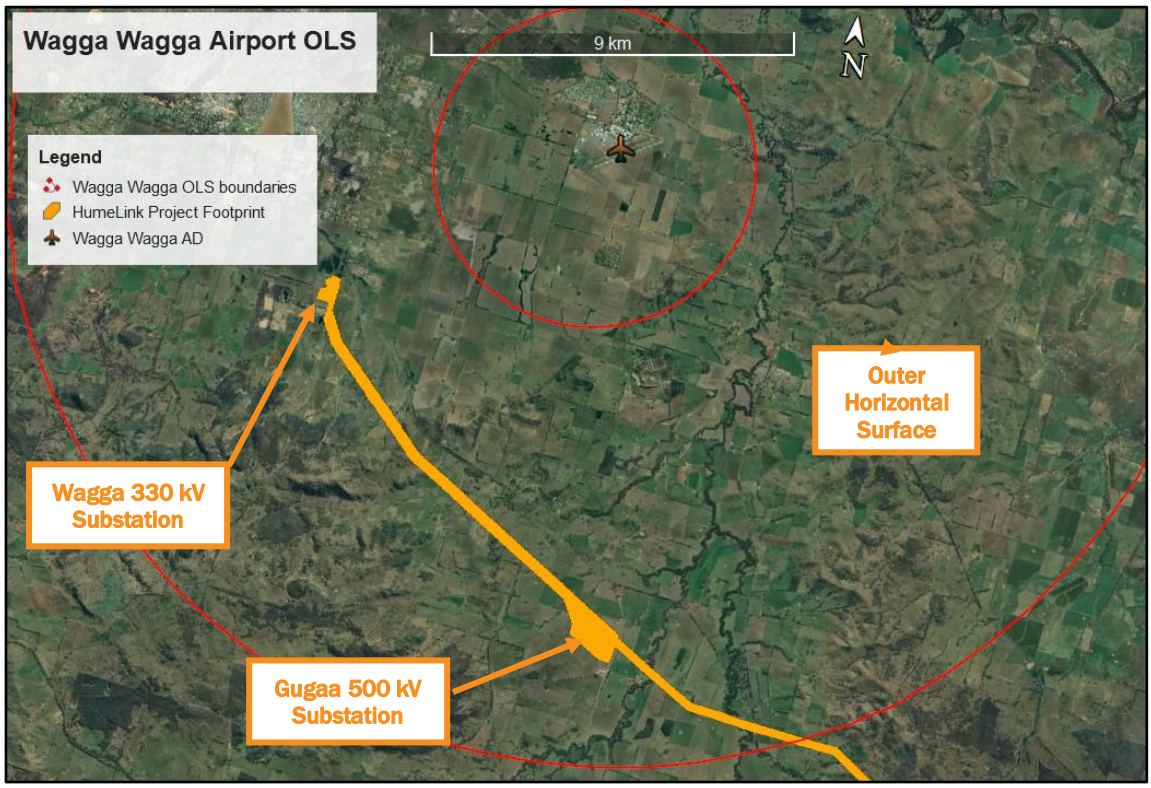

Figure 14 Transmission line structures infringements into OHS of Wagga Wagga Airport

Table 7 Indicative Transmission line structure heights and clearance within Wagga Wagga Airport OHS

Transmission Structure Number	Ground Elevation (m AHD)	Structure Height (m AGL)	Maximum Elevation (m)	OLS Height (m AHD)	Infringement (m)
VTF 25	233	51.6	284.6	352	Clear
VSE 24	233	65.7	298.7	352	Clear
VSE 23	237	53.1	290.1	352	Clear
VSE 22	242	62.7	304.7	352	Clear
VTE 21	245	72.6	317.6	352	Clear
VSE 20	256	71.7	327.7	367	Clear
VSE 19	263	73.2	336.2	367	Clear
VSE 18	269	73.2	342.2	367	Clear
VSE 17	280	73.2	353.2	367	Clear
VSE 16	289	73.2	362.2	367	Clear
VSE 15	314	73.2	387.2	367	20.2
VTE 14	339	68.1	407.1	367	40.1
VSE 13	316	70.2	386.2	367	19.2
VSE 12	296	71.7	367.7	367	0.7
VSE 11	276	61.2	337.2	367	Clear
VSE 10	283	71.7	354.7	367	Clear
VSE 9	279	71.7	350.7	367	Clear
VSE 8	276	61.2	337.2	367	Clear
VSE 7	262	73.2	335.2	367	Clear
VSE 6	253	62.7	315.7	367	Clear
330T1	261	52.5	313.5	352	Clear
330S2	252	51.9	303.9	352	Clear
330T3	245	52.5	297.5	367	Clear
330S4	242	47.9	289.9	367	Clear
330T5	237	52.5	289.5	367	Clear
330S6	233	47.9	280.9	367	Clear
330T7	233	52.5	285.5	367	Clear

The proposed transmission line structures and cranes to be used during construction would not infringe the OLS for Tumut Airport or Goulburn Airport as shown in Figure 11 and Figure 12.

Based on an assessment of the terrain values shown on Google Earth within the project footprint, the OHS component of the OLS for Wagga Wagga Airport would be infringed by transmission line structures near Gregadoo (near Gregadoo East Road and Angels Lane). It is likely that the existing transmission line structures within the HumeLink project footprint also infringe the OHS in the same area. This area is indicated in Figure 14. Clearances and infringements are provided in Table 7.

While the project is expected to infringe the Wagga Wagga Airport OLS, the proposed transmission line structures would not infringe on the approach and take-off climb surfaces. The proposed maximum heights of the structures and construction cranes are below the Wagga Wagga Airport PANS-OPS surfaces. Consultation with Wagga Wagga Airport will be undertaken to ensure any potential impact to aviation safety will be avoided.

CASA will be provided details of the transmission line via the Wagga Wagga Airport Manager.

Notification of the final locations for the transmission line structures to the Wagga Wagga Airport Manager would enable a detailed assessment of the extent of the infringement and publication of the infringement in airport documentation and AIP. This will allow pilots to take the infringement into consideration on flight operations to and from Wagga Wagga Airport.

SEARS Assessment

The HumeLink project, with transmission line structures up to a maximum height of 76 metres AGL will infringe the OHS of Wagga Wagga Airport but is unlikely to impact upon flight operations at the airport as it is apparent that the OHS is already infringed and accepted by CASA.

3.4. Non-certified aerodromes, aircraft landing areas and helicopter landing sites

Non-certified aerodromes are defined in CASR as those aerodromes that are not certified under CASR Part 139. These include private airstrips, aircraft landing areas (ALAs), helicopter landing sites (HLS) and airstrips other than certified aerodromes. The operations of non-certified aerodromes are not regulated by CASA.

3.4.1. Assessment of non-certified aerodromes

As a guide, CASA recommends that an area of interest within a three nautical miles (5.56 kilometres) radius of an ALA is used to assess potential impacts of proposed developments on aircraft conducting taking off and landing operations at or within the vicinity of the airstrip. This area was assessed to find ALAs and then further refined considering orientation, strip length that determined the likely size of aircraft using it and terrain slopes/heights that may determine the use of the ALA.

The three nautical miles area of interest generally contains the area in which aircraft manoeuvre after take-off while climbing to intercept their outbound track until above a height of approximately 1000 feet or 1500 feet AGL, or manoeuvering to align themselves with the landing runway, in accordance with CASA guidance for operations at such aerodromes and descending below 1000 feet or 1500 feet AGL.

Information provided by Transgrid and Argus Consulting indicates that there are 35 ALAs and four HLS within three nautical miles of the proposed HumeLink project footprint. Assessment has been undertaken to determine the level of impacts likely to be imposed on them due to the project.

Each ALA was assessed to determine the approximate extent of the impact from the proposed transmission line. Four levels of impact are used in this report and are defined as follows:

- Major – the use of the ALA would be compromised by the nearby location of the transmission line. This may include the aerodrome being unusable or a significant modification to its layout being required to enable aviation operations to continue
- Moderate – the project would result in some flight paths not being available or requiring a moderate adjustment to avoid the transmission line for most types of flight operations
- Minor – the project would result in some flights paths to require a minor adjustment to avoid the transmission line for some types of flight operations
- No impact – the project is unlikely to have an adverse impact upon flight operations as the ALA is far enough away from the transmission line or oriented, in relation to the transmission line, so that flight operations are unlikely to be impacted if pilots are aware of the location of the transmission line.

The assessment identified the following:

- four ALAs would experience major impact
- four ALAs would experience moderate impact
- eight ALAs and one HLS would experience minor impact
- 15 ALAs and three HLS would experience no impact.

Airstrips identified in this report may be used for aerial agricultural application flight operations, privately owned and operated aircraft. Commercial flights and medical evacuation flights by fixed wing aircraft are unlikely to operate from these airstrips due to the higher regulatory framework that they must adhere to.

Pilots intending to use these non-certified aerodromes are responsible for ensuring that any runway is suitable for the safe operation of their aircraft. They must obtain details of any proposed landing area from the landowner for that purpose, prior to operating there.

Irrespective of HumeLink, not all airstrips are usable at all times. Weather conditions including unsuitable winds, wet surface conditions, grass or crop heights and turbulence created from nearby tree lines can limit the use of these airstrips.

Generally, pilots of aircraft taking-off from an uncertified aerodrome should consider a clearance plane of 2.5% from the far end of the runway. An aerodrome with a runway end within 3040 metres of the proposed structures and powerlines would need to consider turning at a safe distance away from the powerline as they are not assured of the appropriate clearance above the powerline if they were to fly directly over it. This is discussed further in Section 3.4.2.

Unlike fixed-wing aircrafts, helicopters are able to operate in close proximity to trees, buildings and other structures, allowing HLS to be located nearer to structures than airstrips used for fixed wing aircraft operations. . Transgrid has provided Aviation Projects with the location of some HLS and airstrips in the area near the project footprint based on feedback from landowners. Five locations where HLS may exist were identified in close proximity to the transmission line. It is unlikely that the transmission line would have a significant impact to these HLS, or to any others. All of the discovered HLS are on open land without any structural works involved.

The area encompassing the project footprint is generally cleared, and undulating farming land interspersed with rugged tree covered undulating terrain.

Helicopter flight operations are also likely to occur throughout the area, especially for bush fire suppression and medical emergency evacuations and for aerial application operations in areas that are hazardous to fixed wing operations. The flexibility of the helicopter would allow them to land and take-off from locations that would not be impacted by the proposed transmission line.

Pilots intending to use these HLS are responsible for ensuring that HLS is suitable for the safe operation of their aircraft. They must obtain details of any proposed landing area from the landowner for that purpose, prior to operating there.

All pilots operating in the area near the proposed transmission line would need to consider its location in relation to their planned flight to ensure they can remain clear of it by the prescribed margins set out in the aviation regulations

Many of the identified airstrips are within the three nautical mile area of interest and the proposed transmission line may have an impact on take-off and landing operations at some of them. However, aerial application pilots undergo comprehensive training in low level flight operations, taking-off and landing fully loaded aircraft on short, undulating airstrips that are significantly below the normal aerodrome standard conditions, and often in close proximity to trees, buildings, power lines and wind farms.

The proposed transmission line is likely to create an adverse impact on the operational safety of some of the airstrips within three nautical miles of it and may even preclude operations from some of these airstrips. Flight operations at airstrips that are aligned parallel to the transmission line are likely to be limited to one side of the airstrip so as to avoid overflight of the transmission line. Airstrips that point towards the transmission line may have to become one-way airstrips to avoid overflight of the transmission line if possible. This would limit landings to a direction that avoids overflight of the transmission line and take-off in the other direction, away from the transmission line. These options would be considered by pilots in consideration of the local weather and especially wind conditions at the proposed time of the operation.

Due to the number of airstrips in the area that may be close to the project footprint, an alternative site is likely to be available within a short distance and further away from the project footprint. The terrain and tree coverage indicates that other areas of the farmland could also be converted to a runway strip to cater for aerial application take-off and landing.

Landowners may have other operational airstrips on their properties that would be unaffected by the proposed transmission line, allowing aerial application flight operations to continue in the area without a significant impact to the cost of the aerial application on a particular property.

It is difficult to determine a precise impact to flight operations at most of these airstrips as the characteristics of the type and size of the aircraft being used by the landowner is not apparent from a desktop study.

The number of ALAs in the area surrounding the project footprint that appear to only be available for aerial application purposes provides a sufficient number of alternative ALAs should one or other become hazardous to use due to the proposed transmission line or for any other factor such as undergrowth, waterlogged ground, etc.

3.4.2. Approach and take-off surfaces

The analysis of approach and take-off surfaces is based on the guidance previously published in the CASA Civil Aviation Advisory Publication (CAAP) 92-1(1) *Guidelines for aeroplane landing areas*. The CAAP has been

withdrawn but remains the only source for the reasonable identification and protection of the surrounding airspace for ALAs.

CASA's Advisory Circular 91-02, *Guidelines for aeroplanes with MTOW not exceeding 5700 kg – Suitable places to land or take-off*, provides appropriate guidance to pilots operating at ALAs although it does not include the protection area diagrams. It is therefore apparent that CASA relies upon pilot knowledge and competence to be enable them to judge a suitably safe location for the landing or take-off operation, considering the runway's suitability and the ability to manoeuvre safely while approaching to land and after take-off.

The guidance provided in the obsolete CAAP 92-1(1) for the protection areas is referred to, for information related to the ALAs in very close proximity to the transmission line, to show that either an infringement occurs, or that the transmission line is clear of those areas.

The purpose of the CAAP 92-1(1) guidance is described as follows:

> *These guidelines set out factors that may be used to determine the suitability of a place for the landing and taking-off of aeroplanes. Experience has shown that, in most cases, application of these guidelines will enable a take-off or landing to be completed safely, provided that the pilot in command:*
>
> *a. has sound piloting skills; and*
>
> *b. displays sound airmanship.*

Figure 15 provides a copy of CAAP 92-1(1) Figure 2A – Single engine and Centreline Thrust Aeroplanes not exceeding 2000 kg maximum take-off weight (MTOW) (day operations) which may be applicable to the project.

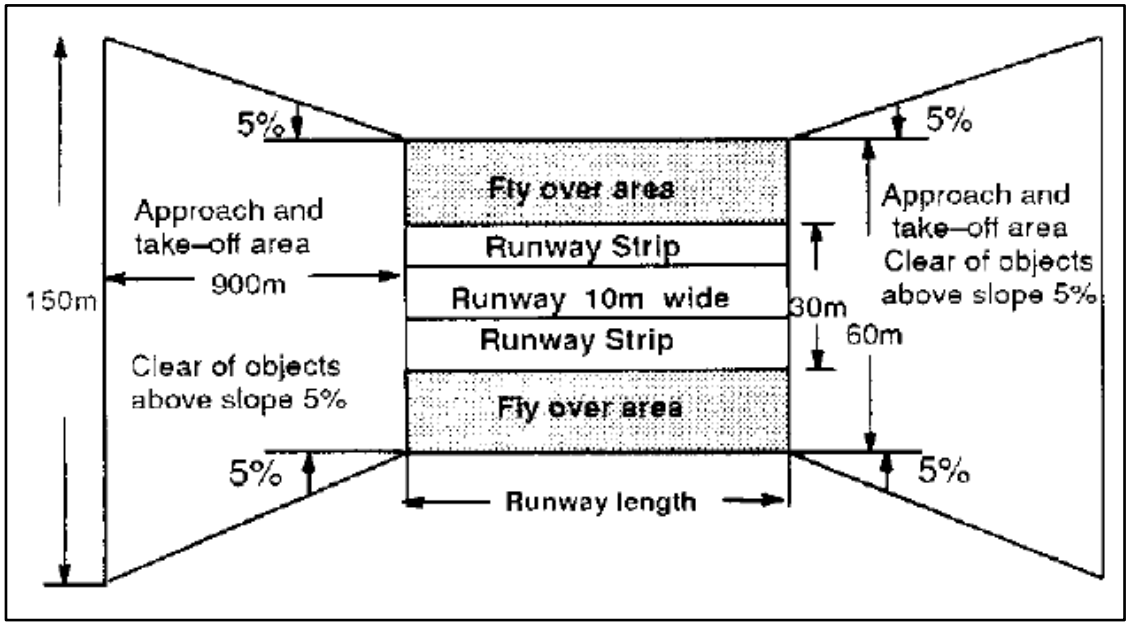

Figure 15 Single engine and Centreline Thrust Aeroplanes not exceeding 2000 kg MTOW (day operations)

For these operations, the approach and take-off surfaces for each runway end commence at the runway end (threshold) at a distance of 30 metres either side of the runway centreline and diverge at a rate of five per cent

to a distance of 900 metres. The surfaces increase in height at a rate of five percent, or five metres in every 100 metres.

For aerial application operations, the physical characteristics and OLS are considerably less restrictive.

Figure 16 shows the physical characteristics applicable to aerial application operations and is extracted from CAAP 92-1(1) Guidelines for aeroplane landing areas (as Figure 4).

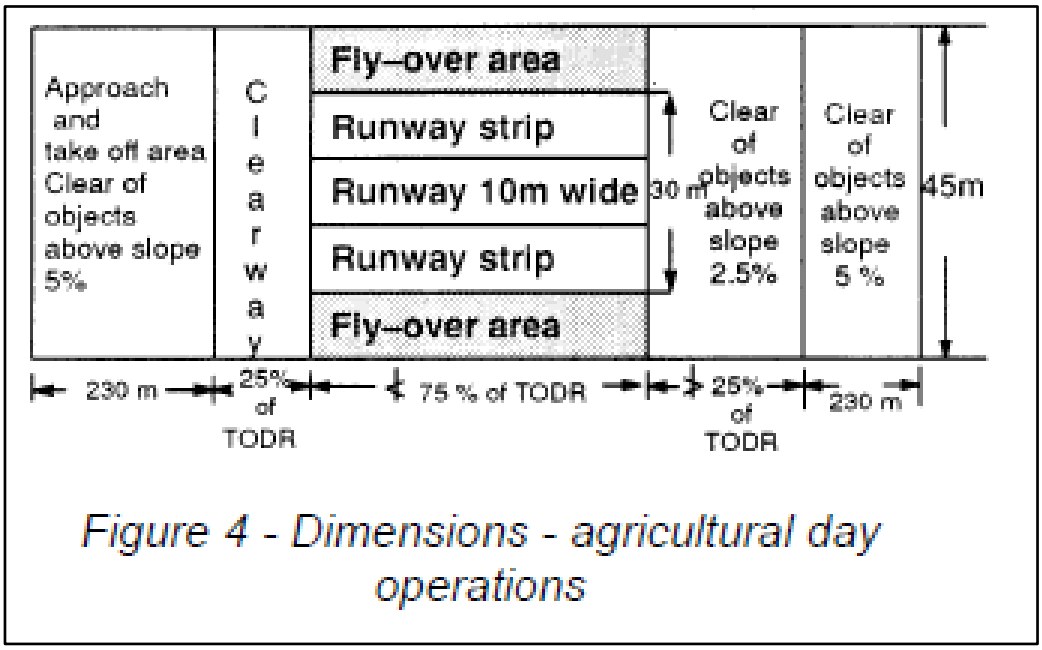

Figure 16 Dimensions - agricultural day operations

For the purposes of the flight circuit analysis, the following design parameters have been adopted:

- left hand circuit direction unless otherwise published in the AIP
- one nautical mile upwind to achieve at least 500 feet AGL
- one nautical mile abeam and parallel to the runway for downwind spacing
- a 45-degree relative position from the threshold for the turn from downwind onto the base leg; and
- roll out on final at 1 nautical mile, not below 500 feet above ground level.

Aerial application operators would most likely conduct smaller circuits than this nominal arrangement for commercial reasons and pilot experience.

To facilitate the flight planning of aerial application operators conducting flight operations on any property near the proposed transmission line, details of the project, including location and height information of the finalised design of the transmission line and structures would be provided to landowners. This is so that, when asked for hazard information on their property, the landowner may provide the aerial application pilot with all relevant information.

3.5. Air route and grid lowest safe altitude

Air routes between airports are provided with a lowest safe altitude (LSALT), which is the lowest altitude that an aircraft can fly in instrument meteorological conditions. That is, where they can't necessarily maintain visual contact with the ground or water to avoid obstacles.

A Grid LSALT is provided for IFR aircraft that are not flying along a published air route. The grid is a one degree by one degree within the whole number latitude and longitude graticule.

CASR Part 173 MOS prescribes a minimum obstacle clearance of 1000 feet below the published LSALT is maintained along each air route.

Several air routes and Grid LSALT areas exist above the length of the transmission line, each is listed in Table 8.

Figure 17 shows an area of the Enroute Low Chart Low 2 published by Airservices Australia as a component of the AIP.

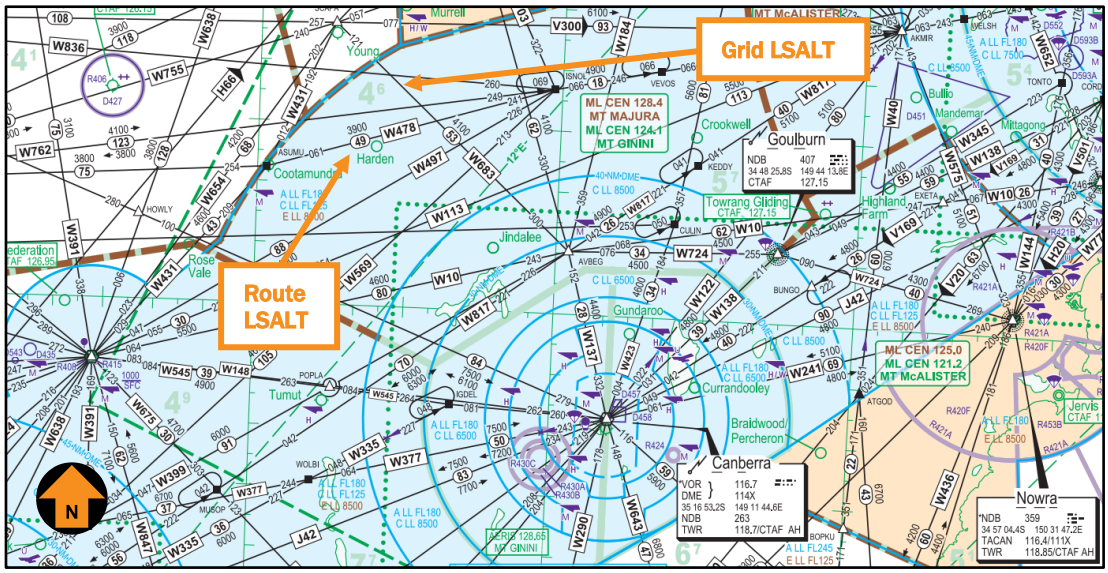

Figure 17 Enroute Chart L2 air routes

Table 8 Air route and grid LSALT data

Air route	Route segment	LSALT (ft AHD)	Protection surface (ft/m AHD)	Highest transmission line structure (m AHD)	Result IAW highest tower
W10	EXETA to AVBEG	4500	3500/1066	Terrain lower than 800 + 76 < 876	Below protection area
W10	AVBEG to Wagga Wagga	4600	3600/1097	Terrain lower than 800 + 76 < 876	Below protection area
W137	AVBEG - Cowra	4100	3100/944	Terrain lower than 800 + 76 < 876	Below protection area
W148 and W545	Wagga Wagga - POPLA	4900	3900/1188	Terrain lower than 600 + 76 < 676	Below protection area
W184	AVBEG – MUDGI	5400	4400/1341	Terrain lower than 800 + 76 < 876	Below protection area
W266	HOWLY – Canberra	6100	5100/1554	Terrain lower than 800 + 76 < 876	Below protection area
W399	UGVER – POPLA	6000	5000/1524	Terrain lower than 1300 + 76 < 1376	Below protection area
W423	Canberra – CULIN	4600	3600/1097	Terrain lower than 950 + 76 < 1026	Below protection area
W569	UGVER – ISNOL	4600	3600/1097	Terrain lower than 650 + 76 < 726	Below protection area
W675	Wagga Wagga – MUSOP	4700	3700/1127	Terrain lower than 400 + 76 < 476	Below protection area
W683	AVBEG – SCAPA	4100	3100/944	Terrain lower than 800 + 76 < 876	Below protection area
W724	AVBEG – Goulburn	4500	3500/1066	Terrain lower than 800 + 76 < 876	Below protection area
W817	MUSOP – Goulburn	6000	5000/1524	Terrain lower than 1300 + 76 < 1376	Below protection area
W817	AVBEG – AKMIR	5100	4100/1249	Terrain lower than 800 + 76 < 876	Below protection area
W847	Wagga Wagga - DUBUS	5600	4600/1402	Terrain lower than 400 + 76 < 476	Below protection area
Grid LSALT		4600	3600/1097	Terrain lower than 700 + 76 < 776	Below protection area

Air route	Route segment	LSALT (ft AHD)	Protection surface (ft/m AHD)	Highest transmission line structure (m AHD)	Result IAW highest tower
Grid LSALT		4900	3900/1188	Terrain lower than 400 + 76 < 476	Below protection area
Grid LSALT		5700	4700/1432	Terrain lower than 400 + 76 < 476	Below protection area
Grid LSALT		7700	6700/2042	Terrain lower than 1300 + 76 < 1376	Below protection area

Construction cranes approximately 15 metres above the tip of the transmission line structures would not infringe any of these protection surfaces.

The air routes and the Grid LSALTs located overhead the proposed transmission line structures (if the structures were placed on the highest terrain within the lateral protection area for the air route or Grid LSALT) would not infringe them and therefore have no impact upon them.

SEARS Assessment

The HumeLink project, with transmission line structures up to a maximum height of 76 metres AGL will not impact IFR aircraft operating heights related to air routes.

3.6. Aviation navigation facilities

The following aviation navigation facilities were identified as the closest to the project footprint:

- air traffic control (ATC) Radio Transmitter, non-directional radio beacon (NDB), distance measuring equipment (DME) and VOR located at Wagga Wagga Airport, approximately seven kilometres (four nautical miles) north-east of the transmission line and Wagga 330 kV substation, which is proposed to be modified as part of the project
- aviation frequency and NDB located at Goulburn Airport, approximately 29 kilometres (16 nautical miles) south of the project footprint.

There are no aviation navigation facilities at Tumut Airport.

ATC communication systems are located at Mount Majura, approximately 54 kilometres (29 nautical metres) south of the nearest part of the project footprint near Yass.

The maximum protection area associated with above navigational aids is four kilometres. The project is not located in any protection area associated with these aviation facilities.

SEARS Assessment

The HumeLink project, with transmission line structures up to a maximum height of 76 metres AGL will not impact upon aviation navigation and communication facilities.

3.7. ATC radar facilities

The closest ATC radar facilities are:

- Mount Bobbara Route Surveillance Radar (RSR) located approximately 124 kilometres (67 nautical miles) north-east of Wagga Wagga and 27.8 kilometres (15 nautical miles) north of the project footprint near Bookham.
- Mount Majura RSR located approximately 54 kilometres (29nautical miles) south of the project footprint near Yass.

The open lattice construction of the proposed HumeLink transmission line structures is known not to interfere with ATC surveillance systems.

Other transmission lines already exist within close proximity to ATC systems and aviation communication facilities without known interference. Airservices Australia will conduct their own assessment upon receipt of details of the proposed transmission line.

SEARS Assessment

The HumeLink project, with transmission line structures up to a maximum height of 76 metres AGL will not impact upon ATC radar facilities.

3.8. Obstacle lighting

CASA's Advisory Circular (AC) 139.E-05 v1.0; *Obstacles (including wind farms) outside the vicinity of a CASA certified aerodrome*, effective from May 2021, refers to tall structures that might infringe navigable airspace and provides criteria for obstacle lighting.

Navigable airspace is defined within the AC as the airspace above the minimum flight altitudes for VFR and IFR flight, including airspace required to ensure the safety for the take-off and landing of an aircraft. Generally, minimum flight altitude limits equate to 500 feet (152 m) AGL, for VFR flight, other than licenced low-level operations, known obstacles and terrain within 300 metres laterally from the aircraft. The PANS-OPS and LSALTs protect IFR aircraft.

Based on assessment against criteria set out in the AC, the project would not require obstacle lighting to maintain an acceptable level of safety to aircraft due to the height of the transmission line structures not exceeding 76 metres AGL in areas outside of the OLS.

However, transmission line structures that may infringe the Wagga Wagga Airport OLS may require obstacle lighting to be installed. Details of the infringement by the proposed transmission line structures must be provided to the Wagga Wagga Airport Manager for onforwarding to CASA for assessment as to whether obstacle lighting is required, noting the existing power line structures within the limits of the OLS are not currently equipped with obstacle lighting.

Lighting

"CASA has no authority or powers in relation to a wind farm or tall structure approval outside the vicinity of a certified aerodrome but advice from CASA will inform the planning authority in regard to any decisions or conditions on any approval the planning authority might place on a development." [2]

CASA considers that obstacles lower than 500 ft/152.4 metres AGL do not infringe *"navigable airspace"* and therefore, over areas outside a built-up area, do not require obstacle lights to be fitted.

CASA has not required obstacle lighting for the existing terrain and transmission line that technically infringes the Runway 05 Approach Surface at Wagga Wagga Airport which is consistent with the provisions of Section 9.27 of the CASR Part 139 Manual of Standards - Aerodromes (CASR Part 139 MOS).

Obstacle lighting across the length of existing transmission lines has not been required by CASA, as evidenced by the symbology on the aeronautical charts related to power transmission lines across Australia.

Based on this assessment, it is unlikely that obstacle lighting would be required for the transmission structures located outside the Wagga Wagga Airport OLS. The transmission line structures that may infringe the OLS at Wagga Wagga Airport may require obstacle lighting to be installed.

However, this would be confirmed by CASA once it has conducted its own safety assessment. This would occur once CASA has received advice and this report from the Wagga Wagga Airport manager.

Marking

Transmission line structures associated with high-voltage power transmission lines are large structures that are readily identified from the ground and from airborne aircraft. They are depicted on a variety of charts, including aeronautical charts of all scales.

The existing transmission lines east and south-east of Wagga Wagga passes by similar, if not the same, areas that the proposed new transmission line will.

ALA owners will be familiar with the existing transmission line. The airport management of Wagga Wagga Airport will be familiar with the existing transmission line and the lack of impact that it creates to airport operations. The proposed transmission line, whilst being slightly higher than the existing line, will generally have the same characteristics as the existing transmission line.

At 76 metres AGL, the proposed transmission line does not infringe navigable airspace along its route beyond the lateral extent of the Wagga Wagga Airport OLS, and it is unlikely that marking would be required. This would be confirmed by CASA once it has conducted its own safety assessment.

Australian Standard AS 3891.1 *Air Navigation – Cables and their supporting structures – Marking and Safety requirements, Part 1, Permanent marking of overhead cables and their supporting structures for other than planned low-level flying* and AS 3891.2 *Air Navigation – Cables and their supporting structures – Marking and safety requirements, Part 2: Marking of overhead cables for planned low-level flying operations,* specify the requirements for permanent warning markers for use on overhead cables.

AS 3891.1 specifies the requirements for permanent marking of overhead cables and their supporting structures for other than planned low-level flying. Section 3 of this report details the minimum height requirements for flight operations other than low-level flying.

[2] CASA AC 139.E05v1.0 - May 2021

The Standard requires any section of cable with a height in excess of 90 metres from any road, railway or navigable waterway or above 90 metres continuously above any ground not containing a road, railway or navigable waterway to be marked with spherical markers at specified intervals.

The maximum height of the transmission line structures will not exceed 76 metres AGL and therefore the cables between them will not exceed 76 metres AGL.

Over the general landscape of the project footprint, marker balls are not required under these Standards.

Marking of some areas of the transmission cables and structures in proximity to some aircraft landing areas may be required in accordance with AS 3891.1 and 3891.2 following consultation with the appropriate landowners.

3.9. Aerial firefighting and emergency services

Regional aerial firefighting services and the operators of aerial firefighting aircraft are conducted after extensive planning and local emergency services consider the tall infrastructure environment in the area affected by the fire. Existing high tension transmission line structures in the area would already be included in aerial firefighting plans.

Emergency medical helicopter flights are able to choose a suitable landing area away from obstacles such as trees, powerlines, buildings, etc or if required, can conduct winching operation to retrieve patients in areas not suitable for a landing. They can operate in close proximity to such structures after identifying them and considering their impact on the flight operation.

SEARS Assessment

The HumeLink project, with transmission line structures up to a maximum height of 76 metres AGL will not impact upon aerial firefighting and emergency services operations.

3.10. Cumulative impacts

Construction of transmission line structures for HumeLink and other proposed, approved or under construction major projects in and around the HumeLink project footprint would not result in any cumulative impacts on the OLSs of certified airports considered in this assessment.

While the operation of transmission line structures for HumeLink and Transgrid's Project EnergyConnect (Eastern Section) would both result in intrusions of the OLS at Wagga Wagga Airport, there is no cumulative effect. Each project will be managed in accordance with their respective mitigation measures, in consultation with CASA, Airservices Australia and Wagga Wagga Airport.

4. CONSULTATION

Details of consultation undertaken, feedback received and actions arising from this consultation are provided in Table 9.

Table 9 Stakeholder consultation

Stakeholder	*Feedback provided*	*Action required*
Airservices Australia	Email received 03 March 2023: ***Airspace Procedures*** *With respect to procedures designed by Airservices in accordance with ICAO PANS-OPS and Document 9905, at a maximum height of 409.47m/1344ft AHD, the transmission lines will not affect any sector or circling altitude, nor any instrument approach or departure procedure at Wagga Wagga aerodrome.* *Note: procedures not designed by Airservices at Wagga Wagga aerodrome were not considered in this assessment.* ***Communications/Navigation/Surveillance (CNS) Facilities*** *We have assessed the proposal to a maximum height of 409.47m/1344ft AHD 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.* ***Air Traffic Control (ATC) Operations*** *There are no additional instructions or concerns from our ATC.* ***Summary*** *Based on the above assessment, our view is that the proposed transmission lines would not have an impact on any Airservices designed instrument procedures, CNS facilities or ATC operations at Wagga Wagga aerodrome.*	Provide details of tower locations to Airservices Australia once the concept design is completed.
Department of Defence	Request for feedback was sent on 20 October 2022 but no response was received.	N/A
NSW Air Ambulance	Email received 24 October 2022: *Both the Toll Senior Contact Pilot and I have looked over this document.* *We can see no operational or aviation impact to NSW Ambulance aeromedical service provision.*	Nil

Stakeholder	*Feedback provided*	*Action required*
NSW National Parks and Wildlife Service	Email received 26 October 2022 *After viewing the Humelink Aviation Impact Statement, I do not see any issues that will affect our operations. Two things I would like to propose:* 1. *The mapping of the transmission line is made available to NPWS once completed to allow for appropriate inclusion in our Aviation Danger GIS systems* 2. *Consideration for visual cues on the towers and lines around areas in close proximity to NPWS locations to aid in visual identification of hazards* *NPWS does conduct a large volume of Aerial firefighting in and around our areas of responsibility. A high volume of the aerial work operations we conduct are at or below 250 feet AGL in both helicopters and fixed wing aircraft.*	Provide details of the transmission line and towers once completed. Consider the application of visual markings on towers and lines near NPWS locations.
NSW Rural Fire Service	Request for feedback was sent on 20 October 2022 but no response was received.	N/A
Wagga Wagga Council	Transgrid met with Wagga Wagga Council (which manages the Wagga Wagga airport) last year (24 Nov 2022) and discussed the aviation impacts. Council did not raise concerns about the project. Note also that the tower locations would be provided to Council once they have been finalised.	Provide details of tower locations to Wagga Wagga Council (Wagga Wagga Airport) once the design is finalised.

5. CONCLUSIONS

Based on the assessment of the overall transmission route pathway, the proposed transmission line structures and associated temporary construction cranes:

- would infringe the OLS at Wagga Wagga Airport by up to 40.1 m but the infringement may be acceptable
- would not infringe the OLS at other certified airports including Goulburn Airport and Tumut Airport
- cranes would infringe PANS-OPS surface associated with the missed approach segment of the Wagga Wagga VOR RWY 23 procedure and the final approach segment of the Wagga Wagga VOR RWY 05 procedure. Management of the crane operation, in conjunction with Wagga Wagga Airport management, should allow the crane operations to proceed without impact to aircraft operations
- of the approximate 35 ALAs within three nautical miles of the project footprint, the proposed transmission line is likely to create a major impact to four of them. The nature of the terrain should enable other nearby locations to be used as an ALA, or there are other nearby ALAs that would allow aircraft operations
- are unlikely to create an adverse impact to firefighting and emergency evacuation flight operations when the recommended risk management process is carried out by the pilot and landowner whose property has the transmission line overhead or is immediately adjacent to the proposed transmission line
- would not have an impact on designated air routes
- would not have an impact on the relevant Grid lowest safe altitude (Grid LSALT)
- is wholly contained within uncontrolled airspace (Class G)
- is outside any Special Use Airspace
- is outside the clearance zones associated with aviation navigation aids, radar systems and communication facilities
- transmission line structures are unlikely to be required to be marked or lit
- cranes should be equipped with obstacle lighting at the highest point of the crane when in operation
- can be compatible with aerial application flight operations when the recommended risk management process is carried out by the pilot and landowner whose property has the transmission line overhead and immediately adjacent to the proposed transmission line.

6. RECOMMENDATIONS

Recommended actions resulting from the assessment are provided below.

1. The concept design of the transmission line structures with coordinates and elevations should be provided to Airservices Australia once the concept design is confirmed, using the following email address: vod@airservicesaustralia.com. Note also that:
    a. Airservices Australia has been assigned the task of maintaining a database of tall structures, the top measurement of which is:
        i. 30 metres or more above ground level—within 30 kilometres of an aerodrome; or
        ii. 45 metres or more above ground level elsewhere.
    b. The purpose of notifying Airservices Australia of these structures is to enable their details to be provided in aeronautical information databases and maps/charts etc used by pilots, so that the obstacles can be avoided.
    c. The notification to Airservices Australia should be made as early as possible following the concept design of the project for the preliminary design. Aeronautical charts are updated twice per year, in June and December, with cut off dates approximately six months prior. The Amendment Cycle is available at https://www.airservicesaustralia.com/industry-info/aeronautical-information-management/document-amendment-calendar/.
    d. Further notification is to occur if the finalised design of the project alters the details supplied to Airservices Australia.
2. The concept design for the transmission line structure coordinates and elevations should be provided to Department of Defence, using the following email address: land.planning@defence.gov.au. Further notification is to occur if the finalised design of the project alters the details supplied to the Department of Defence.
3. Following the finalised design of the project, Transgrid will provide relevant details of the proposed transmission line to the ALA owners along the confirmed transmission line, to enable them to consider the potential impact of the transmission structures and power lines on flight operations from their property.
4. To facilitate the flight planning of aerial application operators conducting flight operations on any property near to the proposed transmission line, details of the project, including location and height information of the finalised design of the transmission line and structures would be provided to landowners. This is so that, when asked for hazard information on their property, the landowner may provide the aerial application pilot with all relevant information.
5. Obstacle lighting and marking of the transmission line structures is not considered required outside of the lateral limits of the Wagga Wagga Airport OLS, however, this would need to be confirmed by CASA. The provision of markers on cables and structures within three nautical miles of the project footprint should be discussed with the appropriate stakeholders.
6. Approval to operate construction cranes in this area must be obtained from the Wagga Wagga Airport Manager in advance of the proposed activity. Transgrid will provide the airport manager with details of

the crane operations at least seven days prior to their commencement to enable notification to aircraft planning to operate in the area via the Notice to Airmen (NOTAM) procedure.

REFERENCES

Aerial Application Pilots Manual, 3rd Edition 2011

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Australian Standard 3891.1 Air Navigation – Cables and their supporting structures – Marking and Safety requirements, Part 1, Permanent marking of overhead cables and their supporting structures for other than planned low-level flying 2008

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Civil Aviation Safety Authority, *Civil Aviation Advisory Circular AC 91-10 v1.1: Operations in the vicinity of non-controlled aerodromes*, dated November 2021

Civil Aviation Safety Authority, *Manual of Standards Part 173 – Standards Applicable to Instrument Flight Procedure Design*, version 1.5, dated March 2016

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Civil Aviation Safety Authority, Advisory Circular (AC) 139.E-01v1.0: *Reporting of Tall Structures*, dated December 2021

Department of Infrastructure and Regional Development, Australian Government, National Airport Safeguarding Framework, N*ational Airports Safeguarding Framework (NASF) Guideline F: Managing the Risk of Intrusions into the Protected Operational Airspace of Airports*

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Transgrid, HumeLink Scoping Report, dated 11 February 2022

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aviationprojects.com.au