

8.0 Aviation

8.1 Introduction

This chapter considers the potential for the Project to result in impacts on aviation safety, integrity and efficiency.

AGL is proposing to develop the Project, which will be located approximately 45 km west - south west of Kingaroy in the South Burnett region of Queensland. The Project will consist of a maximum 115 wind turbines that will generally be located on the elevated ridge lines which form part of the Great Dividing Range in this area. The location and an indicative layout of the Project are shown in Figure 2.1 and Figure 2.2 in Volume 2 of this EIS.

A set of parameters for the wind turbine model and layout have been established and these are set out in Table 8.1. These parameters have been used for the assessment of potential aviation impacts. The final wind turbine model to be used for the Project will be determined during detailed design, however will comply with these parameters.

Table 8.1 Wind turbine parameters for the Project

Project feature	Statistic
Number of turbines	Maximum 115
Approximate blade tip height	180 m
Approximate rotor diameter	140 m

8.2 Scope of assessment

An advisory report on aviation related issues associated with the Project has been prepared by aerodrome consultants SGS Hart Aviation (SGS Hart, 2016) and is included in Appendix J, Volume 3. The scope of the advisory report consisted of an assessment of aviation related issues relevant to the Project, including:

- An assessment of the risks associated with aviation operations in the area
- An assessment of any need or requirement for obstacle lighting
- Identification of any requirement for further consultation with relevant agencies/ authorities.

In assessing the potential impact on aviation operations, consideration has been given to all registered / certified aerodromes within 30 nautical miles (55.56 km) from any obstacle associated with the Project Site.

8.3 Methodology

The advisory report on aviation related issues for the Project was prepared using the following assessment methodology:

- Review of charts, maps, and strategic airspace (including prohibited, restricted and danger areas (PRDs), airfield and airstrip guides and directories, en route and visual terminal charts and Notices to Airmen (NOTAMs))
- Review of all aviation activities occurring or likely to occur in the boundary of the Project Site, or potentially affected by the presence of the Project, including civil and military operations
- Consideration of the Queensland Wind Farm State Code and Planning Guideline (DILGP 2016)
- Consideration of the relevance of any Australian regulatory authority requirements and international standards, recommendations and guidelines.

Using the outputs of the aforementioned reviews, an assessment of the risks associated with aviation operations in or around the Project and an assessment of the need or otherwise for aviation obstacle lighting to be installed has been undertaken.

8.4 Stakeholder consultation

Preliminary consultation with the CASA, AirServices Australia (ASA) and the Department of Defence (DoD) was undertaken in 2011 during initial planning for the Project. Significant revisions to the Project layout and the reference turbine parameters has not occurred since the consultation undertaken in 2011. However, a revised round of consultation with relevant authorities/ agencies has been undertaken as part of the public consultation on the draft terms of reference for the Project. No significant concerns were raised.

8.5 Potential impacts

8.5.1 Potential flying activities

Flying activities possibly conducted within the local area surrounding the Project include:

- General aviation – including private flying and ad-hoc charter
- Ultralights and other sports aircraft
- Fire bombing and other fire-fighting related activities
- Aerial agriculture
- Power line survey (rotary wing)
- Military low flying.

8.5.2 Airfields near the Project

No licensed or unlicensed aerodromes or airfields are located on properties associated with the Project. There are licensed and unlicensed aerodromes within the vicinity of the Project, none of which will be impacted. A summary of the nearest aerodromes are provided in Table 8.2.

Table 8.2 Summary of nearby aerodromes

Aerodrome	Distance / direction from proposed development	Aerodrome type	Comments
Kingaroy Airport	45 km north east	Licensed civil	Too distant from the Project to be impacted.
Lyndley Station	21 km south west	Unlicensed	Identified on the World Aeronautical Chart (WAC) (3340) Brisbane. This is a private airstrip around 1270 m long, and permission is required prior to use. The airstrip is suitable for private small light aircraft visual flight rules(VFR) operations. Too distant from the Project to be impacted.
Jimbour House	32 km south west	Unlicensed	Not identified on the relevant WAC (3340) Brisbane. Consists of one sealed strip around 915 m long and permission is required prior to use. Manual lighting is available for emergency operations. The airstrip is suitable for private small light aircraft VFR operations. Too distant from the Project to be impacted.
Trevanna Station	40 km east	Unlicensed	Too distant from the Project to be impacted.

Aerodrome	Distance / direction from proposed development	Aerodrome type	Comments
Nanago (Joe Anderson Airfield)	50 km north – north east	Unlicensed	Too distant from the Project to be impacted.
Dalby	50 km south	Uncertified aerodrome	Too distant from the Project to be impacted.

Other aerodromes

A comprehensive search of all available relevant documentation including the En Route Supplement Australia (ESRA), the Aircraft Owners and Pilots Association (AOPA) National Airfield Directory and FlightAce Country Airstrip Guide did not identify any other aerodromes or airstrips within the vicinity of the Project.

In summary, the Project will not impact on the operation of any licensed or unlicensed aerodromes or aeroplane landing areas.

8.5.3 Obstacle limitation surfaces

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

As there are no certified aerodromes or regular aviation operations within 30 km of the Project, there will be no adverse impact on obstacle limitation surfaces.

8.5.4 Aircraft operating heights

Most aircraft are required under the current regulatory framework to operate above 500 feet (152 m) above ground level, and avoid obstacles horizontally by 600 m (Civil Aviation Regulation 157 refers). Other aircraft, such as those involved in aerial agriculture and fire fighting activities, are permitted to fly at lower heights subject to strict training, licensing and operational control requirements. When flying with visual reference to the surroundings, there is a regulatory requirement to maintain a specified horizontal visibility and clearance from cloud to ensure sufficient time is available to manoeuvre an aircraft clear of terrain and obstacles.

VFR operations should be above the height of the wind turbines if operated strictly in accordance with the guidelines. Civil night VFR operation or instruction flight rules (IFR) aircraft operations are required to abide by lowest safe altitude requirements, which will ensure that any such operations will be above the highest point of any of the proposed wind turbines.

However, the proposed tip height for the wind turbines is 180 m (around 591 feet) above ground level. This is more than 500 feet above ground level and as such, wind turbines will extend into navigable airspace if turbines with this tip height were to be used.

This has the effect of slightly increasing the risk profile for aviation operations around the Project. The minor level of increase in risk is because, with the possible exception of low level military jet operations, limited civil aircraft operations are likely to occur within the vicinity of the Project Site.

Defined air traffic routes

The Project is in Class E airspace and is well clear of (below) the airspace control zones for Oakey, Amberley, Kingaroy and Brisbane Airports. The operating height of aircraft over the area is such that the presence of the Project will have no impact on these aviation operations.

The Project will not affect any sector or circling altitude. There will also be no impact on any approach or departure altitudes.

In reviewing the routes which pass over or within ten nautical miles of the Project, in all cases the defined lowest safe altitude (LSALT) for the listed routes are more than 1,000 feet (around 305 m) higher than the highest proposed wind turbine. The Project will therefore not impact on the LSALT of any of the identified routes which pass over or within ten nautical miles of the Project.

No active Notices to Airmen (NOTAM) which might impact on the development of the Project were identified.

The nearest Danger Area is D664, which is the flying training area for Kingaroy Airport. Other Restricted or Danger Areas are located in the Oakey military control zone. The Project will not impact on these areas.

Navigation aids, communication systems and radar interference

The Project will not impact on precision / non-precision navigational aids, HF and VHF communications, advanced surface movement guidance and control systems, or radar or satellite links. The nearest radar is at Brisbane, around 90 to 100 nautical miles south east of the Project and beyond the potential area of influence.

Defence aviation operations

One potential impact on Defence related operational issues has been identified, being a potential impact on low level jet operations in the vicinity of the Project Site (as identified in the Visual Navigation Chart (VNC-4) BRISBANE).

It is not anticipated that the outcomes of consultation with the Department of Defence will result in any significant impact on or change to the Project layout.

8.5.5 Reference masts for meteorological monitoring

Seven permanent meteorological masts (met masts) will be installed at the Project Site. The coordinates of these met masts are shown in Table 8.3. The heights (above ground level) of these masts varies although does not exceed 80 m above ground level. The locations of the met masts are shown in Figure 2.1, Volume 2 of this EIS.

The met masts will be lattice or tubular construction of grey steel material and are held in place by steel guy wires. The met masts are not marked or lit, and there is no requirement to do so.

Met masts can be difficult to see under some instances, although are typically at a height which does not pose a risk to VFR or IFR operations. Met masts do have the potential to impact on aerial agricultural operations and other low-level aviation operations.

Table 8.3 Locations and heights of the meteorological monitoring masts (met masts)

Met mast label	Easting	Northing
MM-1	346953.131000	7039306.615200
MM-2	340459.340400	7041396.217900
MM-5	339043.328600	7044696.357500
MM-9	348960.653300	7043568.288700
MM-10	335224.777300	7048565.800300
MM-13	337882.553100	7050827.846900
MM-14	348116.659100	7047573.941100

If required, consideration could be given to marking the wind monitoring towers according to the requirements set out in the Manual of Standards (MOS) 139 Section 8.10 Obstacle Markings; specifically:

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

8.5.6 Aerial fire fighting activities

Aerial fire fighting activities in the region could be undertaken via the use of helicopters and fixed wing aircraft. Although these activities can occur within the confines the Project they are generally not recommended due to the potential risks associated with these operations.

The Project will limit the capacity for fixed wing aircraft to undertake fire fighting operations within the explicit confines of the Project Site, where aircraft undertaking these activities will typically operate at low altitudes and in

environments where visibility could be hampered by smoke. Further, the operation of helicopters within the explicit confines of the Project Site, while possible, will also be potentially hazardous.

It is possible that aerial fire fighting could be carried out above the level of the wind turbines, however the effectiveness of water or retardant dispersed from this height will be diminished.

Generally, wind farms improve the capacity for fire fighting personnel to respond to fire events through the provision of improved access to areas which will otherwise in many instances be constrained (i.e. along ridge lines). Upgrades of existing and / or provision of new access tracks within the Project Site are designed such that they can accommodate fire fighting vehicles. Further, environmental and work site management practices can reduce the risk of fire around wind turbines and other project infrastructure, including the provision of buffer zones where vegetation (including pasture grasses) are required to be kept short during the fire danger periods, and through the control of work practices which present a fire risk (i.e. restricting hot works or works which create sparks during periods of higher fire danger).

The potential impacts and associated mitigation measures to manage potential fire risks in the vicinity of the Project are described in Chapter 9 Hazard, Health and Safety.

8.5.7 Aerial agricultural operations

Agricultural aerial spraying (including seeding and the spreading of fertilisers) has the potential to occur in the vicinity of the Project. These operations generally occur between 20 m and 30 m from the ground.

It is standard operating practice that any approved low level operations are required to check for obstacles which might impact on aerial agricultural operations. These operations will be undertaken in accordance with day VFR. There are some instances, or 'special cases' where night spraying of crops is deemed necessary. No 'special cases' have been identified in the area surrounding the Project Site.

The Project will not impact on the ability for agricultural aviation operations to be undertaken satisfactorily at locations around the Project Site, as it is standard operating practice that approved low level aviation operations verify the presence and location of any obstacles which could impact on these operations before starting. All aerial agricultural operations will be day VFR.

8.5.8 Rural ambulance services

No fixed-wing air ambulance operations currently occur within the confines of the Project Site. Fixed wing air ambulance operations will use the Kingaroy Airport under most probable scenarios.

Helicopter ambulance operations could theoretically occur within the confines of the Project Site if required and will also operate in the broader region.

Helicopter ambulance services could be restricted within the confines of the Project Site, however these impacts will be limited to the explicit area around the turbines only. Helicopter air ambulances will be able to access areas outside of the explicit confines of the Project Site. The impact to air ambulance services is therefore considered to be negligible.

8.5.9 Gliding hang-gliding and paragliding operations

Gliding operations may occur in the vicinity of the Project Site, originating from Kingaroy Airport and other airfields south of the Project. Gliding operations will be subject to the same constraints as VFR operations.

Knowledge of the presence of the Project will ensure that gliding operators will avoid the area where there could be a need for an outlanding (a landing which occurs elsewhere than at an airfield). Consultation with the Gliding Federation of Australia will be ongoing to ensure that any issues of concern are considered as far as feasible and reasonable.

No evidence was found of any hang gliding or paragliding occurring in the vicinity of the Project Site. Hang gliding and paragliding does occur near Dalby. Given the limited range of these activities, impacts to these operations are considered to be negligible.

8.6 Mitigation measures

8.6.1 Obstacle marking and lighting

The overall risk to aviation operations in the vicinity of the Project Site is low. However, there are two areas where the risk to aviation is slightly higher:

- The proposed tip height for the wind turbines is 180 m above ground level. Under this scenario, the proposed turbines will extend into navigable airspace.
- Low level military jet operations could occur in the vicinity of the proposed development.

With the exception of possible low level military operations, only limited civil aircraft operations are expected to occur in the vicinity of the Project. However, the risk profile for aviation operations will increase slightly with the establishment of the Project, principally due to the wind turbines ('obstacles') which will penetrate 'navigable airspace'.

In considering the need for aviation hazard lighting, the applicable regulatory context was determined.

Civil Aviation Safety Regulations 1998, Part 139-Aerodromes

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

CASA currently has no specific authority to require the marking or lighting of obstacles that are not at (or in the vicinity of) an aerodrome. Notwithstanding this, their duty of care to aviation operators will be considered.

Manual of Standards Part 139-Aerodromes

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

- 7.1.5.1 Under CASR Part 139 any object which extends to a height of 110 m or more above local ground level must be notified to CASA. Note: For instrument runways, obstacle monitoring includes the PANS-OPS surface which extends beyond the OLS of the aerodrome. See paragraph 7.1.1
- 7.1.5.2 Any object that extends to a height of 150 m or more above local ground level must be regarded as an obstacle unless it is assessed by CASA to be otherwise.

Consultation with CASA regarding the Project is ongoing in the context of the approximate tip height of the turbines being in excess of 150 m. However, as noted above, CASA does not have any authority to regulate in respect to wind farms when the location is proposed to be away from the vicinity of an aerodrome.

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

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

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

- a) 30 m or more above ground level—within 30 km of an aerodrome; or
- b) 45 m or more above ground level elsewhere.

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

8.7 Residual impacts

As the proposed turbines will be located more than 30 km from a licenced aerodrome but will be higher than 45 m AGL, they must be reported to RAAF AIS. This action will occur once the layout is confirmed at the completion of the detailed design process and prior to construction.

Although the risk to aviation operations in the vicinity of the Project is low, the proposed tip height of the wind turbines is 180 m AGL (around 591 feet). The tips of the turbine blades will therefore penetrate 'navigable airspace' which could impact some aviation operations. Further, low level military jet operations could occur in the region. These potential operations will need to be confirmed through consultation with the Department of Defence to allow for identification of any specific mitigation measures to be designed and implemented.

The aviation advisory report prepared by SGS Hart (2016) recommends that obstacle lighting be installed on turbines which exceed 150 m in height. Although this may be a potential mitigation measure for low flying aircraft, it is not a regulatory requirement as the Project is outside of the extent of CASA's regulatory powers. Ongoing consultation with CASA, AirServices Australia and the Department of Defence will further identify any requirement for obstacle lighting as an appropriate risk mitigation measure, having regard to the limited aviation operations which occur in the vicinity of the Project.

As the proposed turbines will be located more than 30 km from an aerodrome but will be higher than 45 m AGL, the location of the turbines must be reported to RAAF AIS. This action will occur once the final layout is confirmed at the completion of the detail design process and prior to construction.

The met masts have been identified as presenting a low level of risk to aviation operations. The masts are below 110 m AGL and as such do not need to be reported to CASA. The SGS Hart advisory report recommends that consideration be given to delineating the top one third of the wind monitoring towers (i.e. via painting the top of the mast in alternating colour bands and/ or through the installation of marker balls or high visibility flags or sleeves on the outside guy wires).

Ongoing consultation with CASA, AirServices Australia and the Department of Defence will assist in determining the appropriateness of these proposed risk mitigation strategies for the met masts, having regard to the absence of aviation operations (including low-level and/ or night operations) within the confines of the Project Site and the limited aviation operations which occur in the broader area.

In accordance with the CASA Advisory Circular AC 139-08(0) (April 2005) the details of the met masts will be provided to the RAAF such that they can be included on the RAAF Aeronautical Information Services database of tall structures.

8.8 Summary and conclusions

The risk to aviation operations in the vicinity of the Project has been determined as being low. However, the height of the proposed wind turbines (180 m) will mean that the tips of the blades will penetrate navigable airspace. There is also some evidence that low level military jet operations could occur in the area.

Although not a regulatory requirement, the SGS Hart advisory report recommends that risk mitigation measures be considered to manage the potential risk to aviation operations, including the installation of obstacle lighting.

In accordance with the recommendations of the SGS Hart advisory report and the Queensland Wind Farm State Code and Planning Guidelines, consultation with CASA, AirServices Australia and the Department of Defence is ongoing to determine the potential risk to aviation operations and to identify appropriate risk mitigation (which could include obstacle lighting, marking of met masts and/ or other risk mitigation strategies as appropriate).

Risk mitigation will be developed having regard to the limited aviation operations which occur in the vicinity of the Project and the associated low risk rating.

8.9 References

DILGP, 2016. Queensland Wind Farm State Code and Planning Guideline. Dated July 2016

SGS Hart, 2016, *Advisory Report on proposed Coopers Gap Wind Farm*