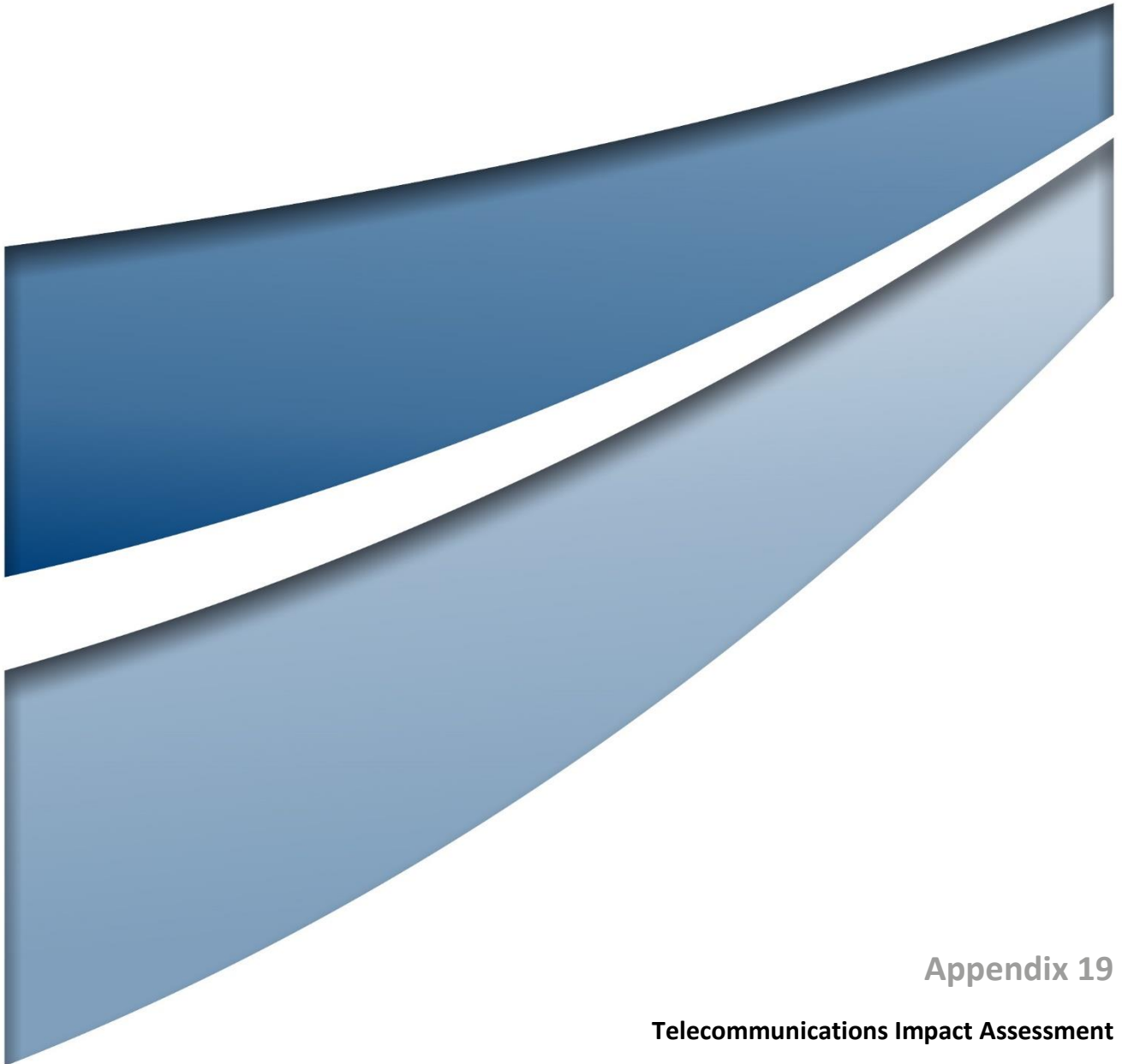




Appendix 19

Telecommunications Impact Assessment



Client: Umwelt (Australia) Pty Ltd

**Project: Junction Rivers Wind Project Telecommunications
Impact Assessment**

Report: Telecommunications Impact Assessment Report

Document Number: 22092-E-RPT-0001

Revision: 1

Revision history

Table 1: Revision history

Revision	Date	Description	Prepared by	Reviewed by	Approved by
A	05/12/2022	Initial draft for client review	Liam Jordan	Eric Bendtsen	N/A – initial draft
B	19/06/2023	Second Draft	Ramez Barakat	Eric Bendtsen	Timothy Cervenjak
C	24/11/2023	Final Draft	Ramez Barakat	Eric Bendtsen	Timothy Cervenjak
0	26/03/2024	First Issue	Ramez Barakat	Eric Bendtsen	Timothy Cervenjak
1	16/05/2024	Second Issue – Amended non-involved dwellings	Ramez Barakat	Eric Bendtsen	Alex Low

Executive Summary

Umwelt engaged Middleton Group Engineering (MGE) to undertake an Electro-Magnetic Interference (EMI) desktop study for the Junction Rivers wind project (the Project) in New South Wales. The Proponent for the Project is Windlab Developments Pty Ltd.

This assessment has been undertaken in accordance with the Secretary's Environmental Assessment Requirements. Consistent with the NSW Planning Guidelines: Wind Farms [1] the Proponent has undertaken consultation with potentially affected stakeholders.

The Australian Communications and Media Authority (ACMA) database for point-to-point links within a 200 kilometre (km) radius of the site has been surveyed. One link was identified passing within the Project Area boundary.

The comprehensive study scope and summary assessment is tabulated in Table 2.

Table 2: Assessment summary

Scope	Assessment	Stakeholder Response
Point-to-point microwave links	No impact in terms of near-field effects, reflection/scattering or diffraction effects.	Link owner Ambulance NSW confirmed no impact to their link is expected
Meteorological radar	Manageable Impact	Bureau of Meteorology (BoM) conditionally approve. The Project will meet the conditions.
Mobile voice-based communications	Negligible to mobile services	Optus confirmed no impact expected. No response from Telstra.
Wireless and satellite internet services	No impact expected as no non-involved residences in vicinity of wind farm	Private agreement with involved landholders
Broadcast and digital radio and television	No impact, wind turbine generators (WTGs) not near broadcast towers	Not applicable
Trigonometry stations	WTGs more than 350 m from survey marks. Safe clearance distance.	Not applicable
GPS	WTGs more than 17 km from GNSS station, no impact expected	Geoscience Australia confirmed no impact expected.

The Project has been designed, located, and sited to avoid, or minimise electromagnetic interference to pre-existing television, radar and radio transmission and reception. With reference to BoM conditions regarding construction and operation of the wind farm, Windlab would continue consultation with BOM on the Project and update BOM with the following commitments:

1. Informing the Bureau of significant variation in turbine layout (i.e. by more than 100 m in any lateral direction, or alteration of tip height) between the initial plan and construction.
2. Providing advance notice (one week preferably) to the Bureau of any planned wind farm shutdown events for more than 12 hours, to allow the recalibration of radar systems.
3. Collaborate with the Bureau in the event of severe weather conditions to assist in endeavour of community safety.

Table of contents

Revision history	2
Executive Summary	3
1 Abbreviations / Definitions	6
2 Background	7
3 Scope	8
4 Inputs	9
5 Analysis	10
5.1 Assumptions	10
5.2 Point-to-Point Links	10
5.3 Meteorological Radar	15
5.4 Mobile Voice-based Communications	17
5.5 Wireless and satellite internet services	20
5.6 Trigonometrical Station and GPS	21
5.7 Broadcast and Digital Radio and Television	24
6 Stakeholder Engagement	26
7 Conclusions	27
8 Normative References	28
Appendix A Stakeholder Correspondence and Responses	29
Appendix A.1 Ambulance Service of NSW	29
Appendix A.2 Optus	30
Appendix A.3 Bureau of Meteorology	31
Appendix A.4 Geoscience Australia	32
Appendix A.5 Telstra	33

Figures

Figure 1: Wind turbines, 2 km buffer with ACMA communication sites and link assignments.	11
Figure 2: ACMA link Maximum 2 nd Fresnel zone.....	14
Figure 3: Meteorological radars map	15
Figure 4: Proximity of the Project to mobile phone base stations.	17
Figure 5: Telstra 4G mobile network coverage in the approximate Project Area	18
Figure 6: Telstra 3G mobile network coverage in the approximate Project Area	18
Figure 7: Optus mobile network coverage in the approximate Project Area	19
Figure 8: Vodafone mobile network coverage in the approximate Project Area	19
Figure 9: Dwellings located nearby the Project.	20
Figure 10: Survey marks within the vicinity of the Project area	21
Figure 11: GNSS stations location and 20 km wind turbine buffer	23
Figure 12: Location of broadcasters relative to the Project.	25

Tables

Table 1: Revision history.....	2
Table 2: Assessment summary	3
Table 3: Abbreviations.....	6
Table 4: Study inputs.	9
Table 5: List of point-to-point links that pass across the Project Area.	10
Table 6: Information of point-to-point links	13
Table 7: Summary table for the closest weather radars to the Project area	16

1 Abbreviations / Definitions

Table 3: Abbreviations

Abbreviation	Explanation
ACMA	Australian Communications and Media Authority
AM	Amplitude Modulation
BSL	Broadband Service Locator
BOM	Bureau of Meteorology
NSWGTA	New South Wales Government Telecommunications Authority
C/I	Carrier-to-interference ratio
D_a	Diameter of antenna physical aperture (m)
D_{nf}	Near-field clearance distance
DTV	Digital Television
EDM	Electronic Distance Measurement
EMI	Electro-Magnetic Interference
f	frequency (GHz)
FM	Frequency Modulated
F_n	n th Fresnel Zone; also, F_1 , F_2 , etc.
G	Maximum (boresight) antenna gain (dBi)
GHz	Giga-Hertz – 1 billion Hertz
GIS	Geographic Information System
GNSS	Global Navigation Satellite System Networks
ICNIRP	International Commission on Non-Ionizing Radiation Protection
LoS	Line of Sight
MGE	Middleton Group Engineering
MHz	Mega-Hertz – 1 million Hertz
PO3	Performance Outcome 3
RPM	Revolutions per minute
UHF	Ultra-High Frequency
WMO	World Meteorological Organization
η	Antenna efficiency
OPERA	Operational Programme for the Exchange of Weather Radar Information
EUMETNET	European Meteorological Network

2 Background

Windlab Developments Pty Ltd (Windlab) proposes to develop the Junction Rivers Wind Project (the Project) to provide a reliable and affordable source of energy for the people of New South Wales (NSW) and contribute to reducing greenhouse gas (GHG) emissions associated with energy generation. The Project is located approximately 15 kilometres (km) south of Balranald, 10 km north of Kyalite, 24 km north of Tooleybuc, and 20 km northeast of the NSW and Victorian border within the southern section of the Murray-Darling Basin. The Project is within the Murray River Council Local Government Area (LGA) and immediately east of Balranald Shire LGA. The Project is located within the South-West Renewable Energy Zone (SW REZ), which the NSW Government has identified as a target area for renewable energy development in its Transmission Infrastructure Strategy (EnergyCo 2023) and Electricity Infrastructure Roadmap (NSW Government 2020).

The Project is State Significant Development (SSD) as defined under *State Environmental Planning Policy (Planning Systems) 2021* (Planning Systems SEPP) and will require development consent under Part 4 of the *NSW Environmental Planning and Assessment Act 1979* (EP&A Act).

The Project will have a generating capacity of approximately 750 megawatts (MW) and would connect to the existing 220 kilovolt (kV) transmission line that traverses the site and/or the proposed Project EnergyConnect 330 kV transmission line. The key components of the Project include:

- Up to 96 (3 blade) Wind Turbine Generators (WTG)s with a maximum blade tip height of up to 300 metres (m)
- Electrical connections between the proposed WTGs and substations/switching stations (underground or a combination of underground and overhead powerlines)
- Substations/switching stations and transmission connections to connect to the existing 220 kV transmission line and/or the proposed Project EnergyConnect 330kV transmission line
- up to four battery energy storage system (BESS) facilities (to a total of 200 megawatts (MW) with a 4 hour delivery capacity), or up to four static synchronous compensator (STATcom) facilities
- Permanent power performance masts
- Other associated infrastructure including access roads and tracks, operation and maintenance buildings, construction facilities
- Temporary on-site concrete batching plants, rock crushing facilities, calibration meteorological masts during the construction phases
- Targeted road network upgrades to facilitate delivery of WTG components to the site as required.

The Project may be constructed in two stages. Stage 1 may see the construction of up to 30 WTGs and required ancillary infrastructure and Stage 2 may see the construction of the remaining balance of WTGs and required ancillary infrastructure. The construction period would be approximately four years across the two stages.

For environmental assessment purposes, a Project 'Development Corridor' has been established consisting of a buffer around the conceptual layout for the Project. The Development Corridor

represents a worst-case assessment scenario and allows for refinement of Project infrastructure, such as micro-siting of WTGs, during the detailed design phase.

Middleton Group Engineering (MGE) has been engaged by Umwelt (Australia) Pty Ltd to undertake an Electro-Magnetic Interference (EMI) desktop study for inclusion within an Environmental Impact Statement (EIS).

3 Scope

This Telecommunications and EMI Study is a desktop study mapping the turbine locations along with telecommunication services and evaluating the impact of the wind turbines on these services.

The study has been undertaken to address the *expected* telecommunications impacts in accordance with the Secretary's Environmental Assessment Requirements (SEARs) issued 19 December 2023, specifically to:

Identify possible effect on telecommunications systems, assess impacts and mitigation measures including undertaking a detailed assessment to examine potential impacts as well as analysis and agreement on the implementation of suitable option to avoid potential disruptions to radio communication services which may include the installation and maintenance of alternative sites.

The study is confined to the analysis of publicly available information and consultation with key stakeholders. Consultation has been undertaken in line with the Wind Energy Guideline for State Significant Development [2].

The impact of the Project has been assessed with respect to the following services:

- Point-to-point microwave links;
- Meteorological radar;
- Mobile voice-based communications;
- Wireless and satellite internet services;
- Broadcast and digital radio;
- Broadcast, digital and satellite television;
- Trigonometry stations; and
- GPS.

Wind turbine Electro-Magnetic Compatibility has not been assessed in this report, however, any electrical component installed in Australia must comply with the *Radiocommunications Act (1992)* (the Act) and associated notices. All installations for the Project will comply with the Act, including affixation of relevant compliance markers to the equipment. The original equipment manufacturers must guarantee compliance. Wind farm equipment and detailed design will be designed to ensure compliance with the 2020 ICNIRP Health Guidelines.

4 Inputs

This assessment is based on the inputs specified in Table 4 based on the turbine co-ordinates and specifications supplied by Umwelt/the Proponent.

Post approval, wind turbines may be micro-sited by up to 100 m from the currently identified locations. Where relevant, recommendations for micro-siting have been made within this assessment.

Table 4: Study inputs.

Input	Source	Format	Date Provided/Accessed
Wind turbine coordinates	Umwelt (Australia) Pty Ltd	.shp .csv	09-05-2023
Wind turbine dimensions: (Blade length: max 100 m, Hub height: max 200 m, Uppermost blade tip: max 300 m, Lowermost blade tip: min 49 m).	Umwelt (Australia) Pty Ltd	Email	09-05-2023
Dwellings	Umwelt (Australia) Pty Ltd	.shp	09-05-2023
Point-to-point microwave links, mobile voice-based communication, and internet services	ACMA Site Location Map RFNSA Website	.kml Website: Lats & Longs	09-05-2023 09-05-2023
AM, FM, Digital Radio Broadcasters Digital TV	List of transmitters with a licence to broadcast	.kmz	10-05-2023
Meteorological Radar	NSW Radars Information VIC Radars Information	Website: Lats & Longs	09-05-2023
Trigonometrical Station and GPS	GNSS Network Map	Website: Lats & Longs	09-05-2023

5 Analysis

5.1 Assumptions

This study has been developed on the following basis:

- The study is desktop only. No site visit or on-site ground-truthing has been conducted.
- Information, including the spatial location of items, antenna heights, emission frequencies and the like, as sourced from ACMA are correct. While MGE checked information against satellite imagery, MGE has developed the report on the basis that information supplied by/through ACMA is correct, except where a stakeholder provides updated specifications.

5.2 Point-to-Point Links

Wind turbines have the potential to impact on point-to-point communication links through three mechanisms [3]:

1. Near field effects.
2. Diffraction.
3. Reflection or scattering effects.

As shown in Figure 1, one (1) ACMA link transverses the Project Area.

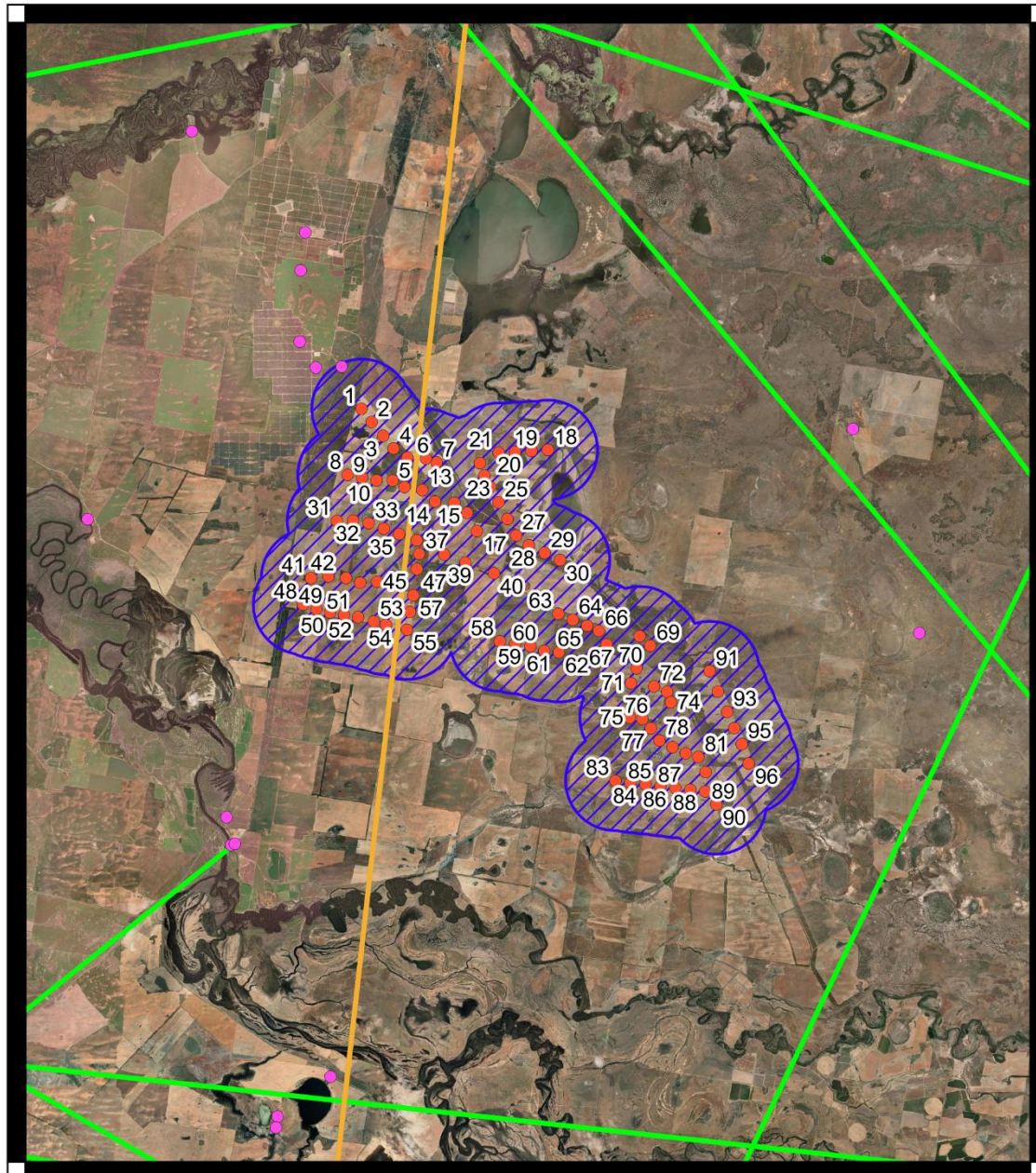
In addition, it also shows that there are no communication sites registered with ACMA located within 2 km of the wind turbines.

Discussion of near-field and reflection/scattering effects is presented in the following section.

Details of the link passing through the Project Area are highlighted in Table 5 below. The single link carries two licences. Since both licences follow the same path, the Minimum Frequency licence was considered for the assessment, as this has the larger Fresnel Zone and thus is at higher risk of interference.

Table 5: List of point-to-point links that pass across the Project Area.

#	BSL/ Licence No	Site 1	Site 2	Length (km)	Frequency	Owner
1	11235793/1	Essential Energy 90m Guyed Mast off Ivanhoe Rd ID: 35591	Essential Energy 35m Lattice Tower 1681 Lake Poomah Rd ID: 9971	60.5	849.5 MHz	New South Wales Government Telecommunications Authority
2	1433364/1	Essential Energy 90m Guyed Mast off Ivanhoe Rd ID: 35591	Essential Energy 35m Lattice Tower 1681 Lake Poomah Rd ID: 9971	60.5	404.65MHz	Ambulance Service of NSW



- Junction Rivers Wind Farm WTGs
- ACMA Link 1
- ACMA Sites
- ACMA Links
- WTG 2 km Buffer

0 2.5 5 km

Imagery from ESRI servers. Wind turbine location provided by Umwelt Pty Ltd. ACMA sites sourced from ACMA site location map.

middleton
Group

Figure 1: Wind turbines, 2 km buffer with ACMA communication sites and link assignments.

5.2.1 Near-field effects

Near-field effects occur in the vicinity of the transmitter and receiver, typically being impacted by objects with inductive fields up to several hundred metres from the transmitter/receiver – though the precise impact is difficult to calculate.

As per Bacon's paper [3], the near-field clearance distance, D_{nf} (m) can be calculated as follows:

For a dish or horn type of antenna:

$$D_{nf} = 10 \times \eta \times D_a^2 \times f$$

For any other type of antenna:

$$D_{nf} = 0.1 \times 10^{0.1G} / f$$

Where:

η = antenna efficiency

D_a = diameter of antenna physical aperture (m)

f = frequency (GHz)

G = maximum (boresight) antenna gain (dBi)

Near field effects may be caused by WTGs up to 500 m from transmitter/receivers. One ACMA communication site was found on the 2 km boundary of the wind turbines as shown in Figure 1. The distance between the site and WTG1 is greater than the near-field clearance distance. Furthermore, there are no linked assignments to this site that could be impeded. Therefore, no material near-field effects due to the Project are anticipated.

5.2.2 Reflection/scattering effects

Reflection and scattering relate to the interference by an object that reflects the signal from the transmitter to the receiver. This process creates a longer path between the transmitter and receiver, which can cause undesirable temporal modulation. However, where the carrier to interference ratio, that is the ratio of the strength of the intended signal to the interference signal is sufficiently high, the performance will be unaffected. This threshold varies from site to site. Generally, impacts on signal will be negligible beyond 2 km from a transmitter/receiver.

As per Figure 1, no communication sites with ACMA links were found within 2 km boundary of the wind turbines. Therefore, it is unlikely that the Project will cause any reflection and scattering effects on a communication site.

5.2.3 Diffraction effects

Diffraction is where an object modifies a wave, by obstructing its path of travel. Fresnel zones define an envelope of influence along the length of the ray line, whereby a rotating wind turbine could adversely impact the signal.

The radius of the n -th Fresnel Zone, F_n , of a point-to-point link of length D , at a distance d_1 from the transmitter (or receiver) is given by the following equation:

$$F_n = \sqrt{\frac{n\lambda d_1(D - d_1)}{D}}$$

The wavelength of the transmittal signal, λ , is calculated as c/f , where c is the speed of light in air and f is the frequency of the transmittal signal.

Obstacles within the 1st Fresnel Zone will adversely impact the signal, whereas, beyond the 1st Fresnel Zone the impact is reduced. More specifically, for odd values of n the Fresnel Zone is a region of constructive interference, whereas for even values of n the Fresnel Zone is a region of destructive interference [4].

In calculating the paths of the links and the relative impact of obstacles, it is important to account for the curvature of the earth and the height of any antennae, as available.

Some sources recommend a clearance threshold of 60% of the 1st Fresnel Zone Radius - in particular for ground clearance and the like [3]; this advice typically relates to 400 MHz links. However, a more conservative approach for wind turbines is often preferred – that is, maintaining a clearance of the full 1st Fresnel Zone, or, as recommended by Bacon [3], clearance of the full 2nd Fresnel Zone. The latter is typically required for GHz (higher frequency) links. In particular, for sub-GHz links, the impact of a wind turbine on the link will be a function of the carrier to interference ratio, C/I. In some instances, the presence of a wind turbine penetrating the 1st Fresnel Zone will have no material impact on the link; in other instances, the presence of the wind turbine may have an impact, and mitigation strategies may be required.

The maximum radii of the 1st and 2nd Fresnel Zones of the communication link is summarised in Table 6.

Note that the single link carries two licences. Since both licences follow the same path, the Minimum Frequency licence was considered for the assessment, as this has the larger Fresnel Zone and thus is at higher risk of interference from nearby WTGs.

Table 6: Information of point-to-point links

#	BSL/ Licence No	Length (km)	Minimum Frequency (MHz)	Closest WTGs	F_1 Max (m)	F_2 Max (m)
1	1433364/1	60.5	404.65MHz	21, 22, 33, 41	100.26	141.79



Figure 2: ACMA link Maximum 2nd Fresnel zone.

Based on the analysis presented, the wind turbine layout (including WTG blade diameter) is not sited in the maximum 2nd Fresnel zone of the traversing ACMA link nor in the near-field zones of any ACMA sites. Therefore, no impact is expected from the WTGs.

Ambulance Service NSW have confirmed no impact from the Project is expected on their communications link.

As the NSW Telecommunications Authority link has a higher frequency and smaller Fresnel zone, it will therefore not experience interference from the WTGs.

Care must be taken when micro-siting of turbines to ensure that the final as-built location does not impede the maximum second Fresnel Zone of Link 1.

5.3 Meteorological Radar

Meteorological radars detect rain and thunderstorm events, as well as other phenomena such as flocks of birds, smoke or ash, which cause echoes to be visible. The Bureau of Meteorology's (BoM's) radars typically detect rain between 2.5 km to 3.5 km above the ground within a radius of 250 km, and in some instances, beyond. Some wind farms are visible to meteorological radars, registering as static echoes.

Details of specific radars and corresponding coverage maps are available online from <http://www.bom.gov.au/australia/radar/index.shtml>.

The World Meteorological Organisation (WMO) recommends that wind turbines are sited, at a minimum, beyond 5 km from meteorological radars, and preferably beyond 20 km [5]. The Operational Programme for the Exchange of Weather Radar Information (OPERA) group of European Meteorological Network (EUMETNET) state that no wind turbine should be deployed within 5 km radius of C-band radars and 10 km radius of S-band radars. An impact study should be submitted if the wind turbines are sited within 20 km radius of C-band radars and 30 km radius of S-band radars [6].

Figure 3 demonstrates the location of the Meteorological radars in relation to the Project area. The details of the closest 3 weather radars are outlined in Table 7.

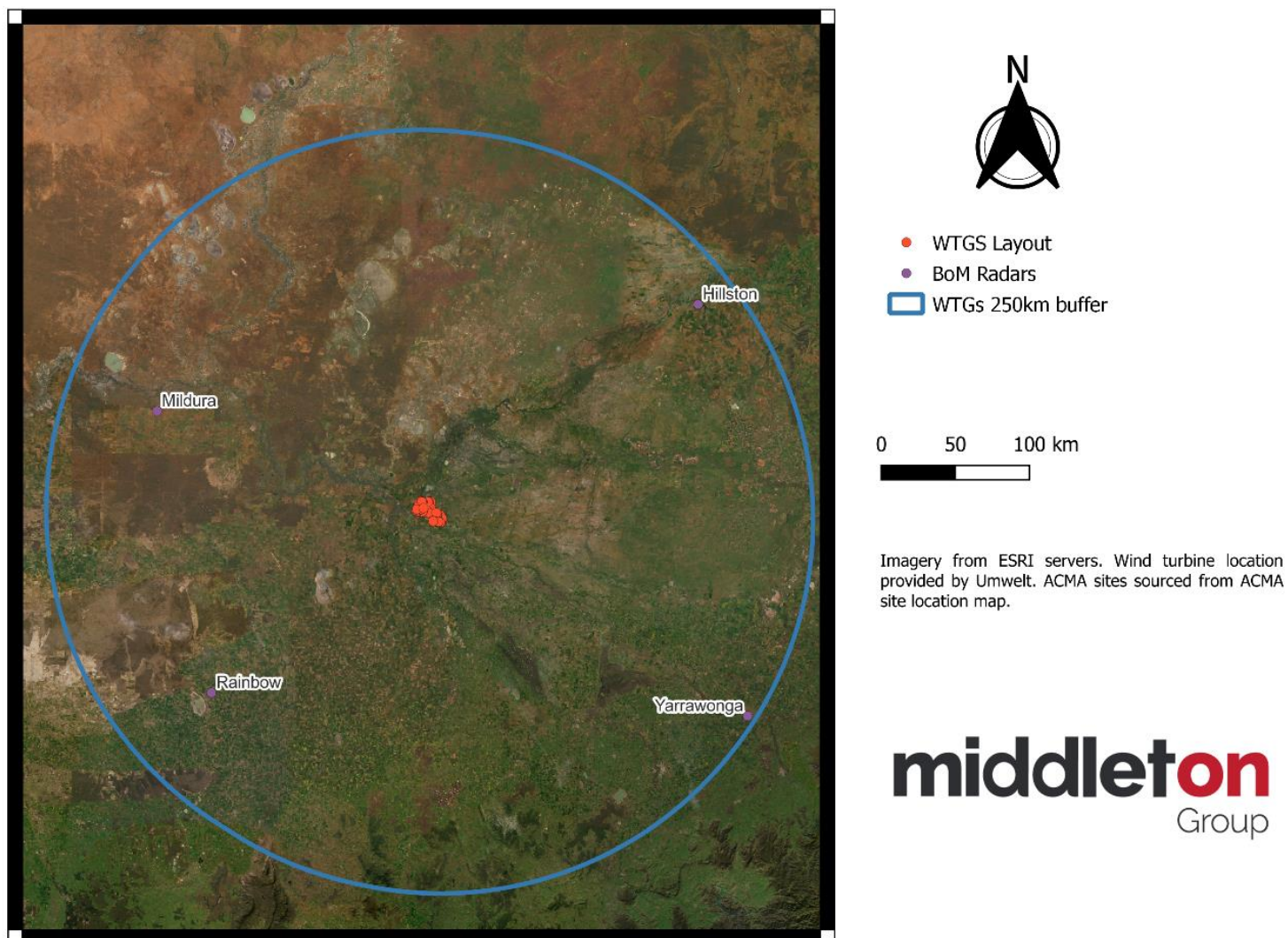


Figure 3: Meteorological radars map

Table 7: Summary table for the closest weather radars to the Project area

Weather radar name	Coordinates		Distance to Nearest Turbine	Radar type
	Latitude	Longitude		
Hillston	33.55° S	145.52° E	227 km	Meteor 735CDP (C-Band, Doppler and Dual Pol enabled)
Mildura	34.28° S	141.59° E	187 km	Meteor 735CDP, C-band, Dual Pol
Rainbow	35.99° S	142.01° S	183 km	Meteor 735C (C-Band, Doppler and Dual Pol enabled)

The closest radar is Rainbow. This radar is located more than 183 km from the closest turbine.

The Rainbow radar may see some wind turbines in its North-East direction.

The Project complies with WMO standards based on distance setbacks from the various meteorological radars in the region. Further, there is excellent coverage from the three radars in the region, giving good visibility of weather events in the wider region. As such, the presence of the WTGs is unlikely to cause adverse performance of the radars during life threatening weather events.

BoM have stated that any impact from the Project on their weather radar network is manageable in normal weather conditions. BoM have made conditions for wind farm operation, which are below. Full correspondence from the BoM is in Appendix A.3:

1. Informing the Bureau of significant variation in turbine layout (i.e. by more than 100 m in any lateral direction, or alteration of tip height) between the initial plan and construction.
2. Providing advance notice (one week preferably) to the Bureau of any planned wind farm shutdown events for more than 12 hours, to allow the recalibration of radar systems.
3. Collaborate with the Bureau in the event of severe weather conditions to assist in endeavour of community safety.

In response, Windlab have provided the following statement:

Windlab would continue consultation with BOM on the Project and update BOM with the following commitments:

1. *Informing the Bureau of significant variation in turbine layout (i.e. by more than 100 m in any lateral direction, or alteration of tip height) between the initial plan and construction.*
2. *Providing advance notice (one week preferably) to the Bureau of any planned wind farm shutdown events for more than 12 hours, to allow the recalibration of radar systems.*
3. *Collaborate with the Bureau in the event of severe weather conditions to assist in endeavour of community safety.*

BoM's provisional acceptance of the proposed Project, and the Project's commitment to the BoM conditions, is satisfactory for this report.

5.4 Mobile Voice-based Communications

Mobile phone base stations are assessed to be located beyond the 2 km buffer of the WTG locations, as shown within Figure 4.

Typically, the signal will not be significantly impacted where the towers are located more than 1 km from wind turbines. Therefore, the Project will not cause any significant impact on the operation of mobile phone base stations.

The closest mobile towers are operated by Telstra and Optus, as shown below.

Optus have confirmed no impact is expected on their network, correspondence is included in Appendix A.2.

Telstra did not provide response to Middleton Group. Given the Telstra towers are at similar or greater distance to the wind farm as the Optus towers, it is expected that Telstra will also experience negligible impact to their network from the wind farm.



Figure 4: Proximity of the Project to mobile phone base stations.

The mobile network coverage maps of Telstra and Optus within the region are shown in Figure 5 to Figure 8: Vodafone mobile network coverage in the approximate Project Area. It is noted that there are some mobile network services provided by Telstra and Optus in the Project Area.

In the immediate vicinity of the wind turbines, some reduction in signal may occur. This concern was not raised by Telstra nor Optus, hence is unlikely to materialise. Should signal quality drop near a turbine, this can be mitigated by relocating the mobile phone in the order of tens of metres. Beyond the Project Area, there will not be any significant impact on the signal.

Note the 3G network will be decommissioned across Australia over the coming years. The 3G network figures will not be relevant in the long term.

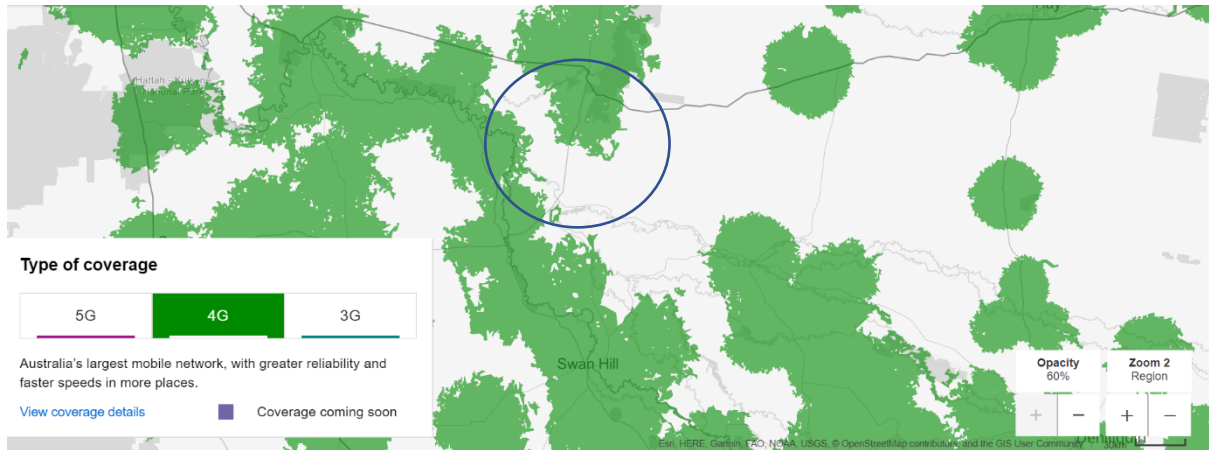


Figure 5: Telstra 4G mobile network coverage in the approximate Project Area

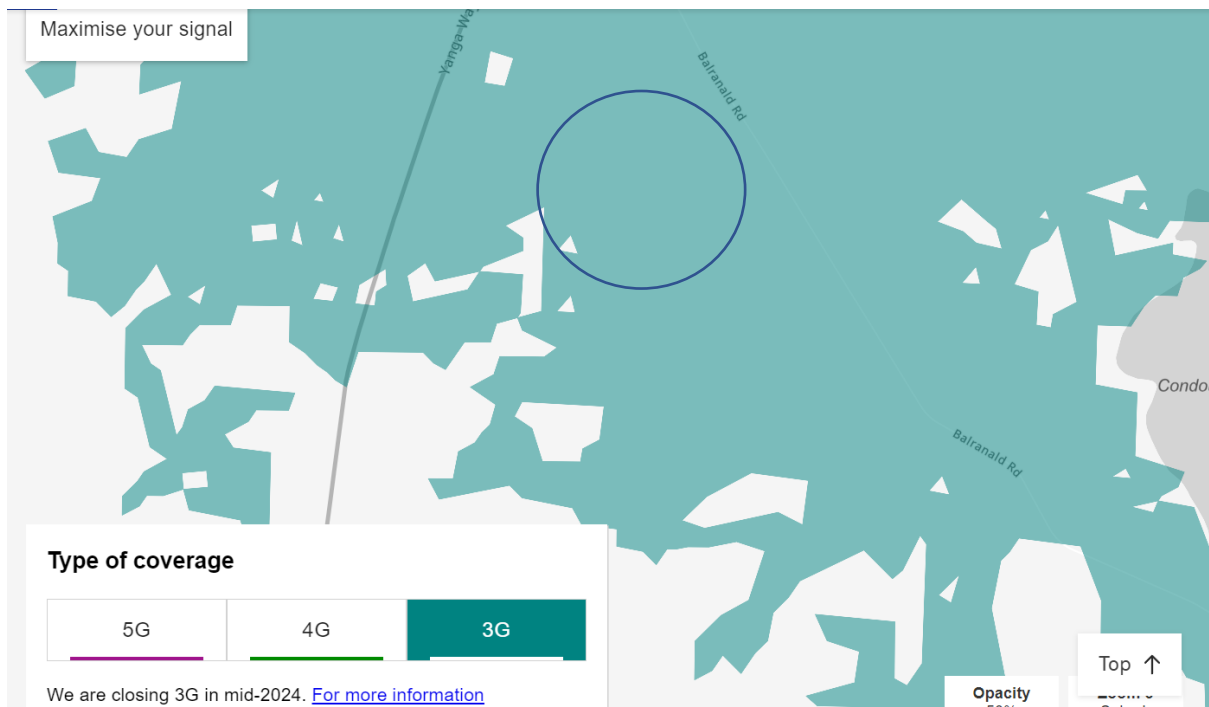


Figure 6: Telstra 3G mobile network coverage in the approximate Project Area

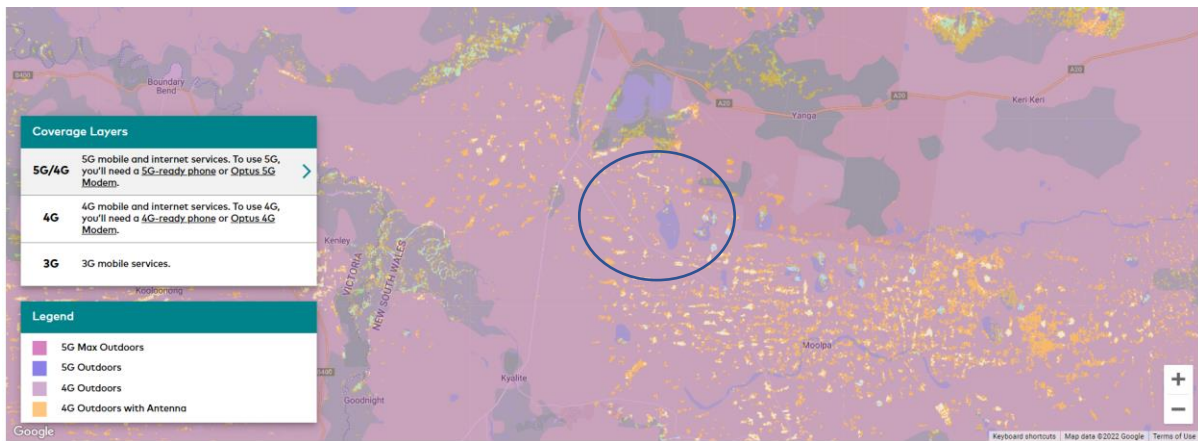


Figure 7: Optus mobile network coverage in the approximate Project Area

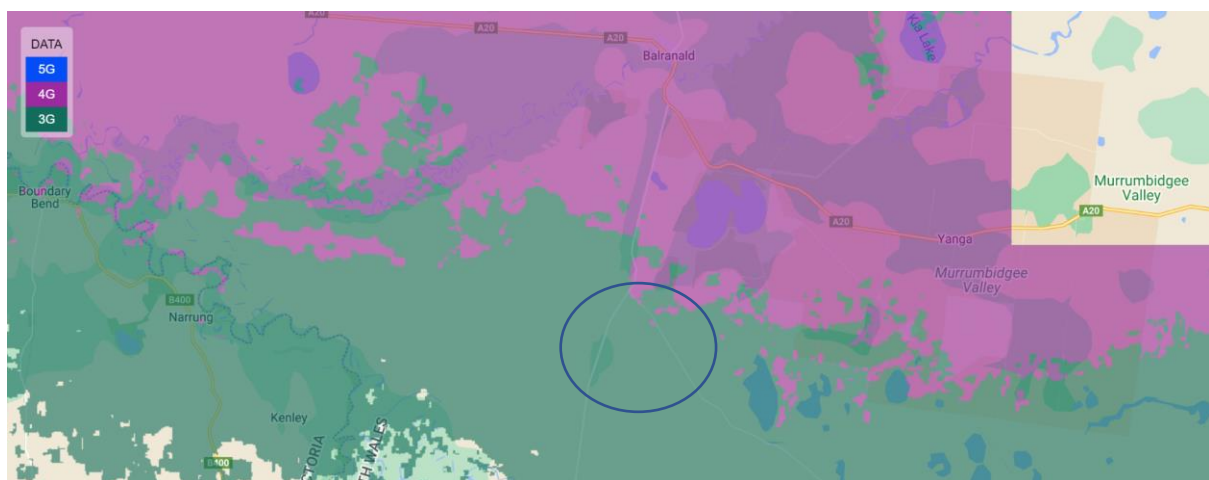


Figure 8: Vodafone mobile network coverage in the approximate Project Area

5.5 Wireless and satellite internet services

Satellite services will only be impacted where receivers are sited in close proximity to turbines, impeding their view of the sky. These satellites typically provide pay-tv, wireless internet, and satellite phone coverage, as well as TV coverage where there is no terrestrial service available.

As shown in Figure 9, there are two dwellings within 2 km of the turbine layout or the Project Area.

There is a low to moderate likelihood these dwellings may experience some degradation of satellite services. As these dwellings are involved with the Project, management of any satellite services impact will be arranged privately between the Proponent and the associated landowner.

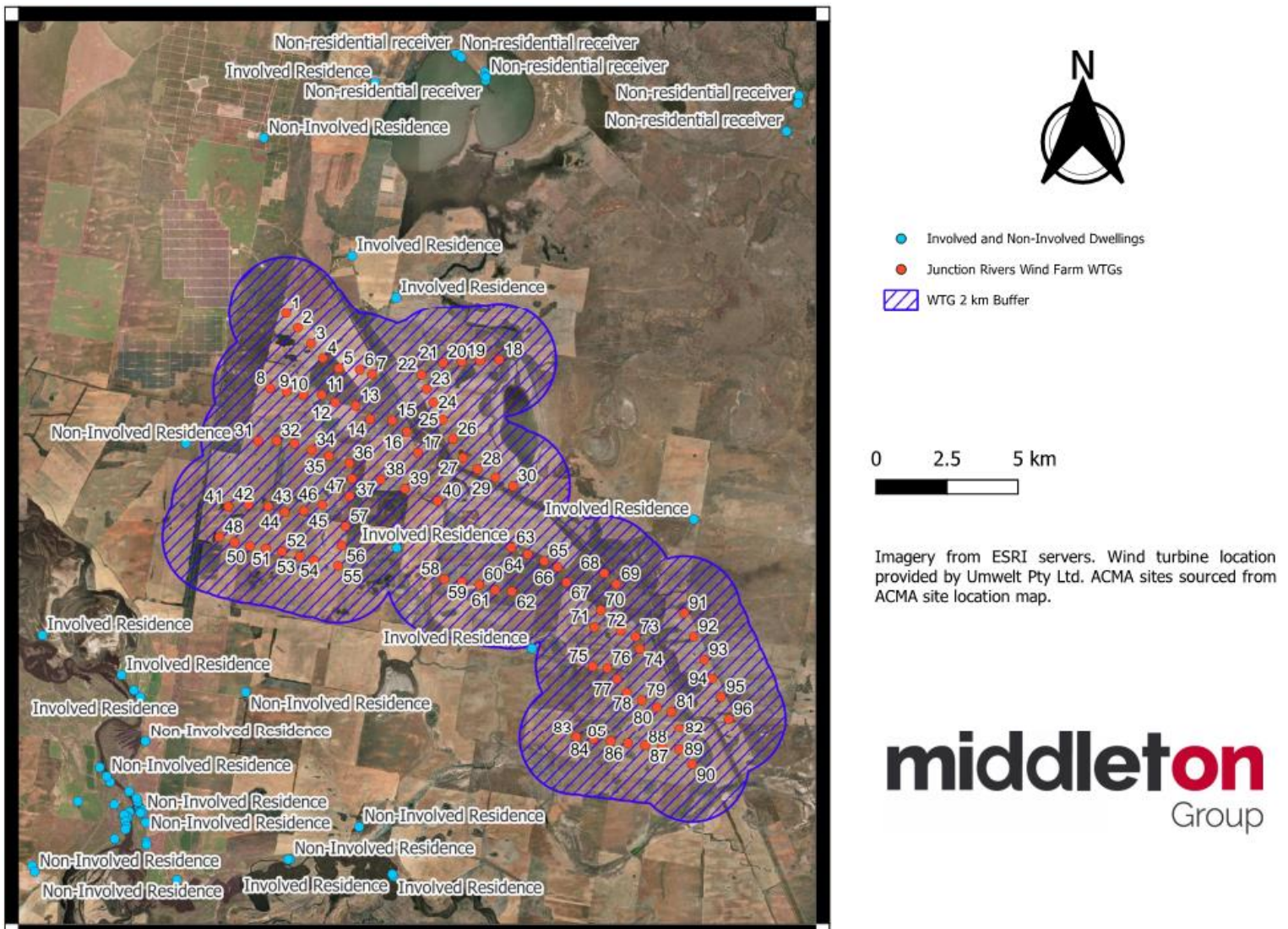


Figure 9: Dwellings located nearby the Project.

5.6 Trigonometrical Station and GPS

Trigonometrical stations and survey marks are observation marks used for surveying or distance measuring purposes. GPS antennas and Electronic Distance Measuring (EDM) devices may be installed at some Trigonometrical stations.

5.6.1 Survey Marks & Electronic Distance Measuring

The performance of the EDM devices depends on the type of wavelength bands used. The current EDM devices operate by using three different wavelength bands: microwave systems, infrared systems, and light wave systems. Microwave systems have a measurement range of up to 150 km and are not limited to line of sight or visibility. The infrared systems and light wave systems can measure a range 3 – 5 km, but accuracy may be limited by the line of sight or visibility [7]. If a line-of-sight blockage occurs, moving laterally one to two metres will typically alleviate the line-of-sight blockage. In addition, the presence of turbines will typically assist with sight navigation, providing fixed reference points.

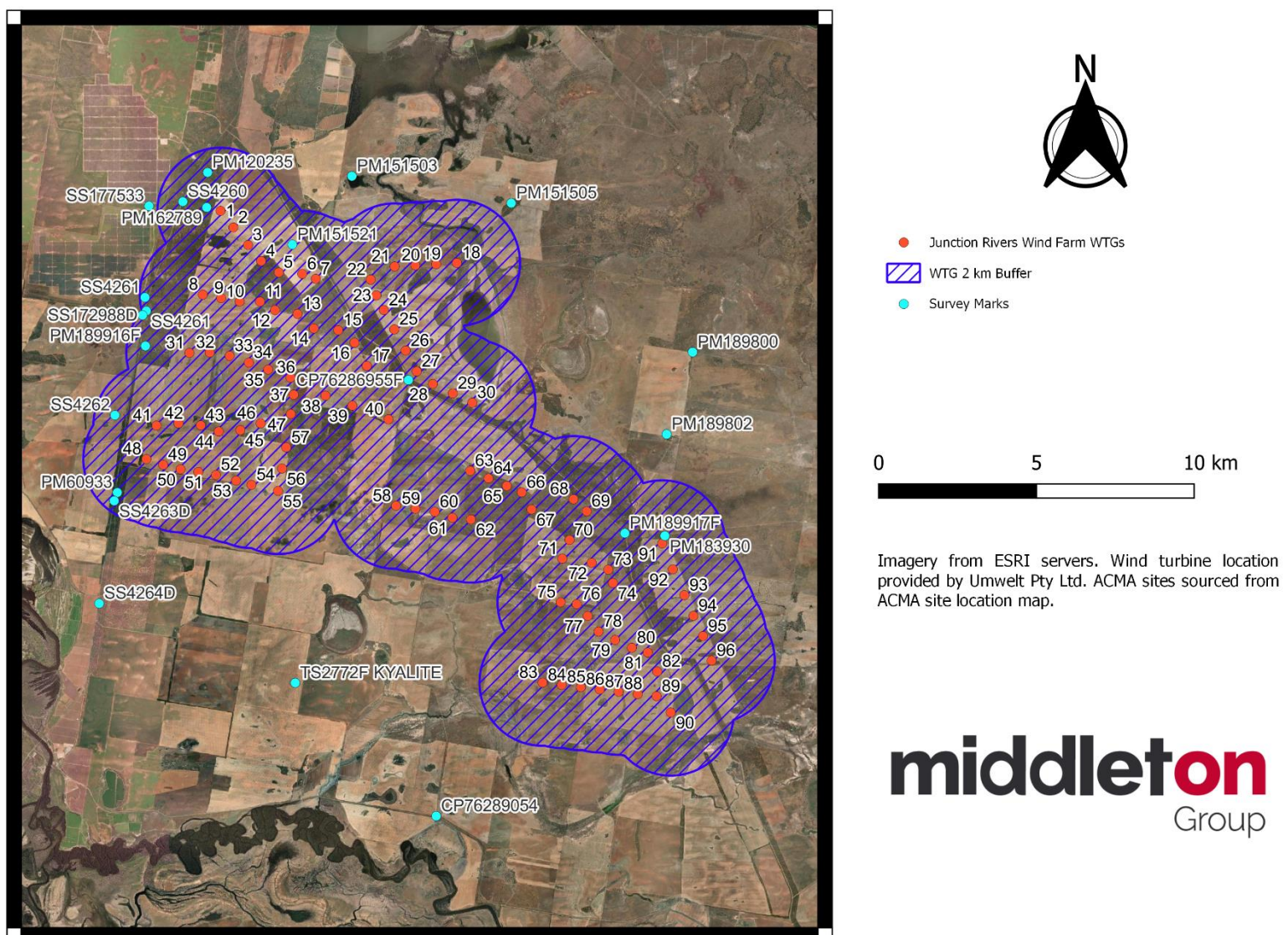


Figure 10: Survey marks within the vicinity of the Project area

A review on the location of all survey marks has been completed, and the findings are summarised as the below:

- There is no proposed wind turbine location that shares the same location as a survey mark.
- The closest distance between a survey mark and a wind turbine (WTG54) is approximately 355 m, as shown in Figure 10.
- Site works will need to be designed to avoid the survey marks, or, alternatively, seek assistance from a registered surveyor to move or remove the survey marks.

The wind farm construction could potentially physically impact these survey marks. If this is likely to occur the Proponent should consult with the NSW Government via the [Spatial Services Website](#). As stated above, assistance from a registered surveyor may be required.

Global Navigation Satellite System (GNSS) networks are operated and maintained across the Australian region and the South Pacific. This includes the Australian Regional GNSS Network (ARGN), the South Pacific Regional GNSS Network (SPRGN) and the AuScope Network. GNSS networks provide the geodetic framework for the spatial data infrastructure in Australia and its territories. Data from the GNSS Network also contributes to the International GNSS Service (IGS). Typically, wind farms have little impact on GNSS sites connection to satellites unless they are in close proximity.

Geoscience Australia have confirmed the Project will have no impact on their network.



5.7 Broadcast and Digital Radio and Television

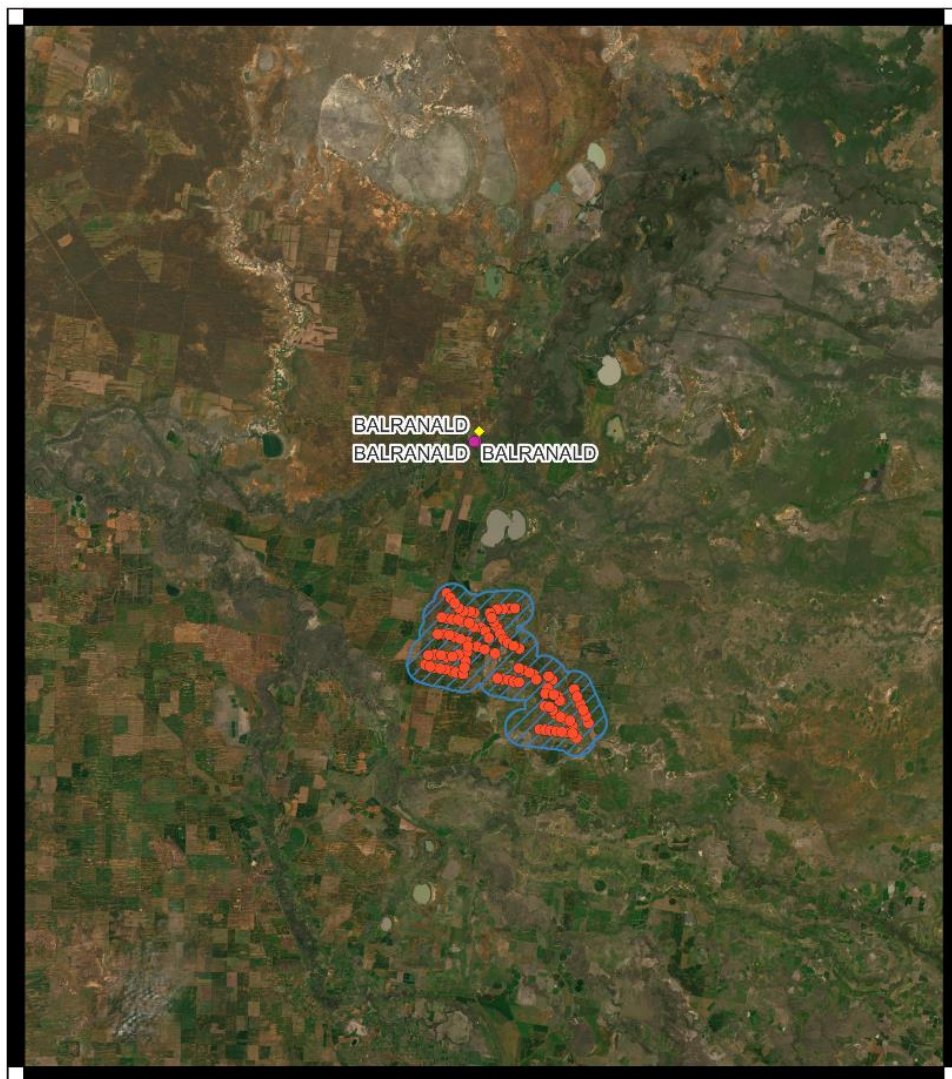
Amplitude Modulation (AM) signals are long wave signals. Operating wind turbines can influence the radiating patterns, with the potential to result in reduced signal quality and strength, as well as causing interference at neighbouring frequencies. A 2 km radius consultation zone exists around AM transmitters. The field of influence from the receiver's perspective is in the order of tens of metres.

Frequency modulated (FM) signals tend to be more robust around obstructions such as buildings and wind farms. At the edge of their transmission range, where the signal to noise ratio is already quite low, wind turbines can have an adverse influence on the signal. A 1 km radius consultation zone exists around FM radio transmitters.

Digital signals tend to be more robust than analogue signals. A 2 km radius is generally desirable around transmitters – for both digital radio (DAB) and Digital Television (DTV). Digital signals are more robust against ghosting, though wind turbine rotor pass can cause signal frequency variation.

As can be seen in Figure 12, no AM, FM, or DTV are located within the 2 km radius of the WTGs. No digital radio (DAB) and Temporary Licence transmitters (TEMP) were identified in the vicinity of the Project Area.

If issues are encountered with television reception, this is most readily mitigated by readjusting the receptor, to capture signal from an alternative transmitter.



- Final WTGs Layout
- ▨ WTGs 2km Buffer
- Broadcast
 - FM 2023 GDA54
 - DTV 2023 GDA54

0 5 10 km

Imagery from ESRI servers. Wind turbine location provided by Umwelt. ACMA sites sourced from ACMA site location map.

middleton
Group

Figure 12: Location of broadcasters relative to the Project.

6 Stakeholder Engagement

Consultation and engagement with stakeholders were initiated by Middleton Group. A list of key stakeholders is presented below. Responses from these stakeholders are provided in Appendix A.

A summary of the engagement is listed below:

- Ambulance Service of NSW have expressed no concerns about impacts to their network. This is shown in Appendix A.1.
- Telstra did not respond to Middleton Group emails. Consultant sent to Telstra is in Appendix A.5.
- Optus has expressed no concerns about impacts to their network. This is shown in Appendix A.2.
- The BoM have stated that the Project would have manageable impact on their weather radar network, in normal weather conditions. The BoM have identified conditional agreement to the Project with some minor management conditions. BoM's provisional acceptance of the proposed wind farm is satisfactory for this report. This is show in Appendix A.3. Windlab will meet the BoM's conditions, any further details of private agreement between Windlab and the BoM in relation to any operational management measures for the Project is not included in this report.
- Geoscience Australia has confirmed that the proposed wind farm will cause no impact on their trigonometrical stations and Global Navigation Satellite System (GNSS) reference stations or associated assets. This is show in Appendix A.4.

7 Conclusions

The potential electromagnetic interference impact of the Junction Rivers Wind Project has been assessed in this report.

Based on analysis and consultation with key stakeholders, the Project will have no material impact on:

- Point-to-point microwave links.
- Meteorological radar.
- Mobile voice-based communications.
- Wireless and satellite internet services.
- Broadcast and digital radio.
- Broadcast, digital and satellite television.
- Trigonometry stations; and
- GPS.

The BoM have stated that the Project will have manageable impact on its assets in normal atmospheric/propagation conditions. As such, the BoM conditionally agree to this Project. The Project will commit to the Bureau's conditions, provided in Appendix A.3.

Consistent with the Wind Energy Guideline for State Significant Development [2] the Proponent has undertaken consultation with potentially affected stakeholders. Stakeholder correspondence is appended to this report.

The final findings are that the Project has been designed, located, and sited to avoid, or minimise electromagnetic interference to pre-existing television, radar and radio transmission and reception.

8 Normative References

- [1] NSW Department of Planning and Infrastructure, “NSW Planning Guidelines: Wind Farms,” State of New South Wales through the Department of Planning & Infrastructure, 2011.
- [2] NSW Department of Planning and Environment, “Wind Energy Guideline for State Significant Development,” 2016.
- [3] D. Bacon, “Fixed-link wind-turbine exclusion zone method,” Radiocommunications Agency UK, 2002.
- [4] G. Durgin, “The Practical Behavior of Various Edge-Diffraction Formulas,” *IEEE Antennas and Propagation Magazine*, vol. 51, no. 3, pp. 24-35, 2009.
- [5] Commission for Instruments and Methods of Observation, “WMO Guidance Paper on Weather Radar/Wind Turbine Siting,” World Meteorological Organisation, Helsinki, 2010.
- [6] O. Il, “Impact of Wind Turbines on Weather Radars,” 2006.
- [7] Satheesh Gopi, R. Sathikumar, N. Madhu, “8.3 EDM Instrument Characteristics,” in *Advanced Surveying: Total Station, Gis and Remote Sensing*, Pearson, 2006.
- [8] G. Australia, “GNSS Network Map,” Geoscience Australia, [Online]. Available: <https://gnss.ga.gov.au/network>. [Accessed 25 05 2021].
- [9] I. Angulo, D. de la Vega, I. Cascón, J. Cañizo, Y. Wu, D. Guerra, P. Angueira, “Impact analysis of wind farms on telecommunication services,” *Renewable and Sustainable Energy Reviews*, vol. 32, pp. 84-99, 2014.
- [10] B S Randhawa, R Rudd, “RF Measurement Assessment of Potential Wind Farm Interference to Fixed Links and Scanning Telemetry Devices,” OFCOM, Dorset, 2009.
- [11] “Statement of the OPERA group on the cohabitation between weather radars and wind turbines,” in *OPERA group*, 2006.

Appendix A Stakeholder Correspondence and Responses

Appendix A.1 Ambulance Service of NSW

Ramez Barakat

From: Eric Bendtsen
Sent: Wednesday, 31 May 2023 5:21 PM
To: Ramez Barakat
Subject: FW: Burrawong Wind Farm – Ambulance Service of NSW EMI Consultation

FYI

Eric Bendtsen | Power Engineer | **middleton** Group
M: +61 409 850 842 | **E:** eric.bendtsen@middletongroup.com.au



Middleton Group acknowledges the Traditional Custodians of country throughout Australia and their connections to land, sea and community. We pay our respect to their Elders past, present and emerging and extend that respect to all Aboriginal and Torres Strait Islander people today.

From: Eric Bendtsen <eric.bendtsen@middletongroup.com.au>
Sent: Friday, May 26, 2023 3:45 PM
To: Jason Youl (NSW Ambulance) <Jason.Youl@health.nsw.gov.au>
Cc: Simon Morgan (NSW Ambulance) <Simon.Morgan@health.nsw.gov.au>; James O'Hehir (NSW Ambulance) <James.OHehir@health.nsw.gov.au>; Mark Garner (NSW Ambulance) <Mark.Garner@health.nsw.gov.au>
Subject: RE: Burrawong Wind Farm – Ambulance Service of NSW EMI Consultation

Fantastic, thank you

Eric Bendtsen | Power Engineer | **middleton** Group
M: +61 409 850 842 | **E:** eric.bendtsen@middletongroup.com.au



Middleton Group acknowledges the Traditional Custodians of country throughout Australia and their connections to land, sea and community. We pay our respect to their Elders past, present and emerging and extend that respect to all Aboriginal and Torres Strait Islander people today.

From: Jason Youl (NSW Ambulance) <Jason.Youl@health.nsw.gov.au>
Sent: Friday, May 26, 2023 3:36 PM
To: Eric Bendtsen <eric.bendtsen@middletongroup.com.au>
Cc: Simon Morgan (NSW Ambulance) <Simon.Morgan@health.nsw.gov.au>; James O'Hehir (NSW Ambulance) <James.OHehir@health.nsw.gov.au>; Mark Garner (NSW Ambulance) <Mark.Garner@health.nsw.gov.au>
Subject: RE: Burrawong Wind Farm – Ambulance Service of NSW EMI Consultation

Eric,

NSW Ambulance have no concerns with the proposed wind farm layout.

Regards,

Jason

From: Eric Bendtsen <eric.bendtsen@middletongroup.com.au>
Sent: Friday, May 26, 2023 2:38 PM
To: Jason Youl (NSW Ambulance) <Jason.Youl@health.nsw.gov.au>
Cc: Simon Morgan (NSW Ambulance) <Simon.Morgan@health.nsw.gov.au>; James O'Hehir (NSW Ambulance) <James.OHehir@health.nsw.gov.au>; Mark Garner (NSW Ambulance) <Mark.Garner@health.nsw.gov.au>
Subject: RE: Burrawong Wind Farm – Ambulance Service of NSW EMI Consultation

Hi Jason,

Thank you for confirming. It seemingly didn't appear on the ACMA database when we checked, but it is clearly there now.

I would like to flag that there's been a minor change in WTG layout since our earlier correspondence, but none of the change is near the NSW Ambulance link. See attached WTG locations for your information.

Let me know if you have any concerns regarding this proposed wind farm. We will otherwise consider that NSW Ambulance accept the proposed WTG layout.

Regards,

Eric Bendtsen | Power Engineer | **middleton** Group
M: +61 409 850 842 | **E:** eric.bendtsen@middletongroup.com.au



Middleton Group acknowledges the Traditional Custodians of country throughout Australia and their connections to land, sea and community. We pay our respect to their Elders past, present and emerging and extend that respect to all Aboriginal and Torres Strait Islander people today.

From: Jason Youl (NSW Ambulance) <Jason.Youl@health.nsw.gov.au>
Sent: Wednesday, May 17, 2023 4:59 PM
To: Eric Bendtsen <eric.bendtsen@middletongroup.com.au>
Cc: Simon Morgan (NSW Ambulance) <Simon.Morgan@health.nsw.gov.au>; James O'Hehir (NSW Ambulance) <James.OHehir@health.nsw.gov.au>; Mark Garner (NSW Ambulance) <Mark.Garner@health.nsw.gov.au>
Subject: RE: Burrawong Wind Farm – Ambulance Service of NSW EMI Consultation

Good Afternoon Eric

Apologies for the late reply.

I can confirm that the licence 1433364/1 and the associated link is still in use by NSW Ambulance and will be for the foreseeable future.

If you have any further questions, please feel free to email me directly

Regards,

Jason Youl

Project Manager | Property | Spectrum | Access |
Information and Digital Services | Finance and Corporate Services

Building 22C, Norton Manning Dr Gladesville (Gladesville Hospital - Off Victoria Rd)
m: 0422 115 131

www.ambulance.nsw.gov.au



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Views expressed in this message are those of the individual sender, and are not necessarily the views of NSW Health or any of its entities

From: Eric Bendtsen [<mailto:eric.bendtsen@middletongroup.com.au>]
Sent: Monday, 15 May 2023 5:36 PM
To: AMBULANCE-GeneralEnquiry <AMBULANCE-GeneralEnquiry@health.nsw.gov.au>
Cc: Lachlan Sweeney <lsweeney@umwelt.com.au>; Tim Stuckey <tim.stuckey@windlab.com>; Lisa Caruso <lisa.caruso@windlab.com>
Subject: RE: Burrawong Wind Farm – Ambulance Service of NSW EMI Consultation

You don't often get email from eric.bendtsen@middletongroup.com.au. [Learn why this is important](#)

To whom it may concern,

A important follow up on this email. Please review the previous email for context.

Our recent analysis shows that the communication link referred to below (License number 1433364/1) has been removed.

As such, there is no impact of this proposed wind farm on the Ambulance Service of NSW telecommunications.

We would greatly appreciate confirmation of this by 29/05/2023.

Best Regards,

Eric Bendtsen | Power Engineer | **middleton** Group
M: +61 409 850 842 | **E:**



Middleton Group acknowledges the Traditional Custodians of country throughout Australia and their connections to land, sea and community. We pay our respect to their Elders past, present and emerging and extend that respect to all Aboriginal and Torres Strait Islander people today.

From: Eric Bendtsen
Sent: Tuesday, January 10, 2023 2:35 PM
To: Ambulance-GeneralEnquiry@health.nsw.gov.au
Cc: Lachlan Sweeney <lsweeney@umwelt.com.au>; Tim Stuckey <tim.stuckey@windlab.com>; Lisa Caruso <lisa.caruso@windlab.com>
Subject: Burrawong Wind Farm – Ambulance Service of NSW EMI Consultation

To whom it may concern,

We are conducting an early-stage consultation for the proposed Burrawong Wind Farm, focussing on Electro-Magnetic Interference (EMI). An environmental impact statement is being prepared for the state significant development project (SSD-30448824) by Umwelt Environmental and Social Consultants. The proponent for the wind farm is Windlab.

The Wind Farm is located approximately 15 km south of Balranald, 5 km west of Moolpa in the Murrumbidgee Valley region of New South Wales.

We note that your organisation has one licensed communication link which passes through the proposed project boundary, License number 1433364/1.

Based on our analysis, from a bird's eye the edge of the closest wind turbine (Turbine 11) will come within 27 metres of the second Fresnel Zone. Wind Turbines 4, 5, 21, 22, 33 and 42 are also nearby but positioned further from the link's second Fresnel Zone. The Turbines should not reduce the performance of the wireless link, as per typical industry standards. The image below demonstrates this for turbines respectively.



We append the wind turbine co-ordinates in .csv and .kml format. Note that the rotor diameter of the turbines will be up to 200 m, with a tip height of 300 m.

If you have any concerns relating to the development and any potential impacts on your communication links, please get in contact by return email or by calling us on the phone number listed below prior to 14th February 2023

Kind Regards,

Eric Bendtsen
MEng (Electrical)

Appendix A.2 Optus

Ramez Barakat

From: Eric Bendtsen
Sent: Wednesday, 31 May 2023 5:22 PM
To: Ramez Barakat
Subject: FW: Burrawong Wind Farm – Optus EMI Consultation

FYI

Eric Bendtsen | Power Engineer | **middleton** Group
M: +61 409 850 842 | **E:** eric.bendtsen@middletongroup.com.au



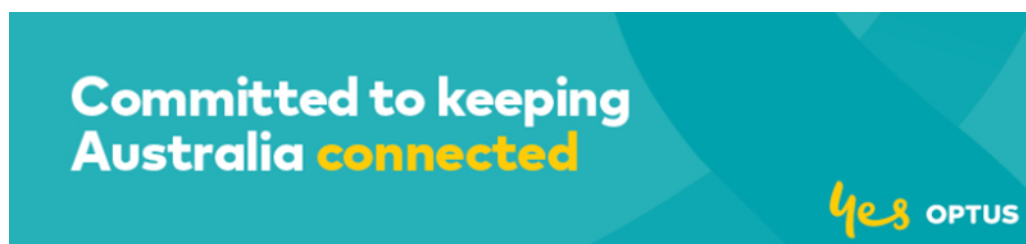
Middleton Group acknowledges the Traditional Custodians of country throughout Australia and their connections to land, sea and community. We pay our respect to their Elders past, present and emerging and extend that respect to all Aboriginal and Torres Strait Islander people today.

From: EME Enquiries <emeenquiries@optus.com.au>
Sent: Thursday, January 12, 2023 3:25 PM
To: Eric Bendtsen <eric.bendtsen@middletongroup.com.au>; EME Enquiries <emeenquiries@optus.com.au>
Cc: Lachlan Sweeney <lsweeney@umwelt.com.au>; Tim Stuckey <tim.stuckey@windlab.com>; Lisa Caruso <lisa.caruso@windlab.com>
Subject: RE: Burrawong Wind Farm – Optus EMI Consultation

Eric

Optus has no concerns about impacts from the proposal.

EME Enquiries | Mobile Deployment | Optus
e: emeenquiries@optus.com.au



From: Eric Bendtsen <eric.bendtsen@middletongroup.com.au>
Sent: Tuesday, 10 January 2023 2:37 PM
To: EME Enquiries <emeenquiries@optus.com.au>
Cc: Lachlan Sweeney <lsweeney@umwelt.com.au>; Tim Stuckey <tim.stuckey@windlab.com>; Lisa Caruso <lisa.caruso@windlab.com>
Subject: Burrawong Wind Farm – Optus EMI Consultation

[External email] Please be cautious when clicking on any links or attachments.

To whom it may concern,

We are conducting an early-stage consultation for the proposed Burrawong Wind Farm, focussing on Electro-Magnetic Interference (EMI). An environmental impact statement is being prepared for the state significant development project (SSD-30448824) by Umwelt Environmental and Social Consultants. The proponent for the wind farm is Windlab.

The Wind Farm is located approximately 15 km south of Balranald, 5 km west of Moolpa in the Murrumbidgee Valley region of New South Wales. We have attached both a Google Earth .kml file of the wind farm layout and a .csv file contain the wind turbine co-ordinates in GDA94 Zone 54, noting that the rotor diameter of the Proponent's turbines will be up to 200 m with a maximum tip height of 300 m.

We note that all installations on the wind farm will comply with the Radiocommunications Act (1992) and associated notices.

If you have any concerns relating to the development and any potential impacts on your mobile coverage, please get in contact by return email or by calling us on the phone number listed below prior to 14th February 2023

Regards,

Eric Bendtsen

MEng (Electrical)

Power Engineer

M: +61 409 850 842 | **E:** eric.bendtsen@middletongroup.com.au

L10, 350 Collins Street Melbourne, VIC 3000 | **W:** www.middletongroup.com.au



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Appendix A.3 Bureau of Meteorology

Ramez Barakat

From: Eric Bendtsen
Sent: Wednesday, 31 May 2023 5:25 PM
To: Ramez Barakat
Subject: FW: Burrawong Wind Farm – Bureau of Meteorology EMI Consultation [SEC=OFFICIAL]

FYI

Eric Bendtsen | Power Engineer | **middleton** Group
M: +61 409 850 842 | **E:** eric.bendtsen@middletongroup.com.au



Middleton Group acknowledges the Traditional Custodians of country throughout Australia and their connections to land, sea and community. We pay our respect to their Elders past, present and emerging and extend that respect to all Aboriginal and Torres Strait Islander people today.

From: Muhammad Afzal <Muhammad.Afzal@bom.gov.au>
Sent: Thursday, January 19, 2023 11:19 AM
To: Eric Bendtsen <eric.bendtsen@middletongroup.com.au>; windfarmenquiries <windfarmenquiries@bom.gov.au>
Cc: Lachlan Sweeney <lsweeney@umwelt.com.au>; Tim Stuckey <tim.stuckey@windlab.com>; Lisa Caruso <lisa.caruso@windlab.com>
Subject: RE: Burrawong Wind Farm – Bureau of Meteorology EMI Consultation [SEC=OFFICIAL]

Hi Eric,

We have finalized our assessment through desktop analysis for the proposed Burrawong windfarm.

The assessment shows manageable impact on the Bureau of Meteorology's assets, specifically on its weather radar network, in normal atmospheric/propagation conditions. As such, the Bureau could conditionally agree to this project.

The Bureau requires a letter from the farm developer/owner to acknowledge that the operation of the proposed wind farm will include the following commitments:

1. Informing the Bureau of significant variation in turbine layout (i.e. by more than 100 m in any lateral direction, or alteration of tip height) between the initial plan and construction.
2. Providing advance notice (one week preferably) to the Bureau of any planned wind farm shutdown events for more than 12 hours, to allow the recalibration of radar systems.
3. Collaborate with the Bureau in the event of severe weather conditions to assist in endeavour of community safety.

Please let me know if you need any further information related to this assessment.

Regards,

Muhammad Usman Afzal (Ph.D)
Spectrum Engineer
Observing Systems and Operations Program, Data and Digital Group
M: 0420 696 374
Level 15, 300 Elizabeth St, Surry Hills, NSW 2000



From: Muhammad Afzal <Muhammad.Afzal@bom.gov.au>
Sent: Tuesday, 10 January 2023 5:35 PM
To: Eric Bendtsen <eric.bendtsen@middletongroup.com.au>; windfarmenquiries <windfarmenquiries@bom.gov.au>
Cc: Lachlan Sweeney <lsweeney@umwelt.com.au>; Tim Stuckey <tim.stuckey@windlab.com>; Lisa Caruso <lisa.caruso@windlab.com>
Subject: RE: Burrawong Wind Farm – Bureau of Meteorology EMI Consultation [SEC=OFFICIAL]

Dear Eric,

Thanks for the email. I can confirm that we have received the email and relevant data/files we need to carry out our assessment of the proposed wind farm. We will get back to you with our results in 2 – 3 weeks.

Kind Regards,

Muhammad Usman Afzal (Ph.D)
Spectrum Engineer
Observing Systems and Operations Program, Data and Digital Group
M: 0420 696 374
Level 15, 300 Elizabeth St, Surry Hills, NSW 2000
muhammad.afzal@bom.gov.au | www.bom.gov.au



From: Eric Bendtsen <eric.bendtsen@middletongroup.com.au>
Sent: Tuesday, 10 January 2023 2:36 PM
To: windfarmenquiries <windfarmenquiries@bom.gov.au>
Cc: Lachlan Sweeney <lsweeney@umwelt.com.au>; Tim Stuckey <tim.stuckey@windlab.com>; Lisa Caruso <lisa.caruso@windlab.com>
Subject: Burrawong Wind Farm – Bureau of Meteorology EMI Consultation

To whom it may concern,

We are conducting an early-stage consultation for the proposed Burrawong Wind Farm, focussing on Electro-Magnetic Interference (EMI). An environmental impact statement is being prepared for the state significant development project (SSD-30448824) by Umwelt Environmental and Social Consultants. The proponent for the wind farm is Windlab.

The Wind Farm is located approximately 15 km south of Balranald, 5 km west of Moolpa in the Murrumbidgee Valley region of New South Wales.

As a result of our assessment, three (3) sites have been identified as per below:

- Hillston Meteor 735CDP (C-Band, Doppler and Dual Pol enabled)
- Mildura Meteor 735CDP (C-Band, Doppler and Dual Pol enabled)
- Rainbow Meteor 735C (C-Band, Doppler and Dual Pol enabled)

The closest radar, in Rainbow Victoria, is located 183 km from the closest turbine. The other two radars, Mildura, and Hillston are located 187 km and 227 km away respectively. Our mapping results show that Burrawong Wind Farm project is in the overlapping area of these radars.

Based on our analysis of the coverage area of Bureau radars and the WMO guidance document (WMO -No.1064, Annex VI Table), we do not anticipate that the wind farm will significantly impact the radar operation. We have attached both a Google Earth .kml file of the wind farm layout and a .csv file containing the wind turbine coordinates in GDA94 Zone 54, noting that the rotor diameter of the Proponent's turbines will be up to 200 m with a maximum tip height of 300 m.

If you have any concerns relating to the development and any potential impacts on your communication links, please get in contact by return email or by calling us on the phone number listed below prior to 14th February 2023

Regards,

Eric Bendtsen

MEng (Electrical)

Power Engineer

M: +61 409 850 842 | **E:** eric.bendtsen@middletongroup.com.au

L10, 350 Collins Street Melbourne, VIC 3000 | **W:** www.middletongroup.com.au



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Appendix A.4 Geoscience Australia

Ramez Barakat

From: Eric Bendtsen
Sent: Wednesday, 31 May 2023 5:22 PM
To: Ramez Barakat
Subject: FW: CLIENT ENQUIRY Burrawong Wind Farm - Geoscience Australia EMI Consultation [SEC=OFFICIAL]

FYI

Eric Bendtsen | Power Engineer | **middleton** Group
M: +61 409 850 842 | **E:** eric.bendtsen@middletongroup.com.au



Middleton Group acknowledges the Traditional Custodians of country throughout Australia and their connections to land, sea and community. We pay our respect to their Elders past, present and emerging and extend that respect to all Aboriginal and Torres Strait Islander people today.

From: Ryan Ruddick <Ryan.Ruddick@ga.gov.au>
Sent: Monday, January 16, 2023 9:44 AM
To: Eric Bendtsen <eric.bendtsen@middletongroup.com.au>
Cc: Client Services <ClientServices@ga.gov.au>; tim.stuckey@windlab.com; lsweeney@umwelt.com.au; lisa.caruso@windlab.com; GA GNSS Operations <gnss@ga.gov.au>
Subject: RE: CLIENT ENQUIRY Burrawong Wind Farm - Geoscience Australia EMI Consultation [SEC=OFFICIAL]

Hi Eric.

Geoscience Australia do not foresee any impact from EMI on our GNSS infrastructure or trigonometrical stations as a result of the proposed Burrawong Wind Farm.

Kind regards,

Ryan Ruddick | Director
GNSS Infrastructure and Informatics Section | Positioning Australia
Space Division

t +61 2 6249 9426 **m** +61 429 771 069 ga.gov.au

The Geoscience Australia logo, featuring the text "Geoscience Australia" in a bold, white sans-serif font, with the tagline "Earth sciences for Australia's future" in a smaller, lighter font underneath. The logo is set against a dark teal background with a wavy, abstract pattern on the right side.

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Geoscience Australia acknowledges the traditional owners and custodians of Country throughout Australia and acknowledges their continuing connection to land, waters and community. We pay our respects to the people, the cultures and the elders past and present.

From: Client Services <ClientServices@ga.gov.au>
Sent: Tuesday, 10 January 2023 2:52 PM
To: Ryan Ruddick <Ryan.Ruddick@ga.gov.au>
Subject: FW: CLIENT ENQUIRY Burrawong Wind Farm - Geoscience Australia EMI Consultation [SEC=OFFICIAL]

Hi Ryan,

Please see the request below and attached querying whether a proposed wind farm will interfere with GA's nearby equipment.

Could you please copy us in on your response so we can track the enquiry's progress.

Thank you!

Louise

Louise Soroka | Public Programs & Spaces Officer
Office of the Chief Scientist

t +61 2 6249 9256 ga.gov.au



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Geoscience Australia acknowledges the traditional owners and custodians of Country throughout Australia and their continuing connection to land, waters and community.
We pay our respects to the people, the cultures and the Elders past and present.

From: Eric Bendtsen <eric.bendtsen@middletongroup.com.au>
Sent: Tuesday, 10 January 2023 2:36 PM
To: Client Services <ClientServices@ga.gov.au>
Cc: Tim Stuckey <tim.stuckey@windlab.com>; Lachlan Sweeney <lsweeney@umwelt.com.au>; Lisa Caruso <lisa.caruso@windlab.com>
Subject: Burrawong Wind Farm - Geoscience Australia EMI Consultation

To Whom it May Concern,

We are conducting an early-stage consultation for the proposed Burrawong Wind Farm, focussing on Electro-Magnetic Interference (EMI). An environmental impact statement is being prepared for the state significant development project (SSD-30448824) by Umwelt Environmental and Social Consultants. The proponent for the wind farm is Windlab. Our consultation particularly relates to potential impact on survey marks and GNSS stations.

The Wind Farm is located approximately 15 km south of Balranald, 5 km west of Moolpa in the Murrumbidgee Valley region of New South Wales. We have attached both a Google Earth .kml file of the wind farm layout and a .csv file contain the wind turbine co-ordinates in GDA94 Zone 54, noting that the rotor diameter of the Proponent's turbines will be up to 200 m with a maximum tip height of 300 m.

If you have any concerns relating to the development and any potential impacts on your communication links, please get in contact by return email or by calling us on the phone number listed below prior to 14th February 2023

Kind regards,

Eric Bendtsen
MEng (Electrical)
Power Engineer

M: +61 409 850 842 | **E:** eric.bendtsen@middletongroup.com.au
L10, 350 Collins Street Melbourne, VIC 3000 | **W:** www.middletongroup.com.au



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Appendix A.5 Telstra

Eric Bendtsen

From: Eric Bendtsen
Sent: Tuesday, 10 January 2023 2:38 PM
To: 'windfarmassessmentrequests@team.telstra.com'
Cc: Lachlan Sweeney; Tim Stuckey; Lisa Caruso
Subject: Burrawong Wind Farm - Telstra EMI Consultation
Attachments: 20221019_Burrawong_RevL_WTGLayout_Coordinates_BM.xlsx; 20221013_Burrawong_Rev L_99WTG_PointsOnly_BM.kml

To whom it may concern,

We are conducting an early-stage consultation on Electro-Magnetic Interference (EMI) for the Burrawong Wind Farm on Behalf of Umwelt.

The Wind Farm is located approximately 15 km south of Balranald, 5 km west of Moolpa in the Murrumbidgee Valley region of New South Wales. We have attached both a Google Earth .kml file of the wind farm layout and a .csv file contain the wind turbine co-ordinates in GDA94 Zone 54, noting that the rotor diameter of the Proponent's turbines will be up to 200 m with a maximum tip height of 300 m.

We note that all installations on the wind farm will comply with the Radiocommunications Act (1992) and associated notices.

If you have any concerns relating to the development and any potential impacts on your mobile coverage, please get in contact by return email or by calling us on the phone number listed below prior to 14th February 2023

Regards,

Eric Bendtsen

MEng (Electrical)

Power Engineer

M: +61 409 850 842 | **E:** eric.bendtsen@middletongroup.com.au

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Eric Bendtsen

From: Eric Bendtsen
Sent: Monday, 25 March 2024 4:11 PM
To: ! Windfarm Assessment Requests
Subject: Junction Rivers Wind Farm - Telstra EMI Consultation
Attachments: WTG Layout KML.kml; Junction Rivers Wind Farm Turbine Locations_25_03_2024.csv

To whom it may concern,

We are conducting an early-stage consultation on Electro-Magnetic Interference (EMI) for the Junction Rivers Wind Farm on Behalf of Umwelt.

The Wind Farm is located approximately 17 km south of Balranald, 5 km west of Moolpa in the Murrumbidgee Valley region of New South Wales. We have attached both a Google Earth .kml file of the wind farm layout and a .csv file contain the wind turbine co-ordinates in GDA94 Zone 54, noting that the rotor diameter of the Proponent's turbines will be up to 172 m with a maximum tip height of 256 m.

We note that all installations on the wind farm will comply with the Radiocommunications Act (1992) and associated notices.

If you have any concerns relating to the development and any potential impacts on your communication links, please get in contact by return email or by calling us on the phone number listed below prior to 4th April 2024.

Regards,

Eric Bendtsen

MEng (Electrical)

Power Engineer

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On leave: 14th November – 21st November