



APPENDIX P

TELECOMMUNICATIONS IMPACT ASSESSMENT



ERM Australia PTY Ltd

The Plains Wind Farm

Telecommunications Impact Assessment

Document Number: 23016-E-RPT-0001

Revision: 0

Revision history

Table 1: Revision history

Revision	Date	Description	Prepared by	Reviewed by	Approved by
0	09/01/2023	Issued for Review	Ramez Barakat	Eric Bendtsen	Timothy Cervenjak
0	27/03/2024	First Issue	Heshna Uppadoo	Eric Bendtsen	Timothy Cervenjak

Executive Summary

Middleton Group Engineering (MGE) has been engaged by ERM Australia Pty Ltd to undertake a Telecommunications Impact Assessment (TIA) desktop study for the Plains Wind Farm in NSW.

This study assesses the impact of Plains Wind Farm on the following telecommunication 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.
- GPS.

The ACMA database for point-to-point links within a 200 km radius of the site has been surveyed. One link was identified passing within the project boundary. Detailed assessment and consultation with the owners of these links has been undertaken based on the turbine locations provided and the location of the transmitters/receiver provided by ACMA.

The Proponent has undertaken consultation with potentially affected stakeholders. Most stakeholders have not yet responded at the time of writing this draft report. Based on our assessment of the Project is unlikely to have a material impact on existing telecommunication services.

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1 Abbreviations / Definitions

Table 2: Abbreviations

Abbreviation	Explanation
ACMA	Australian Communications and Media Authority
AM	Amplitude Modulation
BSL	Broadband Service Locator
BOM	Bureau of Meteorology
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	<i>n</i> 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
RPM	Revolutions per minute
The Project	The Plain Wind Farm
UHF	Ultra-High Frequency
WMO	World Meteorological Organization
WTGs	Wind Turbine Generators
η	Antenna efficiency

2 Normative References

- [1] D. Bacon, "Fixed-link wind-turbine exclusion zone method," Radiocommunications Agency UK, 2002.
- [2] G. Durgin, "The Practical Behavior of Various Edge-Diffraction Formulas," *IEEE Antennas and Propagation Magazine*, vol. 51, no. 3, pp. 24-35, 2009.
- [3] Commission for Instruments and Methods of Observation, "WMO Guidance Paper on Weather Radar/WTGs Siting," World Meteorological Organisation, Helsinki, 2010.
- [4] O. Il, "Impact of WTGs on Weather Radars," 2006.
- [5] Satheesh Gopi, R. Sathikumar, N. Madhu, "8.3 EDM Instrument Characteristics," in *Advanced Surveying: Total Station, Gis and Remote Sensing*, Pearson, 2006.
- [6] G. Australia, "GNSS Network Map," Geoscience Australia, [Online]. Available: <https://gnss.ga.gov.au/network>. [Accessed 25 05 2021].
- [7] 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.
- [8] B S Randhawa, R Rudd, "RF Measurement Assessment of Potential Wind Farm Interference to Fixed Links and Scanning Telemetry Devices," OFCOM, Dorset, 2009.
- [9] "Statement of the OPERA group on the cohabitation between weather radars and WTGs," in *OPERA group*, 2006.

3 Background

The Plains Wind Farm Project Area is located south of Hay in the Riverina Murray region of New South Wales and situated on Mungadal Station and four adjoining properties to the east and west of the Cobb Highway.

The Project Area covers approximately 53,894 hectares of land area. The Project proposes up to 188 WTGs generators (WTG) and which have an approximate height of 270 metres above the ground with a combined maximum installed capacity of 1350 MW.

Middleton Group Engineering (MGE) has been engaged by ERM Australia Pty Ltd to undertake a Telecommunications Impact Assessment (TIA) desktop study for inclusion within an Environmental Impact Statement (EIS).

4 Scope

4.1 Note on WTGs Electro Magnetic Compatibility

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

4.2 TIA Study Scope

This Telecommunications Impact Assessment is a desktop study mapping the turbine locations along with telecommunication services and evaluating any potential impact of the WTGs on these services. The study has been undertaken to address the telecommunications element of Secretary's Environmental Assessment Requirements (SEARs), 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.

The impact of the Plains Wind Farm 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.

5 Inputs

5.1 TIA Study Inputs

This assessment is based on the inputs specified in Table 3.

Table 3: Study inputs.

Input	Source	Format	Date Provided/Accessed
WTG coordinates	ERM Pty Ltd	.shp .csv	25/09/2023
WTG dimensions: Maximum Blade Tip Height: 270m Blade Length: 90 m Hub Height: 180 m	ERM Pty Ltd	Email	24/05/2023
Dwellings	ERM Pty Ltd	.shp	24/05/2023
Point-to-point microwave links, mobile voice-based communication, and internet services	ACMA Site Location Map RFNSA Website	.kml Website: Lats & Longs	24/05/2023 24/05/2023
AM, FM, Digital Radio Broadcasters Digital TV	List of transmitters with a licence to broadcast	.kmz	24/05/2023
Meteorological Radar	NSW Radars Information	Website: Lats & Longs	24/05/2023
Trigonometrical Station and GPS	GNSS Network Map	Website: Lats & Longs	24/05/2023

6 Telecommunications Study Analysis

6.1 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.

6.2 Point-to-Point Links

WTGs have the potential to impact on point-to-point communication links through three mechanisms [1]:

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

As can be seen in Figure 1, there is one (1) communication link found within the 2 km boundary of the WTGs. There are several links in close proximity to the WTGs layout but are outside the 2 km boundary.

In addition, Figure 1 also shows that there is one (1) communication sites registered with ACMA located within 2 km of the WTGs. However, no active assignments are identified on the link, so no further investigation is required. Discussion of near-field and reflection/scattering effects is presented in section 6.2.1.

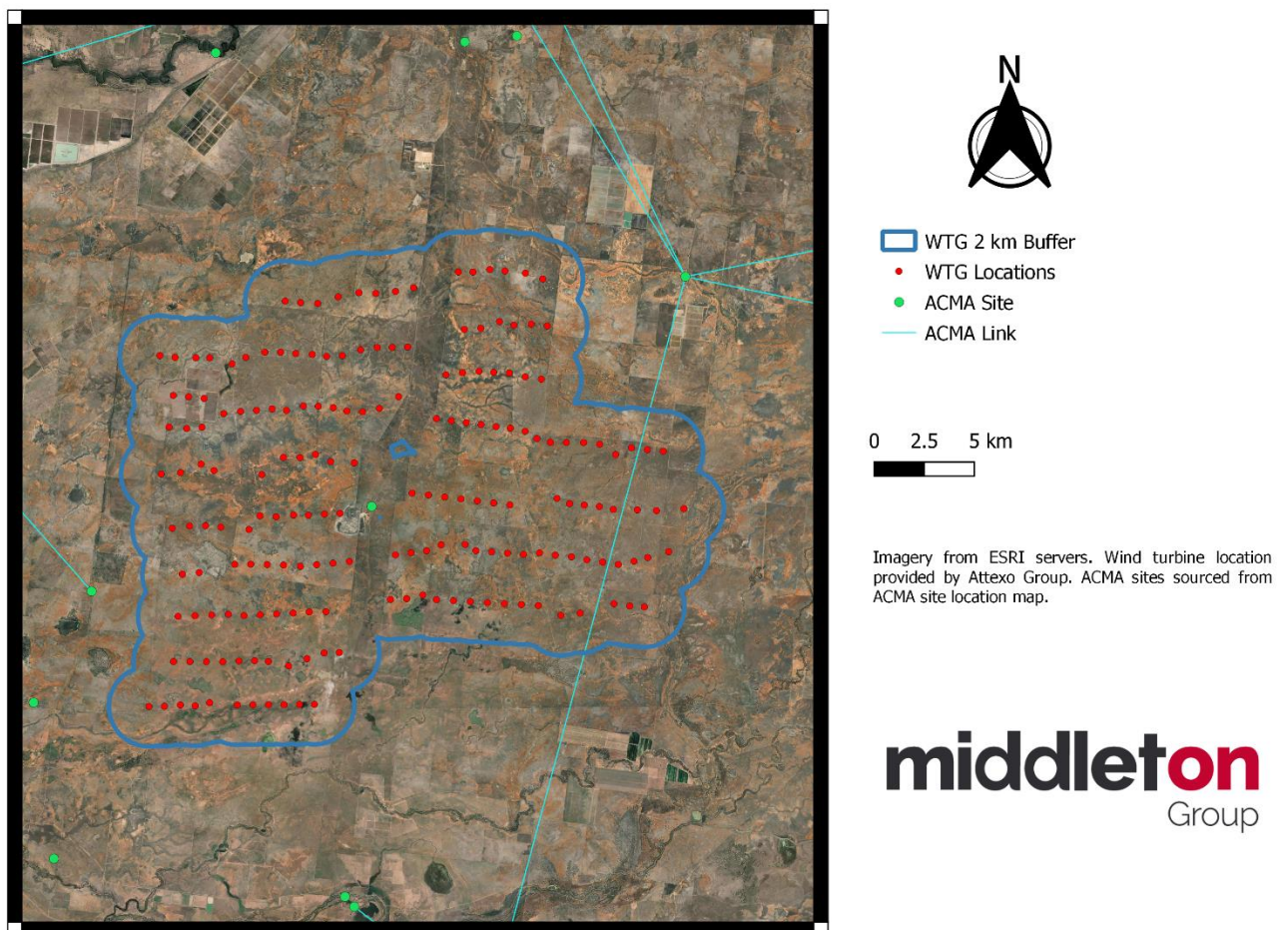


Figure 1: WTGs, 2 km buffer with ACMA communication sites and link assignments.

Table 4: List of point-to-point links that pass across the site.

#	BSL / Licence No	Site 1	Site 2	Length (km)	Frequency	Owner
1	11300366/1	NSWTA 100m Guyed Mast 75 Warwillah Road ID: 10026558	Transgrid 80m Guyed Mast off 1494 Jerilderie Rd ID: 35103	46.3 km	7.435 GHz	NSW Government Telecommunications Authority

6.2.1 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 [1], 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)

No ACMA communication sites were found within 2 km boundary of the WTGs as shown in Figure 1. Therefore, no material near-field effects due to the Plains Wind Farm are anticipated.

6.2.2 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.

There is currently one ACMA site with no assignments within a 2 km boundary of the WTGs. As such, no reflection/scattering effects are expected.

6.2.3 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 WTGs 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 [2].

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 [1]; this advice typically relates to 400 MHz links. However, a more conservative approach for WTGs is often preferred – that is, maintaining a clearance of the full 1st Fresnel Zone, or, as recommended by Bacon [1], 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 WTGs on the link will be a function of the carrier to interference ratio, C/I. In some instances, the presence of a WTGs penetrating the 1st Fresnel Zone will have no material impact on the link; in other instances, the presence of the WTGs may have an impact, and mitigation strategies may be required.

The maximum radii of the 1st and 2nd Fresnel Zones of the communication links is summarised in Table 5 for the link that may have diffraction effects.

Table 5: Information of point-to-point links

#	BSL/ Licence No	Length (km)	Minimum Frequency (GHz)	Nearest Turbine	Offset from LoS to turbine nacelle (m)	F ₁ Max (m)	F ₂ Max (m)
1	11300366/1	46.3	7.596	DE14	310	21.6	30.55

As detailed in Table 5, Link 1 passes through the site with at least 300 m margin before the nearest WTGs (DE 14) could impinge upon the full 2nd Fresnel Zone. The WTGs pose negligible risk to the link owner.

Notwithstanding, link owner NSW Government Telecommunications Authority has been informed of the planned wind farm. NSW Telco Authority have stated that there shouldn't be any issues with the proposed WTG layout. However, a reassessment will be required in case the turbine locations change.

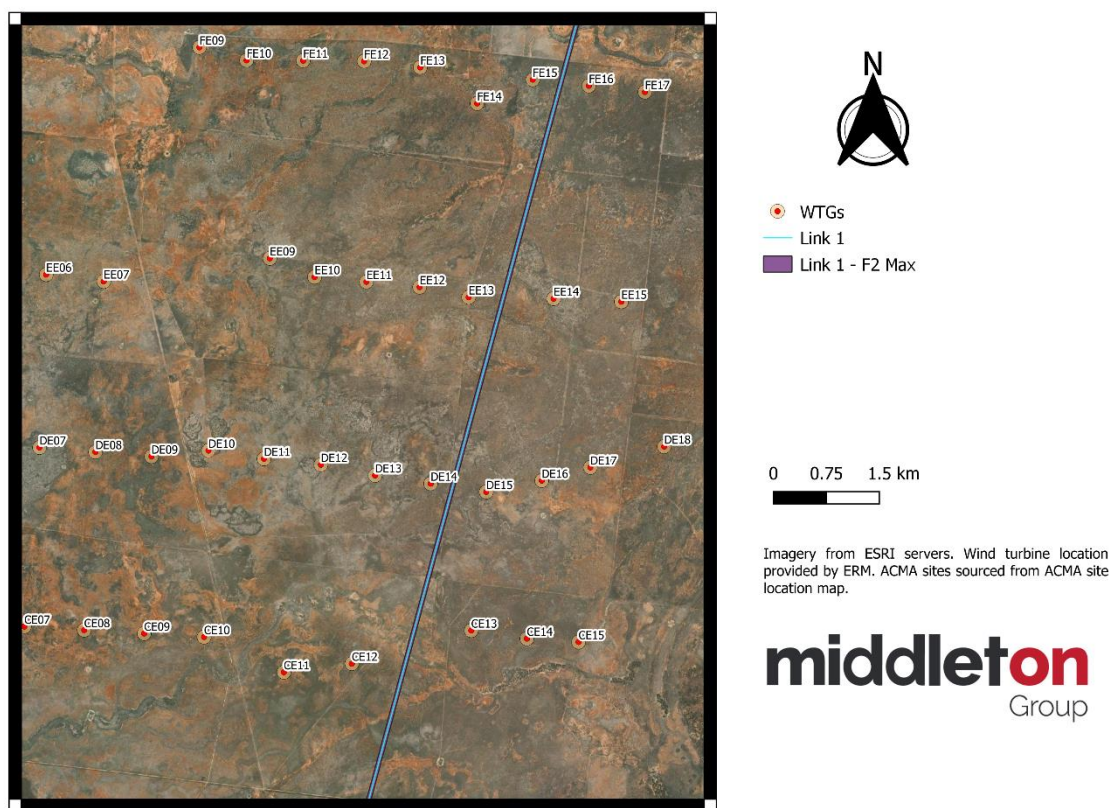


Figure 2: Link 1 2nd max Fresnel zone passing through the ERM Plains Wind Farm

6.2.4 Summary

Based on the analysis presented and consultation with link owners/managers, the proposed WTGs are not sited in the near-field zones of any transmitters/receivers, nor are they located in the reflection or scatter zones.

Consultation with the owner of the links will be documented in Appendix A.

6.3 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 [here](#).

The World Meteorological Organisation (WMO) recommends that WTGs are sited, at a minimum, beyond 5 km from meteorological radars, and preferably beyond 20 km [3]. The OPERA group of EUMETNET state that no WTGs 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 WTGs are sited within 20 km radius of C-band radars and 30 km radius of S-band radars [4].

Figure 3 demonstrates the location of the Meteorological radars in relation to the Project area. The details of the closest five weather radars are outlined in Table 6.

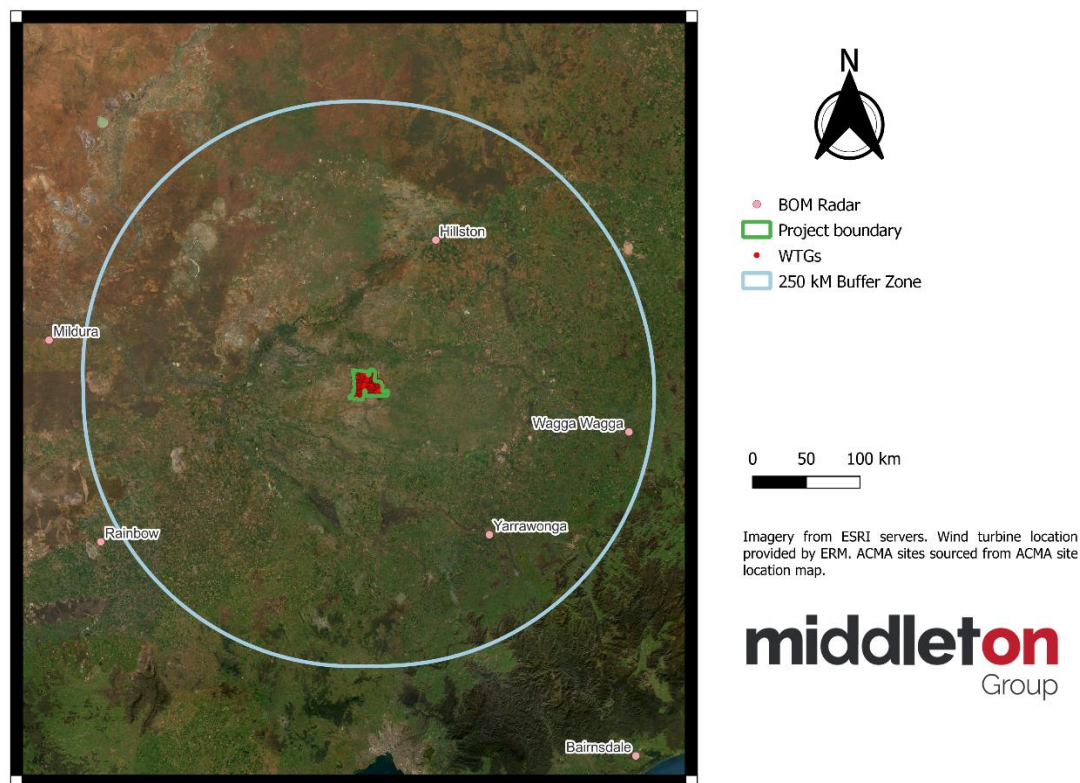


Figure 3: Bureau of Meteorology Radars

Table 6: Summary table for the closest weather radars in the Project area

Weather radar name	Coordinates		Distance to Nearest Turbine (km)	Radar type
	Latitude	Longitude		
Hillston	33.55° S	145.52° E	135	Meteor 735CDP (C-Band, Doppler and Dual Pol enabled)
Wagga Wagga	35.17° S	147.47° E	236	WF 100 C Band
Mildura	34.28° S	141.59° E	285	Meteor 735CDP (C-Band and Dual Pol enabled)
Rainbow	35.99° S	142.01° E	270	Meteor 735CDP (C-Band, Doppler and Dual Pol enabled)
Yarrawonga	36.03° S	146.03° E	173	WSR 81C C-Band

It is shown in Figure 3 that the Plains Wind Farm is located within the coverage areas of the Hilston, Wagga Wagga, Yarrawonga, Mildura and Rainbow. The closest radar, in Hilston, is located more than 135 kms from the closest turbine.

The Plains Wind Farm complies with WMO standards based on distance setbacks from the various meteorological radars in the region.

Following stakeholder engagement, the wind farm will have manageable impact on the Bureau of Meteorology radars under normal propagation conditions.

However, the Bureau of Meteorology has requested the Applicant to:

- Inform the Bureau of any changes in the wind farm, including varying the layout of the farm, changing the location of a turbine more than 100 meters, or altering turbine height.
- Informs the Bureau at least 2 weeks before any planned Shut-down of the wind farm (for maintenance or any other reason) so that the Bureau may calibrate its weather radar system.
- Collaborates with the Bureau in the event of severe weather conditions to assist in matters of community safety.

Details of the wind farm have been submitted to BoM.

6.4 Mobile Voice-based Communications

All mobile phone base stations located within the area of the Plains Wind Farm are beyond the 2 km buffer of the site's WTGs as shown in Figure 4. The nearest mobile tower to the WTGs is beyond 10 km. Therefore, the project will not cause any significant impact on the operation of mobile phone base stations.

Consultation and engagement with the mobile service providers (Telstra, Optus, Vodafone), with respect to the impact on their mobile telemetry services, was initiated.



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

The mobile network coverage maps of Telstra and Optus within the region are shown in Figure 5 to Figure 7. It is noted that there are some mobile network services provided by Telstra and Optus in the vicinity of the Project area.

In the immediate vicinity of the WTGs, there is possibility of interference to the signal between a mobile phone and a mobile tower. However, this can be mitigated by simply moving a short distance (tens of metres) to a new location until the signal improves. Beyond the project area, there will be no impact on the signal.

Optus or Telstra have been consulted regarding potential impact to their operations. Optus has advised that there would not be any impact on their networks, however, no response from Telstra has been received at this point.



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

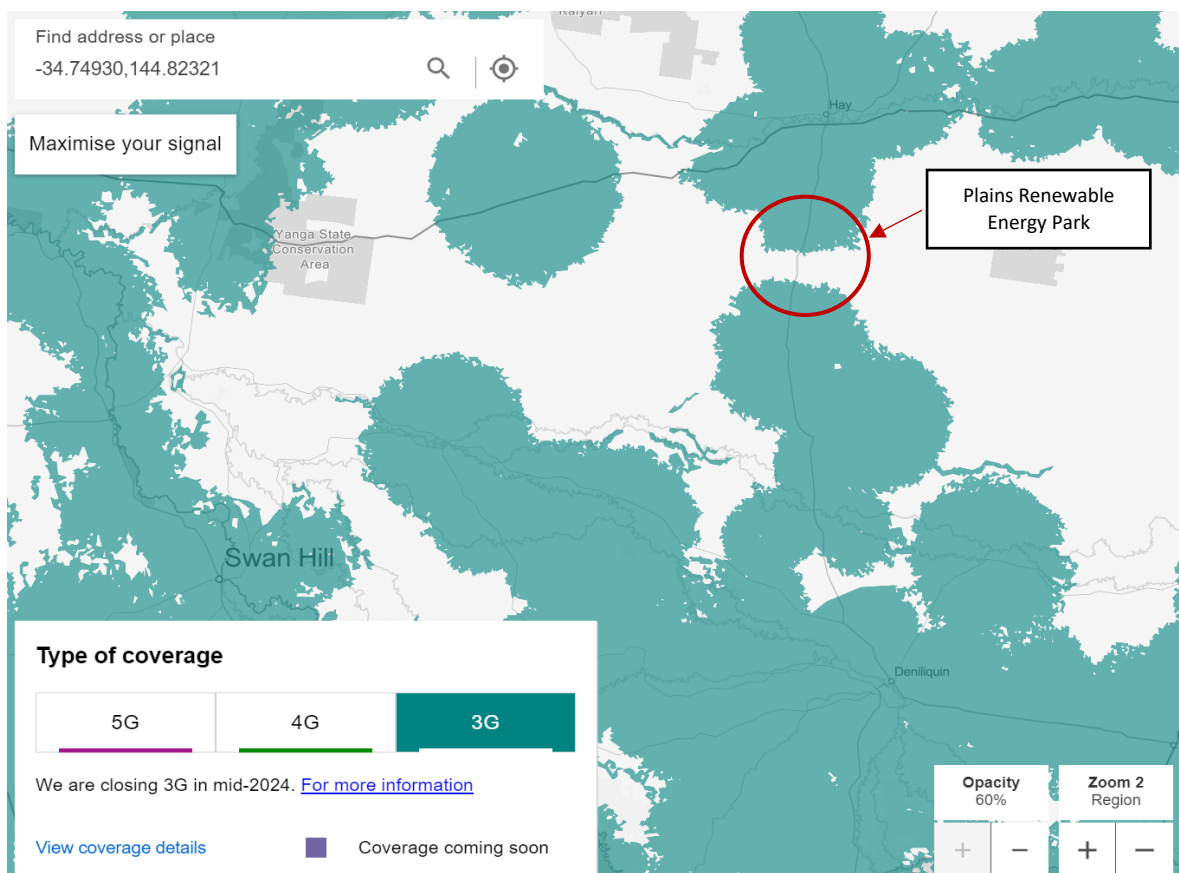


Figure 6: Telstra 3G mobile network coverage in the Project area

Client: ERM Australia
Report: TIA Report
Revision: 0

Project: The Plains Renewable Energy Park
Document Number: 23016-E-RPT-001

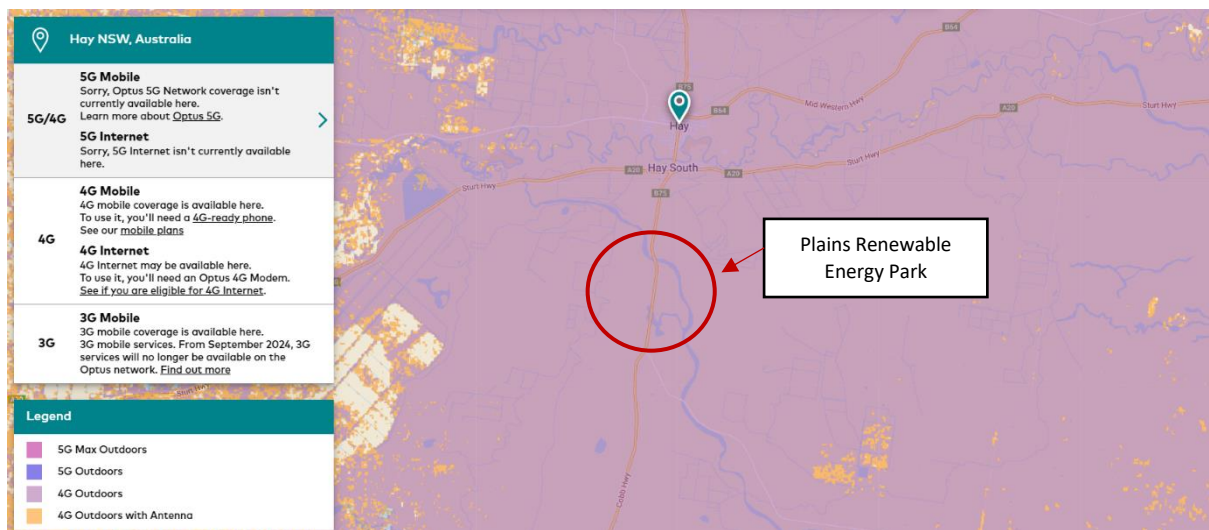


Figure 7: Optus mobile network coverage in the Project area

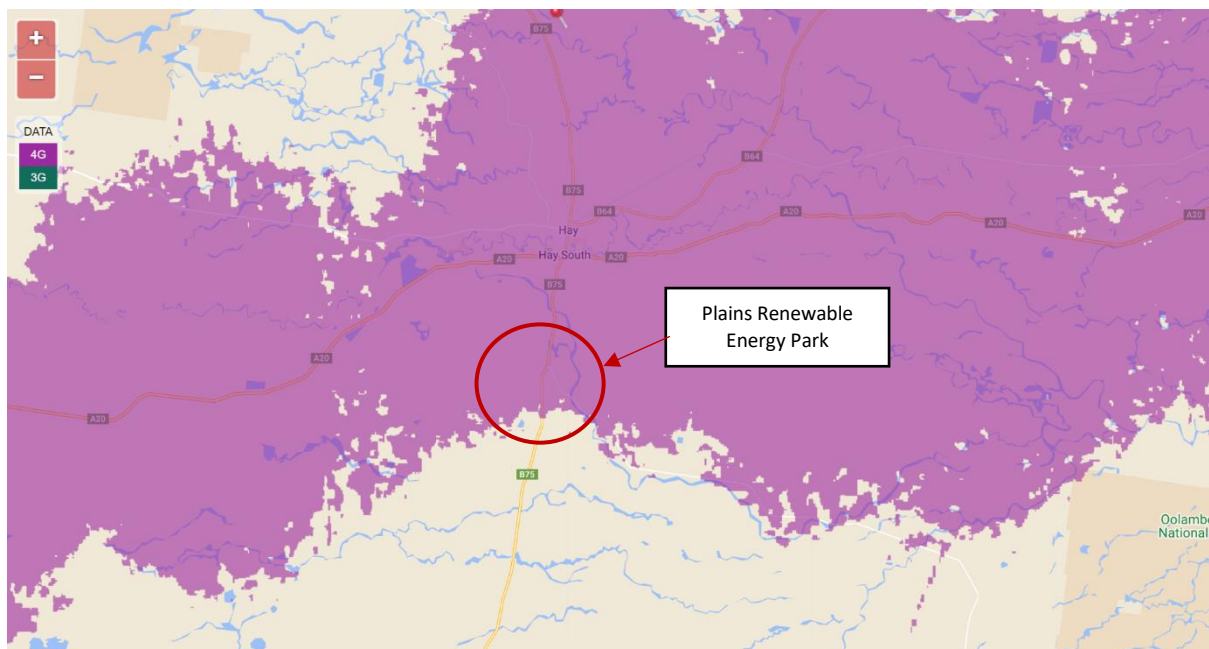


Figure 8: Vodafone mobile network coverage in the Project area

6.5 Wireless and Satellite Services

Satellite services will only be impacted where receivers are sited in extremely close proximity, within 800 m to the 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.

There are no dwellings within 2 km of the Project area. Therefore, it is highly unlikely that the Plains Wind Farm will impact satellite services.

However, as shown in Figure 9, there are multiple structures within 2 km of the WTGs which are associated, and any potential impacts are covered off with agreements in place with landowners and the project.

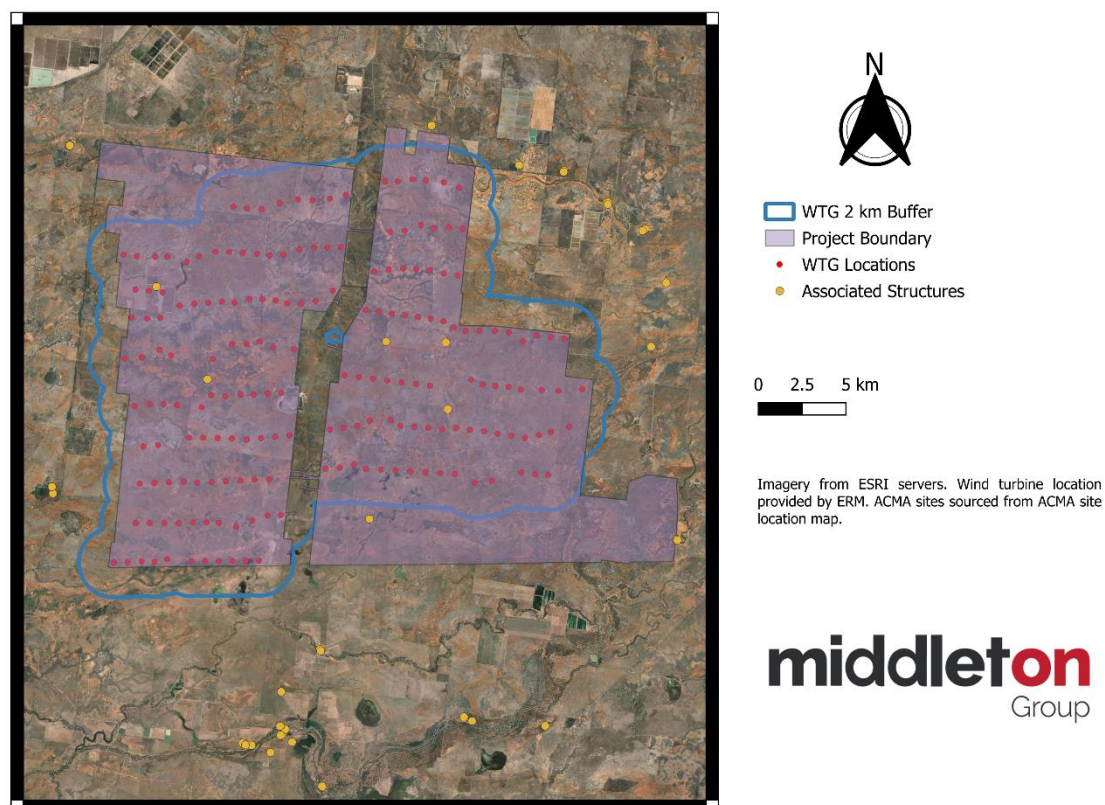


Figure 9: Associated structures around 2 km boundary of the WTGs

6.6 Trigonometrical Station and GPS

6.6.1 Trigonometrical Stations and Survey Marks

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.

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 [5]. 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 project area – overview



Figure 11: Survey marks within project area – closeup IW16



Figure 12: Survey marks within project area – closeup HW16 and GW15

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

- There are approximately 51 survey marks located within a 2 km buffer of the WTGs, 48 of these are located along the Cobb Highway and 3 survey marks are on the edge of the WTGs 2 km buffer, as shown in Figure 10.
- There is no proposed WTGs location that shares the same location as a survey mark. The closest distance between a survey mark and the WTGs (WTG IW16) is approximately 390 m, as shown in Figure 11.
- The second closest distance between a survey mark and a WTGs (WTG HW16 and GW15) is approximately 450 m and 500 m respectively, as shown in Figure 12.

Site works will need to be designed to avoid the survey mark, or, alternatively, seek assistance from a registered surveyor to move or remove the survey marks.

Project construction may physically impact these survey marks. If this is likely to occur the project Proponent should consult with the NSW Government. As stated above, assistance from a registered surveyor may be required.

6.6.2 GPS (GNSS)

Global Navigation Satellite System (GNSS) networks are operated and maintained across Australia. This includes the Australian Regional GNSS Network (ARGN) 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).

Based on the GNSS network map provided by Geoscience Australia [6], the impact of the project to the GNSS stations has been analysed. Figure 13 demonstrates that there are no GNSS stations within 20 km of the Project boundary. The closest GNSS station, MOUL, is 60 km away from the nearest WTGs. The next closest GNSS stations, WAKL, is 70 km from the nearest WTGs.

A minimum clearance of 20 km from the WTGs is generally recommended to avoid interference to the GNSS networks. Since, all the GNSS stations are outside 20 km boundary of the WTGs, the GNSS networks are unlikely to be affected by interference from the Plains Wind Farm.

Consultation and engagement with Geoscience Australia were initiated as shown in appendix A.2. Geoscience responded that the project will not cause any impact to the Commonwealth owned trigonometrical stations and/or Global Navigation Satellite System (GNSS) reference station or associated assets.

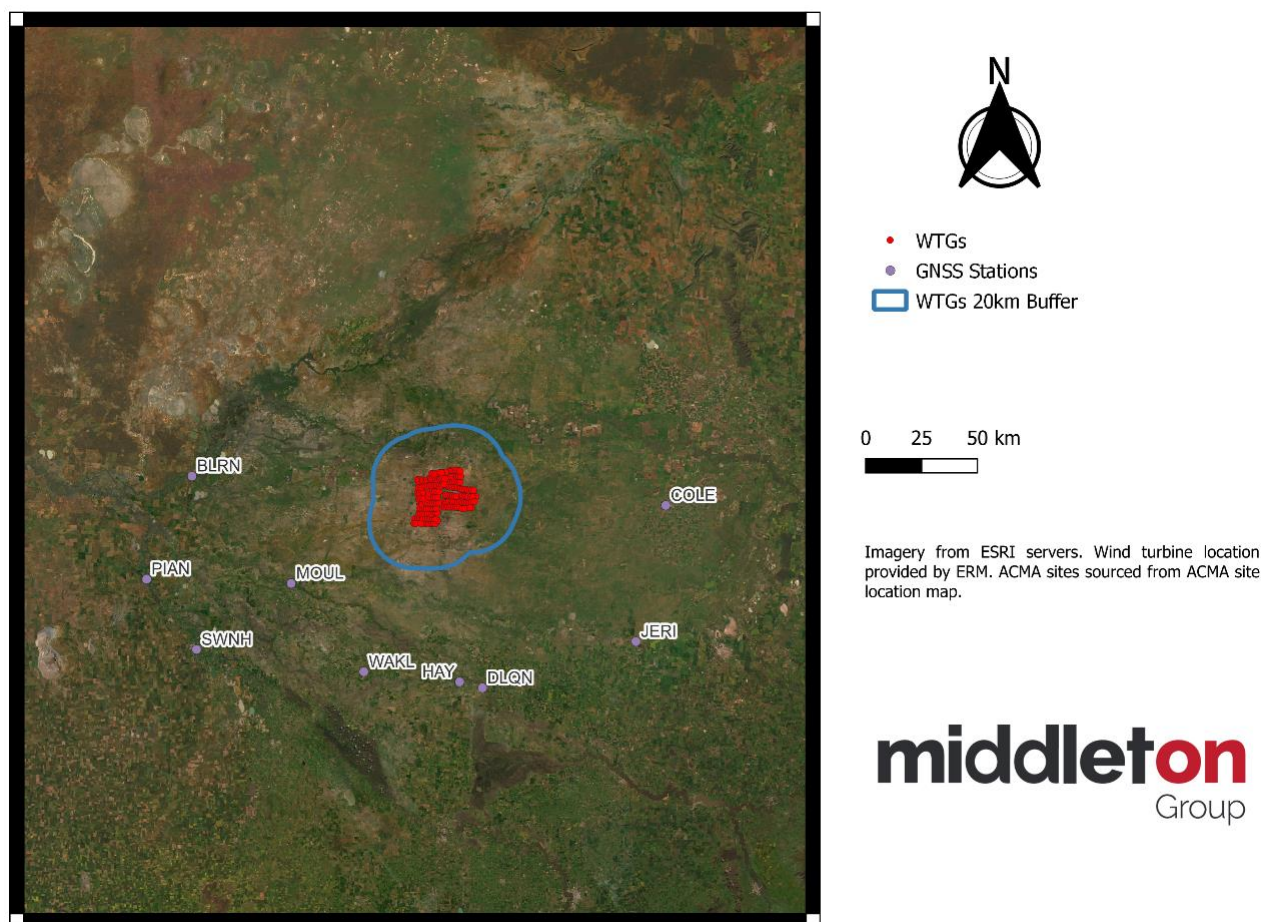


Figure 13 GNSS stations location and 20 km WTGs buffer

6.7 Broadcast and Digital Radio and Television

Amplitude Modulation (AM) signals are long wave signals. Operating WTGs 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 than Amplitude modulated signals. At the edge of their transmission range, where the signal to noise ratio is already quite low, WTGs 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 WTGs rotor pass can cause signal frequency variation.

As can be seen in Figure 14, no AM, FM, DAB, DTV or Temporary Licence transmitters are located within 5 km of a turbine. No digital radio transmitters were identified in the vicinity of the site.

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

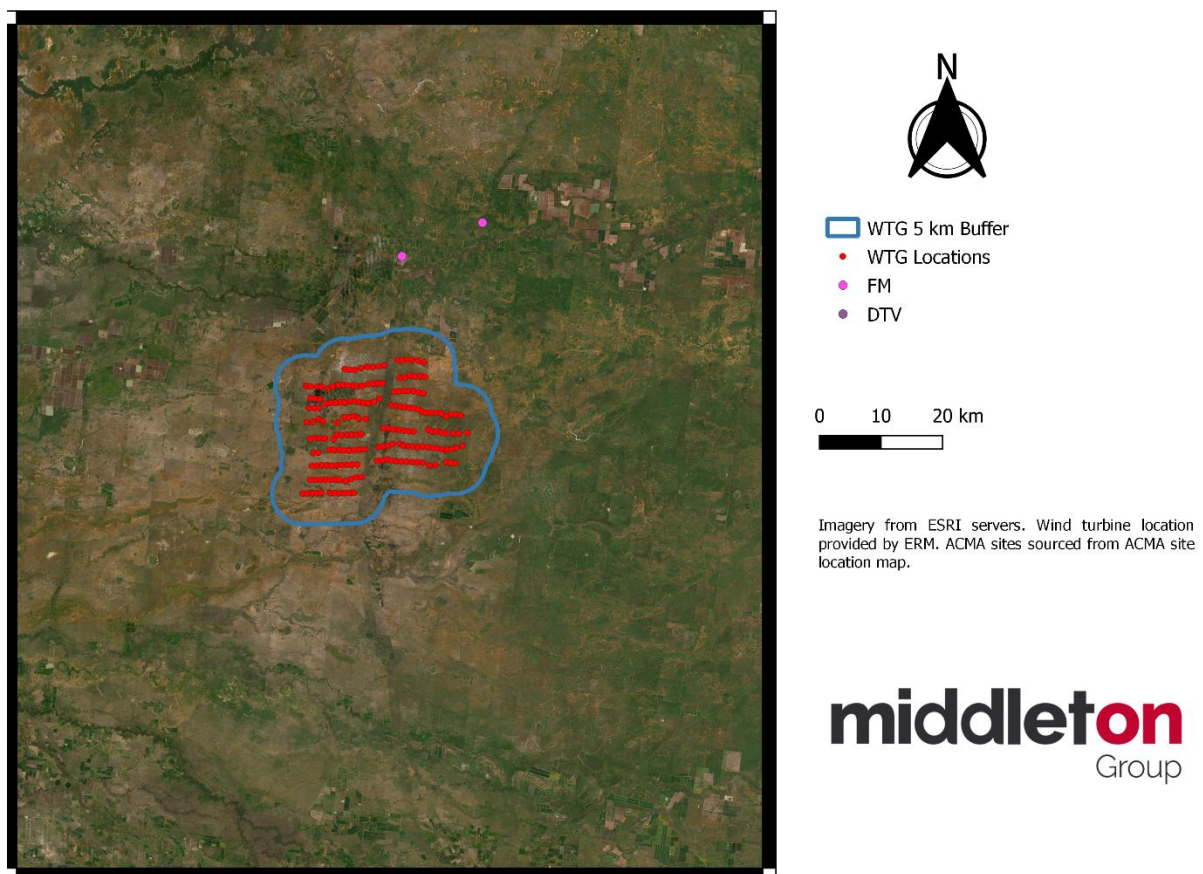


Figure 14: Location of broadcasters relative to the Project.

7 Stakeholder Engagement

Consultation and engagement with stakeholders were initiated by the Applicant. A list of key stakeholders is presented in Table 7. Responses from these stakeholders will be provided in Appendix A.

A summary of the engagement is listed below.

Table 7: List of stakeholder engagement.

Stakeholder	Email address	Impact	Responses
NSW Government Telco Authority	No email address, use following link: Contact Us NSW Telco Authority	Fixed point-to-point link (License No: 11300366/1)	Confirmed No Impact
Optus Mobile Pty Limited	emeenquiries@optus.com.au	Mobile service operation	Confirmed No Impact
Vodafone	smc.vha@nokia.com	Mobile service operation	No response received
Bureau of Meteorology	windfarmenquiries@bom.gov.au	Meteorological radar operation	Confirmed manageable risk
Telstra	windfarmassessmentrequests@team.telstra.com	Mobile service operation	No response received
Geoscience Australia	clientservices@ga.gov.au	Survey marks, GNSS stations	Confirmed No Impact

8 Conclusion

The potential electromagnetic interference impact of the Plains Wind Farm 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.
- Mobile voice-based communications.
- Wireless and satellite internet services.
- Broadcast and digital radio.
- Broadcast, digital and satellite television.
- Trigonometry stations.
- GPS.

As part of the assessment, MGE have worked with the Applicant to engage and consult with key stakeholders.

NSW Telco Authority, Optus and Geoscience Australia have advised that the Project has no material impact on their services while the Bureau of Meteorology have expressed that the risks would be manageable, and the Applicant will agree to their conditions.

Based on MGE's assessments it is expected that Project has been designed, located, and sited to avoid, or minimise and mitigate electromagnetic interference to the pre-existing television, radar and radio transmission and reception. Stakeholders have been contacted regarding impact on their services, and correspondence is steadily being collated.

Appendix A Stakeholder Correspondence and Responses

Appendix A.1 NSW Government Telco Authority

Eric Bendtsen

From: Shaunak Patel <Shaunak.Patel@customerservice.nsw.gov.au>
Sent: Tuesday, 30 January 2024 12:41 PM
To: Eric Bendtsen
Cc: Ramez Barakat; Telco Spectrum
Subject: RE: Plains Wind Farm - engagement with Telco Authority

Hi Eric,

There are no concerns of impacts from this Wind Farm Project into NSWTA assets based on the latest Turbine location data made available to NSWTA for this assessment.

Any change to turbine locations will require a reassessment in particular turbines that are moved closer to our existing licence ACMA licence 11300366/1.

Regards,

Shaunak Patel
Spectrum Engineer, Telco Wireless

NSW Telco Authority | Department of Customer Service
p 02 8276 8757
e Shaunak.Patel@customerservice.nsw.gov.au | www.telco.nsw.gov.au
Level 10, McKell Building, 2-24 Rawson Place, Haymarket NSW 2000



**Telco
Authority**

Please consider the environment before printing this email

From: Shaunak Patel <Shaunak.Patel@customerservice.nsw.gov.au>
Sent: Wednesday, 10 January 2024 10:59 AM
To: 'Eric Bendtsen' <eric.bendtsen@middletongroup.com.au>
Cc: Ramez Barakat <ramez.barakat@middletongroup.com.au>; Telco Spectrum <telco.spectrum@customerservice.nsw.gov.au>
Subject: RE: Plains Wind Farm - engagement with Telco Authority

Hi Eric,

Thanks for reaching out to NSWTA.

We will assess the impacts of the proposed wind farm to our Public Safety Network will aim to provide feedback in 2-3 weeks.

Regards,

Shaunak Patel
Spectrum Engineer, Telco Wireless

NSW Telco Authority | Department of Customer Service
p 02 8276 8757
e Shaunak.Patel@customerservice.nsw.gov.au | www.telco.nsw.gov.au
Level 10, McKell Building, 2-24 Rawson Place, Haymarket NSW 2000

Please consider the environment before printing this email

From: Eric Bendtsen <eric.bendtsen@middletongroup.com.au>

Sent: Tuesday, 9 January 2024 2:46 PM

To: Shaunak Patel <Shaunak.Patel@customerservice.nsw.gov.au>; Telco Spectrum <telco.spectrum@customerservice.nsw.gov.au>; Jay Sharma <Jayanta.Sharma@customerservice.nsw.gov.au>

Cc: Ramez Barakat <ramez.barakat@middletongroup.com.au>

Subject: Plains Wind Farm - engagement with Telco Authority

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

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Hi Jay, Shaunak,

We are conducting an early-stage consultation for the proposed the Plains Renewable Energy Park, focussing on Electro-Magnetic Interference (EMI). An environmental impact statement is being prepared by ERM and the proponent for the wind farm is Engie.

The Plains Renewable Energy Park, approximately 85,245 hectares, is situated on Mungadal Station, located south of Hay in NSW, which is a large-scale sheep breeding property.

We note that your organisation has one licensed communication link which passes through the proposed project boundary, license number 11300366/1.

Based on our analysis, from a bird's eye the closest wind turbine (Turbine DE14) will come within 300 metres of the 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 Proponent's turbines will be up to 183 m with a maximum tip height of 290 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 25/01/24.



- WTGs
- Link 1
- Link 1 - F2 Max

0 0.75 1.5 km

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

middleton
Group

Regards,

Eric Bendtsen

MEng (Electrical)

Power Engineer

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

L13, 500 Collins Street Melbourne, VIC 3000 | **W:** www.middletongroup.com.au



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Appendix A.2 Geoscience Australia

Eric Bendtsen

From: Amy Peterson <Amy.Peterson@ga.gov.au>
Sent: Tuesday, 9 January 2024 6:36 PM
To: Eric Bendtsen
Cc: Ramez Barakat; Client Services; Ryan Ruddick
Subject: RE: Plains Wind Farm - Geoscience Australia Engagement [SEC=OFFICIAL]

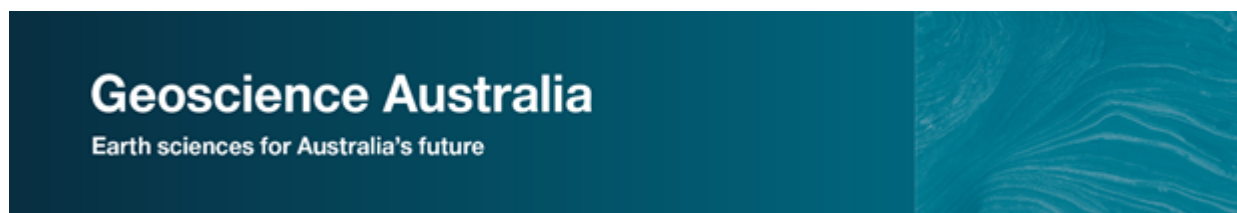
Hi Eric,

I confirm that Geoscience Australia does not operate or maintain any Commonwealth GNSS Infrastructure within the extent of the proposed wind farm.

I would encourage you to similarly reach out to CORSnet NSW (CORSnet@customerservice.nsw.gov.au) to consider and respond to the enquiry, noting they maintain and operate physical state-based positioning infrastructure and survey control marks, and the associated legislation, across NSW.

Kind Regards;

Amy Peterson
GNSS Infrastructure Team Leader | National Positioning Infrastructure
t +61 2 6249 9126 www.ga.gov.au



Geoscience Australia acknowledges the Traditional Custodians of Country throughout Australia and recognises the continuing connection to lands, waters and communities. We pay our respects to Aboriginal and Torres Strait Islanders Cultures; and to elders past, present and emerging.



Make flexibility work. If you receive an email from me at a time that is outside of normal business hours, I am sending it at a time that suits me. I am not expecting you to read or reply until normal business hours.

From: Client Services <ClientServices@ga.gov.au>
Sent: Tuesday, January 9, 2024 3:04 PM
To: Amy Peterson <Amy.Peterson@ga.gov.au>
Subject: FW: Plains Wind Farm - Geoscience Australia Engagement [SEC=OFFICIAL]

Hi Amy,

Here is another wind farm email. Again, if you could copy Client Services into your response we'd appreciate it.

Regards

Darren

Darren King | Client and Visitor Services Officer

Discovery and Engagement Section
Office of the Chief Scientist

t +61 2 6249 9775 ga.gov.au

Mon, Tues: Work From Home | Wed, Thurs and Fri: In the Office 8.00am – 4.00pm



Twitter | Facebook | YouTube | LinkedIn

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: Eric Bendtsen <eric.bendtsen@middletongroup.com.au>
Sent: Tuesday, January 9, 2024 2:51 PM
To: Client Services <ClientServices@ga.gov.au>
Cc: Ramez Barakat <ramez.barakat@middletongroup.com.au>
Subject: Plains Wind Farm - Geoscience Australia Engagement

To whom it may concern,

We are conducting an early-stage consultation for the proposed the Plains Renewable Energy Park, focussing on Electro-Magnetic Interference (EMI). An environmental impact statement is being prepared by ERM and the proponent for the wind farm is Engie.

The Plains Renewable Energy Park, approximately 85,245 hectares, is situated on Mungadal Station, located south of Hay in NSW, which is a large-scale sheep breeding property.

We append the wind turbine co-ordinates in .csv and .kml format. Note that the rotor diameter of the Proponent's turbines will be up to 183 m with a maximum tip height of 290 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 25/01/24.

Regards,

Eric Bendtsen

MEng (Electrical)

Power Engineer

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

L13, 500 Collins Street Melbourne, VIC 3000 | **W:** www.middletongroup.com.au



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Appendix A.3 Optus

Eric Bendtsen

From: EME Enquiries <emeenquiries@optus.com.au>
Sent: Wednesday, 10 January 2024 2:41 PM
To: Eric Bendtsen
Cc: Ramez Barakat
Subject: RE: Plains Wind Farm - Optus EMI Consultation

Hi Eric,

Thanks for your email. Our technical team has reviewed this proposal and advise not interference issues with Optus equipment.

Kind regards,

Yadira Narvaez
Community Manager | Mobile Deployment | Networks | Optus
M: 0411286005
727 Collins Street, Melbourne 3000, Australia
Yadira.Narvaez@optus.com.au



OPTUS

Follow us



Optus acknowledges the Traditional Owners and Custodians of the lands on which we live, work, and serve. We celebrate the oldest living culture and its unbroken history of storytelling and communication. We pay our respect to Elders – past, present, and future – and we strive together to embrace an optimistic outlook for our future in harmony, across all of Australia and for all of its people

This email may be confidential. If you received it accidentally, please do not send it to anyone else, delete it and let the sender know straight away.

From: Eric Bendtsen <eric.bendtsen@middletongroup.com.au>
Sent: Tuesday, 9 January 2024 2:56 PM
To: EME Enquiries <emeenquiries@optus.com.au>
Cc: Ramez Barakat <ramez.barakat@middletongroup.com.au>
Subject: Plains 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 Electro-Magnetic Interference (EMI) consultation for the proposed the Plains Renewable Energy Park on behalf of ERM.

The Plains Renewable Energy Park, approximately 85,245 hectares, is situated on Mungadal Station, located south of Hay in NSW, which is a large-scale sheep breeding property.

We note that there are no mobile towers within approximately 15 km of the wind farm site and no point-to-point links cross the site.

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 55, noting that the rotor diameter of the Proponent's turbines will be up to 183 m with a maximum tip height of 262 m.

If you have any concerns relating to the development and any potential impacts on your services, please get in contact by return email or by calling us on the phone number listed below prior to 25/01/2024.

Regards,

Eric Bendtsen

MEng (Electrical)

Power Engineer

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

L13, 500 Collins Street Melbourne, VIC 3000 | **W:** www.middletongroup.com.au



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Appendix A.4 Telstra

Eric Bendtsen

From: ! Windfarm Assessment Requests
<WindfarmAssessmentRequests@team.telstra.com>
Sent: Wednesday, 31 January 2024 10:00 PM
To: Eric Bendtsen
Cc: Ramez Barakat
Subject: RE: Plains Wind Farm - Telstra Consultation

Hi Eric,

Apologies for the delay.

Confirming receipt of your wind farm assessment request for the proposed Plains wind farm.

It is envisaged that the investigation will take 6 to 8 weeks from the time of submission (this timeframe is also somewhat dependent on what the investigation finds).

Any concerns please get back to me.

Regards,
David Jonas
Senior Chapter Lead
Fixed Access Planning WA, SA & NT
Connectivity Engineering
Global Networks & Technology



Flow to Work – CAN Reliability Team

P 08 6224 6268
M 0438 934 894
E David.Jonas@team.telstra.com
W www.telstra.com

This email may contain confidential information.
If I've sent it to you by accident, please delete it immediately

General

From: Eric Bendtsen <eric.bendtsen@middletongroup.com.au>
Sent: Tuesday, January 9, 2024 12:04 PM
To: ! Windfarm Assessment Requests <windfarmassessmentrequests@team.telstra.com>
Cc: Ramez Barakat <ramez.barakat@middletongroup.com.au>
Subject: Plains Wind Farm - Telstra Consultation

[External Email] This email was sent from outside the organisation – be cautious, particularly with links and attachments.

To whom it may concern,

We are conducting an early-stage Electro-Magnetic Interference (EMI) consultation for the proposed the Plains Renewable Energy Park on behalf of ERM.

The Plains Renewable Energy Park, approximately 85,245 hectares, is situated on Mungadal Station, located south of Hay in NSW, which is a large-scale sheep breeding property.

We note that there are no mobile towers within approximately 15 km of the wind farm site and no point-to-point links cross the site.

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 55, noting that the rotor diameter of the Proponent's turbines will be up to 183 m with a maximum tip height of 262 m.

If you have any concerns relating to the development and any potential impacts on your services, please get in contact by return email or by calling us on the phone number listed below prior to 25/01/2024.

Regards,

Eric Bendtsen

MEng (Electrical)

Power Engineer

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

L13, 500 Collins Street Melbourne, VIC 3000 | **W:** www.middletongroup.com.au



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Appendix A.5 Vodafone

Appendix A.6 Bureau of Meteorology

Eric Bendtsen

From: Muhammad Afzal <Muhammad.Afzal@bom.gov.au>
Sent: Tuesday, 15 August 2023 2:14 PM
To: Eric Bendtsen; windfarmenquiries
Cc: Ramez Barakat; Joanne Woodhouse; Rhys Lade; Eve Merton; Adrian Cresswell; GM_OSO
Subject: RE: Plains Renewable Wind Farm – Bureau of Meteorology EMI Consultation [SEC=OFFICIAL]

Hi Eric,

Apologies for the delay. We were updating our processes in responding/engaging with wind farm developers' request for last few weeks.

The assessment of the proposed Plains Renewable wind farm is complete, which indicates manageable impact to our neighbouring assets, under normal propagation conditions.

The Bureau of Meteorology requests that the owner/operator of the Plains Renewable wind farm:

- informs the Bureau of any changes in the wind farm, including varying the layout of the farm, changing the location of a turbine more than 100 meters, or altering turbine height
- informs the Bureau at least 2 weeks before any planned shut-down of the wind farm (for maintenance or any other reason) so that the Bureau may calibrate its weather radar system
- collaborates with the Bureau in the event of severe weather conditions to assist in matters of community safety.

Please let us know if you need any further information in this regard.

Kind Regards,

Muhammad Usman Afzal (Ph.D)

Spectrum Engineer

Observing Systems & Operations, Data and Digital Group

Level 15, 300 Elizabeth Street, Surry Hills, NSW

muhammad.afzal@bom.gov.au | www.bom.gov.au



From: Muhammad Afzal <Muhammad.Afzal@bom.gov.au>

Sent: Thursday, June 15, 2023 10:39 AM

To: Eric Bendtsen <eric.bendtsen@middletongroup.com.au>; windfarmenquiries <windfarmenquiries@bom.gov.au>

Cc: Ramez Barakat <ramez.barakat@middletongroup.com.au>; Joanne Woodhouse <Joanne.Woodhouse@erm.com>

Subject: RE: Plains Renewable Wind Farm – Bureau of Meteorology EMI Consultation [SEC=OFFICIAL]

Hi Eric,

This is to acknowledge your email. Thanks for contacting us and providing with the data.

We will investigate the impact to our closest radars and will provide you feedback on the outcomes before the date you mentioned.

Regards,

Muhammad Usman Afzal (Ph.D)
Spectrum Engineer
Observing Systems & Operations, Data and Digital Group
Level 15, 300 Elizabeth Street, Surry Hills, NSW
muhammad.afzal@bom.gov.au | www.bom.gov.au



From: Eric Bendtsen <eric.bendtsen@middletongroup.com.au>
Sent: Wednesday, June 14, 2023 3:57 PM
To: windfarmenquiries <windfarmenquiries@bom.gov.au>
Cc: Ramez Barakat <ramez.barakat@middletongroup.com.au>; Joanne Woodhouse <Joanne.Woodhouse@erm.com>
Subject: Plains Renewable Wind Farm – Bureau of Meteorology EMI Consultation

To whom it may concern,

We are conducting an early-stage consultation for the proposed the Plains Renewable Energy Park, focussing on Electro-Magnetic Interference (EMI) and Electro-Magnetic Field (EMF). An Environmental Impact Statement (EIS) is being prepared by ERM and the proponent for the wind farm is Engie Australia Pty Ltd (Engie).

The Plains Renewable Energy Park extends across an area of approximately 60,489 hectares and is situated on Mungadal Station and neighbouring properties to the east and west of the Cobb Highway, south of Hay in NSW. Mungadal Station is a large-scale sheep breeding property that specialises in the production of Merino Sheep and wool.

As a result of our assessment, five (5) sites have been identified as per below:

- Hillston
- Wagga Wagga
- Mildura
- Rainbow
- Yarrawonga

The closest radar, in Hilston, is located more than 135 kms from the closest turbine. The next two closest radars, Wagga Wagga and Yarrawonga, are located 160 kms and 165 kms away respectively. Our mapping results show that Plains Renewable Energy Park project is in the overlapping area of these radars. Mildura and Rainbow are both located outside of a 200 km buffer of the project site.

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 55, noting that the rotor diameter of the Proponent's turbines will be up to 220 m with a maximum tip height of 290 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 5th July 2023.

Regards,

Eric Bendtsen

MEng (Electrical)

Power Engineer

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

L13, 500 Collins Street Melbourne, VIC 3000 | **W:** www.middletongroup.com.au



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