



Cattle Creek Wind Farm

Electromagnetic Interference Assessment



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FINAL



Revision control

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A	16.08.24	Initial draft for client review	Harika Tatipakala Gayantha Paranawithana	Eric Bendtsen	Craig Johnston
B	27.11.25	Final draft for client review incorporating revised WTG layout	Gayantha Paranawithana	Priyanga Ambanwala	Craig Johnston
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3	14.04.26	Final Issue (Addressing client comments)	Gayantha Paranawithana	Priyanga Ambanwala	Craig Johnston

Disclaimer

This document has been prepared for ERM for the purposes and objectives set out in this document. Use of this document by anyone else is at their own risk.

In arriving at the report conclusions, a number of assumptions have been made where input information is either not available, cannot be relied upon, or is subject to change. Should these assumptions prove to be incorrect based on new relevant information coming to light, it is likely the findings of this report may also need to change. The client should validate these assumptions prior to implementation of the conclusions or recommendations found in this report.

Executive Summary

Middleton Group Engineering has been engaged by Environmental Resources Management Pty Limited (ERM) to undertake an Electromagnetic Interference Assessment (EMI) by desktop study methodology, for the Cattle Creek Wind Farm (the Project) located in the 110 km west of Toowoomba Local Government Area (LGA) and 50 km North-West of Millmerran LGA in Queensland.

Methodology

The study has been undertaken to address the telecommunications element of the QLD Government's State code 23: Wind Farm Development, specifically to identify that:

"Development is designed and/or mitigation measures are used to protect pre-existing television, radar and radio transmission and reception from electromagnetic interference."

Further, this study has been completed with due regard to the Draft National Wind Farm Guideline [1] and the Clean Energy Council Best Practice Guidelines [2], to assess potential impacts of the Project on existing telecommunications and ensure the able of service is maintained.

This study assesses the impact of Cattle Creek Wind Farm on the following telecommunication services:

- Point-to-point (fixed) radiocommunications links;
- Meteorological radar;
- Mobile voice-based communications;
- Wireless and satellite internet services for dwellings;
- Broadcast and digital radio signals;
- Broadcast, digital and satellite television;
- Trigonometry stations; and
- GPS.

The ACMA database has been searched for point-to-point links within a 150 km from the project boundary in August 2024 and again in November 2025. One ACMA link was identified passing through the project boundary.

Assessment Overview

Based on our assessment and outcomes from key stakeholders, the proposed WTGs are unlikely to affect the operation of either the ACMA links, or the other existing telecommunications services. Accordingly, MGE consider that the Project has been designed, located, and sited to avoid or minimise telecommunications impact to pre-existing television, radar and radio transmission.

Engagement with key stakeholders has been undertaken to assess any potential EMI impacts on their assets. Consultation with the Bureau of Meteorology (BoM) is ongoing to ensure their services remain unaffected. RWE Renewables Australia Pty Ltd (the Proponent) will continue working with this stakeholder as final outcomes are pending. Stakeholder correspondences have been collated and presented in Appendix A of this report.

Recommendations

If any design changes occur that have the potential to generate electromagnetic interference issues or telecommunications impacts, consultation with key stakeholders should occur, and this study should be revised, to safeguard against potential future impacts.

If impacts are identified as a result of future design changes the following mitigation options may be considered:

- Modify the design to either relocate and/or remove wind turbines to avoid, minimise and/or mitigate any electromagnetic interference issues and telecommunications impacts.
- Monitor telecommunications during construction, operational and/or decommissioning phases of the Project to confirm impacts.
- Modify telecommunications transmission paths around wind turbines.
- Modify existing telecommunications infrastructure to improve performance.

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1 Abbreviations / Definitions

Table 1: 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
ERM	Environmental Resources Management (company)
f	Frequency (GHz)
FM	Frequency Modulation
F_n	<i>n</i> th Fresnel Zone; also, F ₁ , F ₂ , etc.
G	Maximum (boresight) antenna gain (dBi)
GHz	Giga-Hertz – 10 ⁹ Hertz
GIS	Geographic Information System
GNSS	Global Navigation Satellite System Networks
GPS	Global Positioning System
LoS	Line of Sight
MGE	Middleton Group Engineering
MHz	Mega-Hertz – 10 ⁶ Hertz
RFNSA	Radio Frequency National Site Archive
The Project	Cattle Creek Wind Farm
The Proponent	RWE Renewables Australia Pty Ltd
UHF	Ultra-High Frequency (300 MHz – 3 GHz)
WMO	World Meteorological Organization
WTG	Wind Turbine Generator
η	Antenna efficiency

Table 2 Definitions of Telecommunication Services Addressed

Telecommunication service	Definition
Point-to-point microwave links	Point-to-point microwave links transmit data wirelessly between specific locations using high-frequency microwaves.
Meteorological radar	Meteorological radar uses radio waves to detect and monitor precipitation, wind patterns, and atmospheric conditions for weather forecasting.
Mobile voice-based communications	Mobile voice-based communications enable real-time conversations over cellular networks through mobile phones.
Wireless and satellite internet services	Wireless and satellite internet services provide internet connectivity without physical cables, using radio signals or satellites.
Broadcast and digital radio	Broadcast and digital radio deliver audio content through traditional or digital signals, offering diverse programming.
Broadcast, digital and satellite television	Broadcast, digital, and satellite television transmit visual content through various methods, providing a range of channels and programming.
Trigonometry stations	Trigonometry stations use instruments to measure angles and distances for surveying, navigation, and geodetic activities.
GPS	GPS (Global Positioning System) is a satellite-based navigation system providing accurate location and time information for navigation and location-based services.

2 Background

Middleton Group (MGE) has been engaged by ERM to undertake an EMI desktop study for Cattle Creek Wind Farm project. The Project is spread over 20,000 ha of land, located in the 110 km west of Toowoomba Local Government Area (LGA) and 50 km North-West of Millmerran LGA in Queensland.

The Project will include the installation, operation, maintenance and decommissioning of up to 135 wind turbine generators (WTGs), battery storage, ancillary infrastructure, and temporary facilities associated with construction of the Project. The Project design has a total nameplate generating capacity of approximately 972 MW, with the capability to power 525,000 homes across Queensland.

MGE has been engaged by Environmental Resources Management Australia Pty Limited (ERM) to undertake an Electromagnetic Interference Assessment desktop study. ERM, in turn has been engaged by RWE Renewables Australia Pty Ltd (The Proponent).

3 Scope

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

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

The study has been undertaken to address the Electromagnetic Interference element of the QLD Government's State code 23: Wind Farm Development, specifically to identify that:

"Development is designed and/or mitigation measures are used to protect pre-existing television, radar and radio transmission and reception from electromagnetic interference."

The impact of the Cattle Creek 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.

The study is confined to the analysis of publicly available information and consultation with key stakeholders ([Appendix A](#)).

4 Inputs

This assessment is based on ERM's provided information and key stakeholders' publicly available data specified in Table 3 and Table 4.

Table 3: Study Inputs – Project Infrastructure

Project Detail	Value
Wind turbine coordinates	Wind turbine layout received from ERM (via email on 05.11.2025)
Wind turbine dimensions	Tip Height: Up to 260 m Turbine Blade Diameter: Up to 175 m (A conservative worst-case value of 200m is used for the analysis) Hub Height: Up to 169 m
Project Construction Corridor	Received from ERM (via email on 13.03.2026)
Project Boundary	Received from ERM (via email on 13.04.2026)

Table 4: Study Inputs - Stakeholder Infrastructure

Input	Source	Date Provided/Accessed
Coordinates for Dwellings	The Proponent	25.07.24
Point-to -point microwave links, mobile voice-based communication, and internet services	ACMA Site Location Map RFNSA Website	25.11.25
AM, FM, Digital Radio, Digital TV broadcasters	List of transmitters with a licence to broadcast	25.11.25
Meteorological Radar	BoM	07.10.25
Survey Marks	Queensland	25.11.25
Trigonometrical Station and GPS	Geoscience Australia GNSS Station	25.11.25

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; and
- 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, this report has been developed on the basis that information supplied by/through ACMA is correct, except where a stakeholder provides updated specifications.

5.2 Site Overview

An overview of the location of the Project and relevant telecommunication services is shown in Figure 1.

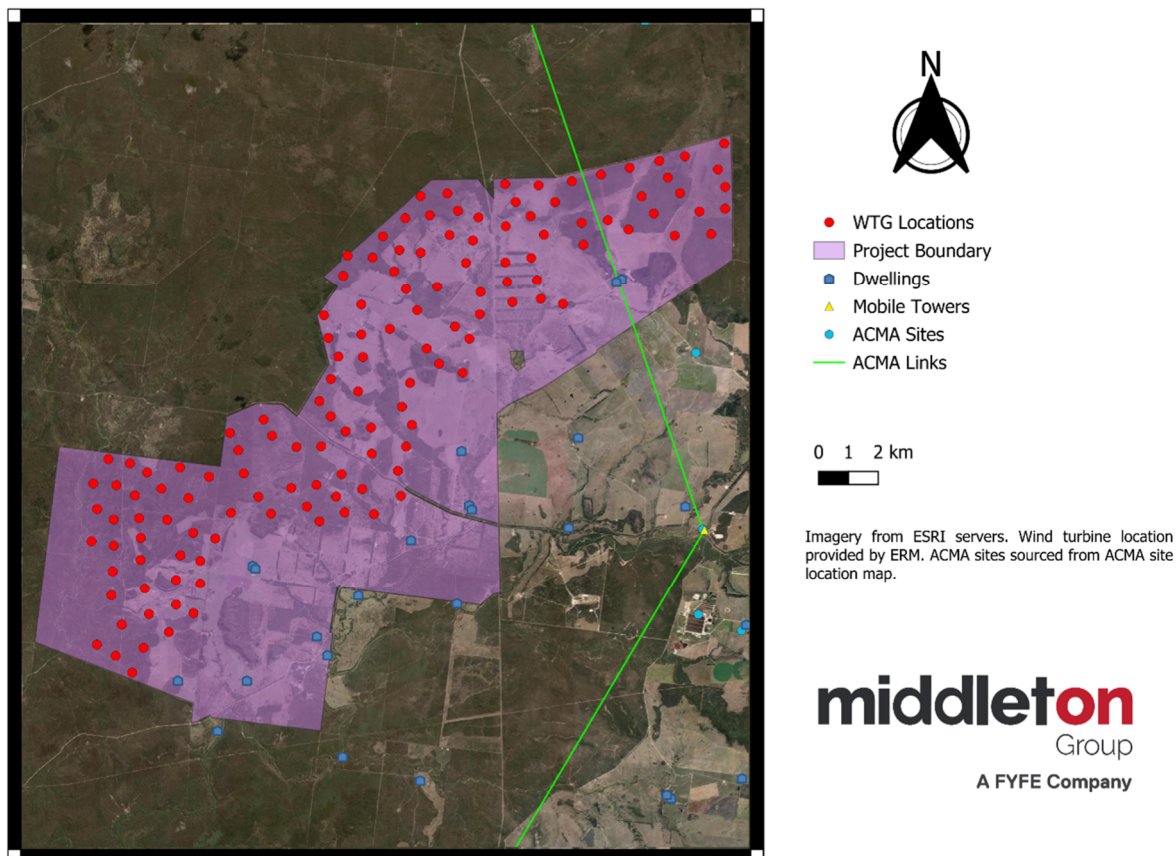


Figure 1: Wind turbine layout overlaid with telecommunication services

5.3 Point-to-Point Links

WTGs have the potential to impact on point-to-point ACMA communication links through three mechanisms [3].

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

As seen in Figure 2, there is only one communication link found through the project boundary. There are no ACMA sites within a 2 km radius of the WTGs. Detailed information of the link is outlined in Table 5, with an in-depth analysis presented in the following subsections.

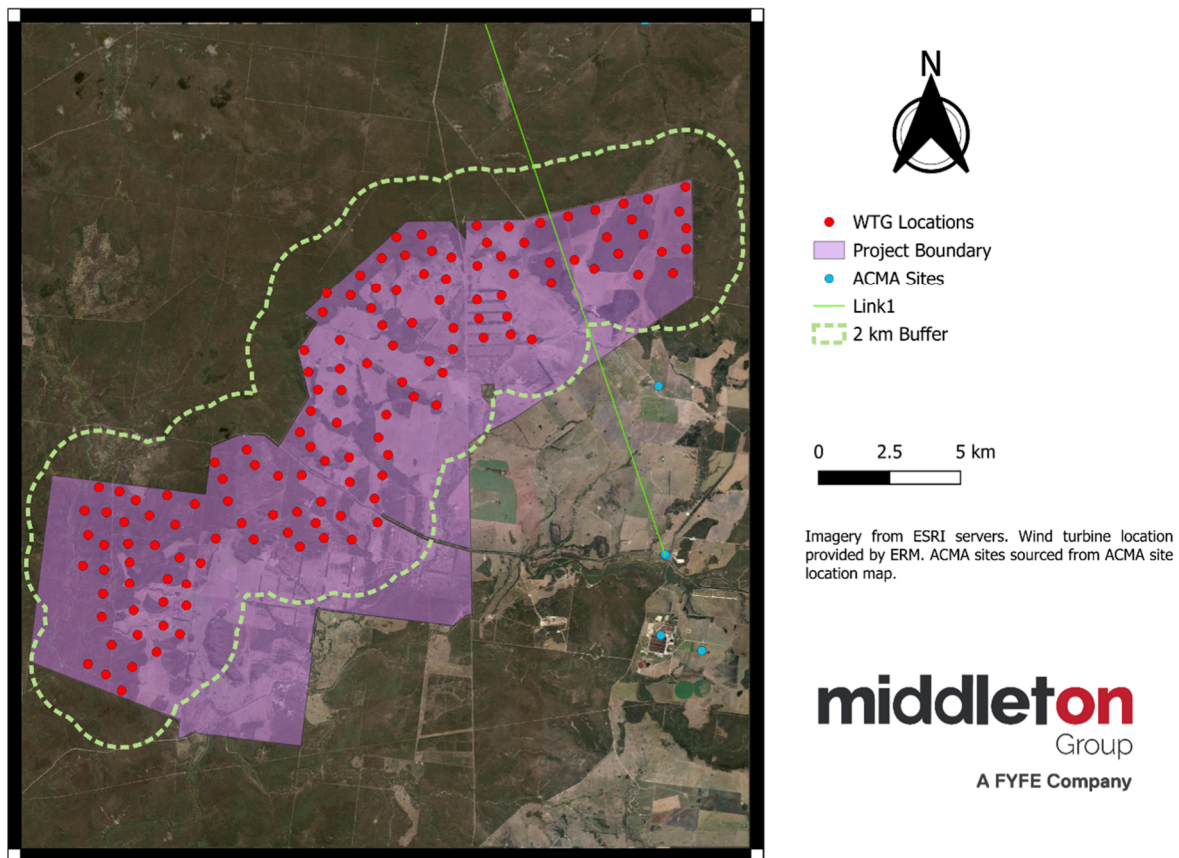


Figure 2: ACMA point-to-point links within a 2 km radius

Table 5: Point-to-point link details.

Point-to-Point link number	BSL / Licence No	Site 1	Site 2	Length (km)	Frequency (MHz)	Owner
1	9997572/1	Dunmore Mast 12 km E of CATTLE CREEK ID: 9028241	Telstra Exchange DURABILLA ID: 14751	31	7821.825	Telstra Limited

Multiple licences may be assigned to one link. This assessment highlights the licence with the lowest frequency when calculating Fresnel zones, as lower frequencies produce broader Fresnel zones.

5.3.1 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 [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)

No WTGs have been placed within or close to the ACMA towers that could result in near-field effects.

5.3.2 Reflection and 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 and receiver.

There are currently no transmitters and receivers within 2 km of Cattle Creek Wind Farm.

Since there are no ACMA sites within 2 km of boundary, there will be no reflection and scattering effects.

5.3.3 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 divided by 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 microwave (GHz) links. In particular, for links below 1 GHz, the impact of a wind turbine on the link will be a function of the carrier to interference ratio, C divided by 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 a wind turbine may have an impact, and mitigation strategies may be required.

The maximum radii of the 1st and 2nd Fresnel Zones for the communication links that traverse the Project Area has been summarised in Table 6.

Table 6 Fresnel Zone and Exclusion Zone for the Point-to-point Links

Link number	BSL/ Licence No	Length(km)	Frequency (MHz)	0.6 x $F_{1\text{Max}}$ (m)	$F_{2\text{Max}}$
1	9997572/1	31	7821.825	10.38	24.37

Link 1

Telstra manages license 9997572/1 which connects Site 1 (Dunmore Mast 12 km E of CATTLE CREEK ID: 9028241) to Site 2 (Telstra Exchange DURABILLA ID: 14751). The lowest frequency signal, 7.821825 GHz, has been applied in this analysis.

From a bird's eye view, as seen in Figure 3, the rotor extent of WTG20, WTG17, WTG21 and WTG16 appear to be close to Maximum 1st Fresnel Zone ($F1_{\text{max}}$) by 390 m, 577 m, 520 m and 300 m respectively.

As part of the stakeholder engagement process, consultations were undertaken with Telstra regarding the existing point-to-point link (9997572/1) that traverses the project site. Telstra has advised that no impacts are expected, as the proposed WTG locations in proximity to the link are considered acceptable. However, further assessment will be required should any changes or deviations to these locations occur. For detailed stakeholder responses, refer to Section 6 and the supporting information provided in Appendix A section A.1.

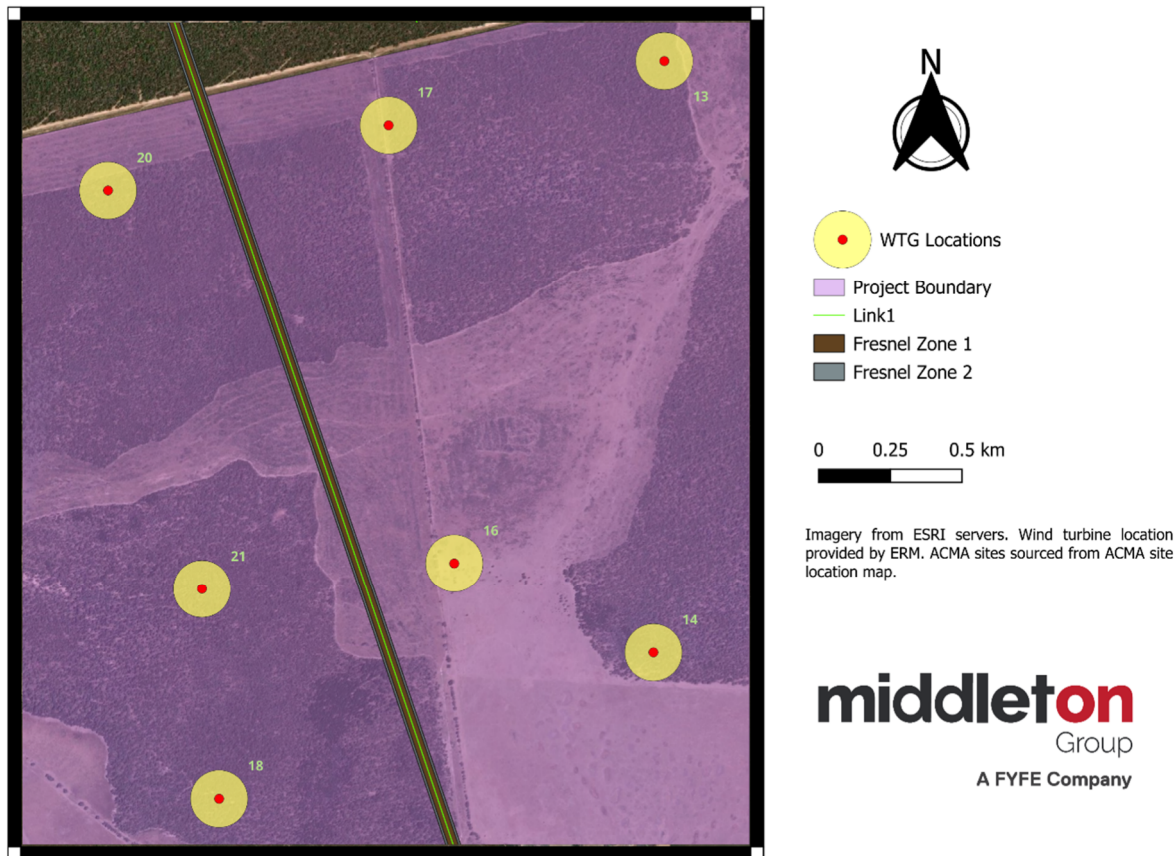


Figure 3: Link 1 passing through the Project Area

5.4 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. 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 this threshold. Some wind farms are visible to meteorological radars, registering as static echoes.

Details of specific radars and corresponding coverage maps are available online from: [online](#).

The World Meteorological Organisation (WMO) recommends that wind turbines are sited, at a minimum, 5 km away from meteorological radars, and preferably outside a radius of 20 km [5]. Furthermore, The Operational Programme for the Exchange of Weather Radar Information (OPERA), and the radar programme of European Meteorological Services 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 4 demonstrates the location of the meteorological radars in relation to the Project Area. The details of the closest six weather radars that are within 250 km are also outlined in Table 7.

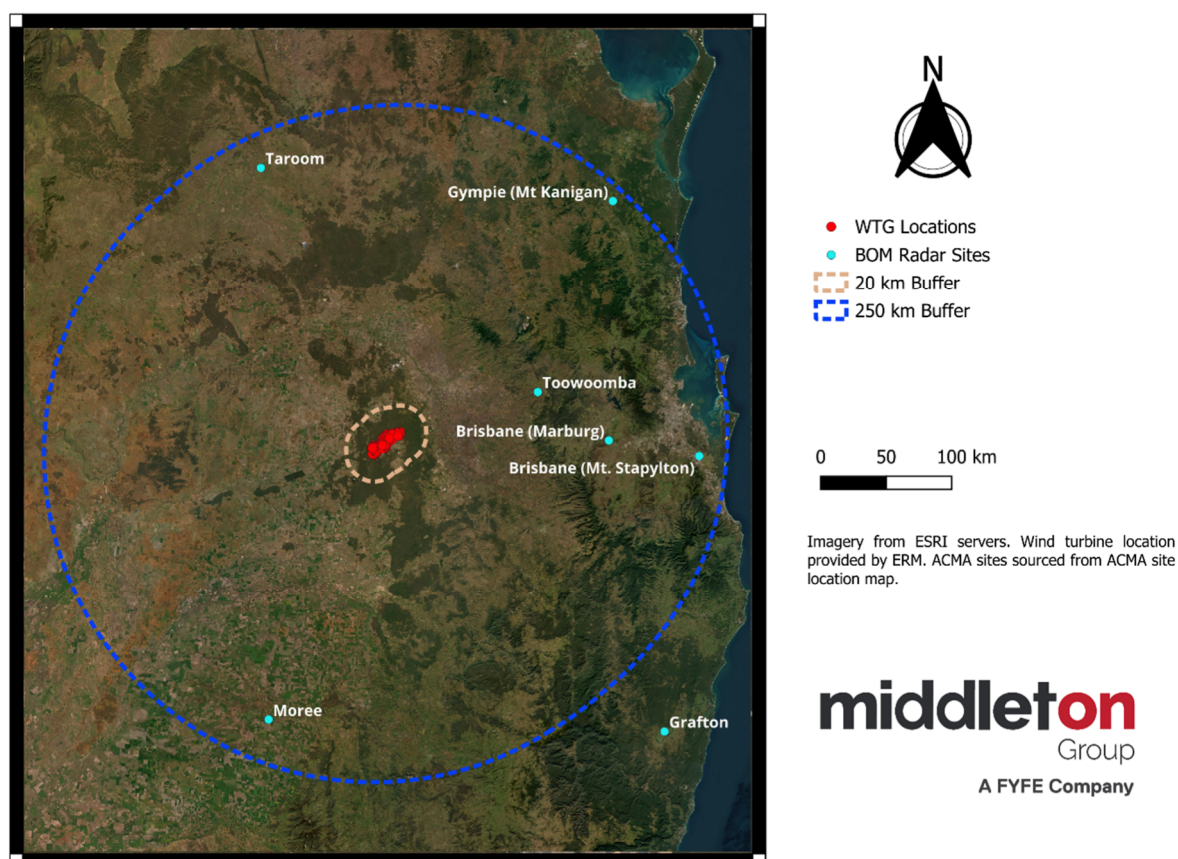


Figure 4: Meteorological Radar

Table 7: Meteorological Radar Information

Weather Radar Name	Coordinate	Radar type	Distance to Cattle Creek Wind Farm Project Area (km)
Toowoomba	27.27° S, 151.99° E	Meteor 1700 S-band Doppler	109
Brisbane (Mt. Stapylton)	27.72°S, 153.24°E	Meteor 1500 S-band Doppler	229
Gympie (Mt Kanigan)	25.99°S, 152.58°E	DWSR 8502S 2° S-band	240
Taroom (Sellicks Hill)	25.7°S, 149.9°E	WF 100, C-band	226
Marburg	27.61°S, 152.54°E	Meteor 1700SDP (S-band, Doppler and Dual Pol enabled)	161
Moree	29.50°S, 149.85°E	WF 100 C Band	217

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 six radars within 250 km of the wind farm, giving

good visibility of weather events in that region. As such, the presence of the wind farm is unlikely to cause adverse performance of the radars during extreme weather events.

However, consultation with BoM is ongoing to ensure their services remain unaffected. BoM has indicated that a detailed analysis will be required, and the Proponent will continue to engage with BoM should any radiocommunication concerns arise, as final outcomes are still pending. For updates on the progress of this stakeholder engagement, refer to Section 6 and Appendix A section A.2.

5.5 Mobile Voice-Based Communications

5.5.1 Mobile Coverage – Nearby Towers

There are no mobile phone base station located within the 2 km buffer of the Project's wind turbines as shown in Figure 5. The closest mobile phone base station is 9.9 km away from the nearest WTG. Typically, the signal will not be significantly impacted where the towers are located more than 2 km from wind turbines. Therefore, it is unlikely that the project will cause any significant impact on the operation of mobile phone base stations.

Consultation and engagement with Telstra with respect to the impact on their mobile telemetry services is being collated in Appendix A.

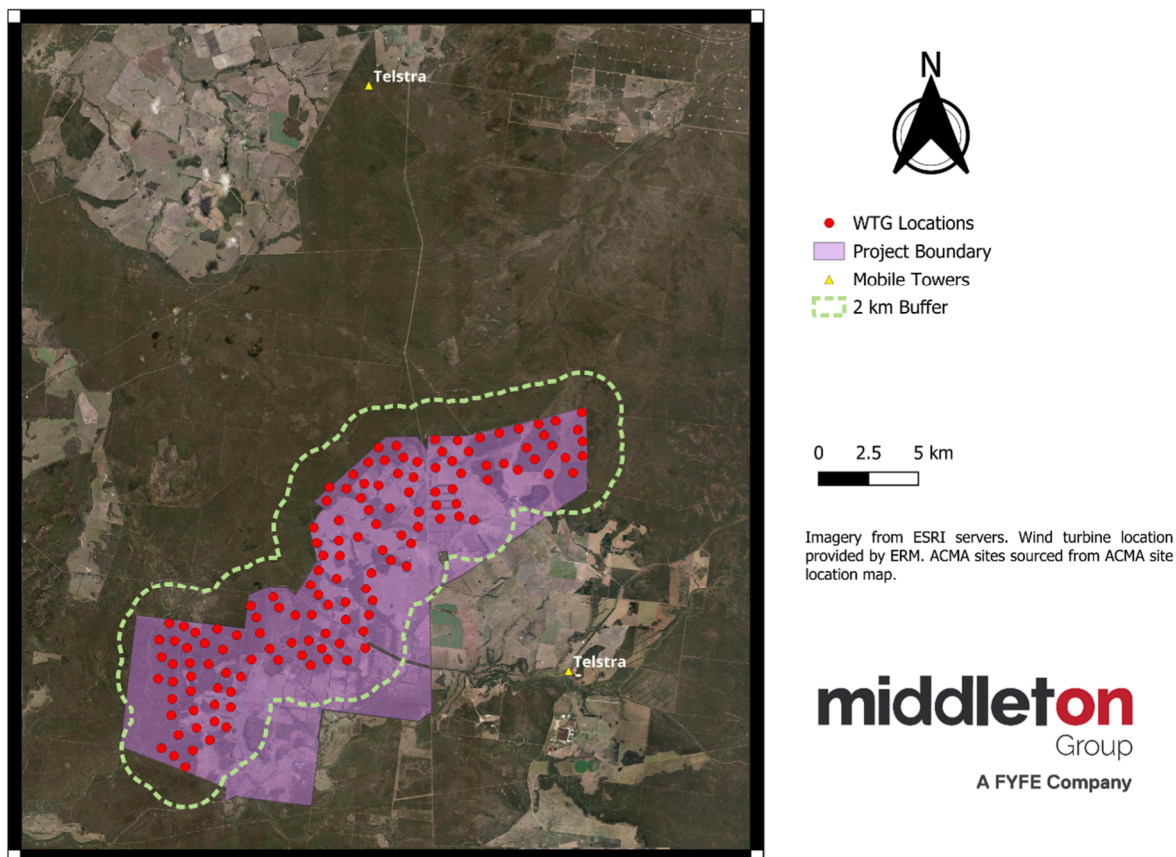


Figure 5: Proximity of project to mobile phone base stations

5.5.2 Mobile Coverage – General

The mobile network coverage map of Telstra within the region is shown in Figure 6.

In the immediate vicinity of the wind turbines, some reduction in signal may occur. However, this can be mitigated by relocating the mobile phone receiver in the order of tens of metres. Beyond the Project Area, there will not be any significant impact on the signal.

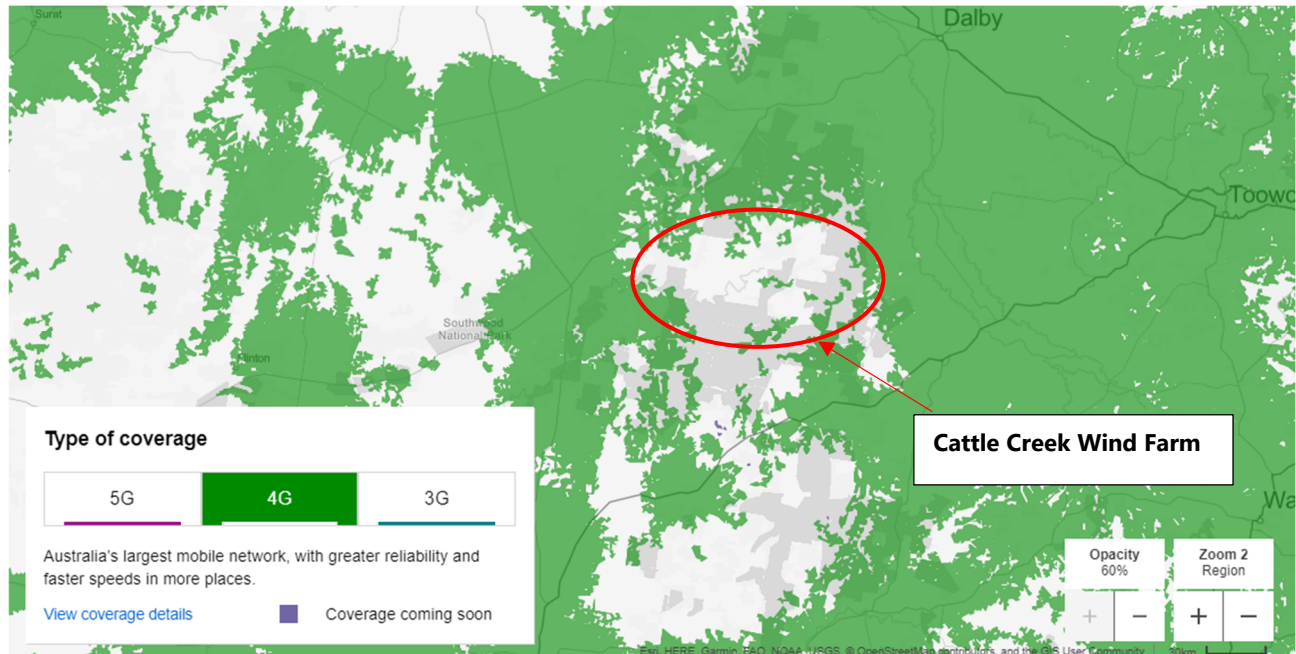


Figure 6: Telstra Network Coverage Map of Cattle Creek Wind Farm

Telstra has been consulted to ensure their services will not be impacted. Refer to Section 6 and the corresponding information in Appendix A section A.1 for further details.

5.6 Wireless and Satellite 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.

All dwellings within the Project Area are associated with the wind farm. As shown in Figure 7, there are seven dwellings within 2 km of the WTG. The closest dwelling, labelled 46, is within 1.52 km of WTG number 103. A detailed summary of these dwellings and their proximity to the WTGs can be found in Table 8 below.

The Project may cause some degradation in satellite signal quality for these associated dwellings. This potential impact will be addressed through discussions and agreements between the project Proponent and the landowners of these dwellings.

There are no non-associated dwellings resides within 2 km of any WTGs, as shown in Figure 7. Consequently, it is highly unlikely that the project will have any significant impact on satellite services for non-associated dwellings.

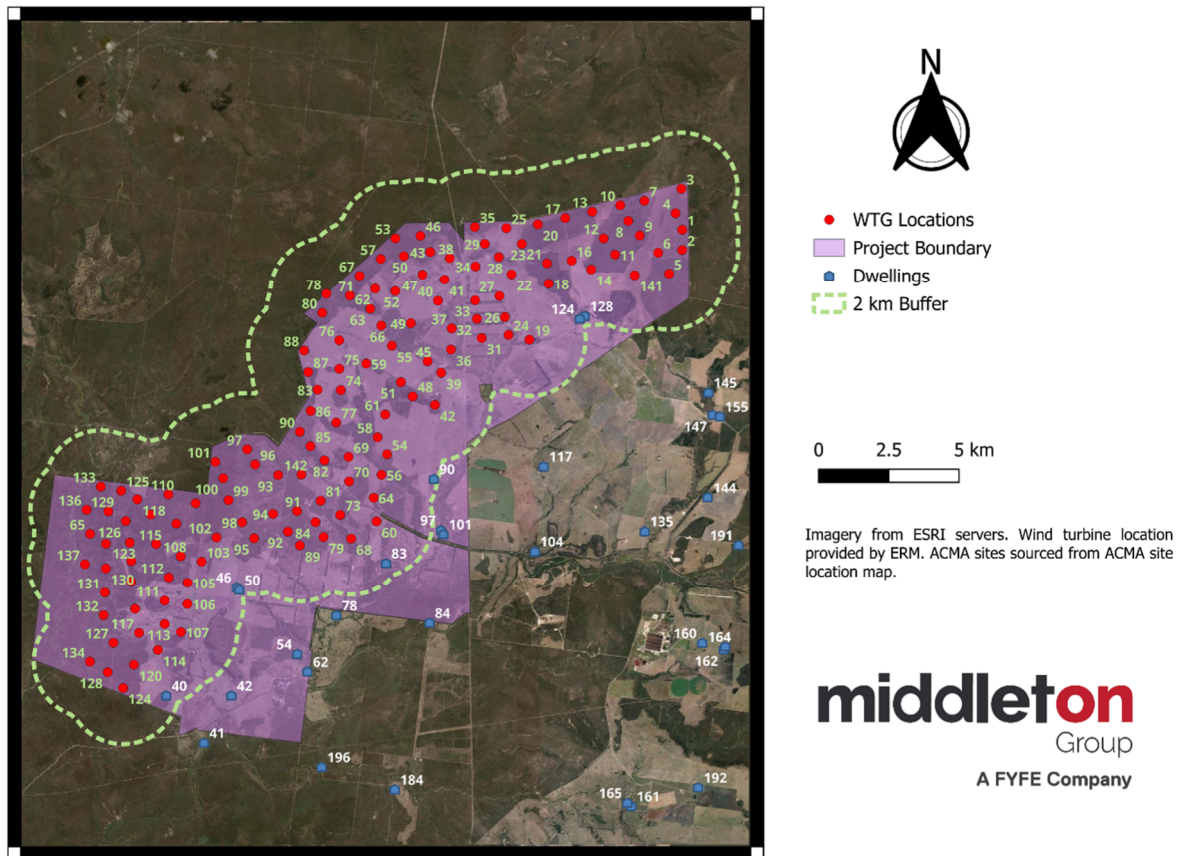


Figure 7: Dwellings located nearby the project

Table 8: Dwellings Summary

Dwelling ID	WTG ID	Distance (km)
46	103	1.52
83	68	1.53
40	124	1.56
124	18	1.67
50	103	1.68
128	18	1.73
90	56	1.86

5.7 Trigonometrical Stations and GPS

5.7.1 Survey Marks

Trigonometrical stations and survey marks are physical observation marks used for surveying or distance measuring purposes, administered by state-based authorities.

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

- There is no proposed wind turbine location or part of construction corridor coinciding with a survey mark;
- There are 9 survey marks within a 2 km buffer of proposed wind turbine location; and

The closest distance between a survey mark and WTG number 29 is approximately 0.43 km, as shown in Figure 9. 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.

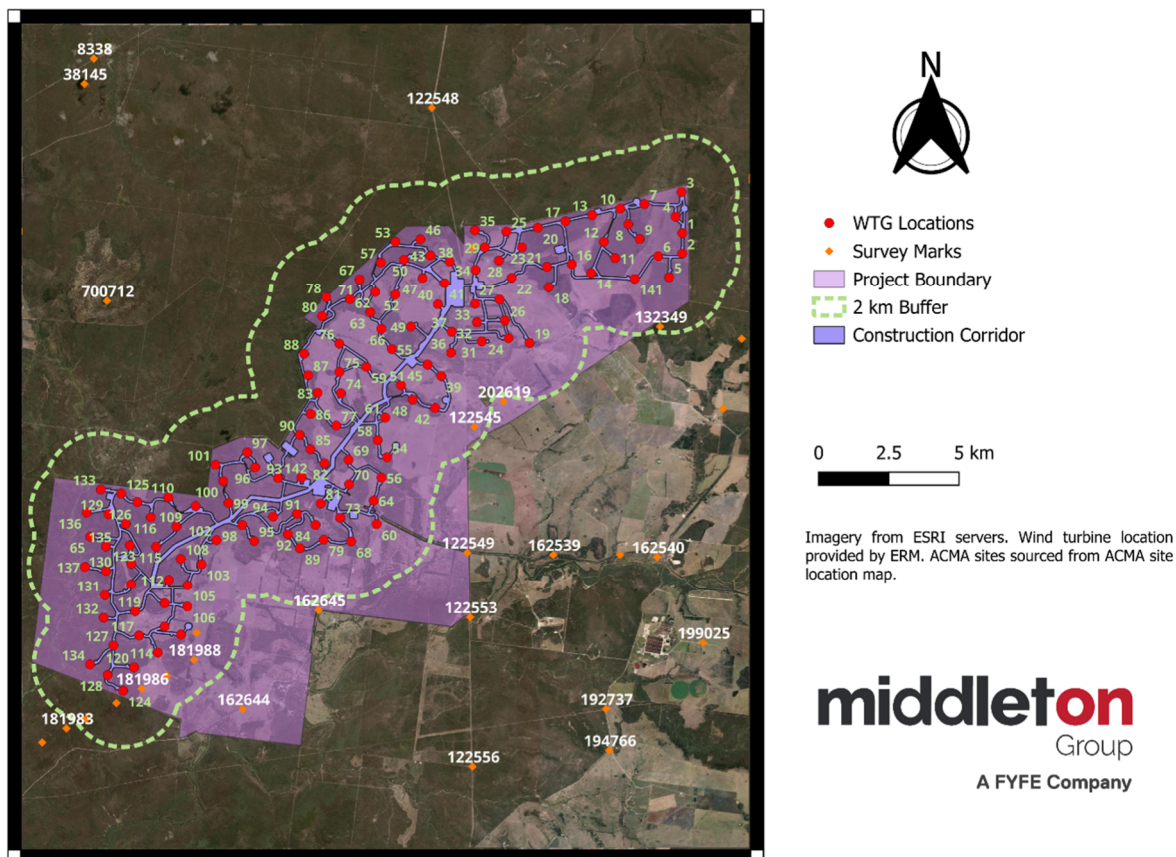


Figure 8: Survey Marks within the project area

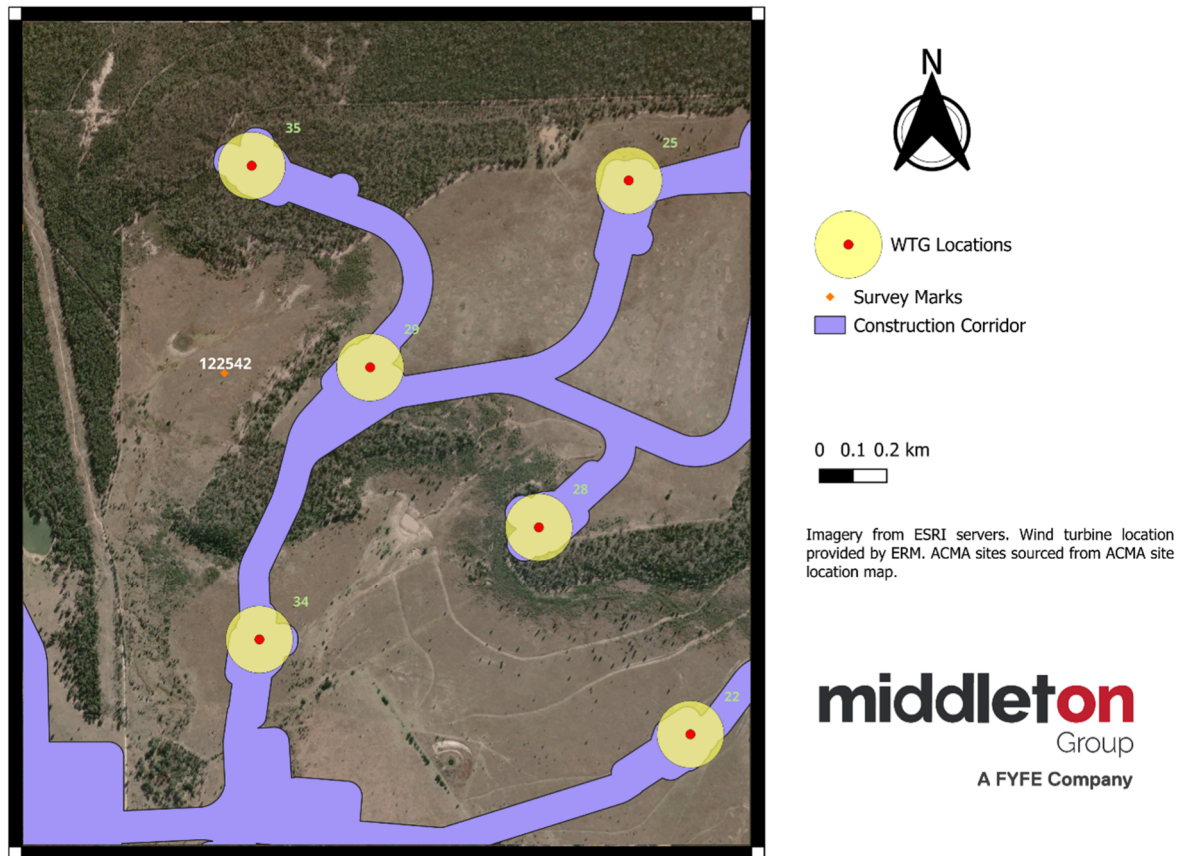


Figure 9: Survey Marks close to WTG29

The summary of survey marks can be found in Table 9.

Table 9: Proximity of Nearby Survey Marks and the Project Site

Survey Mark ID	WTG ID	Distance (km)
122542	29	0.43
181989	107	0.57
181985	124	0.5
181986	124	0.66
181987	114	0.89
181988	107	0.99
122545	42	1.54
181984	124	1.65
132349	5	1.78

Wind farm construction may physically impact these survey marks. If this is likely to occur, the Proponent should consult with the Queensland Government via the following [website](#). As stated above, assistance from a registered surveyor may be required.

5.7.2 Global Navigation Satellite System (GNSS) Station

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).

Based on the GNSS network map provided by Geoscience Australia [8], the EMI impact of the Project to the GNSS stations has been analysed shown in Figure 10, demonstrates that there are no GNSS station within the Cattle Creek Wind Farm's 20 km boundary. The nearest GNSS station, MOON is 32 km away from the nearest wind turbine.

GNSS has been consulted to ensure their services will not be impacted. Refer to Section 6 and the corresponding information in Appendix A section A.3 for further details.



Figure 10: GNSS Station locations relative to WTG layout

5.8 Broadcast, Digital Radio and Television

Amplitude Modulation (AM) broadcast-band signals are medium 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) broadcast-band 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 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 11, no broadcast, radio, and television services transmitters are located within 5 km of a wind turbine. The closest is the MOONIE which is 32 km away from the nearest turbine.

It is highly unlikely that the Project will impact any broadcast, radio, and television services transmitters.

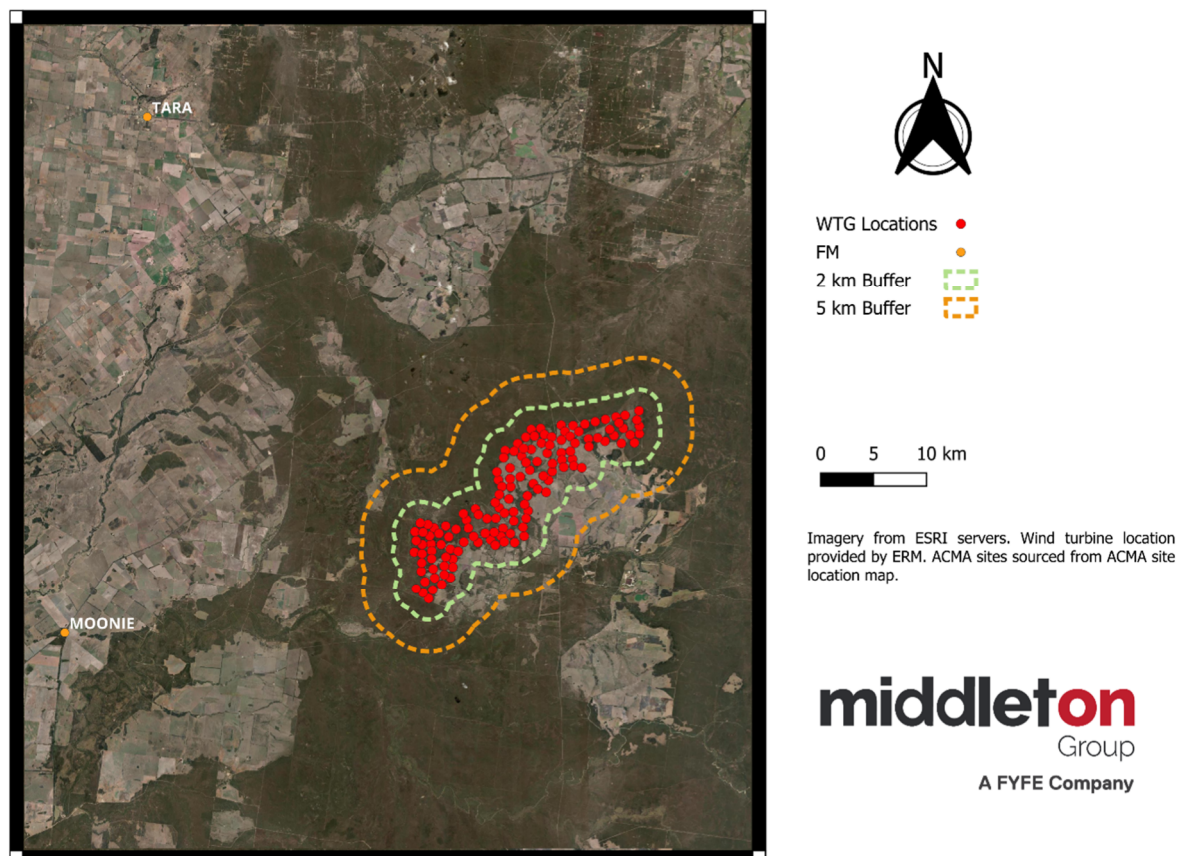


Figure 11: Location of broadcast transmitters relative to WTG layout

6 Stakeholder Engagement

Consultation and engagement with stakeholders were initiated by the Proponent. A list of key stakeholders is presented in Table 10. Responses from these stakeholders are provided in Appendix A.

Note: Stakeholder engagement was undertaken based on an earlier set of WTG locations and corresponding WTG IDs (as included in Appendix A). Minor adjustments to turbine positions and numbering have since been made; however, these are not material and do not impact stakeholder engagement or the outcomes of this assessment.

A summary of the engagement is listed below:

Table 10: List of stakeholder engagement

Stakeholder	Impact	MGE Assessment & Correspondence Status	Stakeholder Response
Telstra	Mobile service operation ACMA Link and site	Response received	No impact
BoM*	Meteorological radar operations	Response received	Ongoing
Geoscience Australia	GNSS Towers and Trigonometrical infrastructure	Response received	No impact

* Consultation is ongoing, and the Proponent will work with the stakeholder as final outcomes are still pending. For progress update, refer to A.2

7 Recommendations

The Project design has avoided, minimised and mitigated EMI that could disrupt the pre-existing television, radar, and radio transmission and reception systems. Accordingly, there are no Project-specific recommendations required or provided by MGE, as relevant to the Project assessed in this study.

To safeguard against potential future impacts, consultation with key stakeholders has been undertaken, and this study should be revised, if any design changes occur that have the potential to generate EMI issues or telecommunications impacts.

If impacts were identified as a result of any future design changes the following conceptual avoidance, minimisation and/or mitigation options may be considered:

- Modify the design to either relocate and/or remove wind turbines to avoid, minimise and/or mitigate any EMI issues and telecommunications impacts;
- Monitoring telecommunications during construction, operational and/or decommissioning phases of the Project to confirm impacts;
- Modify telecommunications transmission paths around wind turbines; and
- Modify existing telecommunications infrastructure to improve performance.

Where these options require future investigation, any interaction and/or cumulative impacts should be considered.

No further recommendations and/or safeguards are warranted or provided in this report.

8 Conclusion

The potential electromagnetic interference impact of the Cattle Creek Wind Farm has been assessed in this report.

Key stakeholders' correspondence regarding the impact of the project on the following services is already collated:

- Point-to-point links (Telstra);
- Meteorological radar;
- Mobile services;
- Trigonometry stations; and
- GPS.

Key stakeholders have been engaged to assess potential EMI impacts on their services. The BoM have indicated that the wind farm poses a significant risk to the operation of the Toowoomba radar. To determine mitigation measures, a comprehensive technical assessment must be conducted by BoM. The Proponent will continue to work directly with the BoM to address the impact, ensuring it is considered in the Project's design and delivery.

All other stakeholders have advised that they see no potential electromagnetic interference impacts on their services from Cattle creek wind farm. Continuous engagement with stakeholders is necessary to ensure the project does not cause any future impacts.

9 References

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- [2] Clean Energy Council, "Best Practice Guidelines," June 2018. [Online]. Available: <https://assets.cleanenergycouncil.org.au/documents/advocacy-initiatives/community-engagement/wind-best-practice-implementation-guidelines.pdf>.
- [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].

Appendix A Stakeholder Correspondence

A.1 Telstra

From: Windfarm Assessment Requests <WindfarmAssessmentRequests@team.telstra.com>

Sent: Tuesday, 17 June 2025 5:38 PM

To: Gayantha Paranawithana <Gayantha.Paranawithana@middletongroup.com.au>

Subject: RE: Cattle Creek Windfarm Assessment

Gayantha Paranawithana

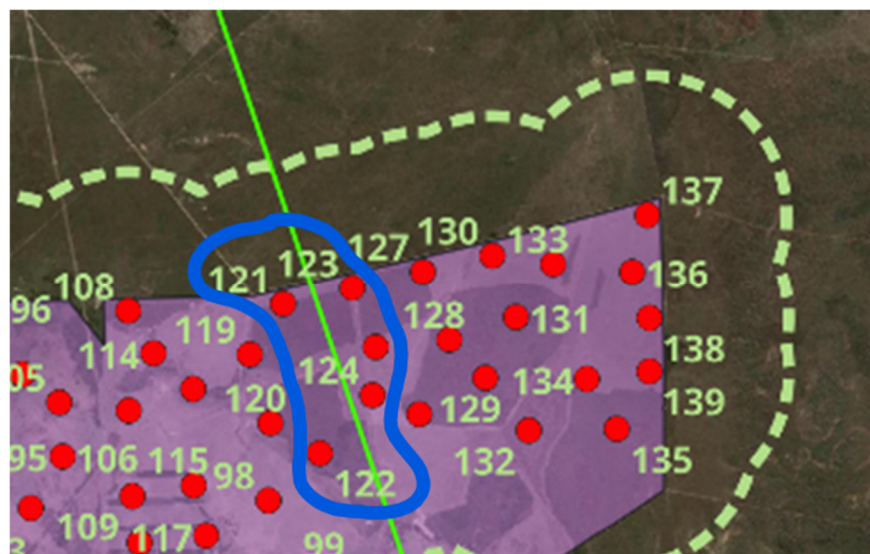
Middleton Group

RE: Proposed Cattle Creek Wind Farm

Dear Gayantha,

To provide a better understanding of potential impacts to Telstra infrastructure a desktop assessment was undertaken based on information sent to Telstra on 15 November 2025. The results were as follows:

1. There are no expected impacts to Telstra's Mobile network due to this wind farm based on the turbine locations provided.
2. Based on the turbine locations provided and information regarding Telstra's existing point to point radio links obtained from Waypoint and maprad.io, the proposed wind farm should not impact on any of Telstra's existing point to point radio links.
 - a. Turbines including 121, 122, 123, 124 are in close proximity to existing links. These proposed locations are acceptable, however, any deviation from these locations will require reassessment.
 - i. Refer to proposed turbine locations circled in the blue ring



3. A detailed analysis of the full power coordination impact (Low Frequency Induction (LFI) and/or Earth Potential Rise (EPR)) of the wind farm development is required. This includes location of the wind farm switch yard, the route and potential of any associated HV transmissions lines and the LFI and EPR impact on any Telstra plant they may affect.
4. It is recommended that you contact Before You Dig Australia, so you are aware of the underground assets in the area. They will provide you with the location of Telstra's as well as any other utilities' underground assets.

The developer also confirms its role as the proponent and ultimate owner of the proposed wind farm and that it has the authority to ensure that the conditions set out above are implemented and complied with. If the agreement of any other person or entity is required to ensure the conditions set out in this letter are complied with, the developer undertakes to obtain that agreement in writing and to provide it to Telstra prior to lodging a development application for the wind farm.

If the proposed plans and specifications of the development are altered or amended, Telstra reserves the right to request further conditions and amendments to the development.

Should you wish to discuss any aspect of this letter please do not hesitate to contact the undersigned. Otherwise, I would appreciate you responding to me confirming the developer's agreement to the conditions and matters set out above.

Yours faithfully,

Andrew Panagopoulos

Regards,
Andrew Panagopoulos
Fixed Access Network Reliability
Network and Infrastructure Engineering, Global Networks & Technology



M
E Andrew.Panagopoulos@team.telstra.com
W www.telstra.com

Telstra recognises and acknowledges the existing, original, and ancient connection Aboriginal and Torres Strait Islander peoples have to the lands and waterways across the Australian continent. We pay our respects to their Elders past and present.

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

A.2 Bureau of Meterology (BoM)

From: Stephanie MacDonald <stephanie.macdonald@bom.gov.au>

Sent: Tuesday, 18 March 2025 4:48 PM

To: Gayantha Paranawithana <Gayantha.Paranawithana@middletongroup.com.au>

Cc: Energy <energy@bom.gov.au>; windfarmenquiries <windfarmenquiries@bom.gov.au>; Stephen Duggan <stephen.duggan@bom.gov.au>

Subject: Cattle Creek Wind Farm - Telecommunication Impact Consultation Enquiry CAS-100424-W2B0G3
[SEC=OFFICIAL] CRM:0399000208

In reply please quote: CAS-100424-W2B0G3

Date: 18/03/2025

Dear Gayantha,

Thank you for your continued patience and apologies for the delay in response on this matter. The Bureau has received a large volume of enquiries from wind farm developers and required a Bureau-wide response which was considered at the highest levels of governance. This process took time to finalise agreements and charges for impacts assessments.

Our assessment of the current Cattle Creek wind farm proposal had determined it posed a high risk to the Toowoomba radar.

The Bureau cannot support the development without a comprehensive technical assessment of potential impacts and possible mitigation measures for your development.

This service is charged at \$45,000.00 (excl. GST) per assessment and would include the following:

- Detailed EMI modelling of the development proposal to assess meteorological data and service interference
- Detailed service impact assessments in consultation with a range of impacted Bureau service teams
- Consideration and suggestion of mitigation options to restore impacted services and maintain service quality
- Reporting of findings and Bureau's position on development

The mitigation options suggested will not be designed in detail. They will be proposed as a requirement for the development to consider for the Bureau to be supportive.

You may choose to have the work undertaken by another consultant, but we'll expect to review and approve findings ahead of any endorsement from us. We won't be providing advice regarding wind farm developments without a very clear understanding of the potential for impacts to our services.

We expect to be able to complete the consultancy within 8 weeks from commissioning. The delivered report findings will stand whilst the relevant technical details of the project remain the same (footprint, number of turbines, hub and tip height etc.).

Please let us know if you have any questions or to arrange an assessment.

Kind regards,

Stephanie MacDonald (she/her)

Energy & Resources Program | Business Solutions Group

Working days: Tuesday, Wednesday, Thursday, Friday (half-day)

energy@bom.gov.au | www.bom.gov.au



The Bureau of Meteorology acknowledges the Traditional Custodians of Australia and their continuing connection to land, sea and community.

Important: This message may contain confidential or legally privileged information. If you think it was sent to you by mistake, please delete all copies and advise the sender.



A.3 Geoscience Australia

From: GA GNSS Operations <gnss@ga.gov.au>

Sent: Friday, 30 August 2024 9:42 AM

To: Gayantha Paranawithana <Gayantha.Paranawithana@middletongroup.com.au>

Cc: Client Services <ClientServices@ga.gov.au>

Subject: RE: Cattle Creek Wind Farm – Telecommunication Impact Consultation - GNSS [SEC=OFFICIAL]

Good morning,

Geoscience Australia do not foresee any interference to our GNSS infrastructure as a result of the proposed Cattle Creek Wind Farm in QLD.

Thank you.

Kind regards,

Tayla Hume (she/they) | Operations Officer

GNSS Infrastructure and Informatics

Positioning Australia Branch

Space Division

Contactable between 8am and 4pm

Work Phone: +61 02 6249 9004 | +61 26126 8791

ga.gov.au

The logo for Geoscience Australia, featuring the text "Geoscience Australia" in a bold, white, sans-serif font. Below it, in a smaller, lighter font, is the tagline "Earth sciences for Australia's future". The background of the logo is a dark teal color with a subtle, wavy 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.

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