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Pottinger Wind Farm

Telecommunication Impact Assessment

Client: **RPS AAP Consulting Pty Ltd**
Revision: 0
Project: Pottinger Wind Farm TIA Assessment
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FINAL

Revision control

Revision	Date	Description	Prepared by	Reviewed by	Approved by
A	22.11.23	Initial Draft for Client Review	Ebony Apps	Ramez Barakat Eric Bendtsen	Timothy Cervenjak
B	19.12.23	Revision of client comments	Ebony Apps	Ramez Barakat	Timothy Cervenjak
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0	03.04.24	Final Issue	Ebony Apps	Maha Ismail	Timothy Cervenjak

Disclaimer

Executive Summary

RPS Group engaged Middleton Group Engineering (MG) to undertake a Telecommunications Impact Assessment (TIA) desktop study for the Pottinger Wind Farm (the Project) in the Riverina region of New South Wales.

This study assesses the impact of Pottinger 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; and
- GPS.

The ACMA database for point-to-point links within a 150 km radius of the site has been surveyed. Two links were identified within the Project boundary.

Based on MG's assessments and correspondence with stakeholders, the Project is unlikely to have a material impact on existing telecommunication services. As such, we expect 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; and the Project is compliant with the Secretary's Environmental Assessment Requirements.

Stakeholder consultation has been collated in Appendix B and there are no expected impacts of the Project on any surrounding telecommunication services.

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Tables

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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
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
MG	Middleton Group Engineering
MHz	Mega-Hertz – 1 million Hertz
PO3	Performance Outcome 3
RPM	Revolutions per minute
RPS	RPS AAP Consulting Pty Ltd
TIA	Telecommunication Impact Assessment
The Project	Pottinger Wind Farm
UHF	Ultra-High Frequency
WMO	World Meteorological Organization
WTG	Wind Turbine Generator

Abbreviation	Explanation
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

2.1 Overview

Middleton Group was engaged by RPS AAP Consulting Pty Ltd (RPS) to conduct a Telecommunication Impact Assessment (TIA) of the Pottinger Wind Farm for Pottinger Renewables Pty Ltd (the Applicant).

The Project includes the construction, operation and decommissioning of a Project and associated infrastructure with a targeted electricity generation capacity of 1.3 GW. The Project Area covers 26,400 ha as shown in Figure 1. It is located 60 km south of Hay in the rural locality of Booroorban in south-western NSW, entirely within the South West Renewable Energy Zone (REZ).

The impacts and proposed mitigation for telecommunication services from the proposed construction, operation and decommissioning phases of the Project are addressed in this report in accordance with relevant regulatory requirements and guidelines (this assessment).

This report supports a State Significant Development (SSD) Development Consent application under Part 4, Division 4.7 of the Environmental Planning and Assessment Act 1979 (SSD-59235464), as an appendix to the Environmental Impact Statement (EIS) for the Project. Each is listed in Table 3 which also indicates where each is addressed.

The following guidelines have been considered in this assessment:

- Pottinger Wind Farm SEARs
- NSW Wind Energy Guideline
- National Project Development Guidelines

Regulatory submissions to SEARs and community issues and where each is addressed in this report are listed in Table 3, Table 4 and respectively.

Table 3: SEARs and Where Addressed

SEAR	Issue	Section addressed in this report
Telecommunications	Identify possible effects on telecommunications systems, assess impacts and mitigation measures including undertaking a detailed assessment to examine the potential impacts as well as analysis and agreement on the implementation of suitable options to avoid potential disruptions to radio communication services, which may include the installation and maintenance of alternative sites	Section 5

Table 4: Regulatory Submission to SEARs and Where Addressed

Regulator	Reference and Issue	Section addressed in this report
N/A	N/A	N/A

2.2 Project Description

The Applicant seeks in perpetuity approval for the construction, operation and decommissioning of a 1.3 GW wind farm, electrical infrastructure, other infrastructure and ancillary activities generally including the following components:

- Up to 247 Wind Turbine Generators (WTGs) of which each has a tip height of up to 280 m and capacity up to 8 MW;
- Electrical reticulation network:
    - Up to six substations and 13 transformers;
        - One BESS 33/330kV substation with three transformers;
        - Internal 33 kV, 66 kV, 132 kV, or 330 kV electrical reticulation network and infrastructure connecting to the 330 kV Project EnergyConnect line via a switchyard and collector station;
    - Approximately 500 MW / 2 gigawatt hours (GWh) Battery Energy Storage (BESS);
- Other temporary and permanent infrastructure including:
    - Operations and Maintenance (O&M) facilities and infrastructure including site office, control room, storage facilities, car parking and fencing;
    - Accommodation facilities;
    - Construction and operational compounds;
    - Hardstands for WTGs and other infrastructure;
    - Internal access tracks and road turning head connecting Project infrastructure;

    - Meteorological masts; and
    - Concrete batching plants, crushing facilities, gravel / borrow pits, construction laydown areas;
- Ancillary activities including sourcing of materials and equipment for construction; sourcing of water for construction; subdivision and boundary adjustments, visual screening and associated ancillary works;
- Access road use via four locations and Project-required upgrades:
    - Project Area access: via the Cobb Highway from Jerilderie Road in the north east, from Wargam Road in the west, from East West Road in the south and West Burrabogie Road in the west, as well as emergency access; and
    - Wind farm major components transported via Port of Adelaide;
- Operational workforce of up to 50 Full Time Equivalent (FTE) and construction up to 900 FTE;
- Construction generally within standard construction hours and operations 24 hours per day 7 days per week; and
- Preliminary disturbance footprint of up to 1,066 ha.

No external transmission lines or associated easements are currently anticipated for the Project. Some of the Project-associated infrastructure will be shared with the Pottinger Solar Farm (the subject of a separate application)

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 WTGs on these services.

The study is confined to the analysis of publicly available information and consultation with key stakeholders.

The impact of the Pottinger 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.

4 Inputs

This assessment is based on stakeholder infrastructure specified in Table 5.

Table 5: Study Inputs – Project Infrastructure

Project Detail	Value
WTG coordinates	Latest WTG layout received from RPS via email dated 28/02/2024. Note minor changes to the final layout are expected. These will be within the micro siting allowance and have negligible impact to the findings of this report.
WTG dimensions	Tip Height: 280 m Hub Height: 180 m Turbine Blade Diameter: 200 m

Table 6: Study Inputs - Stakeholder Infrastructure

Input	Source	Date Provided/Accessed
Associated dwellings coordinates	The Applicant	31.10.23
Point-to-point microwave links, mobile voice-based communication, and internet services	ACMA Site Location Map RFNSA Website	06.11.23
AM, FM, Digital Radio, Digital TV broadcasters	List of transmitters with a licence to broadcast	06.11.23
Meteorological Radar	NSW Radar Information	08.11.23
Survey Marks	New South Wales – Spatial Services	08.11.23
Trigonometrical Station and GPS	GNSS Network Map	08.11.23

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 MG checked information against satellite imagery, MG has developed the report on the basis that information supplied by/through ACMA is correct, except where a stakeholder provides updated specifications.

5.2 Site Overview

A snapshot of the site and nearby telecommunication services is shown in Figure 1.

Figure 1: WTG layout overlaid with telecommunication services.

5.3 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 2, there are two communication links found within the Project Boundary. Detailed information for these links is outlined in Table 7. In depth analysis of the links will be presented in the following subsections.

In addition, Figure 3 shows that there are no communication sites registered with ACMA located the Project Boundary. Discussion of near-field and reflection/scattering effects is presented in section 5.3.1 and section 5.3.2 respectively, with diffraction effects assessed in section 5.3.3.

Figure 2: WTGs, Project Area and ACMA linked assignments.

Table 7: Point-to-point link details.

Point-to-Point link number	BSL / Licence No	Site 1	Site 2	Length (km)	Frequency (MHz)	Owner
1	11300366/1	NSWTA 100m Guyed Mast 75 Warwillah Road Site ID: 10026558	Transgrid 80m Guyed Mast off 1494 Jerilderie Rd Site ID: 35103	46.3	7435	New South Wales Government Telecommunications Authority
2	1207619/1	Murrumbidgee Shire Council 76.6m Guyed Mast Argoon, off Kidman Way Site ID: 402871	Essential Energy 35m Lattice Tower 75 Warwillah Rd Site ID: 35605	101	404.28	NSW Rural Fire Service

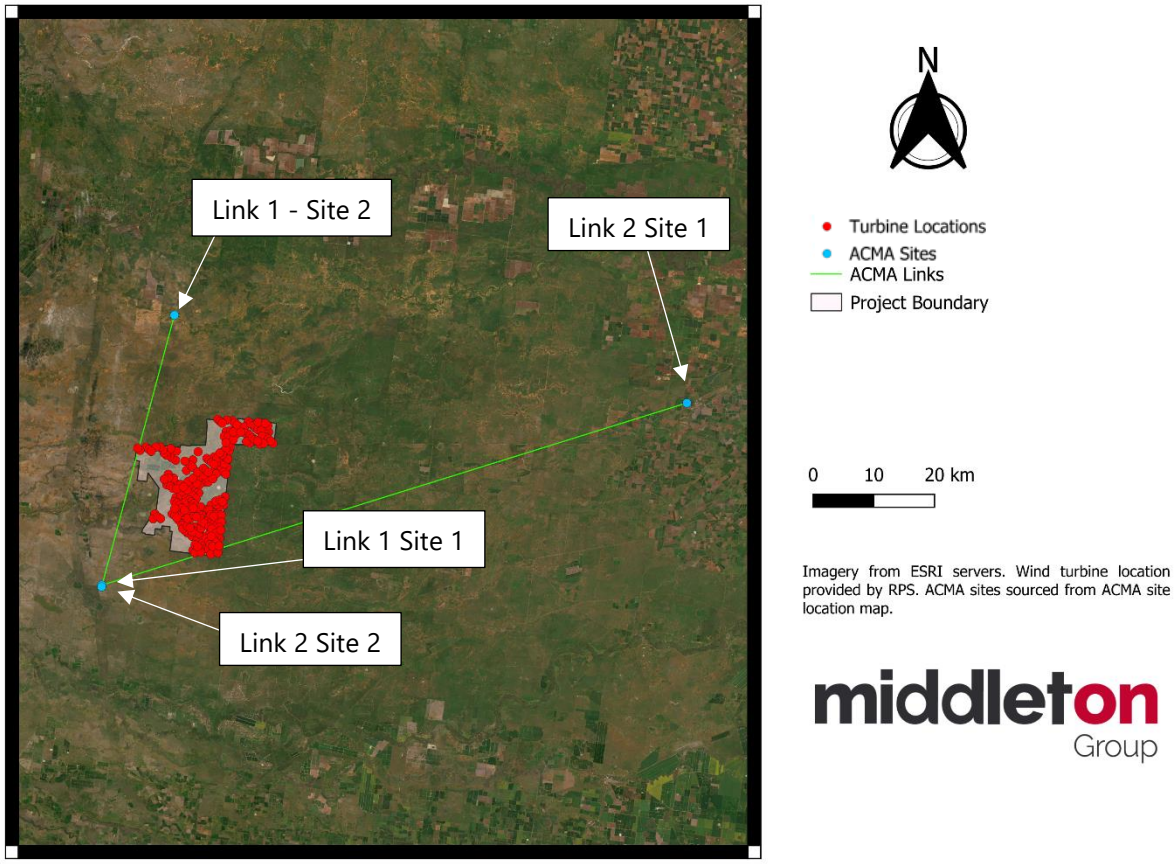


Figure 3: WTGs, Project Area and ACMA linked assignments with their associated sites.

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 [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 turbines have been built within or close to the ACMA (Australian Communications and Media Authority) towers at this time that could result in near-field effects.

5.3.2 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 are currently no transmitters nor receivers within 2 km of Pottinger Wind Farm.

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 WTG 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 WTG on the link will be a function of the carrier to interference ratio, C/I. In some instances, the presence of a WTG penetrating the 1st Fresnel Zone will have no material impact on the link; in other instances, the presence of the WTG 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 8 for the link that passes through the Project Area.

Table 8: Fresnel zones for the point-to-point link.

Point to Point Link number	BSL / Licence No	F_1 Max (m)	F_2 Max (m)
1	11300366/1	21.60	30.548
2	1207619/1	136.82	193.49

5.3.3.1 Link 1

The New South Wales Government Telecommunications Authority manages licence 11300366/1 which connects Site 1 (NSWTA 100m Guyed Mast 75 Warwillah Road ID: 10026558) to Site 2 (Transgrid 80m Guyed Mast off 1494 Jerilderie Rd ID: 35103). The lowest frequency signal, 7.435 GHz, has been applied in this analysis.

Figure 4, shows the aerial view of Link 1 passing through the site boundary. Table 9 details the effect of the link on the surrounding turbines.

Table 9: WTG distance to link 1.

Turbine Number	Is the link's Fresnel zone affected? (Y/N)	Distance from maximum 2nd Fresnel zone to rotor extent
WTG 1	N	52.88 m
WTG 2	N	148.44 m

This is a conservative analysis, using the maximum 1st and 2nd Fresnel Zones of the link. The radius of the link's Fresnel zone changes in size across the course of the link, reaching a maximum size at the mid-point of the link. The actual Fresnel zone size of Link 1 in vicinity of WTG1 and WTG2 may be smaller than what is represented in Figure 4. No turbine contacts the link's maximum Fresnel zones, and this assessment finds that the WTG locations are unlikely to cause telecommunication interference with Link 1.

Consultation and engagement with the New South Wales Government Telecommunications Authority with respect to the impact on their link has been compiled in Appendix B.5. The stakeholder found no expected impacts on their assets from the Project.

Figure 4: Aerial view of Link 1 passing through the WTG layout.

5.3.3.2 Link 2

The NSW Rural Fire Service manages licence 1207619/1 which connects Site 1 (Murrumbidgee Shire Council 76.6m Guyed Mast Argoon, off Kidman Way ID: 402871) to Site 2 (Essential Energy 35m Lattice Tower 75 Warwillah Rd ID: 35605). The lowest frequency signal, 404.275 MHz, has been applied in this analysis.

Figure 5, shows the aerial view of Link 2 passing through the site boundary. Table 10 details the effect of the link on the surrounding turbines.

Table 10: WTG distance to link 2.

Turbine Number	Fresnel Zone Impacted. (Y/N)	Distance from maximum 2nd Fresnel zone to rotor extent
WTG 260	Y	-
WTG 267	N	24.485 m
WTG 272	N	131.129 m

This is a conservative analysis, using the maximum 1st and 2nd Fresnel Zones of the link. The radius of the link's Fresnel zone changes in size across the course of the link, reaching a maximum size at the mid-point of the link. The actual Fresnel zone size of Link 2 in vicinity of WTG 255, WTG 260, WTG 267 and WTG 272 may be smaller than what is represented in Figure 5. As one WTG contacts the link's Fresnel zone, further 3D analysis must be conducted to determine if the WTG locations are likely to cause telecommunication interference with Link 2. This is investigated in the section below.

Consultation and engagement with the NSW Rural Fire Service with respect to the impact on their link has been compiled in Appendix B.6. The stakeholder found no expected impacts on their assets from the Project.

Figure 5: Aerial view of Link 2 passing through the WTG layout.

WTG 260

Figure 6 and Figure 7, below, show a snapshot of the 3D analysis results for link 2 and WTG 260. In 3D analysis, Middleton Group models the width of the Fresnel zone at the specific location of the turbine, to increase accuracy. There is a heightened risk of signal disruption due to obstructions in the middle of the link, as the Fresnel zone is widest there. As seen in Figure 6, Link 2's line-of-sight path does not intersect the turbine at any point but crosses below it. Figure 7 shows a cross-sectional view of the rotor of WTG 260 with respect to the link's Fresnel zones at that point. The rotor of the WTG touches but does not cross the 2nd Fresnel zone of link 2. As such, this assessment finds that Turbine 260 is unlikely to cause interference to link 2.

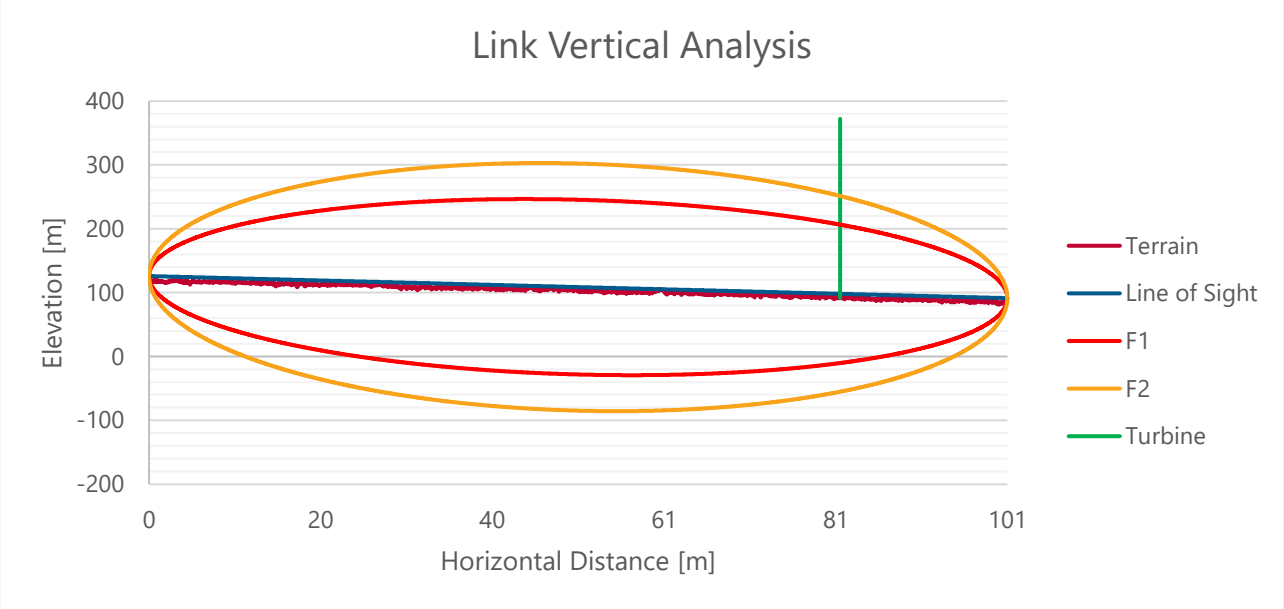


Figure 6: Side view of the path of link 2 and location of WTG 260

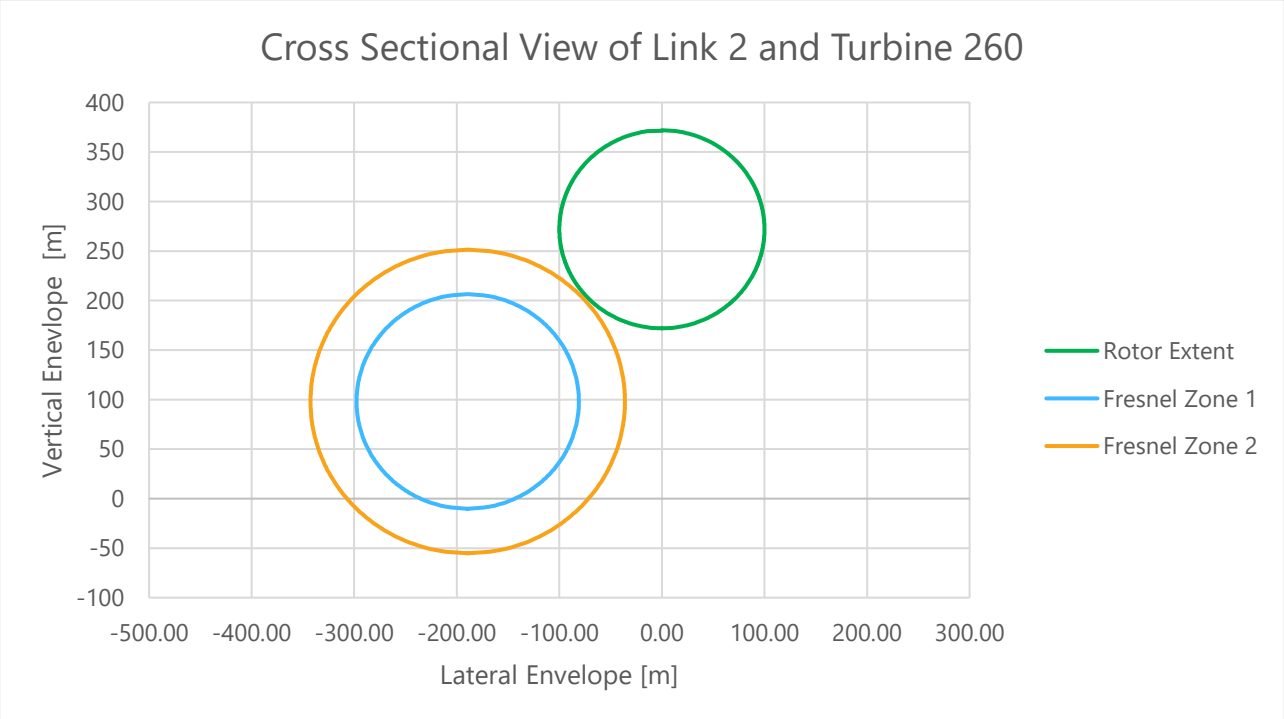


Figure 7: Cross sectional view of link 2 and WTG 260

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. 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 Projects are visible to meteorological radars, registering as static echoes.

Details of specific radars and corresponding coverage maps are available online from this link.

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 Operational Programme for the Exchange of Weather Radar Information (OPERA), the radar programme of European Meteorological Services Network (EUMETNET), of state that no WTG 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 8 demonstrates the location of the Meteorological radars in relation to the Project area. The details of the closest three (3) weather radars are outlined in Table 11.

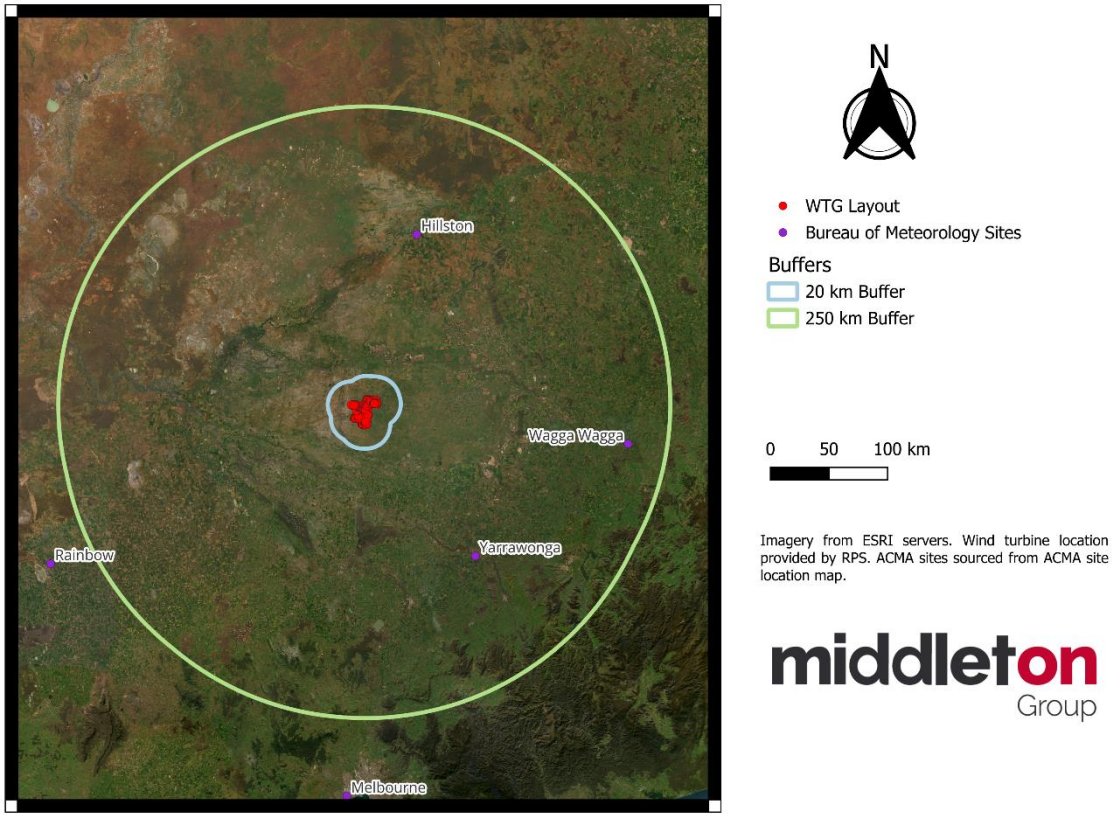


Figure 8: Meteorological Radars Map

Table 11: Meteorological Radar Information

Weather Radar Name	Coordinate	Radar type	Distance to Pottinger Wind Farm Project Area
Yarrawonga	36.03° S, 146.03° E	WSR 81C C-Band	145.30 km
Hillston	33.55° S, 145.52° E	Meteor 735CDP	146.06 km
Wagga Wagga	35.17° S, 147.47° E	WF 100 C Band	216.68 km

The Pottinger Wind Farm 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 within 250 km of the Project, giving good visibility of weather events in that region. As such, the presence of the Project is unlikely to cause adverse performance of the radars during extreme weather events.

Consultation and engagement with the Bureau of Meteorology with respect to the impact on their services has been compiled in Appendix B.4. The stakeholder found no expected impacts on their assets from the Project and requested the Proponent:

- 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.

5.5 Mobile Voice-Based Communications

5.5.1 Mobile Coverage – Nearby Towers

There are no mobile phone base stations located within the 2 km buffer of the Project's WTGs as shown in Figure 9. Typically, the signal will not be significantly impacted where the towers are located more than 1 km from WTGs. Therefore, it is unlikely that the project will cause any significant impact on the operation of mobile phone base stations.

Figure 9: Proximity of the Project to mobile phone base stations.

Consultation and engagement with Optus and Telstra with respect to the impact on their mobile telemetry services has been conducted and has been compiled in Appendix B.2 and B.3 respectively. Telstra has stipulated the following conditions:

- There are no expected impacts to Telstra's Mobile network due to this wind farm based on the turbine locations provided.
- 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 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.
- 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.

5.5.2 Mobile Coverage – General

The mobile network coverage maps of Telstra and Optus within the region are shown in Figure 10 and Figure 11 respectively. 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 WTGs, 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.

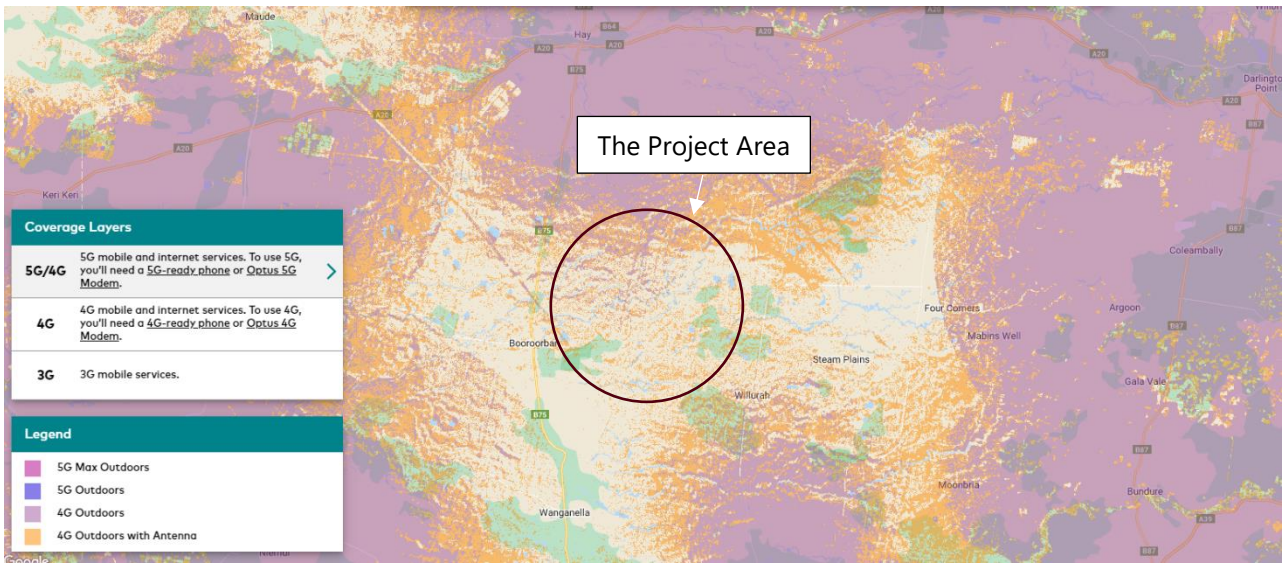


Figure 10: Optus network coverage map of Pottinger Wind Farm.

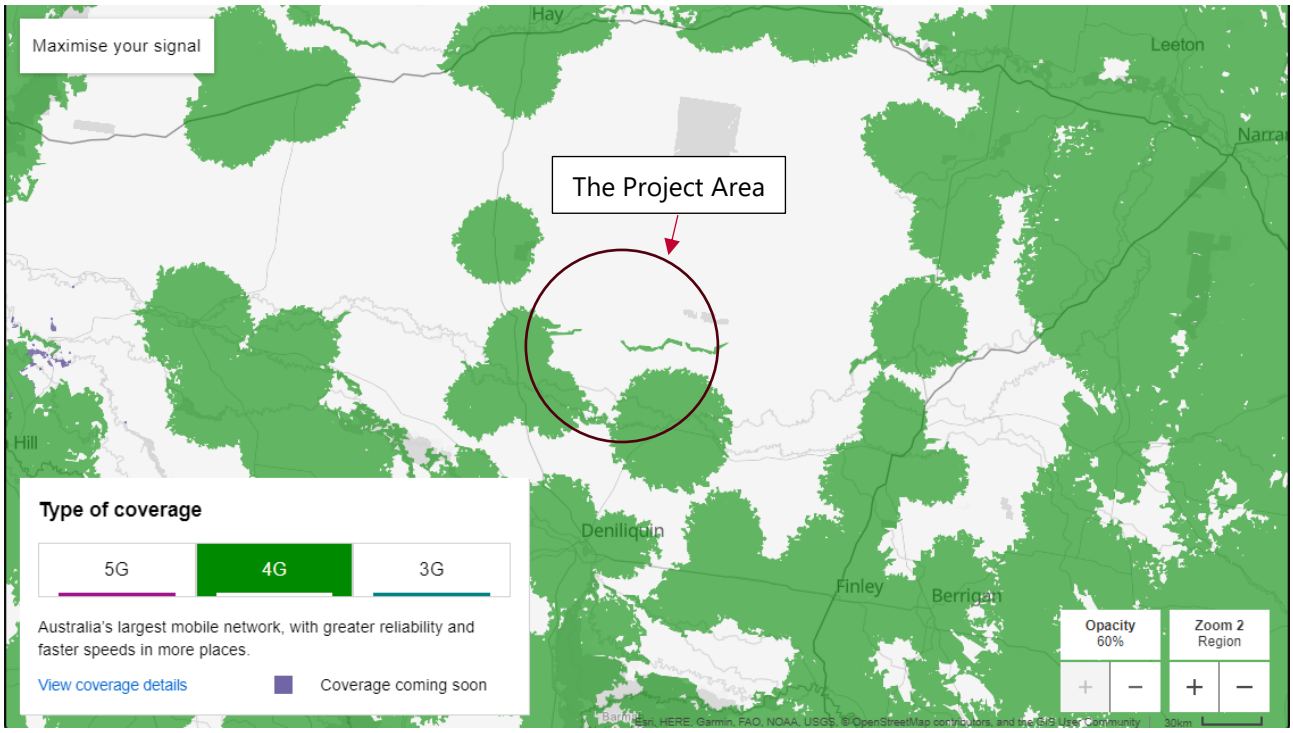


Figure 11: Telstra network coverage map of Pottinger Wind Farm.

5.6 Wireless and Satellite Services

Satellite services will only be impacted where receivers are sited in extremely 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 12 there is one associated dwelling within 2 km of the turbine layout or the Project Area. The Pottinger Wind Farm may cause degradation to signal quality from satellite services to this associated dwelling. No non associated dwellings will be impacted by the Project.

Figure 12: Dwellings located nearby the Project.

5.7 Trigonometrical Stations and GPS

5.7.1 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 13: Survey marks within the Project area.

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

- There are six (6) survey marks within 2 km of a turbine: CP79278151, CP79273999 F, PM83545, PM83546, PM113445, and CP79288163.
- The closest distance between a survey mark (CP79273999 F) and the WTG (WTG 268) is approximately 219 m, as shown in Figure 13. 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.

There is no WTG location that shares the same location as a survey mark. As such the project will have no significant effect on their operation. Any line-of-sight blockages are to be considered by the surveyor when the sites are in use.

The Project construction may physically impact these survey marks. If this is likely to occur the Proponent should consult with the New South Wales Government via the linked website. As stated above, assistance from a registered surveyor may be required.

5.7.2 GNSS Services

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).

Based on the GNSS network map provided by Geoscience Australia [6], the EMI impact of the Project to the GNSS stations has been analysed. Figure 14 demonstrates that there is no GNSS stations within the Pottinger Wind Farm's 20 km boundary. The closest GNSS station, HAY1 is 38 km away from the nearest WTG. The next closest GNSS station, DLQN is 58 km away from the nearest WTG.

It is highly unlikely that the Pottinger Wind Farm will impact the GNSS services.

Consultation and engagement with the Geoscience Australia with respect to the impact on their services has been compiled in Appendix B.1. The stakeholder found no expected impacts on their assets from the Project.

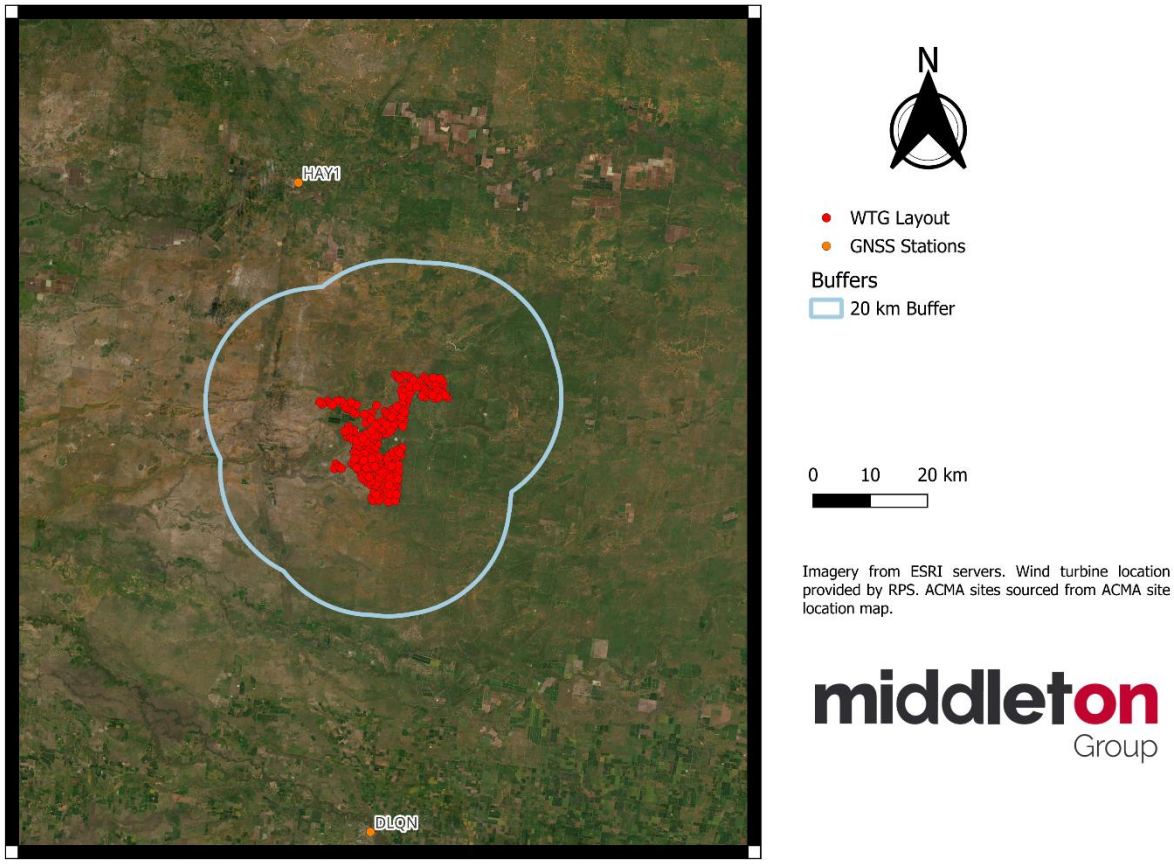


Figure 14: GNSS station locations relative to WTG layout.

5.8 Broadcast, 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 Projects. 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 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 15, no AM, FM, DTV, or Temporary Licence transmitters are located within 20 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 15: Location of broadcast transmitters relative to the WTG layout.

5.9 Cumulative Impact

Summarised below, in Table 12, are the wind farms in proximity to Pottinger Wind Farm as supplied from Section 2.3.1.1 Table 1 of the Scoping Report.

Table 12: Nearby Renewable Energy Projects to Pottinger Wind Farm

Project	Distance to Project Area	Size	Current Status
Bullawah Wind Farm	<1km (adjacent)	170 wind WTGs 1,000 MW capacity	Proposed
The Plains Wind Farm	<1km (adjacent)	226 WTGs 1800 MW	EIS to be Prepared.

Based on the available data from the NSW planning portal [7], it is suggested that the cumulative impact from adjacent wind farms is unlikely. Any potential cumulative impact to ACMA links lies in multiple WTGs from separate wind farms impinging on the Fresnel zone of specific point-to-point links. Based on our analysis in section 5.3, Pottinger wind farm is unlikely to add to the cumulative impact from the wind farms on the links passing through its project boundary.

This assessment is based on a bottom-up approach to assess any potential impacts from this site specifically. The recommendation is to demonstrate that all efforts have been taken to minimise potential impacts from this site and ensure all stakeholders are consulted and approvals gained.

The impacts on other telecommunication services are summarised in Table 13.

Table 13: Cumulative impact on telecommunication services.

Telecommunication service	Cumulative Impact (Y/N)	Notes
Meteorological radar	Y	This impact is to be discussed with BoM during stakeholder engagement and any interference, as determined by the BoM will need to be mitigated through collaboration with the respective proponents.
Mobile voice-based communications	N	In the immediate vicinity of the group of wind farms, some reduction in signal may occur, as is normally expected. This can be mitigated by relocating the mobile phone receiver in the order of tens of metres.
Wireless and satellite internet services	N	The cumulative effect is influenced by factors such as the density of WTGs, their proximity to telecommunication infrastructure, and the specific characteristics of the communication signals involved. There is unlikely to be an increased impact on these services because of cumulative effects.
Broadcast and digital radio	N	The impact on these services depends on whether a turbine from one of the wind farms falls within the buffer zone of this service. There is unlikely to be an increased impact on these services because of cumulative effects.

Telecommunication service	Cumulative Impact (Y/N)	Notes
Broadcast, digital and satellite television	N	The impact on these services depends on whether a turbine from one of the wind farms falls within the buffer zone of this service. There is unlikely to be an increased impact on these services because of cumulative effects.
Trigonometry stations	N	The impact on these services depends on whether a turbine from one of the wind farms falls within the buffer zone of this service. There is unlikely to be an increased impact on these services because of cumulative effects.
GPS	N	The impact on these services depends on whether a turbine from one of the wind farms falls within the buffer zone of this service. There is unlikely to be an increased impact on these services because of cumulative effects.

Thus, cumulative impact from nearby wind farms is expected to be minimal, primarily affecting mobile-voice based and BOM radars due to the high number of WTGs. While mobile interference is unavoidable, stakeholder engagement is recommended to mitigate interference to the BOM assets. This analysis can be confirmed and mitigated by engaging the respective stakeholders to notify them of potential impingements from different Pottinger's.

5.10 Micro-siting Allowance

The Project seeks additional flexibility for up to 300-meter micro-siting of WTGs. MG have conducted brief aerial analysis of 300-meter radius around each turbine and have come to the following conclusions:

- There are no additional ACMA links or sites, beyond the two links which currently fall within the project boundary, which will interfere with the turbine layout.
- The 300-meter micro-siting allowance will have no material impact on wireless and satellite internet services, broadcast and digital radio, broadcast, digital and satellite television, and GPS.

After conducting brief aerial analysis, several WTG's have the potential to impinge on the Fresnel Zones of link 1 and 2 if micro-siting in the direction of the link is performed. Table 14, lists the WTG's (not including WTG 260 and 267) this is applicable to and the link they would impact. The impact of WTG 260 may increase if micro-siting occurs in the direction of the link. Figure 16, shows the impact of the radii on Link's 1 and 2.

Table 14: Micro-siting ACMA Impacts.

Turbine No.	Link Impacted
1	Link 1
2	Link 1
255	Link 2
267	Link 2
268	Link 2
272	Link 2

Additionally, there is potential for interference with survey marks, as survey mark CP79273999 F falls within the micro siting radius of WTG 268. Interference occurs only if these WTG and survey mark share the same location.

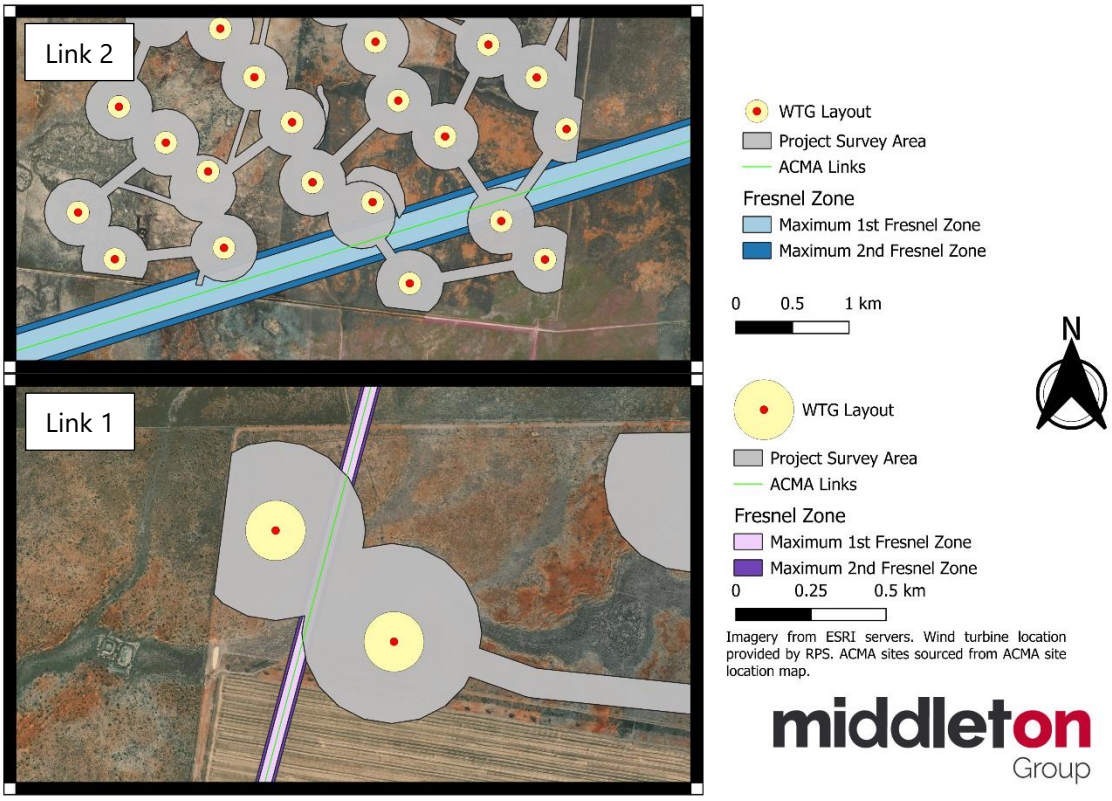


Figure 16: Link 1 and 2 and WTG Micro-siting Radii.

This report recommends that a final review be performed once WTG locations are confirmed, this will ensure no changes to location of WTG's will cause any potential impact.

6 Stakeholder Engagement

Consultation and engagement with stakeholders was initiated by MG. A list of key stakeholders is presented in Table 15. Responses from these stakeholders has been collated in Appendix B.

A summary of the engagement is listed below:

Table 15: List of stakeholder engagement

Stakeholder	Impact	Responses
Geoscience Australia	Survey Marks, GNSS Towers and Trigonometrical infrastructure	No Impact
Optus	Mobile service operation	No Impact
Telstra	Mobile service operation	No Impact
Bureau of Meteorology	Meteorological radar operations	No Impact
New South Wales Government Telecommunications Authority	ACMA Link	No Impact
NSW Rural Fire Service	ACMA Link	No Impact

7 Conclusion

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

Based on analysis, the Project will have no material impact on:

- Wireless and satellite internet services;
- Broadcast and digital radio;
- Broadcast, digital and satellite television;
- Trigonometry stations; and
- GPS.

From the analysis, it is important to note that:

- There is one associated dwelling within 2 km of the Turbine layout and there is likely to be a noticeable impact on the landowner's satellite services. This impact is to be discussed and privately agreed upon between the Proponent and the landowner.
- Initial 3D analysis conducted by MG has found WTGs 260 is unlikely to have an impact on link 2.
- Pottinger wind farm is unlikely to add to the cumulative impact from the wind farms on the ACMA links passing through its project boundary.
- The 300 m micro-siting radius will have no material impact on wireless and satellite internet services, broadcast and digital radio, broadcast, digital and satellite television, and GPS. There is a potential for WTG 1, 2, 255, 267, 268 and 272 to impinge upon the Fresnel zone on link 1 and 2 if micro-siting were to occur. Additionally, survey mark CP79273999 F falls within the micro siting radius of WTG 268 and interference will occurs if the WTG and survey mark share the same location. These potential impacts should be considered if micro siting is to occur.

Based on MG'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 the impact on their services, and correspondence has been collated in Appendix B. Consultation and engagement have confirmed that no impact from the Project is expected on any telecommunication services assessed in this report. Telstra and the Bureau of Meteorology require the Proponent to agree to conditions summarised in Appendix B.3 and B.4 respectively.

Appendix A 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/Wind Turbine Siting," World Meteorological Organisation, Helsinki, 2010.

[4] O. Il, "Impact of Wind Turbines 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] NSW Government, "State Significant Applications," NSW Government, [Online]. Available: https://www.planningportal.nsw.gov.au/major-projects/projects?status=All&lga=All&development_type=Electricity+generation+-+Wind&industry_type=All&case_type=All. [Accessed 15 December 2023].

Appendix B Stakeholder Correspondence

B.1 Geoscience Australia

From: Amy Peterson <Amy.Peterson@ga.gov.au>
Sent: Tuesday, January 9, 2024 6:29 PM
To: Ebony Apps <Ebony.apps@middletongroup.com.au>
Cc: Client Services <ClientServices@ga.gov.au>; Ramez Barakat <ramez.barakat@middletongroup.com.au>; Dianne Munro <Dianne.Munro@rpsgroup.com.au>; Nicholas Simmons <Nicholas.Simmons@rpsgroup.com.au>; Timothy Cervenjak <Timothy.Cervenjak@middletongroup.com.au>
Subject: RE: Pottinger Wind Farm Geoscience Australia Consultation [SEC=OFFICIAL]

Hi Ebony,

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
A/g Director, GNSS Infrastructure & Informatics
GNSS Infrastructure Team Leader | Positioning Australia Branch

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: Ebony Apps <Ebony.apps@middletongroup.com.au>
Sent: Monday, January 8, 2024 3:31 PM
To: Client Services <ClientServices@ga.gov.au>
Cc: Ramez Barakat <ramez.barakat@middletongroup.com.au>; Dianne Munro <Dianne.Munro@rpsgroup.com.au>; Nicholas Simmons <Nicholas.Simmons@rpsgroup.com.au>; Timothy Cervenjak <Timothy.Cervenjak@middletongroup.com.au>
Subject: Pottinger Wind Farm Geoscience Australia Consultation

To whom it may concern,

We are conducting early-stage consultation for the Pottinger Wind Farm in New South Wales, focusing on Electromagnetic Interference. An environmental impact statement is being prepared by RPS Group for Someva (the Applicant). Our consultation particularly relates to potential impact on survey marks and GNSS stations.

The Project Area covers 26,400 ha, consisting of up to 253 Wind Turbine Generators (WTGs), and is located 60 km south of Hay in the rural locality of Booroorban in south-western NSW.

We note that the HAY1 station is 38 km away from the nearest wind turbine.

We append the wind turbine co-ordinates for turbines in proximity to the link in .csv and .kml format. Note that the rotor diameter of the turbines will be up to 200 m, with a tip height of 280 m.

It is important to note that the applicant for the wind farm is seeking a 300-meter micro siting allowance and this should be considered in your analysis.

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 services, please get in contact by return email or by calling us on the phone number listed below prior to 22nd January 2023.

Warm Regards,

Ebony Apps | middleton Group

M: +61 424 777 971 **| E:** ebony.apps@middletongroup.com.au

B.2 Optus correspondence

From: EME Enquiries <emeenquiries@optus.com.au>
Sent: Wednesday, January 10, 2024 2:41 PM
To: Ebony Apps <Ebony.apps@middletongroup.com.au>
Cc: Ramez Barakat <ramez.barakat@middletongroup.com.au>; Dianne Munro <Dianne.Munro@rpsgroup.com.au>; Nicholas Simmons <Nicholas.Simmons@rpsgroup.com.au>; Timothy Cervenjak <Timothy.Cervenjak@middletongroup.com.au>
Subject: RE: Pottinger Wind Farm Optus Consultation

Hi Ebony,

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

From: Ebony Apps <Ebony.apps@middletongroup.com.au>
Sent: Monday, 8 January 2024 3:30 PM
To: EME Enquiries <emeenquiries@optus.com.au>
Cc: Ramez Barakat <ramez.barakat@middletongroup.com.au>; Dianne Munro <Dianne.Munro@rpsgroup.com.au>; Nicholas Simmons <Nicholas.Simmons@rpsgroup.com.au>; Timothy Cervenjak <Timothy.Cervenjak@middletongroup.com.au>
Subject: Pottinger Wind Farm Optus Consultation

To whom it may concern,

We are conducting early-stage consultation for the Pottinger Wind Farm in New South Wales, focusing on Electromagnetic Interference. An environmental impact statement is being prepared by RPS Group for Someva (the Applicant).

The Project Area covers 26,400 ha, consisting of up to 253 Wind Turbine Generators (WTGs), and is located 60 km south of Hay in the rural locality of Booroorban in south-western NSW.

There are no Optus Mobile Towers within 2 km of the proposed project site.

We append the wind turbine co-ordinates for turbines in proximity to the link in .csv and .kml format. Note that the rotor diameter of the turbines will be up to 200 m, with a tip height of 280 m.

It is important to note that the applicant for the wind farm is seeking a 300-meter micro siting allowance and this should be considered in your analysis.

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

If Optus have any concerns relating to the development and any potential impacts on your mobile services, please get in contact by return email or by calling us on the phone number listed below prior to 22nd January 2023.

Warm Regards,

Ebony Apps | middleton Group

M: +61 424 777 971 **| E:** ebony.apps@middletongroup.com.au

B.3 Telstra correspondence

15 March 2024

Ebony Apps
Middleton Group
Sydney NSW 2000

Re: Proposed Pottinger Wind Farm

Dear Ebony,

To provide a better understanding of potential impacts to Telstra infrastructure a desktop assessment was undertaken. Based on this assessment, to minimise potential interference to Telstra's telecommunications network, Telstra requires the developer to confirm its agreement to the conditions and matters set out below:

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.

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.

TELSTRA CORPORATION LIMITED (ABN 33 051 775 556) Page 1/2

Yours faithfully,

David Jonas
Senior Access Planner
Fixed Access Planning
david.jonas@team.telstra.com

From: ! Windfarm Assessment Requests <WindfarmAssessmentRequests@team.telstra.com>
Sent: Friday, March 15, 2024 6:50 PM
To: Ebony Apps <Ebony.apps@middletongroup.com.au>
Cc: Ramez Barakat <ramez.barakat@middletongroup.com.au>; Dianne Munro <Dianne.Munro@rpsgroup.com.au>; Nicholas Simmons <Nicholas.Simmons@rpsgroup.com.au>; Timothy Cervenjak <Timothy.Cervenjak@middletongroup.com.au>
Subject: RE: Pottinger Wind Farm Telstra Consultation

Hi Ebony,

Please find attached our response to the proposed Pottinger wind farm.

If you have any questions on our response please do not hesitate to 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

From: Ebony Apps <Ebony.apps@middletongroup.com.au>
Sent: Monday, March 11, 2024 11:44 AM
To: ! Windfarm Assessment Requests <WindfarmAssessmentRequests@team.telstra.com>
Cc: Ramez Barakat <ramez.barakat@middletongroup.com.au>; Dianne Munro <Dianne.Munro@rpsgroup.com.au>; Nicholas Simmons <Nicholas.Simmons@rpsgroup.com.au>; Timothy Cervenjak <Timothy.Cervenjak@middletongroup.com.au>
Subject: RE: Pottinger Wind Farm Telstra Consultation

Hi David,

I am just following up on this submission as it has been just over 8 weeks. When can we expect to hear back from you?

Please let me know if you have any issues.

Kind Regards,

Ebony Apps | middleton Group

M: +61 424 777 971 **| E:** ebony.apps@middletongroup.com.au

Level 4, 59 Goulburn St, Haymarket NSW 2000

From: ! Windfarm Assessment Requests <WindfarmAssessmentRequests@team.telstra.com>
Sent: Wednesday, January 31, 2024 9:59 PM
To: Ebony Apps <Ebony.apps@middletongroup.com.au>
Cc: Ramez Barakat <ramez.barakat@middletongroup.com.au>; Dianne Munro <Dianne.Munro@rpsgroup.com.au>; Nicholas Simmons <Nicholas.Simmons@rpsgroup.com.au>; Timothy Cervenjak <Timothy.Cervenjak@middletongroup.com.au>
Subject: RE: Pottinger Wind Farm Telstra Consultation

Hi Ebony,

Apologies for the delay.

Confirming receipt of your wind farm assessment request for the proposed Pottinger 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

From: Ebony Apps <Ebony.apps@middletongroup.com.au>
Sent: Monday, January 8, 2024 12:28 PM
To: ! Windfarm Assessment Requests <windfarmassessmentrequests@team.telstra.com>
Cc: Ramez Barakat <ramez.barakat@middletongroup.com.au>; Dianne Munro <Dianne.Munro@rpsgroup.com.au>; Nicholas Simmons <Nicholas.Simmons@rpsgroup.com.au>; Timothy Cervenjak <Timothy.Cervenjak@middletongroup.com.au>
Subject: Pottinger Wind Farm Telstra Consultation

To whom it may concern,

We are conducting early-stage consultation for the Pottinger Wind Farm in New South Wales, focusing on Electromagnetic Interference. An environmental impact statement is being prepared by RPS Group for Someva (the Applicant).

The Project Area covers 26,400 ha, consisting of up to 253 Wind Turbine Generators (WTGs), and is located 60 km south of Hay in the rural locality of Booroorban in south-western NSW.

There are no Telstra Mobile Towers within 2 km of the proposed project site.

We append the wind turbine co-ordinates for turbines in proximity to the link in .csv and .kml format. Note that the rotor diameter of the turbines will be up to 200 m, with a tip height of 280 m.

It is important to note that the applicant for the wind farm is seeking a 300-meter micro siting allowance and this should be considered in your analysis.

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

If Telstra have any concerns relating to the development and any potential impacts on your mobile services, please get in contact by return email or by calling us on the phone number listed below prior to 22nd January 2023.

Warm Regards,

Ebony Apps | middleton Group

M: +61 424 777 971 **| E:** ebony.apps@middletongroup.com.au

B.4 Bureau of Meteorology correspondence

From: Mohammad Zomorrodi <Mohammad.Zomorrodi@bom.gov.au>
Sent: Monday, January 22, 2024 11:02 AM
To: Ebony Apps <Ebony.apps@middletongroup.com.au>
Cc: Ramez Barakat <ramez.barakat@middletongroup.com.au>; Dianne Munro <Dianne.Munro@rpsgroup.com.au>; Nicholas Simmons <Nicholas.Simmons@rpsgroup.com.au>; Timothy Cervenjak <Timothy.Cervenjak@middletongroup.com.au>
Subject: RE: Pottinger Wind Farm Bureau of Meteorology Consultation [SEC=OFFICIAL]

Hi Ebony,

The Bureau of Meteorology's assessment of the proposed *Pottinger* wind farm is now complete, which indicates manageable impact to our neighboring assets, under normal propagation conditions.

The Bureau requests that the owner/operator of the *Pottinger* wind farm to:

- 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 kindly acknowledge the receipt of this E-mail and direct any further correspondence to energy@bom.gov.au & windfarmenquiries@bom.gov.au, including Pottinger in the subject line, and let us know if you have any queries.

Kind regards,

From: Ebony Apps <Ebony.apps@middletongroup.com.au>
Sent: Monday, January 8, 2024 3:33 PM
To: windfarmenquiries <windfarmenquiries@bom.gov.au>
Cc: Ramez Barakat <ramez.barakat@middletongroup.com.au>; Dianne Munro <Dianne.Munro@rpsgroup.com.au>; Nicholas Simmons <Nicholas.Simmons@rpsgroup.com.au>; Timothy Cervenjak <Timothy.Cervenjak@middletongroup.com.au>
Subject: Pottinger Wind Farm Bureau of Meteorology Consultation

To whom it may concern,

We are conducting early-stage consultation for the Pottinger Wind Farm in New South Wales, focusing on Electromagnetic Interference. An environmental impact statement is being prepared by RPS Group for Someva (the Applicant).

The Project Area covers 26,400 ha, consisting of up to 253 Wind Turbine Generators (WTGs), and is located 60 km south of Hay in the rural locality of Booroorban in south-western NSW.

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

Weather Radar Name	Coordinate	Radar type	Distance to Pottinger Wind Farm Project Area
Yarrawonga	36.03° S, 146.03° E	WSR 81C C-Band	145.30 km
Hillston	33.55° S, 145.52° E	Meteor 735CDP	146.06 km
Wagga Wagga	35.17° S, 147.47° E	WF 100 C Band	216.68 km

Based on our analysis of the coverage area of BoM 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 append the wind turbine co-ordinates for turbines in proximity to the link in .csv and .kml format. Note that the rotor diameter of the turbines will be up to 200 m, with a tip height of 280 m.

It is important to note that the applicant for the wind farm is seeking a 300-meter micro siting allowance and this should be considered in your analysis.

If you have any concerns relating to the development and any potential impacts on your operations, please get in contact by replying to this email or by calling us on the phone number listed below prior to 22nd January 2023.

Warm Regards,
Ebony Apps | middleton Group
M: +61 424 777 971 **| E:** ebony.apps@middletongroup.com.au

B.5 New South Wales Government Telecommunications Authority

From: Telco Spectrum <telco.spectrum@customerservice.nsw.gov.au>
Sent: Tuesday, January 30, 2024 12:49 PM
To: Nicholas Simmons <Nicholas.Simmons@rpsgroup.com.au>
Cc: Telco Spectrum <telco.spectrum@customerservice.nsw.gov.au>; Dianne Munro <Dianne.Munro@rpsgroup.com.au>
Subject: RE: Pottinger Wind Farm (SSD-59235464) - Southern Extension Area Update and Feedback Request

Hi Nicolas,

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 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

From: Jay Sharma <Jayanta.Sharma@customerservice.nsw.gov.au>
Sent: Tuesday, 9 January 2024 1:45 PM
To: Telco Spectrum <telco.spectrum@customerservice.nsw.gov.au>
Cc: Luke Fletcher <luke.fletcher@customerservice.nsw.gov.au>; Neil Gregerson <Neil.Gregerson@customerservice.nsw.gov.au>; Shaunak Patel <Shaunak.Patel@customerservice.nsw.gov.au>; Elpidio Jabonete <Elpidio.Jabonete@customerservice.nsw.gov.au>
Subject: FW: Pottinger Wind Farm (SSD-59235464) - Southern Extension Area Update and Feedback Request

FYI –

Hi Gents,

Please review and respond.

Kind Regards

Jay Sharma
Principal Spectrum Engineer, NSW Telco Authority

ICT and Digital Government Division | Department of Customer Service
p 02 9219 3158

e jayanta.sharma@customerservice.nsw.gov.au | www.customerservice.nsw.gov.au
Level 10, McKell Building, 2-24 Rawson Place NSW 2000

From: Dylan Mead <Dylan.Mead@customerservice.nsw.gov.au>
Sent: Tuesday, 9 January 2024 1:41 PM
To: Jay Sharma <Jayanta.Sharma@customerservice.nsw.gov.au>
Cc: Ivonne Lienau <Ivonne.Lienau@customerservice.nsw.gov.au>; Luke Fletcher <luke.fletcher@customerservice.nsw.gov.au>; Neil Gregerson <Neil.Gregerson@customerservice.nsw.gov.au>
Subject: RE: Pottinger Wind Farm (SSD-59235464) - Southern Extension Area Update and Feedback Request

Hi Jay,

Further to the below, we have now received the attached correspondence from Pottinger Renewables Pty Ltd (c/- Middleton Group) regarding a proposed wind farm positioned within proximity to one of our links

Middleton Group has undertaken some independent investigation into the wind farm's impact to NSWTA's link, and has concluded:

> *While the link does not come into contact with any turbines, it does pass through the proposed project site. The Turbines should not reduce the performance of the wireless link, as per typical industry standards. The image attached demonstrates this for the closest turbines.*
>
> *Based on our analysis, from a bird's eye view the edge of the closest wind turbine the following is true for this link:*

Turbine Number	*Is the link's Fresnel zone affected? (Y/N)*	*Distance from maximum 2nd Fresnel zone to rotor extent*
WTG 1	*N*	*52.88m*
WTG 2	*N*	*148.44 m*

> *We append the wind turbine co-ordinates for turbines in proximity to the link in .csv and .kml format. Note that the rotor diameter of the turbines will be up to 200 m, with a tip height of 280 m.*
>
> *It is important to note that the applicant for the wind farm is seeking a 300-meter micro siting allowance and this should be considered in your analysis.*

@Jay Sharma do you have any comments to make in response? Are NSWTA comfortable with this analysis and outcome? Myself and Ivonne are happy to assist.

Middleton Group has requested feedback by **22nd January 2024**.

Kind regards,

Dylan Mead
Principal Environmental Planner, NSW Telco Authority

ICT and Digital Government Division | Department of Customer Service
p 0420 394 617
e dylan.mead@customerservice.nsw.gov.au | www.customerservice.nsw.gov.au
Level 10 East, McKell Building, 2-24 Rawson Place, Sydney NSW 2000

From: Ebony Apps
Sent: Monday, January 8, 2024 3:47 PM
To: CCEPinfo@customerservice.nsw.gov.au
Cc: Ramez Barakat <ramez.barakat@middletongroup.com.au>; Dianne Munro <Dianne.Munro@rpsgroup.com.au>; Nicholas Simmons <Nicholas.Simmons@rpsgroup.com.au>; Timothy Cervenjak <Timothy.Cervenjak@middletongroup.com.au>
Subject: Pottinger Wind Farm ACMA Link Consultation

To whom it may concern,

We are conducting early-stage consultation for the Pottinger Wind Farm in New South Wales, focusing on Electromagnetic Interference. An environmental impact statement is being prepared by RPS Group for Someva (the Applicant).

The Project Area covers 26,400 ha, consisting of up to 253 Wind Turbine Generators (WTGs), and is located 60 km south of Hay in the rural locality of Booroorban in south-western NSW.

We note that your organisation has one licensed communication link which lies within the proposed project boundary. The details of the linked assignments can be found below:

BSL / Licence No	Site 1	Site 2	Length (km)	Frequency (MHz)	Owner
11300366/1	NSWTA 100m Guyed Mast 75 Warwillah Road Site ID: 10026558	Transgrid 80m Guyed Mast off 1494 Jerilderie Rd Site ID: 35103	46.3	7435	New South Wales Government Telecommunications Authority

While the link does not come into contact with any turbines, it does pass through the proposed project site. The Turbines should not reduce the performance of the wireless link, as per typical industry standards. The image attached demonstrates this for the closest turbines.

Based on our analysis, from a bird's eye view the edge of the closest wind turbine the following is true for this link:

Turbine Number	Is the link's Fresnel zone affected? (Y/N)	Distance from maximum 2nd Fresnel zone to rotor extent
WTG 1	N	52.88m
WTG 2	N	148.44 m

We append the wind turbine co-ordinates for turbines in proximity to the link in .csv and .kml format. Note that the rotor diameter of the turbines will be up to 200 m, with a tip height of 280 m.

It is important to note that the applicant for the wind farm is seeking a 300-meter micro siting allowance and this should be considered in your analysis.

If you have any concerns relating to the development and any potential impacts on your communications link, please get in contact by replying to this email or by calling us on the phone number listed below prior to 22nd January 2023.

Warm Regards,
Ebony Apps | middleton Group
M: +61 424 777 971 | **E:** ebony.apps@middletongroup.com.au

From: Dylan Mead <Dylan.Mead@customerservice.nsw.gov.au>
Sent: Monday, 27 November 2023 3:16 PM
To: Jay Sharma <Jayanta.Sharma@customerservice.nsw.gov.au>
Cc: Ivonne Lienau Ivonne.Lienau@customerservice.nsw.gov.au; Luke Fletcher luke.fletcher@customerservice.nsw.gov.au; Neil Gregerson Neil.Gregerson@customerservice.nsw.gov.au
Subject: FW: Pottinger Wind Farm (SSD-59235464) - Southern Extension Area Update and Feedback Request

Hi Jay,

NSWTA have received the attached letter from RPS (obo Pottinger Renewables Pty Ltd) regarding a proposed wind farm ("Pottinger Wind Farm") located approximately 60km south of Hay, NSW.

I have reviewed the Scoping report for this proposal, which identifies ACMA licences within 50km of the proposed wind farm. The report identified one NSWTA link which is understood to intersect the North-East portion of the proposed wind farm.

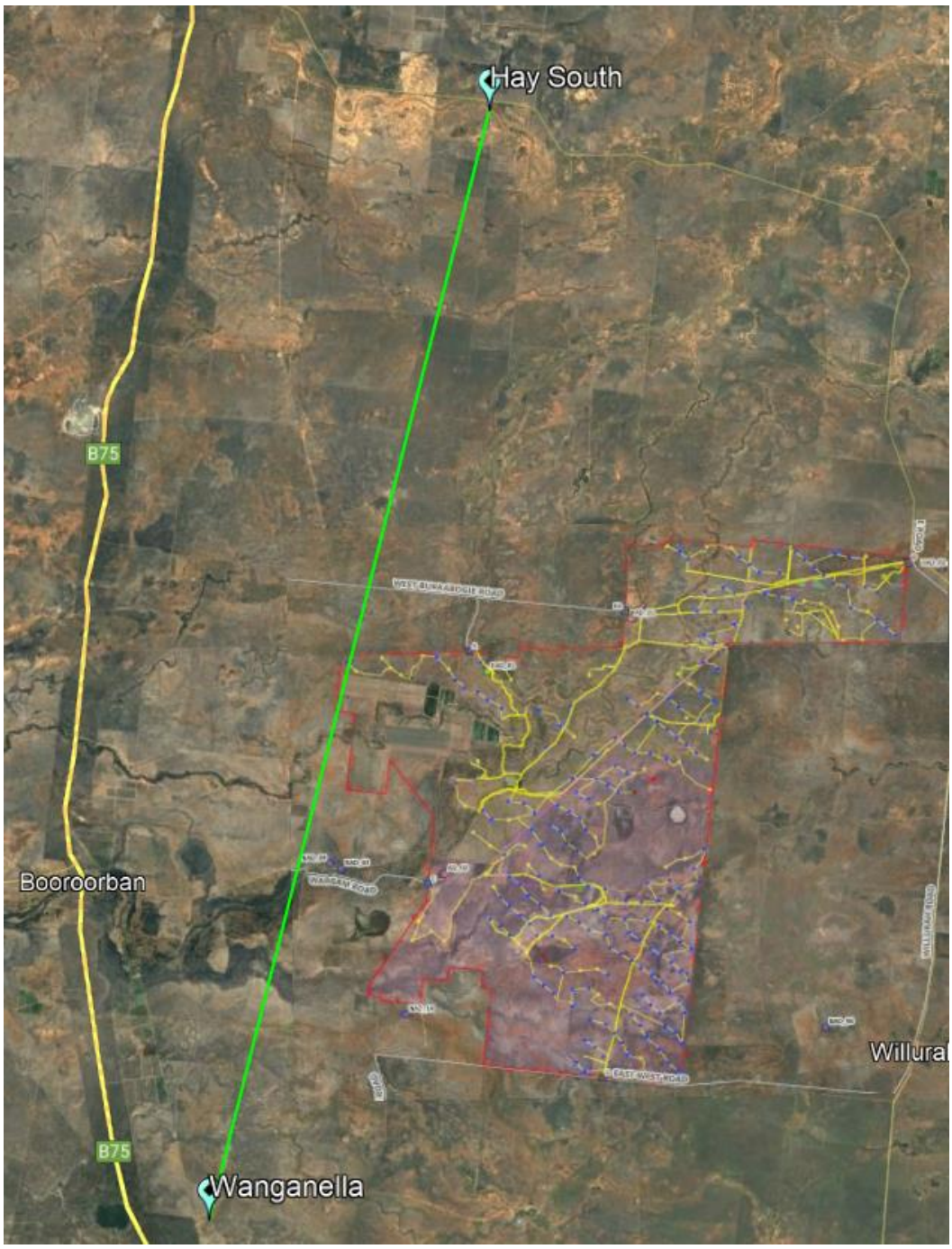
> **6.9.2 Preliminary Assessment**
>
> A search of the Australian Communication and Media Authority (ACMA) database carried out in February 2023 has identified 69 registered sites associated with licences and point to point links within 50 km of the Project Area. One link crosses the north west section of the Project Area. This link is a NSW Telco Authority (NSWTA) and Transgrid transmission line and will be assessed further in the EIS by the relevant specialist.
>
> Other nearby sites are held by NSW Rural Fire Service (RFS), Murrumbidgee Council, and Telstra Corporation Limited.

I suspect this refers to the link between "Wanganella" and "Hay South (refer to below and attached **indicative path and windfarm project overlay**) which may intersect one or some of the proposed wind turbines.

RPS (obo Pottinger Renewables Pty Ltd) have invited NSWTA to provide comment by **22 December 2023**.
Can you please advise how NSWTA wish to respond on this item?
I am happy to assist with the response, and/or help facilitate a meeting with Pottinger Renewables Pty Ltd if required.

Let me know your thoughts.

Indicative path and windfarm project overlay



Thanks

Dylan Mead
Principal Environmental Planner, NSW Telco Authority

ICT and Digital Government Division | Department of Customer Service
p 0420 394 617
e dylan.mead@customerservice.nsw.gov.au | www.customerservice.nsw.gov.au
Level 10 East, McKell Building, 2-24 Rawson Place, Sydney NSW 2000

From: Ivonne Lienau <Ivonne.Lienau@customerservice.nsw.gov.au>
Sent: Monday, 27 November 2023 1:48 PM
To: Dylan Mead <Dylan.Mead@customerservice.nsw.gov.au>; Emily Manchee <Emily.Manchee@customerservice.nsw.gov.au>
Subject: FW: Pottinger Wind Farm (SSD-59235464) - Southern Extension Area Update and Feedback Request

Hi Emily, hi Dylan,

We have received the submission below. The proposed windfarm is near Hay in the Western part of NSW.

Please advise a suitable response.

Thank you,
Ivonne

Ivonne Lienau
Stakeholder Engagement | Customer and Stakeholder Services | CCEP
NSW Telco Authority

T (02) 8276 8076 | M 0405 639 931 | E ivonne.lienau@customerservice.nsw.gov.au
W nsw.gov.au/telco-authority

McKell Building
2-24 Rawson Place
Sydney NSW 2000

Department of
Customer Service

I acknowledge the traditional custodians of the land and pay respects to Elders past and present. I also acknowledge all the Aboriginal and Torres Strait Islander staff working with NSW Government at this time.
Please consider the environment before printing this email.

From: CCEP Info <CCEPinfo@customerservice.nsw.gov.au>
Sent: Monday, 27 November 2023 10:25 AM
To: Ivonne Lienau <Ivonne.Lienau@customerservice.nsw.gov.au>
Subject: FW: Pottinger Wind Farm (SSD-59235464) - Southern Extension Area Update and Feedback Request

From: Nicholas Simmons <Nicholas.Simmons@rpsgroup.com.au>
Sent: Friday, 24 November 2023 10:06 AM
To: CCEP Info <CCEPinfo@customerservice.nsw.gov.au>
Cc: Dianne Munro <Dianne.Munro@rpsgroup.com.au>
Subject: Pottinger Wind Farm (SSD-59235464) - Southern Extension Area Update and Feedback Request

To whom it may concern,

Pottinger Renewables Pty Ltd seeks to develop the Pottinger Wind Farm located 60 km south of Hay in NSW in the rural locality of Booroorban, entirely within the South West Renewable Energy Zone.

SEARs were issued in June 2023 in response to the 'Pottinger Wind Farm Scoping Report'.

The attached letter seeks to introduce you to a proposed Southern Extension Area to the Project.

In relation to the Southern Extension Area, please let us know if you have any additional feedback to that provided in your submission to the SEARs and SEARs. If your response could be received by **22 December 2023** it would be greatly appreciated.

Please contact Tim Mead at Someva directly via the contact detailed in the attached; or Dianne Munro on the details below if you would like to discuss.

Dianne Munro
Senior Principal
RPS | Australia Asia Pacific
T +61 2 4940 4200 **M** 0437898884
E dianne.munro@rpsgroup.com.au

Kind regards,

Nicholas Simmons (He/Him)
Environmental Consultant
RPS | Australia Asia Pacific
Level 13, 420 George Street
Sydney NSW 2000, Australia
T +61 2 8099 3200 **F** +61 2 8099 3299
E nicholas.simmons@rpsgroup.com.au

B.6 NSW Rural Fire Service

From: Joanne Laundess <Joanne.Laundess@rfs.nsw.gov.au>
Sent: Wednesday, January 31, 2024 11:19 AM
To: Ebony Apps <Ebony.apps@middletongroup.com.au>
Cc: Haydn Follett <Haydn.Follett@rfs.nsw.gov.au>
Subject: RFS Advice: Pottinger Wind Farm ACMA Link Consultation

Good morning Ebony,

There is a licenced link through the wind farm from Argon to Glenmire, but it is no longer in use by the RFS.

Regards,

Jo

From: Haydn Follett <Haydn.Follett@rfs.nsw.gov.au>
Sent: Wednesday, January 31, 2024 10:29 AM
To: Joanne Laundess <Joanne.Laundess@rfs.nsw.gov.au>
Cc: Martin Webster <Martin.Webster@rfs.nsw.gov.au>
Subject: FW: Advice: Pottinger Wind Farm ACMA Link Consultation

Hi Jo

Can you please reply to Ebbony Apps confirming the link path they were worried about is no longer in use by RFS.

Thanks

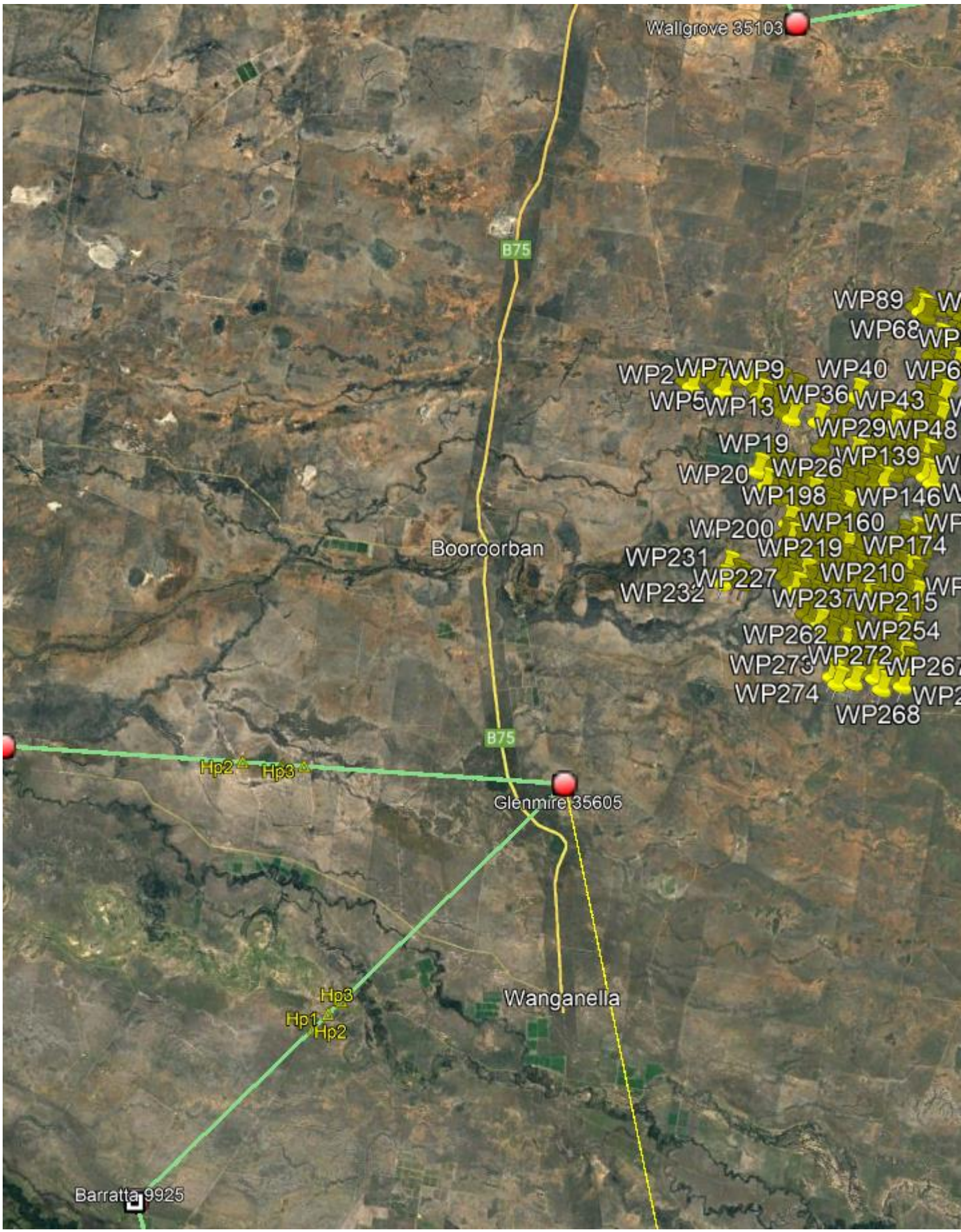
Regards

Haydn Follett | ICT Field Operations Officer | ICT Field Engineering & Communications
NSW RURAL FIRE SERVICE
Unit 2, 63 Cranbrook Road, Batemans Bay 2536 | **PO Box 35, Batemans Bay 2536**
P 02 4472 0600 **F** 02 4472 0690 **M** 0428 280 066 **E** haydn.follett@rfs.nsw.gov.au
ICT Help Desk P 02 8741 5123 **E** Communication.systems@rfs.nsw.gov.au
www.rfs.nsw.gov.au | www.facebook.com/nswrfs | www.twitter.com/nswrfs
PREPARE. ACT. SURVIVE.

From: Bruce Neilson <Bruce.Neilson@rfs.nsw.gov.au>
Sent: Wednesday, January 31, 2024 10:05 AM
To: Haydn Follett <Haydn.Follett@rfs.nsw.gov.au>
Cc: Graeme Smart <Graeme.Smart@rfs.nsw.gov.au>
Subject: RE: Advice: Pottinger Wind Farm ACMA Link Consultation

Hi Haydn

There is a licenced link through the wind farm from Argon to Glenmire, but it is not longer in use. Probably Stratnet


Wallgrove 35103
B75
WP89
WP68
WP2
WP7
WP9
WP40
WP5
WP13
WP36
WP43
WP29
WP48
WP19
WP139
WP20
WP26
WP198
WP146
WP200
WP160
Booroorban
WP219
WP174
WP231
WP227
WP210
WP232
WP237
WP215
WP262
WP254
WP273
WP272
WP274
WP268
B75
Hp2
Hp3
Glenmire 35605
Hp3
Hp1
Hp2
Wanganella
Barratta 9925

Regards

Bruce Neilson | Property Liaison Officer| ICT Field Engineering & Communications
NSW RURAL FIRE SERVICE
Headquarters 4 Murray Rose Avenue, Sydney Olympic Park NSW 2127 **|** Locked Bag 17 Granville NSW 2142
P 0418 161 742 **F** 02 8741 5550
E Bruce.Neilson@rfs.nsw.gov.au
www.rfs.nsw.gov.au | www.facebook.com/nswrfs **|** www.twitter.com/nswrfs
PREPARE. ACT. SURVIVE.

From: Haydn Follett <Haydn.Follett@rfs.nsw.gov.au>
Sent: Wednesday, January 31, 2024 8:43 AM
To: Bruce Neilson <Bruce.Neilson@rfs.nsw.gov.au>
Cc: Graeme Smart <Graeme.Smart@rfs.nsw.gov.au>
Subject: FW: Advice: Pottinger Wind Farm ACMA Link Consultation

Regards

Haydn Follett | ICT Field Operations Officer | ICT Field Engineering & Communications
NSW RURAL FIRE SERVICE
Unit 2, 63 Cranbrook Road, Batemans Bay 2536 **| PO Box 35, Batemans Bay 2536**
P 02 4472 0600 **F** 02 4472 0690 **M** 0428 280 066 **E** haydn.follett@rfs.nsw.gov.au
ICT Help Desk P 02 8741 5123 **E** Communication.systems@rfs.nsw.gov.au
www.rfs.nsw.gov.au | www.facebook.com/nswrfs | www.twitter.com/nswrfs
PREPARE. ACT. SURVIVE.

From: Joanne Laundess <Joanne.Laundess@rfs.nsw.gov.au>
Sent: Wednesday, January 31, 2024 8:00 AM
To: Haydn Follett <Haydn.Follett@rfs.nsw.gov.au>
Cc: Bruce Neilson <Bruce.Neilson@rfs.nsw.gov.au>
Subject: RE: Advice: Pottinger Wind Farm ACMA Link Consultation

Here you go Hayd ☺

From: Haydn Follett <Haydn.Follett@rfs.nsw.gov.au>
Sent: Tuesday, January 30, 2024 7:15 PM
To: Joanne Laundess <Joanne.Laundess@rfs.nsw.gov.au>
Cc: Bruce Neilson <Bruce.Neilson@rfs.nsw.gov.au>
Subject: RE: Advice: Pottinger Wind Farm ACMA Link Consultation

Hi Jo

The .csv and .kml files that are stated in the original email seamed to have been dropped off.

Can you please check to see if they are in the original email?

Regards

Haydn Follett | ICT Field Operations Officer | ICT Field Engineering & Communications
NSW RURAL FIRE SERVICE
Unit 2, 63 Cranbrook Road, Batemans Bay 2536 | **PO Box 35, Batemans Bay 2536**
P 02 4472 0600 **F** 02 4472 0690 **M** 0428 280 066 **E** haydn.follett@rfs.nsw.gov.au
ICT Help Desk P 02 8741 5123 **E** Communication.systems@rfs.nsw.gov.au
www.rfs.nsw.gov.au | www.facebook.com/nswrfs | www.twitter.com/nswrfs
PREPARE. ACT. SURVIVE.

From: Ebony Apps <Ebony.apps@middletongroup.com.au>
Sent: Tuesday, January 30, 2024 10:12 AM
To: Webmaster <webmaster@rfs.nsw.gov.au>; Planning & Environment Services <CustomerService.Centre@rfs.nsw.gov.au>
Subject: RE: Pottinger Wind Farm ACMA Link Consultation

> Some people who received this message don't often get email from ebony.apps@middletongroup.com.au. Learn why this is important

To whom it may concern,

Just reaching out with a follow-up email regarding the below engagement. Can you kindly advise if the Wind Farm has any potential impact on your link? We would appreciate a response by the **06/02/23** if possible.

If you have any questions do not hesitate to reach out.

Kind Regards,

Ebony Apps | middleton Group

M: +61 424 777 971 **| E:** ebony.apps@middletongroup.com.au

From: Ebony Apps
Sent: Monday, January 8, 2024 3:46 PM
To: webmaster@rfs.nsw.gov.au
Cc: Ramez Barakat <ramez.barakat@middletongroup.com.au>; Dianne Munro <Dianne.Munro@rpsgroup.com.au>; Nicholas Simmons <Nicholas.Simmons@rpsgroup.com.au>; Timothy Cervenjak <Timothy.Cervenjak@middletongroup.com.au>
Subject: Pottinger Wind Farm ACMA Link Consultation

To whom it may concern,

We are conducting early-stage consultation for the Pottinger Wind Farm in New South Wales, focusing on Electromagnetic Interference. An environmental impact statement is being prepared by RPS Group for Someva (the Applicant).

The Project Area covers 26,400 ha, consisting of up to 253 Wind Turbine Generators (WTGs), and is located 60 km south of Hay in the rural locality of Booroorban in south-western NSW.

We note that your organisation has one licensed communication link which lies within the proposed project boundary. The details of the linked assignments can be found below:

BSL / Licence No	Site 1	Site 2	Length (km)	Frequency (MHz)	Owner
1207619/1	Murrumbidgee Shire Council 76.6m Guyed Mast Argoon, off Kidman Way Site ID: 402871	Essential Energy 35m Lattice Tower 75 Warwillah Rd Site ID: 35605	101	404.28	NSW Rural Fire Service

From a bird's eye view two turbines, WTG 260 and WTG 267 fall within the maximum extent of the link's 2nd Fresnel zone. The image attached demonstrates this for the turbines. Based on our analysis, from a bird's eye the edge of the closest wind turbine the following is true for this link:

Turbine Number	Is the link's Fresnel zone affected? (Y/N)	Distance from maximum 2nd Fresnel zone to rotor extent
WTG 255	N	52.881 m
WTG 260	Y	-
WTG 267	Y	-
WTG 272	N	131.129 m

Upon further 3D analysis, it can be noted that we found the line-of-sight path of the link to pass below both turbines rotor extent, indicating the turbine will have negligible effect on the link's operation. The graphs attached to this email demonstrate this for both turbines.

We append the wind turbine co-ordinates for turbines in proximity to the link in .csv and .kml format. Note that the rotor diameter of the turbines will be up to 200 m, with a tip height of 280 m.

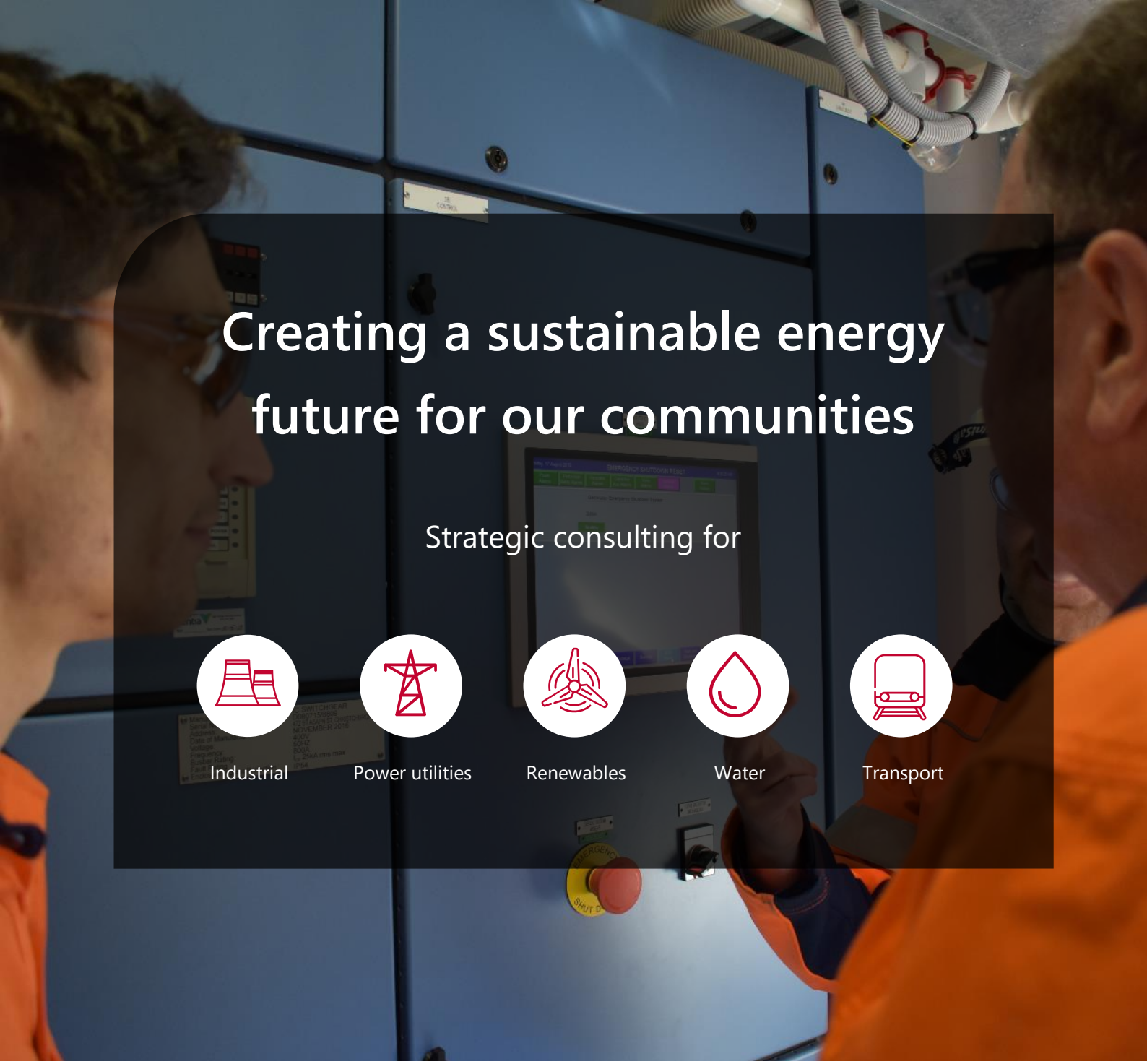
It is important to note that the applicant for the wind farm is seeking a 300-meter micro siting allowance and this should be considered in your analysis.

If you have any concerns relating to the development and any potential impacts on your communications link, please get in contact by replying to this email or by calling us on the phone number listed below prior to 22nd January 2023.

Warm Regards,

Ebony Apps | middleton Group

M: +61 424 777 971 **| E:** ebony.apps@middletongroup.com.au



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Melbourne VIC 3000

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201 Sussex Street, Sydney NSW 2000

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