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Tilt Renewables Australia Pty Ltd

Liverpool Range Wind Farm Electromagnetic Interference Assessment

Proposed 173 WTG layout – Mod-3 Application

2026-02-20

PS228133

Document distribution

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Revisions

Rev	Date	Details
A	2026-01-30	Initial issue
B	2026-02-20	Minor comments addressed

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Abbreviations

Abbreviations

Abbreviation	Description
ACMA	Australian Communications and Media Authority
AM	Amplitude Modulation
AWS	Automatic Weather Station
BoM	Bureau of Meteorology
EMI	Electromagnetic Interference
FM	Frequency Modulation
GIS	Geographic Information System
ISP	Internet Service Provider
LRWF	Liverpool Range Wind Farm
NSWTA	NSW Telecommunications Authority
P2MP	Point-to-multipoint
P2P	Point-to-point
RADCOM	Register of radio licences, radio communication towers and radio services
RFNSA	Radio Frequency National Site Archive
TV	Television
UHF	Ultra-High Frequency
WSP	WSP Australia Pty Limited
WTG	Wind turbine generator

Executive summary

WSP Australia Pty Limited (WSP) has been engaged by Tilt Renewables Australia Pty Ltd as trustee for Liverpool Range Wind Farm Project Trust (Tilt Renewables) to complete an update to the electromagnetic interference (EMI) assessment at Liverpool Range Wind Farm (LRWF or the project).

LRWF is already approved (State Significant Development Consent SSD-6696), and Tilt Renewables is now seeking approval to modify the Development Consent with this Mod-3 Application. This EMI assessment conducted by WSP considered the updated layout relevant to the Mod-3 Application, which includes a reduction in wind turbine generators (WTGs) from 185 to 173.

WSP accessed the ACMA RADCOM database in October 2025 and considered potential impacts of LRWF on registered point-to-point, point-to-multipoint and point-to-area communications services, as well as radar (meteorological, aviation and defence) and emergency services.

WSP then undertook a consultation process with relevant licensees to further understand any potential impacts and recommended approaches for management and mitigation of these potential impacts.

Key findings from the assessment include:

- Overall, the layout changes associated with the Mod-3 Application do not result in an increased level of EMI interference risk compared to the Approved Development.
- There is one existing communication tower within 2 km of a proposed WTG. All 5 licensees operating from this tower were contacted, and no concerns were raised about near-field interference.
- There is one point-to-point link (Link 5) intersecting the site boundary. No proposed WTGs are calculated to be intersecting with the 2nd Fresnel zone of this link, with the closest distance between blade tip and 2nd Fresnel zone being approximately 24 m at E31.
    - The licensee of Link 5 (New South Wales Telecommunications Authority) has requested that WTG E31 be moved a minimum of 10 m to the south to achieve optimal clearance.
- WSP has contacted licensees of point-to-multipoint licences and point-to-area licences within 10 km of LRWF, as well as nearby broadcasting services. From consultation with all identified licensees, no objections were raised.
    - LRWF has the potential to impact the TV signal strength at nearby residences. There are mitigation options including installation of satellite TV services at any affected properties.
- The closest meteorological radar to LRWF remains Namoi (Blackjack Mountain) which is approximately 80 km from the site boundary. The BoM has indicated that there is the possibility of interference to this radar. Tilt Renewables will continue consultation with BoM to discuss potential impacts and possible mitigation strategies.
- No potential impacts were raised by Airservices Australia, Department of Defence or any emergency service organisations.

A summary of contacted licensees and responses can be found in Appendix B.

1. Introduction

WSP Australia Pty Limited (WSP) has been engaged by Tilt Renewables Australia Pty Ltd as trustee for Liverpool Range Wind Farm Project Trust (Tilt Renewables) to complete an update to the electromagnetic interference (EMI) assessment at Liverpool Range Wind Farm (LRWF or the project). WSP has previously conducted multiple EMI assessments on LRWF between 2020 and 2023.

Tilt Renewables is the Proponent of the approved LRWF as authorised by State Significant Development (SSD) Consent SSD-6696 (the Development Consent) originally approved on 27 March 2018 and the subsequent modifications to the Development Consent granted on 23 October 2024 (SSD-6696-Mod-1) and 30 October 2025 (SSD-6696-Mod-2) (the Approved Development).

The Approved Development is located approximately 6 kilometres (km) east of the township of Coolah, New South Wales (NSW) and extends across the Warrumbungle, Upper Hunter and Mid-Western Local Government Areas (LGAs).

The Development Consent as currently modified, authorises the construction, operation and decommissioning of up to 185 wind turbines with a maximum tip height of 215 metres (m) and associated infrastructure including a transmission line with an indicative capacity of 330 kilovolts (kV) from within the wind farm to the approved connection point at Ulan.

Tilt Renewables is currently undertaking a value engineering process as part of detailed construction planning which has identified the requirement to modify the Development Consent (Mod-3 Application).

The changes proposed by the Mod-3 Application are detailed below and are required to rationalise and optimise the indicative layout design following value engineering investigations, further landowner consultation, and commitment to connect LRWF into the Central-West Orana (CWO) Transmission Project being progressed by EnergyCo. The project is now proposed to connect to the CWO Transmission Project at the wind farm's connection sub-station off Rotherwood Road.

1.1 High level Mod-3 Application description

The Mod-3 Application includes the following changes to the Approved Development:

- inclusion of up to seven communication towers (monopoles up to 40m height AGL) to allow for an alternate communications pathway between substations (if required)
- inclusion of an optional access track off Coolah Creek Road
- micro-siting 61 turbines (less than 100 m) and relocating 6 turbines (greater than 100 m).
- including discrete areas of Wind Farm (WF) Development Corridor for constructability purposes and to provide flexibility for micro-siting the revised layout
- revised locations of ancillary infrastructure including permanent met masts, substations, concrete batch plants, O&M facilities, site access points and internal access tracks

- inclusion of a dedicated Public Road Upgrade (PRU) Development Corridor along the public roads subject to potential upgrades/repairs as authorised under the Development Consent.

The Mod-3 Application proposes to remove infrastructure components that will not be built. Although the removal of project components does not specifically require modification, these removals have been included to provide context to the overall reduction in total impact of the Mod-3 Application relative to the Approved Development. Components to be removed include:

- 12 turbines (reducing the maximum number of turbines from 185 to 173)
- removing the external transmission line that extends from the wind farm's connection sub-station (located in the F Cluster off Rotherwood Road) to Ulan together with the associated infrastructure (including the concrete batch plant, connection substation/switchyard, access tracks and site access points and the full extent of the External Transmission Line Development Corridor)
- use of State Forest Road and most of Turee Vale Road for the project by all Light, Heavy and Over-size/over-mass vehicles during construction and operations
- discrete areas of indicative development footprint and WF Development Corridor that are no longer required.

The Mod-3 Application includes additional areas of ground disturbance, however there will be an overall reduction in ground disturbance relative to the Approved Development, due to the removal of 12 turbines and the approved external transmission line to Ulan.

A glossary of terms relating to the Mod-3 Application has been provided by Tilt Renewables, and can be found in Appendix C.

Changes relevant to the EMI assessment at LRWF are provided in Table 1.1.

Table 1.1 Relevant changes to the LRWF Project

Aspect	Original SSD-6696 Development Consent (2018)	Approved Development (as modified) (2024/5)	Mod-3 Application (2025) - with comparison against Approved Development
Estimated Generation Capacity (assuming 7.2 MW wind turbine)	962 MW	1,332 MW	Reduction to 1,245.6 MW (-6.5%)
Max Blade Tip Height	165	215 m	No Change
Max number of wind turbines	267	185	Reduction to 173 (-6.5%)
Development Corridor Area	12,405 ha	8,949.9 ha, comprised of: ■ Wind Farm Development Corridor: 7,409.5 ha ■ Public Road Upgrade Development Corridor: n/a ■ External Transmission Line Development Corridor: 1,540.4 ha	Reduction to 7,112.7 ha (-20.5%), comprised of: ■ Wind Farm Development Corridor: 6,664.2 ha (-10.1%) ■ Public Road Upgrade Development Corridor: 448.5 ha (+100%) ■ Removal of External Transmission Line Development Corridor (-100%)
Indicative Development Footprint (IDF)	752.82 ha	1,803.7 ha, comprised of: ■ Wind Farm IDF: 1,377.6 ha ■ Public Road Upgrade IDF: 184.8 ha ■ External Transmission Line IDF: 240.9 ha	Reduction to 1,581 ha (-12.3%), comprised of: ■ Wind Farm IDF: 1,109.8 ha (-19.4%) ■ Public Road Upgrade IDF: 274.3 ha (+48.4%) ■ Removal of External Transmission Line IDF (-100%)
External transmission line	56.82 km	Approximately 41.7 km overhead powerline up to 330kV extending from wind farm to the approved connection point at Ulan.	Removed, including all associated access tracks, site access points, temporary construction compounds / laydown areas / batching plants and associated infrastructure.
Communication towers	N/A	N/A	Inclusion of up to 7 x communication towers (monopoles up to 40m height above AGL).

1.2 Wind farms & electromagnetic interference

Communication systems using radio waves are heavily utilised in Australia. Mobile phones, television (TV), commercial radio, land mobile radio and emergency radio are common examples of systems that rely on radio and telecommunication. These systems generally use radio towers to transmit and receive signals across a wide area. In the context of wind farm development and operation, electromagnetic interference (EMI) is the impact of WTGs and associated infrastructure on surrounding communication services resulting in a detrimental effect to the communication service. Radar services (such as aviation and weather) can also potentially be impacted by wind farms.

1.2.1 Types of impacts

The different effects WTGs can have on communication services include:

- *Near field impact:* A property of a transmitting and/or receiving antenna is a “near field” zone that is present around the antenna. Any object that can conduct or absorb radio waves, placed within the near field zone, can alter the behaviour of the antenna.
- *Obstruction impact:* If a conductive object is placed in the path of an advancing radio wavefront, wave energy can be absorbed, detrimentally affecting the signal detected at the receiver.
- *Reflection and scattering impacts:* If an object reflective to radio waves is placed in the path of an advancing radio wavefront, it may reflect energy away. The reflected signal may be reflected from the transmitting or receiving antenna which can interfere with the desired signal.
- *Electromagnetic fields / radio frequency interference:* The operation of a WTG and the associated electrical transmission infrastructure create an electromagnetic emission that can, theoretically, interact with radio communications.

1.2.2 Relevant Categories

In assessing potential EMI impacts resulting from wind farm development and operation, radio systems are commonly broken into several different categories based on type. For the purposes of the current investigation, the following categories of services are considered.

- *Fixed point-to-point:* Radio links that transmit and receive between 2 fixed points fall under this category. For example, network backhaul (such as a dedicated transport core network) commonly utilises point-to-point communication.
- *Fixed point-to-multipoint:* A central location transmits to, and sometimes receives from, several independent locations, such as remote control or base stations for utility and power providers. Some land mobile systems fall under this category.
- *Other/Point-to-area:* TV and radio broadcasting and reception, mobile phones (to the cell site mast) and land mobile systems fall under this category.
- *Radar:* Radar transmits a signal which is reflected back to the transmitting station. Some systems involve communication between a radar station and a transponder. Services that utilise radar technology include aircraft detection and weather services.

2. Methodology

WSP has used the following industry standard guidelines to inform this EMI assessment:

- Environment Protection and Heritage Council: National Wind Farm Development Guidelines - Draft 2010 (Draft National Guidelines) [1]
- Fixed-link wind-turbine exclusion zone method [2]

2.1 EMI methodology

2.1.1 Exclusion zones

In many cases, impacts can be sufficiently characterised and mitigated using calculated “exclusion zones” and ensuring these zones are free from WTGs. In other cases, such as when exclusion zones are not feasible to calculate or not appropriate for the communication service, mitigation options are available, as discussed in Section 4. Details of the calculated exclusion zones are given below

- *Near field impact:* The recommended methodology for determine exclusion zones to mitigate near field impacts is given in the ‘Fixed-link wind-turbine exclusion zone method’ [2]. WSP recommends a minimum standard 1 km radio tower exclusion zone from WTGs as a precautionary measure for any near field impacts that may be produced.
- Obstruction impact: The Draft National Guidelines notes that it is generally accepted that obstruction effects can be avoided by placing the WTGs (including blades) outside the second Fresnel zone of any point-to-point links [1].
- *Reflection and scattering:* The accepted methods for calculating these impacts generally require information on signal performance requirements specific to each service and client. Additionally, impact calculations require complex modelling to determine. The scope of this assessment does not include the calculation of reflection/scattering impacts, however it is expected that licencees will identify any associated concerns as part of the consultation process.

2.1.2 Impact assessment

To assess the potential EMI impacts arising from the proposed LRWF, WSP has developed the following methodology:

1 Using the Australian Communications and Media Authority (ACMA), radio communication towers and radio services (RADCOM) database, all licences currently registered within 75 km of the site boundary were identified. The ACMA RADCOM database was accessed on 16 October 2025 [3].

2 All communications towers within 2 km of the site boundary were investigated and assessed for potential near-field and obstruction effects.

3 All registered fixed point-to-point licences passing within 2 km of the site boundary were identified and assessed for potential EMI impacts.

4 The proposed internal microwave towers and associated point-to-point links provided by Tilt Renewables were assessed for potential EMI impacts.

5 All fixed point-to-multipoint licences within 30 km of the LRWF site boundary were identified and assessed for potential EMI impacts.

6 All other remaining registered licences within 30 km of the LRWF site boundary were assessed for potential impacts.

7 Operators of radar services, including the Bureau of Meteorology (BoM) and aviation services, were identified within 250 nautical miles of the LRWF site boundary.

8 Emergency services operating licences within 30 km of the LRWF site boundary were identified.

9 All licensees deemed to require consultation were contacted for feedback.

2.1.3 Consultation process

The Draft National Wind Farm Guidelines [1] recommends that any organisations operating services that are found to be within 5 km of causing an impact should be contacted to confirm the existence of any potential issues. WSP considered organisations within 10 km of the site boundary.

WSP undertook an initial consultation process for LRWF in 2020/21, based on licensees identified in April 2020. An updated consultation process was then undertaken in 2025 regarding the Mod-3 layout changes.

A summary of contacted licences and any associated responses can be found in Appendix B. WSP has used the ACMA database to source the contact information of licensees and takes no responsibility for the accuracy of the information. In cases where the parties did not respond to the 2025 consultation, feedback from the earlier consultation has been included in this report.

2.2 Exclusions

This assessment does not include the calculation of reflection/scattering impacts. This EMI study only qualitatively assesses the potential impact caused from WTGs, and it does not consider the EMI impact of other wind farm infrastructure such as overhead powerlines, substations, or met masts etc. Further, this Report does not include an Electromagnetic Radiation (EMR) assessment.

2.3 Assessment inputs

The assessment has considered the following GIS files provided by Tilt Renewables on 13/10/25:

- WTG layout: ‘LRWF_Indicative_WTG_Layout_17_20251010.shp’ [4]
- Site boundary: ‘LRWF_Mod-1 Approved Site Boundary_Wind Farm_20230501.shp’ [5]
- Proposed internal microwave towers: ‘LRWF_Indicative Microwave Towers_20250407.shp’ [6]
- Proposed internal microwave links: ‘LRWF_Indicative Microwave Towers Link_20250407.shp’ [7]

3. Potential Impacts

Following the methodology and inputs described in Section 2, WSP has undertaken an independent analysis of the potential EMI impacts arising from the development and operation of LRWF.

The ACMA RADCOM database [3] was accessed in October 2025 and used to identify all active licences within 75 km of the site boundary.

WSP notes that some distances mentioned in this section have changed from previous reporting. This is due to an updated methodology where distances are now calculated to the closest point of the Site boundary rather than a set point in the middle of the wind farm. WSP considers this new approach to be more reasonable for the purpose of an EMI assessment.

3.1 Near field impact

A refined search was undertaken to identify any towers located within 2 km of the site boundary. A total of 4 towers were identified, as shown in Table 3.1.

Table 3.1 Existing towers within 2 km of site boundary

Site ID	Latitude [°]	Longitude [°]	Name	Approx. distance to nearest WTG [km]
11282	-31.68177	149.83881	Comms Tower Adj Oakey Trig Off Mullaley-Coolah Rd Coolah	0.8
205756	-32.00472	149.98114	Telstra Exchange Llangollen Rd Cassilis	4.8
10023461	-32.00517	149.98113	MarchNet Facility Cassilis, 24 Buccleugh Street Cassilis	4.8
6201	-32.00738	149.98034	Cassilis Police Station Cassilis	4.9

WSP notes that this is a reduction compared to the 15 sites identified in the previous assessment [8]. This is mainly due to a reduction in the site boundary, with the external transmission line to Ulan being removed.

Typically, WSP recommends consultation with licensees of any towers within 2 km of WTGs. Site ID 11282 is the only communication tower located within this distance, as shown in Figure 3.1.

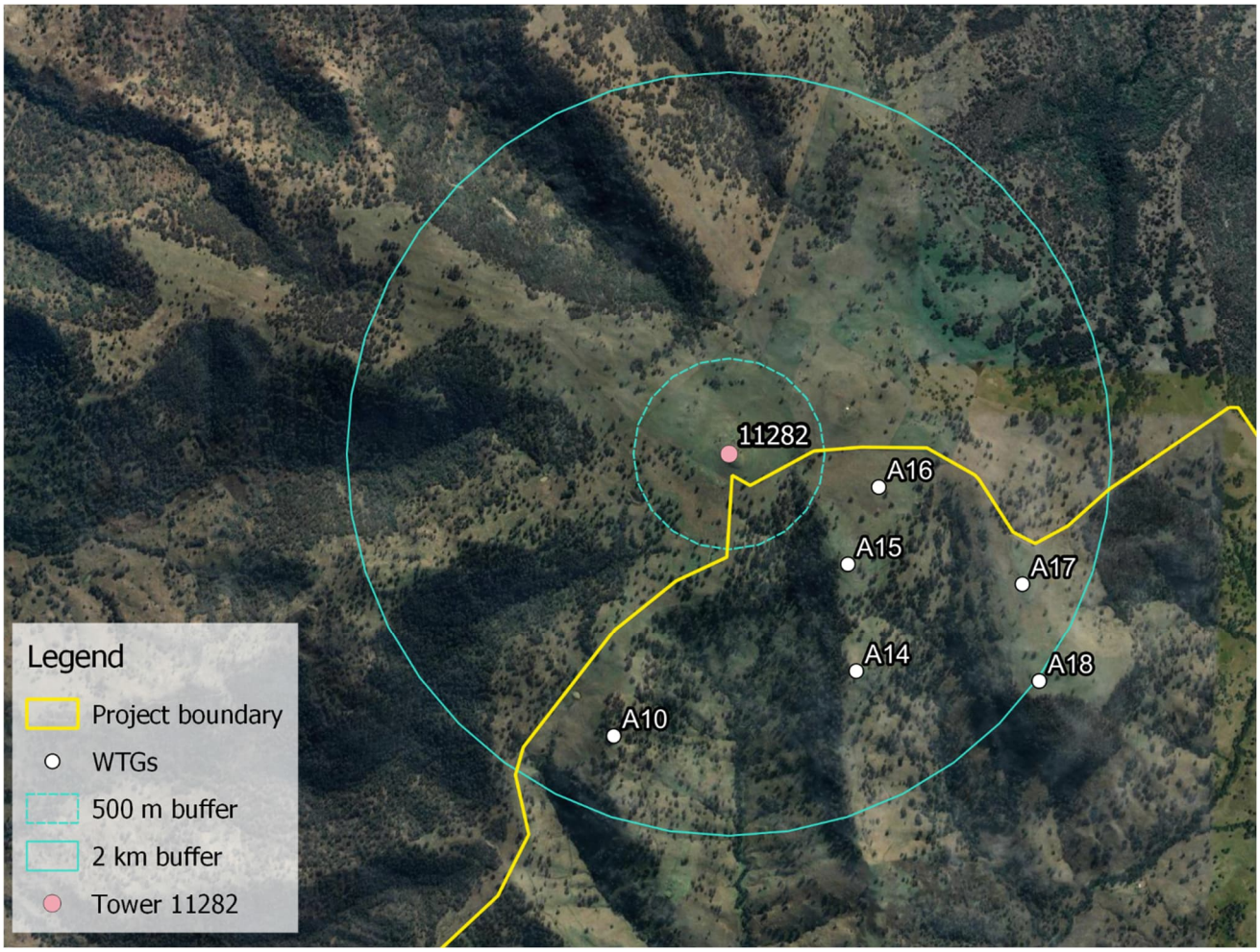

Figure 3.1 Communication towers identified in vicinity to LRWF

According to the ACMA database [3], the tower (Site ID 11282) has 5 associated licensees. WSP has contacted all 5 licensees, with the responses summarised in Table 3.2.

Table 3.2 Communication tower site 11282 licensees and consultation feedback

Licensee	Response
Electrostar Pty Limited	"…no feedback to provide" (04/08/20)
New South Wales Government Telecommunications Authority	No concerns stated regarding near field interference. Commentary relating to P2P link is outlined in Section 3.2.1
NSW Rural Fire Service	"...there [are] nil concerns and is RFS approved" (19/12/25)
Paspaley Pastoral Company Pty Ltd	Confirmed tower location but no mention of impacts (03/07/20)
Talbragar Broadcasters Incorporated	"…all should be ok" (16/12/25)

WSP notes that all 7 internal microwave tower locations proposed by Tilt Renewables are within 2 km of a WTG, with the closest being approximately 200 m. Given this distance, there is the potential of near field effects to those project-related communication towers.

3.2 Point-to-point licences

All registered fixed point-to-point links within 75 km of the site boundary have been identified and further analysed for potential intersection with WTGs. 7 point-to-point links have been identified to pass within 2 km of the site boundary as shown in Table 3.3.

Table 3.3 Active point-to-point links

Link	Site 1 ID [lat, long]	Site 2 ID [lat, long]	Licensees	Minimum frequency
1	11282 [31.68177°,149.83881°]	9009759 [-31.94884°,149.21312°]	NSW Rural Fire Service	451.125 MHz
2	11282 [31.68177°,149.83881°]	11018 [-31.34631°,149.02619°]	NSW Rural Fire Service	451.275 MHz
3	11282 [31.68177°,149.83881°]	403796 [-31.35739°,149.79422°]	NSW Rural Fire Service	450.850 MHz
4	11282 [31.68177°,149.83881°]	6525 [-31.30188°,150.68562°]	Electrostar Pty Limited	404.650 MHz
5	11283 [31.77604°,149.72641°]	10021216 [-31. 81929°,150.16263°]	NSW Government Telecommunications Authority	7.435 GHz
6	10023461 [-32.00517°,149.98113°]	6202 [-32.02118°,149.99584°]	March IT Pty Ltd	18.429 GHz
7	205756 [-32.00472°,149.9811°]	133163 [-32.02143°,149.99570°]	Telstra Ltd	18.580 GHz

Additionally, Tilt Renewables has provided WSP with 7 proposed communication tower locations, and the 6 associated point-to-point links [6, 7]. These links are summarised in Table 3.4. As per correspondence with Tilt Renewables, WSP has assumed the frequency of these internal links to be 11 GHz.

Table 3.4 Proposed internal point-to-point links

Link	Proposed site 1 [lat, long]	Proposed site 2 [lat, long]	Proposed frequency
8	T1 [-31.69029°,149.83405°]	T2 [-31.71603°,149.93125°]	11 GHz
9	T1 [-31.69029°,149.83405°]	T3 [-31.72066°,149.85188°]	11 GHz
10	T3 [-31.72066°,149.85188°]	T4 [-31.79657°,149.86702°]	11 GHz
11	T4 [-31.79657°,149.86702°]	T5 [-31.82595°,149.92465°]	11 GHz
12	T5 [-31.82595°,149.92465°]	T6 [-31.71458°,149.94545°]	11 GHz
13	T5 [-31.82595°,149.92465°]	T7 [-31.90379°,149.94750°]	11 GHz

To assess the likely impact of LRWF on the nearby point-to-point links, WSP has calculated the 2nd Fresnel exclusion zones for each link using the 'Fixed-link wind turbine exclusion zone method' [2]. As a conservative approach, the lowest frequency associated with each link has been used to develop the 2nd Fresnel zones, as this results in the largest radius. Further, it is noted that the analysis doesn't consider the vertical position of the point-to-point links and therefore represents a worst case 2D impact scenario. Figure 3.2 shows the calculated 2nd Fresnel zones of all 13 links, as well as an 86 m buffer around WTG locations to account for the blade length.

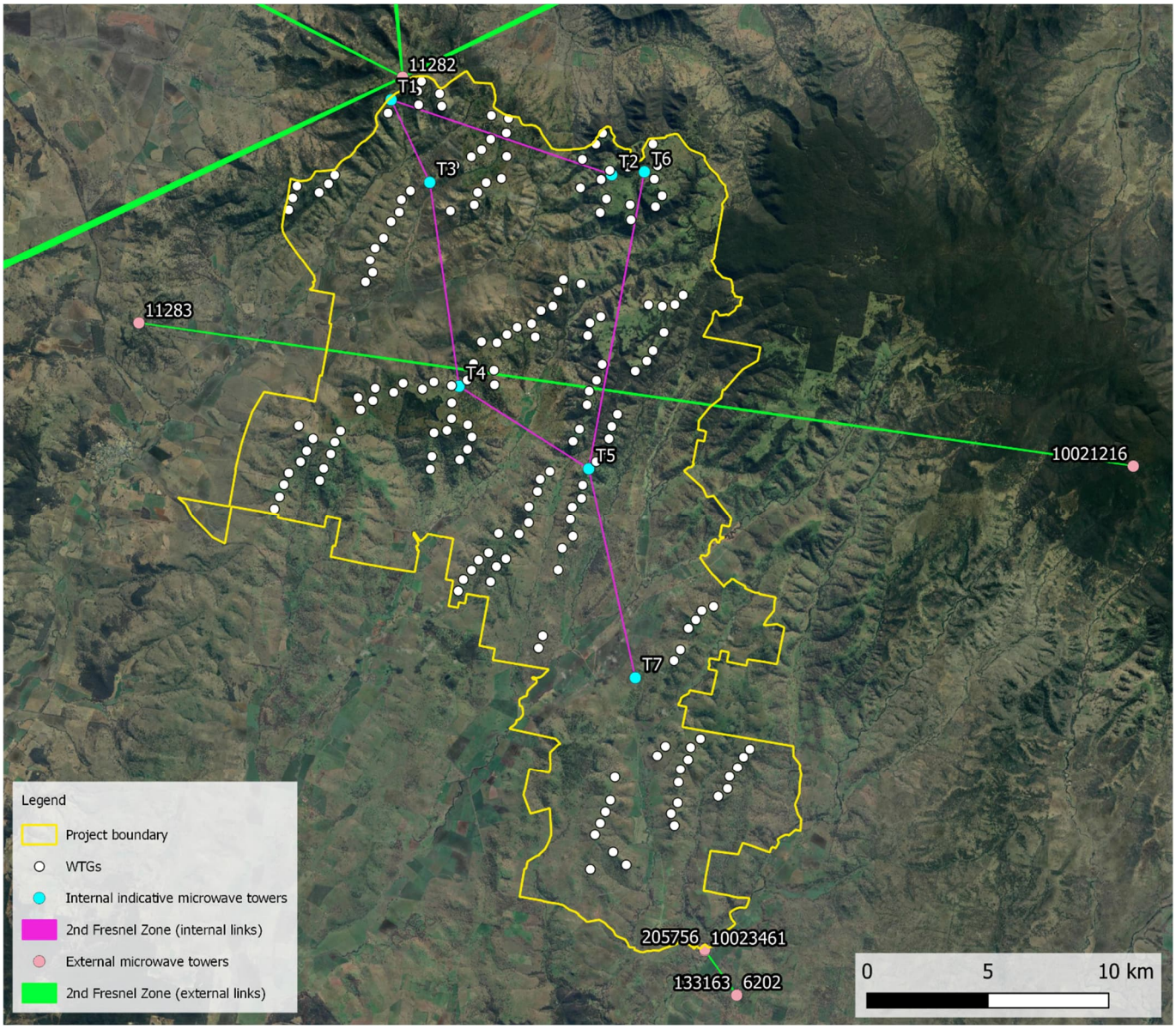

Figure 3.2 Point-to-point links identified in vicinity to LRWF

The Draft National Guidelines recommends that as a conservative approach, WTGs (including blades) should be placed outside the 2nd Fresnel zone of any point-to-point links. There are no WTGs in the updated layout that are encroaching on the second Fresnel zone of any of the existing links.

3.2.1 Link 5

Link 5, between the communication towers 11283 and 10021216 is the only link passing through the site boundary. Table 3.5 lists the details for the link, including the associated assignment IDs and frequencies.

Table 3.5 Link 5 assignments

Licensee	Site 1	Site 2	Assignment ID	Frequency
NSW Telecommunications Authority	11283 [NSWTA 20m Lattice Tower Queensborough Hill]	10021216 [NSWTA 65m Lattice Tower Coolah Tops]	7069451 – 7069452	7.596 GHz
			7069454 – 7069453	**7.435 GHz**

Figure 3.3 shows the calculated 2nd Fresnel zone of link 5 in relation to the updated WTG layout at LRWF, with a blade buffer of 86 m. No WTGs are currently positioned as such to encroach on the 2nd Fresnel zone of Link 5. The closest WTGs are D43 and E31, with blade tips being approximately 42 m and 24 m respectively from the 2nd Fresnel zone.

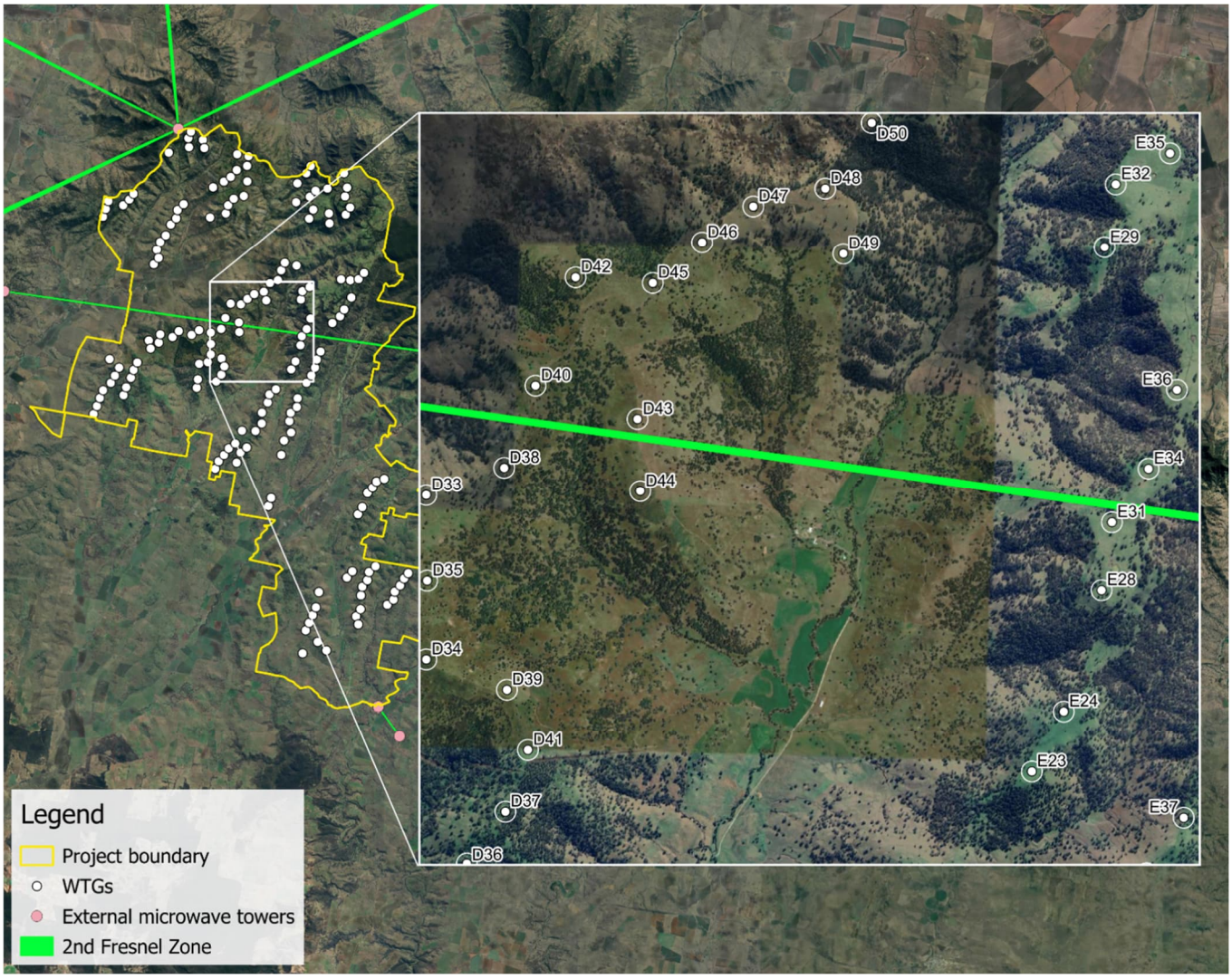

Figure 3.3 Link 5

WSP has contacted the NSW Telecommunications Authority (NSWTA) to ascertain any potential risks or interference issues that may arise from the proposed WTG layout on point-to-point Link 5. NSWTA noted the importance of the microwave link in operating the mission critical Public Safety Network in NSW and requested that WTG E31 be moved by minimum 10m south to achieve optimal clearance.

3.2.2 Other ACMA links

The other 6 active links do not pass through the site boundary and WSP deems there to be a low risk of interference from WTGs. WSP has contacted all licensees regarding potential impacts and no objections were raised.

3.2.3 Internal links

No WTGs are encroaching on the 2nd Fresnel zones of the proposed internal microwave links. The closest WTG is C09, where the blade tip is within 59 m of the 2nd Fresnel zone of Link 8. It is important to note that WSP has assumed a frequency of 11GHz, and that if a lower frequency was used, the width of the 2nd Fresnel zone would increase. WSP notes that Tilt Renewables will need to confirm with ACMA that the proposed radio spectrum and associated channels are available.

WSP notes that 2 of the proposed internal links (Links 10 and 12) are intersecting with existing Link 5 operated by NSW Telecommunications Authority. It is not expected that this will cause any interference to either of the links.

3.3 Point-to-multipoint licences

A search of any active point-to-multipoint licences within 30 km of the site boundary was undertaken. One (1) licensee was identified, as shown in Table 3.6.

Table 3.6 P2MP licensees

Licensee	Site	Site ID	Assignment ID	Frequency [MHz]	Distance to site boundary [km]
Ulan Coal Mines Pty Ltd	EOB Site Ulan Mine ULAN	9025971	4322577	471.425	27.3
			4322574	471.425	

WSP notes that this is a reduction from 5 licensees identified previously. This reduction is due to the removal of the external transmission line to Ulan to the south of the project.

Due to the distance from the site boundary, WSP deems there is a low risk of EMI impacts, and the licensee has not been contacted as part of the consultation process.

3.4 Point-to-area and broadcasting services

Active point-to-area services within 30 km of the site boundary were identified. A total of 1241 licences were identified, as summarised in Table 3.7

Table 3.7 Point-to-area and broadcasting services

Licence type	Licence category	Number of licences	Minimum distance to site boundary [km]
Broadcasting	Commercial television	5	2.2
	Community broadcasting	1	0.1
	Narrowcasting service (LPON)	3	2.3
	National broadcasting	3	2.2
Land mobile	Land mobile system - > 30MHz	120	0.1
	Paging system - exterior	4	0.1
PTS	PMTS Class B	4	5.9
Spectrum	1800 MHz Band	10	3.1
	2 GHz Band	6	3.1
	2.3 GHz Band	348	2.9
	3.4 GHz Band	604	2.9
	700 MHz Band	72	2.3
	800 MHz Band	26	2.3
	850/900 MHz Band	30	2.3
	AWL - FSS Only	5	20.1

WSP notes that there are changes to the identified licences since the RADCOM database was last accessed by WSP in 2020. There has been a significant increase in the number of licences (up from 433). A particular increase can be seen in the 2.3 and 3.4 GHz categories and NBN Co Limited is the licensee for the majority of these.

All point-to-area licences within 10 km of the site boundary have been contacted by WSP for comment on potential EMI impacts to their services as a result of LRWF. A summary of contacted licensees and associated responses is shown in Appendix B.

In 2020, WSP previously sought feedback from Betrola Investments Pty Ltd (Betrola) regarding a Land Mobile radio licence that was used for communicating between two properties. Betrola indicated that there was the potential for interference to their service. This licence is no longer active in the ACMA database, however, WSP contacted Betrola as part of the 2025 consultation process but did not receive a response.

3.4.1 Radio

AM signals can propagate around WTGs and as such, WSP does not expect that LRWF will adversely impact the AM radio services in the area. FM signals, however, are more susceptible to interference from nearby obstacles, such as WTGs. However, this can only occur when the receiver is in close proximity to the obstacle.

Radio signals in the VHF (Very High Frequency) and UHF (Ultra-high Frequency) bands are generally unaffected by wind turbine structures. While interference from the wind turbines is expected to be minimal, a simple mitigation step is to move a short distance until the signal strength increases.

3.4.2 Mobile phone reception

Mobile phone reception can be affected by the development and operations of wind farms, depending on the level of coverage surrounding the site. WSP has assessed the existing mobile coverage from Telstra, Optus and TPG (Vodafone) within the LWRF site boundary and coverage maps are provided in Figure 3.4, Figure 3.5 and Figure 3.6 respectively. Table 3.8 summaries the consultation feedback from each of the mobile network providers.

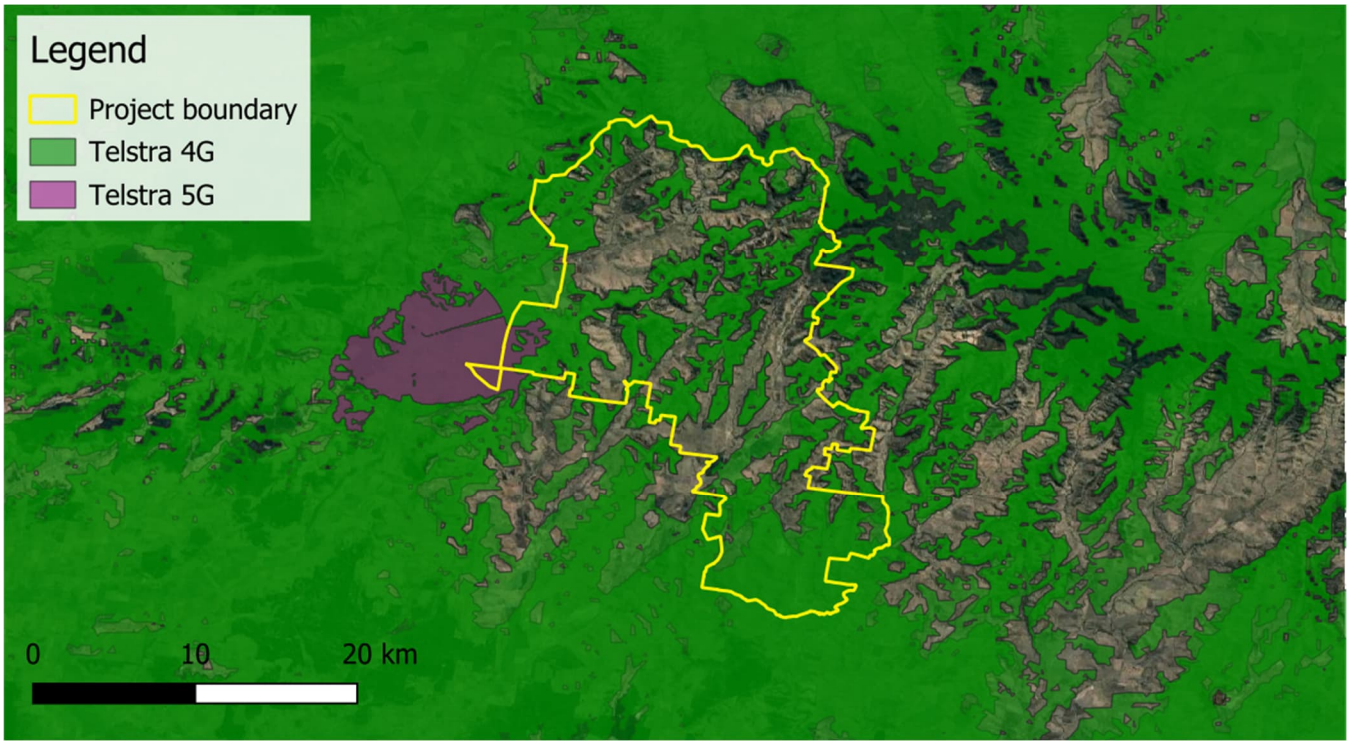

Figure 3.4 Telstra coverage map [9, 10, 11]

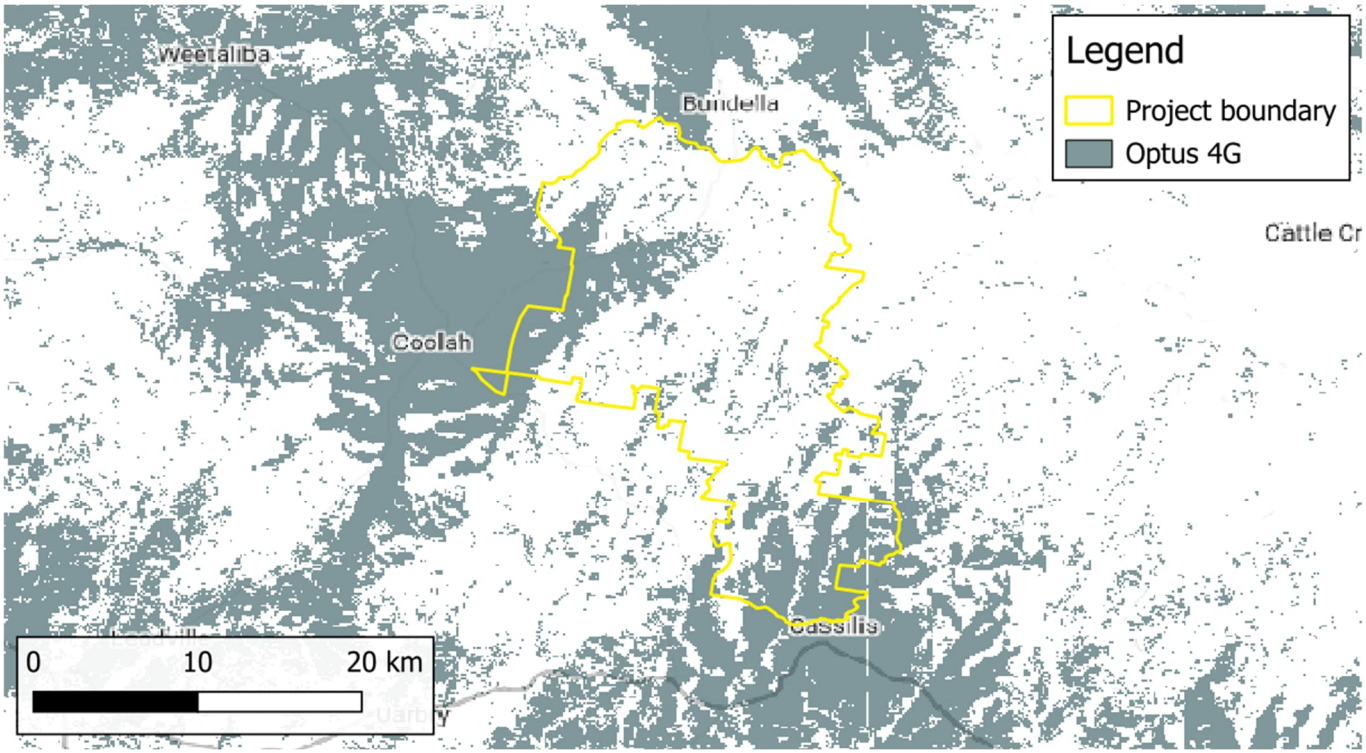

Figure 3.5 Optus coverage map [12, 13, 14, 15, 16, 17]

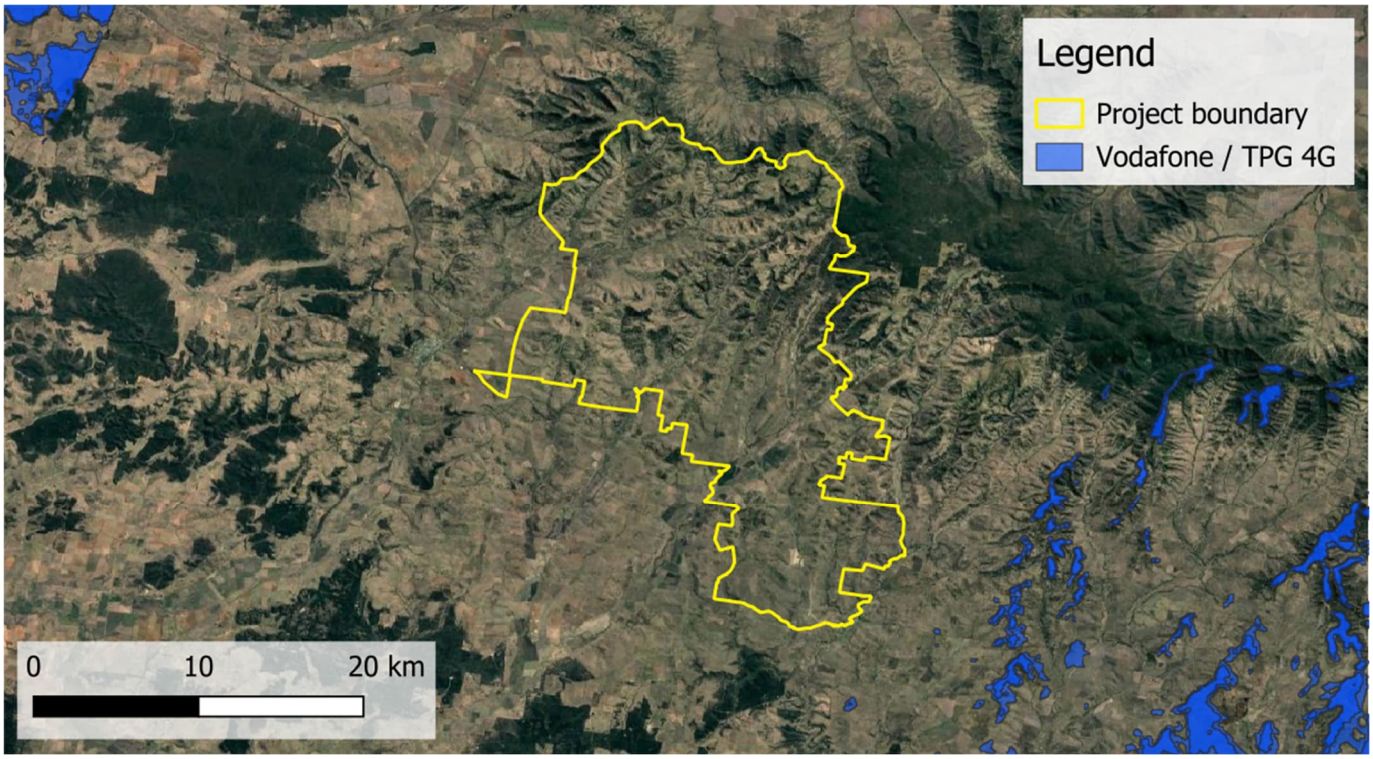

Figure 3.6 Vodafone coverage map [18, 19, 20, 21]

Table 3.8 Mobile network providers coverage and consultation feedback

Licensee	Network coverage around LRWF	Response
Telstra	Patchy 4G coverage throughout the site, as well as a limited area with 5G coverage to the west of the site.	"Telstra has no objection to development application in relation to the proposed wind farm subject to WSP Australia Pty Limited confirming its agreement to the conditions and matters set out in this letter. Telstra will require the protection of/relocation of its fixed telecommunications infrastructure that may be impacted by activities on this site. To minimise risk of liability due to any damage, the DialBeforeYouDig 1100 Inquiry number should be contacted to obtain location of Telstra plant before commencement of construction work." (09/07/20)
Optus	Limited to no 4G coverage. Only 4G is available in the area.	"Our transmission team recommends that W6 turbine should be relocated to be >200m away from proposed 8G56M MW link licence 12799082/1 (FZ Radius 15-25m). The minimum separation distance from this microwave link should be 200m and WT6 is less than 200m from the identified microwave link." (15/01/26) **Note:** It appears that Optus has made an error when providing this feedback. The referenced licence corresponds to a link that is located near Cooma NSW, over 450 km from LRWF. WSP is in the process of confirming this with Optus.
Vodafone	No network coverage	Not contacted – no licences in the area.

3.4.3 Television reception

Analog TV signals are known to be affected by interference from WTGs. Analog TV was gradually phased out in Australia from 2010 and completed nation-wide in 2013. At present, digital TV signals are available across the country and are usually less prone to interference if the signal is strong enough initially. It is possible that where a WTG obstructs the line of sight between dwellings and nearby TV broadcast stations, residences may experience interference to their existing TV coverage.

A search of the digital TV broadcast stations was conducted in proximity of LRWF using the mySwitch website [22]. There are 2 relevant TV towers within 10km of the Project: Coolah (site ID 11281) and Cassilis (site ID 6202). It was found that the TV reception ranges from no coverage to variable.

Figure 3.7 and Figure 3.8 show the coverage from the TV towers in relation to the wind farm and nearby dwellings.

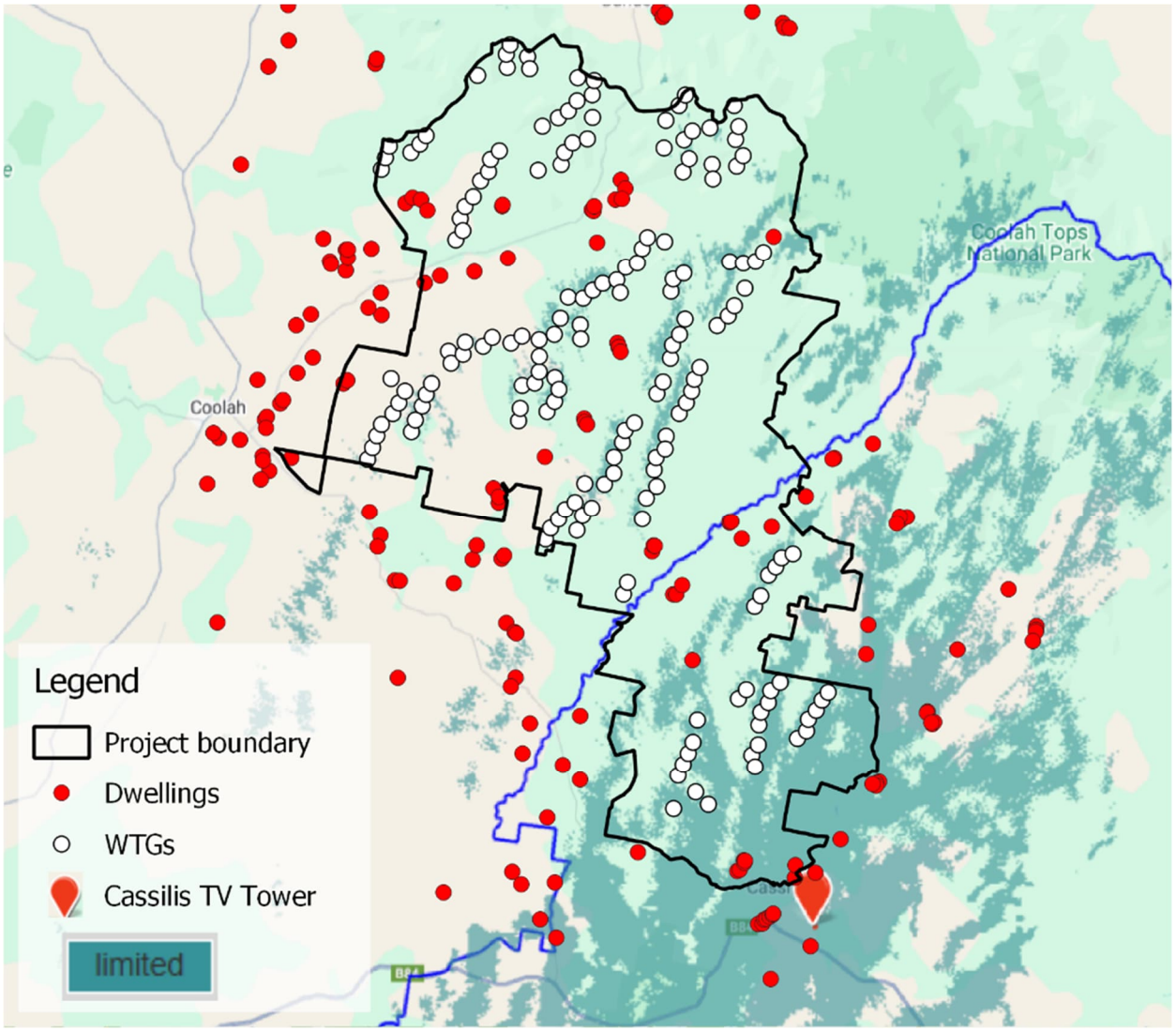

Figure 3.7 Cassilis TV broadcasting site (ID 6202)

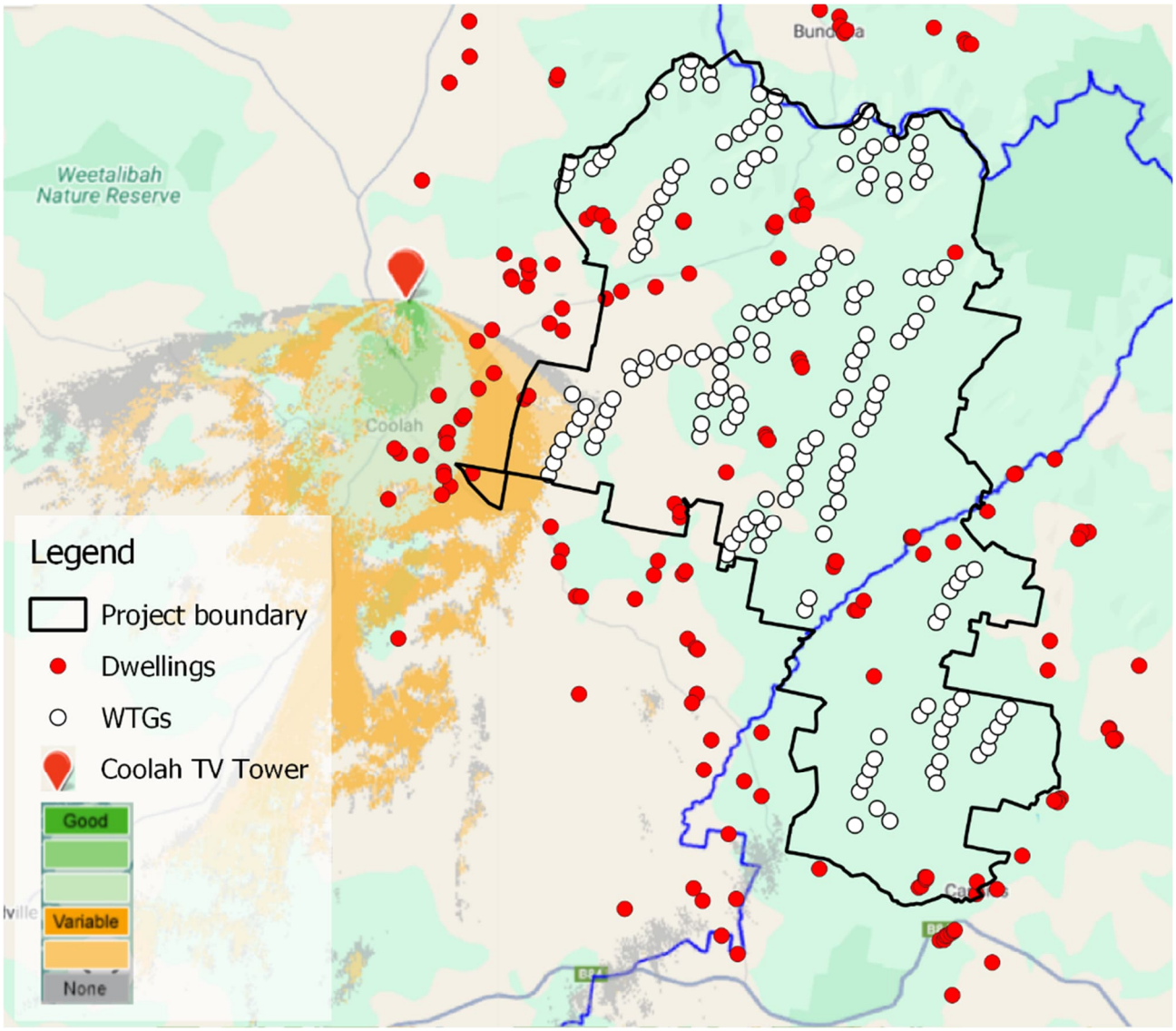

Figure 3.8 Coolah TV broadcasting site (ID 12281)

As existing TV coverage is considered marginal, there is potential for TV signal strength at nearby residences to be affected by LRWF. Should any residences experience TV interference, there are various mitigation options available. The most common approach is the installation of satellite television services, such as Viewer Access Satellite Television (VAST), at affected properties. WSP understands that Tilt Renewables are planning to use this approach.

If it is required that the impact of the project on TV signals is confirmed / quantified prior to construction, pre and post construction signal strength surveys can be conducted at a representative subset of residences to inform options for any post-construction mitigations.

WSP has sought feedback from TV broadcasting licensees identified within 10 km of the project as part of the consultation process. The feedback is summarised in Table 3.9.

Table 3.9 TV broadcasting consultation responses

Licensee	Response
ABC	"...a risk to the television reception of a small number of households currently receiving services from our Borombiel Hill and Mt Cenn Cruiach sites. If these interference predictions are borne out in reality, the only alternative for these residents would be to switch to our direct-to-home satellite service, VAST." (22/09/20)
NBN Ltd	"At this time we feel there won't be any detrimental direct affect to any NBN television services in the area of the proposed wind farm. There was a suspicion that the viewers in the town of Cassilis may be affected by reflected scatter from the Turbine blades at the lower end of the proposed area, however due to the small amount of turbines indicated in that region we don't see that any interference will occur." (06/09/20)
Network Ten (Melbourne) Pty Ltd	No response
Prime Television (Southern) Pty Ltd	No response
SBS	"Considering the wind farm is not directly within the coverage footprint of the SBS Queensborough Trig transmitter and only touching it marginally on the north-western side, we believe the wind farm EMF emission will not materially impact our services in the area." (02/07/20)
WIN Television	"We will investigate what effects if any, the Wind farm will have on the television services provided to the township of Coolah. The broadcast services transmit over a wide frequency range 652 Mhz to 694 Mhz and receive low level signals from Mt Cenn Cruiach in the west a path of over 81.7 km. from 181 Mhz to 230 Mhz. Any interference in these frequency ranges could effect the broadcast services from this site, especially the fact that we are running low power." (04/08/20)

3.5 Radar

3.5.1 Meteorological services

Meteorological radars within 250 nautical miles (approximately 460 km) of the Site boundary were identified from the BoM website [23]. A total of 11 sites were identified. A summary of identified radars is presented in Table 3.10.

Table 3.10 Meteorological radars

BoM radar site	Latitude [°][1]	Longitude [°][1]	Radar category	Approx distance from site boundary [km]
Brewarrina	-29.96	146.81	Meteor 735CDP (C-Band, Doppler and Dual Pol enabled)	350
Canberra / Captains Flat	-35.66	149.51	WSR 74 S Band Doppler	410
Grafton	-29.62	152.97	WSR 74 S Band	370
Hillston	-33.55	145.52	Meteor 735CDP (C-Band, Doppler and Dual Pol enabled)	440
Moree	-29.50	149.85	WF 100 C Band	240
Namoi (Blackjack Mountain)	-31.02	150.19	DWSR 8502S 2° S-band	80
Newcastle	-32.73	152.03	WSR 74 S Band Doppler	210
Sydney (Terry Hills)	-33.70	151.21	Meteor 1500 S-band Doppler	220
Wagga Wagga	-35.17	147.47	WF 100 C Band	420
Wollongong (Appin)	-34.26	150.87	DWSR 8502S 2° S-band	260
Yeoval	-32.74	148.70	Meteor 735CDP (C-Band, Doppler and Dual Pol enabled)	140

1) Latitude and longitude have only been reported to 2 d.p. as per the BoM website

There are 4 more radars compared to previous assessments. The closest radar to LRWF remains Namoi (Blackjack Mountain) which is approximately 80 km from the site boundary. The closest new radar is at Yeoval, approximately 140 km from the site boundary.

WSP contacted the BoM to seek feedback on any potential EMI impacts on their services and operation. The response from BoM was that "*under normal atmospheric conditions, it [LRWF] remains a significant risk to the Namoi radar. To proceed without objection, the Bureau requires a comprehensive technical assessment of potential impacts and possible mitigation measures for your development*."

WSP understands that Tilt renewables will continue consultation with BoM to discuss potential mitigation and management strategies in the event of an adverse impact to the radar as a result of LRWF. The BoM is aware that the Approved project is located within the Central West and Orana Renewable Energy Zone (CWO REZ) and of the potential impacts that other wind farm projects proposed within the CWO REZ may have on its weather radar operations.

3.5.2 Aviation

The nearest major regional airport to LRWF is Mudgee airport, located approximately 70 km from the site boundary. The nearest international airport is Sydney airport, located approximately 240 km from the site boundary.

WSP contacted Airservices Australia regarding any potential impacts of the Project. The response was that *"the proposed wind farm would not have an impact on the safety, efficiency or regularity of existing, or future air transport operations into or out of any airport".*

3.5.3 Defence

As part of the consultation process, WSP contacted the Department of Defence seeking feedback on any potential impact to their services and operations. The response was that the *"Defence Spectrum Office has no objections to, nor comments to add in response to the Liverpool Range Wind Farm proposal".*

3.6 Emergency services

Using the ACMA RADCOM database, a search was conducted of radiocommunication sites within 30 km of the LRWF site boundary operated by emergency service providers. Four licensees were identified, with a total of 61 active assignments. WSP has contacted the 4 licensees and a summary of the associated number of assignments and responses outlined in Figure 3.11.

Table 3.11 Emergency services within 30 km of LRWF

Licensee	No of assignments	Response
Ambulance Service of NSW	2	No response
NSW Police Force	16	"...the proposed Liverpool Range Wind Farm would not affect the existing NSW Police radiocommunications services." (01/12/25)
NSW Rural Fire Service	39	"...there [are] nil concerns and is RFS approved" (19/12/25)
NSW Volunteer Rescue Association	4	“The main concern for the NSW Volunteer Rescue Association is around a potential “rescue event” on any of the wind farms… We have no radio towers that belong to the NSW VRA that would be affected…” (04/08/20)

4. Management and mitigation

Generally, potential EMI impacts can be avoided and reduced through a comprehensive consultation process and the appropriate modification of the WTG layout. However, some further mitigation measures can be considered in different cases. The Draft National Wind Farm Development Guidelines [1] provides the following hierarchy of mitigation options in order of most to least preferable:

- Re-location / removal of WTGs
- Replacement of the existing radiocommunications service equipment with another less affected type (e.g. replace UHF link with microwave link)
- Re-location of radio communications services to another existing radio communications site
- Re-location of radio communications services to a new telecommunications site
- Substitute radio communication for underground or overhead optical fibre
- Enhance radar filters

These exclusion zones should be determined by an assessment using accepted methodologies as set out in this report or otherwise agreed with relevant licence holders. Crane booms and the raising and lowering of WTG parts may also cause interference. It is recommended that the exclusion distances (including exclusion tower buffers and 2nd Fresnel zones), which are established and applied to the final layout, be respected during construction, maintenance and decommissioning.

In the event that WTGs cannot be adequately micro-sited, further mitigation techniques are possible. Some potential mitigation options for different types of impacts are shown below in Table 4.1. Further mitigation techniques (including commissioning of new radio towers and fibre optic cabling) are possible beyond the options discussed, however, significant cost may be incurred if these options are undertaken.

Table 4.1 Additional mitigation options

Type of impact	Mitigation options (beyond micro-siting)
Near field interference	■ Modify or upgrade affected services to new apparatus or frequencies with smaller near field exclusion zones. ■ Re-locate and/or re-direct services to alternative existing sites.
Point-to-point link interference	■ Modify or upgrade affected services to new apparatus or frequencies with narrower 2nd Fresnel exclusion zones. ■ Re-locate and/or re-direct services to alternative existing sites.
Point-to-area and broadcasting interference	■ Retuning the antenna to another tower, not within the line of sight of the WTGs ■ The use of a higher gain antenna ■ Installation of an appropriate amplifier to all affected residences ■ Moving the existing antenna to a less affected position, i.e. moving a short distance until the signal improves ■ For TV, the installation of satellite TV at the affected residence, such as Viewer Access Satellite Television (VAST) ■ Increase the broadcast strength from the transmission tower, move the tower or install a signal repeater

In some cases, the EMI effects cannot be easily quantified. It may then be necessary to conduct baseline testing of signal strength followed by post-construction monitoring and subsequent mitigation if required.

5. Conclusions

WSP makes the following observations, recommendations and conclusions regarding potential EMI impacts caused by LRWF:

- Overall, the layout changes associated with the Mod-3 Application do not result in an increased level of EMI interference risk compared to the Approved Development.
- One existing communications tower (site ID 11282) is within 2 km of a WTG. It is located approximately 0.8 km from the nearest WTG.
    - All 5 licensees operating from this tower were contacted, and no concerns were raised about near-field interference.
- A total of 7 existing point-to-point links pass within 2 km of the site boundary. No WTG blades are calculated to be encroaching on the 2nd Fresnel zone of these links.
    - Link 5 is the only link in the vicinity of WTG blades, with a minimum distance from blade-tip to 2nd Fresnel zone of 24 m at E31.
    - The licensee of Link 5 is NSW Telecommunication Authority (NSWTA). NSWTA requested that WTG E31 be moved a minimum of 10 m to the south to achieve optimal clearance.
- Tilt Renewables has proposed locations for 7 additional internal microwave towers at LRWF, resulting in 6 additional point-to-point links.
    - None of the WTGs are encroaching on the 2nd Fresnel zones of these links (assuming a frequency of 11 GHz).
    - Tilt Renewables should confirm with ACMA that the proposed radio spectrum and associated channels are available.
    - Whilst 2 of the proposed internal links intersect with existing link 5, it is not expected that this will cause any interference.
    - All of the proposed additional towers are within 2 km of a WTG and therefore susceptible to near-field effects. It is expected that this can be managed by Tilt Renewables during detailed design.
- One point-to-multipoint licence was identified within 30 km of the site boundary. WSP does not expect LRWF to cause any interference.
- A total of 1241 point-to-area licences were identified within 30 km of the site boundary.
    - Existing mobile reception is observed to be variable. Telstra did not raise any concerns. Optus flagged potential interference to a P2P link, however WSP believes this is an error, with the reference link located over 450 km from LRWF. WSP is in the process of confirming this with Optus.
    - There are 2 TV broadcasting sites in proximity to the Project. These have very limited coverage and there is potential for residences to be impacted by the WTGs. Should any residences experience interference, there are various mitigation options available. The most common approach is the installation of satellite television services, such as Viewer Access Satellite Television (VAST), at affected properties.
    - If it is required that the impact of the project on TV signals is confirmed / quantified prior to construction, pre and post construction signal strength surveys can be conducted at a representative subset of residences to inform options for any post-construction mitigations.

- 11 meteorological radars were found to be within 250 nautical miles of LRWF, with the closest being Namoi (Blackjack Mountain) which is approximately 80 km from the site boundary.
    - WSP contacted the BoM to seek feedback on any potential EMI impacts on their services and operation. The response from BoM was *that "under normal atmospheric conditions, it [LRWF] remains a significant risk to the Namoi radar. To proceed without objection, the Bureau requires a comprehensive technical assessment of potential impacts and possible mitigation measures for your development."*
    - WSP understands that Tilt renewables will continue consultation with BoM to discuss potential mitigation and management strategies in the event of an adverse impact to the radar as a result of LRWF.
- Department of Defence and Airservices Australia were also contacted regarding any potential impact to their radar services. Neither party had any objections to the Project.
- 4 emergency service organisations were identified to be operating services within 30 km of LRWF.
    - NSW Police Force, NSW RFS and NSWVRA indicated that LRWF would not cause any EMI impacts to their services.
    - No response was received from Ambulance Service of NSW

A summary of all responses received throughout the entire consultation process can be found in Appendix B.

6. Limitations statement

This Report is provided by WSP Australia Pty Limited (WSP) for Tilt Renewables (Client) in response to specific instructions from the Client and in accordance with WSP's proposal dated 2 October 2025 and agreement with the Client dated 6 October 2025 (Agreement).

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1

Appendices

Appendix A – WTG coordinates

WTG ID	WGS 84 UTM Zone 55S	
	Easting	Southing
A01	764396	6485857
A02	764567	6486348
A03	764735	6486839
A04	765657	6486573
A05	766043	6486932
A06	766305	6487294
A10	768510	6489855
A14	769779	6490193
A15	769735	6490757
A16	769897	6491161
A17	770648	6490653
A18	770736	6490142
B01	767579	6482849
B02	767770	6483761
B03	767877	6483242
B04	767975	6484271
B05	768324	6484686
B06	768638	6485368
B07	768977	6485759
B08	769063	6486277
B09	769440	6486643
B10	771095	6485815
B11	771283	6487693
B13	771960	6488050
B14	772082	6486065
B16	772225	6486575
B18	772386	6488340
B19	772575	6486982
B20	772763	6488774
B21	772793	6489755
B24	773206	6487152
B25	773412	6489030
B26	773427	6488066

WTG ID	WGS 84 UTM Zone 55S	
	Easting	Southing
B27	773499	6489633
C01	776481	6486764
C02	776560	6487941
C04	777121	6488572
C05	777297	6485744
C06	777335	6487108
C07	777395	6489020
C08	777554	6486309
C09	777695	6487487
C11	778446	6487616
C12	778539	6486068
C13	778573	6485445
C14	779481	6488573
C15	779541	6487124
C16	779588	6485990
C17	779674	6487677
C18	779864	6486437
D01	763805	6473465
D02	764015	6473965
D03	764200	6474470
D04	764400	6474954
D05	764810	6476905
D06	764885	6475416
D07	765140	6475867
D08	765405	6476370
D09	765682	6474644
D10	765846	6475140
D11	766140	6475736
D12	766310	6476230
D61	766541	6476694
D60	768746	6478283
D16	767265	6478070
D20	767373	6477563

WTG ID	WGS 84 UTM Zone 55S	
	Easting	Southing
D24	767887	6477940
D25	767979	6478454
D26	769138	6478661
D27	769937	6478420
D28	770260	6475109
D29	770330	6475638
D30	770416	6476612
D31	770408	6478714
D32	770952	6476714
D33	771142	6478563
D34	771142	6477198
D35	771149	6477851
D36	771480	6475501
D37	771800	6475930
D38	771790	6478790
D39	771813	6476947
D40	772050	6479475
D41	771987	6476442
D42	772383	6480376
D43	772898	6479197
D44	772920	6478596
D45	773025	6480330
D46	773435	6480670
D47	773860	6480970
D48	774459	6481118
D49	774609	6480574
D50	774845	6481663
D51	775338	6481846
D52	775547	6482464
D53	775774	6482941
D54	776509	6482765
E01	771417	6470034
E02	771630	6470510
E03	771970	6470900
E04	772260	6471315
E05	772758	6470419
E06	772675	6471620

WTG ID	WGS 84 UTM Zone 55S	
	Easting	Southing
E07	773000	6471050
E08	773091	6472425
E09	773390	6471370
E10	773936	6472401
E11	774330	6472873
E12	774343	6473554
E13	774703	6474188
E14	774745	6467673
E15	774811	6474695
E16	774919	6468177
E17	775217	6475018
E18	775554	6470908
E19	775726	6471805
E20	776060	6473019
E21	776143	6473541
E22	776169	6472307
E23	776176	6476263
E24	776441	6476765
E25	776574	6474451
E26	776529	6473904
E28	776755	6477771
E29	776780	6480630
E31	776841	6478335
E32	776873	6481153
E33	777130	6475420
E34	777146	6478783
E35	777324	6481410
E36	777382	6479441
E37	777438	6475880
E38	777662	6476370
E39	777776	6476874
E40	778014	6477378
E43	778751	6479162
E44	779230	6479580
E45	779296	6481899
E46	779489	6480007
E47	779940	6480758

WTG ID	WGS 84 UTM Zone 55S	
	Easting	Southing
E48	779874	6481838
E50	780394	6481909
E51	780734	6482300
F01	776890	6458475
F02	777082	6459907
F03	777301	6460379
F04	777517	6460853
F05	777721	6461338
F06	777834	6459190
F07	777908	6462294
F08	778378	6458658
F09	779662	6463197
F10	780001	6463590
F11	780236	6460778
F12	780355	6467150
F13	780373	6460279
F14	780538	6462084

WTG ID	WGS 84 UTM Zone 55S	
	Easting	Southing
F15	780510	6461229
F16	780619	6467599
F17	780623	6462625
F20	780940	6463036
F21	780951	6468488
F22	781044	6463546
F24	781450	6463905
F25	781258	6468837
F26	781508	6469221
F28	781996	6469395
F30	782187	6461499
F31	782573	6461823
F32	782653	6462321
F33	782988	6462704
F34	783238	6463141
F35	783497	6463476

Appendix B – Consultation summary

Licensee	Service	Consultation date	Most recent response- summary
ABC	P2A	Initial: 26/06/20 2021 update: 10/06/21 Mod-3 update: 20/11/25	"...a risk to the television reception of a small number of households currently receiving services from our Borombiel Hill and Mt Cenn Cruiach sites. If these interference predictions are borne out in reality, the only alternative for these residents would be to switch to our direct-to-home satellite service, VAST." (22/09/20)
Airservices Australia	Radar	Initial: 01/07/20 Mod-3 update: 20/11/25	"The proposed activity does not impact Airservices operations or facilities or any air routes." (22/01/26)
Ambulance Service of NSW	Emergency	Initial: 30/06/20 Mod-3 update: 20/11/25	No response
Andrew Andrews	P2A	Initial: 26/06/20 Mod-3 update: 20/11/25	"…the impact on our service, at the moment is minimal at best." (04/08/20)
Betrola Investments Pty Ltd	P2A (not licenced anymore)	Initial: 26/06/20 Mod-3 update: 20/11/25	Potential for interference of private 2-way repeater channel between two properties. (05/08/20)
Bureau of Meteorology	Radar	Initial: 01/07/20 2021 update: 04/06/21 Mod-3 update: 03/12/25	"Our assessment of the current Liverpool Range wind Our assessment of the current Liverpool Range wind farm proposal has determined that, under normal atmospheric conditions, it remains a significant risk to the Namoi radar. To proceed without objection, the Bureau requires a comprehensive technical assessment of potential impacts and possible mitigation measures for your development." (09/01/26)
Department of Defence	Radar	Initial: 30/06/20 2021 update: 10/06/21 Mod-3 update: 20/11/25	"As per the advice we provided Estate Planning, Defence Spectrum Office has no objections to, nor comments to add in response to the Liverpool Range Wind Farm proposal." (10/06/21)
Electrostar Pty Limited	P2P, P2A	Initial: 26/06/20 2021 update: 10/06/21 Mod-3 update: 20/11/25	"…no feedback to provide" (04/08/20)
Hello Radio Pty Ltd	P2A	Initial: 06/07/20 Mod-3 update: 25/11/25	No response
March IT Pty Ltd	P2P	Mod-3 update: 20/11/25	"…the wind farm will not have an impact on the existing MarchNet microwave link." (21/11/25)
NBN Co Limited	P2A	Initial: 26/06/20 Mod-3 update: 24/11/25	""…there are currently no nbn customers inside the wind farm tower areas that would be impacted by the proposed wind tower locations…Nor is there any impact on any existing or planned nbn microwave links in this area. Once known, please provide information on any RF transmission equipment planned to be used during construction or permanently installed so a potential interference impact can be assessed. This information should include as a minimum the operating transmission frequency and transmit power, channel bandwidths, antenna types and radiation patterns as well as the exact location with antenna height, boresight azimuth and tilt [mechanical and electrical tilt]." (06/01/26)
NBN Ltd	P2A	Initial: 30/06/20 Mod-3 update: 24/11/25	"At this time we feel there won't be any detrimental direct affect to any NBN television services in the area of the proposed wind farm. There was a suspicion that the viewers in the town of Cassilis may be affected by reflected scatter from the Turbine blades at the lower end of the proposed

Licensee	Service	Consultation date	Most recent response- summary
			area, however due to the small amount of turbines indicated in that region we don't see that any interference will occur." (06/09/20)
Network Ten (Melbourne) Pty Limited	P2A	Mod-3 update: 25/11/25	No response
New South Wales Government Telecommunications Authority	P2P, P2A	Initial: 29/06/20 2021 update: 02/09/21 Mod-3 update: 24/11/25	"…Obstruction of microwave links could be service impacting and impact the ability of emergency services in protecting public and property… Could you please move Turbine E31 by minimum 10 m south, so we can achieve optimal clearance? All the other turbines are outside minimum required clearance of 200m." (20/01/26)
NSW Police Force	P2A	Initial: 29/06/20 2021 update: 10/06/21 Mod-3 update: 24/11/25	"...the proposed Liverpool Range Wind Farm would not affect the existing NSW Police radiocommunications services." (01/12/25)
NSW Rural Fire Service	P2P, P2A	Initial: 29/06/20 2021 update: 10/06/21 Mod-3 update: 20/11/25	"...there [are] nil concerns and is RFS approved" (19/12/25)
NSW Spatial Services	NA - Trig stations	Initial: 30/06/20 Mod-3 update: 24/11/25	"The changes will not affect CORSnet-NSW operations." (15/01/26)
Optus Mobile Pty Limited	P2A	Initial: 29/06/20 2021 update: 10/06/21 Mod-3 update: 20/11/25	"Our transmission team recommends that W6 turbine should be relocated to be >200m away from proposed 8G56M MW link licence 12799082/1 (FZ Radius 15-25m). The minimum separation distance from this microwave link should be 200m and WT6 is less than 200m from the identified microwave link." (15/01/26) **Note:** It appears that Optus has made an error when providing this feedback. The referenced licence corresponds to a link that is located near Cooma NSW, over 450 km from LRWF. WSP is in the process of confirming this with Optus.
Paspaley Pastoral Company Pty Ltd	P2A	Initial: 29/06/20 2021 update: 10/06/21 Mod-3 update: 20/11/25	Confirmed tower location but no mention of impacts (03/07/20)
Prime Television (Southern) Pty. Limited	P2A	Initial: 03/07/20 Mod-3 update: 24/11/25	No response
Ron Potter (Farms) Pty Ltd	P2A	Mod-3 update: 25/11/25	No response
SBS	P2A	Initial: 30/06/20 Mod-3 update: 20/11/25	"Considering the wind farm is not directly within the coverage footprint of the SBS Queensborough Trig transmitter and only touching it marginally on the north-western side, we believe the wind farm EMF emission will not materially impact our services in the area." (02/07/20)
Talbragar Broadcasters Incorporated	P2A	Initial: 30/06/20 2021 update: 10/06/21 Mod-3 update: 24/11/25	"...all should be OK" (16/12/25)
Telstra Limited / Telstra 3G Spectrum Holdings Pty Ltd	P2P, P2A	Initial: 30/06/20 2021 update: 10/06/21 Mod-3 update: 20/11/25	"Telstra has no objection to development application in relation to the proposed wind farm subject to WSP Australia Pty Limited confirming its agreement to the conditions and matters set out in this letter. Telstra will require the protection of/relocation of its fixed telecommunications infrastructure that may be impacted by activities on this site. To minimise risk of liability due to any damage, the DialBeforeYouDig 1100 Inquiry number should

Licensee	Service	Consultation date	Most recent response- summary
			be contacted to obtain location of Telstra plant before commencement of construction work." (09/07/20)
TPG Internet Pty Ltd	P2A	Mod-3 update: 24/11/25	"All operations of Vodafone/TPGT systems at the 3 listed sites are part of the MOCN agreement with Optus." (18/12/25)
United Christian Broadcasters Australia Limited	P2A	Mod-3 update: 20/11/25	No response
VRA Rescue NSW Limited	P2A	Initial: 29/06/20 Mod-3 update: 24/11/25	"The main concern for the NSW Volunteer Rescue Association is around a potential "rescue event" on any of the wind farms… We have no radio towers that belong to the NSW VRA that would be affected…" (04/08/20)
Warrumbungle Shire Council	P2A (not licenced anymore)	Initial: 30/06/20 Mod-3 update: 24/11/25	"The proposed windfarm is not expected to adversely impact Council's radio telecommunications network." (18/12/25)
WIN Television NSW Pty Limited	P2A	Initial: 30/06/20 Mod-3 update: 20/11/25	"We will investigate what effects if any, the Wind farm will have on the television services provided to the township of Coolah. The broadcast services transmit over a wide frequency range 652 Mhz to 694 Mhz and receive low level signals from Mt Cenn Cruiach in the west a path of over 81.7 km. from 181 Mhz to 230 Mhz. Any interference in these frequency ranges could effect the broadcast services from this site, especially the fact that we are running low power." (04/08/20)

Appendix C – Glossary

The following glossary of terms relating to the project has been provided by Tilt Renewables.

Glossary

Term	Description
Accommodation Camp	Temporary onsite workforce accommodation camp (previously referred to as a Temporary Workers Facility (TWA).
Ancillary Infrastructure	All wind farm infrastructure with the exception of wind turbines, including but not limited to collector substations, switching stations, permanent offices and site compounds, underground and overhead electricity transmission lines, communications towers, wind monitoring masts and internal access roads
Applicant	Tilt Renewables Australia Pty Ltd as trustee for Liverpool Range Wind Farm Project Trust (Tilt Renewables)
Approved Development	The currently approved Liverpool Range Wind Farm Project as modified under Development Consent SSD 6696 on 30 October 2025 (SSD-6696-Mod-2) providing for the construction, operation and decommissioning of up to 185 wind turbines and ancillary infrastructure.
Approved Development Corridor	The area which contains the Approved Indicative Development Footprint for the wind farm, transmission lines, accommodation camp and ancillary infrastructure with additional buffer to allow for final detailed design and any micro-siting. The Approved Development Corridor comprised three separate areas that each encompass the relevant areas required to construct the Approved Development, referred to as the: • Approved Development Corridor – Wind Farm • Approved Development Corridor – External Transmission Line • Approved Development Corridor – TWA Facility.
Approved Indicative Development Footprint	The extent of approved ground disturbance and vegetation removal required for construction of the Approved Development, including turbine hardstands, internal access tracks, collector substations and ancillary equipment, transmission lines, wind monitoring masts and other temporary and permanent ancillary infrastructure. The Approved Indicative Development Footprint comprises four separate areas that each encompass the relevant areas required to construct the Approved Development, referred to as the: • Approved Indicative Development Footprint – Wind Farm • Approved Indicative Development Footprint – External Transmission Line • Approved Indicative Development Footprint – Public Road Upgrades • Approved Indicative Development Footprint – TWA Facility.
Associated Residence	Any residence located on land hosting infrastructure or where the Applicant has a negotiated agreement in place with the landowner in relation to impacts associated with the Approved Development.

Term	Description
Conditions of Consent	Consolidated Conditions of Development Consent SSD 6696 (as modified) which authorise and regulate the Approved Development.
Development Consent	Development Consent SSD 6696 (as modified) granted under Section 4.38 of the NSW *Environmental Planning and Assessment Act 1979* (EP&A Act) on 30 October 2025 (SSD-6696-Mod-2)
Environmental Impact Statement	As defined in Development Consent SSD 6696 (as modified), this includes the Environmental Impact Statement titled Liverpool Range Wind Farm Environmental Assessment, prepared by Epuron Pty Ltd and dated July 2014, as modified by associated assessment documentation: • the Liverpool Range Wind Farm Response to Submissions Report, dated May 2017 • the Modification Application for Modification 1 dated 01 September 2022, including Submissions Reports dated 14 August 2023 and 19 April 2024, Amendment Reports dated August 2023 and January 2024 and additional information provided on 13 September 2022, 18 January 2024, 13 March 2024 and 25 June 2024; and • the Modification Application for changes to the approved development corridor dated 12 September 2025.
EPBC 2022/09416	Current EPBC Approval under the *Environment Protection and Biodiversity Conservation Act 1999* 'to install, operate and decommission a wind farm and associated ancillary infrastructure. Date of decision, subject to conditions, 4 March 2025.
External Transmission Line	The portion of transmission line within the Approved Development extending from the southern-most collector substation near Rotherwood Road, Cassilis, south to a connection substation at Ulan, consisting of overhead powerlines of up to 330 kV, supported by poles or towers and located within a 60 m wide easement.
Indicative Project Layout	The refined wind farm layout proposed as part of the Mod-3 Application.
Internal transmission line	The portion of the transmission line within the Approved Development extending from the north-west of the Site Boundary to the southern-most collector substation near Rotherwood Road, Cassilis, consisting of an overhead powerline of up to 330 kV, supported by poles or towers and located within a 60 m wide easement.
Liverpool Range Wind Farm (LRWF) Project	The development being undertaken by the Applicant to construct, operate and decommission a wind farm and associated infrastructure.
Micro-siting	Refinement of turbine and ancillary infrastructure placement to the extent allowed by the Conditions of Consent, considering design optimisation, environmental and physical constraints.
Mod-1 Development	The Proponent submitted an application to modify the Development Consent (SSD-6696) under Section 4.55(2) of the NSW Environmental Planning and Assessment Act 1979 (EP&A Act) in September 2022. This application is referred to as the Mod-1 Development. The key changes associated with the Mod-1 Development were a reduction in the number of wind turbines to185, an increase in the maximum blade tip height to 215 m above ground level, amendments to

Term	Description
	the associated infrastructure and inclusion of an onsite temporary workforce accommodation camp (TWA Facility) a The Mod-1 Development was approved and consolidated Conditions of Consent granted on 23 October 2024 (SSD-6696-Mod-1).
Mod-2 Development	The Proponent submitted an application to modify the Development Consent (SSD-6696) under Section 4.55(1A) of the NSW Environmental Planning and Assessment Act 1979 (EP&A Act) in September 2025. This application is referred to as the Mod-2 Development. The Mod-2 Development sought the re-inclusion of three areas of land, totalling 15.6 hectares (ha), into the Approved Development Corridor to facilitate micro-siting of key ancillary infrastructure. The Mod-2 Development was approved and consolidated Conditions of Consent granted on 30 October 2025 (SSD-6696-Mod-2).
Mod-3 Application	The Mod-3 Application reflects the current proposed Indicative Project Layout design refinements to the Approved Development, including revised internal transmission line alignment, micro-siting and relocation of wind turbines, inclusion of communications towers and updated access track alignments. It proposes to remove the approved External Transmission Line between the wind farm's connection substation and the approved connection point at Ulan, as access rights have been granted by the NSW Government to connect LRWF into the Central West Orana Renewable Energy Zone (CWO REZ) Transmission Line. This connection will now occur within the connection substation on-site off Rotherwood Road.
Non-Associated Residence	Any residence on privately-owned land where the landowner has not reached a financial or in-kind agreement with the Applicant in relation to the Approved Development.
Original Development	The original Liverpool Range Wind Farm Project as approved in March 2018 under Development Consent SSD 6696 to allow for the construction, operation and decommissioning of up to 267 wind turbines with a maximum tip height of 165 m and associated infrastructure including a transmission line with an indicative capacity of 330 kV from within the wind farm to the approved connection point at Ulan.
Proposed Development Corridor	The area which contains the Proposed Indicative Development Footprint for the wind farm, public road upgrades, internal transmission line, accommodation camp and ancillary infrastructure with additional buffer to provide for final detailed design and micro-siting. The Proposed Development Corridor comprises two separate areas that each encompass the relevant areas required to construct the Mod-3 Application, referred to as the: • Proposed Development Corridor – Wind Farm • Proposed Development Corridor – Public Road Upgrades.
Proposed Development Corridor – Public Road Upgrades	The portion of the Proposed Development Corridor that includes the upgrades/repairs to public roads, intersections and associated structures that may be required to facilitate the construction of the Mod-3 Application. This corridor has been developed, defined and assessed separately as part of the Mod-3 Application to allow flexibility for further

Term	Description
	detailed design in consultation with Upper Hunter and Warrumbungle Shire Councils.
Proposed Development Corridor - Wind Farm	The portion of the Proposed Development Corridor that includes all wind farm related infrastructure including wind turbines, hardstands, site access points, access tracks, underground reticulation cabling, internal transmission line, collector sub-stations, connection substation, operation and maintenance facilities, temporary construction compounds (including accommodation camp, laydown areas and concrete batch plants), communications towers, permanent and temporary wind monitoring masts.
Proposed Indicative Development Footprint (IDF)	The estimated extent of proposed ground disturbance and vegetation removal required for construction of the indicative project layout proposed as part of the Mod-3 Application, including wind turbines, hardstands, site access points, access tracks, underground reticulation cabling, internal transmission line, collector sub-stations, connection substation, operation and maintenance facilities, temporary construction compounds (including accommodation camp, laydown areas and concrete batch plants), communications towers, permanent and temporary wind monitoring masts and the public road upgrades. The Proposed Indicative Development Footprint comprises three separate areas that each encompass the relevant areas required to construct the Mod-3 Application, referred to as the: • Proposed Indicative Development Footprint – Wind Farm • Proposed Indicative Development Footprint – Balance of Easement (associated with Internal Transmission Line) • Proposed Indicative Development Footprint – Public Road Uprades.
Proposed Indicative Development Footprint – Balance of Easement	The portions of the Proposed Indicative Development Footprint relating to the internal transmission line that does not require ground disturbance, however vegetation above four metres at maturity may require removal, pruning or management during operations.
Proposed Indicative Development Footprint – Public Road Upgrades.	The estimated extent of all temporary and permanent ground disturbance and vegetation removal associated with the construction of the public road upgrades.
Proposed Indicative Development Footprint - Wind Farm	The portion of the Proposed Development Corridor that includes all wind farm related infrastructure including wind turbines, hardstands, site access points, access tracks, underground reticulation cabling, internal transmission line (which requires ground disturbance), collector sub-stations, connection substation, operation and maintenance facilities, temporary construction compounds (including accommodation camp, laydown areas and concrete batch plants), communications towers, permanent and temporary wind monitoring masts.
Residence	Any dwelling in existence at the date of submission of this report, or a dwelling that is either the subject of a development consent or a development application that was lodged but not yet determined at the date of submission of this report.

Term	Description
Site Boundary	The Site Boundary contains the entirety of the approved wind farm infrastructure.
Temporary Facilities	Temporary facilities used for the construction and/or decommissioning of the Approved Development, including but not limited to temporary site offices and compounds, concrete batching plants, accommodation camps, materials storage compounds, maintenance workshops, testing laboratories or material stockpiles.
Wind Turbine Generator (WTG)	Turbines used for the generation of electricity by wind, including the tower, nacelle, hub, blades and associated components

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