

APPENDIX 15.1

Telecommunications Impact Study

 <i>Total Broadband Solutions</i>	Procedure: 001	Rev: 2.0
Title: Littleton Wind Farm Telecommunications Impact Study	Approved: KH	Date: 19/03/2025

Report

Littleton Wind Farm Telecommunications Impact Study

Document Number:

Author: David McGrath

Approved for Release: Rev 2.0 D McG **Date:** 19/03/2025

Document Filename: *Littleton Wind Farm Telecommunications Impact Study Report*

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Executive Summary

Ai Bridges was commissioned to evaluate the possible impacts that the proposed wind farm development at Littleton, Co. Tipperary could have on the existing telecommunications operator networks. The scope of work included field and desktop surveys to determine telecommunications network infrastructure that could be impacted by the proposed development. Consultations with telecom operators were also undertaken to assist in identifying network infrastructure that could be impacted by the proposed wind farm.

Telecommunications mast-sites with network infrastructure that could potentially be impacted by the development were identified and a field survey of each of these sites was carried out. During the field surveys, radio antennas with bearings in the direction of the wind farm were recorded. The findings of the field surveys are provided in Appendix B of this report.

Consultations with telecom network operators first commenced in 2021. The telecom operators were subsequently contacted in March 2025 and were advised of the most recent site layout. The operators were requested to raise any concerns they may have regarding impacts to their networks due to the proposed development. The responses received (i.e. the 2021 and 2025 responses) from each of the telecom operators are presented in Section 3 of this report.

Using the information obtained from the consultation responses and the field survey assessments, a desktop impact analysis was carried out, and all of the telecommunication operator networks were analysed using radio planning \ modelling software (2D and 3D).

Results from the consultation process indicate that there are fifteen radio links in the vicinity of the proposed development. These radio links are listed below in Table 1. The findings of the network analysis indicate that none of the radio links would be obstructed by the proposed turbine layout.

No.	Operator	Link Description	Nearest Turbine	Fresnel Zone (F1) Clearance Distance to Blade-tip of Turbine	Impact of Proposed Turbine Layout
1	Eir	PTP microwave radio link from Glengoogle to Thurles	T09	> 100 m	No impacts
2	Eir	PTP microwave radio link from Curraheen to Glengoogle	T11	65.9 m	No impacts
3	Eir	PTP microwave radio link from Thurles to Kilbrannel	T11	> 100 m	No impacts
4	Eir	PTP microwave radio link from Rosoulty to Glengoogle	T09	> 100 m	No impacts
5	Enet	PTP microwave radio link from Ballyspellan to Centenary, Ballyduff	T01	> 1 km	No impacts
6	Enet	PTP microwave radio link from Templemore Garda to Garransilly, Urlingford	T01	> 1 km	No impacts
7	ESB	PTP UHF radio link from Thurles 110kV to Glengoogle 38kV	T07	> 500 m	No impacts
8	Three	PTP microwave radio link from Killenaule Quarry (Kilbrannel) to AQS Tipperary	T07	> 100 m	No impacts
9	Three	PTP microwave radio link from Ballyspellan to Leigh	T01	> 100 m	No impacts

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10	Three	PTP microwave radio link from Littleton to Ballyspellan	T03	> 100 m	No impacts
11	Vodafone	PTP microwave radio link from Glengoole to Leigh, Twomileborris	T05	> 100 m	No impacts
12	Vodafone	PTP microwave radio link from Glengoole to Thurles	T09	> 100 m	No impacts
13	Vodafone	PTP microwave radio link from Glengoole to Ballymurreen	T09	> 100 m	No impacts
14	Vodafone	PTP microwave radio link from Glengoole to Laghtseefin, Glencarbry	T11	58.4 m	No impacts
15	Vodafone	PTP microwave radio link from Glengoole to Garranacanty	T11	> 100 m	No impacts

Table 1. Radio links crossing over/near the proposed wind farm site.

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Section 1 - Wind Farm Site Information

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1. Introduction

In this section a brief summary of the wind farm site is provided. Details regarding the site's geographic location and the proposed wind turbine dimensions are presented.

1.1 Wind Farm Site Information

The proposed wind farm development is located approximately 9 km east of Thurles. The development is in the pre-planning stage and exact details regarding the quantity, location and turbine dimension have yet to be finalized.

For the purpose of this study, an 11-turbine layout has been considered. The coordinates of the turbines assessed in this report are provided in Appendix A. The dimensions of the turbines assessed in this report are provided in Table 2 below.

Wind Farm	Number of Turbines	Turbine Hub Height	Turbine Rotor Diameter
Littleton	11	119 m	162 m

Table 2. Littleton Wind Farm Turbine Details

The location of the proposed wind farm development is shown below in Figure 1.

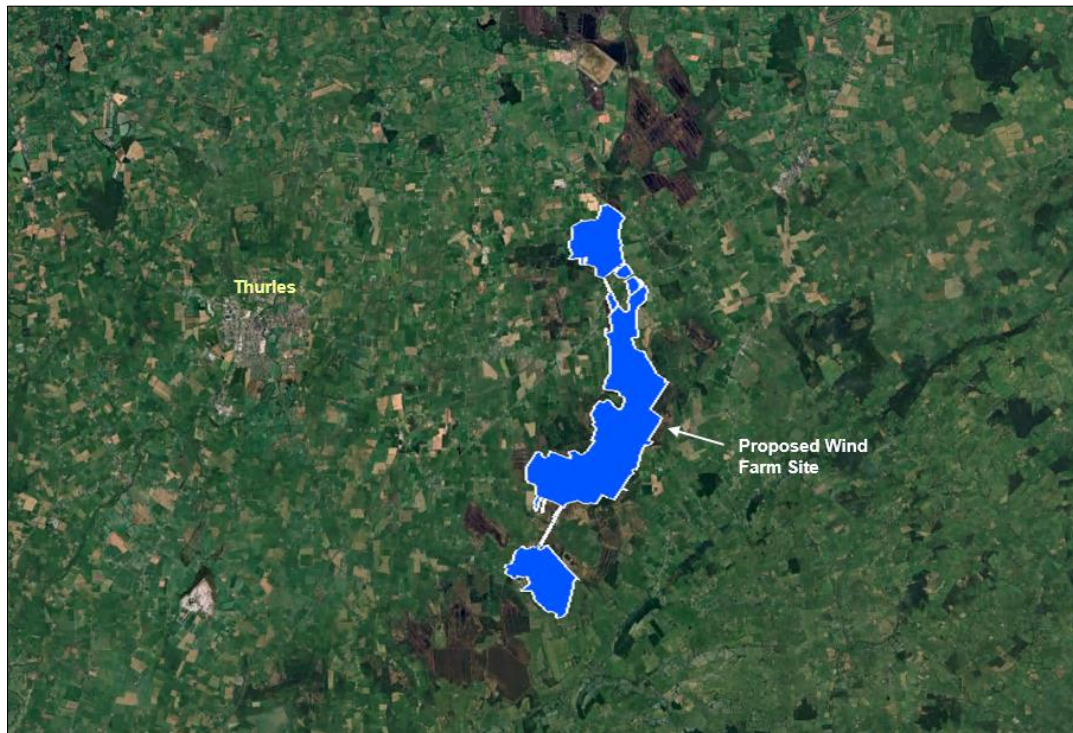


Figure 1. Location of proposed Wind Farm.

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Section 2 - Methodology

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2. Introduction

In this section a brief summary of the Telecommunication Impact Study Methodology is provided.

2.1 Methodology

There are four primary stages in preparing and compiling a communication impact study:

- Telecom Operator Consultations
- Field Surveys
- Desktop Survey Network Modeling and Analysis
- Report Generation

A summary of each of these stages is provided below:

Telecom Operator Consultations

Consultations are commenced with telecom operators who are requested to raise any concerns they have regarding the impact of the proposed wind farm on their networks. The consultation process is used to assist in identifying telecoms infrastructure that could be impacted by the proposed wind farm development.

Field Surveys

Field surveys are undertaken and the co-ordinates of communication masts are recorded. During the field surveys of the communication sites, approximations of antenna size, bearing and height are made for the antennas installed on each of the masts surveyed.

Desktop Survey and Analysis

A desktop survey is carried out to plot the wind turbines in a radio planning tool. The radio planning tool uses GIS and terrain mapping databases to enable accurate modelling. A selection of mast-site coordinates is then obtained and inputs from various operators \ service providers are converted from ITM / IG (Easting and Northing in meters) to degrees minutes seconds format and then imported into the radio planning tool. This provides a means of graphically showing telecommunications sites in the vicinity relative to the proposed wind farm at Littleton. Figure 2 below shows the proposed wind farm site boundary plotted in the radio planning tool.

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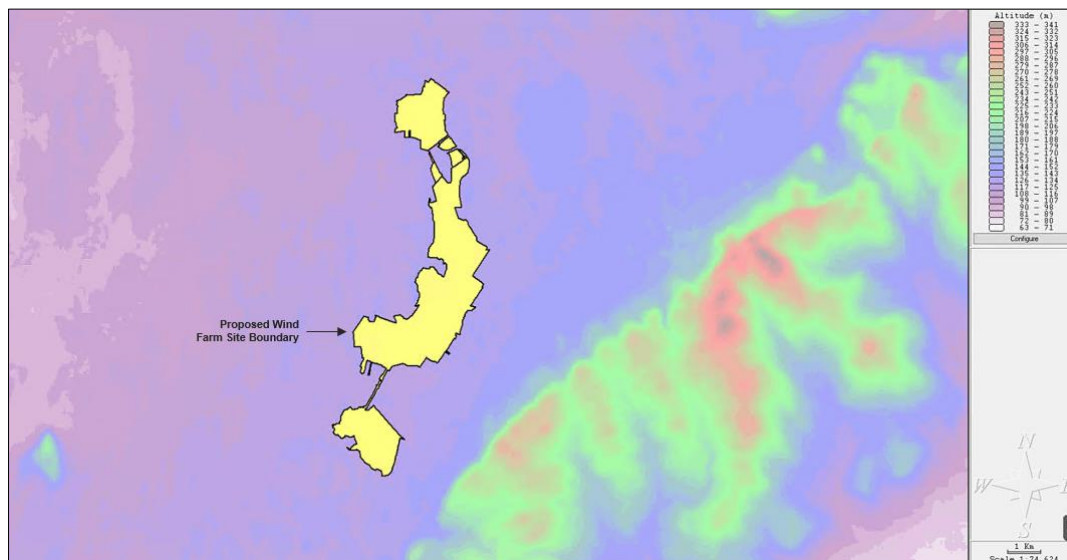


Figure 2. Wind Farm Site plotted in Radio Planning Software

The findings from the consultations and field surveys are collated and the communications networks requiring further analysis are identified. 3D network modeling is used to assess the impact of the turbines on the communications networks.

The results from the network modeling are used to determine if mitigation measures are required. Figure 3 below shows an example of a microwave radio link that crosses over the wind farm site boundary modelled in radio planning software.

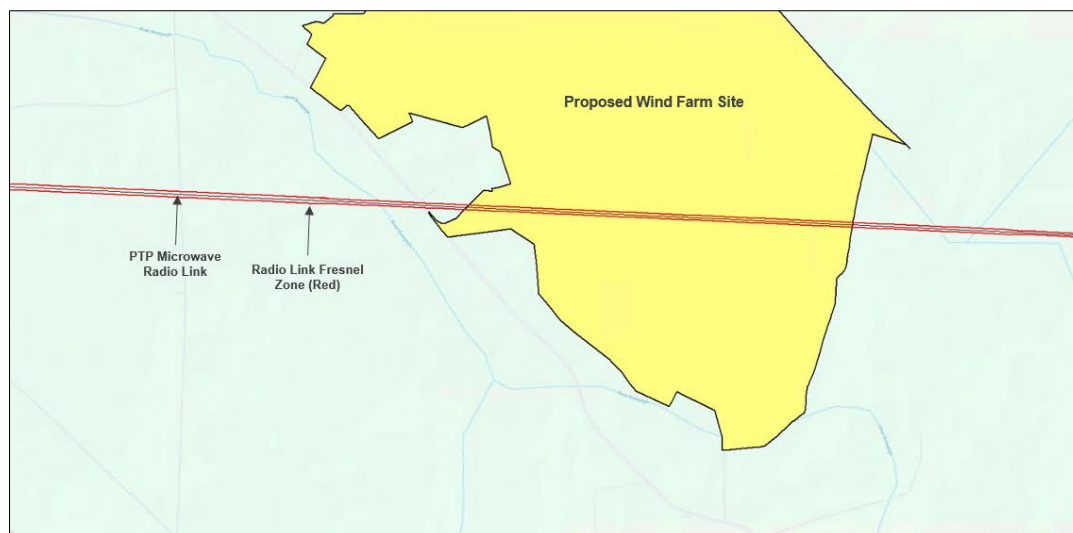


Figure 3. Example of microwave radio link crossing over the proposed wind farm site modelled in radio planning software.

Report Generation

The final stage of the communications impact study process is to collate the data and present the findings & analysis into a report for submission.

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Section 3 - Telecom Operator Consultations

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3. Introduction

In this section the consultation process undertaken with telecom operators is described. The response received from each operator is also provided.

3.1 Telecom Operator Consultations

Consultations with telecom network operators first commenced in July 2021 and subsequent consultations were undertaken in March 2025. The operators were requested to raise any concerns they may have regarding impacts to their networks due to the proposed development. Table 3 lists the telecom operators contacted, and the issues raised by the operators.

The responses received from each of the Telecom Operators are provided in Sections 3.1.1 to 3.1.19 that follow.

ID	Operator	Issues raised by Operator \ Observations.	
		2021	2025
1	2RN	No issues regarding transmission links; however, 2RN did request that a protocol document be signed should the wind farm go ahead (regarding the TV broadcast service in the area).	No issues regarding transmission links; however, 2RN have requested that a protocol document be signed should the wind farm go ahead (regarding the TV broadcast service in the area).
2	Airwave	No response.	No response.
3	An Garda Síochána*	N.A.	No response.
4	Coimisiún na Meán	No issues.	No issues.
5	BT Ireland	No issues.	No issues.
6	CIE/Irish Rail*	N.A.	CIE have stated that the wind farm would be located within the "Coordination Zone" of their GSM-R network (Mobile Network for Railways). The nearest rail line to the proposed development is 9 km away and at this distance there will be no impact to the GSM-R network.
7	Dept. of Defence	No issues.	No response.
8	Eir	Eir raised concerns regarding four PTP radio links.	Eir raised concerns regarding four PTP radio links.
9	Enet	Enet raised concerns regarding six PTP radio links.	Enet raised a concern regarding two Licensed PTP microwave radio links.
10	ESB Networks	ESB raised concerns regarding one PMP radio link.	No response.
11	Imagine Broadband	No issues.	No issues.

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12	IAA / AirNav	No response.	No response.
13	Uisce Éireann*	N.A.	No issues.
14	Tipperary Co Co	No response.	No response.
15	Tetra Ireland (TI)	No issues.	No issues.
16	Three Ireland	Three Ireland raised concerns regarding four PTP radio links.	Three Ireland raised a concern regarding three Licensed PTP microwave radio links.
17	Viatel*	N.A.	No issues.
18	Virgin Media	No issues.	No response.
19	Vodafone	Vodafone raised concerns regarding five PTP radio links.	No response.

Table 3. Telecom Operators Consulted

**Telecom Operator not contacted in original (2021) round of consultations.*

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3.1.1 2RN Response to Consultations

2RN did not raise any concerns in relation to transmission links; however, 2RN did have a concern regarding their broadcast service in the area and have requested that a protocol document be signed should the wind farm go ahead. The responses received from 2RN are provided below.

2021 Response:

"The proposed turbine locations will not affect our fixed linking. There is a risk of interference to DTT viewers receiving from our sites at Kilduff and to a lesser extent from Mt. Leinster. We would therefore ask that a Protocol be signed between the Developer and 2rn should the site go ahead."

2025 Response:

"There has been no change to our network in the area outlined in your email. 2rn's fixed linking will not be affected, there is a risk to broadcast services from Kilduff and to a lesser extent from Mt. Leinster. We would therefore ask that a Protocol be signed between the Developer and 2rn should the site go ahead."

3.1.2 Airwave Response to Consultations

Airwave provided the following email response to consultations:

2021 Response:

N.A. (Not contacted in 2021)

2025 Response:

No response received.

3.1.3 An Garda Síochána Response to Consultations

An Garda Síochána provided the following email response to consultations:

2021 Response:

N.A. (Not contacted in 2021)

2025 Response:

No response received.

3.1.4 Coimisiún na Meán Response to Consultations

Coimisiún na Meán provided the following email response to consultations:

2021 Response:

"The BAI [former name of Coimisiún na Meán] does not perform an in-depth analysis of the effect of wind turbines on FM networks. However, we are not aware of any issues from existing windfarms into existing FM networks. Also, the proposed windfarms are not located close to any existing or planned FM transmission sites."

2025 Response:

"Coimisiún na Meán does not perform an in-depth analysis of the effect of wind turbines on FM networks. However, we are not aware of any issues from existing windfarms into existing FM networks. Also, the proposed windfarms are not located close to any existing or planned FM transmission sites."

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3.1.5 BT Ireland Response to Consultations

BT provided the following email response to consultations:

2021 Response:

"BT are in process of winding down our microwave network which will be complete in the coming months. We only have a network presence in Louth and Waterford."

2025 Response:

"BT no longer have a radio microwave network."

3.1.6 CIE/Irish Rail Response to Consultations

CIE provided the following email response to consultations:

2021 Response:

N.A. (Not contacted in 2021)

2025 Response:

"The proposed site lies within the GSM-R (Mobile Network for Railways) coordination zone. Please see below:

From a study carried out by the ANFR (Agence Nationale des Frequences in France), the output calls for 2 main recommendations by defining 2 main zones as follows:

- 1- Exclusion zone: wind farm not less than 5 Km from antenna*
- 2- Coordination zone: : 5Km<wind farm <30Km: this area, coordination between operators is required to fix any issue and impact on the signal propagation."*

3.1.7 Department of Defence (DoD) Response to Consultations

The DoD provided the following email response to consultations:

2021 Response:

"I refer to your e-mail below, in relation to the proposed Windfarm development of Littleton Wind Farm in Co Tipperary.

As a matter of practice, the Department of Defence does not provide any observations or advice in the Pre- planning process, except where the relevant parties have been directed by a planning authority to seek the Department's views.

The Minister for Defence reserves the right to comment on an actual planning application as and when it is submitted in accordance with the provisions of the planning regulatory code."

2025 Response:

No response received.

3.1.8 Eir Response to Consultations

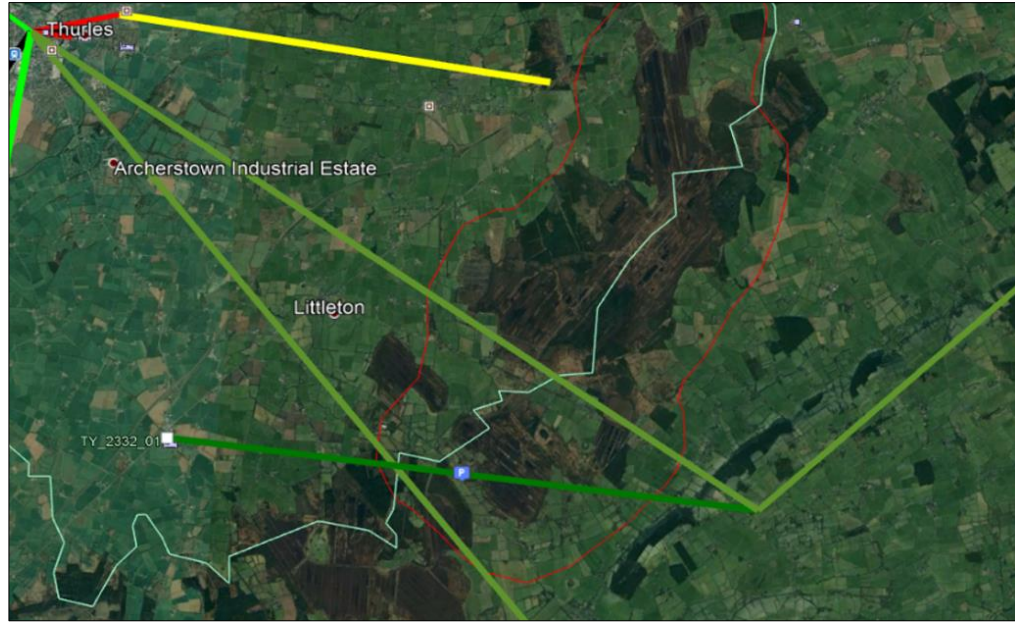
Eir provided the following email responses to consultations:

2021 Response

"We have [four] links within the proposed area that are at risk with the current plots, the end points of the transmission link are below, for windfarm developments we would keep a buffer of 100meters radius away from this transmission path."

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Link Name / ID	Band MHz/GHz	Link Length	Site A						Site B					
			Lat	Long	Easting	Northing	Ant Height	Structure Height	Lat	Long	Easting	Northing	Ant Height	Structure Height
TY_4700-TY_2484	11Ghz	15km	52°36'33.24"N	7°37'26.22"W			30m		52°40'48.03"N	7°49'4.87"W			22m	
TY_2332-TY_4700	13Ghz	10km	52°36'52.47"N	7°46'32.08"W			14m		52°36'33.24"N	7°37'26.22"W			31m	
TY_2484-TY_1918	11Ghz	15km	52°40'48.03"N	7°49'4.87"W			25m		52°34'54.49"N	7°40'15.46"W			27m	
RSY-GCL	13Ghz	25km	52°41'1.02"N	7°58'17.04"W			10m		52°36'33.72"N	7°37'25.43"W			30m	



2025 Response

"There is no change with the status of our links over the site."

3.1.9 Enet Response to Consultations

Enet provided the following email responses to consultations:

2021 Response

"See links passing through this area."

Link Name / ID	Band MHz/GHz	Link Length	Site A						Site B					
			Lat	Long	Easting	Northing	Ant Height	Structure Height	Lat	Long	Easting	Northing	Ant Height	Structure Height
Scoil Ruain	11Ghz	33.3km	52°50'6.77"N	7°54'35.98"W			15m	36m	52°34'17.30"N	7°40'37.40"W			6m	
St Josephs College	11Ghz	31.3km	52°38'40.91"N	7°31'47.47"W			15m	36m	52°44'55.95"N	7°57'36.25"W			6m	
Hivolt Tipperary	15Ghz	13.84km	52°38'40.91"N	7°31'47.47"W			15m	36m	52°42'7.18"N	7°43'13.53"W			6m	
Centenary Ballyduff	15Ghz	14.3km	52°38'40.91"N	7°31'47.47"W			15m	36m	52°41'54.66"N	7°42'54.16"W			7m	
Templemore Garda	8Ghz	26.5km	52°38'40.91"N	7°31'47.47"W			15m	36m	52°47'24.95"N	7°50'25.24"W			15m	30m
Eob Kilduff	7Ghz	33.3km	52°38'40.91"N	7°31'47.47"W			15m	36m	52°50'6.45"N	7°54'38.30"W			15m	30m

2025 Response

"We now have just two links affected currently."

Link Name / ID	Band MHz/GHz	Link Length	Site A				Site B			
			Lat	Long	Ant Height	Structure Height	Lat	Long	Ant Height	Structure Height
TC Ballyspellan - Centenary Ballyduff	13Ghz	15.6km	52.760144	-7.508189	15m	42m	52.698563	-7.715087	7m	
Templemore Garda – Signal Urlingford	8Ghz	26.5km	52.790264	-7.840344	15m	36m	52.644696	-7.529853	15m	36m

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3.1.10 ESB Response to Consultations

ESB provided the following email responses to consultations:

2021 Response

“Please see the below details. There is one link crossing the outline planned windfarm. Please let me know when the details and locations of the turbines have been identified.”

Link Name / ID	Band MHz/GHz	Link Length	Site A						Site B					
			Lat	Long	Easting	Northing	Ant Height	Structure Height	Lat	Long	Easting	Northing	Ant Height	Structure Height
Thurles 110kV to Glengoose 38kV P2MP	458MHz	13.35km	52.691998	-7.7646142	215963	160090	14	14	52.616569	-7.6431035	224219	151730	15	15

2025 Response

No response received.

3.1.11 Imagine Broadband Response to Consultations

Imagine Broadband provided the following email response to consultations:

2021 Response

“No imagine MW links are affected by this development.”

2025 Response

“No change. Imagine are not affected by this development.”

3.1.12 AirNav Ireland Response to Consultations

AirNav provided the following email response to consultations:

2021 Response

No response received.

2025 Response

No response received.

3.1.13 Uisce Éireann Response to Consultations

Uisce Éireann provided the following email response to consultations:

2021 Response

N.A. (Not contacted in 2021).

2025 Response

“I can confirm that Uisce Éireann have no communications links traversing the proposed development”.

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3.1.14 Tipperary County Council Response to Consultations

Tipperary County Council provided the following email response to consultations:

2021 Response

No response received.

2025 Response

No response received.

3.1.15 Tetra Ireland Response to Consultations

Tetra Ireland provided the following email response to consultations:

2021 Response

"We anticipate no impact from the development as proposed. Can you ensure the proposal is also reviewed by eir."

2025 Response

"We anticipate no impact from the development as proposed. Can you ensure the development is also reviewed by eir please."

3.1.16 Three Ireland Response to Consultations

Three Ireland provided the following email response to consultations:

2021 Response

"I have reviewed the area for the proposed Littleton WF and 3Ireland have 4 microwave links that traverse the area and could potentially be affected. Please find attached details as requested and Google earth view of the links."

Link no.	Link Ref	Freq.	Length	Site A	X	Y	Dish Height	Site B	X	Y	Dish Height
1	ML051227	13GHz	21km	TP0134	220322	151371	20m	KK0120	233191	167793	18m
2	ML020634	18GHz	14.3km	TP0215	222354	147841	25m	TP0002	212791	158375	26m
3	ML051109	13GHz	27.8km	KK0120	233191	167793	30m	TP0119	211502	150398	30m
4	ML050205	15GHz	15km	KK0120	233191	167793	25m	TP0079	221364	158480	26m



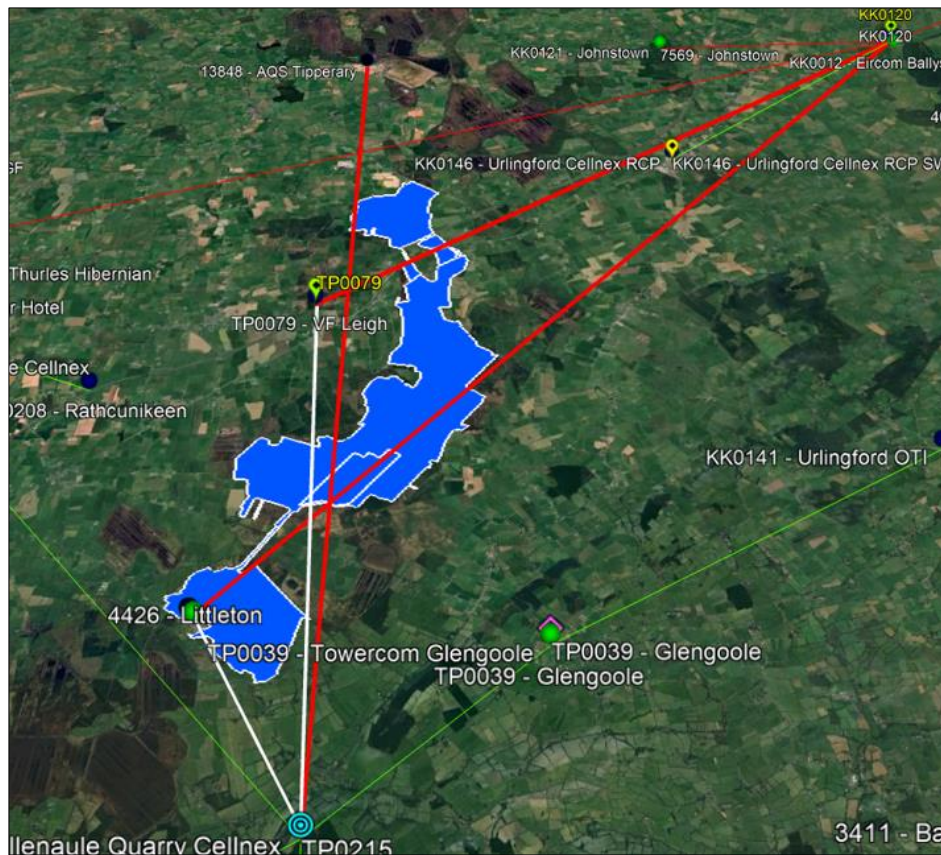
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2025 Response

"We have 3 x live links going through that area (red lines).

Link no.	Link Ref	Freq.	Length	Site A	X	Y	Dish Height (m)	Site B	X	Y	Dish Height (m)
1	ML090503	13GHz	18,7km	TP0215 - Killenaule Quarry Cellnex	222,354	147,841	23	13848 - AQS Tipperary	221,584	166,603	13
2	ML050205	15GHz	15km	KK0120 - Ballyspellan	233,191	167,793	6	TP0079 - VF Leigh	221,364	158,480	25,5
3	ML051227	13GHz	20,8km	TP0134 - Littleton	220,322	151,371	20	KK0120 - Ballyspellan	233,191	167,793	18

We were planning to re-route TP0079 to TP0215 Killenaule quarry (white line) - for Roll-out 2025. There is also an option to re-route Littleton to TP0215 Killenaule quarry. Looks like both of these options would be impacted by that area."



3.1.17 Viatel Response to Consultations

Viatel provided the following email response to consultations:

2021 Response

N.A. (Not contacted in 2021).

2025 Response

"No impact on Viatel wireless infrastructure."

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3.1.18 Virgin Media Response to Consultations

Virgin Media provided the following email response to consultations:

2021 Response

“This will have no impact on VM services in the area.”

2025 Response

No response received.

3.1.19 Vodafone Ireland Response to Consultations

Vodafone provided the following email response to consultations:

2021 Response

“Please see below.”

Link Name / ID	Band MHz/GHz	Link Length	Site A						Site B					
			Lat	Long	Easting	Northing	Ant Height	Structure Height	Lat	Long	Easting	Northing	Ant Height	Structure Height
TYGCLTY117	26GHz	8.6	052-36-34.00	007-37-26.30	225523	150932	20	43	052-40-38.49	007-41-04.20	221389.6	158470.1	20	34
TYGCLTY118	18GHz	15.31	052-36-34.00	007-37-26.30	225523	150932	25	43	052-40-48.07	007-49-04.96	212356	158735	15	23
TYGCLTY051	26GHz	8.66	052-36-34.00	007-37-26.30	225523	150932	15	43	052-38-07.86	007-44-39.98	217351.8	153797.6	15	13
TYGCLTY019	26GHz	5.16	052-36-34.00	007-37-26.30	225523	150932	30	43	052-36-44.43	007-42-00.11	220369.3	151230.3	15	15
TYGCLTYLSF	15GHz	31.69	052-36-34.00	007-37-26.30	225523	150932	15	43	052-37-16.86	008-05-29.07	193858.7	152194.3	15	36
TYGCLTY004	11GHz	37.83	052-36-34.00	007-37-26.30	225523	150932	30	43	052-28-36.60	008-08-14.38	190718.4	136117.3	24	24



“Link TYGCLTY019 can be disregarded , as it is to be decommissioned.”

2025 Response

No response received.

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Section 4 - Field Surveys

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4. Introduction

To assess the accuracy of the network information (radio link co-ordinates, antenna heights etc.) provided by the telecom operators, field surveys of the telecom-mast sites in the vicinity of the proposed wind farm were carried out. During the field surveys, radio antennas with bearings in the direction of the wind farm were recorded.

The telecom mast-sites surveyed for this study (labelled Mast-Site A to Mast-Site P) are shown relative to the proposed wind farm site in Figure 4 below. The findings from the field surveys of the mast-sites are presented in Appendix B of this report.

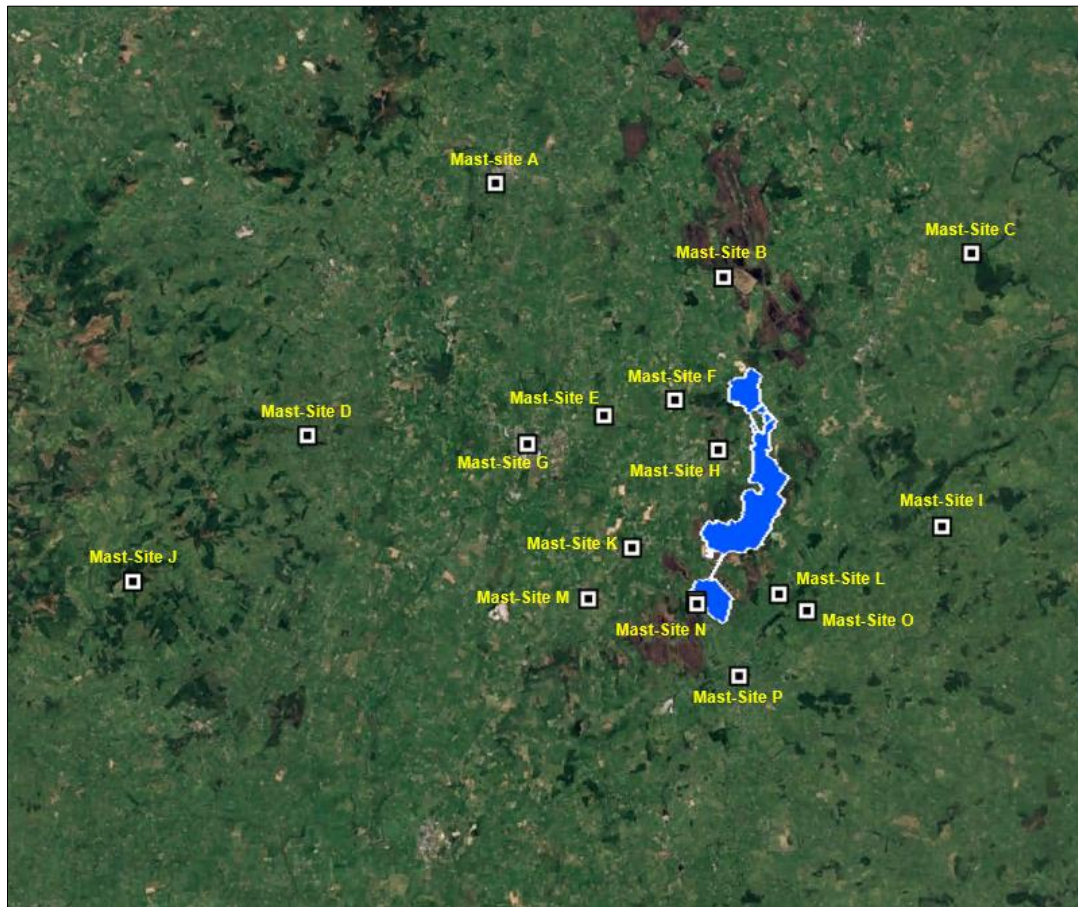


Figure 4. Telecom Mast-Sites in the vicinity of Littleton Wind Farm.

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Section 5 - Desktop Survey Analysis

AiBridges Total Broadband Solutions	Procedure: 001	Rev: 2.0
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5. Introduction

Based on the findings of the consultation process, there are five Telecom Operators with a network in the vicinity of the proposed development that requires a detailed technical analysis:

- Eir Network
- Enet Network
- ESB Network
- Three Ireland Network
- Vodafone Network

Sections 5.1 to 5.5 below outline the desktop survey analysis findings* for the Telecom Operator Networks listed above.

5.1 Eir Network Analysis

The Eir Network in the vicinity of the proposed wind farm consists of four Point-to-Point (PTP) microwave radio links. The radio links are listed below in Table 4 and a Plan View of the Eir radio network is shown in Figure 5.

No.	Operator	Description
1	Eir	PTP microwave radio link from Glengoogle to Thurles
2	Eir	PTP microwave radio link from Curraheen to Glengoogle
3	Eir	PTP microwave radio link from Thurles to Kilbrannel
4	Eir	PTP microwave radio link from Rosoulty to Glengoogle

Table 4. Eir Radio Links requiring Analysis

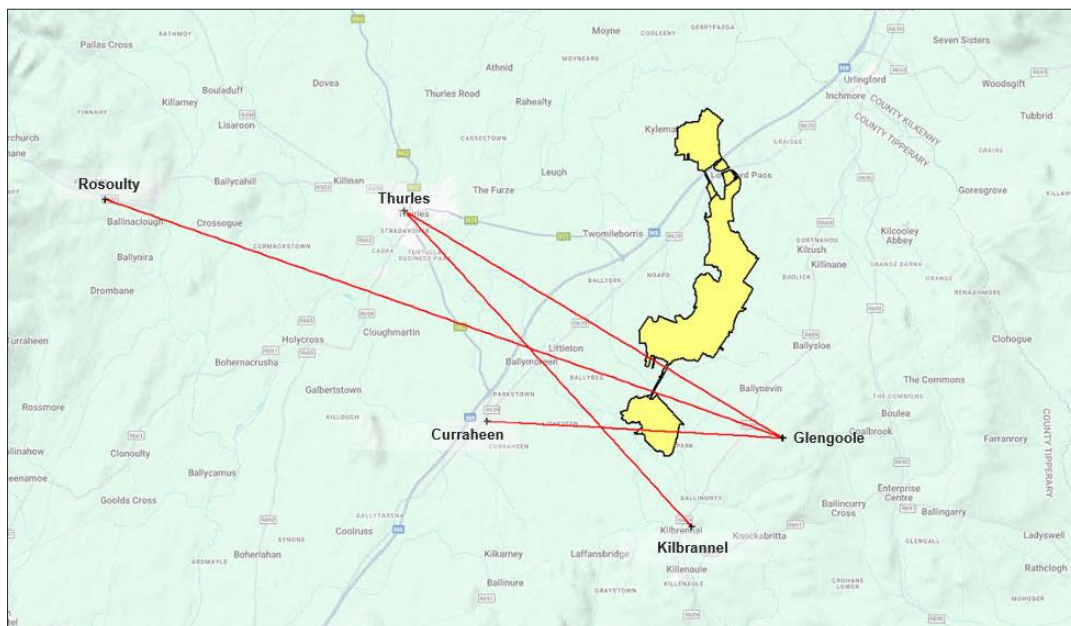


Figure 5. Plan View of the Eir Radio Network

* The Desktop Survey Analysis findings are subject to accuracy of the information (GPS co-ordinates, turbine dimensions, etc.) provided to Ai Bridges.

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Figure 6 below shows a Close-up Plan View of the Eir microwave radio links relative to the proposed wind turbines. The plan view indicates that Turbine T11 is relatively near to the Eir radio link between Glengoose and Curraheen.

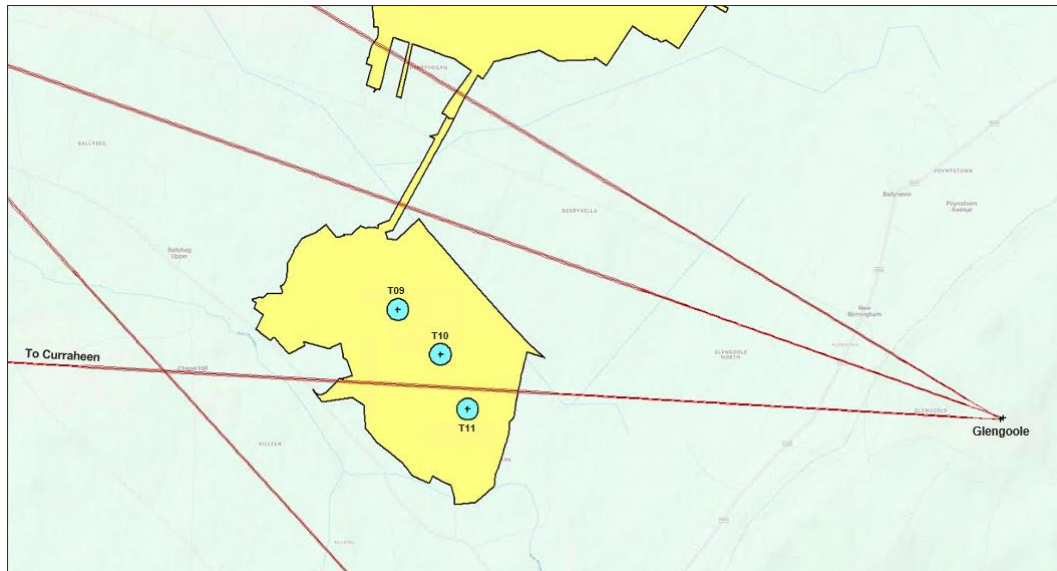


Figure 6. Eir Network – Close-up Plan View.

To further assess the potential impact of T11, the radio link has been modelled in 3D and the Clearance Distance between the Fresnel Zone (F1) of the link and the blade-tip of T11 has been calculated. A 3D view of the microwave radio link relative to the proposed turbine is shown below in Figure 7.

The results of the 3D analysis indicate that there is a clearance distance of over 50 m between the blade-tip of T11 and the Fresnel Zone of the radio link. At this distance there would be no impact to the Eir radio link.

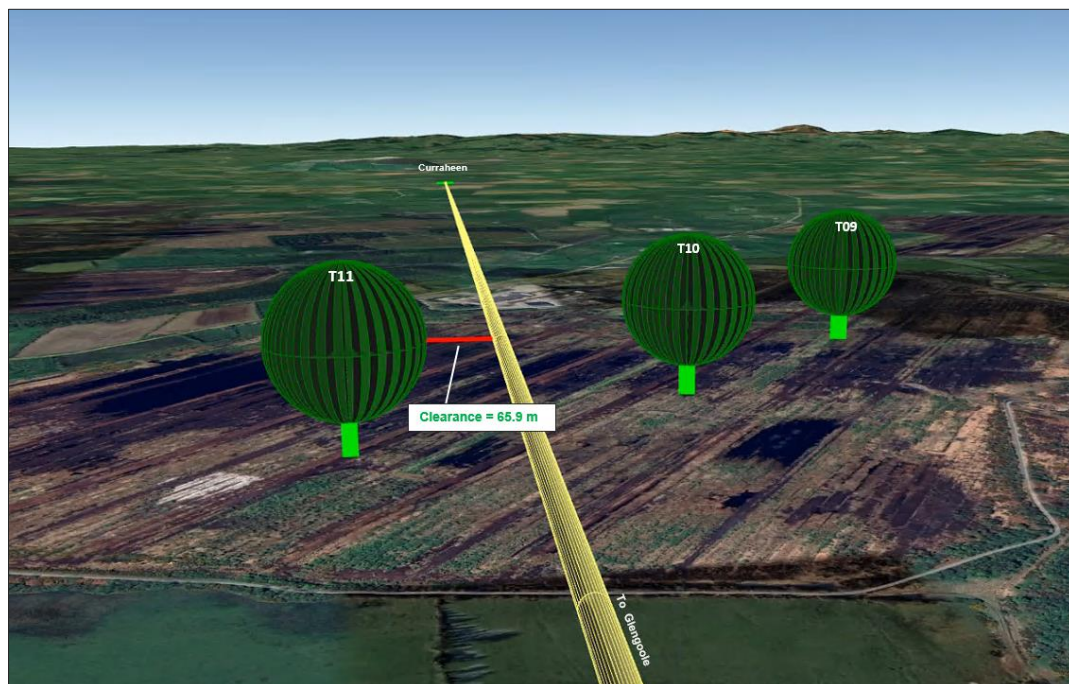


Figure 7. Eir Network – 3D View.

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Table 5 below provides a brief summary of the network analysis for the Eir network in the vicinity of the proposed wind farm.

Radio Link ID	Link Description	Nearest Turbine	Fresnel Zone (F1) Clearance	Wind Farm Impacts / Observations
Eir_L1	Glengoogle to Thurles	T09	> 100 m	No impacts.
Eir_L2	Curraheen to Glengoole	T11	65.9 m	No impacts.
Eir_L3	Thurles to Kilbrannel	T11	> 100 m	No impacts.
Eir_L4	Rosoulty to Glengoole	T09	> 100 m	No impacts.

Table 5. Eir Network – Analysis Summary

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5.2 Enet Network Analysis

The Enet Network in the vicinity of Littleton consists of two Point-to-Point (PTP) microwave radio links. The radio links are listed below in Table 6 and a Plan View of the Enet radio network is shown in Figure 8.

No.	Operator	Description
1	Enet	PTP microwave radio link from Ballyspellan to Centenary, Ballyduff
2	Enet	PTP microwave radio link from Templemore Garda to Garransilly, Urlingford

Table 6. Enet Radio Links requiring Analysis

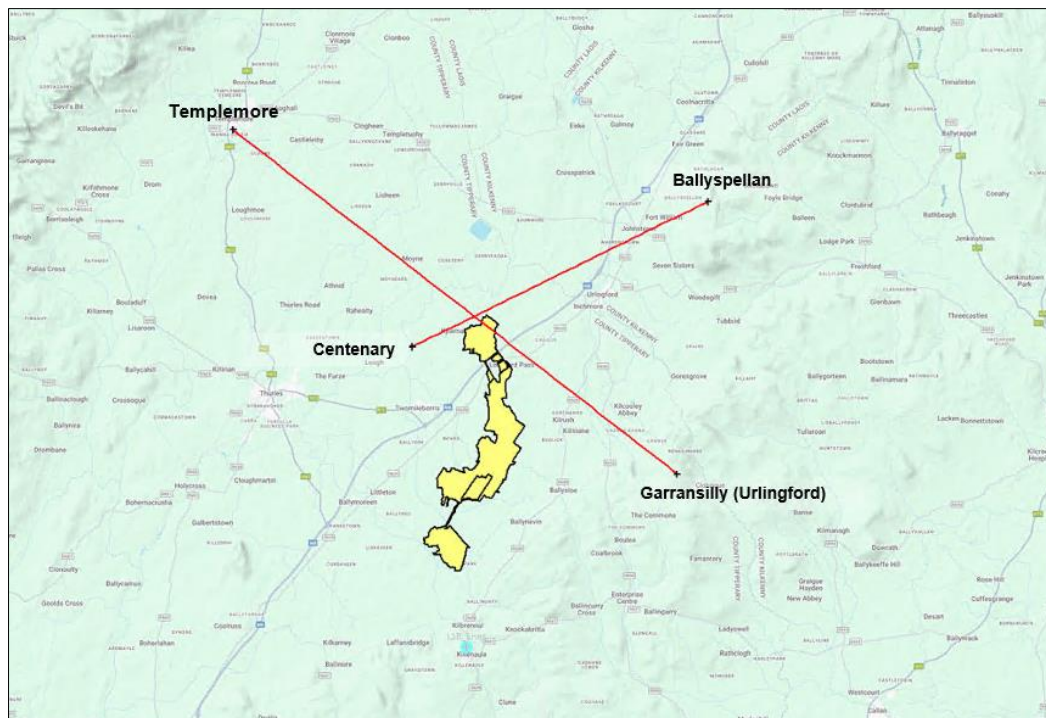


Figure 8. Plan View of the Enet Radio Network

Figure 9 below shows a Close-up Plan View of the Enet microwave radio links relative to the proposed wind turbines. The plan view indicates that none of the proposed turbines would obstruct the radio links and the operation of the Enet network would not be impacted by the proposed development.

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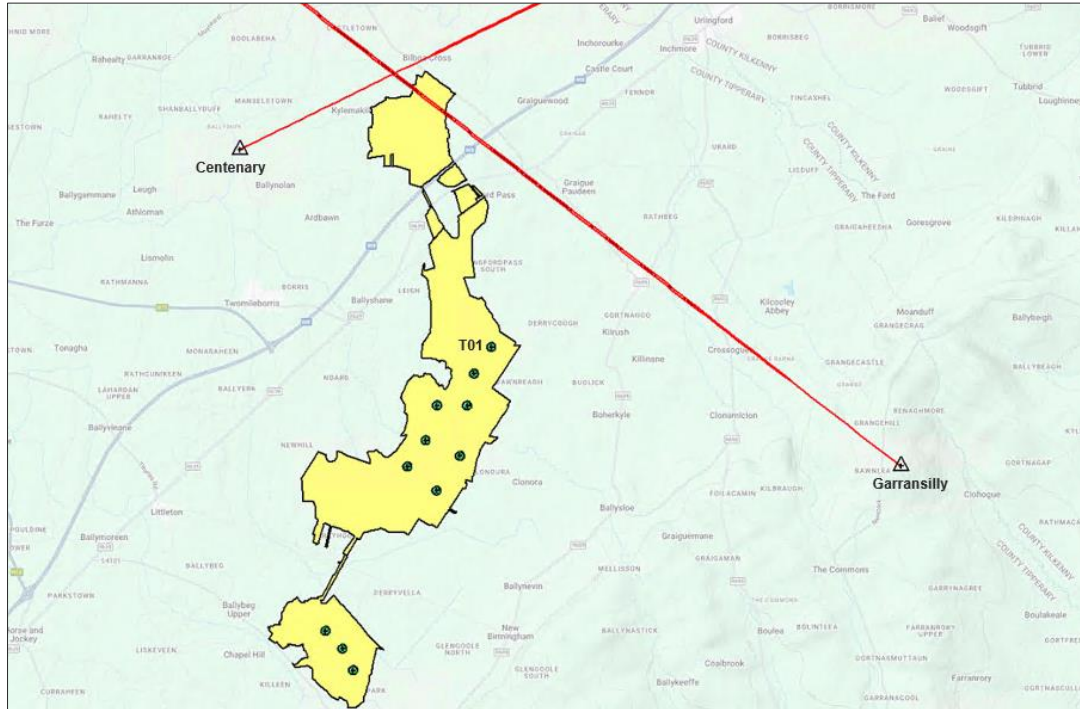


Figure 9. Enet Network – Close-up Plan View.

Table 7 below provides a brief summary of the network analysis for the Enet network in the vicinity of the proposed wind farm.

Radio Link ID	Link Description	Nearest Turbine	Fresnel Zone (F1) Clearance	Wind Farm Impacts / Observations
Enet_L1	Ballyspellan to Centenary, Ballyduff	T01	> 1 km	No impacts.
Enet_L2	Templemore Garda to Garransilly, Urlingford	T01	> 1 km	No impacts.

Table 7. Enet Network – Analysis Summary

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5.3 ESB Services Network Analysis

The ESB Network in the vicinity of Littleton consists of one Point-to-Multipoint (PMP) UHF radio link. The radio link is listed below in Table 8 and a Plan View of the ESB radio network is shown in Figure 10.

No.	Operator	Description
1	ESB	PTP UHF radio link from Thurles 110kV to Glengoose 38kV

Table 8. ESB Radio Links requiring Analysis

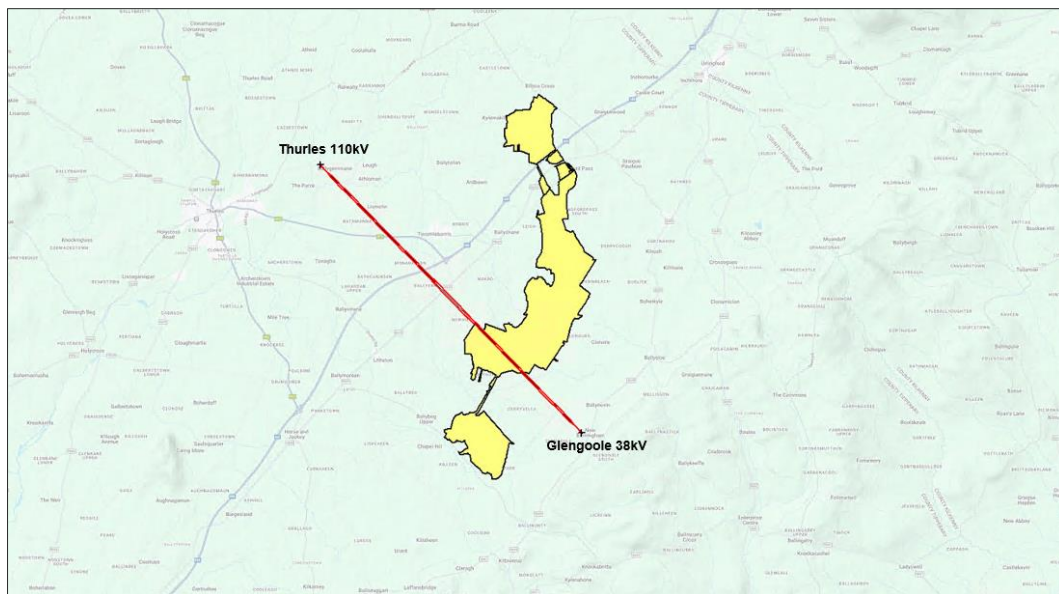


Figure 10. Plan View of the ESB Radio Network

Figure 11 below shows a Close-up Plan View of the ESB radio link relative to the proposed wind turbines. The plan view indicates that none of the proposed turbines would obstruct the radio link and the operation of the ESB network would not be impacted by the proposed development.

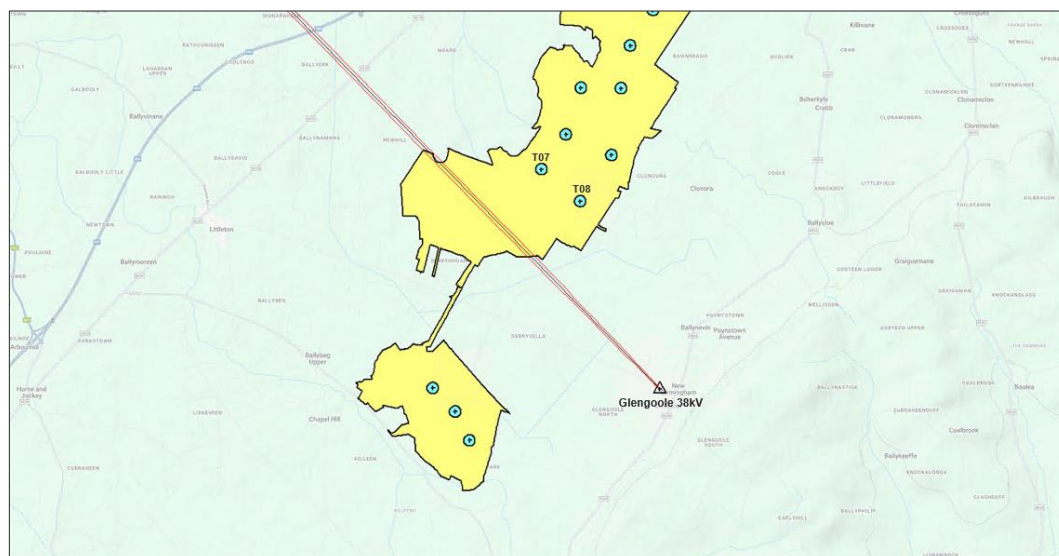


Figure 11. ESB Network – Close-up Plan View.

 <i>Total Broadband Solutions</i>	Procedure: 001	Rev: 2.0
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Table 9 below provides a brief summary of the network analysis for the ESB network in the vicinity of the proposed wind farm.

Radio Link ID	Link Description	Nearest Turbine	Fresnel Zone (F1) Clearance	Wind Farm Impacts / Observations
ESB_L1	Thurles 110kV to Glengoole 38kV	T07	> 500 m	No impacts.

Table 9. ESB Network – Analysis Summary

AiBridges Total Broadband Solutions	Procedure: 001	Rev: 2.0
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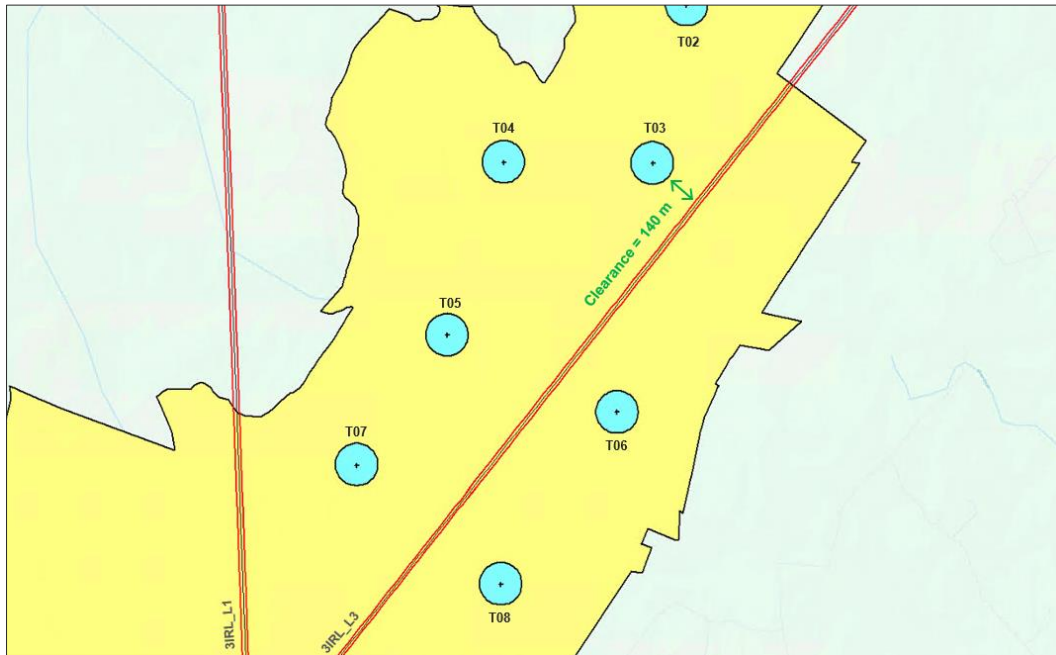


Figure 13. Three Ireland Network – Close-up Plan View.

Table 11 below provides a brief summary of the network analysis for the Three Ireland network in the vicinity of the proposed wind farm.

Radio Link ID	Link Description	Nearest Turbine	Fresnel Zone (F1) Clearance	Wind Farm Impacts / Observations
3IRL_L1	Killenaule Quarry to AQS Tipperary	T07	> 100 m	No impacts.
3IRL_L2	Ballyspellan to Leigh	T01	> 100 m	No impacts.
3IRL_L3	Littleton to Ballyspellan	T03	> 100 m	No impacts.

Table 11. Three Ireland Network – Analysis Summary

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5.5 Vodafone Ireland Network Analysis

The Vodafone Ireland Network in the vicinity of the proposed Littleton wind farm consists of five Point-to-Point (PTP) microwave radio links. The radio links are listed below in Table 12 and a Plan View of the Vodafone radio network is shown in Figure 14.

No.	Operator	Description
1	Vodafone	PTP microwave radio link from Glengoose to Leigh, Twomileborris
2	Vodafone	PTP microwave radio link from Glengoose to Thurles
3	Vodafone	PTP microwave radio link from Glengoose to Ballymurreen
4	Vodafone	PTP microwave radio link from Glengoose to Laghtseeffin, Glencarbry
5	Vodafone	PTP microwave radio link from Glengoose to Garranacanty

Table 12. Vodafone Ireland Radio Links requiring Analysis

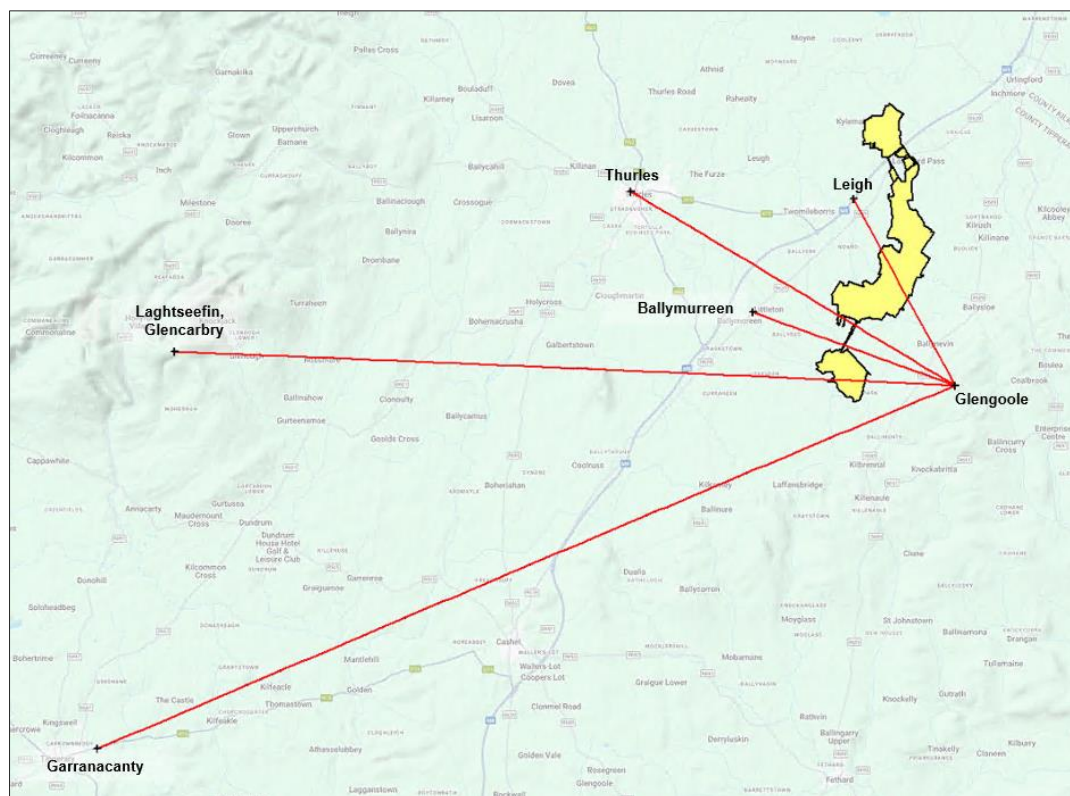


Figure 14. Plan View of the Vodafone Ireland Radio Network

Figure 15 below shows a Close-up Plan View of the Vodafone microwave radio links relative to the proposed wind turbines. The plan view indicates that Turbine T11 is relatively near to the Vodafone radio link between Glengoose and Laghtseeffin.

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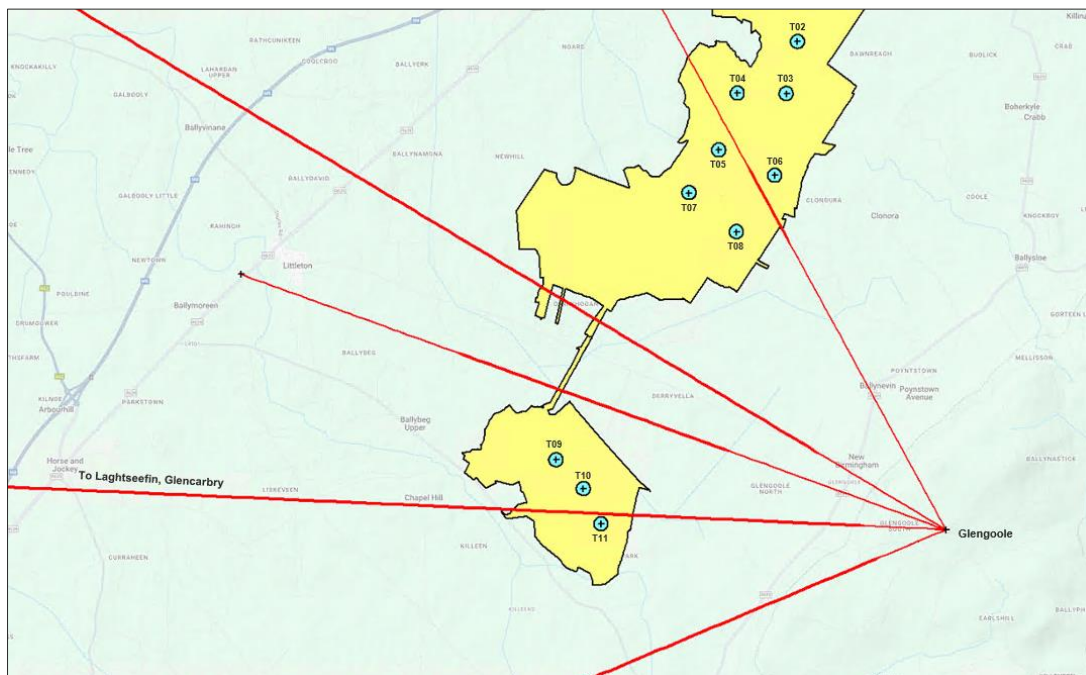


Figure 15. Vodafone Network – Close-up Plan View.

To further assess the potential impact of T11, the radio link has been modelled in 3D and the Clearance Distance between the Fresnel Zone (F1) of the link and the blade-tip of T11 has been calculated. A 3D view of the microwave radio link relative to the proposed turbine is shown below in Figure 16.

The results of the 3D analysis indicate that there is a clearance distance of over 50 m between the blade-tip of T11 and the Fresnel Zone of the radio link. At this distance there would be no impact to the Vodafone radio link.

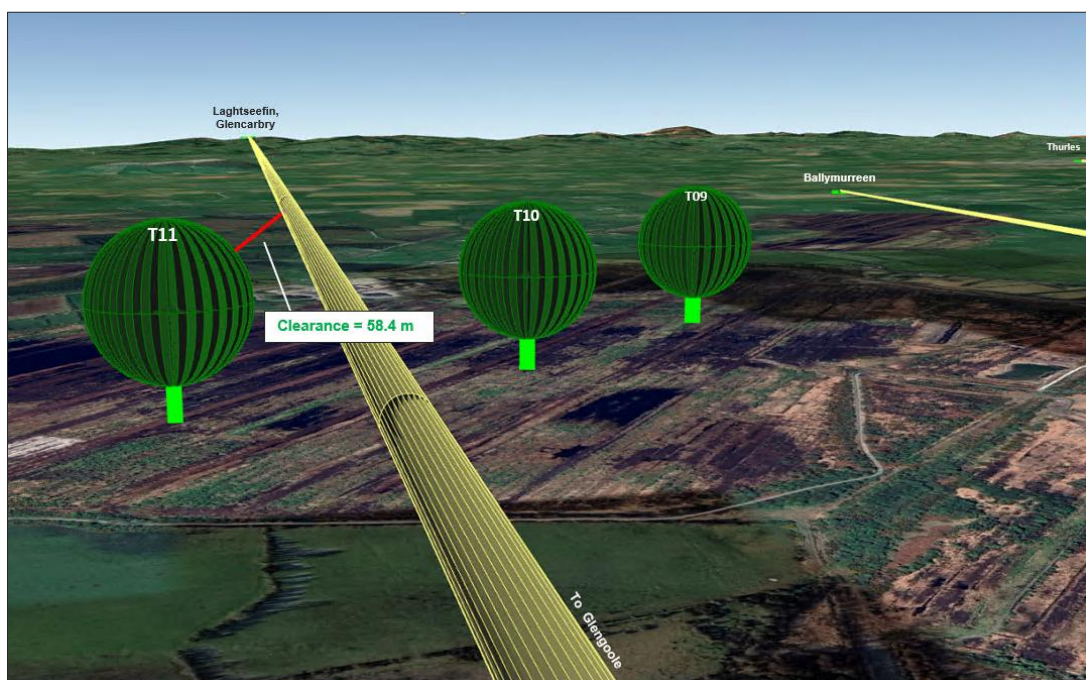


Figure 16. Vodafone Network – 3D View.

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Table 13 below provides a brief summary of the network analysis for the Vodafone network in the vicinity of the proposed wind farm.

Radio Link ID	Link Description	Nearest Turbine	Fresnel Zone (F1) Clearance	Wind Farm Impacts / Observations
VF_L1	Glengoole to Leigh, Twomileborris	T05	> 100 m	No impacts.
VF_L2	Glengoole to Thurles	T09	> 100 m	No impacts.
VF_L3	Glengoole to Ballymurreen	T09	> 100 m	No impacts.
VF_L4	Glengoole to Laghtseefin, Glencarbry	T11	58.4 m	No impacts.
VF_L5	Glengoole to Garranacanty	T11	> 100 m	No impacts.

Table 13. Vodafone Ireland Network – Analysis Summary

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Section 6 - Conclusions

 Total Broadband Solutions	Procedure: 001	Rev: 2.0
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6. Conclusions

From the findings made in this report the following conclusions have been made:

- The findings from the telecom operator consultations and desktop survey analysis indicate that there are fifteen radio links that cross over/near the wind farm site. The radio links are listed below in Table 14.
- Results from the radio link analysis (2D and 3D) indicate that the proposed turbines would not obstruct any of the fifteen radio links (i.e. the proposed turbine layout would not impact any of the telecom operator networks).

Link No.	Operator	Link Description	Impact of Proposed Turbine Layout
1	Eir	PTP microwave radio link from Glengoogle to Thurles	No Impact
2	Eir	PTP microwave radio link from Curraheen to Glengoole	No Impact
3	Eir	PTP microwave radio link from Thurles to Kilbrannel	No Impact
4	Eir	PTP microwave radio link from Rosoulty to Glengoole	No Impact
5	Enet	PTP microwave radio link from Ballyspellan to Centenary, Ballyduff	No Impact
6	Enet	PTP microwave radio link from Templemore Garda to Garransilly, Urlingford	No Impact
7	ESB	PTP UHF radio link from Thurles 110kV to Glengoole 38kV	No Impact
8	Three	PTP microwave radio link from Killenaule Quarry (Kilbrannel) to AQS Tipperary	No Impact
9	Three	PTP microwave radio link from Ballyspellan to Leigh	No Impact
10	Three	PTP microwave radio link from Littleton to Ballyspellan	No Impact
11	Vodafone	PTP microwave radio link from Glengoole to Leigh, Twomileborris	No Impact
12	Vodafone	PTP microwave radio link from Glengoole to Thurles	No Impact
13	Vodafone	PTP microwave radio link from Glengoole to Ballymurreen	No Impact
14	Vodafone	PTP microwave radio link from Glengoole to Laghtseefin, Glencarbry	No Impact
15	Vodafone	PTP microwave radio link from Glengoole to Garranacanty	No Impact

Table 14. Radio Links in vicinity of Proposed Wind Farm.

 <i>Total Broadband Solutions</i>	Procedure: 001	Rev: 2.0
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- Figure 17 below is provided to illustrate each of the telecommunication radio links that cross over/near the proposed development site.

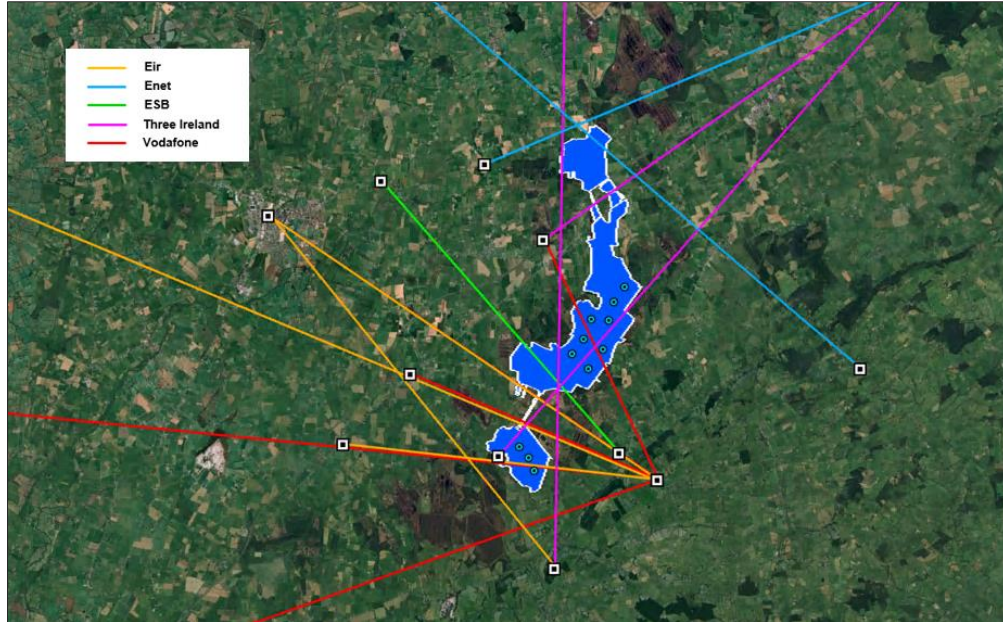


Figure 17. Plan View of Radio Links in vicinity of Proposed Wind Farm

 <i>Total Broadband Solutions</i>	Procedure: 001	Rev: 2.0
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APPENDIX A – Wind Farm Turbine Coordinates

 Total Broadband Solutions	Procedure: 001	Rev: 2.0
Title: Littleton Wind Farm Telecommunications Impact Study	Approved: KH	Date: 19/03/2025

Appendix A – Wind Farm Turbine Co-ordinates

The development is in the pre-planning stage and the Final Turbine Layout is yet to be finalized. The turbine layout considered in this Telecommunications Impact Study is provided below.

Turbine ID	Co-ordinates (IG)	
	X	Y
T01	224098.7	157104.2
T02	223775.9	156595.4
T03	223649.5	155989.3
T04	223077.2	155990.4
T05	222863.6	155329.9
T06	223515.3	155037.3
T07	222519.3	154828.9
T08	223074.5	154377.4
T09	220981.9	151714.7
T10	221303.5	151380.6
T11	221509.5	150971.3

Table 15. Wind Farm Layout - Turbine Co-ordinates

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APPENDIX B – Field Survey Findings

 <i>Total Broadband Solutions</i>	Procedure: 001	Rev: 2.0
Title: Littleton Wind Farm Telecommunications Impact Study	Approved: KH	Date: 19/03/2025

Appendix B – Field Survey findings

The telecom mast-sites surveyed for this Telecoms Impact Study are shown relative to the proposed wind farm site in Figure 18 below.



Figure 18. Telecom Mast-Sites shown relative to proposed wind farm.

The findings from the field surveys of each of the mast-sites are presented below.

AiBridges <i>Total Broadband Solutions</i>	Procedure: 001	Rev: 2.0
Title: Littleton Wind Farm Telecommunications Impact Study	Approved: KH	Date: 19/03/2025

Mast-Site A (Templemore)

Telecommunications Mast-Site A is located at Templemore, Co Tipperary and is approximately 21 km northwest of the proposed wind farm. A photo of the mast at this location is shown in the figure below. The Telecom Operators who have radio links operating from this mast-site in the direction of the wind farm are listed in Table 16.



Figure 19. Mast A1

Mast ID	Telecom operators with radio links in direction of proposed wind farm
Mast A1	Enet

Table 16. Field Survey Summary – Mast-site A

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Title: Littleton Wind Farm Telecommunications Impact Study	Approved: KH	Date: 19/03/2025

Mast-Site B (AQS Tipperary)

Telecommunications Mast-Site B is located in the townland of Kiloran, Co Tipperary and is approximately 5 km north of the proposed development. Access to this mast-site was not possible on the day of survey; however, the site location (as specified by Three Ireland) is shown below in **Figure 20**. The Telecom Operators who have radio links operating from this mast-site in the direction of the wind farm are listed in **Table 17**.



Figure 20. Mast B

Mast ID	Telecom operators with radio links in direction of proposed wind farm
Mast B	Three Ireland

Table 17. Field Survey Summary – Mast B

AiBridges <i>Total Broadband Solutions</i>	Procedure: 001	Rev: 2.0
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Mast-Site C (Ballyspellan, Johnstown)

Telecommunications Mast-Site C is located at Ballyspellan, Johnstown, Co Tipperary and is approximately 11 km northeast of the proposed wind farm. A photo of the mast-structures at this location is shown in the figure below. The Telecom Operators who have radio links operating from this mast-site in the direction of the wind farm are listed in Table 18.



Figure 21. Mast C1

Mast ID	Telecom operators with radio links in direction of proposed wind farm
Mast C1	Three Ireland
Mast C2	Enet

Table 18. Field Survey Summary – Mast-site C

AiBridges Total Broadband Solutions	Procedure: 001	Rev: 2.0
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Mast-Site D (Rossully)

Telecommunications Mast-Site D is located in the townland of Rossully, County Tipperary, and is approximately 19 km west of the proposed wind farm. The mast-site location (as specified by Eir) is shown in Figure 22 below. The Telecom Operators who have radio links operating from this mast-site in the direction of the wind farm are listed in Table 19.



Figure 22. Mast D

Mast ID	Telecom operators with radio links in direction of proposed wind farm
Mast D	Eir

Table 19. Field Survey Summary – Mast-Site D

AiBridges <i>Total Broadband Solutions</i>	Procedure: 001	Rev: 2.0
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Mast-Site E (Thurles 110 kV Substation)

Telecommunications Mast-Site E is located at the Thurles ESB 110kV Substation and is approximately 6 km west of the proposed wind farm. A photo of the mast-structure at this location is shown in the figure below. The Telecom Operators who have radio links operating from this mast-site in the direction of the wind farm are listed in Table 20.



Figure 23. Mast E

Mast ID	Telecom operators with radio links in direction of proposed wind farm
Mast E	ESB

Table 20. Field Survey Summary – Mast-Site E

AiBridges Total Broadband Solutions	Procedure: 001	Rev: 2.0
Title: Littleton Wind Farm Telecommunications Impact Study	Approved: KH	Date: 19/03/2025

Mast-Site F (Centenary)

Telecommunications Mast-Site F is located at the Centenary Co-Op at Ballayduff, County Tipperary, and is approximately 3 km west of the proposed development. A photo of the mast-structure at this location is shown below. The Telecom Operators who have radio links operating from this mast-site in the direction of the wind farm are listed in Table 21.



Figure 24. Mast F

Mast ID	Telecom operators with radio links in direction of proposed wind farm
Mast F	Enet

Table 21. Field Survey Summary – Mast-Site F

AiBridges <i>Total Broadband Solutions</i>	Procedure: 001	Rev: 2.0
Title: Littleton Wind Farm Telecommunications Impact Study	Approved: KH	Date: 19/03/2025

Mast-Site G (Thurles)

Telecommunications Mast-Site G is located at Thurles, Co Tipperary and is approximately 9 km west of the proposed wind farm. A photo of the mast-structure at this location is shown in the figure below. The Telecom Operators who have radio links operating from this mast-site in the direction of the wind farm are listed in Table 21.



Figure 25. Mast G

Mast ID	Telecom operators with radio links in direction of proposed wind farm
Mast G	Eir, Vodafone

Table 22. Field Survey Summary – Mast-Site G

AiBridges <i>Total Broadband Solutions</i>	Procedure: 001	Rev: 2.0
Title: Littleton Wind Farm Telecommunications Impact Study	Approved: KH	Date: 19/03/2025

Mast-Site H (Leigh)

Telecommunications Mast-Site H is located in the townland of Leigh approximately 1.5 km west of the proposed wind farm. A photo of the mast at this location is shown in the figure below. The Telecom Operators who have radio links operating from this mast-site in the direction of the wind farm are listed in Table 23.



Figure 26. Mast H

Mast ID	Telecom operators with radio links in direction of proposed wind farm
Mast H	Three Ireland, Vodafone

Table 23. Field Survey Summary – Mast-Site H

AiBridges <i>Total Broadband Solutions</i>	Procedure: 001	Rev: 2.0
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Mast-Site I (Garransilly, Urlingford)

Telecommunications Mast-Site I is located in the townland of Garransilly, Urlingford, Co Tipperary and is approximately 8 km east of the proposed development. A photo of the mast-structure at this location is shown in the figure below. The Telecom Operators who have radio links operating from this mast-site in the direction of the wind farm are listed in Table 24.



Figure 27. Mast I

Mast ID	Telecom operators with radio links in direction of proposed wind farm
Mast I	Enet

Table 24. Field Survey Summary – Mast-Site I

AiBridges <i>Total Broadband Solutions</i>	Procedure: 001	Rev: 2.0
Title: Littleton Wind Farm Telecommunications Impact Study	Approved: KH	Date: 19/03/2025

Mast-Site J (Laghtseefin, Glencarbry)

Telecommunications Mast-Site J is located at Laghtseefin, Glencarbry, Co Tipperary and is approximately 26 km west of the proposed wind farm. A photo of the mast-structure at this location is shown in the figure below. The Telecom Operators who have radio links operating from this mast-site in the direction of the wind farm are listed in Table 25.



Figure 28. Mast J

Mast ID	Telecom operators with radio links in direction of proposed wind farm
Mast J	Vodafone

Table 25. Field Survey Summary – Mast-Site J

AiBridges <i>Total Broadband Solutions</i>	Procedure: 001	Rev: 2.0
Title: Littleton Wind Farm Telecommunications Impact Study	Approved: KH	Date: 19/03/2025

Mast-Site K (Ballymurreen)

Telecommunications Mast-Site K is located the townland of Ballymurreen, Co Tipperary and is located approximately 3 km west of the proposed wind farm development site. A photo of the mast-structure at this location is shown in the figure below. The Telecom Operators who have radio links operating from this mast-site in the direction of the wind farm are listed in Table 26.



Figure 29. Mast-Site K

Mast ID	Telecom operators with radio links in direction of proposed wind farm
Mast K	Vodafone

Table 26. Field Survey Summary – Mast-Site K

AiBridges <i>Total Broadband Solutions</i>	Procedure: 001	Rev: 2.0
Title: Littleton Wind Farm Telecommunications Impact Study	Approved: KH	Date: 19/03/2025

Mast-Site L (Glengoogle 38KVa)

Telecommunications Mast-Site L is located at the ESB 38KVa station at Glengoogle, Co Tipperary and is approximately 2 km east of the proposed development. A photo of the mast-structure at this location is shown in the figure below. The Telecom Operators who have radio links operating from this mast-site in the direction of the wind farm are listed in Table 27.



Figure 30. Mast L

Mast ID	Telecom operators with radio links in direction of proposed wind farm
Mast L	ESB

Table 27. Field Survey Summary – Mast-Site L

AiBridges <i>Total Broadband Solutions</i>	Procedure: 001	Rev: 2.0
Title: Littleton Wind Farm Telecommunications Impact Study	Approved: KH	Date: 19/03/2025

Mast-Site M (Curraheen)

Telecommunications Mast-Site M is located at the Horse and Jockey Hotel, Curraheen, Co Tipperary and is approximately 5 km west of the proposed wind farm. A photo of the mast-structure at this location is shown in the figure below. The Telecom Operators who have radio links operating from this mast-site in the direction of the wind farm are listed in Table 28.



Figure 31. Mast M

Mast ID	Telecom operators with radio links in direction of proposed wind farm
Mast M	Eir

Table 28. Field Survey Summary – Mast-Site M

AiBridges <i>Total Broadband Solutions</i>	Procedure: 001	Rev: 2.0
Title: Littleton Wind Farm Telecommunications Impact Study	Approved: KH	Date: 19/03/2025

Mast-Site N (Littleton)

Telecommunications Mast-Site N is located in at Bord na Móna facility at Littleton, County Tipperary and is located within 100 m of the proposed wind farm development. A photo of the mast-structure at this location is shown in the figure below. The Telecom Operators who have radio links operating from this mast-site in the direction of the wind farm are listed in Table 29.



Figure 32. Mast N

Mast ID	Telecom operators with radio links in direction of proposed wind farm
Mast N	Three Ireland

Table 29. Field Survey Summary – Mast-Site N

AiBridges <i>Total Broadband Solutions</i>	Procedure: 001	Rev: 2.0
Title: Littleton Wind Farm Telecommunications Impact Study	Approved: KH	Date: 19/03/2025

Mast-Site O (Glengoose)

Mast-Site O is located in the townland of Glengoose approximately 4 km east of the proposed wind farm development. There are two mast structures at this mast-site referenced in this report as Mast O1 and Mast O2.

Mast O1

A photo of Mast O1 shown in the figure below. The Telecom Operators who have radio links operating from this mast structure in the direction of the wind farm are listed in Table 30.



Figure 33. Mast O1

Mast ID	Telecom operators with radio links in direction of proposed wind farm
Mast O1	Vodafone, Eir

Table 30. Field Survey Summary – Mast O1

AiBridges <i>Total Broadband Solutions</i>	Procedure: 001	Rev: 2.0
Title: Littleton Wind Farm Telecommunications Impact Study	Approved: KH	Date: 19/03/2025

Mast O2

A photo of Mast O2 shown in the figure below. The Telecom Operators who have radio links operating from this mast structure in the direction of the wind farm are listed in Table 31.



Figure 34. Mast O2

Mast ID	Telecom operators with radio links in direction of proposed wind farm
Mast O2	Eir

Table 31. Field Survey Summary – Mast O2

AiBridges Total Broadband Solutions	Procedure: 001	Rev: 2.0
Title: Littleton Wind Farm Telecommunications Impact Study	Approved: KH	Date: 19/03/2025

Mast-Site P (Killenaule Quarry, Kilbrannel)

Telecommunications Mast-Site P is located at Killenaule Quarry, Kilbrannel, Co Tipperary and is approximately 2.5 km south of the proposed wind farm. Access to this mast-site was not possible on the day of survey; however, the mast location can be seen in the aerial view of the site, shown below in Figure 35. The Telecom Operators who have radio links operating from this mast-site in the direction of the wind farm are listed in Table 32.



Figure 35. Mast-site P

Mast ID	Telecom operators with radio links in direction of proposed wind farm
Mast P	Eir, Three Ireland

Table 32. Field Survey Summary – Mast-site P