APPENDIX 15-8

TELECOMMUNICATIONS IMPACT ASSESSMENT REPORT

Report

Ballydermot Wind Farm Telecommunications Impact Assessment Report

Document Number:

Author: David McGrath.

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Executive Summary

Ai Bridges was commissioned to evaluate the possible impacts that the proposed wind farm development at Ballydermot, Co. Offaly could have 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.

During the consultation process, nineteen telecom operators were contacted. At the time of writing this report, sixteen of these operators have responded to the consultation request. The responses received from each of the telecom operators can be found 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 twenty-eight radio links that cross over/though the proposed development. These radio links are listed below in Table 1. Network analysis indicated that three Virgin Media radio links could be impacted by the proposed turbine layout, and mitigation measure would be required for these links.

To address the potential impact to these radio links, Ai Bridges carried out additional consultations with Virgin Media (September 2026). In the consultations, Virgin Media stated that one of the radio links had been decommissioned, and another was likely to be decommissioned in the coming weeks. At the time of writing, Virgin Media were not able to confirm if the third radio link was scheduled to be decommissioned or not; however, they did agree to the proposed migration strategy as set out by AiBridges (i.e. should the third radio link be impacted by the development at Ballydermot).

Operator	Link ID	Link Description	Mitigation Measures (Post-Consent)	Residual Impacts
Eir	Eir_L1	Dunmurry Hill to Castlejordan	N.A.	None
	Eir_L2	Dunmurry Hill to Edenderry Garda Stn	N.A.	None
	Eir_L3	Dunmurry Hill to Clonbullouge	N.A.	None
	Eir_L4	Edenderry P.S. to Carbury	N.A.	None
	Eir_L5	Edenderry P.S. to Togher	N.A.	None
Enet	Enet_L1	Kippure to Lullymore Heritage Park	N.A.	None
ESB	ESB_L1	Carbury to Kilcumber 110 kV	N.A.	None
	ESB_L2	Carbury to Ballyoskill	N.A.	None

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	ESB_L3	Carbury to Togher Hill	N.A.	None
	ESB_L4	Carbury to Cushaling (PMP)	N.A.	None
Three Ireland	3IRL_L1	Edenderry to Allenwood	N.A.	None
	3IRL_L2	Edenderry to Clonbulouge GAA	N.A.	None
	3IRL_L3	Clonbulouge GAA to Rathangan	N.A.	None
	3IRL_L4	Edenderry to Edenderry PS (Ballykilleen)	N.A.	None
Virgin Media	VM_L1	RochfortBridge Convent to VM Dunmurry	N.A.	None
	VM_L2	Gaelscoil Eadan Doire to VM Dunmurry	**Option 1:** Re-route via an Alternative Virgin media Mast-stie. **Option 2:** Relay Mast located within proposed wind farm site. **Option 3:** Replace impacted radio link with a fibre broadband connection.	None
	VM_L3	Oaklands Community College to VM Dunmurry	N.A.	None
	VM_L4	Saint Marys Secondary School to VM Dunmurry	N.A.	None
	VM_L5	St Etchens NS to VM Dunmurry	**Option 1:** Re-route via an Alternative Virgin media Mast-stie. **Option 2:** Relay Mast located within proposed wind farm site. **Option 3:** Replace impacted radio link with a fibre broadband connection.	None
	VM_L6	Cloch Rinnce NS to VM Dunmurry	**Option 1:** Re-route via an Alternative Virgin media Mast-stie. **Option 2:** Relay Mast located within proposed wind farm site. **Option 3:** Replace impacted radio link with a fibre broadband connection.	None
	VM_L7	Johnstown Est Hotel to VM Dunmurry	N.A.	None
	VM_L8	Irish Explosives to VM Dunmurry	N.A.	None

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Vodafone	VF_L1	Ballybrack to Coolaght	N.A.	None
	VF_L2	Dunmurry Hill to Edenderry Power Station	N.A.	None
	VF_L3	Dunmurry Hill to Allenwood (Blake 110kV Station)	N.A.	None
	VF_L4	Christianstown to Ballybrack	N.A.	None
	VF_L5	Ballybrack to Carbury	N.A.	None
	VF_L6	Ballinla to Edenderry PS (Ballykilleen)	N.A.	None

Table 1. Radio links that cross over/near the proposed wind farm.

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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 wind farm development is located approximately 1.2 km southeast of Edenderry in County Offaly.

For this study, a 46-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 Tip-Height	Turbine Rotor Diameter
Ballydermot	46	200 - 220 m	170 m

Table 2. 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 Modelling 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 Irish National Grid (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 Ballydermot. Figure 2 below shows the proposed wind farm site plotted in the radio planning tool.

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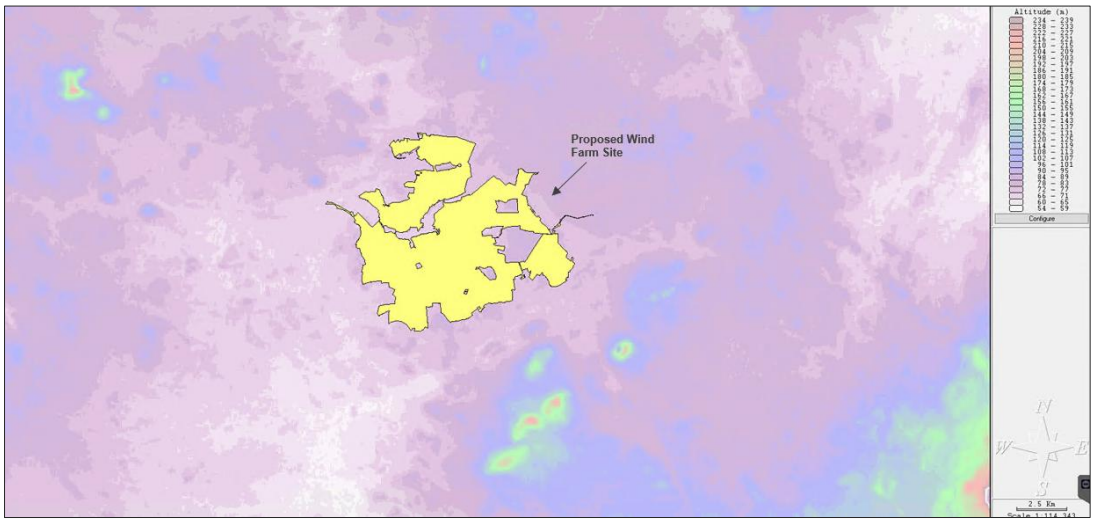


Figure 2. Wind Farm Site plotted in Radio Planning Software

The findings from the consultations and field surveys are collated and the communications networks requiring further analysis are identified. 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 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 beginning in May 2025 were undertaken with telecom network operators to assist in identifying telecommunication infrastructure that could be impacted by proposed wind farm. The operators were requested to raise any concerns they may have regarding impacts to their networks due to the proposed wind farm development. Table 3 lists the telecom operators contacted, and the issues raised by the operators.

The relevant responses received from each of the Telecom Operators are provided in Sections 3.1.1 to 3.1.19. The complete set of correspondences between Ai Bridges Ltd and the Telecom Operators is provided in Appendix E.

ID	Operator	Issues raised by Operator \ Observations.
1	2RN	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 issues.
3	An Garda Síochána	No response.
4	Coimisiún na Meán	No issues.
5	BT Ireland	No issues (Note : BT have confirmed in 2023 during a consultation engagement that they no longer operate a telecommunications network and requested that the no longer be consulted.)
6	CIE/Irish Rail	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 10 km away and at this distance there will be no impact to the GSM-R network.
7	Dept. of Defence	No issues regarding transmission links; however, the DoD have made observations regarding the aviation lighting scheme that would be required, should the wind farm go ahead.
8	Eir	Eir raised concerns regarding five PTP radio links.
9	Enet	Enet raised a concern regarding one PTP radio link.
10	ESB Networks	ESB Networks raised concerns regarding their radio link network in the subject area.
11	Imagine Broadband	No issues.
12	AirNav Ireland	No response.
13	Uisce Éireann	No issues.
14	Offaly County Council	No response.

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15	Tetra Ireland	No issues.
16	Three Ireland	Three Ireland raised concerns regarding four PTP radio links.
17	Viatel	No issues.
18	Virgin Media	Virgin Media raised concerns regarding eight PTP radio links.
19	Vodafone	Vodafone raised concerns regarding six PTP radio links.

Table 3. Telecom Operators Consulted

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3.1.1 2RN Response to Consultations

2RN provided the following email response to consultations.

> *"Our network has not changed in the area that you have highlighted.*
>
> *We are only concerned about the impact to broadcast services from Kippure and would ask that a protocol be signed should the site go ahead. Something that I believe has already been done."*

3.1.2 Airwave Response to Consultations

Airwave provided the following email response to consultations:

> *"No infrastructure here."*

3.1.3 An Garda Síochána Response to Consultations

To date no response has been received.

3.1.4 Coimisiún na Meán (Formerly the BAI) Response to Consultations

Coimisiún na Meán provided the following email response to consultations:

> *"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."*

3.1.5 BT Ireland Response to Consultations

BT provided the following email response to consultations during consultations engagements in 2023:

> *"BT no longer have a radio microwave network so you can take BT off your consultation list. "*

3.1.6 CIE/Irish Rail Response to Consultations

CIE provided the following email response to consultations:

> *"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 : 5 Km <wind farm < 30 Km: 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:

> *"I wish to advise at the outset that any determination in relation to a planning consent is solely a matter for the planning authorities and/or ABP, as appropriate. Therefore, the following observations are made on a non-prejudicial basis, and are not intended to be used to rely on for a prospective planning application, nor are these observations to be relied on in the event of any*

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commercial transaction pertaining to such lands and they are not to be relied on in the event of any contract exchange pertaining to same.

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

Having consulted with the Military authorities, the Department of Defence wishes to make the following observations:

- *All turbines should be illuminated by Type C, Medium intensity, Fixed Red obstacle lighting with a minimum output of 2,000 candela to be visible in all directions of azimuth and to be operational H24/7 days a week. Obstacle lighting should be incandescent or, if LED or if other types are used, of a type visible to Night Vision equipment. Obstacle lighting used must emit light at the near Infra-Red (IR) range of the electromagnetic spectrum, specifically at or near 850 nanometres (nm) of wavelength. Light intensity to be of similar value to that emitted in the visible spectrum of light.*
- *In the event negative impacts on future military radar systems, the owner will engage with the Department of Defence and will provide suitable mitigations as soon as practical.*

Nothing in the above observations shall be taken as a binding response by the Minister for Defence in the event that a planning application is made. The Minister 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.

We would appreciate if you could keep us informed on any progress relating to this proposed development, in particular if this development was to progress to the pre-planning stage."

3.1.8 Eir Response to Consultations

Eir provided the following email responses to consultations:

"No change still the 5 links traversing the area."

Eir fixed network

Link	Description	Link Type	Co-ordinates		Antenna Heights		Link Distance	Freq used in Calculations for Fresnel Zone
			Site A	Site B	Site A	Site B		
1	Dunmurry Hill - Castlejordan	PTP	53 11 55.12 N 06 56 00.84 W	53 23 49.63 N 07 07 06.54 W	37.5m	7m	25.3 km	11 GHz
2	Dunmurry Hill - Edenderry Garda Stn	PTP	53 11 55.12 N 06 56 00.84 W	53 20 11.42 N 07 03 38.24 W	37.5m	24m	17.5 km	11 GHz
3	Dunmurry Hill - Clonbullouge	PTP	53 11 55.12 N 06 56 00.84 W	53 15 43.41 N 07 05 09.36 W	37.5m	10m	12.4 km	11 GHz

Eir mobile network

Link	Description	Link Type	Co-ordinates		Antenna Heights		Link Distance	Freq used in Calculations for Fresnel Zone
			Site A	Site B	Site A	Site B		
1	Edenderry P.S. - Carbury	PTP	53 17 41.82 N 07 04 56.17 W	53 21 21.15 N 06 58 14.85 W	26.5m	12m	10.0 km	13 GHz
2	Edenderry P.S. - Togher	PTP	53 17 41.82 N 07 04 56.17 W	53 20 11.03 N 07 15 26.92 W	26m	23m	12.55 km	11 GHz

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3.1.9 Enet Response to Consultations

Enet provided the following email responses to consultations:

"We have one link passing through this area."

Link Name	A-End Coordinates	A-End Antenna Height	B-End Coordinates	B-End Antenna Height	Frequency	Buffer
RTE Kippure - SCP0087 - Lullymore Heritage Park	53.178050 -6.331566	20m	53.270739 -6.949947	12m	7GHz	50m

3.1.10 ESB Networks Response to Consultations

ESB provided the following email responses to consultations:

"*Please find attached a basic exclusion zone created for the development at Ballydermot Wind Farm. To avoid interference to our links, the development must fall outside of this zone.*

Please note that this exclusion zone represents a conservative zone because we have no turbine parameters, and this could be reduced on provision of hub height and blade size and either turbine location or development boundary.

Any proposed wind turbines within the defined exclusion zone will require further detailed coordination to avoid interference and degradation of critical ESB-operated radio links.

We kindly request that you re-consult with ESB once the turbine locations and dimensions are available."



In the most recent round of consultations ESB Networks did not provide detailed information regarding their radio link network (only a basic exclusion zone was provided). However, in a previous round of consultations (2021) they did provide details regarding their radio links. The response from received from ESB in 2021 is provided below:

2021 Response

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"There are several point to point radio links passing through the proposed site including a trunk radio link, an access radio link and also 1 point to multipoint radio link.

Once the turbine locations have been determined, please let us know as soon as possible so we can carry out a detailed analysis of the potential impact."

2.3.1 Point to Point Radio links

There are 3 radio links that are crossing or near the site boundary, 2 of which are likely to be impacted by the turbines, the third, Carbury Hillsite to Turlough Hill is just for information but isn't expected to be impacted.

Link 1: Carbury to Kilcumber 110kV

Site A: Carbury Hillsite / 8m AGL / 117m ASL / 53.355842 -6.970762 / TX 11465MHz

Site B: Kilcumber 110kV / 36m AGL / 72m ASL/ 53.289091 -7.092573 / TX 10975MHz

Link 2: Carbury to Ballyoskill

Site A: Carbury Hill site / 8m AGL / 117m ASL / 53.355842 -6.970762 / TX 7526MHz

Site B: Ballyoskill Hillsite 110kV / 36m AGL / 72m ASL/ 52.835216 -7.295671 / TX 7624MHz

Link 3: Carbury to Turlough Hill

Site A: Carbury Hill site / 8m AGL / 117m ASL / 53.355842 -6.970762 / TX 7470MHz

Site B: Kilcumber 110kV / 36m AGL / 72m ASL/ 53.029880 -6.411684 / TX 7624MHz

2.3.2 Point to Multipoint Radio links

There is 1 point to multipoint radio link that will be impacted by the planned development:

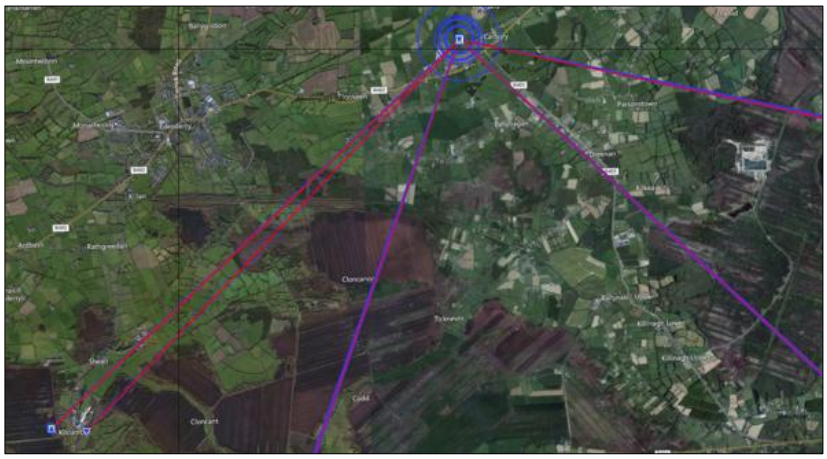
Link 1: Carbury to Cushaling 110kV

Site A: Carbury Hillsite / 10m AGL / 117m ASL / 53.355842 -6.970762 / TX 458MHz

Site B: Cushaling 110kV / 8m AGL / 67m ASL/ 53.289372, -7.084755/ TX 458MHz



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3.1.11 Imagine Broadband Response to Consultations

Imagine Broadband provided the following email response to consultations:

> *"Imagine are in the process of decommissioning all our microwave links. This process should be complete within 12 months."*

3.1.12 AirNav Ireland Response to Consultations

To date no response has been received.

3.1.13 Uisce Éireann Response to Consultations

Uisce Éireann provided the following email response to consultations:

> *"I can confirm that there are no UÉ communication links traversing the proposed wind farm*."

3.1.14 Offaly County Council Response to Consultations

To date, there has been no response to the 2025 consultation request; however, in previous consultations with MKO, Offaly County Council raised no concerns in relation to the proposed wind farm development.

3.1.15 Tetra Ireland Response to Consultations

Tetra Ireland provided the following email response to consultations:

> *"There have not been any changes to the network in the area. [i.e. We anticipate no impact from the development as proposed]. Can you please ensure that the development is reviewed by eir."*

3.1.16 Three Ireland Response to Consultations

Three Ireland provided the following email response to consultations:

> *"A few changes in this area since 2021. Latest transmission link details below. Can you leave a 20m buffer from the blade tips please?"*

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Link no.	Link Ref	Freq.	Site A	X	Y	Lat	Lon	Dish Height	Site B	X	Y	Lat	Lon	Dish Height
1	ML016076	18GHz	OF0003	261743	232851	53.3425	-7.07379	30m	KD0157	274628	227022	53.2885	-6.88175	29m
2	ML020859	26GHz	OF0003	261743	232851	53.3425	-7.07379	30m	OF0108	261317	224051	53.2635	-7.08189	26m
3	ML020331	26GHz	OF0108	261317	224051	53.2635	-7.08189	26m	KD0213	266770	220331	53.2294	-7.00096	29m
4	ML020522	18GHz	OF0003	261743	232851	53.3425	-7.07379	30m	OF0105	261243	227548	53.2949	-7.08232	30m

3.1.17 Viatel Response to Consultations

Viatel provided the following email response to consultations:

"No impact."

3.1.18 Virgin Media Response to Consultations

Virgin Media provided the following email response to consultations:

"This is a very busy site with Virgin Media as we have a lot of radio links here."

Link Name / ID	Band MHz\GHz	Link Length	Site A			Site B		
			Lat	Long	Ant Height	Lat	Long	Ant Height
RochfortBridge Convent 20439I to VM Dunmurry	11GHz	34.5km	53° 24.907'N	7° 18.216'W	8mts	53° 11.906'N	6° 56.003'W	8mts
Gaelscoil Eadan Doire 20332N to VM Dunmurry	13GHz	18.2km	53° 20.340'N	7° 4.292'W	8mts	53° 11.906'N	6° 56.003'W	8mts
Oaklands Community College 72540O to VM Dunmurry	15GHz	17.7km	53° 20.229'N	7° 3.763'W	8mts	53° 11.906'N	6° 56.003'W	8mts
Saint Marys Secondary School 65582Q to VM Dunmurry	13GHz	17.8km	53° 20.380'N	7° 3.592'W	8mts	53° 11.906'N	6° 56.003'W	8mts
ST_Etchens_NS_19848S to VM Dunmurry	11GHz	30.9km	53° 27.396'N	7° 6.171'W	8mts	53° 11.906'N	6° 56.003'W	8mts
Cloch_Rinnce_NS_18093J to VM Dunmurry	13GHz	22.9km	53° 23.865'N	7° 0.902'W	8mts	53° 11.906'N	6° 56.003'W	8mts
Johnstown_Est_Hotel to VM Dunmurry	13GHz	23.9km	53° 24.299'N	6° 50.206'W	8mts	53° 11.906'N	6° 56.003'W	8mts
Irish Explosives to VM Dunmurry	13GHz	21.3km	53° 22.497'N	6° 48.608'W	8mts	53° 11.906'N	6° 56.003'W	8mts

Network Analysis (*Ref. Section 5.5*) indicated that three of the above-listed Virgin Media radio links could be impacted by the proposed turbine layout. To address the potential impact to these radio links, Ai Bridges carried out additional consultations with Virgin Media (September 2026). During these consultations, Virgin Media stated that one of the radio links had been decommissioned, and another was likely to be decommissioned in the coming weeks.

At the time of writing, Virgin Media were not able to confirm if the third radio link was scheduled to be decommissioned or not; however, they did agree to the proposed migration strategy as set out by AiBridges (i.e. should the third radio link be impacted by the development at Ballydermot).

The consultations between Ai Bridges and Virgin Media regarding the proposed mitigation strategy are provided below.

15.09.26 – Email from Ai Bridges Ltd to Virgin Media

From: Kevin Hayes
Sent: 15 September 2026 20:13
To: 'Mark Nolan' <Mark.Nolan@virginmedia.ie>
Cc: AIBridges - Engineering <engineering@aibridges.ie>
Subject: Ballydermot Wind Farm Development - Telecoms Impact Assessment

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Hello Mark,

I am following up from our call earlier. As discussed we are conducting a Telecoms Impact Assessment for the proposed Ballydermot Wind Farm Development

During the consultation process the VM links were identified below and we have modelled the potential impacts of the proposed turbines in relation to same

A number of Mitigation Measures have been proposed, see attached

As discussed we are proposing that if the planning application is consented that Virgin Media would be consulted and a suitable mitigation measure me agreed and implemented to the agreement of Virgin Media

Also as highlighted a consented development may take 3 – 4 years before entering the construction phase

Would you be available for a call tomorrow to discuss

Link Name / ID	Band MHz\GHz	Link Length	Site A			Site B		
			Lat	Long	Ant Height	Lat	Long	Ant Height
RochfortBridge Convent 20439I to VM Dunmurry	11GHz	34.5km	53° 24.907'N	7° 18.216'W	8mts	53° 11.906'N	6° 56.003'W	8mts
Gaelscoil Eadan Doire 20332N to VM Dunmurry	13GHz	18.2km	53° 20.340'N	7° 4.292'W	8mts	53° 11.906'N	6° 56.003'W	8mts
Oaklands Community College 72540O to VM Dunmurry	15GHz	17.7km	53° 20.229'N	7° 3.763'W	8mts	53° 11.906'N	6° 56.003'W	8mts
Saint Marys Secondary School 65582Q to VM Dunmurry	13GHz	17.8km	53° 20.380'N	7° 3.592'W	8mts	53° 11.906'N	6° 56.003'W	8mts
ST_Etchens_NS_19848S to VM Dunmurry	11GHz	30.9km	53° 27.396'N	7° 6.171'W	8mts	53° 11.906'N	6° 56.003'W	8mts
Cloch_Rinnce_NS_18093J to VM Dunmurry	13GHz	22.9km	53° 23.865'N	7° 0.902'W	8mts	53° 11.906'N	6° 56.003'W	8mts
Johnstown_Est_Hotel to VM Dunmurry	13GHz	23.9km	53° 24.299'N	6° 50.206'W	8mts	53° 11.906'N	6° 56.003'W	8mts
Irish Explosives to VM Dunmurry	13GHz	21.3km	53° 22.497'N	6° 48.608'W	8mts	53° 11.906'N	6° 56.003'W	8mts

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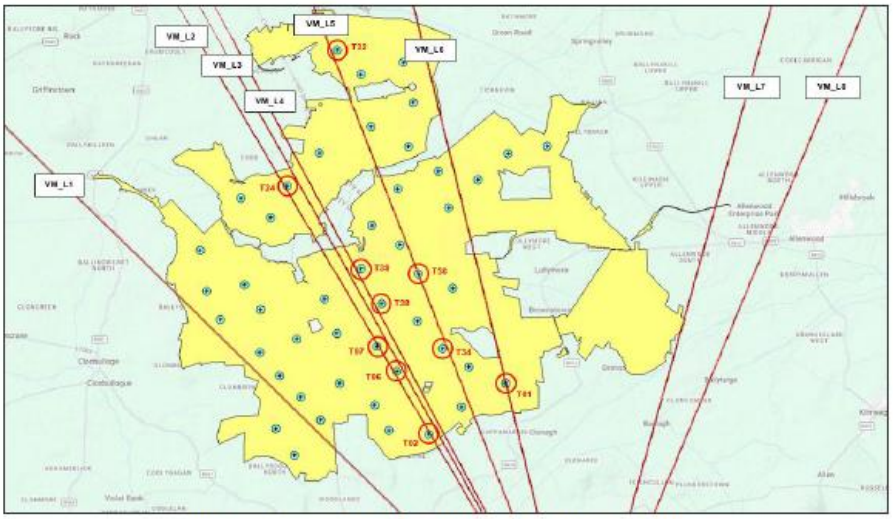


Figure 17. Virgin Media Network – Close-up Plan View

To further assess the potential impact of the proposed turbines, the radio links have been modelled in 3D and the Clearance Distances between the Fresnel Zone(s) of the links and the blade-tip of the turbines have been calculated.

A 3D view of the radio links is shown below in Figure 18. The results of the 3D analysis indicate that the radio path of three Virgin Media radio links would be obstructed by the proposed turbines (VM_L2, VM_L5 and VM_L6).

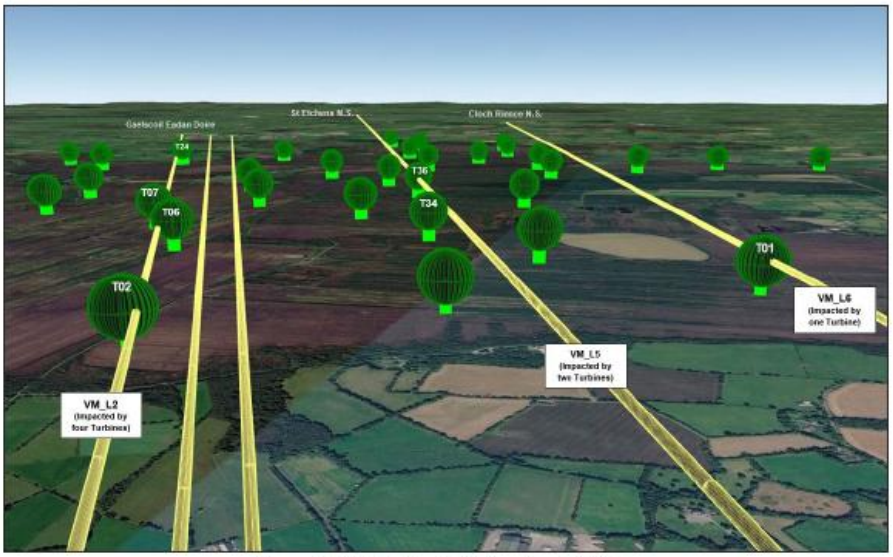


Figure 18. Virgin Media Network – 3D View

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

Link ID	Link Description	Nearest Turbine(s)	Fresnel Zone (F1) Clearance Distance	Observations
VM_L1	Rochfortbridge Convent to VM Dunmurry	T12	> 50 m	No impacts.
VM_L2	Gaelscoil Eadan Doire to VM Dunmurry	T02	- 60.5 m (Interference Condition)	Link impacted by four turbines (T02, T06, T07 & T24) (Mitigation measures required)
		T06	- 31.8 m (Interference Condition)	
		T07	- 45.3 m (Interference Condition)	
		T24	- 8.6 m (Interference Condition)	
VM_L3	Oaklands Community College to VM Dunmurry	T06	35.6 m	No impacts.
VM_L4	Saint Marys Secondary School to VM Dunmurry	T39	20.2 m	No impacts.
VM_L5	St Etchens NS to VM Dunmurry	T32	22.3 m	Likely to be Impacted by two turbines (T34 & T36) (Mitigation measures required)
		T34	< 5 m (Clearance = 1.8 m)	
		T36	- 81.5 m (Interference Condition)	
		T40	47.0 m	
VM_L6	Cloch Rinnce NS to VM Dunmurry	T01	- 82.2 m (Interference Condition)	Link impacted by one turbine (T01) (Mitigation measures required)
VM_L7	Johnstown Est Hotel to VM Dunmurry	T01	> 50 m	No impacts.
VM_L8	Irish Explosives to VM Dunmurry	T01	> 50 m	No impacts.

Table 13. Analysis Summary – Virgin Media Network

23.09.26 – Email from Ai Bridges Ltd to Virgin Media

From: *Kevin Hayes <khayes@aibridges.ie>*
Sent: *Wednesday 23 September 2026 12:40 pm*
To: *Mark Nolan <Mark.Nolan@virginmedia.ie>; Keiran Butler <Kieran.Butler@virginmedia.ie>*
Cc: *AIBridges - Engineering <engineering@aibridges.ie>*
Subject: *FW: Ballydermot Wind Farm Development - Telecoms Impact Assessment*

Hello Mark,

I am following up from our call last week and our email correspondence below.

Would you be available for a call later today, I have also copied your colleague in RF Planning

We are just following up to confirm if you have any comments in relation to our [proposed mitigation measure strategy proposal that any potential impacts to the VM transmission networks would be resolved in advance of construction and operation of any impacting wind turbine

As discussed last week all mitigation measures would be borne by the developer. We are looking to close out consultations by today if possible for submission tomorrow.

Best Regards,
Kevin Hayes,

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23.09.26 – Email from Virgin Media to AiBridges Ltd

From: *Mark Nolan <Mark.Nolan@virginmedia.ie>*
Sent: *23 September 2026 12:49*
To: *Kevin Hayes <khayes@aibridges.ie>; Keiran Butler <Kieran.Butler@virginmedia.ie>*
Cc: *AIBridges - Engineering <engineering@aibridges.ie>*
Subject: *Re: Ballydermot Wind Farm Development - Telecoms Impact Assessment*

Hi Kevin,

Apologies, I was awaiting contract details and term lenght status.

One of those schools have already been decommissioned with another likely to be confirmed in the coming weeks.

The third I have yet to get feedback on.

I will give you a call after lunch but to redirect any of our links will come at a significant cost as we do not have a presence at Saggart.

Rgds
Mark

23.09.26 – Email from Ai Bridges Ltd to Virgin Media

From: *Kevin Hayes*
Sent: *23 September 2026 13:01*
To: *Mark Nolan <Mark.Nolan@virginmedia.ie>; Keiran Butler <Kieran.Butler@virginmedia.ie>*
Cc: *AIBridges - Engineering <engineering@aibridges.ie>*
Subject: *RE: Ballydermot Wind Farm Development - Telecoms Impact Assessment*

Hello Mark

Thank you for the prompt response.

Just to confirm that Ai Bridges are proposing that in the event of a planning consent

1. *that any wind turbine that potentially causes an impact to a Virgin Media Link would not be constructed until a technically viable mitigation measure solution has been implemented*

2. *the developer would cover all associated mitigation measure costs*

Ai Bridges are recommending a condition of planning based on the above.
This would protect existing operation of the Virgin Media links.

Best Regards,
Kevin Hayes,

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24.09.26 – Email from Ai Bridges Ltd to Virgin Media

From: *Kevin Hayes*
Sent: *24 September 2026 17:56*
To: *'Mark Nolan' <Mark.Nolan@virginmedia.ie>; 'Keiran Butler' <Kieran.Butler@virginmedia.ie>*
Cc: *AIBridges - Engineering <engineering@aibridges.ie>*
Subject: *RE: Ballydermot Wind Farm Development - Telecoms Impact Assessment*

Hello Mark,

I am just following up from the email below and from our telephone call just now

As discussed can you confirm that in principle that Virgin Media would be in agreement with the Mitigation Measure Strategy that is being proposed by Ai Bridges

We are looking to include a response from VM in our final recommendations for mitigation measures

Thank you for your assistance on this matter

Best Regards,
Kevin Hayes,

24.09.26 – Email from Virgin Media to AiBridges Ltd

From: *Mark Nolan <Mark.Nolan@virginmedia.ie>*
Sent: *24 September 2026 19:12*
To: *Kevin Hayes <khayes@aibridges.ie>; Keiran Butler <Keiran.Butler@virginmedia.ie>*
Cc: *AIBridges - Engineering <engineering@aibridges.ie>*
Subject: *RE: Ballydermot Wind Farm Development - Telecoms Impact Assessment*

Hi Kevin,

Yes, as discussed, in principle we would be open to review the mitigation measure purposed once all costs that will be incurred including recurring opex costs are taken on by the windfall operators in question.

Rgds

Mark

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3.1.19 Vodafone Ireland Response to Consultations

Vodafone provided the following email response to consultations:

> *"All links highlighted previously are still active but I there are two more that I don't think were included last time. See table below. Let me know if you require any additional information."*

Link Name / ID	Band GHz	Link Length Km	Site A			Site B		
			Northing (Irish Grid)	Easting (Irish Grid)	Ant Height m	Northing (Irish Grid)	Easting (Irish Grid)	Ant Height m
KE012-KE013	18	8.894	228736	271054	15	223632	278338	15
KEDMH-OY020	15	14.604	216953	271317	30	227267.52	260978.39	30
KE120-KEDMH	18	10.603	227025	274631	25	216953	271317	35
KE089-KE012	18	10.169	219294	274833	24	228736	271054	20
KE012-KE114	26	6.2	228736	271054	22	234421	268578	7
OY030-OY042	26	5.839	231903	257364	31	227541	261246	52.87



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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 A to AD) 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.

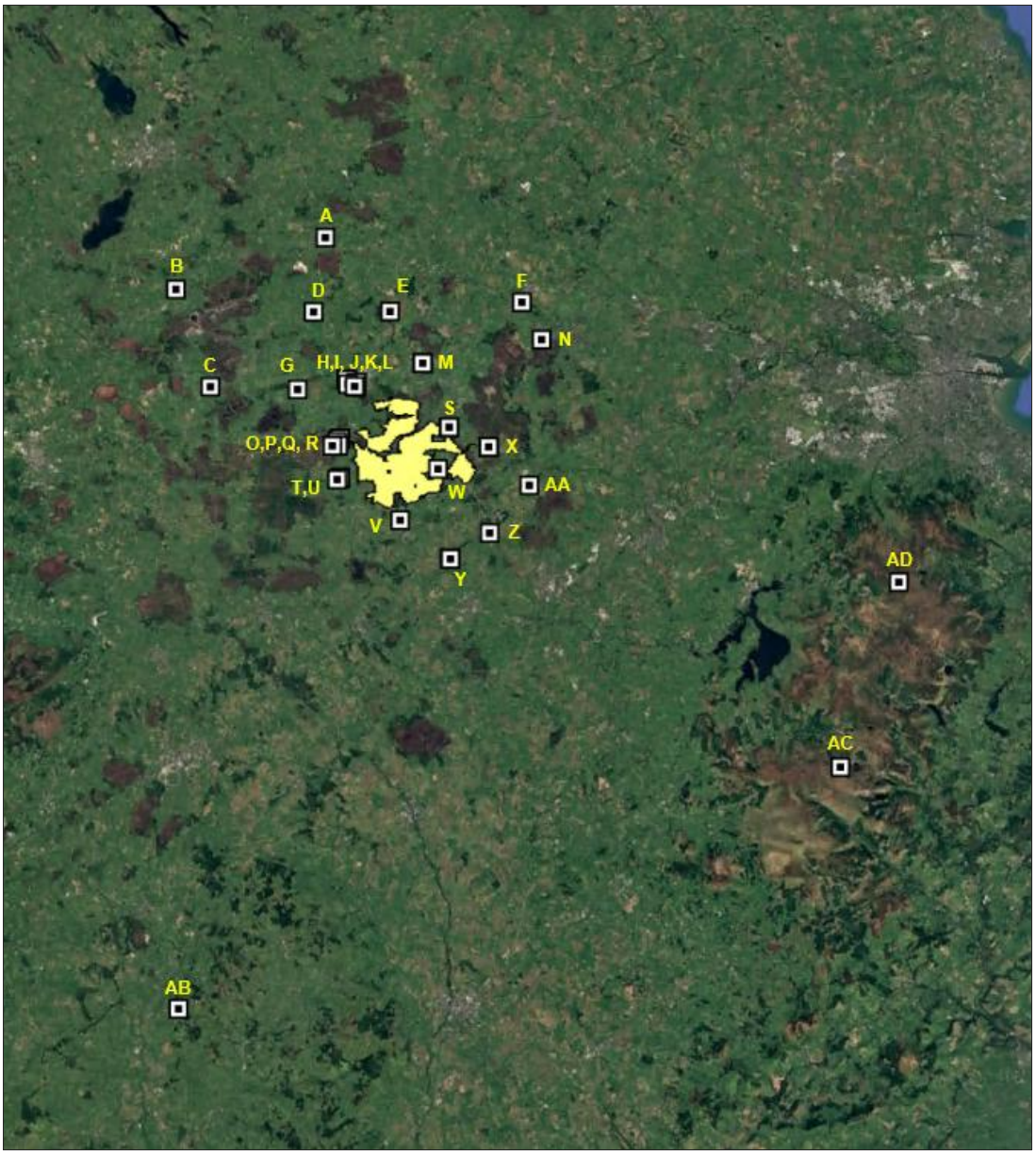


Figure 4. Telecom Mast-sites surveyed.

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Section 5 - Desktop Survey Analysis

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5. Introduction

Based on the findings of the consultation process, there are three Telecom Operators with networks in the vicinity of the proposed wind farm that require a detailed technical analysis:

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

Sections 5.1 to 5.6 below outline the desktop survey analysis findings* for each of the Telecom Operator networks listed above.

5.1 Eir Network Analysis

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

Link ID	Link Description
Eir_L1	PTP microwave radio link from Dunmurry Hill to Castlejordan
Eir_L2	PTP microwave radio link from Dunmurry Hill to Edenderry Garda Stn
Eir_L3	PTP microwave radio link from Dunmurry Hill to Clonbullouge
Eir_L4	PTP microwave radio link from Edenderry P.S. to Carbury
Eir_L5	PTP microwave radio link from Edenderry P.S. to Togher

Table 4. Eir Radio Links requiring Analysis



Figure 5. Eir Radio Network – Plan View

** 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 plan view of the Eir radio links relative to the proposed wind turbines. The plan view indicates that T06 would be relatively near two of the Eir microwave radio links (Eir_L1 and Eir_L2).

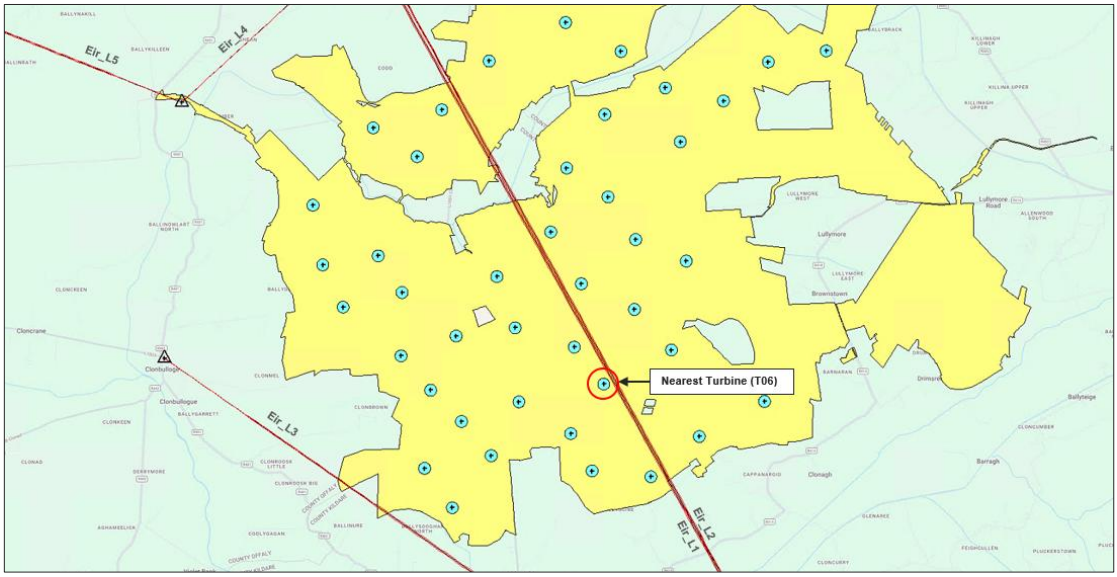


Figure 6. Eir Network – Close-up Plan View.

To further assess the potential impact of the proposed turbines, the radio links have been modelled in 3D and the Clearance Distances between the Fresnel Zone(s) of the links and the blade-tip of the turbines have been calculated.

A 3D view of the microwave radio links is shown below in Figure 7. The results of the 3D analysis indicate that T06 would not obstruct the Fresnel Zone of either of the radio links (i.e. the operation of the Eir radio link network would not be impacted).

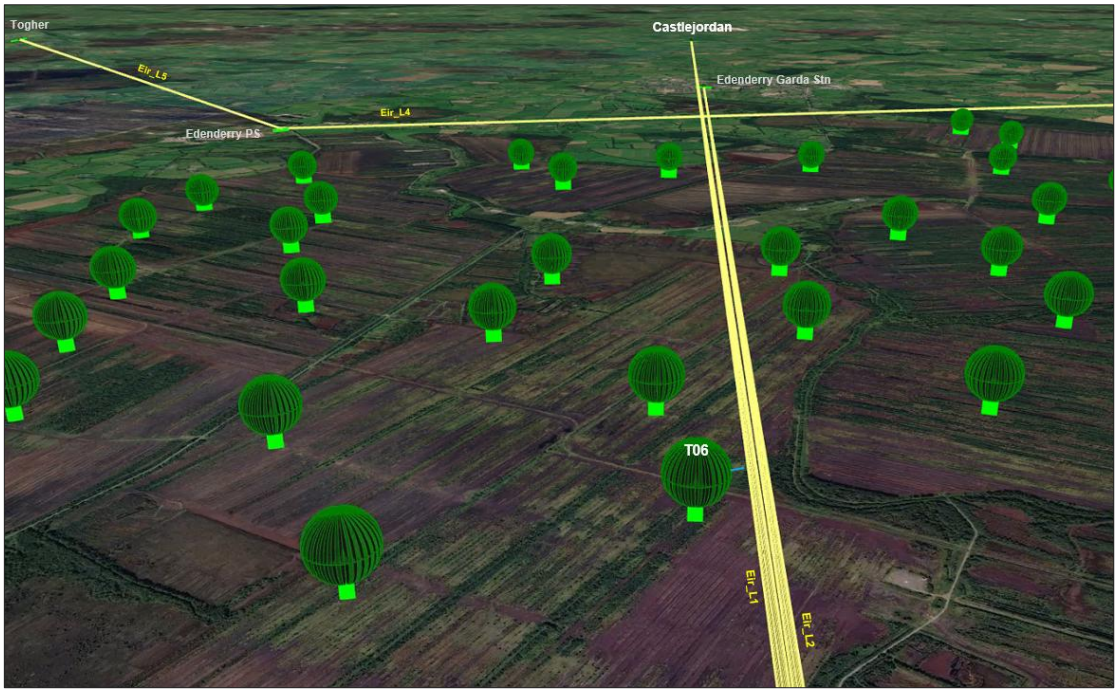


Figure 7. Eir Network – 3D View

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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.

Link ID	Link Description	Nearest Turbine	Fresnel Zone (F1) Clearance Distance	Observations
Eir_L1	Dunmurry Hill to Castlejordan	T06	38.9 m	No impacts.
Eir_L2	Dunmurry Hill to Edenderry Garda Stn	T06	> 50 m	No impacts.
Eir_L3	Dunmurry Hill to Clonbullouge	T14	> 50 m	No impacts.
Eir_L4	Edenderry P.S. to Carbury	T32	> 50 m	No impacts.
Eir_L5	Edenderry P.S. to Togher	T22	> 50 m	No impacts.

Table 5. Analysis Summary – Eir Network

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5.2 Enet Network Analysis

The Enet network in the vicinity of the proposed wind farm consists of one Point-to-Point (PTP) microwave radio link. The radio link is listed in Table 6 below and a Plan view of the Enet network is shown in Figure 8.

Link ID	Link Description
Enet_L1	PTP microwave radio link from Kippure to Lullymore Heritage Park

Table 6. Enet Radio Links requiring Analysis

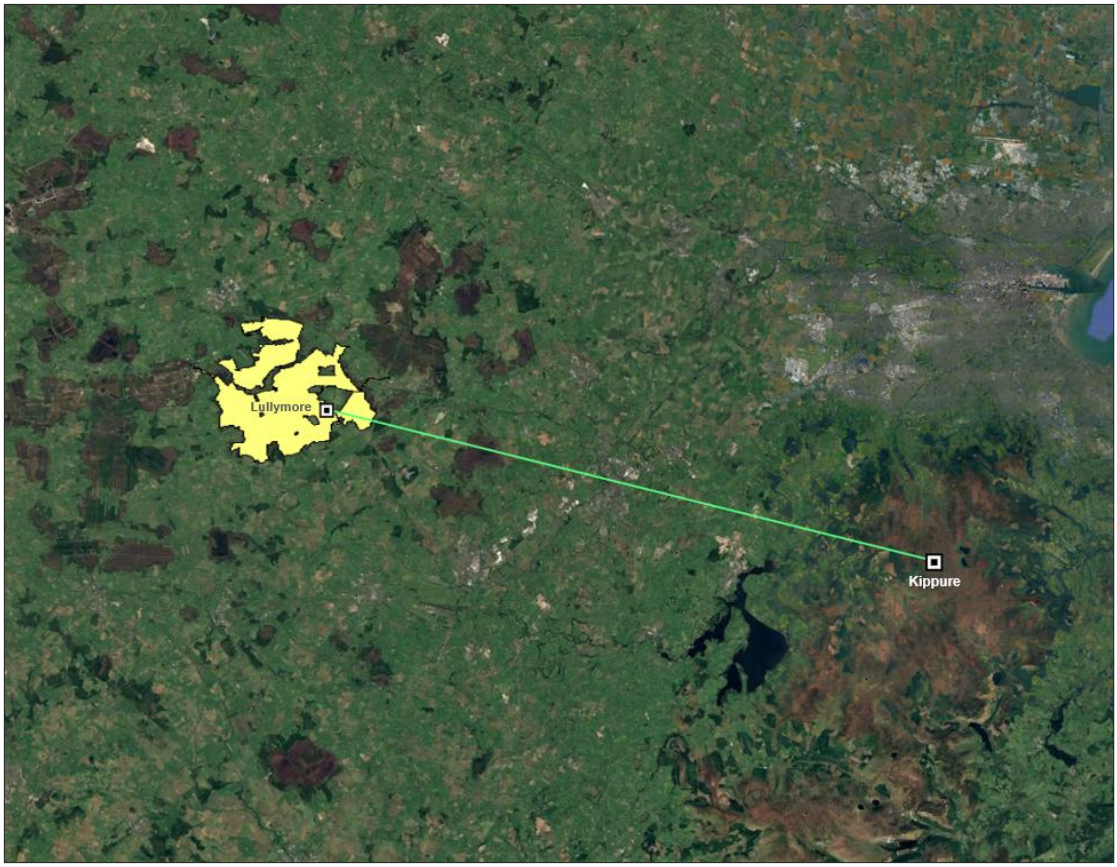


Figure 8. Enet Radio Network – Plan View

Figure 9 below shows a Close-up plan view of the Enet radio link relative to the proposed wind turbines. The plan view indicates that Enet_L1 would not be impacted by the proposed turbine layout.

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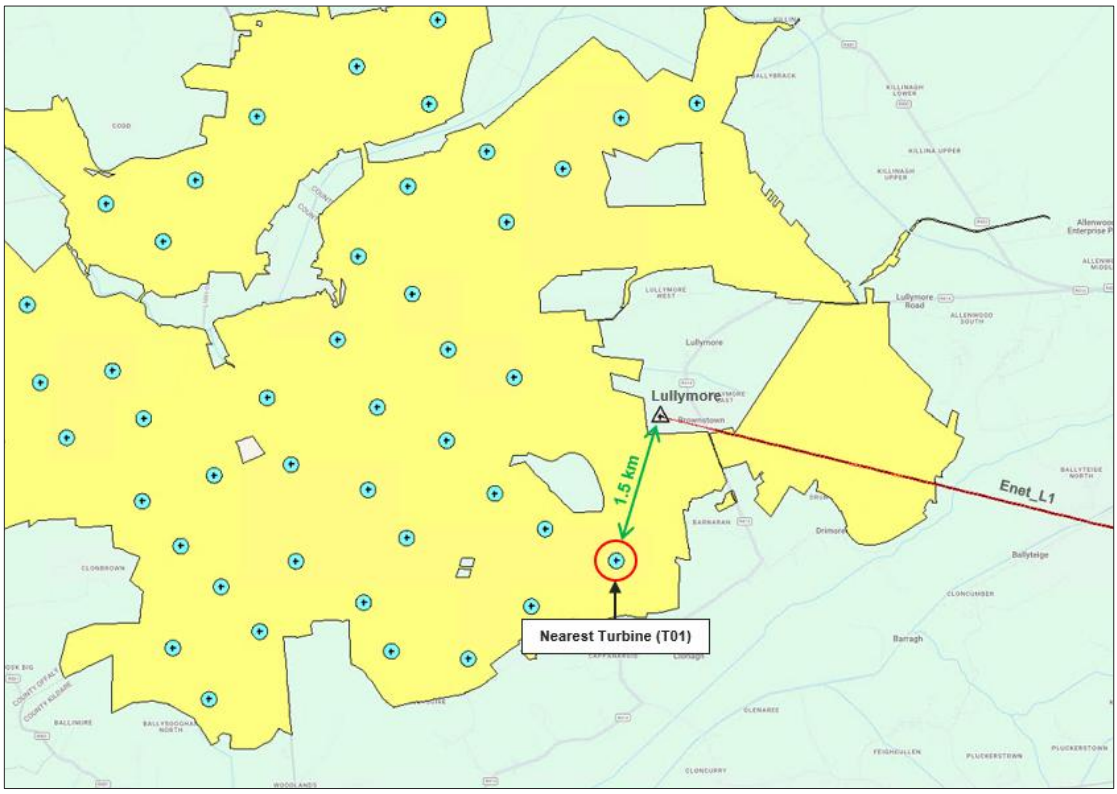


Figure 9. Enet Network – Close-up Plan View.

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

Link ID	Link Description	Nearest Turbine	Fresnel Zone (F1) Clearance Distance	Observations
Enet_L1	Kippure to Lullymore Heritage Park	T01	> 50 m	No impacts.

Table 7. Analysis Summary – Enet Network

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5.3 ESB Network Analysis

The ESB network in the vicinity of the proposed wind farm consists of three Point-to-Point (PTP) microwave radio links and one Point-to-Multipoint UHF radio link. The radio links are listed in Table 8 below and a Plan view of the ESB network is shown in Figure 10.

Link ID	Link Description
ESB_L1	PTP microwave radio link from Carbury to Kilcumber 110 kV
ESB_L2	PTP microwave radio link from Carbury to Ballyoskill
ESB_L3	PTP microwave radio link from Carbury to Turlough Hill
ESB_L4	PMP UHF radio link from Carbury to Cushaling

Table 8. ESB Radio Links requiring Analysis

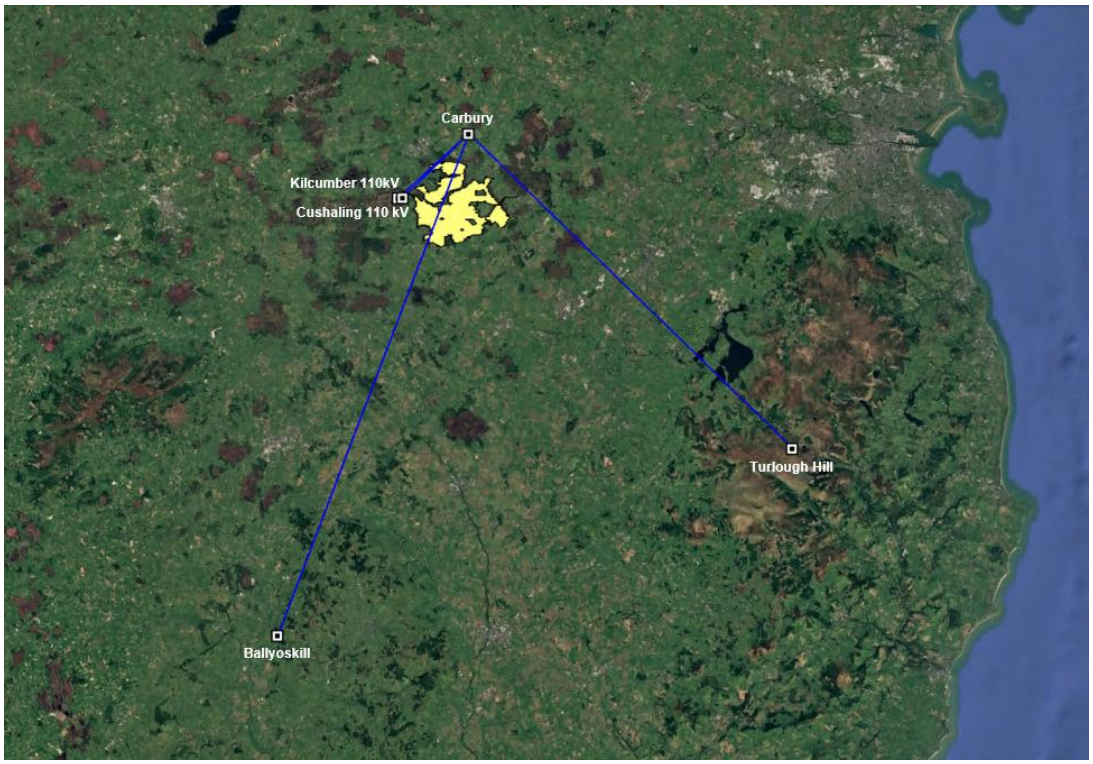


Figure 10. ESB Radio Network – Plan View

Figure 11 below shows a Close-up plan view of the ESB radio links relative to the proposed wind turbines. The plan view indicates that T27 would be relatively close to the ESB radio link between Carbury and Ballyoskill (ESB_L2).

It should be noted that all of the proposed Ballydermot turbines would be further from the ESB radio link than the existing turbines at Cushaling Wind Farm. The existing Cushaling turbines have been included in Figure 11 for reference purposes.

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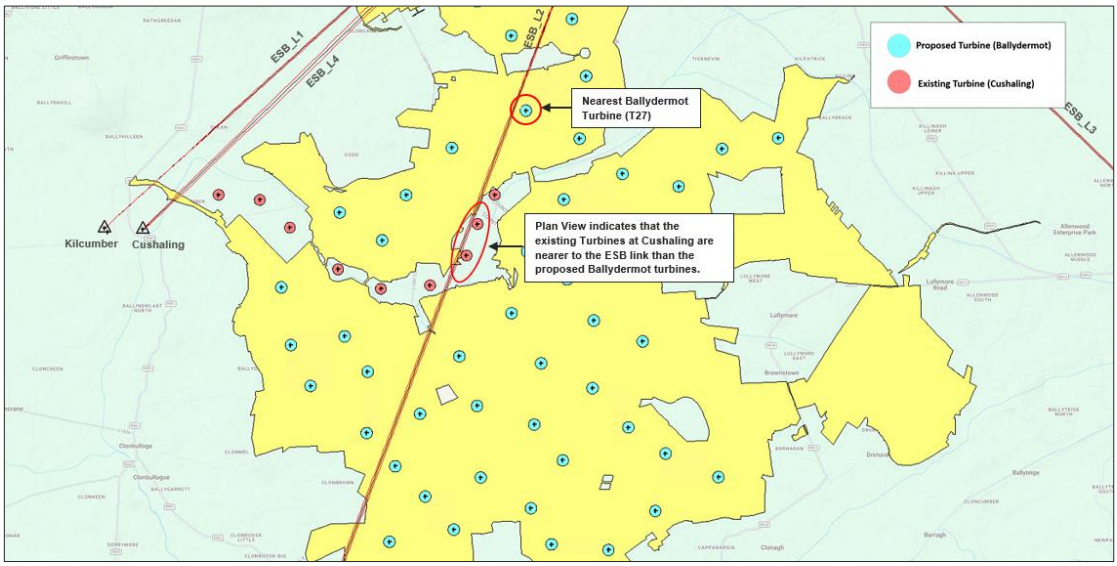


Figure 11. ESB Network – Close-up Plan View.

To further assess the potential impact of the proposed turbines, the radio links have been modelled in 3D and the Clearance Distances between the Fresnel Zone(s) of the links and the blade-tip of the turbines have been calculated.

A 3D view of the radio links is shown below in Figure 12. In the 3D View the proposed Ballydermot turbines are shown in green and (for reference purposes) the existing turbines at Cushaling are shown in pink.

The results of the 3D analysis indicate that T27 would not obstruct the Fresnel Zone of ESB_L3 (i.e. the operation of the ESB radio link network would not be impacted by the proposed Ballydermot turbines).

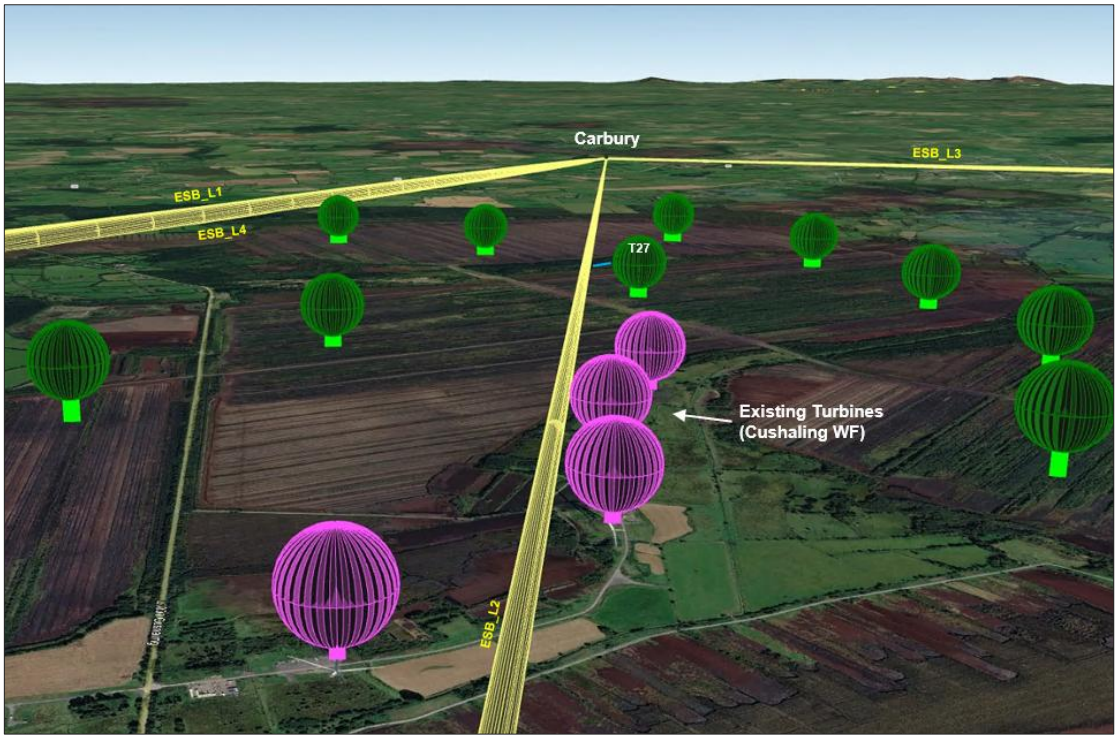


Figure 12. ESB Network – 3D View

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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.

Link ID	Link Description	Nearest Turbine	Fresnel Zone (F1) Clearance Distance	Observations
ESB_L1	Carbury to Kilcumber 110 kV	T32	> 50 m	No impacts.
ESB_L2	Carbury to Ballyoskill	T27	> 50 m	No impacts.
ESB_L3	Carbury to Turlough Hill	T46	> 50m	No impacts.
ESB_L4	Carbury to Cushaling (PMP)	T32	> 50 m	No impacts.

Table 9. Analysis Summary – ESB Network

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5.4 Three Ireland Network Analysis

The Three Ireland network in the vicinity of the proposed wind farm consists of three Point-to-Point (PTP) microwave radio links. The radio links are listed in Table 10 below and a Plan view of the Three Ireland network is shown in Figure 13.

Link ID	Link Description
3IRL_L1	PTP microwave radio link from Edenderry to Allenwood
3IRL_L2	PTP microwave radio link from Edenderry to Clonbulouge GAA
3IRL_L3	PTP microwave radio link from Clonbulouge GAA to Rathangan
3IRL_L4	PTP microwave radio link from Edenderry to Edenderry PS (Ballykilleen)

Table 10. Three Ireland Radio Links requiring Analysis

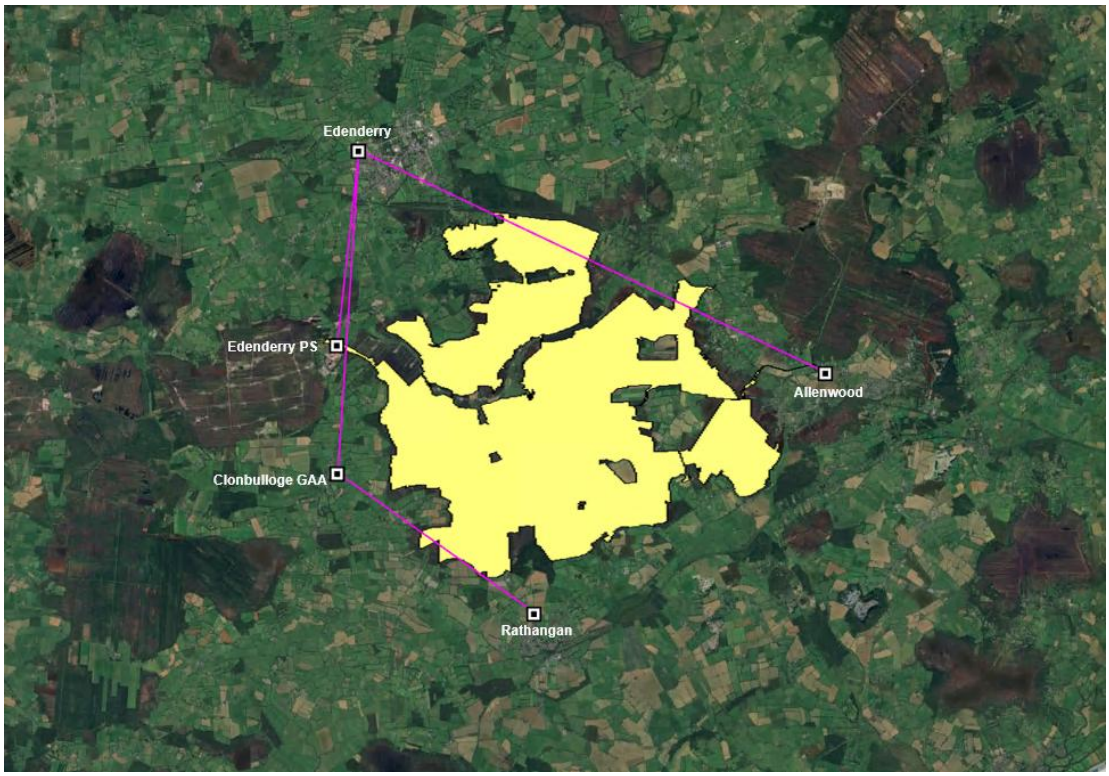


Figure 13. Three Ireland Radio Network – Plan View

Figure 14 below shows a plan view of the Three Ireland radio links relative to the proposed wind turbines. The plan view indicates that T30 would be relatively near to the Three Ireland microwave radio link between Edenderry and Allenwood (3IRL_L1).

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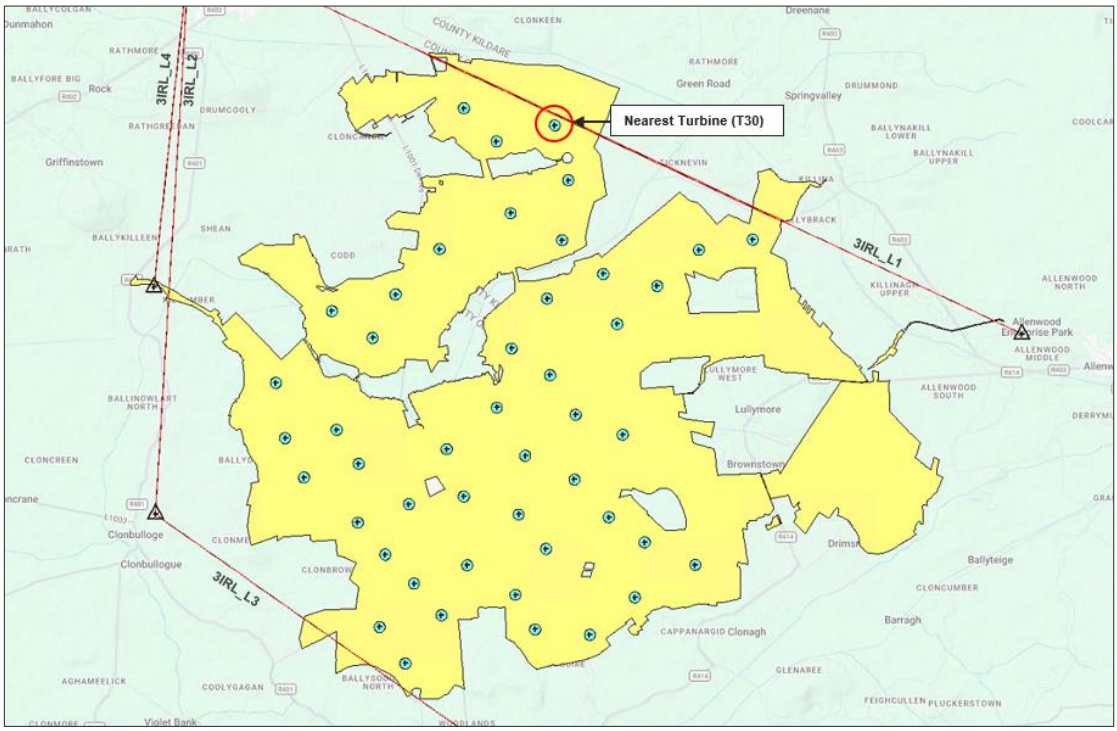


Figure 14. Three Ireland Network – Close-up Plan View.

To further assess the potential impact of the proposed turbines, the radio links have been modelled in 3D and the Clearance Distances between the Fresnel Zone(s) of the links and the blade-tip of the turbines have been calculated.

A 3D view of the microwave radio links is shown below in Figure 15. The results of the 3D analysis indicate that T30 would not obstruct the Fresnel Zone of the 3IRL_L1 (i.e. the operation of the Three Ireland radio link network would not be impacted).

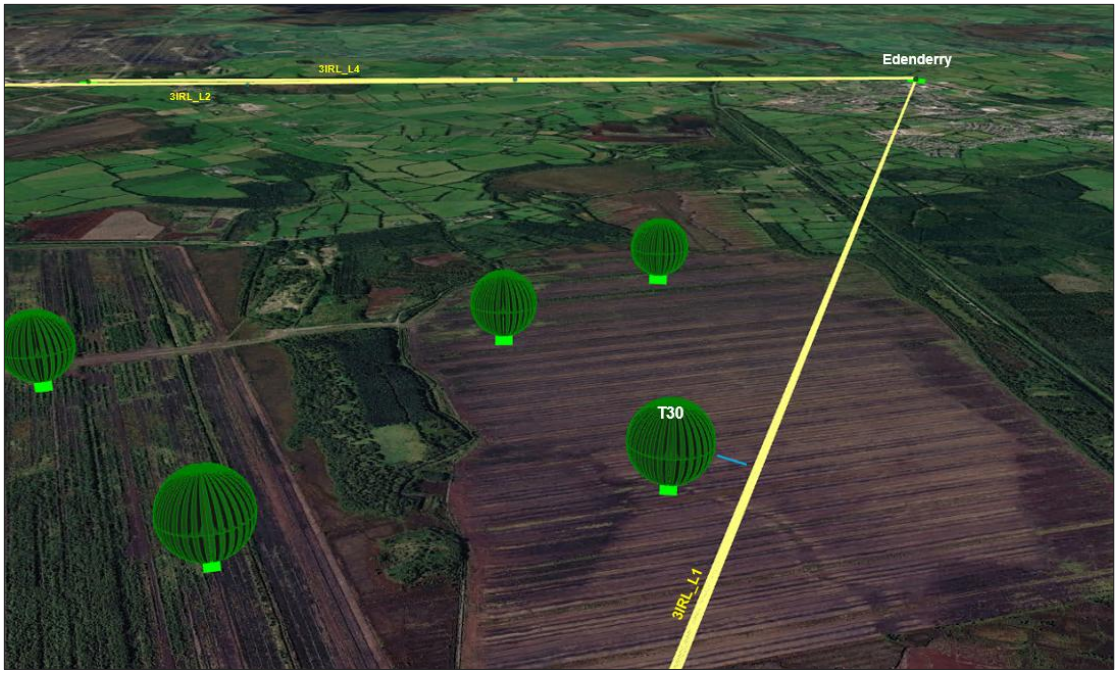


Figure 15. Three Ireland Network – 3D View

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

Link ID	Link Description	Nearest Turbine	Fresnel Zone (F1) Clearance / Interference	Observations
3IRL_L1	Edenderry to Allenwood	T30	> 50 m	No impacts.
3IRL_L2	Edenderry to Clonbulouge GAA	T22	> 50 m	No impacts.
3IRL_L3	Clonbulouge GAA to Rathangan	T14	> 50 m	No impacts.
3IRL_L4	Edenderry to Edenderry PS (Ballykilleen)	T22	> 50 m	No impacts.

Table 11. Analysis Summary – Three Ireland Network

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5.5 Virgin Media Network Analysis

The Virgin Media network in the vicinity of the proposed wind farm consists of eight Point-to-Point (PTP) microwave radio links. The radio links are listed in Table 12 below and a plan view of the Virgin Media network is shown in Figure 16.

Link ID	Link Description
VM_L1	PTP microwave radio link from Rochfortbridge Convent to VM Dunmurry
VM_L2	PTP microwave radio link from Gaelscoil Eadan Doire to VM Dunmurry
VM_L3	PTP microwave radio link from Oaklands Community College to VM Dunmurry
VM_L4	PTP microwave radio link from Saint Marys Secondary School to VM Dunmurry
VM_L5	PTP microwave radio link from St Etchens N.S. to VM Dunmurry
VM_L6	PTP microwave radio link from Cloch Rinnce N.S. to VM Dunmurry
VM_L7	PTP microwave radio link from Johnstown Est Hotel to VM Dunmurry
VM_L8	PTP microwave radio link from Irish Explosives to VM Dunmurry

Table 12. Virgin Media Radio Links requiring Analysis

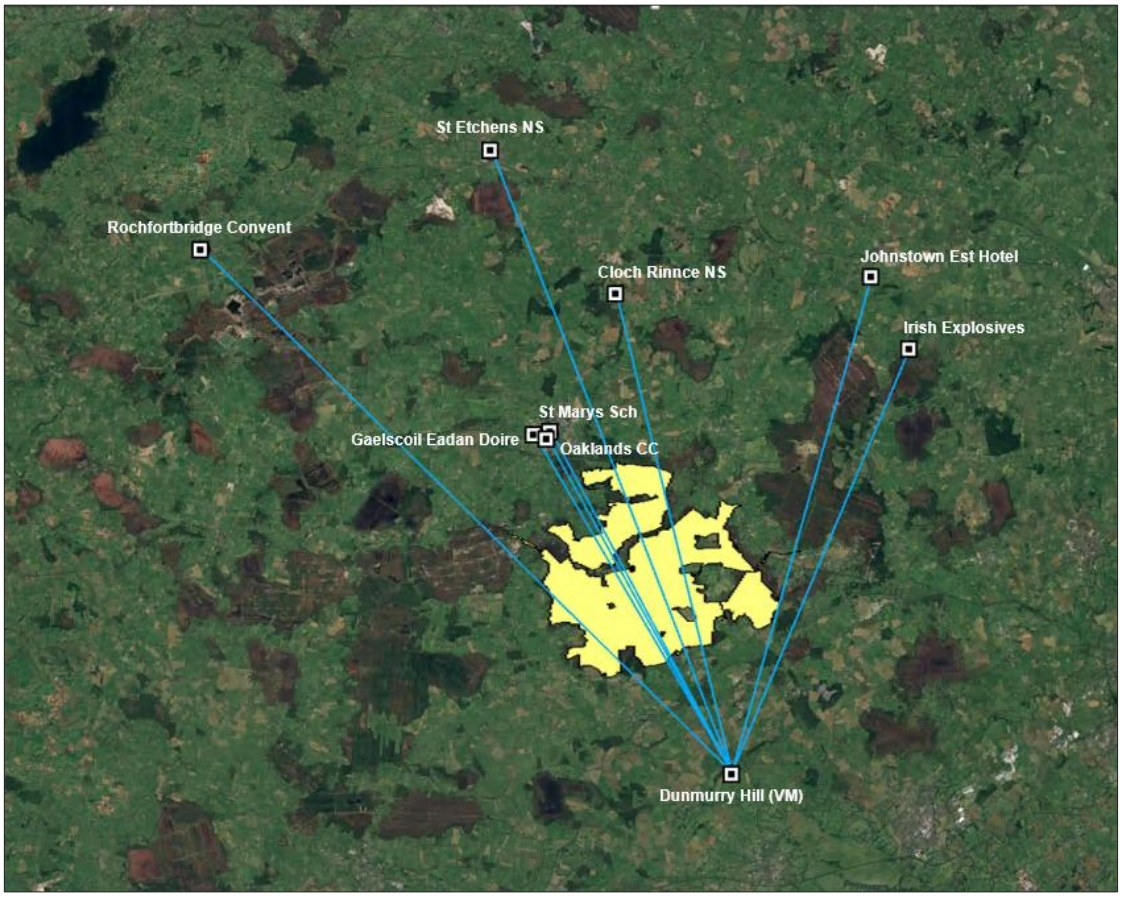


Figure 16. Virgin Media Radio Network – Plan View

Figure 17 below shows a Close-up plan view of the Virgin Media radio links relative to the proposed wind turbines. The plan view indicates that four of the Virgin Media radio links could be impacted by the proposed turbine layout (VM_L2, VM_L4, VM_5 and VM_L6).

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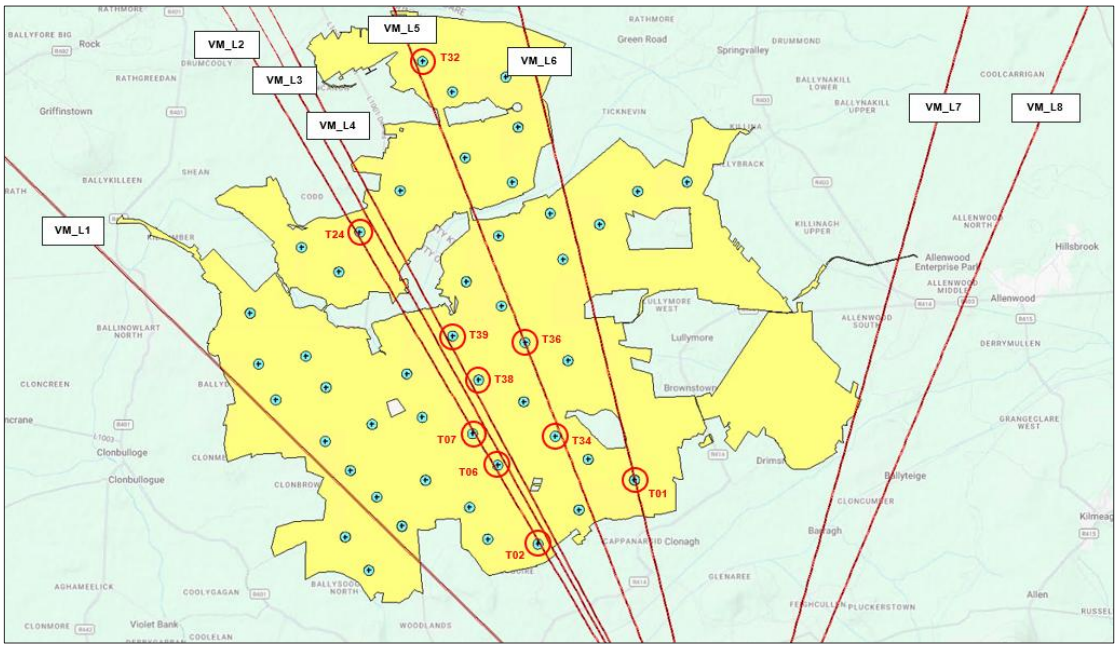


Figure 17. Virgin Media Network – Close-up Plan View

To further assess the potential impact of the proposed turbines, the radio links have been modelled in 3D and the Clearance Distances between the Fresnel Zone(s) of the links and the blade-tip of the turbines have been calculated.

A 3D view of the radio links is shown below in Figure 18. The results of the 3D analysis indicate that the radio path of three Virgin Media radio links would be obstructed by the proposed turbines (VM_L2, VM_L5 and VM_L6).

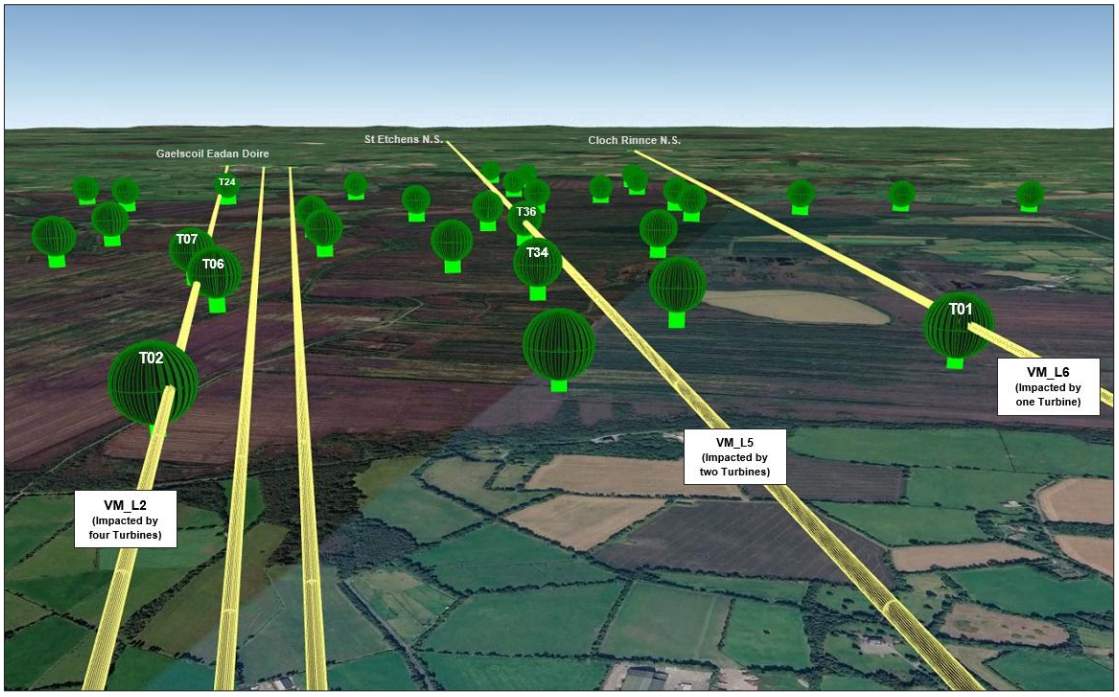


Figure 18. Virgin Media Network – 3D View

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

Link ID	Link Description	Nearest Turbine(s)	Fresnel Zone (F1) Clearance Distance	Observations
VM_L1	Rochfortbridge Convent to VM Dunmurry	T12	> 50 m	No impacts.
VM_L2	Gaelscoil Eadan Doire to VM Dunmurry	T02	- 60.5 m (Interference Condition)	Link impacted by four turbines (T02, T06, T07 & T24) (Mitigation measures required)
		T06	- 31.8 m (Interference Condition)	
		T07	- 45.3 m (Interference Condition)	
		T24	- 8.6 m (Interference Condition)	
VM_L3	Oaklands Community College to VM Dunmurry	T06	35.6 m	No impacts.
VM_L4	Saint Marys Secondary School to VM Dunmurry	T39	20.2 m	No impacts.
VM_L5	St Etchens NS to VM Dunmurry	T32	22.3 m	Likely to be Impacted by two turbines (T34 & T36) (Mitigation measures required)
		T34	< 5 m (Clearance = 1.8 m)	
		T36	- 81.5 m (Interference Condition)	
		T40	47.0 m	
VM_L6	Cloch Rinnce NS to VM Dunmurry	T01	- 82.2 m (Interference Condition)	Link impacted by one turbine (T01) (Mitigation measures required)
VM_L7	Johnstown Est Hotel to VM Dunmurry	T01	> 50 m	No impacts.
VM_L8	Irish Explosives to VM Dunmurry	T01	> 50 m	No impacts.

Table 13. Analysis Summary – Virgin Media Network

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5.6 Vodafone Network Analysis

The Vodafone network in the vicinity of the proposed wind farm consists of six Point-to-Point (PTP) microwave radio links. The radio links are listed in Table 14 below and a Plan view of the Vodafone network is shown in Figure 19.

Link ID	Link Description
VF_L1	PTP microwave radio link from Ballybrack to Coolaght
VF_L2	PTP microwave radio link from Dunmurry Hill to Edenderry Power Station
VF_L3	PTP microwave radio link from Dunmurry Hill to Blake 110kV Station
VF_L4	PTP microwave radio link from Christianstown to Ballybrack
VF_L5	PTP microwave radio link from Ballybrack to Carbury
VF_L6	PTP microwave radio link from Ballinla to Ballykilleen

Table 14. Vodafone Radio Links requiring Analysis

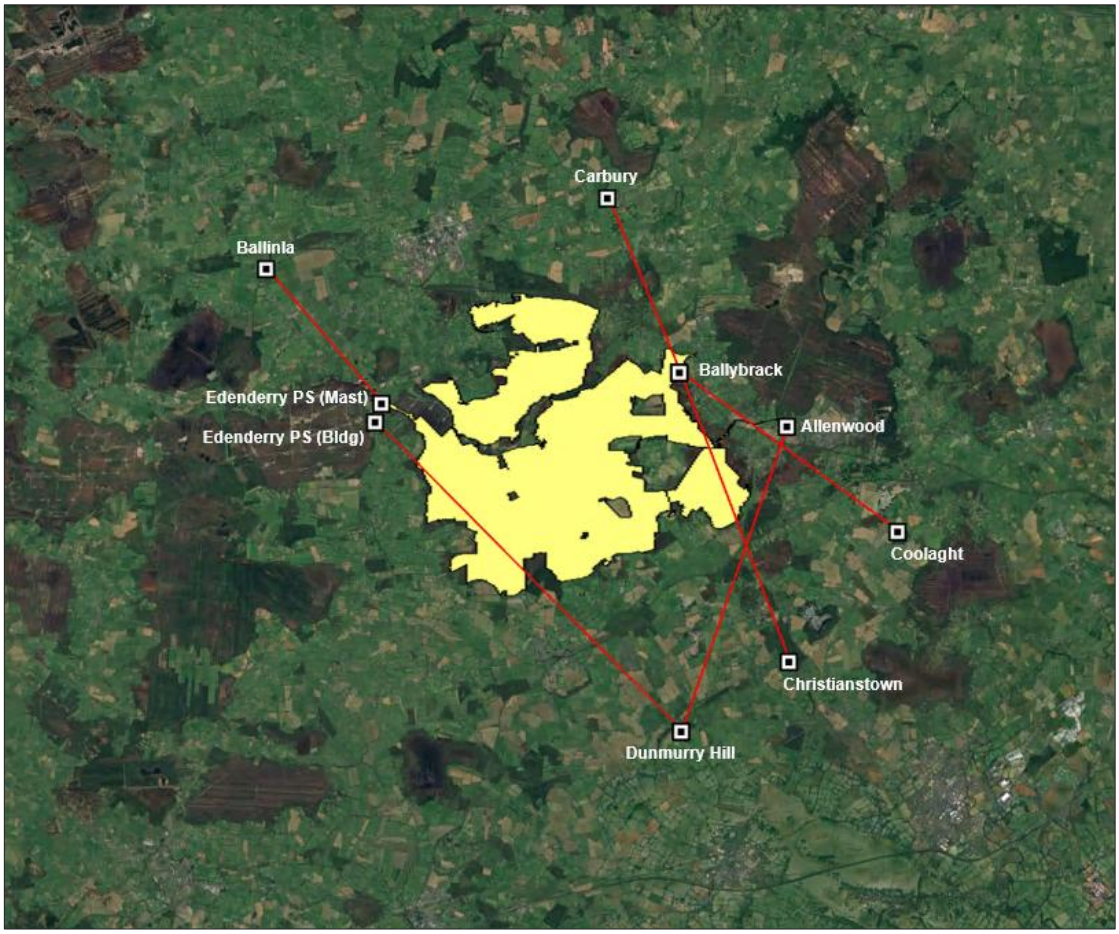


Figure 19. Vodafone Radio Network – Plan View

Figure 20 below shows a Close-up Plan View of the Vodafone radio links relative to the proposed wind turbines. The plan view indicates that T12 would be relatively near to the Vodafone Radio link between Dunmurry Hill and Edenderry Power Station (VF_L2).

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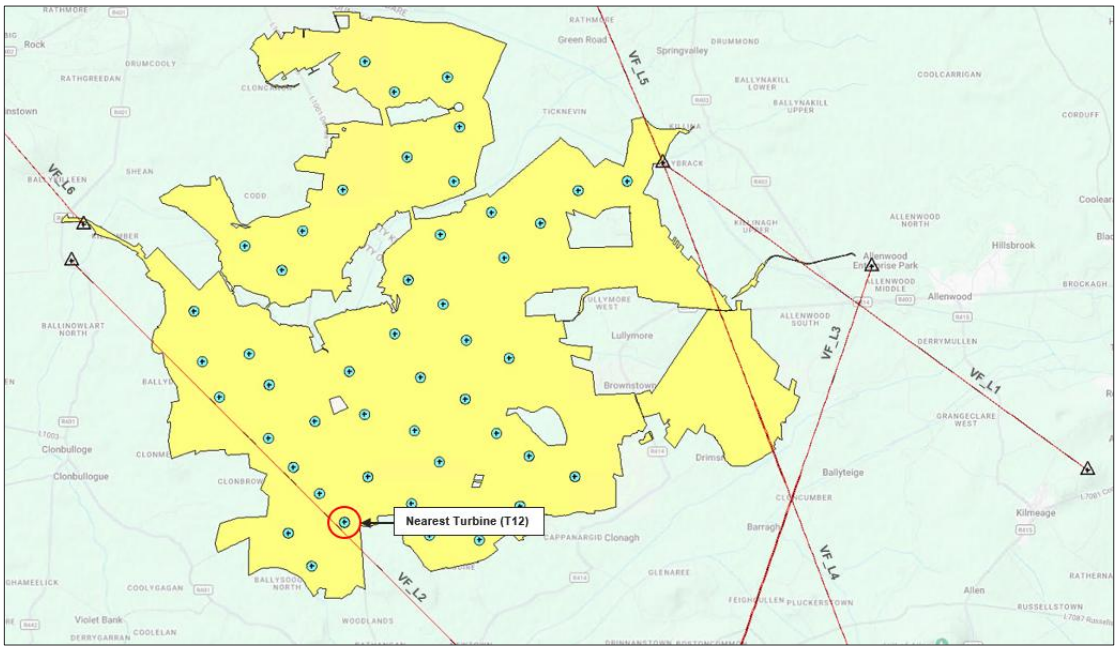


Figure 20. Vodafone Network – Close-up Plan View

To further assess the potential impact of the proposed turbines, the radio links have been modelled in 3D and the Clearance Distances between the Fresnel Zone(s) of the links and the blade-tip of the turbines have been calculated.

A 3D view of the microwave radio links is shown below in Figure 21. The results of the 3D analysis indicate that T12 would not obstruct the Fresnel Zone of VF_L2 (i.e. the operation of the Vodafone radio link network would not be impacted).

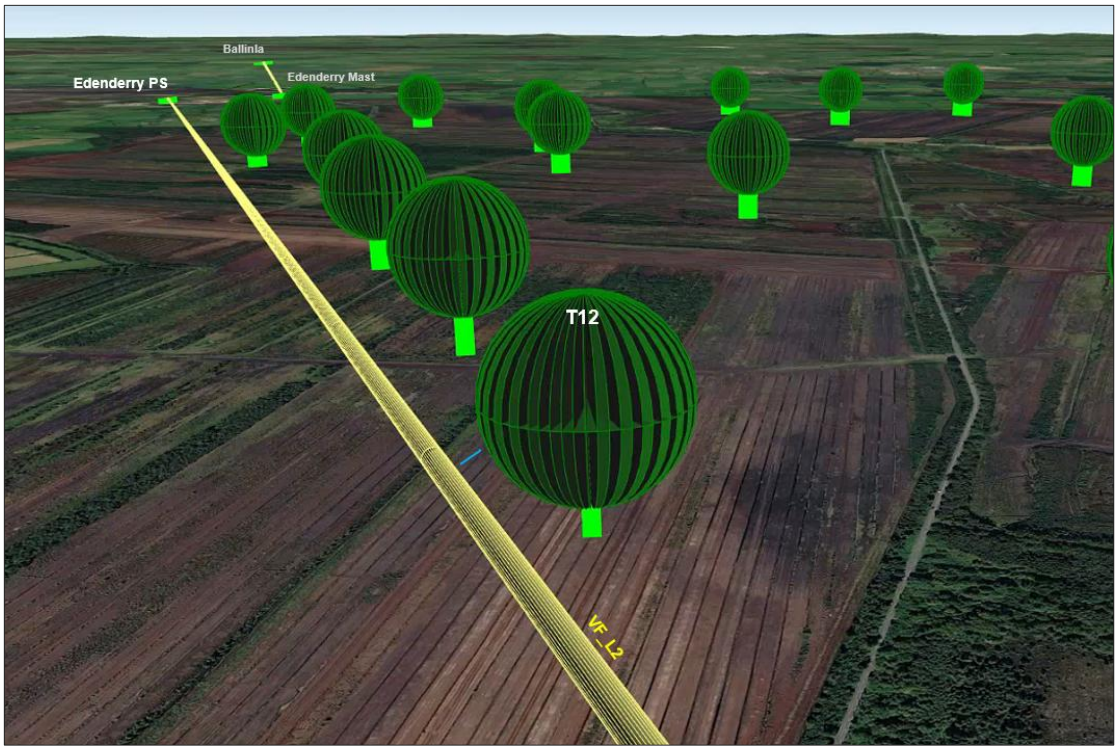


Figure 21. Vodafone Network – 3D View

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Table 15 below provides a brief summary of the network analysis for the Vodafone network in the vicinity of the proposed wind farm.

Link ID	Link Description	Nearest Turbine	Fresnel Zone (F1) Clearance Distance	Observations
VF_L1	Ballybrack to Coolaght	T46	> 50 m	No Impacts.
VF_L2	Dunmurry Hill to Edenderry Power Station	T12	38.4 m	No Impacts.
VF_L3	Dunmurry Hill to Allenwood (Blake 110kV Station)	T01	> 50 m	No Impacts.
VF_L4	Christianstown to Ballybrack	T46	> 50 m	No Impacts.
VF_L5	Ballybrack to Carbury	T46	> 50 m	No Impacts.
VF_L6	Ballinla to Edenderry PS (Ballykilleen)	T22	> 50 m	No Impacts.

Table 15. Analysis Summary – Vodafone Network

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Section 6 - Mitigation Measures

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6. Mitigation Measures

Section 6.1 that follows, describes the mitigation measures available to the wind farm developer to offset any potential impacts due to the proposed turbine layout on the Virgin Media Network.

6.1 Mitigation Measure Options – Virgin Media Network

To offset any potential impacts due to the proposed turbines on the Virgin Media radio network the following mitigation solutions have been assessed:

i) Re-route the impacted radio links via an alternative Virgin Media POP site.

ii) Relay the impacted radio links via a relay-mast located within the proposed wind farm site.

iii) Replace the impacted radio links with fibre broadband connections.

An assessment of each of these mitigation measure solutions is provided in Section 6.2.1 to Section 6.2.3 that follow.

6.1.1 Re-route the impacted radio links via an alternative Virgin Media POP Site.

Another option to mitigate for the impacted radio links would be to use an alternative POP site (Point-of-Presence) to provide a radio link into each of the impacted sites. Figure 22 below illustrates how the telecoms mast-site at Saggart could be used as an alternative POP site to provide a service into each of the impacted Virgin Media customer sites.

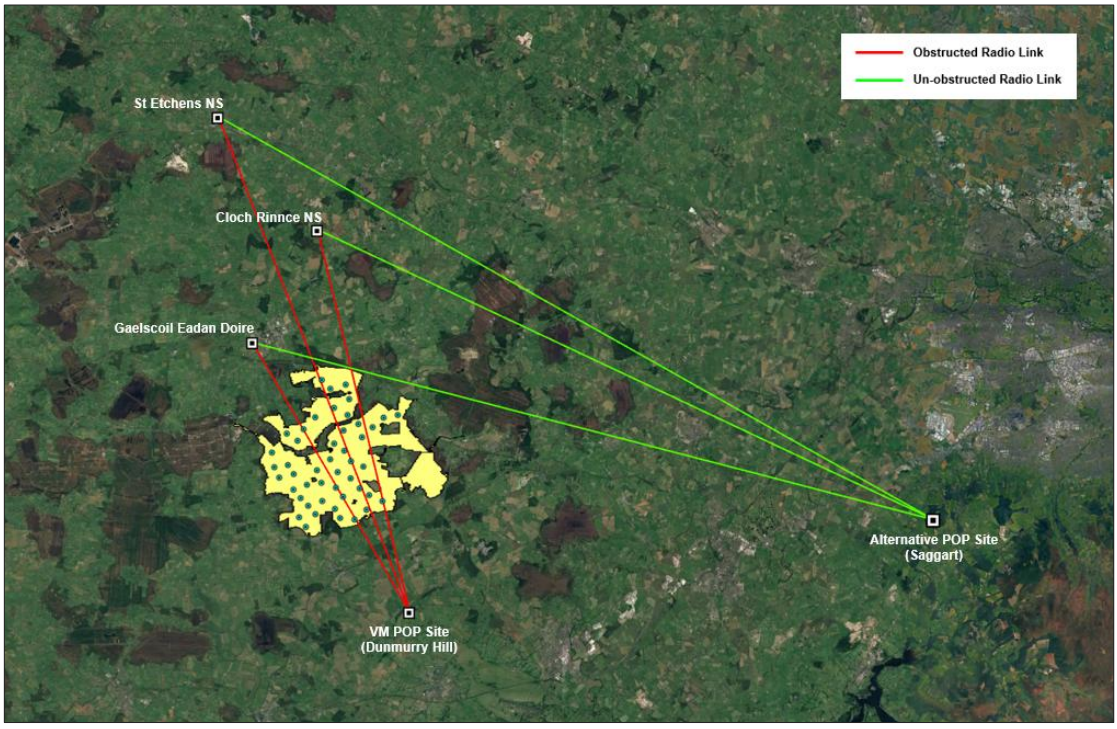


Figure 22. Example of how an alternative feeder-site could be used to mitigate the effects of obstructing turbines

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To determine if the telecoms mast-site at Saggart could be used for a viable radio connection into each of the impacted sites, radio link path profiles have been generated.

Radio link budgets were also carried out to determine if the proposed radio links would meet the radio link availability criteria required by ComReg for radio licensing.

The radio link path profiles and radio link budget are based on the following ITU-R recommendations:

- ITU-R P.525-2
- ITU-R P.526-11
- ITU-R P.676-8

The radio path profiles are shown in Sections 6.1.1.1 to 6.1.1.3 that follow. The radio link budgets can be found in Appendix C.

6.1.1.1 Path Profile – Saggart to Gaelscoil Eadan Doire

The radio link path profile shows clear Line-of-Sight (LOS) and the link budget results would pass the radio availability criteria required by ComReg.

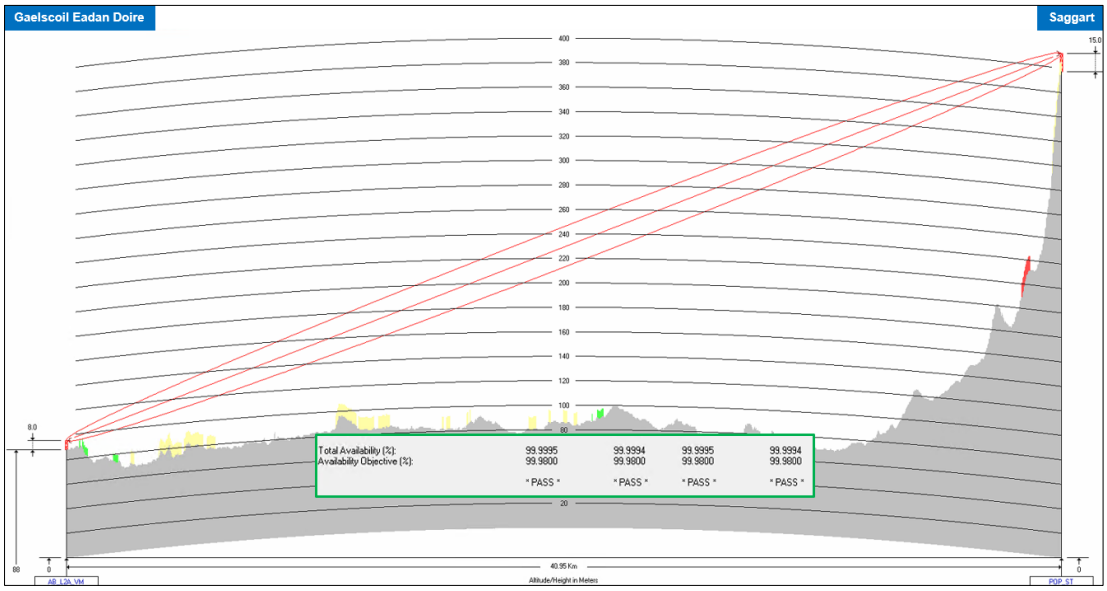


Figure 23. Path Profile – Saggart to Gaelscoil Eadan Doire

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6.1.1.2 Path Profile – Saggart to St Etchens N.S.

The radio link path profile shows clear Line-of-Sight (LOS) and the link budget results would pass the radio availability criteria required by ComReg.

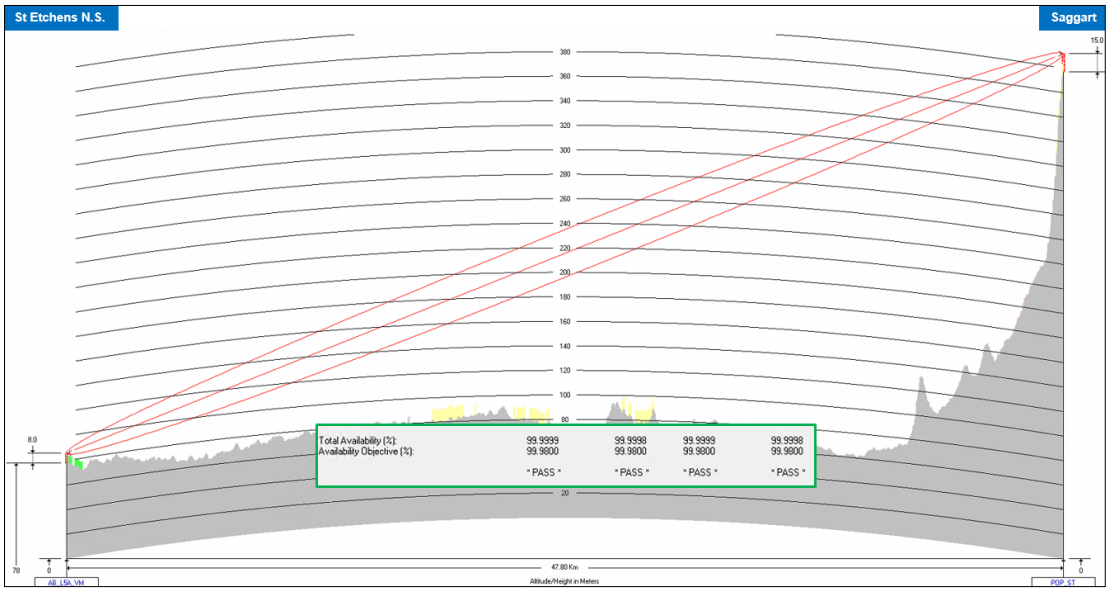


Figure 24. Path Profile – Saggart to St Etchens N.S.

6.1.1.3 Path Profile – Saggart to Cloch Rinnce N.S.

The radio link path profile shows clear Line-of-Sight (LOS) and the link budget results would pass the radio availability criteria required by ComReg.

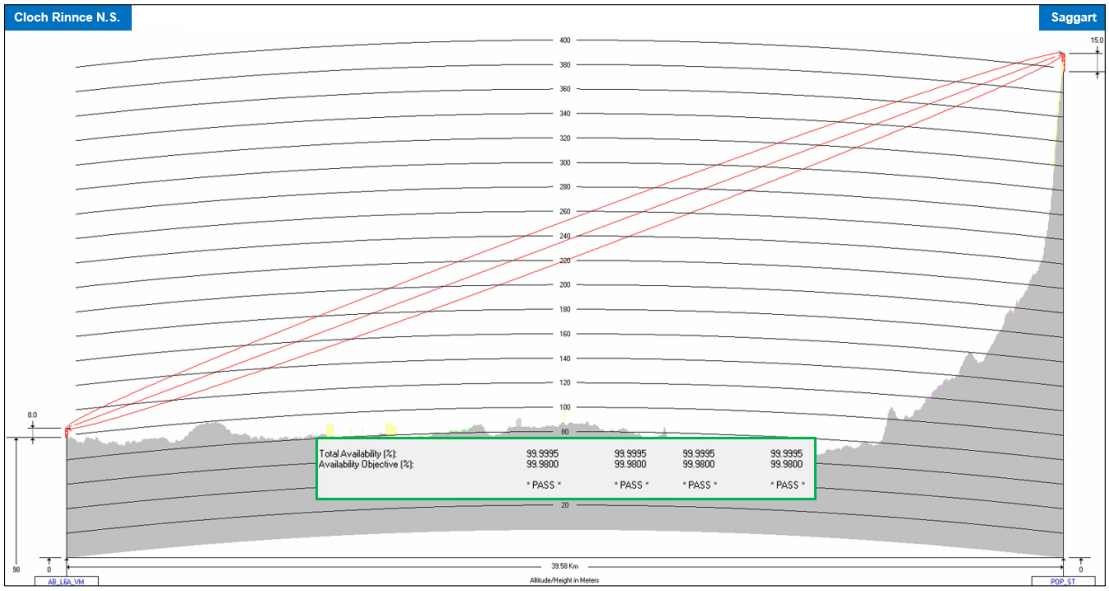


Figure 25. Path Profile – Saggart to Cloch Rinnce N.S.

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Table 16 below provides a summary of the assessment of this mitigation measure option (i.e. re-routing impacted radio links from an alternative POP site).

Mitigation Measure	Impacted Link	Alternative POP site	Observations
Re-route the impacted radio link via an alternative Virgin Media POP Site.	VM_L2 (Gaelscoil Eadan Doire)	Saggart	Radio link analysis indicates that a radio link re-route from Saggart is a viable mitigation solution.
	VM_L5 (St Etchens N.S.)	Saggart	Radio link analysis indicates that a radio link re-route from Saggart is a viable mitigation solution.
	VM_L6 (Cloch Rinnce N.S.)	Saggart	Radio link analysis indicates that a radio link re-route from Saggart is a viable mitigation solution.

Table 16. Mitigation Measure Assessment Summary (VM) – Re-route from Alterative POP Site

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6.1.2 Relay the impacted radio links via a relay-mast located within the proposed wind farm site.

An alternative option to mitigate for the impacts radio links would be to use a relay mast located within the wind farm site boundary. Figure 26 below illustrates how a relay mast could be used to relay the Virgin Media links from Dunmurry Hill onwards to each of the B-end sites.

It should be noted that the location available for a relay-mast is restricted by; topography, the turbine density of the proposed development, existing turbines at Cushaling and other environmental constraints.

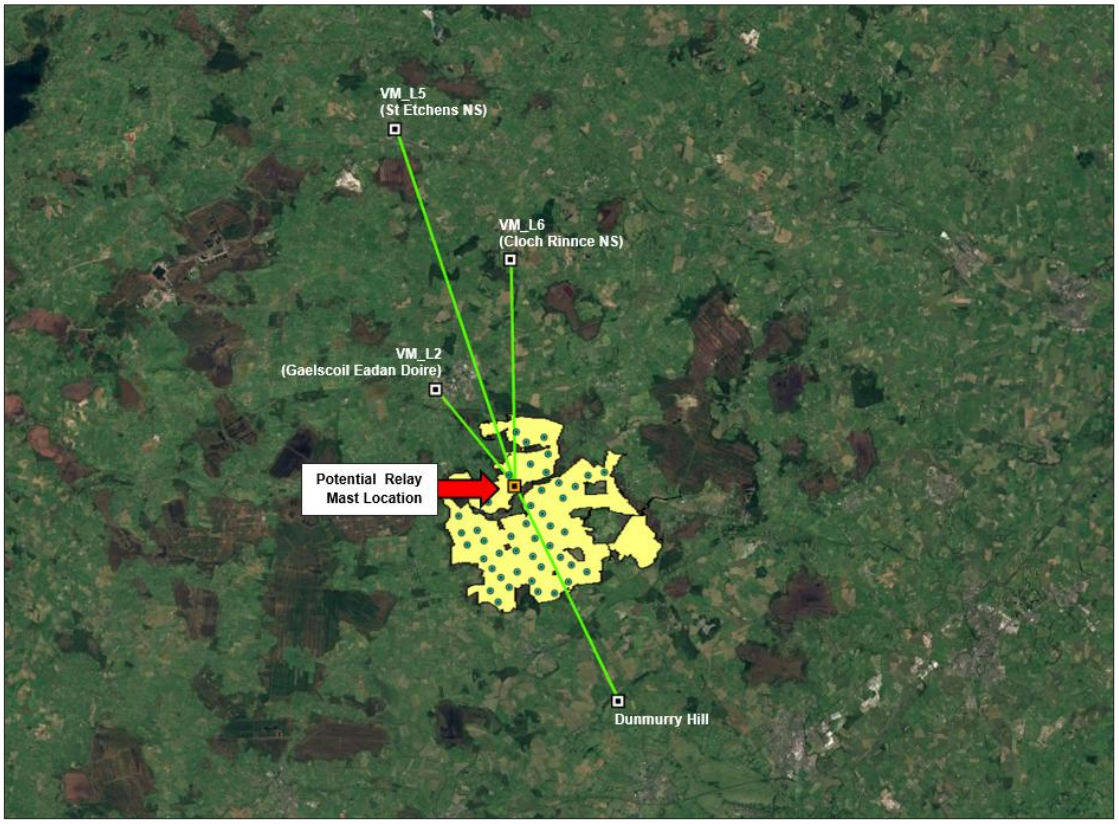


Figure 26. Example of how a relay-mast could be used relay links VM_L2, VM_L5 and VM_L6.

To determine if a relay-mast at the location shown above could be used to facilitate viable connections to the Virgin Media B-End sites (customer sites) from Dunmurry Hill, radio link path profiles were generated. Radio link budgets were also carried out to determine if the proposed radio links would meet the Radio Link Availability Criteria required by ComReg for radio licensing.

The radio link path profiles and radio link budget are based on the following ITU-R recommendations:

- ITU-R P.525-2
- ITU-R P.526-11
- ITU-R P.676-8

The radio path profiles are shown in Sections 6.1.2.1 to 6.1.2.4 that follow. The radio link budgets can be found in Appendix D.

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6.1.2.1 Path Profile – Dunmurry Hill to Relay Mast

The radio link path profile shows clear Line-of-Sight (LOS) and the link budget results would pass the radio availability criteria required by ComReg. (The required radio antenna installation height on the relay-mast would be at least 15m).

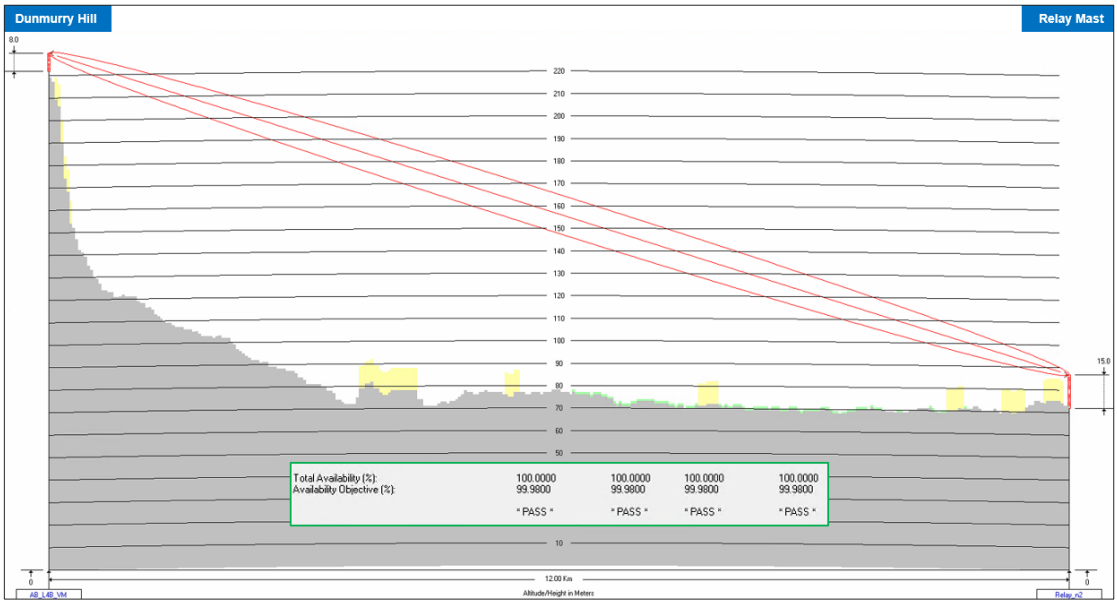


Figure 27. Path Profile - Dunmurry Hill to Relay Mast

6.1.2.2 Path Profile – Relay Mast to Gaelscoil Eadan Doire

The radio link path profile shows clear Line-of-Sight (LOS) and the link budget results would pass the radio availability criteria required by ComReg. (The required radio antenna installation height on the relay-mast would be at least 30m).

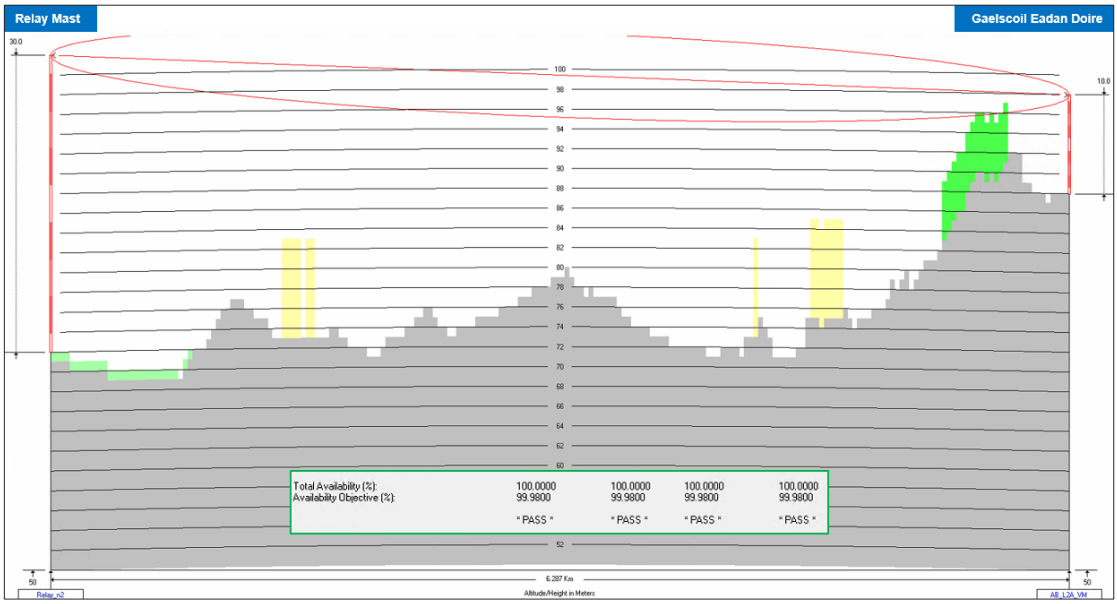


Figure 28. Path Profile - Relay Mast to Gaelscoil Eadan Doire

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6.1.2.3 Path Profile – Relay Mast to St Etchens N.S.

The radio link path profile shows clear Line-of-Sight (LOS) and the link budget results would pass the radio availability criteria required by ComReg. (The required radio antenna installation height on the relay-mast would be at least 60m).

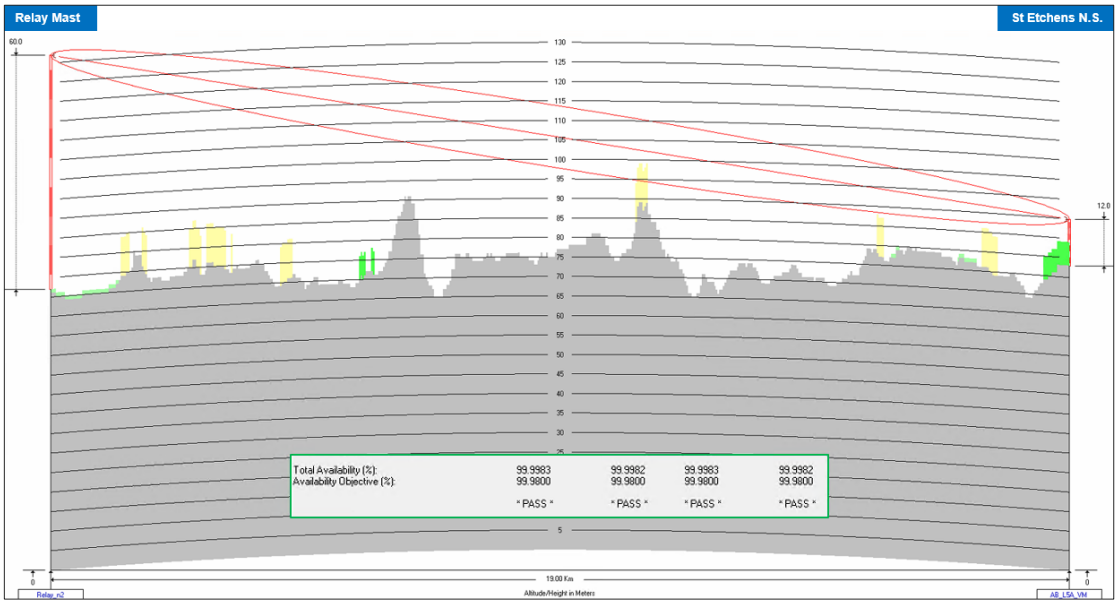


Figure 29. Path Profile - Relay Mast to St Etchens N.S.

6.1.2.4 Path Profile – Relay Mast to Cloch Rinnce N.S.

The radio link path profile shows clear Line-of-Sight (LOS) and the link budget results would pass the radio availability criteria required by ComReg. (The required radio antenna installation height on the relay-mast would be at least 25m).

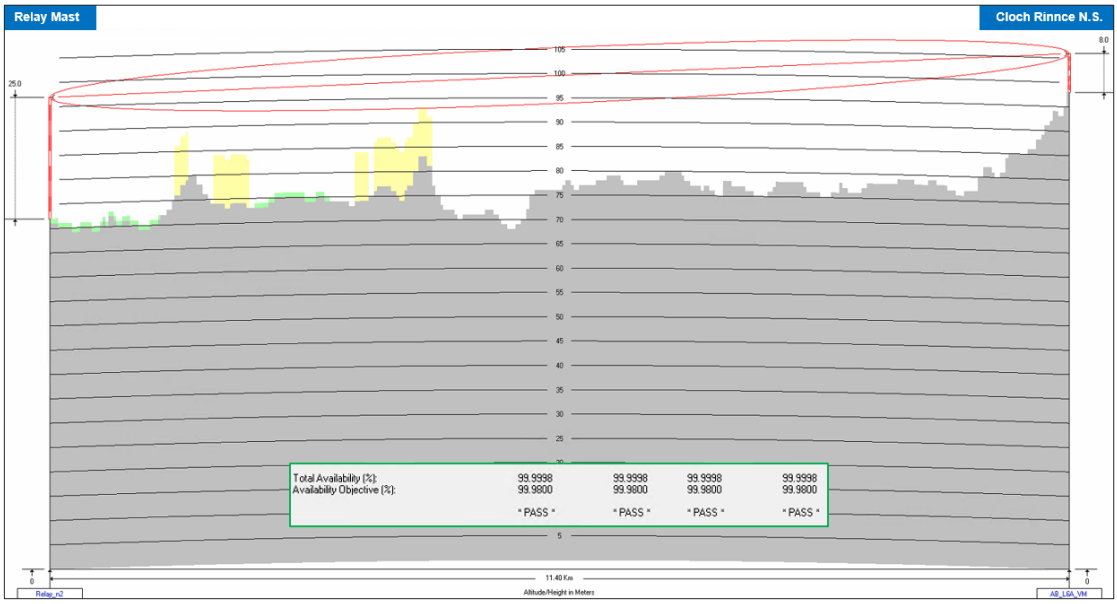


Figure 30. Path Profile - Relay Mast to Cloch Rinnce N.S.

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The path profiles and radio link budgets indicate that a relay-mast at the proposed location could be used to mitigate for the impacted Virgin Media radio links.

To facilitate relay links to all three of the impacted sites, a relay-mast of 60 meters in height would be required. The mast would also be required to be of met-mast grade, and rated for a load capacity for four microwave radio antennas (i.e. one antenna to Dunmurry Hill, and one to each of the three B-ends).

Table 17 below provides a summary of the assessment of this mitigation measure option (i.e. use a relay-mast to facilitate an unobstructed (relay) radio path from Dunmurry Hill to the impacted Virgin Media sites).

Mitigation Measure	Impacted Link	Observations
Relay-mast located within the proposed wind farm site.	VM_L2 (Gaelscoil Eadan Doire)	Radio link analysis indicates that this is a viable mitigation solution. (Antenna to Gaelscoil Eadan Doire would be required to be installed at a height of at least 30 m on the relay-mast.)
	VM_L5 (St Etchens N.S.)	Radio link analysis indicates that this is a viable mitigation solution. (Antenna to St Etchens N.S would be required to be installed at a height of at least 60 m on the relay-mast.)
	VM_L6 (Cloch Rinnce N.S.)	Radio link analysis indicates that this is a viable mitigation solution. (Antenna to Cloch Rinnce N.S. would be required to be installed at a height of at least 25 m on the relay-mast.)

Table 17. Mitigation Measure Assessment Summary (VM) – Relay Mast

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6.1.3 Replace impacted radio link with a fibre broadband connection

An alternative to a radio link connection to each of the impacted Virgin Media sites, would be a fibre broadband connection. In May 2025, Virgin Media announced that the company is upgrading its network to fibre, with current connectivity available to 550,000 premises, the company has a target of reaching 1 million premises by 2026.

In achieving this objective, Virgin Media have agreements in place with wholesale fibre broadband providers; including NBI (National Broadband Ireland) and Siro. The agreements permits Virgin Media to deliver services over the NBI and Siro fibre networks.

An assessment of the fibre availability at each of the impacted Virgin Media sites is provided below in Section 6.2.4.1 to Section 6.4.2.3

6.1.3.1 Fibre Broadband Availably - Gaelscoil Eadan Doire

Virgin Media's fibre broadband checker does not show current availability at Gaelscoil Eadan Doire. However, the broadband checker shows that fibre connectivity is available at properties that are adjacent to the Gaelscoil (via the Siro Network).

As there is fibre available adjacent Gaelscoil, facilitating a fibre connection to the Gaelscoil should be a relatively straight-forward process. For this reason, a fibre connection to Gaelscoil Eadan Doire is considered to be a viable mitigation measure.

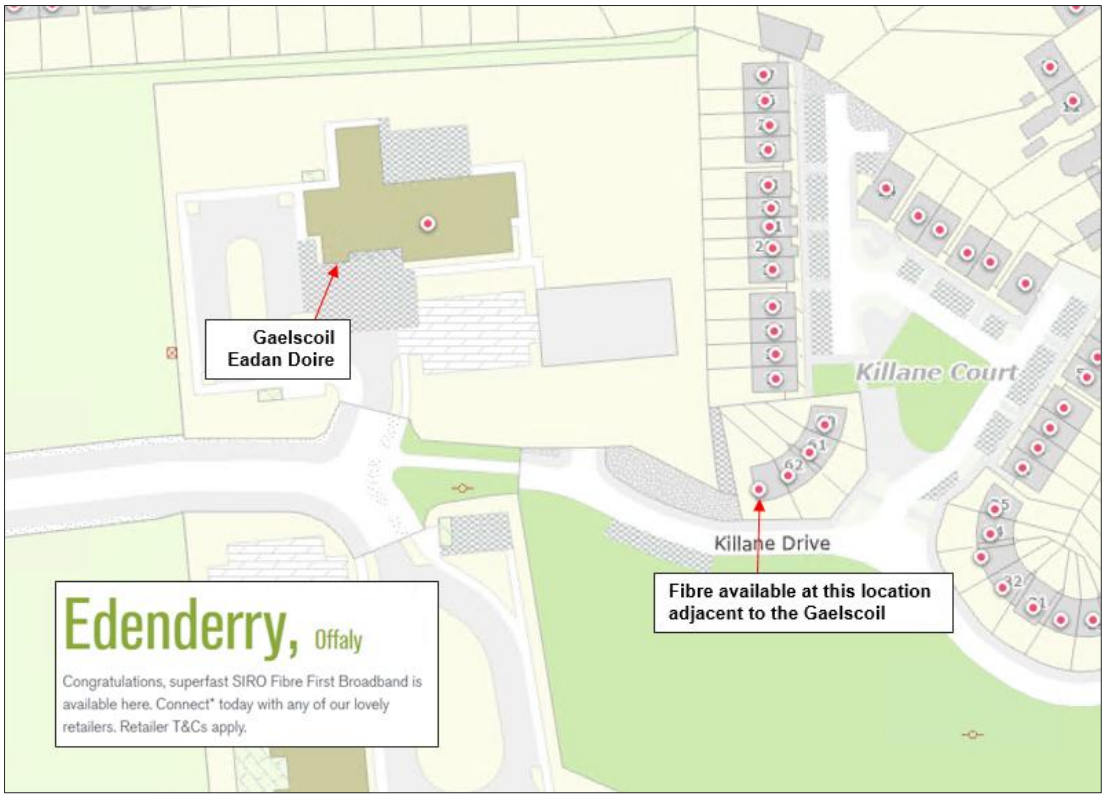


Figure 31. Fibre Broadband availability - Gaelscoil Eadan Doire

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6.1.3.2 Fibre Broadband Availably - St Etchens N.S.

The fibre broadband checker shows that fibre connectivity is available at St Etchens N.S. For this reason, replacing the existing radio link with a fibre connection to St Etchens N.S. is considered to be a viable mitigation measure.

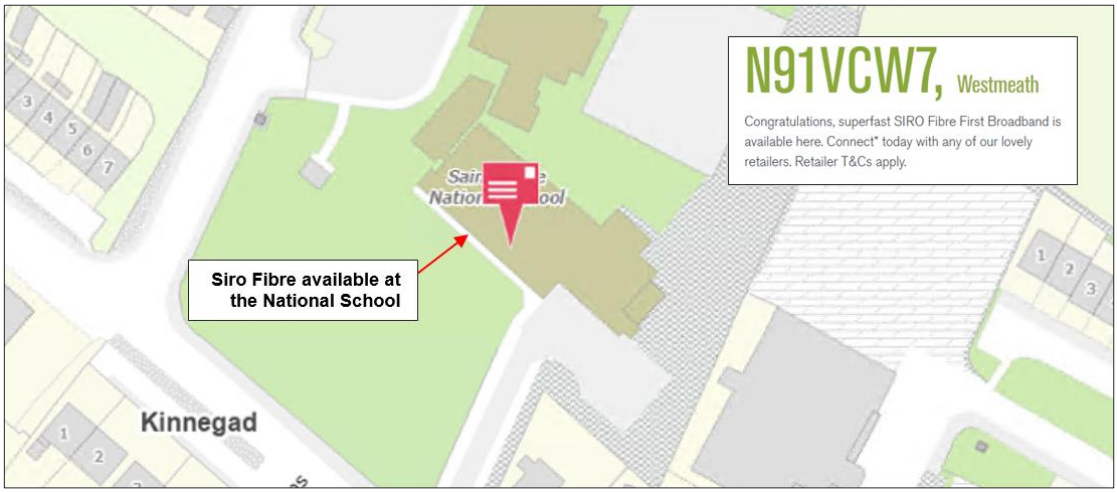


Figure 32. Fibre Broadband availability - St Etchens N.S.

6.1.3.3 Fibre Broadband Availably - Cloch Rinnce N.S.

Virgin Media Fibre broadband is not currently available at Cloch Rinnce N.S. (or in the village of Clogharinka). However, as Virgin Media have pledged to expand their fibre network in the coming years, there is a strong possibility that by the time any turbines are built at Ballydermot (at least 3 – 4 years), the village would be fibre enabled. For this reason, a fibre connection to Cloch Rinnce N.S.is considered to be a potential mitigation measure solution.

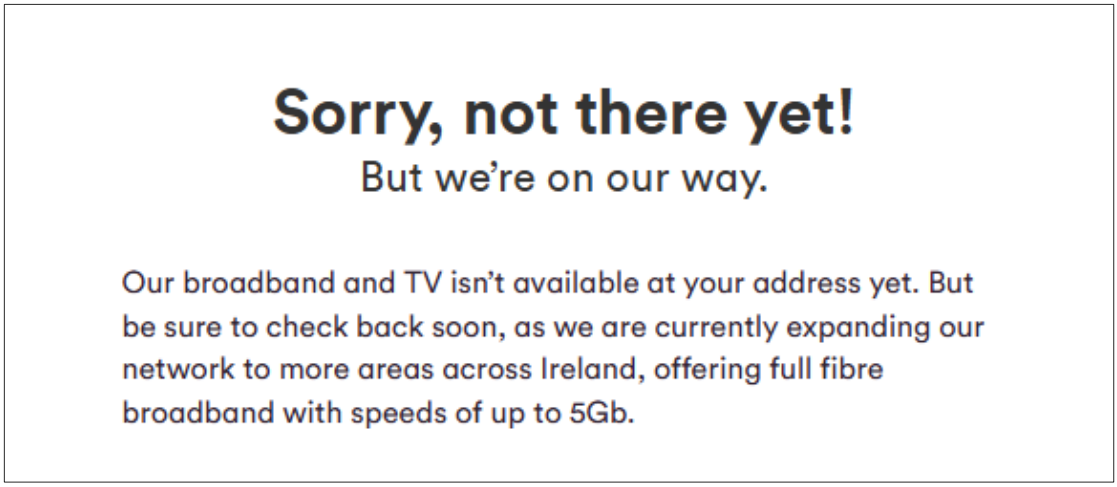


Figure 33. Fibre Broadband availability - Cloch Rinnce N.S.

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Table 18 below provides a summary of the assessment of this mitigation measure option (i.e. replace the impacted radio links with a fibre broadband connection).

Mitigation Measure	Impacted Link	Observations
Fibre Broadband Connection	VM_L2 (Gaelscoil Eadan Doire)	Virgin Media Fibre Broadband is available at properties that are adjacent to the Gaelscoil and connecting the Gaelscoil is considered to be a viable mitigation measure solution.
	VM_L5 (St Etchens N.S.)	Virgin Media Fibre Broadband is available at St Etchens N.S and connecting the National Schooll to the fibre network is considered to be a viable mitigation measure solution.
	VM_L6 (Cloch Rinnce N.S.)	Currently, Virgin Media Fibre is not available at Cloch Rinnce N.S. However, they are expanding their fibre network and may have a service in Clogharinka by the time the proposed turbines at Ballydemot are built. For this reason, a fibre connection at Cloch Rinnce N.S is considered to be a potential mitigation measure solution.

Table 18. Mitigation Measure Assessment Summary (VM) – Fibre Broadband Connection

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6.2 Mitigation Measure Assessment Summary (Virgin Media)

A summary of each of the mitigation measures options for the Virgin Media radio network is provided below in Table 19. The appropriate mitigation measure(s) for each of the impacted radio links will depend on further technical and planning assessments.

Additional consultations with Virgin Media would also be required to confirm that the proposed solutions are technically feasible and that they are acceptable to them.

Mitigation Option	Viable Mitigation Measure (Yes/No)		
	VM_L2 (Gaelscoil Eadan Doire)	VM_L5 (St Etchens N.S.)	VM_L6 (Cloch Rinnce N.S.)
Alternative POP-Site (Saggart)	Yes	Yes	Yes
Relay-mast (60m mast)	Yes	Yes	Yes
Fibre Connection	Yes	Yes	Yes (Subject to confirmation of Virgin Media Fibre network expansion to Clogharinka)

Table 19. Mitigation Measure Assessment Summary – Virgin Media

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Section 7 - Recommendations

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7. Recommendations

To offset the potential impact to the Virgin Media radio network due to the proposed wind turbines, it is recommended that the following technically viable mitigation measure proposal should be effected as a condition of planning in the event of a successful planning application.

In the case where the proposed wind farm is consented, it is recommended that additional consultations with Virgin Media are undertaken to discuss and agree on the technical details of the proposed mitigation measure solution.

All costs of the mitigation measure strategy would be agreed and covered by the Applicant. The Applicant would co-operate with Virgin Media to ensure that the agreed mitigation measures would be implemented in advance of the construction and operation of the wind farm.

Telecom Operator	Radio Link IDs	Recommended Mitigation Measures
Virgin Media	VM_L2 (Gaelscoil Eadan Doire to VM Dunmurry) VM_L5 (St Etchens N.S. to VM Dunmurry) VM_L6 (Cloch Rinnce N.S. to VM Dunmurry)	**Option 1.** Re-route the impacted radio links via an alternative Virgin Media POP Site. (i.e. the existing telecoms mast-site at Saggart could potentially be used to route the Virgin Media service into their customer sites, instead of a radio link from Dunmurry.)
		Option 2. Relay Mast located within the proposed wind farm site. (i.e. relaying the Virgin Media radio link via a new relay mast structure that would be erected at a suitable location within the proposed wind farm development site.)
		Option 3. Replace the impacted radio link(s) with a fibre broadband connection.

Table 20. Recommended Mitigation Measure (Post Planning Consent)

Note: In September 2026 Ai Bridges Ltd were requested to contact Virgin Media with regard to the mitigation measure strategy outlined above. During these consultations, Virgin Media stated that one of the radio links had been decommissioned, and another was likely to be decommissioned in the coming weeks.
At the time of writing, Virgin Media were not able to confirm if the third radio link was scheduled to be decommissioned or not; however, they did agree to the proposed migration strategy as set above (i.e. should the third radio link be impacted by the development at Ballydermot).

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Section 8 - Conclusions

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8. Conclusions

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

- Results from the telecom operator consultations and desktop survey analysis indicate that there are twenty-eight radio links that cross over/near the proposed development. These radio links are below listed in Table 21.
- Network analysis indicated that three Virgin Media radio links would be impacted by the proposed turbine layout, and mitigation measures would be required for these links.
- Following subsequent consultations with Virgin Media (September 2026), Virgin Media stated that stated that one of the radio links had been decommissioned, and another was likely to be decommissioned in the coming weeks. At the time of writing, Virgin Media were not able to confirm if the third radio link was scheduled to be decommissioned or not; however, they did agree to the proposed migration strategy as set out by AiBridges (i.e. should the third radio link be impacted by the development at Ballydermot).

Operator	Link ID	Radio Link Description	Nearest Turbine(s)	Fresnel Zone Clearance	Residual Impact / Observations
Eir	Eir_L1	Dunmurry Hill to Castlejordan	T06	38.9 m	No impacts.
	Eir_L2	Dunmurry Hill to Edenderry Garda Stn	T06	> 50 m	No impacts.
	Eir_L3	Dunmurry Hill to Clonbullouge	T14	> 50 m	No impacts.
	Eir_L4	Edenderry P.S. to Carbury	T32	> 50 m	No impacts.
	Eir_L5	Edenderry P.S. to Togher	T22	> 50 m	No impacts.
Enet	Enet_L1	Kippure to Lullymore Heritage Park	T01	> 50 m	No impacts.
ESB	ESB_L1	Carbury to Kilcumber 110 kV	T32	> 50 m	No impacts.
	ESB_L2	Carbury to Ballyoskill	T27	> 50 m	No impacts.
	ESB_L3	Carbury to Togher Hill	T46	> 50m	No impacts.
	ESB_L4	Carbury to Cushaling (PMP)	T32	> 50 m	No impacts.
Three Ireland	3IRL_L1	Edenderry to Allenwood	T30	> 50 m	No impacts.
	3IRL_L2	Edenderry to Clonbulouge GAA	T22	> 50 m	No impacts.
	3IRL_L3	Clonbulouge GAA to Rathangan	T14	> 50 m	No impacts.
	3IRL_L4	Edenderry to Ballykilleen	T22	> 50 m	No impacts.
Virgin Media	VM_L1	RochfortBridge Convent to VM Dunmurry	T12	> 50 m	No impacts.

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	VM_L2	Gaelscoil Eadan Doire to VM Dunmurry	T02	- 60.5 m (Interference Condition)	No impacts.
			T06	- 31.8 m (Interference Condition)	
			T07	- 45.3 m (Interference Condition)	
	VM_L3	Oaklands Community College to VM Dunmurry	T06	35.6 m	No impacts.
	VM_L4	Saint Marys Secondary School to VM Dunmurry	T39	20.2 m	No impacts.
	VM_L5	St Etchens NS to VM Dunmurry	T34	< 5 m (Clearance = 1.8 m)	No impacts.
			T36	- 81.5 m (Interference Condition)	
	VM_L6	Cloch Rinnce NS to VM Dunmurry	T01	- 82.2 m (Interference Condition)	No impacts.
	VM_L7	Johnstown Est Hotel to VM Dunmurry	T01	> 50 m	No impacts.
	VM_L8	Irish Explosives to VM Dunmurry	T01	> 50 m	No impacts.
Vodafone	VF_L1	Ballybrack to Coolaght	T46	> 50 m	No Impacts.
	VF_L2	Dunmurry Hill to Edenderry Power Station	T12	38.4 m	No Impacts.
	VF_L3	Dunmurry Hill to Allenwood (Blake 110kV Station)	T01	> 50 m	No Impacts.
	VF_L4	Christianstown to Ballybrack	T46	> 50 m	No Impacts.
	VF_L5	Ballybrack to Carbury	T46	> 50 m	No Impacts.
	VF_L6	Ballinla to Edendery PS (Ballykilleen)	T22	> 50 m	No Impacts.

Table 21. Radio Links in vicinity of proposed development.

- Based on professional experience and previous precedents of similar mitigation proposals being proven to work, the best technically feasible mitigation measures are outlined in Table 22 and are considered to be the best technical options for both the telecoms provider (Virgin Media) and the Applicant.

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Operator	Impacted Link	Mitigation Measure Options (Post Consent)
Virgin Media	VM_L2 (Gaelscoil Eadan Doire to VM Dunmurry)	**Option 1:** Radio link re-route from alternative POP Site **Option 2:** Relay Mast located within the proposed wind farm site **Option 3:** Fibre Broadband Connection
	VM_L5 (St Etchens NS to VM Dunmurry)	**Option 1:** Radio link re-route from alternative POP Site **Option 2:** Relay Mast located within the proposed wind farm site **Option 3:** Fibre Broadband Connection
	VM_L6 (Cloch Rinnce NS to VM Dunmurry)	**Option 1:** Radio link re-route from alternative POP Site **Option 2**: Relay Mast located within the proposed wind farm site **Option 3:** Fibre Broadband Connection

Table 22. Mitigation Measure Options.

- The proposed measures will offset the potential impacts of the proposed turbine layout at Ballydermot on the existing telecommunications network infrastructure. The Applicant in this instance will be responsible for all costs associated with the mitigation measures set out. A protocol agreement will be put in place between the Applicant and the impacted telecoms operators (Virgin Media), prior to the construction of the proposed wind farm to agree terms such as estate management, operator access, electricity supply etc.

- Based on the implementation of the mitigation measures outlined in this report it is considered that there will be no residual adverse effects on the existing telecommunication infrastructure network as a result of the proposed wind farm.

- Figure 34 below has been provided to illustrate each of the telecommunication links that cross over/though the proposed wind farm development.

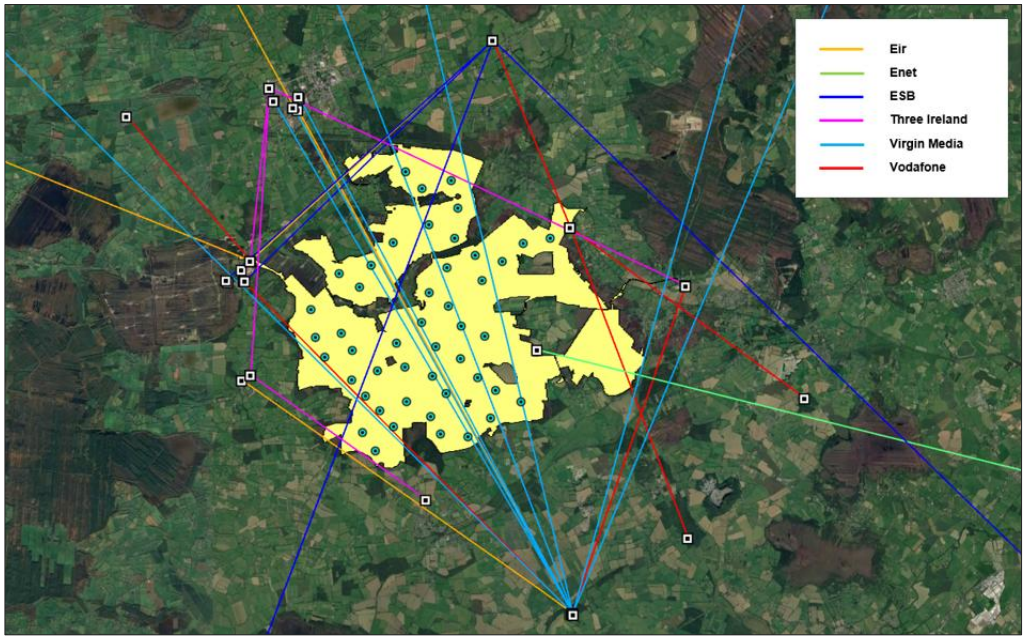


Figure 34. Plan View of radio links that cross over/though the proposed wind farm development.

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APPENDIX A – Wind Farm Turbine Co-ordinates

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Appendix A – Wind Farm Turbine Co-ordinates

The coordinates of the proposed turbine layout considered in this Telecommunications Impact Study are provided in the table below.

Turbine ID	Co-ordinates (WGS-84)		Turbine Tip Height (m)	Rotor Diameter (m)
	Lat	Long		
T01	53° 15' 23.578"N	6° 57' 26.140"W	200	170
T02	53° 14' 48.779"N	6° 58' 53.850"W	200	170
T03	53° 15' 7.403"N	6° 58' 16.446"W	200	170
T04	53° 14' 51.463"N	6° 59' 39.341"W	200	170
T05	53° 15' 8.706"N	6° 59' 55.732"W	220	170
T06	53° 15' 31.590"N	6° 59' 30.308"W	220	170
T07	53° 15' 48.702"N	6° 59' 53.079"W	220	170
T08	53° 15' 23.393"N	7° 0' 35.801"W	220	170
T09	53° 15' 57.617"N	7° 0' 38.705"W	220	170
T10	53° 16' 21.242"N	7° 0' 52.817"W	220	170
T11	53° 15' 14.330"N	7° 1' 20.070"W	220	170
T12	53° 14' 58.501"N	7° 0' 57.208"W	200	170
T13	53° 14' 52.645"N	7° 1' 48.616"W	200	170
T14	53° 14' 34.479"N	7° 1' 27.229"W	200	170
T15	53° 15' 28.745"N	7° 1' 43.934"W	220	170
T16	53° 15' 44.625"N	7° 2' 6.794"W	220	170
T17	53° 16' 13.923"N	7° 2' 6.020"W	220	170
T18	53° 15' 53.824"N	7° 1' 24.247"W	220	170
T19	53° 16' 7.147"N	7° 2' 51.601"W	200	170
T20	53° 16' 26.651"N	7° 3' 7.278"W	200	170
T21	53° 16' 30.843"N	7° 2' 24.442"W	220	170
T22	53° 16' 54.219"N	7° 3' 14.878"W	200	170
T23	53° 18' 0.830"N	7° 0' 58.806"W	200	170
T24	53° 17' 38.295"N	7° 1' 35.344"W	220	170
T25	53° 17' 16.634"N	7° 1' 54.430"W	220	170
T26	53° 17' 29.966"N	7° 2' 28.324"W	200	170
T27	53° 18' 18.689"N	6° 59' 59.744"W	200	170
T28	53° 18' 5.314"N	6° 59' 16.924"W	200	170
T29	53° 18' 35.174"N	6° 59' 11.772"W	200	170
T30	53° 19' 2.448"N	6° 59' 22.926"W	200	170
T31	53° 18' 54.477"N	7° 0' 11.340"W	200	170
T32	53° 19' 10.985"N	7° 0' 38.594"W	200	170

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T33	53° 15' 34.835"N	6° 58' 8.265"W	220	170
T34	53° 15' 47.341"N	6° 58' 38.010"W	220	170
T35	53° 16' 6.107"N	6° 59' 6.605"W	220	170
T36	53° 16' 38.375"N	6° 59' 5.629"W	220	170
T37	53° 16' 28.434"N	6° 58' 26.560"W	220	170
T38	53° 16' 17.923"N	6° 59' 47.590"W	220	170
T39	53° 16' 41.891"N	7° 0' 11.196"W	220	170
T40	53° 16' 58.087"N	6° 59' 26.899"W	220	170
T41	53° 17' 11.370"N	6° 59' 58.886"W	220	170
T42	53° 17' 36.183"N	6° 59' 29.466"W	220	170
T43	53° 17' 23.551"N	6° 58' 31.139"W	220	170
T44	53° 17' 42.449"N	6° 57' 57.829"W	220	170
T45*	53° 17' 48.444"N	6° 58' 42.700"W	220	170
T46	53° 18' 0.435"N	6° 57' 23.199"W	200	170

Table 23. Wind Farm Layout - Turbine Co-ordinates

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APPENDIX B – Field Survey Findings

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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 35 below.

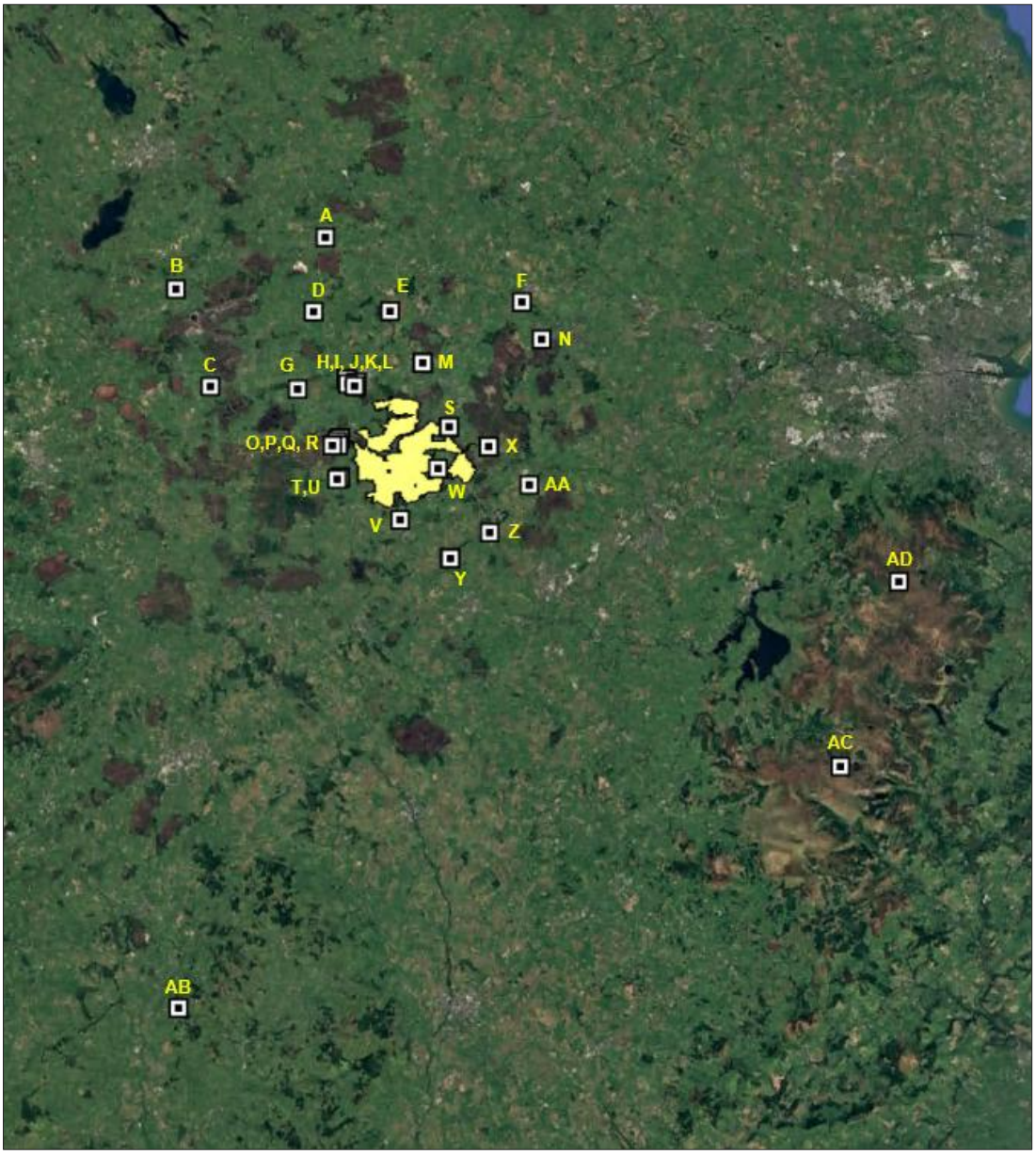


Figure 35. Telecom Mast-Sites shown relative to proposed wind farm

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

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Mast-Site A (St Echen's National School, Kinnegad)

Telecommunications Mast-Site A is located at St Echen's National School, Kinnegad, Co Westmeath and is approximately 16 km north 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 24.



Figure 36. Mast A

Mast ID	Telecom operators with radio links in direction of proposed wind farm
Mast A	Virgin Media

Table 24. Field Survey Summary – Mast-Site A

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Mast-Site B (Rochfortbridge Convent)

Telecommunications Mast-Site B is located within the grounds of the Convent Primary School in Rochfortbridge, Co Westmeath. From the findings of the Field Survey the radio antenna to Dunmurry Hill is not located on the building as referenced by Virgin Media in their consultation response. The actual location of the radio antenna is on the adjacent school building as shown below in Figure 40. 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 37. Mast-site B (No radio antenna at location referenced by Virgin Media)



Figure 38. Mast-site B (Actual location of radio antenna aligned to Dunmurry Hill)

Mast ID	Telecom operators with radio links in direction of proposed wind farm
Mast B	Virgin Media

Table 25. Field Survey Summary – Mast B

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Mast-Site C (Togher)

Telecommunications Mast-Site C is located at Togher, Co Offaly and is approximately 14 km west of the proposed wind farm. Access into this mast-site was not possible on the day of survey; however, the location of the mast-structure can be seen in the aerial view of the site 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 26.



Figure 39. Mast C

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

Table 26. Field Survey Summary – Mast-Site C

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Mast-Site D (Castlejordan)

Telecommunications Mast-Site A is located at Castlejordan, Co. Meath and is approximately 10 km northwest 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 27.



Figure 40. Mast D

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

Table 27. Field Survey Summary – Mast-Site D

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Mast-Site E (Cloch Rinnce National School)

Telecommunications Mast-Site E is located at Castlejordan, Co. Kildare and is approximately 8 km north 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 41. Mast E

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

Table 28. Field Survey Summary – Mast-Site E

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Mast-Site F (Johnstown Est Hotel)

Telecommunications Mast-Site F is located at the Johnstown Estate Hotel, Co Meath and is approximately 12 km northeast of the proposed wind farm.

Access into this mast-site was not possible on the day of survey; however, the location of the antenna at his location (as specified by Virgin Media) be seen in the aerial view of the site 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 29.



Figure 42. Mast F

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

Table 29. Field Survey Summary – Mast-Site F

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Mast-Site G (Ballinla)

Telecommunications Mast-Site G is located is located in the townland of Ballina, Co Offaly and is approximately 7 km west of the proposed wind farm 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 30.



Figure 43. Mast G

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

Table 30. Field Survey Summary – Mast-Site G

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Mast-Site H (Edenderry)

Telecommunications Mast-Site H is located in the Eden Trading Estate in Edenderry town and is approximately 3 km northwest 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 31.



Figure 44. Mast H

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

Table 31. Field Survey Summary – Mast H

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Mast-Site I (Gaelscoil Eadan Doire)

Telecommunications Mast-Site I is located at Gaelscoil Eadan Doire and is approximately 3 km northwest 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 32.



Figure 45. Mast I

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

Table 32. Field Survey Summary – Mast-Site I

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Mast-Site J (Saint Marys Secondary School)

Telecommunications Mast-Site J is located at Saint Marys Secondary School, Edenderry and is approximately 3 km northwest 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 33.



Figure 46. Mast J

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

Table 33. Field Survey Summary – Mast-Site J

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Mast-Site K (Oaklands Community College)

Telecommunications Mast-Site K is located at Oaklands Community College, Edenderry and is approximately 3 km northwest 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 34.

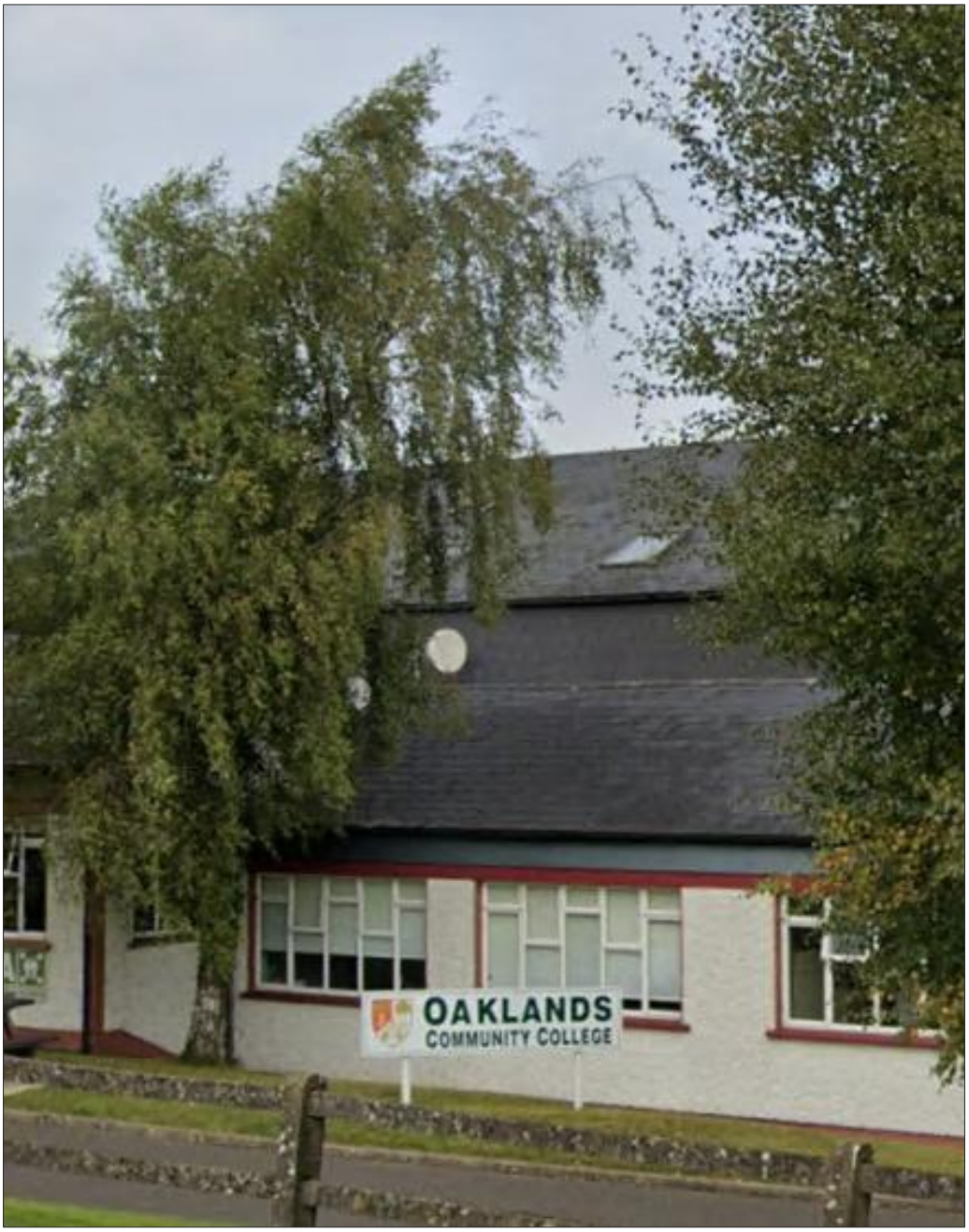


Figure 47. Mast K

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

Table 34. Field Survey Summary – Mast-Site K

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Mast-Site L (Edenderry Garda Station)

Telecommunications Mast-Site L is located at Edenderry Garda Station, Co Offaly and is approximately 3 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 35.



Figure 48. Mast L

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

Table 35. Field Survey Summary – Mast-Site L

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Mast-Site M (Carbury)

Telecommunications Mast-Site G is located is located in the village of Carbury, Co Kildare and is approximately 4 km north of the proposed wind farm 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 36.



Figure 49. Mast G

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

Table 36. Field Survey Summary – Mast-Site G

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Mast-Site N (Irish Explosives)

Telecommunications Mast-Site N is located within the grounds of Irish Explosives, Co Meath and is approximately 12 km northeast of the proposed wind farm. Access into this mast-site was not possible on the day of survey; however, the location of the antenna at his location (as specified by Virgin Media) be seen in the aerial view of the site 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 37.



Figure 50. Mast N

Mast ID	Telecom operators with radio links in direction of proposed wind farm
Mast N	Virgin Media

Table 37. Field Survey Summary – Mast-Site N

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Mast-Site O (Kilcumber 110 kV)

Telecommunications Mast-Site O is located at Kilcumber and is less than 2 km west of the proposed wind farm site. Access into this mast-site was not possible on the day of survey; however, the location of the mast-structure can be seen in the aerial view of the site 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 38.

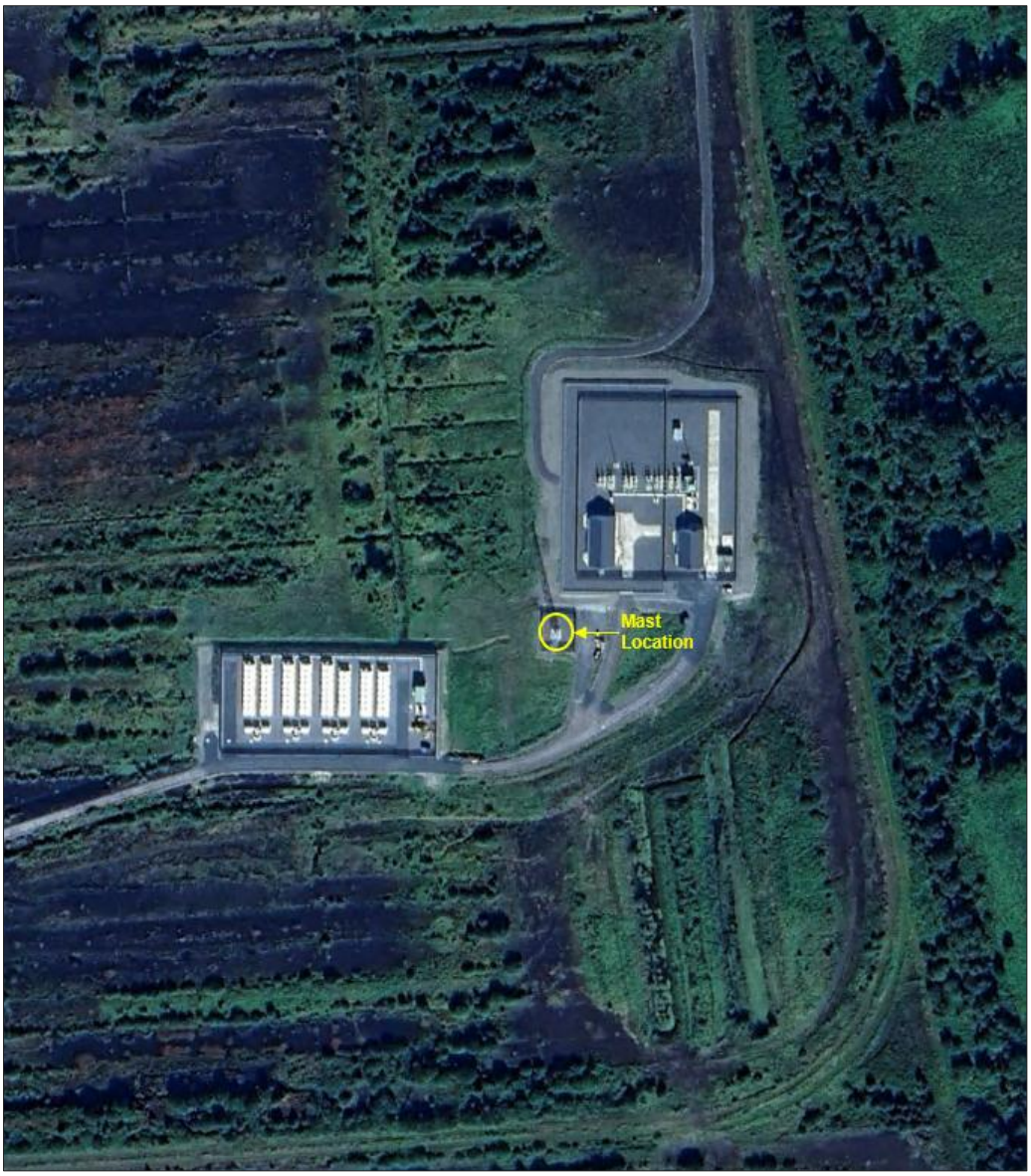


Figure 51. Mast O

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

Table 38. Field Survey Summary – Mast-Site O

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Mast-Site P (Edenderry PS, Ballykilleen)

Telecommunications Mast-Site P is located within the grounds of Edenderry Power Station, Co Offaly and is less than 2 km from the proposed wind farm 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 39.



Figure 52. Mast P

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

Table 39. Field Survey Summary – Mast P

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Mast-Site Q (Edenderry PS, Main Buildings)

Telecommunications Mast-Site Q is located at Edenderry Power Station (Main Buildings), Co Offaly and is less than 2 km from the proposed wind farm site.

On the day of survey, access into the Edenderry Power Station was not possible and a close-up view of the radio antenna at this site was not possible. However, the surveyor did take a photograph of the site from a roadside location. The roadside view of the site is shown below in Figure 19. The Telecom Operators who have radio links operating from this mast-site in the direction of the wind farm are listed in Table 40.



Figure 53. Mast Q

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

Table 40. Field Survey Summary – Mast-Site Q

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Mast-Site R (Cushaling 110 kV)

Telecommunications Mast-Site R is located at the Cushaling 110 kV substation and is less than 2km from the proposed wind farm site.

Access into this mast-site was not possible on the day of survey; however, the location of the antenna at his location (as specified by ESB) be seen in the aerial view of the site 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 41.

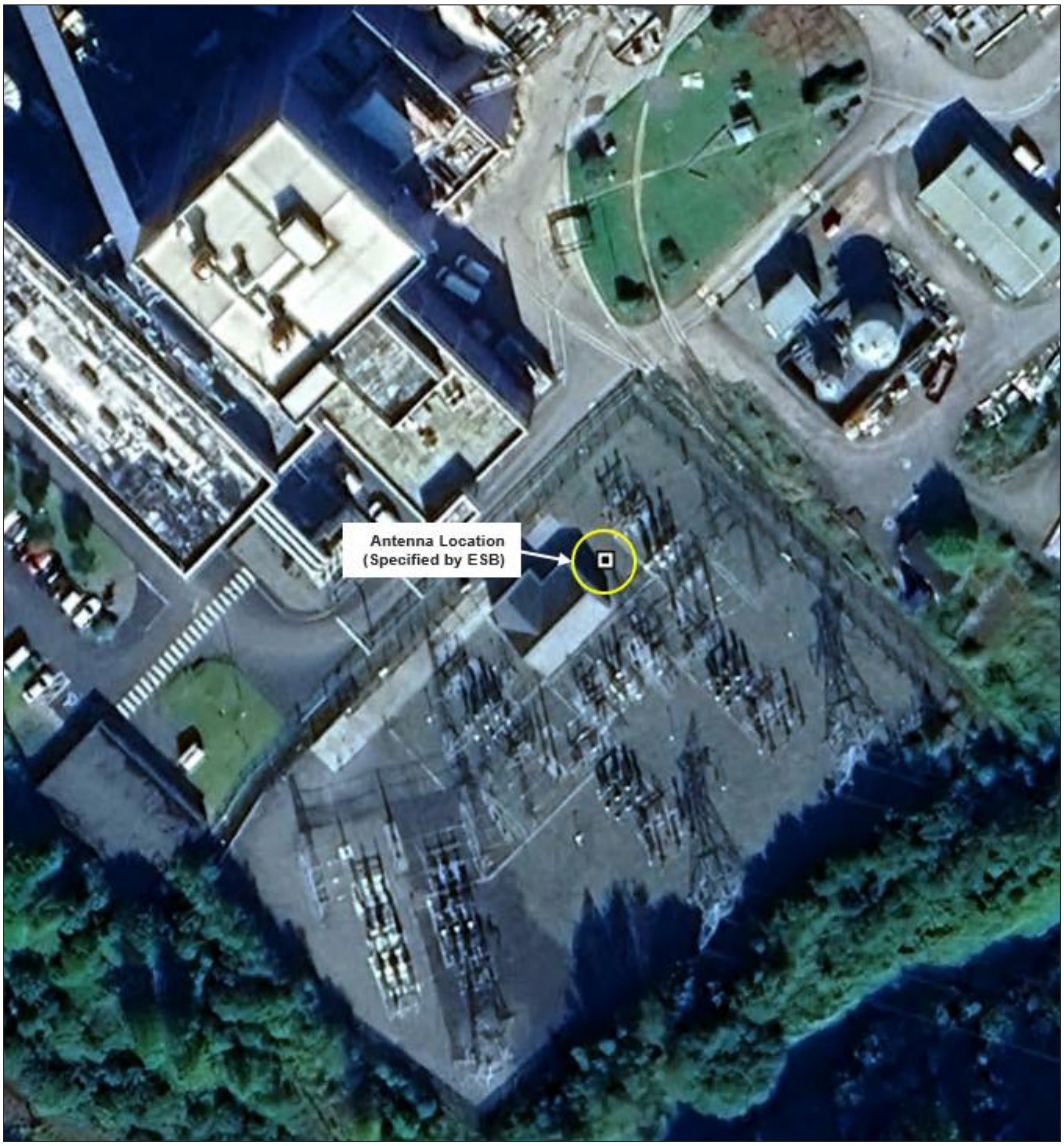


Figure 54. Mast R

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

Table 41. Field Survey Summary – Mast-Site R

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Mast-Site S (Ballybrack)

Telecommunications Mast-Site S is located is located in the townland of Ballybrack, Co Offaly and is less than 1km from the proposed wind farm development site. 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 42.



Figure 55. Mast S

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

Table 42. Field Survey Summary – Mast-Site S

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Mast-Site T (Clonbulloge)

Telecommunications Mast-Site T is located in the village of Clonbulloge and is less than 2 km west of the proposed wind farm site.

Access into this mast-site was not possible on the day of survey; however, the location of the antenna at his location (as specified by Eir) be seen in the aerial view of the site 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 43.

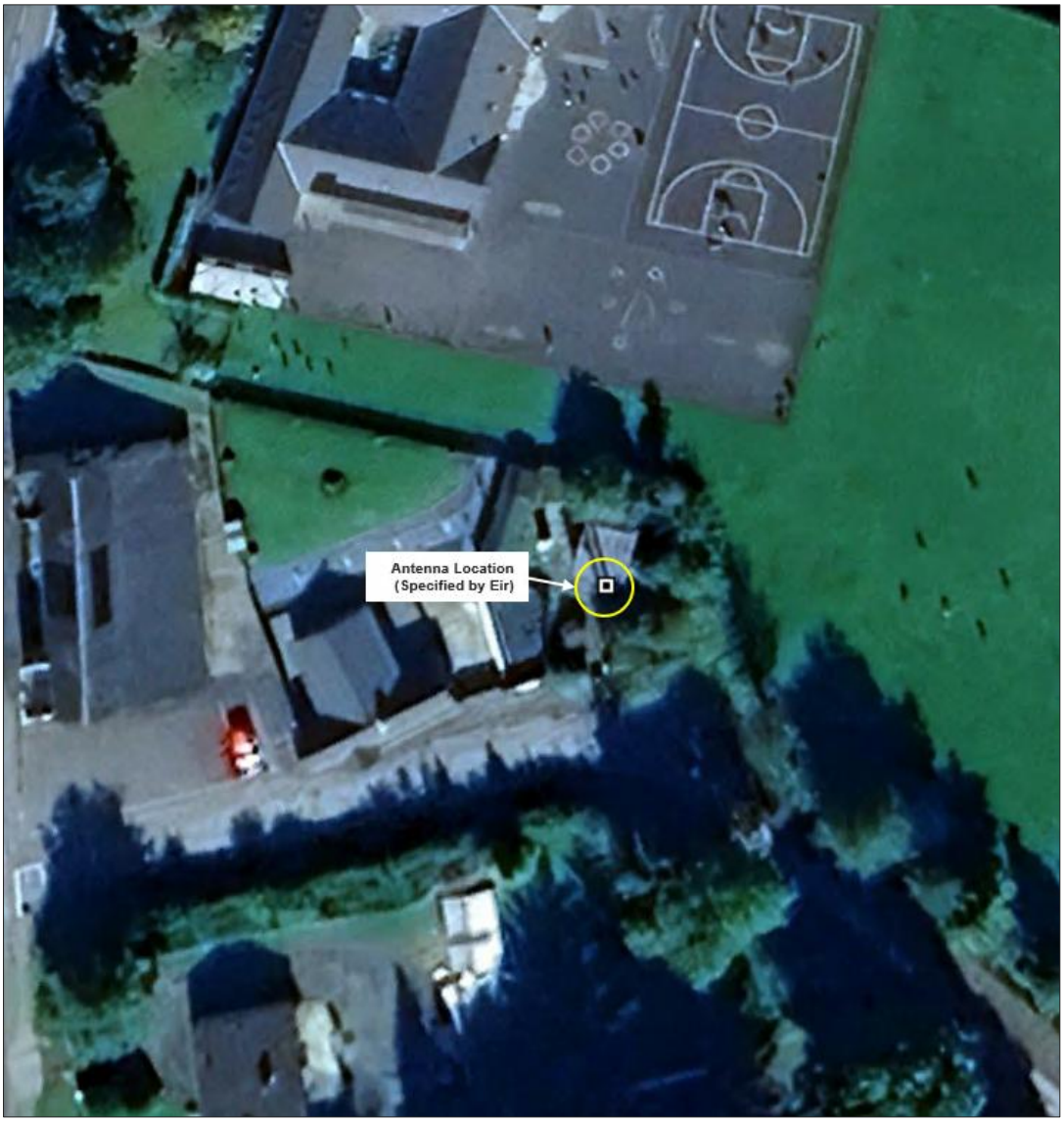


Figure 56. Mast T

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

Table 43. Field Survey Summary – Mast-Site T

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Mast-Site U (Clonbulouge GAA)

Telecommunications Mast-Site U is located at Clonbulouge GAA and is and is less than 2 km west of the proposed wind farm site.

Access into this mast-site was not possible on the day of survey; however, the location of the mast-structure can be seen in the aerial view of the site 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 44.



Figure 57. Mast U

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

Table 44. Field Survey Summary – Mast-Site U

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Mast-Site V (Rathangan)

Telecommunications Mast-Site V is located is located in the townland of Rathangan, Co Kildare and is approximately 2 km south of the proposed wind farm 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 45.



Figure 58. Mast V

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

Table 45. Field Survey Summary – Mast-Site V

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Mast-Site W (Lullymore)

Telecommunications Mast-Site W is in the townland of Luulymore and is located less than 1 km from the proposed wind farm site. 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 46.



Figure 59. Mast W

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

Table 46. Field Survey Summary – Mast-Site W

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Mast-Site X (Allenwood)

Telecommunications Mast-Site X is in the townland of Allenwood and is located approximately 3 km east of the proposed wind farm site. 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 47.

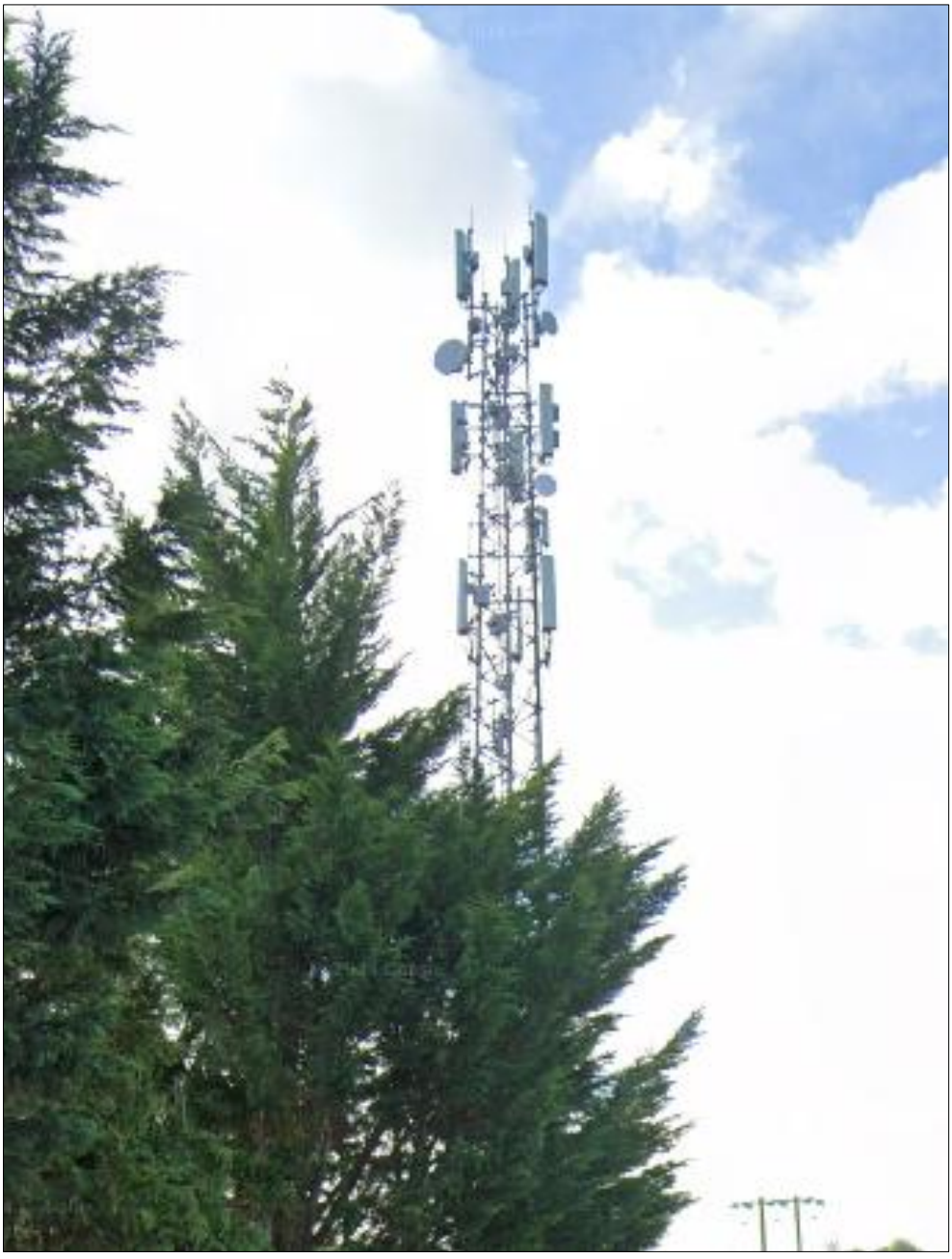


Figure 60. Mast X

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

Table 47. Field Survey Summary – Mast-Site X

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Mast-Site Y (Dunmurry Hill)

Telecommunications Mast-Site Y is located at Dunmurry Hill and is approximately 6 km south of the proposed wind farm site. 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 48. Note: Virgin Media radio antennas installed on structure at rear of main mast.



Figure 61. Mast Y

Mast ID	Telecom operators with radio links in direction of proposed wind farm
Mast Y	Virgin Media, Vodafone

Table 48. Field Survey Summary – Mast-Site Y

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Mast-Site Z (Christianstown)

Telecommunications Mast-Site U is located in the townland of Christianstown and is approximately 5 km southeast of the proposed wind farm site.

Access into this mast-site was not possible on the day of survey; however, the location of the mast-structure can be seen in the aerial view of the site 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 49.



Figure 62. Mast Z

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

Table 49. Field Survey Summary – Mast-Site Z

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Mast-Site AA (Coolaght)

Telecommunications Mast-Site AA is located in the townland of Coolaght and is approximately 5 km east of the proposed wind farm site.

Access into this mast-site was not possible on the day of survey; however, the location of the mast-structure can be seen in the aerial view of the site 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 50.



Figure 63. Mast AA

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

Table 50. Field Survey Summary – Mast-Site AA

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Mast-Site AB (Ballyoskill)

Telecommunications Mast-Site AD is located in the townland of Ballyoskill and is approximately 50 km southwest of the proposed wind farm site.

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 51.



Figure 64. Mast AB

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

Table 51. Field Survey Summary – Mast-Site AB

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Mast-Site AC (Turlough Hill)

Telecommunications Mast-Site AC is located at Turlough Hill, Co Wicklow, and is approximately 42 km southeast of the proposed wind farm site.

Access into this mast-site was not possible on the day of survey; however, the location of the mast-structure can be seen in the aerial view of the site 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 52.



Figure 65. Mast AC

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

Table 52. Field Survey Summary – Mast-Site AC

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Mast-Site AD (Kippure)

Telecommunications Mast-Site AD is located at Kippure Mountain and is approximately 50 km southwest of the proposed wind farm site.

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 53.



Figure 66. Mast AD

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

Table 53. Field Survey Summary – Mast-Site AD

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APPENDIX C – Radio Link Budgets (Radio link re-routes from Saggart POP)

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APPENDIX C – Radio Link Budgets (Radio link re-routes to/from Saggart POP)

C.1. Gaelscoil Eadan Doire – Saggart

Site:	AB_L2A_VM (Gaelscoil Eadan Doire)			POP_ST (Saggart)			
Name:							
Type:	Cell		Cell				
Latitude:	53°20'20.1"N		53°14'48.3"N				
Longitude:	7°04'18.5"W		6°28'35.6"W				
Altitude (m):	88.0		397.0				
UserData1:	User Data						
Datum:	World Geodetic System 1984 (WGS 84)						
	Forward Link		Reverse Link				
Transmission Site:	AB_L2A_VM			POP_ST			
Reception Site:	POP_ST		AB_L2A_VM				
Radio Type:	NetRadio0001			NetRadio0001			
Modulation Scheme:		4-QAM		4-QAM			
Bandwidth (MHz):	2		2				
Roll-Off Factor:	0.2		0.2				
Coding Gain (dB):	0		0				
System Gains (dB):	0		0				
Channel Overhead (%):		20		20			
FEC Overhead (%):	0		0				
Reference Temperature (°K):		290		290			
Receiver Noise Figure (dB):		5		5			
Maximum Data Rate (Mbps):		2.667		2.667			
Maximum Bit Rate (Mbps):		3.333		3.333			
Required Bit Error Rate:		BER 10-3	BER 10-6	BER 10-3	BER 10-6		
Service Threshold (dBm):		-91	-90	-91	-90		
Carrier to Noise Ratio (dB):		14.965	15.965	14.965	15.965		
Cross Polarization Improvement Factor (dB):				20	20	20	20
Rx Equalization Sig Norm Parameter (Kn,M):				0.1	0.1	0.1	0.1
Rx Equalization Sig Norm Parameter (Kn,NM):				0.1	0.1	0.1	0.1
UserData1:		User Data		User Data			
Center Frequency (MHz):		13000		13000			
Channel Bandwidth (MHz):		28		28			
Transmission Power (dBm):		30		30			
Transmission Gains (dB):		0		0			
Transmission System Loss (dB):			0		0		
Transmission Line Loss (dB/100 m):			4		4		
Transmission Line Length (m):			10		10		
Transmission Connection Loss (dB):			0.3		0.3		
Transmission Number of Connections:			2		2		
Transmission Additional Loss (dB):			0		0		
Transmission Losses (dB):		1		1			
Transmission Antenna:		HP2-13-NSMA			HP2-13-NSMA		
Transmission Antenna Size (m):			0.6		0.6		
Transmission Antenna Height (m):			8		15		
Transmission Antenna Gain (dBd):			33.76		33.76		
Transmission Antenna Gain (dBi):			35.9		35.9		
Transmission Power EIRP (dBm):			64.9		64.9		
Reception Gains (dB):		0		0			
Reception System Loss (dB):		0		0			
Reception Line Loss (dB/100 m):			4		4		
Reception Line Length (m):		10		10			
Reception Connection Loss (dB):			0.3		0.3		
Reception Number of Connections:			2		2		
Reception Additional Loss (dB):			0		0		

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Reception Losses (dB):	1		1	
Reception Antenna:	HP2-13-NSMA		HP2-13-NSMA	
Reception Antenna Size (m):	0.6		0.6	
Reception Antenna Height (m):		15		8
Reception Antenna Gain (dBd):		33.76		33.76
Reception Antenna Gain (dBi):		35.9		35.9
Link Polarization:	Vertical	Vertical		
Cross Polarization Factor (dB):		30		30
Link Distance (m):	40952.691		40952.691	
Azimuth - True (°):	104.284	284.762		
Azimuth - Magnetic (°):	105.887		286.119	
Transmission Inclination (°):	-0.442		0.442	
Reception Inclination (°):	-0.442		0.442	
ITU Recommendation:	ITU-R P.525-2			
Free Space Distance (m):	40953.910			40953.910
Center Frequency (MHz):	13000		13000	
Free Space Loss (dB):	146.965		146.965	
Max Fresnel Radius (m):	15.371		15.371	
Max 2nd Fresnel Radius (m):	21.738		21.738	
Earth Radius Factor (K):	4/3			
Effective Radius (m):	8502056.000			
ITU Recommendation:	ITU-R P.526-11			
Diffraction Model:	Cascade Knife Edge			
Diffraction:	No LOS Diffraction		No LOS Diffraction	
Diffraction Loss (dB):	0		0	
Clearance Target (%):	60			
Minimum Clearance (m):	0.862		0.862	
Minimum Clearance Point (m):		563.745		563.745
Terrain Reflection Dispersion (°):		0.5		
Reflection Area 1 (m):	429.975		429.975	
Reflection Area 2 (m):	735.734		735.734	
Reflection Area 3 (m):	793.064		793.064	
Reflection Area 4 (m):	1289.9 - 1461.9			1289.9 - 1461.9
Reflection Area 5 (m):	1519.244		1519.244	
Reflection Area 6 (m):	1576.6 - 1614.8			1576.6 - 1614.8
Reflection Area 7 (m):	1672.123		1672.123	
Reflection Area 8 (m):	1767.673		1767.673	
Reflection Area 9 (m):	1863.2 - 1882.3			1863.2 - 1882.3
Reflection Area 10 (m):	1977.883		1977.883	
Reflection Area 11 (m):	2035.2 - 2092.5			2035.2 - 2092.5
Reflection Area 12 (m):	2283.6 - 2341.0			2283.6 - 2341.0
Reflection Area 13 (m):	2398.3 - 2532			2398.3 - 2532
Reflection Area 14 (m):	2589.403		2589.403	
Reflection Area 15 (m):	2665.843		2665.843	
Reflection Area 16 (m):	2723.2 - 2761.4			2723.2 - 2761.4
ITU Recommendation:	ITU-R P.676-8			
Atmospheric Pressure (hPa):	1013		1013	
Standard Temperature (°C):	15		15	
Water Vapor Density (g/m³):	7.5		7.5	
Atmospheric Gases Loss (dB):		0.894		0.894
Total Path Loss (dB):	147.859		147.859	
Reception Signal Level (dBm):		-48.059		-48.059

	BER 10-3	BER 10-6	BER 10-3	BER 10-6
Service Threshold (dBm):	-91	-90	-91	-90
Link Gross Margin (dB):	42.941	41.941	42.941	41.941

ITU Recommendation:	ITU-R F.1703-0 / ITU-T G.827
Objective ITU Quality Grade:	Short Haul SDH Networks
Unavailability Objective (%):	2.00E-02
Availability Objective (%):	99.9800

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ITU Recommendation:	ITU-R F.1668-1 / ITU-T G.826			
Error Performance Objective BBER (%):	1.60E-05		1.60E-05	
Error Performance Objective BBER (s/Month):	0.42		0.42	
	SESR	ESR	SESR	ESR
Error Performance Objective (%):	1.60E-04	3.20E-03	1.60E-04	3.20E-03
Error Performance Objective (s/Month):	4.205	84.096	4.205	84.096

ITU Recommendation:	ITU-R F.1668-1 / ITU-T G.828			
Error Performance Objective BBER (%):	4.00E-06		4.00E-06	
Error Performance Objective BBER (s/Month):	0.105		0.105	
	SESR	ESR	SESR	ESR
Error Performance Objective (%):	1.60E-04	8.00E-04	1.60E-04	8.00E-04
Error Performance Objective (s/Month):	4.205	21.024	4.205	21.024

Multipath Model:	ITU-R P.530-15	
Multipath Planning Type:	Quick Planning	
Multipath Time Frame:	Average annual distribution	
ITU Recommendation:	ITU-R P.453-9	
Point Refractivity Gradient (dN1):	-76.7	
Geoclimatic Factor:	4.05E-05	4.05E-05
Multipath Occurrence Factor (%):	1.58E+00	1.58E+00

Precipitation Model:	ITU-R P.530-15	
ITU Recommendation:	ITU-R P.837-5 / ITU-R P.841-4	
Precipitation Time Frame:	Average annual distribution	
Precipitation Rate @ 0.01% (mm/h):	22	
ITU Recommendation:	ITU-R P.838-3	
Specific Attenuation (dB/km):	0.949102	0.949102
Rainfall Attenuation (dB):	18.089	18.089

	BER 10-3	BER 10-6	BER 10-3	BER 10-6
Fading Outage (%):	1.09E-05	1.37E-05	1.09E-05	1.37E-05
Selective Fading Outage (%):	3.09E-07	3.09E-07	3.09E-07	3.09E-07
Composite Fading Outage (%):		1.12E-05	1.40E-05	1.12E-05	1.40E-05

Fading Outage (s/Month):	0.286	0.36	0.286	0.36
Selective Fading Outage (s/Month):	0.008	0.008	0.008	0.008
Composite Fading Outage (s/Month):	0.294	0.368	0.294	0.368

	BER 10-3	BER 10-6	BER 10-3	BER 10-6
Unavailability due to Rain (%):	4.83E-04	5.40E-04	4.83E-04	5.40E-04
Unavailability due to Rain (s/Year):		152.299	170.173	152.299	170.173

	BER 10-3	BER 10-6	BER 10-3	BER 10-6
Unavailability due to Fading (%):		1.12E-05	1.40E-05	1.12E-05	1.40E-05
Unavailability due to Rain (%):	4.83E-04	5.40E-04	4.83E-04	5.40E-04
Total Unavailability (%):	4.94E-04	5.54E-04	4.94E-04	5.54E-04
Unavailability Objective (%):	2.00E-02	2.00E-02	2.00E-02	2.00E-02

Unavailability due to Fading (s/Year):		3.531	4.421	3.531	4.421
Unavailability due to Rain (s/Year):		152.299	170.173	152.299	170.173
Total Unavailability (s/Year):	155.831	174.594	155.831	174.594
Unavailability Objective (s/Year):		6307.2	6307.2	6307.2	6307.2

Total Availability (%):	99.9995	99.9994	99.9995	99.9994
Availability Objective (%):	99.9800	99.9800	99.9800	99.9800

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C.2. St Etchens N.S. – Saggart

Site Name:	AB_L5A_VM (St Etchens)			POP_ST (Saggart)			
Type:	Cell	Cell					
Latitude:	53°27'25.3"N		53°14'48.3"N				
Longitude:	7°06'10.5"W		6°28'35.6"W				
Altitude (m):	78.0		397.0				
UserData1:	User Data						
Datum:	World Geodetic System 1984 (WGS 84)						
	Forward Link		Reverse Link				
Transmission Site:	AB_L5A_VM		POP_ST				
Reception Site:	POP_ST		AB_L5A_VM				
Radio Type:	NetRadio0001		NetRadio0001				
Modulation Scheme:	4-QAM		4-QAM				
Bandwidth (MHz):	2		2				
Roll-Off Factor:	0.2		0.2				
Coding Gain (dB):	0		0				
System Gains (dB):	0		0				
Channel Overhead (%):	20		20				
FEC Overhead (%):	0		0				
Reference Temperature (°K):	290		290				
Receiver Noise Figure (dB):	5		5				
Maximum Data Rate (Mbps):	2.667		2.667				
Maximum Bit Rate (Mbps):	3.333		3.333				
Required Bit Error Rate:	BER 10-3	BER 10-6	BER 10-3	BER 10-6			
Service Threshold (dBm):	-91	-90	-91	-90			
Carrier to Noise Ratio (dB):	14.965	15.965	14.965	15.965			
Cross Polarization Improvement Factor (dB):			20	20	20	20	
Rx Equalization Sig Norm Parameter (Kn,M):			0.1	0.1	0.1	0.1	
Rx Equalization Sig Norm Parameter (Kn,NM):			0.1	0.1	0.1	0.1	
UserData1:	User Data		User Data				
Center Frequency (MHz):	11000		11000				
Channel Bandwidth (MHz):	28		28				
Transmission Power (dBm):	30		30				
Transmission Gains (dB):	0		0				
Transmission System Loss (dB):		0		0			
Transmission Line Loss (dB/100 m):		4		4			
Transmission Line Length (m):		10		10			
Transmission Connection Loss (dB):		0.3		0.3			
Transmission Number of Connections:		2		2			
Transmission Additional Loss (dB):		0		0			
Transmission Losses (dB):	1		1				
Transmission Antenna:	HP2-11-NSMA			HP2-11-NSMA			
Transmission Antenna Size (m):		0.6		0.6			
Transmission Antenna Height (m):		8		15			
Transmission Antenna Gain (dBd):		32.36		32.36			
Transmission Antenna Gain (dBi):		34.5		34.5			
Transmission Power EIRP (dBm):		63.5		63.5			
Reception Gains (dB):	0		0				
Reception System Loss (dB):	0		0				
Reception Line Loss (dB/100 m):		4		4			
Reception Line Length (m):	10		10				
Reception Connection Loss (dB):		0.3		0.3			
Reception Number of Connections:		2		2			
Reception Additional Loss (dB):		0		0			
Reception Losses (dB):	1		1				
Reception Antenna:	HP2-11-NSMA		HP2-11-NSMA				
Reception Antenna Size (m):	0.6		0.6				
Reception Antenna Height (m):		15		8			
Reception Antenna Gain (dBd):		32.36		32.36			
Reception Antenna Gain (dBi):		34.5		34.5			

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Link Polarization:	Vertical	Vertical		
Cross Polarization Factor (dB):		26.667		26.667
Link Distance (m):	47795.383		47795.383	
Azimuth - True (°):	119.103	299.606		
Azimuth - Magnetic (°):	120.736		300.963	
Transmission Inclination (°):	-0.391		0.391	
Reception Inclination (°):	-0.391		0.391	
ITU Recommendation:	ITU-R P.525-2			
Free Space Distance (m):	47796.496			47796.496
Center Frequency (MHz):	11000		11000	
Free Space Loss (dB):	146.856		146.856	
Max Fresnel Radius (m):	18.052		18.052	
Max 2nd Fresnel Radius (m):	25.529		25.529	
Earth Radius Factor (K):	4/3			
Effective Radius (m):	8502056.000			
ITU Recommendation:	ITU-R P.526-11			
Diffraction Model:	Cascade Knife Edge			
Diffraction:	No LOS Diffraction		No LOS Diffraction	
Diffraction Loss (dB):	0		0	
Clearance Target (%):	60			
Minimum Clearance (m):	1.72		1.72	
Minimum Clearance Point (m):		10.598		10.598
Terrain Reflection Dispersion (°):		0.5		
Reflection Area 1 (m):	413.308		413.308	
Reflection Area 2 (m):	476.9 - 519.3			476.9 - 519.3
Reflection Area 3 (m):	582.871		582.871	
Reflection Area 4 (m):	688.8 - 731.2			688.8 - 731.2
Reflection Area 5 (m):	1027.972		1027.972	
Reflection Area 6 (m):	1176.339		1176.339	
Reflection Area 7 (m):	1303.5 - 1430.7			1303.5 - 1430.7
Reflection Area 8 (m):	1494.268		1494.268	
Reflection Area 9 (m):	1557.854		1557.854	
Reflection Area 10 (m):	1621.4 - 1706.2			1621.4 - 1706.2
Reflection Area 11 (m):	1769.807		1769.807	
Reflection Area 12 (m):	1833.393		1833.393	
Reflection Area 13 (m):	1939.369		1939.369	
Reflection Area 14 (m):	2003.0 - 2045.3			2003.0 - 2045.3
Reflection Area 15 (m):	2108.932		2108.932	
Reflection Area 16 (m):	2257.3 - 2299.7			2257.3 - 2299.7
ITU Recommendation:	ITU-R P.676-8			
Atmospheric Pressure (hPa):	1013		1013	
Standard Temperature (°C):	15		15	
Water Vapor Density (g/m³):	7.5		7.5	
Atmospheric Gases Loss (dB):		0.789		0.789
Total Path Loss (dB):	147.645		147.645	
Reception Signal Level (dBm):		-50.645		-50.645
	BER 10-3	BER 10-6	BER 10-3	BER 10-6
Service Threshold (dBm):	-91	-90	-91	-90
Link Gross Margin (dB):	40.355	39.355	40.355	39.355
ITU Recommendation:	ITU-R F.1703-0 / ITU-T G.827			
Objective ITU Quality Grade:	Short Haul SDH Networks			
Unavailability Objective (%):	2.00E-02			
Availability Objective (%):	99.9800			
ITU Recommendation:	ITU-R F.1668-1 / ITU-T G.826			
Error Performance Objective BBER (%):	1.60E-05		1.60E-05	
Error Performance Objective BBER (s/Month):		0.42		0.42
	SESR	ESR	SESR	ESR
Error Performance Objective (%):	1.60E-04	3.20E-03	1.60E-04	3.20E-03
Error Performance Objective (s/Month):	4.205	84.096	4.205	84.096

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ITU Recommendation:	ITU-R F.1668-1 / ITU-T G.828			
Error Performance Objective BBER (%):	4.00E-06		4.00E-06	
Error Performance Objective BBER (s/Month):	0.105		0.105	
	SESR	ESR	SESR	ESR
Error Performance Objective (%):	1.60E-04	8.00E-04	1.60E-04	8.00E-04
Error Performance Objective (s/Month):	4.205	21.024	4.205	21.024

Multipath Model:	ITU-R P.530-15			
Multipath Planning Type:	Quick Planning			
Multipath Time Frame:	Average annual distribution			
ITU Recommendation:	ITU-R P.453-9			
Point Refractivity Gradient (dN1):	-76.7			
Geoclimatic Factor:	4.05E-05	4.05E-05		
Multipath Occurrence Factor (%):	2.62E+00		2.62E+00	

Precipitation Model:	ITU-R P.530-15			
ITU Recommendation:	ITU-R P.837-5 / ITU-R P.841-4			
Precipitation Time Frame:	Average annual distribution			
Precipitation Rate @ 0.01% (mm/h):	22			
ITU Recommendation:	ITU-R P.838-3			
Specific Attenuation (dB/km):	0.627671	0.627671		
Rainfall Attenuation (dB):	12.46	12.46		

	BER 10-3	BER 10-6	BER 10-3	BER 10-6
Fading Outage (%):	3.47E-05	4.37E-05	3.47E-05	4.37E-05
Selective Fading Outage (%):	6.73E-07	6.73E-07	6.73E-07	6.73E-07
Composite Fading Outage (%):	3.54E-05	4.44E-05	3.54E-05	4.44E-05

Fading Outage (s/Month):	0.912	1.149	0.912	1.149
Selective Fading Outage (s/Month):	0.018	0.018	0.018	0.018
Composite Fading Outage (s/Month):	0.93	1.166	0.93	1.166

	BER 10-3	BER 10-6	BER 10-3	BER 10-6
Unavailability due to Rain (%):	8.99E-05	1.08E-04	8.99E-05	1.08E-04
Unavailability due to Rain (s/Year):	28.359	33.924	28.359	33.924

	BER 10-3	BER 10-6	BER 10-3	BER 10-6
Unavailability due to Fading (%):	3.54E-05	4.44E-05	3.54E-05	4.44E-05
Unavailability due to Rain (%):	8.99E-05	1.08E-04	8.99E-05	1.08E-04
Total Unavailability (%):	1.25E-04	1.52E-04	1.25E-04	1.52E-04
Unavailability Objective (%):	2.00E-02	2.00E-02	2.00E-02	2.00E-02

Unavailability due to Fading (s/Year):	11.161	13.996	11.161	13.996
Unavailability due to Rain (s/Year):	28.359	33.924	28.359	33.924
Total Unavailability (s/Year):	39.52	47.92	39.52	47.92
Unavailability Objective (s/Year):	6307.2	6307.2	6307.2	6307.2

Total Availability (%):	99.9999	99.9998	99.9999	99.9998
Availability Objective (%):	99.9800	99.9800	99.9800	99.9800

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C.3. Cloch Rinnce N.S. – Saggart

Site:	AB_L6A_VM Cloch Rinnce)		POP_ST (Saggart)				
Name:							
Type:	Cell	Cell					
Latitude:	53°23'51.5"N		53°14'48.3"N				
Longitude:	7°00'54.0"W		6°28'35.6"W				
Altitude (m):	98.0		397.0				
UserData1:	User Data						
Datum:	World Geodetic System 1984 (WGS 84)						
	Forward Link		Reverse Link				
Transmission Site:	AB_L6A_VM		POP_ST				
Reception Site:	POP_ST		AB_L6A_VM				
Radio Type:	NetRadio0001		NetRadio0001				
Modulation Scheme:		4-QAM		4-QAM			
Bandwidth (MHz):	2		2				
Roll-Off Factor:	0.2		0.2				
Coding Gain (dB):	0		0				
System Gains (dB):	0		0				
Channel Overhead (%):		20		20			
FEC Overhead (%):	0		0				
Reference Temperature (°K):		290		290			
Receiver Noise Figure (dB):		5		5			
Maximum Data Rate (Mbps):		2.667		2.667			
Maximum Bit Rate (Mbps):		3.333		3.333			
Required Bit Error Rate:		BER 10-3	BER 10-6	BER 10-3	BER 10-6		
Service Threshold (dBm):		-91	-90	-91	-90		
Carrier to Noise Ratio (dB):		14.965	15.965	14.965	15.965		
Cross Polarization Improvement Factor (dB):			20	20	20	20	
Rx Equalization Sig Norm Parameter (Kn,M):			0.1	0.1	0.1	0.1	
Rx Equalization Sig Norm Parameter (Kn,NM):			0.1	0.1	0.1	0.1	
UserData1:		User Data		User Data			
Center Frequency (MHz):		13000		13000			
Channel Bandwidth (MHz):		28		28			
Transmission Power (dBm):		30		30			
Transmission Gains (dB):		0		0			
Transmission System Loss (dB):			0		0		
Transmission Line Loss (dB/100 m):			4		4		
Transmission Line Length (m):			10		10		
Transmission Connection Loss (dB):			0.3		0.3		
Transmission Number of Connections:			2		2		
Transmission Additional Loss (dB):			0		0		
Transmission Losses (dB):		1		1			
Transmission Antenna:		HP2-13-NSMA			HP2-13-NSMA		
Transmission Antenna Size (m):			0.6		0.6		
Transmission Antenna Height (m):			8		15		
Transmission Antenna Gain (dBd):			33.76		33.76		
Transmission Antenna Gain (dBi):			35.9		35.9		
Transmission Power EIRP (dBm):			64.9		64.9		
Reception Gains (dB):		0		0			
Reception System Loss (dB):		0		0			
Reception Line Loss (dB/100 m):			4		4		
Reception Line Length (m):		10		10			
Reception Connection Loss (dB):			0.3		0.3		
Reception Number of Connections:			2		2		
Reception Additional Loss (dB):			0		0		
Reception Losses (dB):		1		1			
Reception Antenna:	HP2-13-NSMA			HP2-13-NSMA			
Reception Antenna Size (m):		0.6		0.6			
Reception Antenna Height (m):			15		8		
Reception Antenna Gain (dBd):			33.76		33.76		
Reception Antenna Gain (dBi):			35.9		35.9		

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Link Polarization:	Vertical	Vertical		
Cross Polarization Factor (dB):		30	30	
Link Distance (m):	39584.52	39584.52		
Azimuth - True (°):	114.92	295.352		
Azimuth - Magnetic (°):	116.51	296.709		
Transmission Inclination (°):	-0.443	0.443		
Reception Inclination (°):	-0.443	0.443		
ITU Recommendation:	ITU-R P.525-2			
Free Space Distance (m):	39585.703		39585.703	
Center Frequency (MHz):	13000	13000		
Free Space Loss (dB):	146.67	146.67		
Max Fresnel Radius (m):	15.112	15.112		
Max 2nd Fresnel Radius (m):	21.372	21.372		
Earth Radius Factor (K):	4/3			
Effective Radius (m):	8502056.000			
ITU Recommendation:	ITU-R P.526-11			
Diffraction Model:	Cascade Knife Edge			
Diffraction:	No LOS Diffraction	No LOS Diffraction		
Diffraction Loss (dB):	0	0		
Clearance Target (%):	60			
Minimum Clearance (m):	4.606	4.606		
Minimum Clearance Point (m):		39574.309		39574.309
Terrain Reflection Dispersion (°):		0.5		
Reflection Area 1 (m):	786.38	786.38		
Reflection Area 2 (m):	827.2 - 868		827.2 - 868	
Reflection Area 3 (m):	929.4 - 949.8		929.4 - 949.8	
Reflection Area 4 (m):	990.634	990.634		
Reflection Area 5 (m):	1072.3 - 1113.2		1072.3 - 1113.2	
Reflection Area 6 (m):	1174.5 - 1215.3		1174.5 - 1215.3	
Reflection Area 7 (m):	1317.4 - 1337.9		1317.4 - 1337.9	
Reflection Area 8 (m):	1440 - 1501.3		1440 - 1501.3	
Reflection Area 9 (m):	1562.5 - 1603.4		1562.5 - 1603.4	
Reflection Area 10 (m):	1664.7 - 1766.8		1664.7 - 1766.8	
Reflection Area 11 (m):	1828.078	1828.078		
Reflection Area 12 (m):	1889.4 - 1930.2		1889.4 - 1930.2	
Reflection Area 13 (m):	1971.056	1971.056		
Reflection Area 14 (m):	2052.758	2052.758		
Reflection Area 15 (m):	2114.034	2114.034		
Reflection Area 16 (m):	2216.161	2216.161		
ITU Recommendation:	ITU-R P.676-8			
Atmospheric Pressure (hPa):	1013	1013		
Standard Temperature (°C):	15	15		
Water Vapor Density (g/m³):	7.5	7.5		
Atmospheric Gases Loss (dB):		0.865		0.865
Total Path Loss (dB):	147.534	147.534		
Reception Signal Level (dBm):		-47.734		-47.734

	BER 10-3	BER 10-6	BER 10-3	BER 10-6
Service Threshold (dBm):	-91	-90	-91	-90
Link Gross Margin (dB):	43.266	42.266	43.266	42.266

ITU Recommendation:	ITU-R F.1703-0 / ITU-T G.827			
Objective ITU Quality Grade:	Short Haul SDH Networks			
Unavailability Objective (%):	2.00E-02			
Availability Objective (%):	99.9800			
ITU Recommendation:	ITU-R F.1668-1 / ITU-T G.826			
Error Performance Objective BBER (%):	1.60E-05		1.60E-05	
Error Performance Objective BBER (s/Month):		0.42		0.42

	SESR	ESR	SESR	ESR
Error Performance Objective (%):	1.60E-04	3.20E-03	1.60E-04	3.20E-03
Error Performance Objective (s/Month):	4.205	84.096	4.205	84.096

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ITU Recommendation:	ITU-R F.1668-1 / ITU-T G.828			
Error Performance Objective BBER (%):	4.00E-06		4.00E-06	
Error Performance Objective BBER (s/Month):	0.105		0.105	
	SESR	ESR	SESR	ESR
Error Performance Objective (%):	1.60E-04	8.00E-04	1.60E-04	8.00E-04
Error Performance Objective (s/Month):	4.205	21.024	4.205	21.024

Multipath Model:	ITU-R P.530-15			
Multipath Planning Type:	Quick Planning			
Multipath Time Frame:	Average annual distribution			
ITU Recommendation:	ITU-R P.453-9			
Point Refractivity Gradient (dN1):	-76.7			
Geoclimatic Factor: 4.05E-05	4.05E-05			
Multipath Occurrence Factor (%):	1.39E+00		1.39E+00	

Precipitation Model:	ITU-R P.530-15			
ITU Recommendation:	ITU-R P.837-5 / ITU-R P.841-4			
Precipitation Time Frame:	Average annual distribution			
Precipitation Rate @ 0.01% (mm/h):	22			
ITU Recommendation:	ITU-R P.838-3			
Specific Attenuation (dB/km):	0.949102		0.949102	
Rainfall Attenuation (dB):	17.939		17.939	

	BER 10-3	BER 10-6	BER 10-3	BER 10-6
Fading Outage (%):	8.80E-06	1.11E-05	8.80E-06	1.11E-05
Selective Fading Outage (%):	2.57E-07	2.57E-07	2.57E-07	2.57E-07
Composite Fading Outage (%):		9.06E-06	1.13E-05	9.06E-06	1.13E-05

Fading Outage (s/Month):	0.231	0.291	0.231	0.291	
Selective Fading Outage (s/Month):		0.007	0.007	0.007	0.007
Composite Fading Outage (s/Month):		0.238	0.298	0.238	0.298

	BER 10-3	BER 10-6	BER 10-3	BER 10-6
Unavailability due to Rain (%):	4.47E-04	5.01E-04	4.47E-04	5.01E-04
Unavailability due to Rain (s/Year):		141.098	157.843	141.098	157.843

	BER 10-3	BER 10-6	BER 10-3	BER 10-6
Unavailability due to Fading (%):		9.06E-06	1.13E-05	9.06E-06	1.13E-05
Unavailability due to Rain (%):	4.47E-04	5.01E-04	4.47E-04	5.01E-04
Total Unavailability (%):	4.56E-04	5.12E-04	4.56E-04	5.12E-04
Unavailability Objective (%):	2.00E-02	2.00E-02	2.00E-02	2.00E-02

Unavailability due to Fading (s/Year):		2.856	3.575	2.856	3.575
Unavailability due to Rain (s/Year):		141.098	157.843	141.098	157.843
Total Unavailability (s/Year):	143.955	161.418	143.955	161.418	
Unavailability Objective (s/Year):		6307.2	6307.2	6307.2	6307.2

Total Availability (%):	99.9995	99.9995	99.9995	99.9995
Availability Objective (%):	99.9800	99.9800	99.9800	99.9800

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APPENDIX D – Radio Link Budgets (Radio link to/from Relay-mast)

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APPENDIX D – Radio Link Budgets (Radio link to/from Relay-mast)

D.1. Dunmurry Hill – Relay-mast

Site:	AB_L2B_VM (Dunmurry Hill)			Relay_n2 (Relay-mast)			
Name:							
Type:	Cell	Cell					
Latitude:	53°11'54.3"N		53°17'43.4"N				
Longitude:	6°56'00.2"W			7°00'42.1"W			
Altitude (m):	222.0		72.0				
UserData1:	User Data						
Datum:	World Geodetic System 1984 (WGS 84)						
	Forward Link		Reverse Link				
Transmission Site:	AB_L2B_VM			Relay_n2			
Reception Site:	Relay_n2		AB_L2B_VM				
Radio Type:	NetRadio0001			NetRadio0001			
Modulation Scheme:		4-QAM		4-QAM			
Bandwidth (MHz):	2		2				
Roll-Off Factor:	0.2		0.2				
Coding Gain (dB):	0		0				
System Gains (dB):	0		0				
Channel Overhead (%):		20		20			
FEC Overhead (%):	0		0				
Reference Temperature (°K):		290		290			
Receiver Noise Figure (dB):		5		5			
Maximum Data Rate (Mbps):		2.667		2.667			
Maximum Bit Rate (Mbps):		3.333		3.333			
Required Bit Error Rate:		BER 10-3	BER 10-6	BER 10-3	BER 10-6		
Service Threshold (dBm):		-91	-90	-91	-90		
Carrier to Noise Ratio (dB):		14.965	15.965	14.965	15.965		
Cross Polarization Improvement Factor (dB):				20	20	20	20
Rx Equalization Sig Norm Parameter (Kn,M):				0.1	0.1	0.1	0.1
Rx Equalization Sig Norm Parameter (Kn,NM):				0.1	0.1	0.1	0.1
UserData1:		User Data		User Data			
Center Frequency (MHz):		13000		13000			
Channel Bandwidth (MHz):		28		28			
Transmission Power (dBm):		30		30			
Transmission Gains (dB):		0		0			
Transmission System Loss (dB):			0		0		
Transmission Line Loss (dB/100 m):			4		4		
Transmission Line Length (m):			10		10		
Transmission Connection Loss (dB):			0.3		0.3		
Transmission Number of Connections:			2		2		
Transmission Additional Loss (dB):			0		0		
Transmission Losses (dB):		1		1			
Transmission Antenna:		HP2-13-NSMA			HP2-13-NSMA		
Transmission Antenna Size (m):			0.6		0.6		
Transmission Antenna Height (m):			8		15		
Transmission Antenna Gain (dBd):			33.76		33.76		
Transmission Antenna Gain (dBi):			35.9		35.9		
Transmission Power EIRP (dBm):			64.9		64.9		
Reception Gains (dB):		0		0			
Reception System Loss (dB):		0		0			
Reception Line Loss (dB/100 m):			4		4		
Reception Line Length (m):		10		10			
Reception Connection Loss (dB):			0.3		0.3		
Reception Number of Connections:			2		2		
Reception Additional Loss (dB):			0		0		

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Reception Losses (dB):	1		1	
Reception Antenna:	HP2-13-NSMA		HP2-13-NSMA	
Reception Antenna Size (m):	0.6		0.6	
Reception Antenna Height (m):		15		8
Reception Antenna Gain (dBd):		33.76		33.76
Reception Antenna Gain (dBi):		35.9		35.9
Link Polarization:	Vertical	Vertical		
Cross Polarization Factor (dB):		30		30
Link Distance (m):	12001.548		12001.548	
Azimuth - True (°):	334.251	154.188		
Azimuth - Magnetic (°):	335.777		155.76	
Transmission Inclination (°):	0.683		-0.683	
Reception Inclination (°):	0.683		-0.683	
ITU Recommendation:	ITU-R P.525-2			
Free Space Distance (m):	12002.399			12002.399
Center Frequency (MHz):	13000		13000	
Free Space Loss (dB):	136.304		136.304	
Max Fresnel Radius (m):	8.321		8.321	
Max 2nd Fresnel Radius (m):	11.768		11.768	
Earth Radius Factor (K):	4/3			
Effective Radius (m):	8502056.000			
ITU Recommendation:	ITU-R P.526-11			
Diffraction Model:	Cascade Knife Edge			
Diffraction:	No LOS Diffraction		No LOS Diffraction	
Diffraction Loss (dB):	0		0	
Clearance Target (%):	60			
Minimum Clearance (m):	2.355		2.355	
Minimum Clearance Point (m):		11881.188		11881.188
Terrain Reflection Dispersion (°):		0.5		
Reflection Area 1 (m):	2114.886		2114.886	
Reflection Area 2 (m):	2252.4 - 2355.6			2252.4 - 2355.6
Reflection Area 3 (m):	2561.9 - 2596.3			2561.9 - 2596.3
Reflection Area 4 (m):	2940.207		2940.207	
Reflection Area 5 (m):	3937.470		3937.470	
Reflection Area 6 (m):	4659.626		4659.626	
Reflection Area 7 (m):	4934.7 - 5003.5			4934.7 - 5003.5
Reflection Area 8 (m):	5175.453		5175.453	
Reflection Area 9 (m):	5313.006		5313.006	
Reflection Area 10 (m):	5416.171		5416.171	
Reflection Area 11 (m):	5588.1 - 5622.5			5588.1 - 5622.5
Reflection Area 12 (m):	5760.055		5760.055	
Reflection Area 13 (m):	6000.8 - 6035.2			6000.8 - 6035.2
Reflection Area 14 (m):	6103.939		6103.939	
Reflection Area 15 (m):	6207.104		6207.104	
Reflection Area 16 (m):	6344.658		6344.658	
ITU Recommendation:	ITU-R P.676-8			
Atmospheric Pressure (hPa):	1013		1013	
Standard Temperature (°C):	15		15	
Water Vapor Density (g/m³):	7.5		7.5	
Atmospheric Gases Loss (dB):		0.262		0.262
Total Path Loss (dB):	136.566		136.566	
Reception Signal Level (dBm):		-36.766		-36.766

	BER 10-3	BER 10-6	BER 10-3	BER 10-6
Service Threshold (dBm):	-91	-90	-91	-90
Link Gross Margin (dB):	54.234	53.234	54.234	53.234

ITU Recommendation:	ITU-R F.1703-0 / ITU-T G.827
Objective ITU Quality Grade:	Short Haul SDH Networks
Unavailability Objective (%):	2.00E-02
Availability Objective (%):	99.9800

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ITU Recommendation:	ITU-R F.1668-1 / ITU-T G.826			
Error Performance Objective BBER (%):	1.60E-05		1.60E-05	
Error Performance Objective BBER (s/Month):	0.42		0.42	
	SESR	ESR	SESR	ESR
Error Performance Objective (%):	1.60E-04	3.20E-03	1.60E-04	3.20E-03
Error Performance Objective (s/Month):	4.205	84.096	4.205	84.096

ITU Recommendation:	ITU-R F.1668-1 / ITU-T G.828			
Error Performance Objective BBER (%):	4.00E-06		4.00E-06	
Error Performance Objective BBER (s/Month):	0.105		0.105	
	SESR	ESR	SESR	ESR
Error Performance Objective (%):	1.60E-04	8.00E-04	1.60E-04	8.00E-04
Error Performance Objective (s/Month):	4.205	21.024	4.205	21.024

Multipath Model:	ITU-R P.530-15			
Multipath Planning Type:	Quick Planning			
Multipath Time Frame:	Average annual distribution			
ITU Recommendation:	ITU-R P.453-9			
Point Refractivity Gradient (dN1):	-76.7			
Geoclimatic Factor:	4.05E-05	4.05E-05		
Multipath Occurrence Factor (%):	2.15E-02		2.15E-02	

Precipitation Model:	ITU-R P.530-15			
ITU Recommendation:	ITU-R P.837-5 / ITU-R P.841-4			
Precipitation Time Frame:	Average annual distribution			
Precipitation Rate @ 0.01% (mm/h):	22			
ITU Recommendation:	ITU-R P.838-3			
Specific Attenuation (dB/km):	0.949107	0.949107		
Rainfall Attenuation (dB):	8.228	8.228		

	BER 10-3	BER 10-6	BER 10-3	BER 10-6
Fading Outage (%):	7.42E-09	9.35E-09	7.42E-09	9.35E-09
Selective Fading Outage (%):	5.09E-10	5.09E-10	5.09E-10	5.09E-10
Composite Fading Outage (%):		7.93E-09	9.86E-09	7.93E-09	9.86E-09

Fading Outage (s/Month):	0	0	0	0
Selective Fading Outage (s/Month):	0	0	0	0
Composite Fading Outage (s/Month):	0	0	0	0

	BER 10-3	BER 10-6	BER 10-3	BER 10-6
Unavailability due to Rain (%):	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Unavailability due to Rain (s/Year):		0	0	0	0

	BER 10-3	BER 10-6	BER 10-3	BER 10-6
Unavailability due to Fading (%):		7.93E-09	9.86E-09	7.93E-09	9.86E-09
Unavailability due to Rain (%):	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Total Unavailability (%):	7.93E-09	9.86E-09	7.93E-09	9.86E-09
Unavailability Objective (%):	2.00E-02	2.00E-02	2.00E-02	2.00E-02

Unavailability due to Fading (s/Year):		0.003	0.003	0.003	0.003
Unavailability due to Rain (s/Year):		0	0	0	0
Total Unavailability (s/Year):	0.003	0.003	0.003	0.003
Unavailability Objective (s/Year):		6307.2	6307.2	6307.2	6307.2

Total Availability (%):	100.0000	100.0000	100.0000	100.0000
Availability Objective (%):	99.9800	99.9800	99.9800	99.9800

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D.2. Relay-mast – Gaelscoil Eadan Doire

Site:	Relay_n2 (Relay-mast)		AB_L2A_VM (Gaelscoil Eadan Doire)				
Name:							
Type:	Cell	Cell					
Latitude:	53°17'43.4"N		53°20'20.1"N				
Longitude:	7°00'42.1"W		7°04'18.5"W				
Altitude (m):	72.0		88.0				
UserData1:	User Data						
Datum:	World Geodetic System 1984 (WGS 84)						
	Forward Link		Reverse Link				
Transmission Site:	Relay_n2		AB_L2A_VM				
Reception Site:	AB_L2A_VM		Relay_n2				
Radio Type:	NetRadio0001		NetRadio0001				
Modulation Scheme:	4-QAM		4-QAM				
Bandwidth (MHz):	2		2				
Roll-Off Factor:	0.2		0.2				
Coding Gain (dB):	0		0				
System Gains (dB):	0		0				
Channel Overhead (%):	20		20				
FEC Overhead (%):	0		0				
Reference Temperature (°K):	290		290				
Receiver Noise Figure (dB):	5		5				
Maximum Data Rate (Mbps):	2.667		2.667				
Maximum Bit Rate (Mbps):	3.333		3.333				
Required Bit Error Rate:	BER 10-3	BER 10-6	BER 10-3	BER 10-6			
Service Threshold (dBm):	-91	-90	-91	-90			
Carrier to Noise Ratio (dB):	14.965	15.965	14.965	15.965			
Cross Polarization Improvement Factor (dB):			20	20	20	20	
Rx Equalization Sig Norm Parameter (Kn,M):			0.1	0.1	0.1	0.1	
Rx Equalization Sig Norm Parameter (Kn,NM):			0.1	0.1	0.1	0.1	
UserData1:	User Data		User Data				
Center Frequency (MHz):	26000		26000				
Channel Bandwidth (MHz):	28		28				
Transmission Power (dBm):	30		30				
Transmission Gains (dB):	0		0				
Transmission System Loss (dB):		0		0			
Transmission Line Loss (dB/100 m):		4		4			
Transmission Line Length (m):		10		10			
Transmission Connection Loss (dB):		0.3		0.3			
Transmission Number of Connections:		2		2			
Transmission Additional Loss (dB):		0		0			
Transmission Losses (dB):	1		1				
Transmission Antenna:	HP2-26		HP2-26				
Transmission Antenna Size (m):		0.6		0.6			
Transmission Antenna Height (m):		30		10			
Transmission Antenna Gain (dBd):		38.96		38.96			
Transmission Antenna Gain (dBi):		41.1		41.1			
Transmission Power EIRP (dBm):		70.1		70.1			
Reception Gains (dB):	0		0				
Reception System Loss (dB):	0		0				
Reception Line Loss (dB/100 m):		4		4			
Reception Line Length (m):	10		10				
Reception Connection Loss (dB):		0.3		0.3			
Reception Number of Connections:		2		2			
Reception Additional Loss (dB):		0		0			
Reception Losses (dB):	1		1				
Reception Antenna:	HP2-26		HP2-26				
Reception Antenna Size (m):	0.6		0.6				
Reception Antenna Height (m):		10		30			
Reception Antenna Gain (dBd):		38.96		38.96			
Reception Antenna Gain (dBi):		41.1		41.1			

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Link Polarization:	Vertical	Vertical		
Cross Polarization Factor (dB):		30		30
Link Distance (m):	6286.867	6286.867		
Azimuth - True (°):	320.497	140.449		
Azimuth - Magnetic (°):	322.069		142.051	
Transmission Inclination (°):	0.036		-0.036	
Reception Inclination (°):	0.036		-0.036	
ITU Recommendation:	ITU-R P.525-2			
Free Space Distance (m):	6286.868		6286.868	
Center Frequency (MHz):	26000		26000	
Free Space Loss (dB):	136.708		136.708	
Max Fresnel Radius (m):	4.259		4.259	
Max 2nd Fresnel Radius (m):	6.022		6.022	
Earth Radius Factor (K):	4/3			
Effective Radius (m):	8502056.000			
ITU Recommendation:	ITU-R P.526-11			
Diffraction Model:	Cascade Knife Edge			
Diffraction:	No LOS Diffraction		No LOS Diffraction	
Diffraction Loss (dB):	0.293		0.293	
Clearance Target (%):	60			
Minimum Clearance (m):	-0.123		-0.123	
Minimum Clearance Point (m):		5893.938		5893.938
Terrain Reflection Dispersion (°):		0.5		
Reflection Area 1 (m):	771.305		771.305	
Reflection Area 2 (m):	2110.2 - 2139.3			2110.2 - 2139.3
Reflection Area 3 (m):	2546.8 - 2575.9			2546.8 - 2575.9
Reflection Area 4 (m):	2663.2 - 2721.4			2663.2 - 2721.4
Reflection Area 5 (m):	2808.7 - 2837.8			2808.7 - 2837.8
Reflection Area 6 (m):	2925.14		2925.14	
Reflection Area 7 (m):	3012.5 - 3041.6			3012.5 - 3041.6
Reflection Area 8 (m):	3128.88		3128.88	
Reflection Area 9 (m):	3187.092		3187.092	
Reflection Area 10 (m):	3303.5 - 3332.6			3303.5 - 3332.6
Reflection Area 11 (m):	3390.8 - 3449			3390.8 - 3449
Reflection Area 12 (m):	3623.7 - 3652.8			3623.7 - 3652.8
Reflection Area 13 (m):	3740.1 - 3769.2			3740.1 - 3769.2
Reflection Area 14 (m):	3856.5 - 4002			3856.5 - 4002
Reflection Area 15 (m):	4089.374		4089.374	
Reflection Area 16 (m):	4176.7 - 4205.8			4176.7 - 4205.8
ITU Recommendation:	ITU-R P.676-8			
Atmospheric Pressure (hPa):	1013		1013	
Standard Temperature (°C):	15		15	
Water Vapor Density (g/m³):	7.5		7.5	
Atmospheric Gases Loss (dB):		0.832		0.832
Total Path Loss (dB):	137.833		137.833	
Reception Signal Level (dBm):		-27.633		-27.633
	BER 10-3	BER 10-6	BER 10-3	BER 10-6
Service Threshold (dBm):	-91	-90	-91	-90
Link Gross Margin (dB):	63.367	62.367	63.367	62.367
ITU Recommendation:	ITU-R F.1703-0 / ITU-T G.827			
Objective ITU Quality Grade:	Short Haul SDH Networks			
Unavailability Objective (%):	2.00E-02			
Availability Objective (%):	99.9800			
ITU Recommendation:	ITU-R F.1668-1 / ITU-T G.826			
Error Performance Objective BBER (%):	1.60E-05		1.60E-05	
Error Performance Objective BBER (s/Month):		0.42		0.42
	SESR	ESR	SESR	ESR
Error Performance Objective (%):	1.60E-04	3.20E-03	1.60E-04	3.20E-03
Error Performance Objective (s/Month):	4.205	84.096	4.205	84.096

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ITU Recommendation:	ITU-R F.1668-1 / ITU-T G.828			
Error Performance Objective BBER (%):	4.00E-06		4.00E-06	
Error Performance Objective BBER (s/Month):	0.105		0.105	
	SESR	ESR	SESR	ESR
Error Performance Objective (%):	1.60E-04	8.00E-04	1.60E-04	8.00E-04
Error Performance Objective (s/Month):	4.205	21.024	4.205	21.024

Multipath Model:	ITU-R P.530-15			
Multipath Planning Type:	Quick Planning			
Multipath Time Frame:	Average annual distribution			
ITU Recommendation:	ITU-R P.453-9			
Point Refractivity Gradient (dN1):	-76.7			
Geoclimatic Factor:	4.05E-05	4.05E-05		
Multipath Occurrence Factor (%):	7.10E-02		7.10E-02	

Precipitation Model:	ITU-R P.530-15			
ITU Recommendation:	ITU-R P.837-5 / ITU-R P.841-4			
Precipitation Time Frame:	Average annual distribution			
Precipitation Rate @ 0.01% (mm/h):	22			
ITU Recommendation:	ITU-R P.838-3			
Specific Attenuation (dB/km):	3.069479		3.069479	
Rainfall Attenuation (dB):	14.416		14.416	

	BER 10-3	BER 10-6	BER 10-3	BER 10-6
Fading Outage (%):	3.56E-09	4.48E-09	3.56E-09	4.48E-09
Selective Fading Outage (%):	2.32E-10	2.32E-10	2.32E-10	2.32E-10
Composite Fading Outage (%):		3.79E-09	4.71E-09	3.79E-09	4.71E-09

Fading Outage (s/Month):	0	0	0	0
Selective Fading Outage (s/Month):	0	0	0	0
Composite Fading Outage (s/Month):	0	0	0	0

	BER 10-3	BER 10-6	BER 10-3	BER 10-6
Unavailability due to Rain (%):	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Unavailability due to Rain (s/Year):	0	0	0	0

	BER 10-3	BER 10-6	BER 10-3	BER 10-6
Unavailability due to Fading (%):		3.79E-09	4.71E-09	3.79E-09	4.71E-09
Unavailability due to Rain (%):	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Total Unavailability (%):	3.79E-09	4.71E-09	3.79E-09	4.71E-09
Unavailability Objective (%):	2.00E-02	2.00E-02	2.00E-02	2.00E-02

Unavailability due to Fading (s/Year):	0.001	0.001	0.001	0.001
Unavailability due to Rain (s/Year):	0	0	0	0
Total Unavailability (s/Year):	0.001	0.001	0.001	0.001
Unavailability Objective (s/Year):	6307.2	6307.2	6307.2	6307.2

Total Availability (%):	100.0000	100.0000	100.0000	100.0000
Availability Objective (%):	99.9800	99.9800	99.9800	99.9800

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D.3. Relay-mast – St Etchens N.S.

Site Name:	Relay_n2 (Relay-mast)		AB_L5A_VM (St Etchens N.S.)				
Type:	Cell	Cell					
Latitude:	53°17'43.4"N		53°27'25.3"N				
Longitude:	7°00'42.1"W		7°06'10.5"W				
Altitude (m):	72.0		78.0				
UserData1:	User Data						
Datum:	World Geodetic System 1984 (WGS 84)						
	Forward Link		Reverse Link				
Transmission Site:	Relay_n2		AB_L5A_VM				
Reception Site:	AB_L5A_VM		Relay_n2				
Radio Type:	NetRadio0001		NetRadio0001				
Modulation Scheme:	4-QAM		4-QAM				
Bandwidth (MHz):	2		2				
Roll-Off Factor:	0.2		0.2				
Coding Gain (dB):	0		0				
System Gains (dB):	0		0				
Channel Overhead (%):	20		20				
FEC Overhead (%):	0		0				
Reference Temperature (°K):	290		290				
Receiver Noise Figure (dB):	5		5				
Maximum Data Rate (Mbps):	2.667		2.667				
Maximum Bit Rate (Mbps):	3.333		3.333				
Required Bit Error Rate:	BER 10-3	BER 10-6	BER 10-3	BER 10-6			
Service Threshold (dBm):	-91	-90	-91	-90			
Carrier to Noise Ratio (dB):	14.965	15.965	14.965	15.965			
Cross Polarization Improvement Factor (dB):			20	20	20	20	
Rx Equalization Sig Norm Parameter (Kn,M):			0.1	0.1	0.1	0.1	
Rx Equalization Sig Norm Parameter (Kn,NM):			0.1	0.1	0.1	0.1	
UserData1:	User Data		User Data				
Center Frequency (MHz):	23000		23000				
Channel Bandwidth (MHz):	28		28				
Transmission Power (dBm):	30		30				
Transmission Gains (dB):	0		0				
Transmission System Loss (dB):		0		0			
Transmission Line Loss (dB/100 m):		4		4			
Transmission Line Length (m):		10		10			
Transmission Connection Loss (dB):		0.3		0.3			
Transmission Number of Connections:		2		2			
Transmission Additional Loss (dB):		0		0			
Transmission Losses (dB):	1		1				
Transmission Antenna:	HP2-23		HP2-23				
Transmission Antenna Size (m):		0.6		0.6			
Transmission Antenna Height (m):		60		12			
Transmission Antenna Gain (dBd):		38.06		38.06			
Transmission Antenna Gain (dBi):		40.2		40.2			
Transmission Power EIRP (dBm):		69.2		69.2			
Reception Gains (dB):	0		0				
Reception System Loss (dB):	0		0				
Reception Line Loss (dB/100 m):		4		4			
Reception Line Length (m):	10		10				
Reception Connection Loss (dB):		0.3		0.3			
Reception Number of Connections:		2		2			
Reception Additional Loss (dB):		0		0			
Reception Losses (dB):	1		1				
Reception Antenna:	HP2-23		HP2-23				
Reception Antenna Size (m):	0.6		0.6				
Reception Antenna Height (m):		12		60			
Reception Antenna Gain (dBd):		38.06		38.06			
Reception Antenna Gain (dBi):		40.2		40.2			

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Link Polarization:	Vertical	Vertical		
Cross Polarization Factor (dB):		30	30	
Link Distance (m):	19003.014		19003.014	
Azimuth - True (°):	341.429	161.356		
Azimuth - Magnetic (°):	343.001		162.989	
Transmission Inclination (°):	0.127		-0.127	
Reception Inclination (°):	0.127		-0.127	
ITU Recommendation:	ITU-R P.525-2			
Free Space Distance (m):	19003.06		19003.06	
Center Frequency (MHz):	23000		23000	
Free Space Loss (dB):	145.251		145.251	
Max Fresnel Radius (m):	7.872		7.872	
Max 2nd Fresnel Radius (m):	11.133		11.133	
Earth Radius Factor (K):	4/3			
Effective Radius (m):	8502056.000			
ITU Recommendation:	ITU-R P.526-11			
Diffraction Model:	Cascade Knife Edge			
Diffraction:	No LOS Diffraction		No LOS Diffraction	
Diffraction Loss (dB):	3.287		3.287	
Clearance Target (%):	60			
Minimum Clearance (m):	-1.382		-1.382	
Minimum Clearance Point (m):		11117.743		11117.743
Terrain Reflection Dispersion (°):		0.5		
Reflection Area 1 (m):	1583.584		1583.584	
Reflection Area 2 (m):	1844.794		1844.794	
Reflection Area 3 (m):	2040.7 - 2073.4		2040.7 - 2073.4	
Reflection Area 4 (m):	6644.525		6644.525	
Reflection Area 5 (m):	7199.6 - 7264.9		7199.6 - 7264.9	
Reflection Area 6 (m):	7591.41		7591.41	
Reflection Area 7 (m):	7689.364		7689.364	
Reflection Area 8 (m):	7917.9 - 8015.9		7917.9 - 8015.9	
Reflection Area 9 (m):	8146.5 - 8211.8		8146.5 - 8211.8	
Reflection Area 10 (m):	8342.389		8342.389	
Reflection Area 11 (m):	8440.342		8440.342	
Reflection Area 12 (m):	8538.3 - 8701.6		8538.3 - 8701.6	
Reflection Area 13 (m):	8799.5 - 8864.8		8799.5 - 8864.8	
Reflection Area 14 (m):	8962.762		8962.762	
Reflection Area 15 (m):	9158.669		9158.669	
Reflection Area 16 (m):	9256.623		9256.623	
ITU Recommendation:	ITU-R P.676-8			
Atmospheric Pressure (hPa):	1013		1013	
Standard Temperature (°C):	15		15	
Water Vapor Density (g/m³):	7.5		7.5	
Atmospheric Gases Loss (dB):		3.703		3.703
Total Path Loss (dB):	152.241		152.241	
Reception Signal Level (dBm):		-43.841		-43.841

	BER 10-3	BER 10-6	BER 10-3	BER 10-6
Service Threshold (dBm):	-91	-90	-91	-90
Link Gross Margin (dB):	47.159	46.159	47.159	46.159

ITU Recommendation:	ITU-R F.1703-0 / ITU-T G.827			
Objective ITU Quality Grade:	Short Haul SDH Networks			
Unavailability Objective (%):	2.00E-02			
Availability Objective (%):	99.9800			
ITU Recommendation:	ITU-R F.1668-1 / ITU-T G.826			
Error Performance Objective BBER (%):	1.60E-05		1.60E-05	
Error Performance Objective BBER (s/Month):		0.42		0.42

	SESR	ESR	SESR	ESR
Error Performance Objective (%):	1.60E-04	3.20E-03	1.60E-04	3.20E-03
Error Performance Objective (s/Month):	4.205	84.096	4.205	84.096

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ITU Recommendation:	ITU-R F.1668-1 / ITU-T G.828			
Error Performance Objective BBER (%):	4.00E-06		4.00E-06	
Error Performance Objective BBER (s/Month):	0.105		0.105	
	SESR	ESR	SESR	ESR
Error Performance Objective (%):	1.60E-04	8.00E-04	1.60E-04	8.00E-04
Error Performance Objective (s/Month):	4.205	21.024	4.205	21.024

Multipath Model:	ITU-R P.530-15			
Multipath Planning Type:	Quick Planning			
Multipath Time Frame:	Average annual distribution			
ITU Recommendation:	ITU-R P.453-9			
Point Refractivity Gradient (dN1):	-76.7			
Geoclimatic Factor: 4.05E-05	4.05E-05			
Multipath Occurrence Factor (%):	8.46E-01		8.46E-01	

Precipitation Model:	ITU-R P.530-15			
ITU Recommendation:	ITU-R P.837-5 / ITU-R P.841-4			
Precipitation Time Frame:	Average annual distribution			
Precipitation Rate @ 0.01% (mm/h):	22			
ITU Recommendation:	ITU-R P.838-3			
Specific Attenuation (dB/km):	2.518774		2.518774	
Rainfall Attenuation (dB):	27.391		27.391	

	BER 10-3	BER 10-6	BER 10-3	BER 10-6
Fading Outage (%):	2.12E-06	2.67E-06	2.12E-06	2.67E-06
Selective Fading Outage (%):	2.63E-08	2.63E-08	2.63E-08	2.63E-08
Composite Fading Outage (%):		2.15E-06	2.70E-06	2.15E-06	2.70E-06

Fading Outage (s/Month):	0.056	0.07	0.056	0.07	
Selective Fading Outage (s/Month):		0.001	0.001	0.001	0.001
Composite Fading Outage (s/Month):		0.057	0.071	0.057	0.071

	BER 10-3	BER 10-6	BER 10-3	BER 10-6
Unavailability due to Rain (%):	1.68E-03	1.82E-03	1.68E-03	1.82E-03
Unavailability due to Rain (s/Year):		529.127	575.16	529.127	575.16

	BER 10-3	BER 10-6	BER 10-3	BER 10-6
Unavailability due to Fading (%):		2.15E-06	2.70E-06	2.15E-06	2.70E-06
Unavailability due to Rain (%):	1.68E-03	1.82E-03	1.68E-03	1.82E-03
Total Unavailability (%):	1.68E-03	1.83E-03	1.68E-03	1.83E-03
Unavailability Objective (%):	2.00E-02	2.00E-02	2.00E-02	2.00E-02

Unavailability due to Fading (s/Year):		0.678	0.852	0.678	0.852
Unavailability due to Rain (s/Year):		529.127	575.16	529.127	575.16
Total Unavailability (s/Year):	529.806	576.011	529.806	576.011	
Unavailability Objective (s/Year):		6307.2	6307.2	6307.2	6307.2

Total Availability (%):	99.9983	99.9982	99.9983	99.9982
Availability Objective (%):	99.9800	99.9800	99.9800	99.9800

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D.4. Relay-mast – Cloch Rinnce N.S.

Site:	Relay_n2	AB_L6A_VM					
Name:							
Type:	Cell	Cell					
Latitude:	53°17'43.4"N	53°23'51.5"N					
Longitude:	7°00'42.1"W	7°00'54.0"W					
Altitude (m):	72.0	98.0					
UserData1:	User Data						
Datum:	World Geodetic System 1984 (WGS 84)						
	Forward Link	Reverse Link					
Transmission Site:	Relay_n2	AB_L6A_VM					
Reception Site:	AB_L6A_VM	Relay_n2					
Radio Type:	NetRadio0001	NetRadio0001					
Modulation Scheme:	4-QAM	4-QAM					
Bandwidth (MHz):	2	2					
Roll-Off Factor:	0.2	0.2					
Coding Gain (dB):	0	0					
System Gains (dB):	0	0					
Channel Overhead (%):	20	20					
FEC Overhead (%):	0	0					
Reference Temperature (°K):	290	290					
Receiver Noise Figure (dB):	5	5					
Maximum Data Rate (Mbps):	2.667	2.667					
Maximum Bit Rate (Mbps):	3.333	3.333					
Required Bit Error Rate:	BER 10-3	BER 10-6	BER 10-3	BER 10-6			
Service Threshold (dBm):	-91	-90	-91	-90			
Carrier to Noise Ratio (dB):	14.965	15.965	14.965	15.965			
Cross Polarization Improvement Factor (dB):			20	20	20	20	
Rx Equalization Sig Norm Parameter (Kn,M):			0.1	0.1	0.1	0.1	
Rx Equalization Sig Norm Parameter (Kn,NM):			0.1	0.1	0.1	0.1	
UserData1:	User Data		User Data				
Center Frequency (MHz):	26000		26000				
Channel Bandwidth (MHz):	28		28				
Transmission Power (dBm):	30		30				
Transmission Gains (dB):	0		0				
Transmission System Loss (dB):		0		0			
Transmission Line Loss (dB/100 m):		4		4			
Transmission Line Length (m):		10		10			
Transmission Connection Loss (dB):		0.3		0.3			
Transmission Number of Connections:		2		2			
Transmission Additional Loss (dB):		0		0			
Transmission Losses (dB):	1		1				
Transmission Antenna:	HP2-26		HP2-26				
Transmission Antenna Size (m):		0.6		0.6			
Transmission Antenna Height (m):		25		8			
Transmission Antenna Gain (dBd):		38.96		38.96			
Transmission Antenna Gain (dBi):		41.1		41.1			
Transmission Power EIRP (dBm):		70.1		70.1			
Reception Gains (dB):	0		0				
Reception System Loss (dB):	0		0				
Reception Line Loss (dB/100 m):		4		4			
Reception Line Length (m):	10		10				
Reception Connection Loss (dB):		0.3		0.3			
Reception Number of Connections:		2		2			
Reception Additional Loss (dB):		0		0			
Reception Losses (dB):	1		1				
Reception Antenna:	HP2-26		HP2-26				
Reception Antenna Size (m):	0.6		0.6				
Reception Antenna Height (m):		8		25			
Reception Antenna Gain (dBd):		38.96		38.96			
Reception Antenna Gain (dBi):		41.1		41.1			
Link Polarization:	Vertical	Vertical					

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Cross Polarization Factor (dB):	30		30	
Link Distance (m):	11396.078		11396.078	
Azimuth - True (°):	358.898	178.895		
Azimuth - Magnetic (°):	0.47		180.484	
Transmission Inclination (°):	-0.045		0.045	
Reception Inclination (°):	-0.045		0.045	
ITU Recommendation:	ITU-R P.525-2			
Free Space Distance (m):	11396.082		11396.082	
Center Frequency (MHz):	26000		26000	
Free Space Loss (dB):	141.875		141.875	
Max Fresnel Radius (m):	5.734		5.734	
Max 2nd Fresnel Radius (m):	8.108		8.108	
Earth Radius Factor (K):	4/3			
Effective Radius (m):	8502056.000			
ITU Recommendation:	ITU-R P.526-11			
Diffraction Model:	Cascade Knife Edge			
Diffraction:	No LOS Diffraction		No LOS Diffraction	
Diffraction Loss (dB):	0		0	
Clearance Target (%):	60			
Minimum Clearance (m):	2.191		2.191	
Minimum Clearance Point (m):	4134.175		4134.175	
Terrain Reflection Dispersion (°):	0.5			
Reflection Area 1 (m):	696.771		696.771	
Reflection Area 2 (m):	758.706		758.706	
Reflection Area 3 (m):	882.6 - 913.5		882.6 - 913.5	
Reflection Area 4 (m):	975.5 - 1006.4		975.5 - 1006.4	
Reflection Area 5 (m):	1594.832		1594.832	
Reflection Area 6 (m):	1873.5 - 1904.5		1873.5 - 1904.5	
Reflection Area 7 (m):	2059.3 - 2152.2		2059.3 - 2152.2	
Reflection Area 8 (m):	2338 - 2400.0		2338 - 2400.0	
Reflection Area 9 (m):	2554.8 - 2802.6		2554.8 - 2802.6	
Reflection Area 10 (m):	2895.5 - 2926.4		2895.5 - 2926.4	
Reflection Area 11 (m):	3019.341		3019.341	
Reflection Area 12 (m):	3174.2 - 3298		3174.2 - 3298	
Reflection Area 13 (m):	3452.9 - 3514.8		3452.9 - 3514.8	
Reflection Area 14 (m):	3700.6 - 3762.6		3700.6 - 3762.6	
Reflection Area 15 (m):	4165.143		4165.143	
Reflection Area 16 (m):	4443.9 - 4474.8		4443.9 - 4474.8	
ITU Recommendation:	ITU-R P.676-8			
Atmospheric Pressure (hPa):	1013		1013	
Standard Temperature (°C):	15		15	
Water Vapor Density (g/m³):	7.5		7.5	
Atmospheric Gases Loss (dB):	1.508		1.508	
Total Path Loss (dB):	143.383		143.383	
Reception Signal Level (dBm):	-33.183		-33.183	

	BER 10-3	BER 10-6	BER 10-3	BER 10-6
Service Threshold (dBm):	-91	-90	-91	-90
Link Gross Margin (dB):	57.817	56.817	57.817	56.817

ITU Recommendation:	ITU-R F.1703-0 / ITU-T G.827			
Objective ITU Quality Grade:	Short Haul SDH Networks			
Unavailability Objective (%):	2.00E-02			
Availability Objective (%):	99.9800			
ITU Recommendation:	ITU-R F.1668-1 / ITU-T G.826			
Error Performance Objective BBER (%):	1.60E-05		1.60E-05	
Error Performance Objective BBER (s/Month):	0.42		0.42	

	SESR	ESR	SESR	ESR
Error Performance Objective (%):	1.60E-04	3.20E-03	1.60E-04	3.20E-03
Error Performance Objective (s/Month):	4.205	84.096	4.205	84.096

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ITU Recommendation:	ITU-R F.1668-1 / ITU-T G.828			
Error Performance Objective BBER (%):	4.00E-06		4.00E-06	
Error Performance Objective BBER (s/Month):		0.105		0.105
	SESR	ESR	SESR	ESR
Error Performance Objective (%):	1.60E-04	8.00E-04	1.60E-04	8.00E-04
Error Performance Objective (s/Month):	4.205	21.024	4.205	21.024

Multipath Model:	ITU-R P.530-15			
Multipath Planning Type:	Quick Planning			
Multipath Time Frame:	Average annual distribution			
ITU Recommendation:	ITU-R P.453-9			
Point Refractivity Gradient (dN1):	-76.7			
Geoclimatic Factor:	4.05E-05		4.05E-05	
Multipath Occurrence Factor (%):	4.00E-01		4.00E-01	

Precipitation Model:	ITU-R P.530-15			
ITU Recommendation:	ITU-R P.837-5 / ITU-R P.841-4			
Precipitation Time Frame:	Average annual distribution			
Precipitation Rate @ 0.01% (mm/h):	22			
ITU Recommendation:	ITU-R P.838-3			
Specific Attenuation (dB/km):	3.069479		3.069479	
Rainfall Attenuation (dB):	22.164		22.164	

	BER 10-3	BER 10-6	BER 10-3	BER 10-6
Fading Outage (%):	8.32E-08	1.05E-07	8.32E-08	1.05E-07
Selective Fading Outage (%):	3.98E-09	3.98E-09	3.98E-09	3.98E-09
Composite Fading Outage (%):		8.72E-08	1.09E-07	8.72E-08	1.09E-07

Fading Outage (s/Month):	0.002	0.003	0.002	0.003
Selective Fading Outage (s/Month):	0	0	0	0
Composite Fading Outage (s/Month):	0.002	0.003	0.002	0.003

	BER 10-3	BER 10-6	BER 10-3	BER 10-6
Unavailability due to Rain (%):	1.71E-04	1.98E-04	1.71E-04	1.98E-04
Unavailability due to Rain (s/Year):	54.018	62.352	54.018	62.352

	BER 10-3	BER 10-6	BER 10-3	BER 10-6
Unavailability due to Fading (%):		8.72E-08	1.09E-07	8.72E-08	1.09E-07
Unavailability due to Rain (%):	1.71E-04	1.98E-04	1.71E-04	1.98E-04
Total Unavailability (%):	1.71E-04	1.98E-04	1.71E-04	1.98E-04
Unavailability Objective (%):	2.00E-02	2.00E-02	2.00E-02	2.00E-02

Unavailability due to Fading (s/Year):		0.028	0.034	0.028	0.034
Unavailability due to Rain (s/Year):		54.018	62.352	54.018	62.352
Total Unavailability (s/Year):	54.046	62.386	54.046	62.386
Unavailability Objective (s/Year):		6307.2	6307.2	6307.2	6307.2

Total Availability (%):	99.9998	99.9998	99.9998	99.9998
Availability Objective (%):	99.9800	99.9800	99.9800	99.9800

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APPENDIX E – Telecom Operator Consultations

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Ballydermot WF – Telecom Operator Consultations

1. 2RN Response to Consultations

From: Matthew Craig <matthew.craig@2rn.ie>
Sent: Tuesday 6 May 2025 12:05
To: David McGrath <dmcgrath@aibridges.ie>
Cc: Kevin Hayes <khayes@aibridges.ie>; windfarms@rte.ie; Johnny Evans <johnny.evans@2rn.ie>
Subject: RE: Ballydermot Wind Farm Development, Co Offaly

Hi David and Kevin,

Our network has not changed in the area that you have highlighted.
We are only concerned about the impact to broadcast services from Kippure and would ask that a protocol be signed should the site go ahead. Something that I believe has already been done.

Regards

Matthew Craig

Project Engineer
Projects and Coverage Planning
2RN
Block B, Cookstown Court, Old Belgard Road, Tallaght, Dublin 24, Ireland
D24 WK28
Mobile: + 353 (0) 87 7509955

From: David McGrath <dmcgrath@aibridges.ie>
Sent: Tuesday 6 May 2025 11:45
To: Matthew Craig <matthew.craig@2rn.ie>
Cc: Kevin Hayes <khayes@aibridges.ie>; windfarms@rte.ie; Johnny Evans <johnny.evans@2rn.ie>
Subject: RE: Ballydermot Wind Farm Development, Co Offaly

[CAUTION: This email originated from outside of the organisation. Do not click links or open attachments unless you recognise the sender and know the content is safe]

Hello Matthew,

We are looking to conclude our Telecommunications Impact Assessment Statement for the proposed wind farm at Ballydermot, Co. Offaly.
If you have any concerns regarding the development, we would be grateful if you could let us know as soon as possible.

Thank you for your assistance with this matter.

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Yours sincerely,

_____

Kevin Hayes
For and on behalf of **Ai Bridges Limited**

Ai Bridges Ltd.,
UNIT 9, BLOCK B,
Quin Rd. Business Park,
Ennis, Co. Clare,
Ireland.

Tel : +353 65 6848768
FAX : +353 65 6848769
Web : www.aibridges.ie

From: David McGrath
Sent: Thursday 1 May 2025 16:52
To: Matthew Craig <matthew.craig@2rn.ie>
Cc: Kevin Hayes <khayes@aibridges.ie>; windfarms@rte.ie; Johnny Evans <Johnny.Evans@2rn.ie>
Subject: RE: Ballydermot Wind Farm Development, Co Offaly

Hello Matthew,

The developer of Ballydermot Wind Farm has requested us to update the Telecommunications Impact Assessment Statement which was initially prepared for the proposed development in 2021.
The location of the proposed development is to the south of Edenderry, Co Offaly and is shown below in the Site Location Map.

We would appreciate it if you could let us know if there has been any change to your network in the Ballydermot area of Co. Offaly since we first contacted you in 2021.
We would also appreciate it if you could provide your response to the above, by close of business on May 08th 2025. If no response is received by this date, we will assume that there has been no change to your network since our first correspondence in 2021.

Yours sincerely,

_____

Kevin Hayes
For and on behalf of **Ai Bridges Limited**

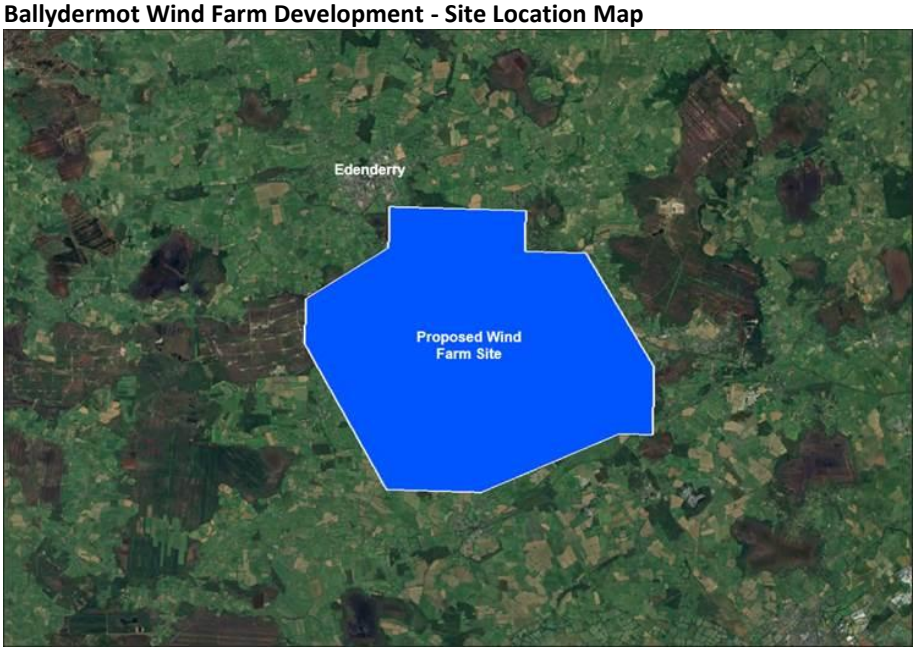
Ai Bridges Ltd.,
UNIT 9, BLOCK B,
Quin Rd. Business Park,

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Ennis, Co. Clare,
Ireland.

Tel : +353 65 6848768
FAX : +353 65 6848769
Web : www.aibridges.ie

Encl.
Ballydermot Wind Farm Development - Site Location Map



From: Matthew Craig <matthew.craig@2rn.ie>
Sent: Tuesday 5 January 2021 10:24
To: David McGrath <dmcgrath@aibridges.ie>
Cc: Kevin Hayes <khayes@aibridges.ie>; windfarms@rte.ie; Johnny Evans <Johnny.Evans@2rn.ie>
Subject: RE: Ballydermot Wind Farm Development, Co Offaly

Hi David,

2RN have no fixed linking in the area but there is a risk of interference to DTT coverage in the area. The strongest server in the area is Kippure and the areas of concern are covered to a lesser degree by Carin Hill and Mt. Leinster.
We would ask that a protocol be signed between 2RN and the Developer should the site go ahead.

Regards

Matthew Craig

Project Engineer
Projects and Coverage Planning
2RN
Block B, Cookstown Court, Old Belgard Road, Tallaght, Dublin 24, Ireland
D24 WK28

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Phone: + 353 (0) 1 2082261
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From: David McGrath <dmcgrath@aibridges.ie>
Sent: 04 January 2021 17:20
To: windfarms@rte.ie; Matthew Craig <matthew.craig@2rn.ie>; Johnny Evans <Johnny.Evans@2rn.ie>
Cc: Kevin Hayes <khayes@aibridges.ie>
Subject: Ballydermot Wind Farm Development, Co Offaly

04th January 2021

RE: Ballydermot Wind Farm Development

Hello Johnny ,

Ai Bridges Limited has been requested to prepare a Telecommunications Impact Assessment for the proposed Ballydermot Wind Farm development in County Offaly.

As we are to conduct a detailed technical analysis of the radio links in the vicinity of the proposed wind farm, we would be grateful if you could forward the following information:

1. Indication of any LOS microwave links that maybe affected by the proposed wind farm development.
2. Site co-ordinates of the telecoms tower locations of microwave links that may be impacted by the proposed development.
3. Antenna mast heights for both ends of each link.
4. Frequency of operation of radio links.
5. Network \ Overlay maps showing impacted telecoms infrastructure traversing the proposed wind farm development.

The proposed wind farm site is located approximately 5km south of Edenderry in Co. Offaly. Refer to the attached; Site Location Map and KMZ file.
We would be grateful if you reply to us before the 13rd January 2021. You can do this by way of email response to info@aibridges.ie.

Yours sincerely,

_____

Kevin Hayes
For and on behalf of **Ai Bridges Limited**

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Ballydermot Wind Farm Development - Site Location Map



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2. Airwave Response to Consultations

From: John Barry <john@airwave.ie>
Sent: Tuesday 6 May 2025 13:41
To: David McGrath <dmcgrath@aibridges.ie>
Cc: Kevin Hayes <khayes@aibridges.ie>; Info @ Airwave <info@airwave.ie>
Subject: RE: Ballydermot Wind Farm Development, Co Offaly

No infrastructure here

John Barry
Airwave Internet
e: john@airwave.ie
p: 021-2024000
m: 087-9471657

From: David McGrath <dmcgrath@aibridges.ie>
Sent: Tuesday 6 May 2025 11:50
To: John Barry <john@airwave.ie>
Cc: Kevin Hayes <khayes@aibridges.ie>; Info @ Airwave <info@airwave.ie>
Subject: RE: Ballydermot Wind Farm Development, Co Offaly

Hello John,

We are looking to conclude our Telecommunications Impact Assessment Statement for the proposed wind farm at Ballydermot, Co. Offaly.
If you have any concerns regarding the development, we would be grateful if you could let us know as soon as possible.

Thank you for your assistance with this matter.

Yours sincerely,

_____
Kevin Hayes
For and on behalf of **Ai Bridges Limited**

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From: David McGrath
Sent: Thursday 1 May 2025 16:53
To: John Barry <john@airwave.ie>
Cc: Kevin Hayes <khayes@aibridges.ie>; Info @ Airwave <info@airwave.ie>
Subject: Ballydermot Wind Farm Development, Co Offaly

01st May 2025,

RE: Ballydermot Wind Farm Development.

Dear Sir/Madam,

Ai Bridges Limited has been engaged to prepare a Preliminary Telecommunications Impact Assessment for a proposed wind farm development at Ballydermot, Co. Offaly. The wind farm developer is in the process of finalising a design layout for the proposed wind farm as part of an environmental impact assessment study. The proposed wind farm site is located just south of Edenderry, Co Offaly. Refer to the attached Site Location Map and KMZ file.

Ai Bridges Ltd has been commissioned to engage with all potentially affected Telecoms Operators to identify and map the telecommunications networks traversing the proposed wind farm site. Ai Bridges will then generate a Telecommunications Infrastructure Constraints Map that will be used by the wind farm developer to assist in finalising an optimal wind farm design layout for the proposed development. We would be grateful if you could provide details of your telecommunications networks in the vicinity of the proposed wind farm study area in the tabular format below.

All telecommunications microwave network links will be modelled based on Fresnel Zone clearances with set-back safety buffers as required. It would be a condition that any proposed wind turbine would not be located inside a safety buffer zone to avoid interference on any of the telecommunications networks.

We would be grateful if you could confirm that this design layout approach, as agreed on previous wind farm studies, being taken by the wind farm developer is acceptable to you.

We would be grateful if you could provide your response to the above by close of business on May 08th 2025.

Link Name / ID	Band MHz\GHz	Link Length	Site A					Site B				
			Lat	Long	Easting	Northing	Ant Height	Lat	Long	Easting	Northing	Ant Height

Yours sincerely,

_____

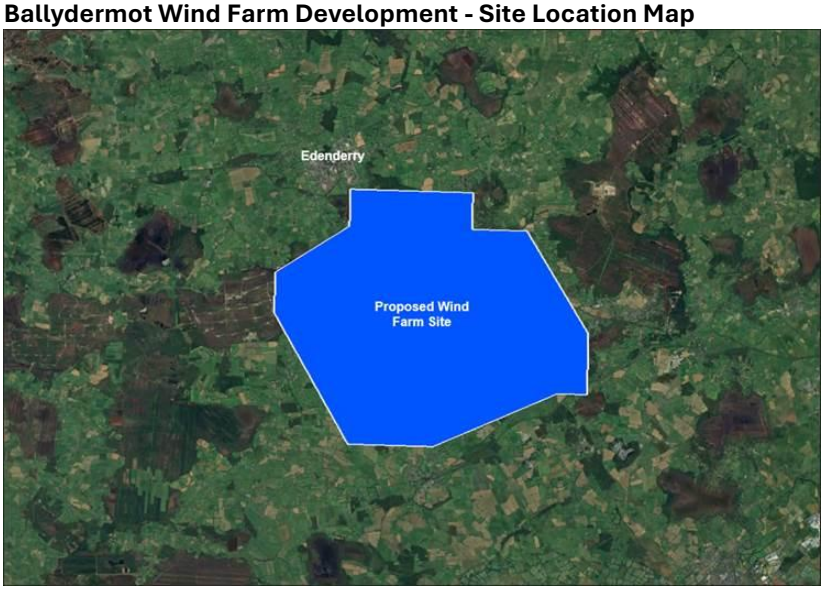
Kevin Hayes
For and on behalf of **Ai Bridges Limited**

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Ballydermot Wind Farm Development - Site Location Map



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3. CIE Response to Consultations

From: Peter Cunningham <Peter.Cunningham@cie.ie>
Sent: Friday 2 May 2025 09:53
To: David McGrath <dmcgrath@aibridges.ie>
Cc: Kevin Hayes <khayes@aibridges.ie>
Subject: FW: Ballydermot Wind Farm Development, Co Offaly

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

Peter Cunningham,
Chartered Surveyor

M: +353 (0)87 2112320,
Curzon House, 35 Lower Abbey St., Dublin 1, D01 H560
www.cie.ie

Driving Change for a Sustainable future
At Córas Iompair Éireann we believe in facilitating flexible working, so while it suits me to email now, I do not expect a response or action outside of your own working hours.

From: David McGrath <dmcgrath@aibridges.ie>
Sent: Thursday 1 May 2025 16:53
To: CIE Group Property <Property.Dept@cie.ie>; Peter Cunningham <Peter.Cunningham@cie.ie>
Cc: Kevin Hayes <khayes@aibridges.ie>
Subject: Ballydermot Wind Farm Development, Co Offaly

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01st May 2025,

RE: Ballydermot Wind Farm Development.

Dear Sir/Madam,

Ai Bridges Limited has been engaged to prepare a Preliminary Telecommunications Impact Assessment for a proposed wind farm development at Ballydermot, Co. Offaly. The wind farm developer is in the process of finalising a design layout for the proposed wind farm as part of an

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environmental impact assessment study. The proposed wind farm site is located just south of Edenderry, Co Offaly. Refer to the attached Site Location Map and KMZ file.

Ai Bridges Ltd has been commissioned to engage with all potentially affected Telecoms Operators to identify and map the telecommunications networks traversing the proposed wind farm site. Ai Bridges will then generate a Telecommunications Infrastructure Constraints Map that will be used by the wind farm developer to assist in finalising an optimal wind farm design layout for the proposed development. We would be grateful if you could provide details of your telecommunications networks in the vicinity of the proposed wind farm study area in the tabular format below.

All telecommunications microwave network links will be modelled based on Fresnel Zone clearances with set-back safety buffers as required. It would be a condition that any proposed wind turbine would not be located inside a safety buffer zone to avoid interference on any of the telecommunications networks.

We would be grateful if you could confirm that this design layout approach, as agreed on previous wind farm studies, being taken by the wind farm developer is acceptable to you.

We would be grateful if you could provide your response to the above by close of business on May 08th 2025.

Link Name / ID	Band MHz\GHz	Link Length	Site A					Site B				
			Lat	Long	Easting	Northing	Ant Height	Lat	Long	Easting	Northing	Ant Height

Yours sincerely,

_____

Kevin Hayes
For and on behalf of **Ai Bridges Limited**

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Ballydermot Wind Farm Development - Site Location Map

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4. Coimisiún na Meán Response to Consultations

From: Roger Woods <rwoods@cnam.ie>
Sent: Friday 2 May 2025 09:04
To: David McGrath <dmcgrath@aibridges.ie>
Cc: Kevin Hayes <khayes@aibridges.ie>
Subject: RE: Ballydermot Wind Farm Development, Co Offaly

Hi David

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

Regards

Roger
Innealtóir Feidhmiúcháin Sinsearach | Senior Executive Engineer

T: +353 (0)1 644 1200 | rwoods@cnam.ie

Coimisiún na Meán

1 Áras Shíol Bhroinn, Bóthar Shíol Bhroinn, Baile Átha Cliath, D04 NP20, Éire.
1 Shelbourne Buildings, Shelbourne Road, Dublin, D04 NP20, Ireland.

Tá an ríomhphost seo agus aon iatán a ghabhann leis rúnda agus is leis an duine sin amháin a bhfuil siad seolta chuige/chuici a bhaineann siad. Muna duitse an ríomhphost seo, ní ceart é a léamh ná a scaoileadh chuig aon tríú páirtí. Iarrtar ort teachtaireacht a sheoladh chuig an seoltóir nó chuig info@cnam.ie, agus an ríomhphost seo a scrios.

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Déan machnamh ar an timpeallacht, le do thoil, roimh an ríomhphost seo a phriontáil.

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From: David McGrath <dmcgrath@aibridges.ie>
Sent: Thursday 1 May 2025 16:53
To: Roger Woods <rwoods@cnam.ie>
Cc: Kevin Hayes <khayes@aibridges.ie>; Reception CnaM <reception@cnam.ie>
Subject: RE: Ballydermot Wind Farm Development, Co Offaly

Hello Roger,

The developer of Ballydermot Wind Farm has requested us to update the Telecommunications Impact Assessment Statement which was initially prepared for the proposed development in 2021.

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The location of the proposed development is to the south of Edenderry, Co Offaly and is shown below in the Site Location Map.

We would appreciate it if you could let us know if there has been any change to your network in the Ballydermot area of Co. Offaly since we first contacted you in 2021.
We would also appreciate it if you could provide your response to the above, by close of business on May 08th 2025. If no response is received by this date, we will assume that there has been no change to your network since our first correspondence in 2021.

Yours sincerely,

_____
Kevin Hayes
For and on behalf of **Ai Bridges Limited**

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Ballydermot Wind Farm Development - Site Location Map



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5. BT Response to Consultations

From: padraig.condon@bt.com <padraig.condon@bt.com>
Sent: Wednesday 5 July 2023 10:16
To: David McGrath <dmcgrath@aibridges.ie>

Hi David,
BT no longer have a radio microwave network so you can take BT off your consultation list.

Regards

Padraig Condon
Core Network Operations

Tel: +353014326819
Mobile number: +353 86 604 0636
BT Meetme: + 353 1 6569053
E-mail padraig.condon@bt.com
https://www.webjoin.com/
Participant: 40342233#
Web: www.btireland.com

6. Department of Defence Response to Consultations

From: Defence Property Management Planning <PropertyManagementPlanning@defence.ie>
Sent: Monday 19 May 2025 15:48
To: David McGrath <dmcgrath@aibridges.ie>
Cc: Kevin Hayes <khayes@aibridges.ie>; Defence Property Management Planning <PropertyManagementPlanning@defence.ie>
Subject: RE: Ballydermot Wind Farm Development, Co Offaly

Without Prejudice

Dear Mr. McGrath,

I refer to your e-mail below, dated 02 May 2025, in relation to the proposed windfarm development at Ballydermot, Co. Offaly.

I wish to advise at the outset that any determination in relation to a planning consent is solely a matter for the planning authorities and/or ABP, as appropriate. Therefore, the following observations are made on a non-prejudicial basis, and are not intended to be used to rely on for a prospective planning application, nor are these observations to be relied on in the event of any commercial transaction pertaining to such lands and they are not to be relied on in the event of any contract exchange pertaining to same.
As a matter of practice, the Department of Defence does not provide observations or advice in the scoping process, except where the relevant parties have been directed by a planning authority to seek the Department's views.

Having consulted with the Military authorities, the Department of Defence wishes to make the following observations:

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- All turbines should be illuminated by Type C, Medium intensity, Fixed Red obstacle lighting with a minimum output of 2,000 candela to be visible in all directions of azimuth and to be operational H24/7 days a week. Obstacle lighting should be incandescent or, if LED or if other types are used, of a type visible to Night Vision equipment. Obstacle lighting used must emit light at the near Infra-Red (IR) range of the electromagnetic spectrum, specifically at or near 850 nanometres (nm) of wavelength. Light intensity to be of similar value to that emitted in the visible spectrum of light.

- In the event negative impacts on future military radar systems, the owner will engage with the Department of Defence and will provide suitable mitigations as soon as practical.

Nothing in the above observations shall be taken as a binding response by the Minister for Defence in the event that a planning application is made. The Minister 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.

We would appreciate if you could keep us informed on any progress relating to this proposed development, in particular if this development was to progress to the pre-planning stage.

Please contact me if you have any queries in this regard.

Kind regards,
Bernie

Bernie Tierney

—

Proprty Management Branch
——
An Roinn Cosanta
Department of Defence
Bóthar an Stáisiúin, An Droichead Nua, Contae Chill Dara, W12 AD93.
Station Road, Newbridge, Co.Kildare, W12 AD93.
——

From: Defence Property Management Planning <PropertyManagementPlanning@defence.ie>
Sent: Friday 2 May 2025 12:09
To: David McGrath <dmcgrath@aibridges.ie>; Defence Property Management Planning <PropertyManagementPlanning@defence.ie>
Cc: Kevin Hayes <khayes@aibridges.ie>
Subject: RE: Ballydermot Wind Farm Development, Co Offaly

Dear Mr. McGrath,

The Department of Defence wishes to acknowledge receipt of your below email in relation to Ballydermot Wind Farm.
We will consult with our military colleagues and will revert in due course.

Please note that Don Watchorn and Sarah Zacharia no longer work in our Planning Unit.

Kind Regards

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Phil
Philomena Evans
Estate Management
Property Management Branch
——
An Roinn Cosanta
Department of Defence
Bóthar an Stáisiúin, An Droichead Nua, Contae Chill Dara, W12 AD93.
Station Road, Newbridge, Co.Kildare, W12 AD93.
——
E-mail propertymanagementplanning@defence.ie

From: David McGrath <dmcgrath@aibridges.ie>
Sent: Thursday 1 May 2025 16:53
To: Defence Property Management Planning <PropertyManagementPlanning@defence.ie>
Cc: Kevin Hayes <khayes@aibridges.ie>; Don Watchorn (Defence) <Don.Watchorn@defence.ie>; Defence Info <info@defence.ie>; Sarah Zacharia (Defence) <Sarah.Zacharia@defence.ie>
Subject: Ballydermot Wind Farm Development, Co Offaly

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01st May 2025,

RE: Ballydermot Wind Farm Development.

Dear Sir/Madam,
Ai Bridges Limited has been engaged to prepare a Preliminary Telecommunications Impact Assessment for a proposed wind farm development at Ballydermot, Co. Offaly. The wind farm developer is in the process of finalising a design layout for the proposed wind farm as part of an environmental impact assessment study. The proposed wind farm site is located just south of Edenderry, Co Offaly. Refer to the attached Site Location Map and KMZ file.

Ai Bridges Ltd has been commissioned to engage with all potentially affected Telecoms Operators to identify and map the telecommunications networks traversing the proposed wind farm site. Ai Bridges will then generate a Telecommunications Infrastructure Constraints Map that will be used by the wind farm developer to assist in finalising an optimal wind farm design layout for the proposed development. We would be grateful if you could provide details of your telecommunications networks in the vicinity of the proposed wind farm study area in the tabular format below.

All telecommunications microwave network links will be modelled based on Fresnel Zone clearances with set-back safety buffers as required. It would be a condition that any proposed wind turbine would not be located inside a safety buffer zone to avoid interference on any of the telecommunications networks.

We would be grateful if you could confirm that this design layout approach, as agreed on previous wind farm studies, being taken by the wind farm developer is acceptable to you.

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We would be grateful if you could provide your response to the above by close of business on May 08th 2025.

Link Name / ID	Band MHz\GHz	Link Length	Site A					Site B				
			Lat	Long	Easting	Northing	Ant Height	Lat	Long	Easting	Northing	Ant Height

Yours sincerely,

_____
Kevin Hayes
For and on behalf of **Ai Bridges Limited**

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Tel : +353 65 6848768
Web: www.aibridges.ie

Encl.
Ballydermot Wind Farm Development - Site Location Map



7. Eir / OpenEir Response to Consultations

From: Bagnall, John <john.bagnall@eir.ie>
Sent: Friday 2 May 2025 12:50
To: David McGrath <dmcgrath@aibridges.ie>
Cc: Kevin Hayes <khayes@aibridges.ie>
Subject: Re: Ballydermot Wind Farm Development, Co Offaly

Hi David,

No change still the 5 links traversing the area.

Eir fixed network

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nk	Description	Link Type	Co-ordinates		Antenna Heights		Link Distance	Freq used in Calculations for Fresnel Zone
			Site A	Site B	Site A	Site B		
1	Dunmurry Hill - Castlejordan	PTP	53 11 55.12 N 06 56 00.84 W	53 23 49.63 N 07 07 06.54 W	37.5m	7m	25.3 km	11 GHz
2	Dunmurry Hill - Edenderry Garda Stn	PTP	53 11 55.12 N 06 56 00.84 W	53 20 11.42 N 07 03 38.24 W	37.5m	24m	17.5 km	11 GHz
3	Dunmurry Hill - Clonbullouge	PTP	53 11 55.12 N 06 56 00.84 W	53 15 43.41 N 07 05 09.36 W	37.5m	10m	12.4 km	11 GHz

Eir mobile network

Link	Description	Link Type	Co-ordinates		Antenna Heights		Link Distance	Freq used in Calculations for Fresnel Zone
			Site A	Site B	Site A	Site B		
1	Edenderry P.S. - Carbury	PTP	53 17 41.82 N 07 04 56.17 W	53 21 21.15 N 06 58 14.85 W	**26.5m**	**12m**	10.0 km	13 GHz
2	Edenderry P.S. - Togher	PTP	53 17 41.82 N 07 04 56.17 W	53 20 11.03 N 07 15 26.92 W	**26m**	**23m**	12.55 km	**11 GHz**

Kind regards,

John Bagnall
Wireless Transmission Engineer

M: +353 85 1053746
E: john.bagnall@eir.ie
Address: EirCode - D08 Y42N

From: Bagnall, John <john.bagnall@eir.ie>
Sent: 22 September 2021 10:14
To: David McGrath <dmcgrath@aibridges.ie>
Cc: Kevin Hayes <khayes@aibridges.ie>; mobilenetworkstxn <mobilenetworkstxn@eir.ie>
Subject: Re: Ballydermot Wind Farm Development, Co Offaly

Hi David,
I have rechecked the links crossing your study area for the mobile and fixed Eir microwave network. With the 5 links below we can reduce to a minimal buffer of 30meters radius. Please find below updated frequency and dish heights for the eir mobile links, the eir fixed links are fine.

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Eir fixed network

Link	Description	Link Type	Co-ordinates		Antenna Heights		Link Distance	Freq used in Calculations for Fresnel Zone
			Site A	Site B	Site A	Site B		
1	Dunmurry Hill - Castlejordan	PTP	53 11 55.12 N 06 56 00.84 W	53 23 49.63 N 07 07 06.54 W	37.5m	7m	25.3 km	11 GHz
2	Dunmurry Hill - Edenderry Garda Stn	PTP	53 11 55.12 N 06 56 00.84 W	53 20 11.42 N 07 03 38.24 W	37.5m	24m	17.5 km	11 GHz
3	Dunmurry Hill - Clonbullouge	PTP	53 11 55.12 N 06 56 00.84 W	53 15 43.41 N 07 05 09.36 W	37.5m	10m	12.4 km	11 GHz

Eir mobile network

Link	Description	Link Type	Co-ordinates		Antenna Heights		Link Distance	Freq used in Calculations for Fresnel Zone
			Site A	Site B	Site A	Site B		
1	Edenderry P.S. - Carbury	PTP	53 17 41.82 N 07 04 56.17 W	53 21 21.15 N 06 58 14.85 W	**26.5m**	**12m**	10.0 km	13 GHz
2	Edenderry P.S. - Togher	PTP	53 17 41.82 N 07 04 56.17 W	53 20 11.03 N 07 15 26.92 W	**26m**	**23m**	12.55 km	**11 GHz**

Regards,

John Bagnall
Transmission Design & Engineering

M: +353 85 1053746
E: john.bagnall@eir.ie
Address: EirCode - D24 HX03

From: David McGrath
Sent: Thursday 1 May 2025 17:10
To: John Bagnall <John.Bagnall@eir.ie>; MobileNetworksTXN@eir.ie
Cc: Kevin Hayes <khayes@aibridges.ie>
Subject: RE: Ballydermot Wind Farm Development, Co Offaly

Hello John,

The developer of Ballydermot Wind Farm has requested us to update the Telecommunications Impact Assessment Statement which was initially prepared for the proposed development in 2021.

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The location of the proposed development is to the south of Edenderry, Co Offaly and is shown below in the Site Location Map.

We would appreciate it if you could let us know if there has been any change to your network in the Ballydermot area of Co. Offaly since we first contacted you in 2021.
We would also appreciate it if you could provide your response to the above, by close of business on May 08th 2025. If no response is received by this date, we will assume that there has been no change to your network since our first correspondence in 2021.

Yours sincerely,

_____

Kevin Hayes
For and on behalf of **Ai Bridges Limited**

Ai Bridges Ltd.,
UNIT 9, BLOCK B,
Quin Rd. Business Park,
Ennis, Co. Clare,
Ireland.
Tel : +353 65 6848768
FAX : +353 65 6848769
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On Tue, 21 Sept 2021 at 11:24, David McGrath <dmcgrath@aibridges.ie> wrote:
21st September 2021

RE: Ballydermot Wind Farm Development

Dear John,

The wind farm developer of the proposed wind farm development at Ballydermot, Co. Offaly is finalising the design layout for planning application purposes.

Ai Bridges Ltd has been commissioned to finalise the telecommunications constraints mapping based on the consultations conducted with telecoms operators earlier this year. All telecommunications networks identified to be traversing the wind farm network have been modelled. The 3D modelling of the OpenEir links have been included below and are available in .kmz format on request. This 3D model has been used by the Wind Farm developer to assist in determining the wind farm design layout for the proposed development.

The microwave radio links have been modelled based on the details provided during our consultations earlier this year and shown in the table below.

The 2nd Fresnel clearance zones and 30m set-back safety buffers have been used by the wind farm developers in line with industry standard buffers. None of the proposed wind turbines will be located inside the agreed safety buffer zones as part of the final design layout to avoid interference on the links.

We would be grateful if you could confirm this design layout approach adopted by the wind farm developer is agreeable to OpenEir.

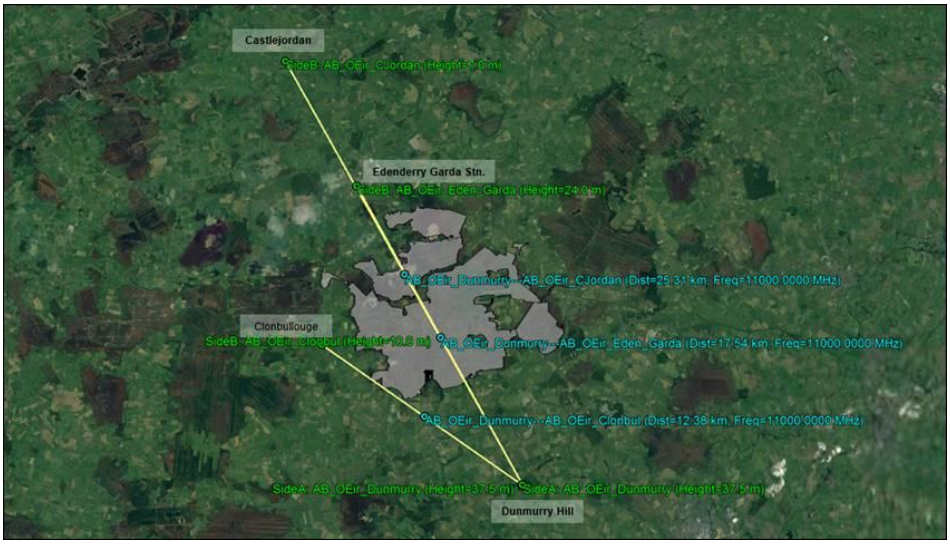
The purpose of this consultation is to seek confirmation from you that this mitigation measure approach, as agreed on previous wind farm studies (30m set-back buffer from 2nd Fresnel Zone) being taken by the wind farm developer is acceptable to OpenEir.

We would be grateful if you can confirm same.

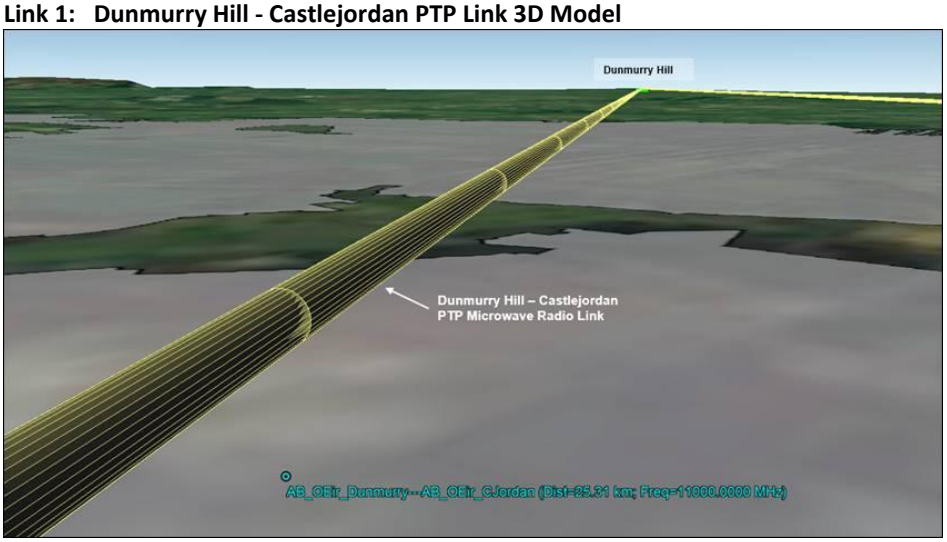
Link	Description	Link Type	Co-ordinates		Antenna Heights		Link Distance	Freq used in Calculations for Fresnel Zone
			Site A	Site B	Site A	Site B		
1	Dunmurry Hill - Castlejordan	PTP	53 11 55.12 N 06 56 00.84 W	53 23 49.63 N 07 07 06.54 W	37.5m	7m	25.3 km	11 GHz
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OpenEir links in the vicinity of the proposed Ballydermot Wind Farm.

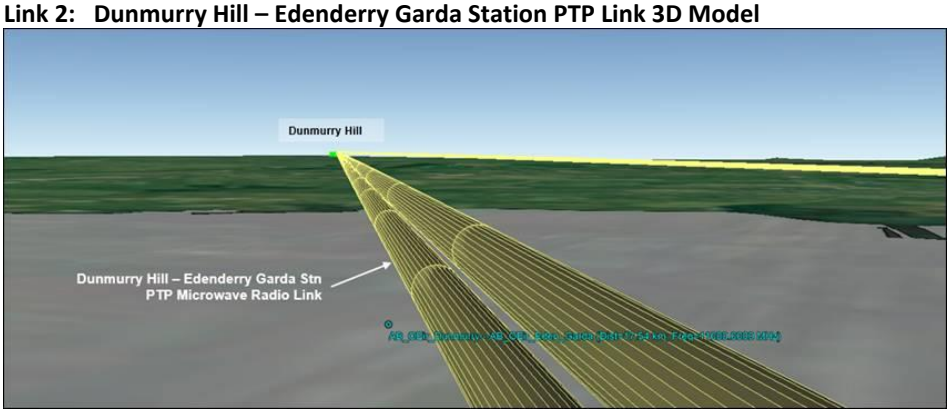
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Link 1: Dunmurry Hill - Castlejordan PTP Link 3D Model

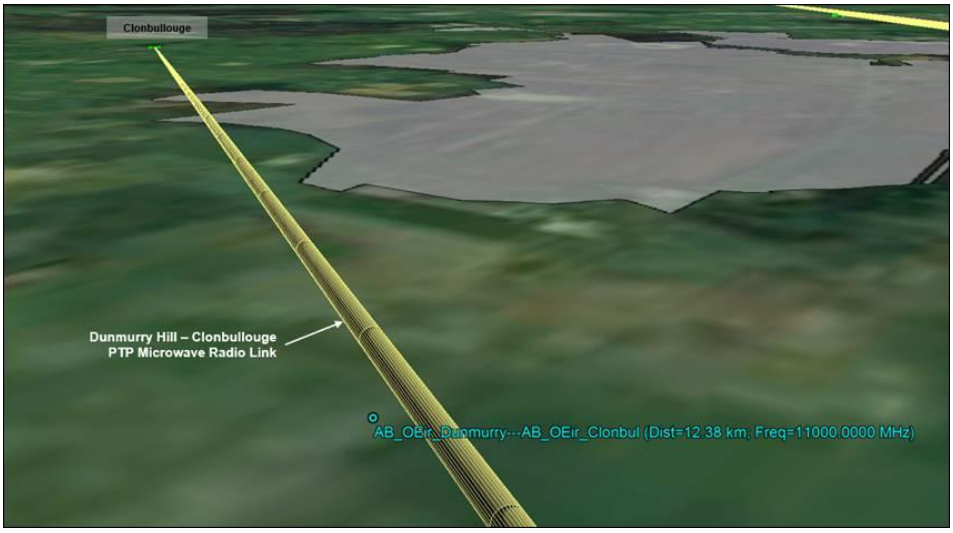


Link 2: Dunmurry Hill – Edenderry Garda Station PTP Link 3D Model



Link 3: Dunmurry Hill – Clonbullouge PTP Link 3D Model

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Yours sincerely,

_____

Kevin Hayes
For and on behalf of **Ai Bridges Limited**
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Quin Rd. Business Park,
Ennis, Co. Clare,
Ireland.
Tel : +353 65 6848768
FAX : +353 65 6848769
Web : www.aibridges.ie

From: Thomas Sheridan [mailto:thomas.sheridan@eir.ie]
Sent: 05 January 2021 14:36
To: David McGrath <dmcgrath@aibridges.ie>
Cc: Thomas.SHERIDAN@openeir.ie; Kevin Hayes <khayes@aibridges.ie>
Subject: Re: Ballydermot Wind Farm Development, Co Offaly

Hi, Kevin, David,

Please see information below that I have already provided to MKO. I don't have confirmation on the accuracy of the radio site coordinates or if they are to be retained in the radio network.

Regards,
Thomas Sheridan

Re: 191136 Ballydermot Proposed Wind Farm

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Thomas Sheridan <thomas.sheridan@eir.ie> Fri, Dec 18, 2020, 12:09 PM

to Karen

Hi Karen,

I had a quick look at the Fresnel zone figures for these radio paths for a nominal frequency of 11 GHz and taken at the worst case centre point on the path with the figures shown below. A 30 metre buffer would also be requested outside this zone. However, the end point coordinates are not exactly known and they would need to be confirmed by taking precision gps measurements if close tolerances are to be used. I would ask for a buffer of +_ 100 metres relative to the coordinates shown above if possible, especially if no surveys are done to confirm radio endpoint details.
(One or more of these radio paths may be ceased in the next few years).

LPP18261 F2 is + - 13 metres

PP20392/1 F2 is +- 15.5 metres

L9462/1 F2 is +- 18.5 metres

Best Regards,
Thomas Sheridan

On Thu, Dec 3, 2020 at 9:33 AM Karen Mulryan <kmulryan@mkoireland.ie> wrote:
Good morning Thomas,
Would you be able to provide information on the Fresnel zone for the links below?
Kind regards,
Karen.

Karen Mulryan
Environmental Scientist
MKO
Tuam Road, Galway
Ireland, H91 VW84
+353 (0) 91 735611
www.mkoireland.ie

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From: Karen Mulryan
Sent: Monday 2 November 2020 16:46
To: Thomas Sheridan <thomas.sheridan@eir.ie>
Subject: 191136 Ballydermot Proposed Wind Farm
Hi Thomas,
That's grand, we will incorporate 100m along the links and when we get the interim and then final design we will be in touch again to ensure no issues and to see if any of the links have since been decommissioned.
We are in the very early stages of the project so the information you have provided is very helpful for us going forward.
Kind regards,
Karen.

Karen Mulryan
Environmental Scientist
MKO
Tuam Road, Galway
Ireland, H91 VW84
+353 (0) 91 735611
www.mkoireland.ie

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From: Thomas Sheridan <thomas.sheridan@eir.ie>
Sent: Monday 2 November 2020 16:40
To: Karen Mulryan <kmulryan@mkoireland.ie>
Subject: Re: 191136 Ballydermot Proposed Wind Farm

Karen,
There is no single answer to this. A 100m separation between the radio path's and the turbine blade tips would be ideal. We have worked with developers to allow less clearance provided that the radio end points are precision gps surveyed and we can eliminate the possibility of the wind turbines being moved any closer under micrositing tolerances.
One of the above links is outside the site.
One or both of the other two may well be decommissioned as the sites are being connected via fibre. I cannot give a definite commitment on this at present as some network link diversity has still to be planned.

Regards,
Tom

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On Mon, Nov 2, 2020 at 4:08 PM Karen Mulryan <kmulryan@mkoireland.ie> wrote:
Hi Thomas,
Sorry I thought I sent you a red line boundary. Do you have a required set back distance from these links?
Kind regards,
Karen.

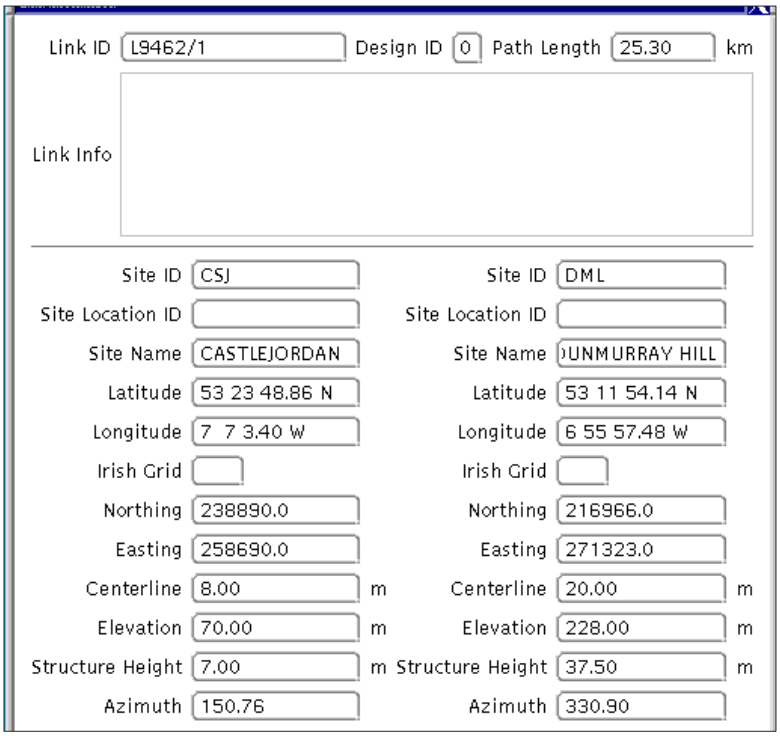
Karen Mulryan
Environmental Scientist
MKO
Tuam Road, Galway
Ireland, H91 VW84
+353 (0) 91 735611
www.mkoireland.ie

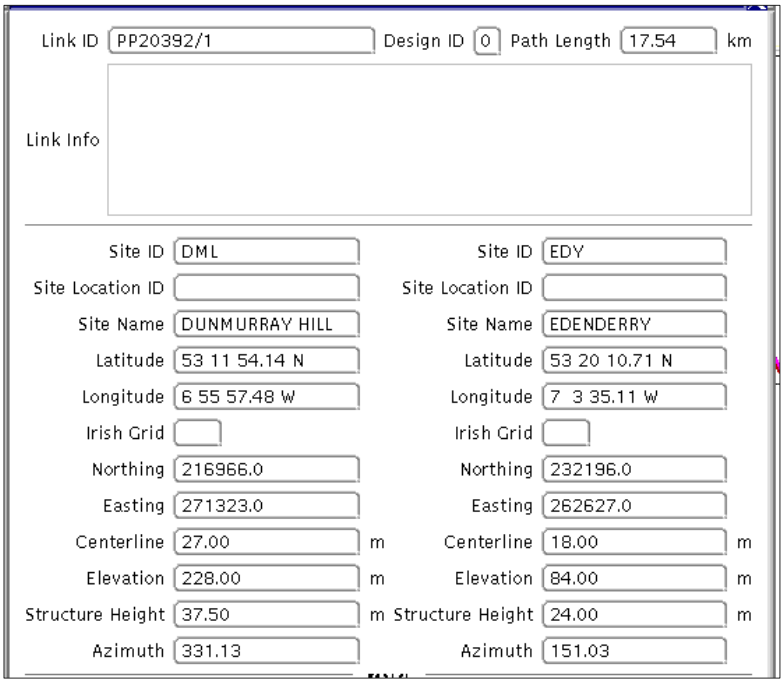
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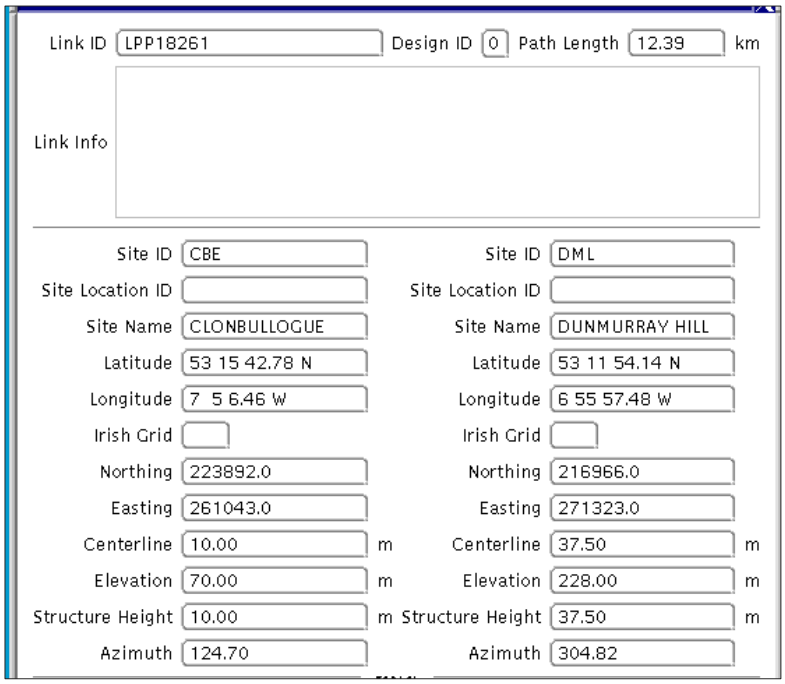
From: Thomas Sheridan <thomas.sheridan@eir.ie>
Sent: Monday 2 November 2020 15:33
To: Karen Mulryan <kmulryan@mkoireland.ie>
Subject: Re: 191136 Ballydermot Proposed Wind Farm
Karen,
The links below are in or close to the turbine locations in the Ballydermot.kmz file. (There is no red line boundary).

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On Mon, Nov 2, 2020 at 3:01 PM Karen Mulryan <kmulryan@mkoireland.ie> wrote:
Hi Thomas,
We don't have them as of yet, the client is trying to design an interim layout using links in the area as a guide along with other eco constraints.
Do you know of any going through the red line boundary that we can buffer out?
Kind regards,
Karen.

Karen Mulryan
Environmental Scientist
MKO
Tuam Road, Galway
Ireland, H91 VW84
+353 (0) 91 735611
www.mkoireland.ie

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From: Thomas Sheridan <thomas.sheridan@eir.ie>
Sent: Monday 2 November 2020 14:57
To: Karen Mulryan <kmulryan@mkoireland.ie>
Subject: Re: 191136 Ballydermot Proposed Wind Farm
Hi Karen,
I had a quick look but I need a more detailed check. Could you please send me the turbine locations in Irish Grid format.

Regards,
Tom

On Mon, Jan 4, 2021 at 5:18 PM David McGrath <dmcgrath@aibridges.ie> wrote:

04th January 2021

RE: Ballydermot Wind Farm Development

Hello Tom,
Ai Bridges Limited has been requested to follow up on the consultation requests that were sent to you (by MKO) in July 2020 regarding the proposed Ballydermot Wind Farm development.
As we are to conduct a detailed technical analysis of the radio links in the vicinity of the proposed wind farm, we would be grateful if you could forward the following information:

1. Indication of any LOS microwave links that maybe affected by the proposed wind farm development.
2. Site co-ordinates of the telecoms tower locations of microwave links that may be impacted by the proposed development.
3. Antenna mast heights for both ends of each link.
4. Frequency of operation of radio links.
5. Network \ Overlay maps showing impacted telecoms infrastructure traversing the proposed wind farm development.

The proposed wind farm site is located approximately 5km south of Edenderry in Co. Offaly.
Refer to the attached; Site Location Map and KMZ file.
We would be grateful if you reply to us before the 13rd January 2021. You can do this by way of email response to info@aibridges.ie.

Yours sincerely,

_____
Kevin Hayes
For and on behalf of **Ai Bridges Limited**
Ai Bridges Ltd.,
UNIT 9, BLOCK B,
Quin Rd. Business Park,
Ennis, Co. Clare,
Ireland.
Tel : +353 65 6848768
FAX : +353 65 6848769
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Encl.

Ballydermot Wind Farm Development - Site Location Map



--

Thomas Sheridan
Core Networks Radio Engineer

T: +353 851742191
E: Thomas.Sheridan@eir.ie
eir Monivea Road, Mervue, Galway

8. Enet Response to Consultations

From: Peter O`Brien <peter.obrien@enet.ie>
Sent: Friday 2 May 2025 09:16
To: David McGrath <dmcgrath@aibridges.ie>
Cc: Kevin Hayes <khayes@aibridges.ie>; John Byrne <John.Byrne@enet.ie>
Subject: RE: Ballydermot Wind Farm Development, Co Offaly

Hi,

We have one link passing through this area:

Link Name	A-End Coordinates	A-End Antenna Height	B-End Coordinates	B-End Antenna Height	Frequency	Buffer

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RTE Kippure - SCP0087 - Lullymore Heritage Park	53.178050 -6.331566	20m	53.270739 -6.949947	12m	7GHz	50m

Regards,

Peter O`Brien | Licensed Link planner
A: Enet House, National Technology Park, Castletroy, Co Limerick, V946P52
M: +353867744313 | **W:** www.enet.ie

Registered in Ireland, Registration No. 332982
Registered Offices: Enet House, National Technology Park, Castletroy, Co Limerick, V94 6P52
enet is a registered business name of e-nasc éireann teoranta

From: David McGrath <dmcgrath@aibridges.ie>
Sent: Thursday, May 1, 2025 4:53 PM
To: Peter O`Brien <peter.obrien@enet.ie>
Cc: Kevin Hayes <khayes@aibridges.ie>; John Byrne <john.byrne@enet.ie>
Subject: RE: Ballydermot Wind Farm Development, Co Offaly

CAUTION: This E-mail has originated from OUTSIDE the Speed Fibre Group | DO NOT CLICK links or attachments unless you recognize the sender and know the content is safe..

Hello Peter,

The developer of Ballydermot Wind Farm has requested us to update the Telecommunications Impact Assessment Statement which was initially prepared for the proposed development in 2021.
The location of the proposed development is to the south of Edenderry, Co Offaly and is shown below in the Site Location Map.

We would appreciate it if you could let us know if there has been any change to your network in the Ballydermot area of Co. Offaly since we first contacted you in 2021.
We would also appreciate it if you could provide your response to the above, by close of business on May 08th 2025. If no response is received by this date, we will assume that there has been no change to your network since our first correspondence in 2021.

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Yours sincerely,

_____

Kevin Hayes
For and on behalf of **Ai Bridges Limited**

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9. ESB Networks Response to Consultations

From: wfanalysis (ESB Networks) <wfanalysis@esb.ie>
Sent: Thursday 28 August 2025 12:23
To: David McGrath <dmcgrath@aibridges.ie>
Subject: RE: Ballydermot Wind Farm Development, Co Offaly

Good morning,

Please find attached a basic exclusion zone created for the development at Ballydermot Wind Farm. To avoid interference to our links, the development must fall outside of this zone.

Please note that this exclusion zone represents a conservative zone because we have no turbine parameters, and this could be reduced on provision of hub height and blade size and either turbine location or development boundary.

Any proposed wind turbines within the defined exclusion zone will require further detailed coordination to avoid interference and degradation of critical ESB-operated radio links.
We kindly request that you re-consult with ESB once the turbine locations and dimensions are available.

Kind regards,
Abud



From: wfanalysis (ESB Networks) <wfanalysis@esb.ie>
Sent: Tuesday 20 May 2025 10:58
To: David McGrath <dmcgrath@aibridges.ie>
Subject: RE: Ballydermot Wind Farm Development, Co Offaly

Good morning,

I am writing to inform you that unfortunately, we have been unable to proceed with the analysis without additional information.

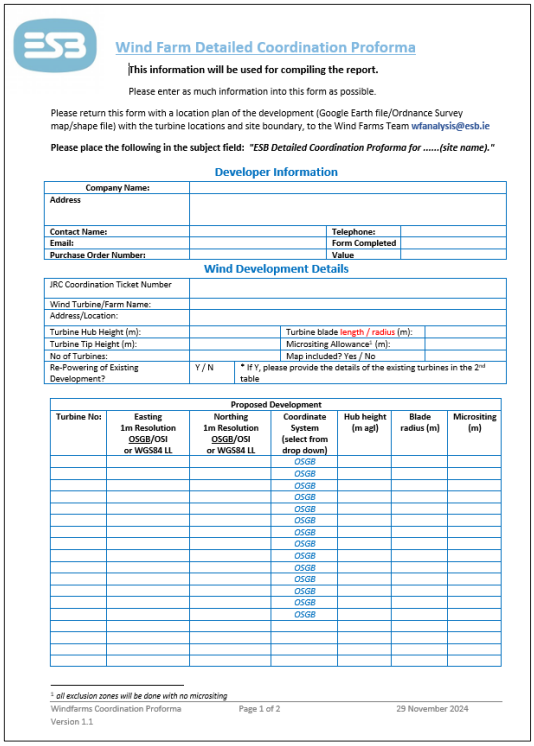
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To move forward, we kindly request you to complete the attached proforma and provide any available GIS data if available. This information is essential for us to carry out an accurate assessment.

Please note that if the requested information is not provided by 20/06/2025, we will proceed by defining a basic exclusion zone. This will be a more conservative zone but may be reduced upon provision of detailed turbine information.

Should you have any questions or require further clarification, please do not hesitate to get in touch.

Kind regards,
Abud



Wind Farm Detailed Coordination Proforma

This information will be used for compiling the report.

Please enter as much information into this form as possible.

Please return this form with a location plan of the development (Google Earth file/Ordnance Survey map/shape file) with the turbine locations and site boundary, to the Wind Farms Team wfanalysis@esb.ie

Please place the following in the subject field: *"ESB Detailed Coordination Proforma for .....(site name)."*

Developer Information

Company Name:			
Address			
Contact Name:		Telephone:	
Email:		Form Completed	
Purchase Order Number:		Value	

Wind Development Details

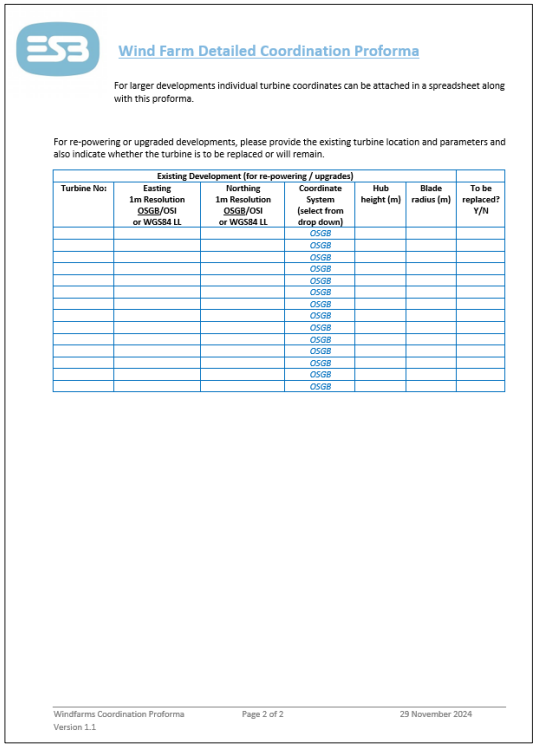
JRC Coordination Ticket Number			
Wind Turbine/Farm Name:			
Address/Location:			
Turbine Hub Height (m):		Turbine blade length / radius (m):	
Turbine Tip Height (m):		Micrositing Allowance[1] (m):	
No of Turbines:		Map included? Yes / No	
Re-Powering of Existing Development?	Y / N	* If Y, please provide the details of the existing turbines in the 2nd table	

Proposed Development

Turbine No:	Easting 1m Resolution OSGB/OSI or WGS84 LL	Northing 1m Resolution OSGB/OSI or WGS84 LL	Coordinate System (select from drop down)	Hub height (m agl)	Blade radius (m)	Micrositing (m)
			OSGB			
			OSGB			
			OSGB			
			OSGB			
			OSGB			
			OSGB			
			OSGB			
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			OSGB			
			OSGB			

[1] *all exclusion zones will be done with no micrositing*

Windfarms Coordination Proforma Page 1 of 2 29 November 2024
Version 1.1



Wind Farm Detailed Coordination Proforma

For larger developments individual turbine coordinates can be attached in a spreadsheet along with this proforma.

For re-powering or upgraded developments, please provide the existing turbine location and parameters and also indicate whether the turbine is to be replaced or will remain.

Existing Development (for re-powering / upgrades)

Turbine No:	Easting 1m Resolution OSGB/OSI or WGS84 LL	Northing 1m Resolution OSGB/OSI or WGS84 LL	Coordinate System (select from drop down)	Hub height (m)	Blade radius (m)	To be replaced? Y/N
			OSGB			
			OSGB			
			OSGB			
			OSGB			
			OSGB			
			OSGB			
			OSGB			
			OSGB			
			OSGB			
			OSGB			
			OSGB			
			OSGB			
			OSGB			
			OSGB			

Windfarms Coordination Proforma Page 2 of 2 29 November 2024
Version 1.1

From: David McGrath <dmcgrath@aibridges.ie>
Sent: Thursday 1 May 2025 17:10
To: wfanalysis (ESB Networks) <wfanalysis@esb.ie>
Cc: Kevin Hayes <khayes@aibridges.ie>; Walsh. Jonathan (ESB Networks) <jonathan.walsh@esb.ie>
Subject: RE: Ballydermot Wind Farm Development, Co Offaly

CAUTION: This message is from an EXTERNAL SENDER - be CAUTIOUS, Do NOT Click any links or Open any attachments if you were not expecting them.

Dear Sir / Madam,

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The developer of Ballydermot Wind Farm has requested us to update the Telecommunications Impact Assessment Statement which was initially prepared for the proposed development in 2021.
The location of the proposed development is to the south of Edenderry, Co Offaly and is shown below in the Site Location Map.

We would appreciate it if you could let us know if there has been any change to your network in the Ballydermot area of Co. Offaly since we first contacted you in 2021.
We would also appreciate it if you could provide your response to the above, by close of business on May 08th 2025. If no response is received by this date, we will assume that there has been no change to your network since our first correspondence in 2021.

Yours sincerely,

_____

Kevin Hayes
For and on behalf of **Ai Bridges Limited**

Ai Bridges Ltd.,
UNIT 9, BLOCK B,
Quin Rd. Business Park,
Ennis, Co. Clare,
Ireland.

Tel : +353 65 6848768
FAX : +353 65 6848769
Web : www.aibridges.ie

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Ballydermot Wind Farm Development - Site Location Map

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From: Myles Redmond <myles.redmond2@esb.ie>
Sent: Tuesday 5 January 2021 09:10
To: David McGrath <dmcgrath@aibridges.ie>; Kevin Hayes <khayes@aibridges.ie>
Cc: Wilson Dalikeni <wilson.dalikeni@esb.ie>; Paul McDonagh <paul.mcdonagh@esb.ie>
Subject: RE: Ballydermot Wind Farm Development, Co Offaly

Hi David, Kevin,

Happy new year to you both.

Please find attached detailed report of the impact to the ESB's Operational Radio Networks. There are several point to point radio links passing through the proposed site including a trunk radio link, an access radio link and also 1 point to multipoint radio link.

Once the turbine locations have been determined, please let us know as soon as possible so we can carry out a detailed analysis of the potential impact.

Regards,

Myles

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NETWORKS

WINDFARM IMPACT ANALYSIS REPORT

NETWORKS TELECOMS – BALLYDERMOT WINDFARM IMPACT ANALYSIS

WAN Team
Network Telecoms
Clanwilliam House
Clanwilliam Place
Dublin 2

NETWORKS

Project Reference	WINDFARM IMPACT ANALYSIS REPORT
Document Title	NETWORKS TELECOMS – BALLYDERMOT WINDFARM IMPACT ANALYSIS
Prepared By	Myles Redmond

Approved By	
Title	
Date	Click here to enter a date.

Version Control

Date	Rev Num	Author	Summary of Change
20/11/20	Rev 0.1	Myles Redmond	Initial Document

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2.2 ESB Networks Radio Networks in Operation in the Area 4
2.3 Detail Radio link Information 6
2.4 Recommended Buffer Clearance Zones 6
3 CONCLUSIONS 7

1 Preliminaries

1.1 Purpose of Document

ESB Networks Telecoms has been asked to carry out a Windfarm Impact Analysis by MKO Ireland on a proposed windfarm development in Ballydermot Co. Offaly. This impact analysis was carried out using the ICS Telecoms Radio planning tool to check the impact that may be caused by the Windfarm on the existing Point to Point and Point to Multipoint Radio network. These radio networks carry critical Operational SCADA traffic for ESB Group and its customers.

2 Impact Analysis

2.1 Proposed Ballydermot Windfarm Boundary



Figure 1 – Outlined Ballydermot WF Boundary

2.2 ESB Networks Radio Networks in Operation in the Area

The lines marked in red are the current and planned radio links in this area that are of concern. These are a mixture of Point to Point and Point to Multipoint radio links which carry critical Operational SCADA traffic for ESB Networks.

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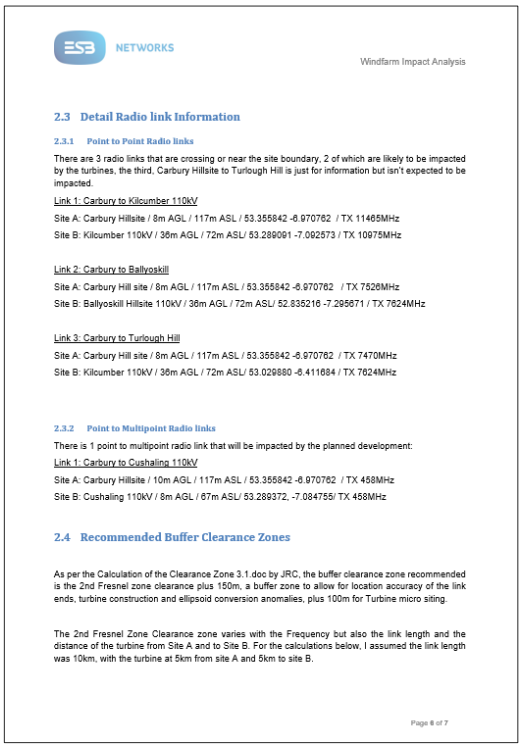
NETWORKS

Windfarm Impact Analysis

Figure 2 -ESB Microwave links

Figure 3 - Microwave links with 2nd Fresnel Zone

Page 6 of 7



NETWORKS

Windfarm Impact Analysis

2.3 Detail Radio link Information

2.3.1 Point to Point Radio links

There are 3 radio links that are crossing or near the site boundary, 2 of which are likely to be impacted by the turbines, the third, Carbury Hillsite to Turlough Hill is just for information but isn't expected to be impacted.

Link 1: Carbury to Kilcumber 110kV

Site A: Carbury Hillsite / 8m AGL / 117m ASL / 53.355842 -6.970762 / TX 11465MHz

Site B: Kilcumber 110kV / 36m AGL / 72m ASL/ 53.289091 -7.092573 / TX 10975MHz

Link 2: Carbury to Ballyoskill

Site A: Carbury Hill site / 8m AGL / 117m ASL / 53.355842 -6.970762 / TX 7526MHz

Site B: Ballyoskill Hillsite 110kV / 36m AGL / 72m ASL/ 52.835216 -7.295671 / TX 7624MHz

Link 3: Carbury to Turlough Hill

Site A: Carbury Hill site / 8m AGL / 117m ASL / 53.355842 -6.970762 / TX 7470MHz

Site B: Kilcumber 110kV / 36m AGL / 72m ASL/ 53.029880 -8.411684 / TX 7624MHz

2.3.2 Point to Multipoint Radio links

There is 1 point to multipoint radio link that will be impacted by the planned development:

Link 1: Carbury to Cushaling 110kV

Site A: Carbury Hillsite / 10m AGL / 117m ASL / 53.355842 -6.970762 / TX 458MHz

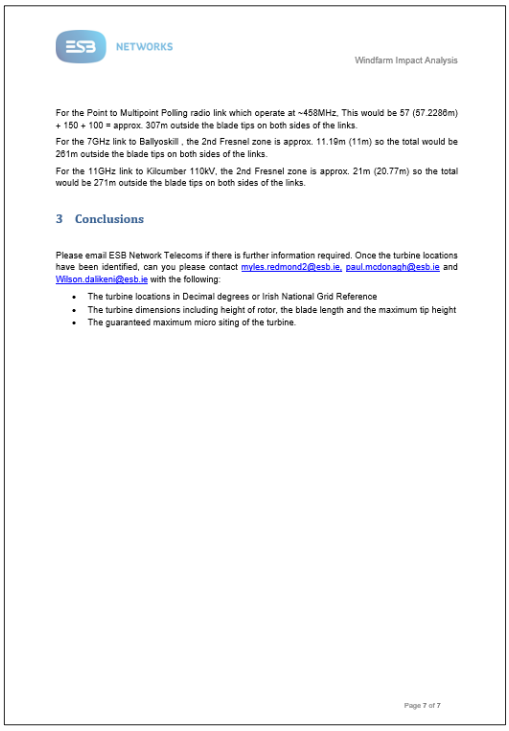
Site B: Cushaling 110kV / 8m AGL / 67m ASL/ 53.289372, -7.084755/ TX 458MHz

2.4 Recommended Buffer Clearance Zones

As per the Calculation of the Clearance Zone 3.1.doc by JRC, the buffer clearance zone recommended is the 2nd Fresnel zone clearance plus 150m, a buffer zone to allow for location accuracy of the link ends, turbine construction and ellipsoid conversion anomalies, plus 100m for Turbine micro siting.

The 2nd Fresnel Zone Clearance zone varies with the Frequency but also the link length and the distance of the turbine from Site A and to Site B. For the calculations below, I assumed the link length was 10km, with the turbine at 5km from site A and 5km to site B.

Page 6 of 7



NETWORKS

Windfarm Impact Analysis

For the Point to Multipoint Polling radio link which operate at ~458MHz, This would be 57 (57.2286m) + 150 + 100 = approx. 307m outside the blade tips on both sides of the links.

For the 7GHz link to Ballyoskill , the 2nd Fresnel zone is approx. 11.19m (11m) so the total would be 261m outside the blade tips on both sides of the links.

For the 11GHz link to Kilcumber 110kV, the 2nd Fresnel zone is approx. 21m (20.77m) so the total would be 271m outside the blade tips on both sides of the links.

3 Conclusions

Please email ESB Network Telecoms if there is further information required. Once the turbine locations have been identified, can you please contact myles.redmond2@esb.ie, paul.mcdonagh@esb.ie and Wilson.dalikeni@esb.ie with the following:

- The turbine locations in Decimal degrees or Irish National Grid Reference
- The turbine dimensions including height of rotor, the blade length and the maximum tip height
- The guaranteed maximum micro siting of the turbine.

Page 7 of 7

From: David McGrath <dmcgrath@aibridges.ie>
Sent: Monday 4 January 2021 17:18
To: Redmond. Myles (ESB Networks) <myles.redmond2@esb.ie>; Dalikeni. Wilson (ESB

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Networks) <wilson.dalikeni@esb.ie>
Cc: Kevin Hayes <khayes@aibridges.ie>
Subject: Ballydermot Wind Farm Development, Co Offaly

CAUTION: This email is from an external sender. If you are unsure about any links or attachments, please forward it to ESB Cybersecurity Operations at spammonitor@esb.ie
04th January 2021

RE: Ballydermot Wind Farm Development

Hello Myles,

Ai Bridges Limited has been requested to follow up on the consultation requests that were sent to you (by MKO) in July 2020 regarding the proposed Ballydermot Wind Farm development.

As we are to conduct a detailed technical analysis of the radio links in the vicinity of the proposed wind farm, we would be grateful if you could forward the following information:

6. Indication of any LOS microwave links that maybe affected by the proposed wind farm development.
7. Site co-ordinates of the telecoms tower locations of microwave links that may be impacted by the proposed development.
8. Antenna mast heights for both ends of each link.
9. Frequency of operation of radio links.
10. Network \ Overlay maps showing impacted telecoms infrastructure traversing the proposed wind farm development.

The proposed wind farm site is located approximately 5km south of Edenderry in Co. Offaly.
Refer to the attached; Site Location Map and KMZ file.
We would be grateful if you reply to us before the 13rd January 2021. You can do this by way of email response to info@aibridges.ie.

Yours sincerely,

_____

Kevin Hayes
For and on behalf of **Ai Bridges Limited**
Ai Bridges Ltd.,
UNIT 9, BLOCK B,
Quin Rd. Business Park,
Ennis, Co. Clare,
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Tel : +353 65 6848768
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Web : www.aibridges.ie

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Ballydermot Wind Farm Development - Site Location Map

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10. Imagine Broadband Response to Consultations

From: Paul Brunel <Paul.Brunel@imaginegroup.ie>
Sent: Friday 2 May 2025 10:57
To: David McGrath <dmcgrath@aibridges.ie>
Cc: Kevin Hayes <khayes@aibridges.ie>; Ronnie O'Neill <Ronnie.ONeill@imaginegroup.ie>
Subject: RE: Ballydermot Wind Farm Development, Co Offaly

Hi David,
Imagine are in the process of decommissioning all our microwave links. This process should be complete within 12 months.
We do not need to be informed of any new developments going forward.

Kind Regards,

Paul Brunel
Transmission Planner,
Network Deployment.
www.imagine.ie
086 388 1962
Sandyford Business Centre |
Blackthorn Road |Sandyford |
D18AW89

Disclaimer: www.imagine.ie/email-disclaimer/

From: David McGrath <dmcgrath@aibridges.ie>
Sent: 01 May 2025 16:53
To: Paul Brunel <Paul.Brunel@imaginegroup.ie>
Cc: Kevin Hayes <khayes@aibridges.ie>; Ronnie O'Neill <Ronnie.ONeill@imaginegroup.ie>
Subject: Ballydermot Wind Farm Development, Co Offaly

This email originated outside of the organisation - please exercise caution when opening attachments or clicking links.
01st May 2025,

RE: Ballydermot Wind Farm Development.

Dear Sir/Madam,

Ai Bridges Limited has been engaged to prepare a Preliminary Telecommunications Impact Assessment for a proposed wind farm development at Ballydermot, Co. Offaly. The wind farm developer is in the process of finalising a design layout for the proposed wind farm as part of an environmental impact assessment study. The proposed wind farm site is located just south of Edenderry, Co Offaly. Refer to the attached Site Location Map and KMZ file.

Ai Bridges Ltd has been commissioned to engage with all potentially affected Telecoms Operators to identify and map the telecommunications networks traversing the proposed wind

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farm site. Ai Bridges will then generate a Telecommunications Infrastructure Constraints Map that will be used by the wind farm developer to assist in finalising an optimal wind farm design layout for the proposed development. We would be grateful if you could provide details of your telecommunications networks in the vicinity of the proposed wind farm study area in the tabular format below.

All telecommunications microwave network links will be modelled based on Fresnel Zone clearances with set-back safety buffers as required. It would be a condition that any proposed wind turbine would not be located inside a safety buffer zone to avoid interference on any of the telecommunications networks.

We would be grateful if you could confirm that this design layout approach, as agreed on previous wind farm studies, being taken by the wind farm developer is acceptable to you.

We would be grateful if you could provide your response to the above by close of business on May 08th 2025.

Link Name / ID	Band MHz\GHz	Link Length	Site A					Site B				
			Lat	Long	Easting	Northing	Ant Height	Lat	Long	Easting	Northing	Ant Height

Yours sincerely,

_____

Kevin Hayes
For and on behalf of **Ai Bridges Limited**

Ai Bridges Ltd.,
UNIT 9, BLOCK B,
Quin Rd. Business Park,
Ennis, Co. Clare,
Ireland.
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Ballydermot Wind Farm Development - Site Location Map

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11. Tetra Ireland Response to Consultations

From: Tom Barry <tom.barry@motorolasolutions.com>
Sent: Friday 2 May 2025 07:59
To: David McGrath <dmcgrath@aibridges.ie>
Cc: Thomas Barry <Tom.Barry@tetraireland.ie>; Kevin Hayes <khayes@aibridges.ie>; Aidan Damer <Aidan.Damer@tetraireland.ie>
Subject: Re: Ballydermot Wind Farm Development, Co Offaly

David,

There have not been any changes to the network in the area. Can you please ensure that the development is reviewed by eir.

Regards,
Tom

On Thu, May 1, 2025 at 5:13 PM David McGrath <dmcgrath@aibridges.ie> wrote:

Hello Tom,

The developer of Ballydermot Wind Farm has requested us to update the Telecommunications Impact Assessment Statement which was initially prepared for the proposed development in 2021.
The location of the proposed development is to the south of Edenderry, Co Offaly and is shown below in the Site Location Map.

We would appreciate it if you could let us know if there has been any change to your network in the Ballydermot area of Co. Offaly since we first contacted you in 2021.
We would also appreciate it if you could provide your response to the above, by close of business on May 08th 2025. If no response is received by this date, we will assume that there has been no change to your network since our first correspondence in 2021.

Yours sincerely,

_____
Kevin Hayes
For and on behalf of **Ai Bridges Limited**

Ai Bridges Ltd.,
UNIT 9, BLOCK B,
Quin Rd. Business Park,
Ennis, Co. Clare,
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Ballydermot Wind Farm Development - Site Location Map



From: Thomas Barry <Tom.Barry@TETRAIRELAND.IE>
Sent: Monday 1 February 2021 16:22
To: David McGrath <dmcgrath@aibridges.ie>
Subject: RE: EXTERNAL MAIL:- Ballydermot Wind Farm Development, Co Offaly

David,

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

Regards,

Tom

From: David McGrath [mailto:dmcgrath@aibridges.ie]
Sent: Monday 4 January 2021 17:20
To: Thomas Barry
Cc: Kevin Hayes; Aidan Damer
Subject: EXTERNAL MAIL:- Ballydermot Wind Farm Development, Co Offaly

04th January 2021

RE: Ballydermot Wind Farm Development

Hello Tom,

Ai Bridges Limited has been requested to prepare a Telecommunications Impact Assessment for the proposed Ballydermot Wind Farm development in County Offaly.

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As we are to conduct a detailed technical analysis of the radio links in the vicinity of the proposed wind farm, we would be grateful if you could forward the following information:

1. Indication of any LOS microwave links that maybe affected by the proposed wind farm development.
2. Site co-ordinates of the telecoms tower locations of microwave links that may be impacted by the proposed development.
3. Antenna mast heights for both ends of each link.
4. Frequency of operation of radio links.
5. Network \ Overlay maps showing impacted telecoms infrastructure traversing the proposed wind farm development.

The proposed wind farm site is located approximately 5km south of Edenderry in Co. Offaly. Refer to the attached; Site Location Map and KMZ file.

We would be grateful if you reply to us before the 13rd January 2021. You can do this by way of email response to info@aibridges.ie.

Yours sincerely,

_____

Kevin Hayes

For and on behalf of **Ai Bridges Limited**

Ai Bridges Ltd.,
UNIT 9, BLOCK B,
Quin Rd. Business Park,
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Ballydermot Wind Farm Development - Site Location Map

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12. Three Ireland Response to Consultations

From: David Montgomery <David.Montgomery@three.ie>
Sent: Tuesday 6 May 2025 12:16
To: David McGrath <dmcgrath@aibridges.ie>; DL Estates ROI <Estates@three.ie>; Monika Biniaszewska <Monika.Biniaszewska@three.ie>
Cc: Kevin Hayes <khayes@aibridges.ie>; Sean Kelly <Sean.Kelly2@three.ie>
Subject: RE: Ballydermot Wind Farm Development, Co Offaly

Hi David,

A few changes in this area since 2021. Latest transmission link details below.
Can you leave a 20m buffer from the blade tips please?

Link no.	Link Ref	Freq.	Site A	X	Y	Lat	Lon	Dish Height	Site B	X	Y	Lat	Lon	Dish Height
1	ML016076	18GHz	OF0003	261743	232851	53.3425	-7.07379	30m	KD0157	274628	227022	53.2885	-6.88175	29m
2	ML020859	26GHz	OF0003	261743	232851	53.3425	-7.07379	30m	OF0108	261317	224051	53.2635	-7.08189	26m
3	ML020331	26GHz	OF0108	261317	224051	53.2635	-7.08189	26m	KD0213	266770	220331	53.2294	-7.00096	29m
4	ML020522	18GHz	OF0003	261743	232851	53.3425	-7.07379	30m	OF0105	261243	227548	53.2949	-7.08232	30m

Regards,

Dave

From: David McGrath <dmcgrath@aibridges.ie>
Sent: Tuesday 6 May 2025 11:51
To: DL Estates ROI <Estates@three.ie>; Monika Biniaszewska <Monika.Biniaszewska@three.ie>; David Montgomery <David.Montgomery@three.ie>
Cc: Kevin Hayes <khayes@aibridges.ie>; Sean Kelly <Sean.Kelly2@three.ie>
Subject: RE: Ballydermot Wind Farm Development, Co Offaly

CAUTION! External Email.

Hello Monika, David,

We are looking to conclude our Telecommunications Impact Assessment Statement for the proposed wind farm at Ballydermot, Co. Offaly.
If you have any concerns regarding the development, we would be grateful if you could let us know as soon as possible.

Thank you for your assistance with this matter.

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Yours sincerely,

_____

Kevin Hayes
For and on behalf of **Ai Bridges Limited**

Ai Bridges Ltd.,
UNIT 9, BLOCK B,
Quin Rd. Business Park,
Ennis, Co. Clare,
Ireland.

Tel : +353 65 6848768
FAX : +353 65 6848769
Web : www.aibridges.ie

From: David McGrath
Sent: Thursday 1 May 2025 17:10
To: DL Estates ROI <Estates@three.ie>; Monika Biniaszewska <monika.biniaszewska@three.ie>
Cc: Kevin Hayes <khayes@aibridges.ie>; David Montgomery <david.montgomery@three.ie>; Sean Kelly <sean.kelly2@three.ie>
Subject: RE: Ballydermot Wind Farm Development, Co Offaly

Dear Sir / Madam,

The developer of Ballydermot Wind Farm has requested us to update the Telecommunications Impact Assessment Statement which was initially prepared for the proposed development in 2021.
The location of the proposed development is to the south of Edenderry, Co Offaly and is shown below in the Site Location Map.

We would appreciate it if you could let us know if there has been any change to your network in the Ballydermot area of Co. Offaly since we first contacted you in 2021.
We would also appreciate it if you could provide your response to the above, by close of business on May 08th 2025. If no response is received by this date, we will assume that there has been no change to your network since our first correspondence in 2021.

Yours sincerely,

_____

Kevin Hayes
For and on behalf of **Ai Bridges Limited**

Ai Bridges Ltd.,
UNIT 9, BLOCK B,
Quin Rd. Business Park,

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Ennis, Co. Clare,
Ireland.

Tel : +353 65 6848768
FAX : +353 65 6848769
Web : www.aibridges.ie

Encl.

Ballydermot Wind Farm Development - Site Location Map



From: Alister Cole [mailto:Alister.Cole1@three.ie]
Sent: 08 January 2021 11:36
To: David McGrath <dmcgrath@aibridges.ie>; Kevin Hayes <khayes@aibridges.ie>
Cc: DL Estates ROI <Estates@three.ie>; Sean Kelly <Sean.Kelly2@three.ie>
Subject: RE: Ballydermot Wind Farm Development, Co Offaly

Hi Kevin/David,

As requested please find attached spreadsheet with MW link details and screenshot.

Link no.	Link Ref	Freq.	Site A	X	Y	Dish Height	Site B	X	Y	Dish Height
1	ML016076	18GHz	OF0003	261743	232851	30m	KD0157	274628	227022	29m
2	ML020274	26GHz	OF0003	261743	232851	30m	OF0076	261077	223562	30m
3	ML020331	26GHz	OF0076	261077	223562	32m	KD0213	266770	220331	29m
4	ML020522	18GHz	OF0003	261743	232851	30m	OF0105	261243	227548	30m

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Best regards,

Alister

Alister Cole
Transmission Engineer

Mobile: 086 6024556
Email: Alister.Cole1@three.ie

From: David McGrath <dmcgrath@aibridges.ie>
Sent: 04 January 2021 17:21
To: Alister Cole <Alister.Cole1@three.ie>
Cc: Kevin Hayes <khayes@aibridges.ie>; Alan Hutchinson <alan.hutchinson@three.ie>; DL Estates ROI <Estates@three.ie>; Sandra Dempsey <Sandra.Dempsey@three.ie>
Subject: Ballydermot Wind Farm Development, Co Offaly

CAUTION! External Email.

04th January 2021

RE: Ballydermot Wind Farm Development

Hello Alister ,

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Ai Bridges Limited has been requested to follow up on the consultation requests that were sent to you (by MKO) in July 2020 regarding the proposed Ballydermot Wind Farm development.

As we are to conduct a detailed technical analysis of the radio links in the vicinity of the proposed wind farm, we would be grateful if you could forward the following information:

11. Indication of any LOS microwave links that maybe affected by the proposed wind farm development.
12. Site co-ordinates of the telecoms tower locations of microwave links that may be impacted by the proposed development.
13. Antenna mast heights for both ends of each link.
14. Frequency of operation of radio links.
15. Network \ Overlay maps showing impacted telecoms infrastructure traversing the proposed wind farm development.

The proposed wind farm site is located approximately 5km south of Edenderry in Co. Offaly. Refer to the attached; Site Location Map and KMZ file.
We would be grateful if you reply to us before the 13rd January 2021. You can do this by way of email response to info@aibridges.ie.

Yours sincerely,

_____

Kevin Hayes
For and on behalf of **Ai Bridges Limited**

Ai Bridges Ltd.,
UNIT 9, BLOCK B,
Quin Rd. Business Park,
Ennis, Co. Clare,
Ireland.

Tel : +353 65 6848768
FAX : +353 65 6848769
Web : www.aibridges.ie

Encl.
Ballydermot Wind Farm Development - Site Location Map

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Three Ireland
28/29 Sir John Rogerson's Quay, Dublin 2, Ireland.

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13. Uisce Éireann Response to Consultations

From: Peter Thornton <pethornt@water.ie>
Sent: Wednesday 7 May 2025 10:50
To: David McGrath <dmcgrath@aibridges.ie>
Cc: Kevin Hayes <khayes@aibridges.ie>
Subject: RE: Ballydermot Wind Farm Development, Co Offaly

Hi David,

I can confirm that there are no UÉ communication links traversing the proposed wind farm.
Regards,
Peter Thornton
Telemetry Services Manager

From: David McGrath <dmcgrath@aibridges.ie>
Sent: Tuesday 6 May 2025 11:51
To: Peter Thornton <pethornt@water.ie>
Cc: Kevin Hayes <khayes@aibridges.ie>; John Flaherty <jflaherty@water.ie>
Subject: RE: Ballydermot Wind Farm Development, Co Offaly

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Hello Peter,

We are looking to conclude our Telecommunications Impact Assessment Statement for the proposed wind farm at Ballydermot, Co. Offaly.
If you have any concerns regarding the development, we would be grateful if you could let us know as soon as possible.

Thank you for your assistance with this matter.

Yours sincerely,

_____
Kevin Hayes
For and on behalf of **Ai Bridges Limited**

Ai Bridges Ltd.,
UNIT 9, BLOCK B,
Quin Rd. Business Park,
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Ireland.
Tel : +353 65 6848768
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From: David McGrath
Sent: Thursday 1 May 2025 16:53
To: Peter Thornton <pethornt@water.ie>
Cc: Kevin Hayes <khayes@aibridges.ie>; John Flaherty <jflaherty@water.ie>
Subject: Ballydermot Wind Farm Development, Co Offaly

01st May 2025,

RE: Ballydermot Wind Farm Development.

Dear Sir/Madam,

Ai Bridges Limited has been engaged to prepare a Preliminary Telecommunications Impact Assessment for a proposed wind farm development at Ballydermot, Co. Offaly. The wind farm developer is in the process of finalising a design layout for the proposed wind farm as part of an environmental impact assessment study. The proposed wind farm site is located just south of Edenderry, Co Offaly. Refer to the attached Site Location Map and KMZ file.

Ai Bridges Ltd has been commissioned to engage with all potentially affected Telecoms Operators to identify and map the telecommunications networks traversing the proposed wind farm site. Ai Bridges will then generate a Telecommunications Infrastructure Constraints Map that will be used by the wind farm developer to assist in finalising an optimal wind farm design layout for the proposed development. We would be grateful if you could provide details of your telecommunications networks in the vicinity of the proposed wind farm study area in the tabular format below.

All telecommunications microwave network links will be modelled based on Fresnel Zone clearances with set-back safety buffers as required. It would be a condition that any proposed wind turbine would not be located inside a safety buffer zone to avoid interference on any of the telecommunications networks.

We would be grateful if you could confirm that this design layout approach, as agreed on previous wind farm studies, being taken by the wind farm developer is acceptable to you.

We would be grateful if you could provide your response to the above by close of business on May 08th 2025.

Link Name / ID	Band MHz\GHz	Link Length	Site A					Site B				
			Lat	Long	Easting	Northing	Ant Height	Lat	Long	Easting	Northing	Ant Height

Yours sincerely,

_____

Kevin Hayes
For and on behalf of **Ai Bridges Limited**

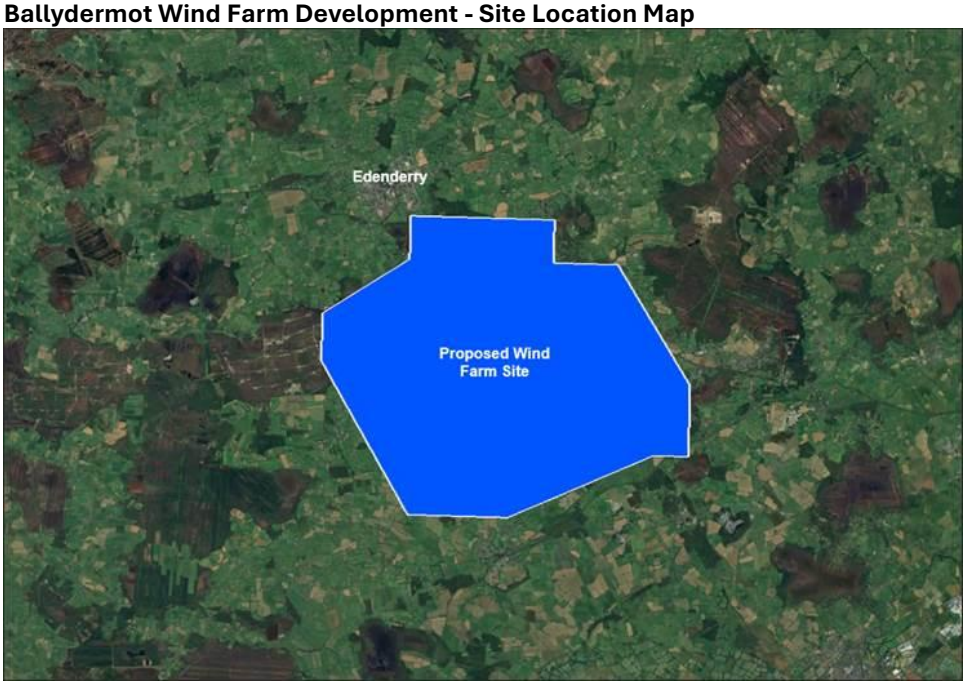
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Ennis, Co. Clare,
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Ballydermot Wind Farm Development - Site Location Map



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14. Viatel / Ripplecom Response to Consultations

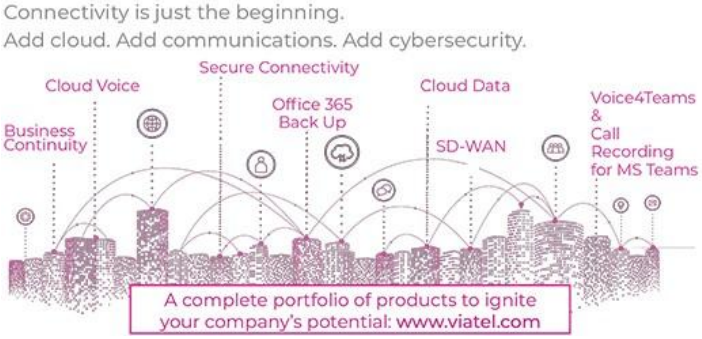
From: Marcin Skupski <Marcin.Skupski@viatel.com>
Sent: Friday 2 May 2025 09:27
To: David McGrath <dmcgrath@aibridges.ie>
Cc: Kevin Hayes <khayes@aibridges.ie>; Conor Pendlebury <Conor.Pendlebury@viatel.com>; Viatel Customer Care <care@viatel.com>
Subject: RE: Ballydermot Wind Farm Development, Co Offaly

Hi David,

No impact.

Thank you,

Marcin Skupski
Build & Maintenance Team Leader
M: +353 (0) 86 8320724
E: Marcin.Skupski@viatel.com



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From: David McGrath <dmcgrath@aibridges.ie>
Sent: 01 May 2025 17:15
To: Marcin Skupski <Marcin.Skupski@viatel.com>
Cc: Kevin Hayes <khayes@aibridges.ie>; Conor Pendlebury <Conor.Pendlebury@viatel.com>; Viatel Customer Care <care@viatel.com>
Subject: RE: Ballydermot Wind Farm Development, Co Offaly

Dear Sir / Madam,

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The developer of Ballydermot Wind Farm has requested us to update the Telecommunications Impact Assessment Statement which was initially prepared for the proposed development in 2021.
The location of the proposed development is to the south of Edenderry, Co Offaly and is shown below in the Site Location Map.

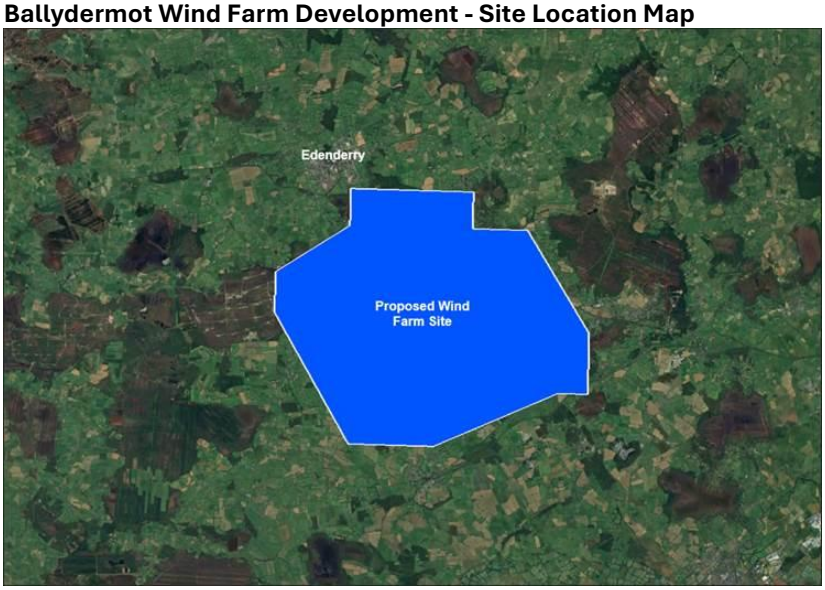
We would appreciate it if you could let us know if there has been any change to your network in the Ballydermot area of Co. Offaly since we first contacted you in 2021.
We would also appreciate it if you could provide your response to the above, by close of business on May 08th 2025. If no response is received by this date, we will assume that there has been no change to your network since our first correspondence in 2021.

Yours sincerely,

_____
Kevin Hayes
For and on behalf of **Ai Bridges Limited**

Ai Bridges Ltd.,
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Quin Rd. Business Park,
Ennis, Co. Clare,
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Web : www.aibridges.ie

Encl.
Ballydermot Wind Farm Development - Site Location Map



From:
Sent: Monday 4 January 2021 17:19

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To: 'andrew.snowdon@ripplecom.net' <andrew.snowdon@ripplecom.net>
Cc: Kevin Hayes <khayes@aibridges.ie>; 'engineering@ripplecom.net' <engineering@ripplecom.net>
Subject: Ballydermot Wind Farm Development, Co Offaly

04th January 2021

RE: Ballydermot Wind Farm Development

Hello Andrew ,

Ai Bridges Limited has been requested to follow up on the consultation requests that were sent to you (by MKO) in July 2020 regarding the proposed Ballydermot Wind Farm development.

As we are to conduct a detailed technical analysis of the radio links in the vicinity of the proposed wind farm, we would be grateful if you could forward the following information:

16. Indication of any LOS microwave links that maybe affected by the proposed wind farm development.
17. Site co-ordinates of the telecoms tower locations of microwave links that may be impacted by the proposed development.
18. Antenna mast heights for both ends of each link.
19. Frequency of operation of radio links.
20. Network \ Overlay maps showing impacted telecoms infrastructure traversing the proposed wind farm development.

The proposed wind farm site is located approximately 5km south of Edenderry in Co. Offaly.
Refer to the attached; Site Location Map and KMZ file.
We would be grateful if you reply to us before the 13rd January 2021. You can do this by way of email response to info@aibridges.ie.

Yours sincerely,

_____

Kevin Hayes
For and on behalf of **Ai Bridges Limited**
Ai Bridges Ltd.,
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Quin Rd. Business Park,
Ennis, Co. Clare,
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Ballydermot Wind Farm Development - Site Location Map

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15. Virgin Media Response to Consultations

From: Keiran Butler <Keiran.Butler@virginmedia.ie>
Sent: Tuesday 13 May 2025 12:58
To: David McGrath <dmcgrath@aibridges.ie>; Mark Nolan <Mark.Nolan@virginmedia.ie>
Cc: Kevin Hayes <khayes@aibridges.ie>
Subject: RE: Ballydermot Wind Farm Development, Co Offaly

Hi All

Please see attached
This is a very busy site with Virgin Media as we have a lot of radio links here

Regards
Keiran Butler

Link Name / ID	Band MHz\GHz	Link Length	Site A					Site B				
			Lat	Long	Easting	Northing	Ant Height	Lat	Long	Easting	Northing	Ant Height
RochfortBridge Convent 20439I to VM Dunmurry	11GHz	34.5km	53° 24.907'N	7° 18.216'W			8mts	53° 11.906'N	6° 56.003'W			8mts
Gaelscoil Eadan Doire 20332N to VM Dunmurry	13GHz	18.2km	53° 20.340'N	7° 4.292'W			8mts	53° 11.906'N	6° 56.003'W			8mts
Oaklands Community College 72540O to VM Dunmurry	15GHz	17.7km	53° 20.229'N	7° 3.763'W			8mts	53° 11.906'N	6° 56.003'W			8mts
Saint Marys Secondary School 65582Q to VM Dunmurry	13GHz	17.8km	53° 20.380'N	7° 3.592'W			8mts	53° 11.906'N	6° 56.003'W			8mts
ST_Etchens_NS_19848S to VM Dunmurry	11GHz	30.9km	53° 27.396'N	7° 6.171'W			8mts	53° 11.906'N	6° 56.003'W			8mts
Cloch_Rinnce_NS_18093J to VM Dunmurry	13GHz	22.9km	53° 23.865'N	7° 0.902'W			8mts	53° 11.906'N	6° 56.003'W			8mts
Johnstown_Est_Hotel to VM Dunmurry	13GHz	23.9km	53° 24.299'N	6° 50.206'W			8mts	53° 11.906'N	6° 56.003'W			8mts
Irish Explosives to VM Dunmurry	13GHz	21.3km	53° 22.497'N	6° 48.608'W			8mts	53° 11.906'N	6° 56.003'W			8mts

From: David McGrath <dmcgrath@aibridges.ie>
Sent: Thursday 1 May 2025 16:53
To: Keiran Butler <Keiran.Butler@virginmedia.ie>; Mark Nolan <Mark.Nolan@virginmedia.ie>
Cc: Kevin Hayes <khayes@aibridges.ie>
Subject: Ballydermot Wind Farm Development, Co Offaly

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01st May 2025,

RE: Ballydermot Wind Farm Development.

Dear Sir/Madam,

Ai Bridges Limited has been engaged to prepare a Preliminary Telecommunications Impact Assessment for a proposed wind farm development at Ballydermot, Co. Offaly. The wind farm developer is in the process of finalising a design layout for the proposed wind farm as part of an environmental impact assessment study. The proposed wind farm site is located just south of Edenderry, Co Offaly. Refer to the attached Site Location Map and KMZ file.

Ai Bridges Ltd has been commissioned to engage with all potentially affected Telecoms Operators to identify and map the telecommunications networks traversing the proposed wind farm site. Ai Bridges will then generate a Telecommunications Infrastructure Constraints Map that will be used

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by the wind farm developer to assist in finalising an optimal wind farm design layout for the proposed development. We would be grateful if you could provide details of your telecommunications networks in the vicinity of the proposed wind farm study area in the tabular format below.

All telecommunications microwave network links will be modelled based on Fresnel Zone clearances with set-back safety buffers as required. It would be a condition that any proposed wind turbine would not be located inside a safety buffer zone to avoid interference on any of the telecommunications networks.

We would be grateful if you could confirm that this design layout approach, as agreed on previous wind farm studies, being taken by the wind farm developer is acceptable to you.

We would be grateful if you could provide your response to the above by close of business on May 08th 2025.

Link Name / ID	Band MHz\GHz	Link Length	Site A					Site B				
			Lat	Long	Easting	Northing	Ant Height	Lat	Long	Easting	Northing	Ant Height

Yours sincerely,

_____

Kevin Hayes
For and on behalf of **Ai Bridges Limited**

Ai Bridges Ltd.,
UNIT 9, BLOCK B,
Quin Rd. Business Park,
Ennis, Co. Clare,
Ireland.

Tel : +353 65 6848768
Web: www.aibridges.ie

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Ballydermot Wind Farm Development - Site Location Map

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From: Kevin Hayes
Sent: 15 September 2026 20:13
To: 'Mark Nolan' <Mark.Nolan@virginmedia.ie>
Cc: AIBridges - Engineering <engineering@aibridges.ie>
Subject: Ballydermot Wind Farm Development - Telecoms Impact Assessment

Hello Mark,

I am following up from our call earlier. As discussed we are conducting a Telecoms Impact Assessment for the proposed Ballydermot Wind Farm Development

During the consultation process the VM links were identified below and we have modelled the potential impacts of the proposed turbines in relation to same

A number of Mitigation Measures have been proposed, see attached

As discussed we are proposing that if the planning application is consented that Virgin Media would be consulted and a suitable mitigation measure me agreed and implemented to the agreement of Virgin Media

Also as highlighted a consented development may take 3 – 4 years before entering the construction phase

Would you be available for a call tomorrow to discuss

Link Name / ID	Band MHz|GHz	Link Length	Site A			Site B		
			Lat	Long	Ant Height	Lat	Long	Ant Height
RochfortBridge Convent 20439I to VM Dunmurry	11GHz	34.5km	53° 24.907'N	7° 18.216'W	8mts	53° 11.906'N	6° 56.003'W	8mts
Gaelscoil Eadan Doire 20332N to VM Dunmurry	13GHz	18.2km	53° 20.340'N	7° 4.292'W	8mts	53° 11.906'N	6° 56.003'W	8mts
Oaklands Community College 72540O to VM Dunmurry	15GHz	17.7km	53° 20.229'N	7° 3.763'W	8mts	53° 11.906'N	6° 56.003'W	8mts
Saint Marys Secondary School 65582Q to VM Dunmurry	13GHz	17.8km	53° 20.380'N	7° 3.592'W	8mts	53° 11.906'N	6° 56.003'W	8mts
ST_Etchens_NS_19848S to VM Dunmurry	11GHz	30.9km	53° 27.396'N	7° 6.171'W	8mts	53° 11.906'N	6° 56.003'W	8mts
Cloch_Rinnce_NS_18093J to VM Dunmurry	13GHz	22.9km	53° 23.866'N	7° 0.902'W	8mts	53° 11.906'N	6° 56.003'W	8mts
Johnstown_Est_Hotel to VM Dunmurry	13GHz	23.9km	53° 24.299'N	6° 50.206'W	8mts	53° 11.906'N	6° 56.003'W	8mts
Irish Explosives to VM Dunmurry	13GHz	21.3km	53° 22.497'N	6° 48.608'W	8mts	53° 11.906'N	6° 56.003'W	8mts

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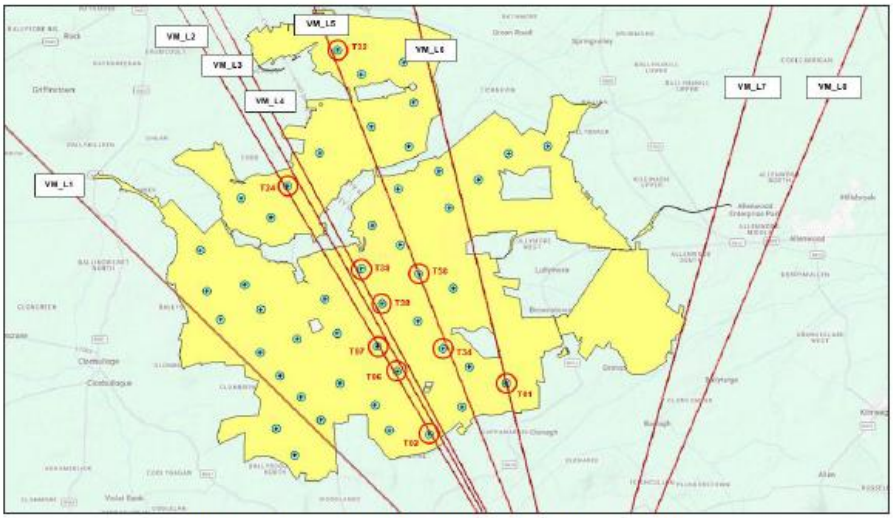


Figure 17. Virgin Media Network – Close-up Plan View

To further assess the potential impact of the proposed turbines, the radio links have been modelled in 3D and the Clearance Distances between the Fresnel Zone(s) of the links and the blade-tip of the turbines have been calculated.

A 3D view of the radio links is shown below in Figure 18. The results of the 3D analysis indicate that the radio path of three Virgin Media radio links would be obstructed by the proposed turbines (VM_L2, VM_L5 and VM_L6).

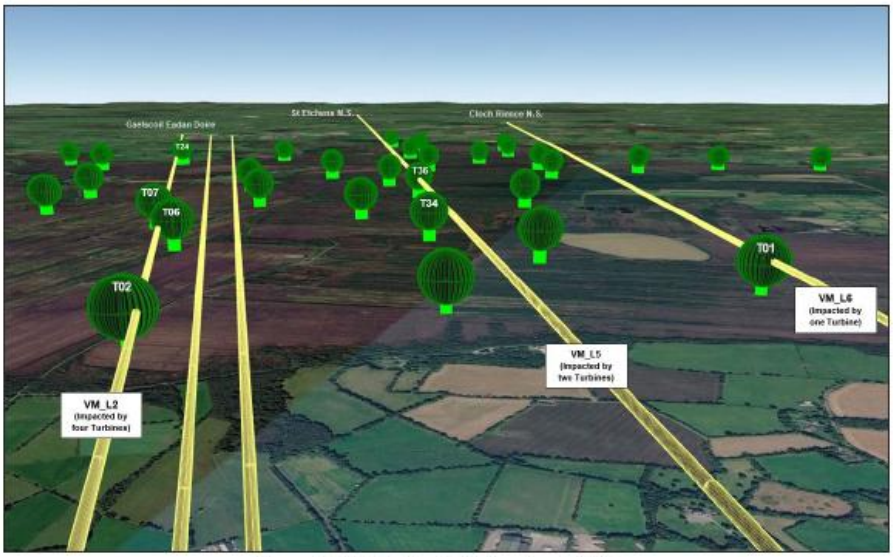


Figure 18. Virgin Media Network – 3D View

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

Link ID	Link Description	Nearest Turbine(s)	Fresnel Zone (F1) Clearance Distance	Observations
VM_L1	Rochfortbridge Convent to VM Dunmurry	T12	> 50 m	No impacts.
VM_L2	Gaelscoil Eadan Doire to VM Dunmurry	T02	- 60.5 m (Interference Condition)	Link impacted by four turbines (T02, T06, T07 & T24) (Mitigation measures required)
		T06	- 31.8 m (Interference Condition)	
		T07	- 45.3 m (Interference Condition)	
		T24	- 8.6 m (Interference Condition)	
VM_L3	Oaklands Community College to VM Dunmurry	T06	35.6 m	No impacts.
VM_L4	Saint Marys Secondary School to VM Dunmurry	T39	20.2 m	No impacts.
VM_L5	St Etchens NS to VM Dunmurry	T32	22.3 m	Likely to be Impacted by two turbines (T34 & T36) (Mitigation measures required)
		T34	< 5 m (Clearance = 1.8 m)	
		T36	- 81.5 m (Interference Condition)	
		T40	47.0 m	
VM_L6	Cloch Rinnce NS to VM Dunmurry	T01	- 82.2 m (Interference Condition)	Link impacted by one turbine (T01) (Mitigation measures required)
VM_L7	Johnstown Est Hotel to VM Dunmurry	T01	> 50 m	No impacts.
VM_L8	Irish Explosives to VM Dunmurry	T01	> 50 m	No impacts.

Table 13. Analysis Summary – Virgin Media Network

From: Kevin Hayes <khayes@aibridges.ie>
Sent: Wednesday 23 September 2026 12:40 pm
To: Mark Nolan <Mark.Nolan@virginmedia.ie>; Keiran Butler <Kieran.Butler@virginmedia.ie>
Cc: AIBridges - Engineering <engineering@aibridges.ie>
Subject: FW: Ballydermot Wind Farm Development - Telecoms Impact Assessment

Hello Mark,

I am following up from our call last week and our email correspondence below.

Would you be available for a call later today, I have also copied your colleague in RF Planning

We are just following up to confirm if you have any comments in relation to our [proposed mitigation measure strategy proposal that any potential impacts to the VM transmission networks would be resolved in advance of construction and operation of any impacting wind turbine

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As discussed last week all mitigation measures would be borne by the developer

We are looking to close out consultations by today if possible for submission tomorrow
Best Regards,
Kevin Hayes,
Ai Bridges Ltd.,
...Total Communications Solutions...
UNIT 9, BLOCK B,
Quin Rd. Business Park,
Ennis, Co. Clare,
Ireland.

From: Mark Nolan <Mark.Nolan@virginmedia.ie>
Sent: 23 September 2026 12:49
To: Kevin Hayes <khayes@aibridges.ie>; Keiran Butler <Kieran.Butler@virginmedia.ie>
Cc: AIBridges - Engineering <engineering@aibridges.ie>
Subject: Re: Ballydermot Wind Farm Development - Telecoms Impact Assessment

Hi Kevin,

Apologies, I was awaiting contract details and term lenght status.

One of those schools have already been decommissioned with another likely to be confirmed in the coming weeks.

The third I have yet to get feedback on.

I will give you a call after lunch but to redirect any of our links will come at a significant cost as we do not have a presence at Saggart.

Rgds

Mark

From: Kevin Hayes
Sent: 23 September 2026 13:01
To: Mark Nolan <Mark.Nolan@virginmedia.ie>; Keiran Butler <Kieran.Butler@virginmedia.ie>
Cc: AIBridges - Engineering <engineering@aibridges.ie>
Subject: RE: Ballydermot Wind Farm Development - Telecoms Impact Assessment

Hello Mark

Thank you for the prompt response.

Just to confirm that Ai Bridges are proposing that in the event of a planning consent

1. that any wind turbine that potentially causes an impact to a Virgin Media Link would not be constructed until a technically viable mitigation measure solution has been implemented

2. the developer would cover all associated mitigation measure costs

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Ai Bridges are recommending a condition of planning based on the above.

This would protect existing operation of the Virgin Media links.
Best Regards,
Kevin Hayes,
Ai Bridges Ltd.,
...Total Communications Solutions...
UNIT 9, BLOCK B,
Quin Rd. Business Park,
Ennis, Co. Clare,
Ireland.

From: Kevin Hayes <khayes@aibridges.ie>
Date: 24/09/2026 17:56 (GMT+00:00)
To: Mark Nolan <Mark.Nolan@virginmedia.ie>, Keiran Butler <Kieran.Butler@virginmedia.ie>
Cc: AIBridges - Engineering <engineering@aibridges.ie>
Subject: RE: Ballydermot Wind Farm Development - Telecoms Impact Assessment

Hello Mark,

I am just following up from the email below and from our telephone call just now

As discussed can you confirm that in principle that Virgin Media would be in agreement with the Mitigation Measure Strategy that is being proposed by Ai Bridges

We are looking to include a response from VM in our final recommendations for mitigation measures

Thank you for your assistance on this matter

Best Regards,
Kevin Hayes,
Ai Bridges Ltd.,
...Total Communications Solutions...
UNIT 9, BLOCK B,
Quin Rd. Business Park,
Ennis, Co. Clare,
Ireland.

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From: Mark Nolan <Mark.Nolan@virginmedia.ie>
Sent: 24 September 2026 19:12
To: Kevin Hayes <khayes@aibridges.ie>; Keiran Butler <Keiran.Butler@virginmedia.ie>
Cc: AIBridges - Engineering <engineering@aibridges.ie>
Subject: RE: Ballydermot Wind Farm Development - Telecoms Impact Assessment

Hi Kevin,

Yes, as discussed, in principle we would be open to review the mitigation measure purposed once all costs that will be incurred including recurring opex costs are taken on by the windfall operators in question.

Rgds

Mark

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16. Vodafone Response to Consultations

From: Robert Power, Vodafone (External) <robert.power1@vodafone.com>
Sent: Friday 2 May 2025 10:04
To: David McGrath <dmcgrath@aibridges.ie>
Cc: Kevin Hayes <khayes@aibridges.ie>; Chris Stephenson, Vodafone (External) <chris.stephenson2@vodafone.com>; Gavin Byrne, Vodafone <gavin.byrne@vodafone.com>; Sean Lyons, Vodafone (External) <sean.lyons@vodafone.com>; Siobhan Burke, Vodafone <siobhan.burke1@vodafone.com>
Subject: RE: Ballydermot Wind Farm Development, Co Offaly

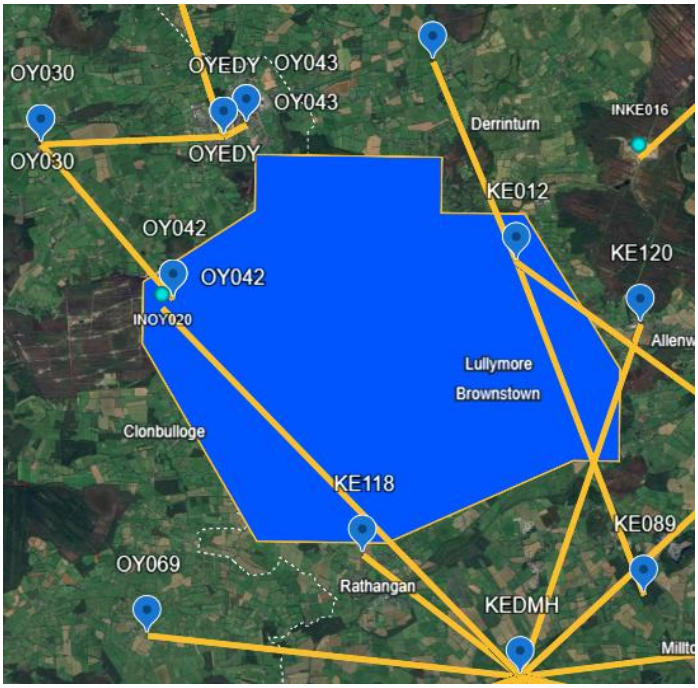
Hi Kevin,

All links highlighted previously are still active but I there are two more that I don't think were included last time. See table below.

Let me know if you require any additional information.

Kind Regards,
Robert

Link Name / ID	Band GHz	Link Length Km	Site A			Site B		
			Northing (Irish Grid)	Easting (Irish Grid)	Ant Height m	Northing (Irish Grid)	Easting (Irish Grid)	Ant Height m
KE012-KE013	18	8.894	228736	271054	15	223632	278338	15
KEDMH-OY020	15	14.604	216953	271317	30	227267.52	260978.39	30
KE120-KEDMH	18	10.603	227025	274631	25	216953	271317	35
KE089-KE012	18	10.169	219294	274833	24	228736	271054	20
KE012-KE114	26	6.2	228736	271054	22	234421	268578	7
OY030-OY042	26	5.839	231903	257364	31	227541	261246	52.87



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From: David McGrath <dmcgrath@aibridges.ie>
Sent: Thursday 1 May 2025 17:16
To: Robert Power, Vodafone (External) <robert.power1@vodafone.com>
Cc: Kevin Hayes <khayes@aibridges.ie>; Chris Stephenson, Vodafone (External) <chris.stephenson2@vodafone.com>; Gavin Byrne, Vodafone <gavin.byrne@vodafone.com>; Sean Lyons, Vodafone (External) <sean.lyons@vodafone.com>; Siobhan Burke, Vodafone <siobhan.burke1@vodafone.com>
Subject: RE: Ballydermot Wind Farm Development, Co Offaly

This email originated from outside of the organisation: Be cautious about the sender, attachments and links. If uncertain use **Report Message** button.

Dear Sir / Madam,

The developer of Ballydermot Wind Farm has requested us to update the Telecommunications Impact Assessment Statement which was initially prepared for the proposed development in 2021.
The location of the proposed development is to the south of Edenderry, Co Offaly and is shown below in the Site Location Map.

We would appreciate it if you could let us know if there has been any change to your network in the Ballydermot area of Co. Offaly since we first contacted you in 2021.
We would also appreciate it if you could provide your response to the above, by close of business on May 08th 2025. If no response is received by this date, we will assume that there has been no change to your network since our first correspondence in 2021.

Yours sincerely,

_____
Kevin Hayes
For and on behalf of **Ai Bridges Limited**

Ai Bridges Ltd.,
UNIT 9, BLOCK B,
Quin Rd. Business Park,
Ennis, Co. Clare,
Ireland.
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FAX : +353 65 6848769
Web : www.aibridges.ie

Encl.
Ballydermot Wind Farm Development - Site Location Map

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From: Byrne, Gavin, Vodafone <gavin.byrne@vodafone.com>
Sent: Monday 20 September 2021 17:46
To: David McGrath <dmcgrath@aibridges.ie>
Cc: Kevin Hayes <khayes@aibridges.ie>; Stephenson, Chris, Vodafone (External) <chris.stephenson2@vodafone.com>; Lyons, Sean, Vodafone (External) <sean.lyons@vodafone.com>; Neill o', Shane, Vodafone <shane.oneill2@vodafone.com>; Dennehy, Darragh, Vantage Towers <darragh.dennehy@vantagetowers.com>
Subject: RE: Ballydermot Wind Farm Development, Co Offaly

Hi David,

The proposed approach outlined is agreeable on the assumption that all co-ordinates are accurate, including microwaves and turbines, the dimensions of the proposed turbines are accurate and all heights of microwave links are reasonably accurate (+/-5m of actual should be generally considered accurate).

Gavin Byrne
TX Planning & Design Engineer
Converged Transmission
+353 876448159
gavin.byrne@vodafone.com

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MountainView, Leopardstown, Dublin 18,
Registered in Ireland: No. 326967

vodafone.ie

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From: David McGrath <dmcgrath@aibridges.ie>
Sent: Monday 20 September 2021 16:21
To: Byrne, Gavin, Vodafone <gavin.byrne@vodafone.com>
Cc: Kevin Hayes <khayes@aibridges.ie>; Stephenson, Chris, Vodafone (External) <chris.stephenson2@vodafone.com>; Lyons, Sean, Vodafone (External)

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<sean.lyons@vodafone.com>
Subject: RE: Ballydermot Wind Farm Development, Co Offaly

CYBER SECURITY WARNING: This email is from an external source - be careful of attachments and links. Please follow the Cyber Code and report suspicious emails.
20th September 2021
RE: Ballydermot Wind Farm Development

Dear Gavin,

The wind farm developer of the proposed wind farm development at Ballydermot, Co. Offaly is finalising the design layout for planning application purposes.

Ai Bridges Ltd has been commissioned to finalise the telecommunications constraints mapping based on the consultations conducted with telecoms operators earlier this year. All telecommunications networks identified to be traversing the wind farm network have been modelled. The 3D modelling of the Vodafone Ireland links have been included below and are available in .kmz format on request. This 3D model has been used by the Wind Farm developer to assist in determining the wind farm design layout for the proposed development.

The microwave radio links have been modelled based on the details provided during our consultations earlier this year and shown in the table below.

The 1st Fresnel clearance zones and the 30m set-back safety buffers requested by Vodafone Ireland have been used by the wind farm developers in line with industry standard buffers. None of the proposed wind turbines will be located inside the agreed safety buffer zones as part of the final design layout to avoid interference on the links.

We would be grateful if you could confirm this design layout approach adopted by the wind farm developer is agreeable to Vodafone Ireland.

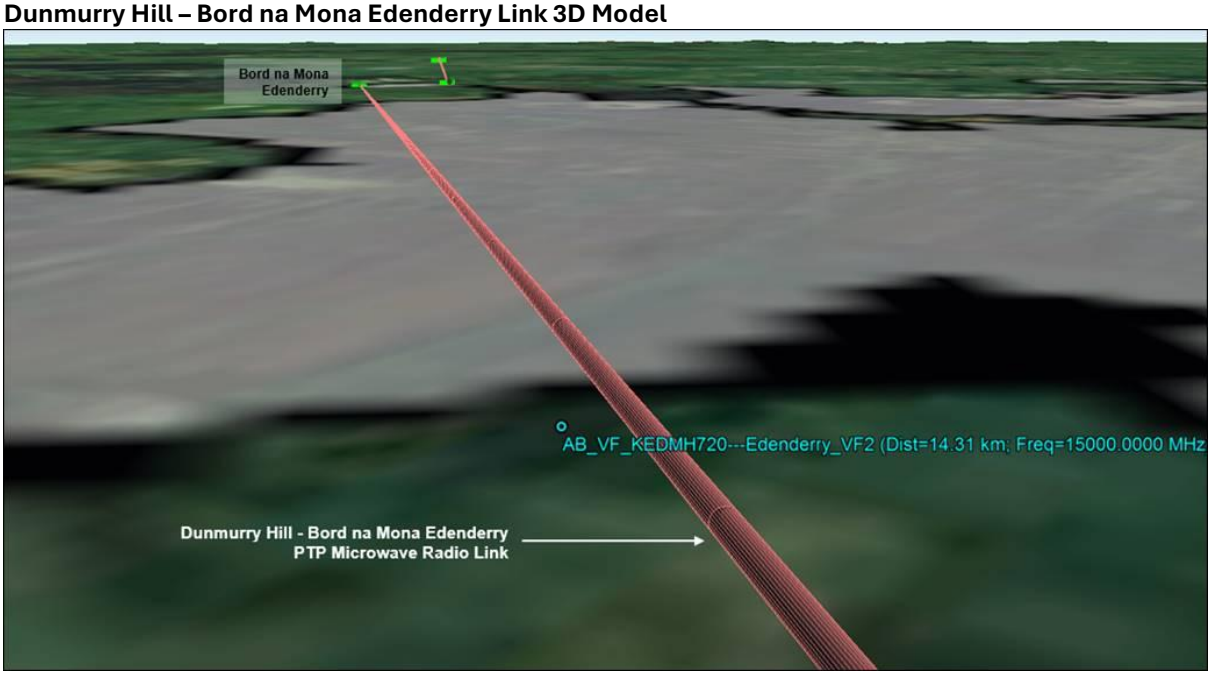
Site Name	Easting	Northing	Site Name	Easting	Northing	Antenna Height (M)	Antenna Height (M)	Area
KEDMH Dunmurry Hill	271319.22	216968.06	OY020 Bord Na Mona Edenderry	261047.65	226928.18	30	14	Ballydermot north & South, Codd 1
OY042 Ballykilleen	261244.04	227548.16	OY030 Ballinla	257364.00	231903.00	31	53	Codd1
KE012 Kilpatrick	271055.70	228732.85	KE013 Coolaght Kilmeague	278334.80	223631.05	30	30	Killina
KE089 Christianstown Cellnex	274831.47	219294.11	KE012 Kilpatrick	271055.70	228732.85	24	20	Derrybrennan, Killina & Lodge

Vodafone Ireland links in the vicinity of the proposed Ballydermot Wind Farm.

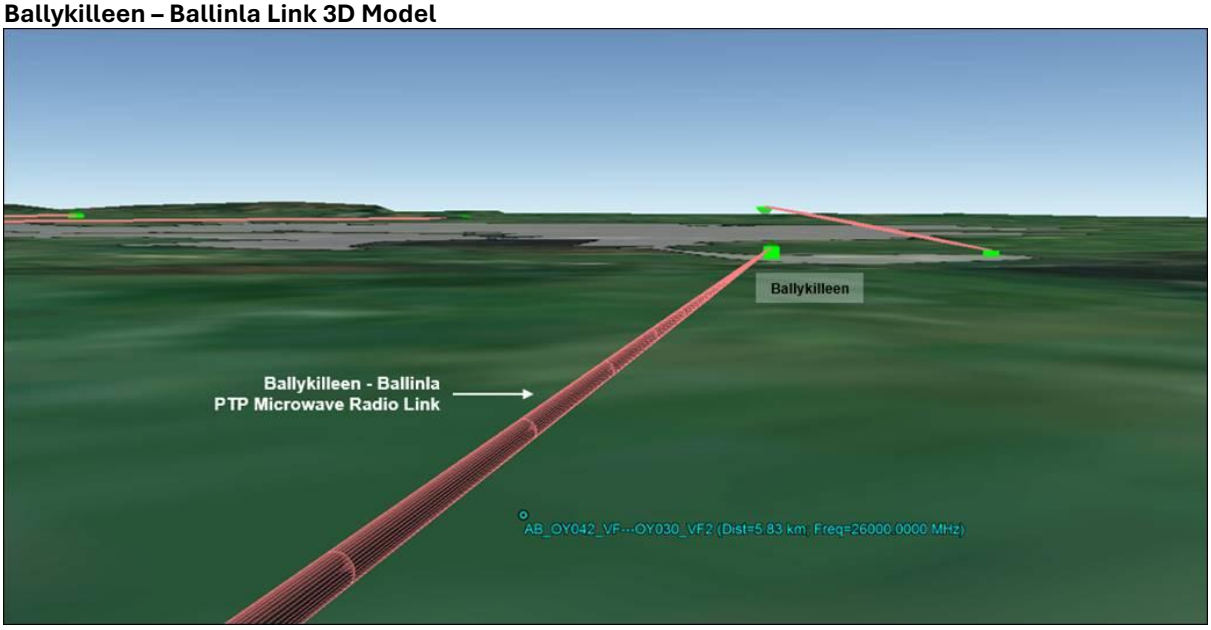


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Dunmurry Hill – Bord na Mona Edenderry Link 3D Model

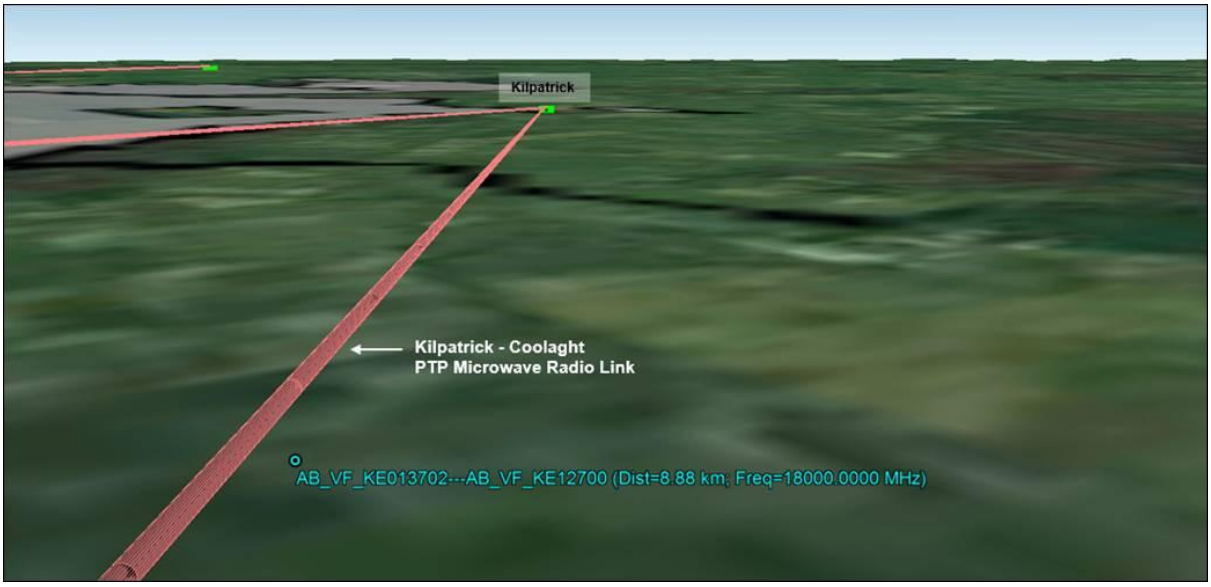


Ballykilleen – Ballinla Link 3D Model

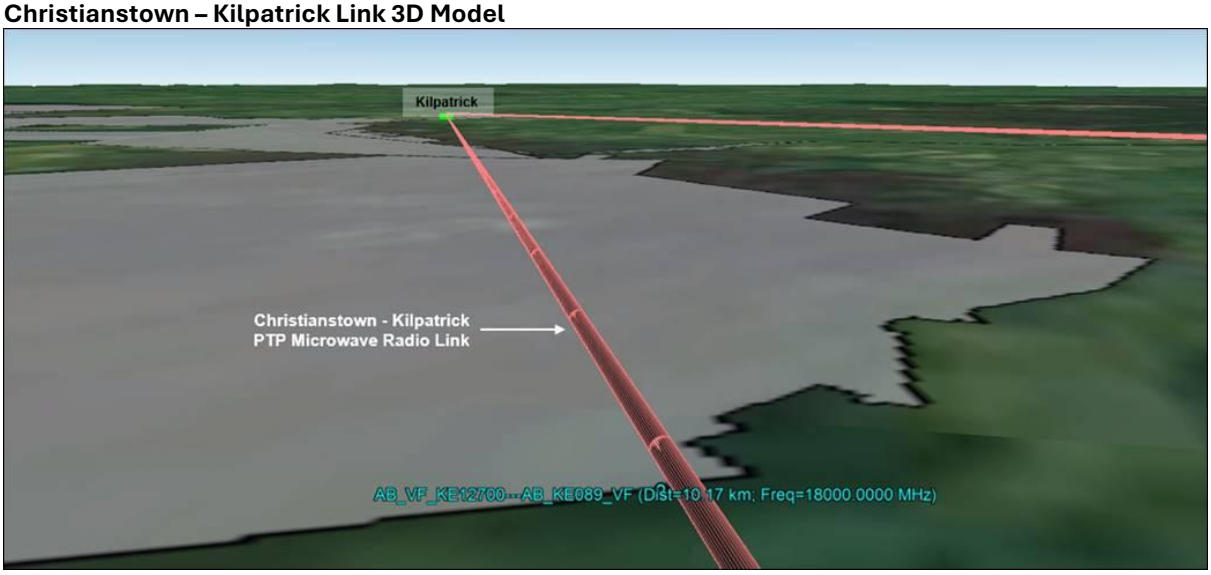


Kilpatrick – Coolaght Link 3D Model

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Christianstown – Kilpatrick Link 3D Model



Yours sincerely,

_____

Kevin Hayes
For and on behalf of **Ai Bridges Limited**
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Ennis, Co. Clare,
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Web : www.aibridges.ie

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From: Stephenson, Chris, Vodafone Ireland (External) [mailto:chris.stephenson2@vodafone.com]
Sent: 12 March 2021 12:06
To: Kevin Hayes <khayes@aibridges.ie>; Byrne, Gavin, Vodafone Ireland <gavin.byrne@vodafone.com>
Cc: Lyons, Sean, Vodafone Ireland (External) <sean.lyons@vodafone.com>; David McGrath <dmcgrath@aibridges.ie>; AIBridges - Engineering <engineering@aibridges.ie>
Subject: RE: Ballydermot Wind Farm Development, Co Offaly

Hi Kevin,
Please find response to your engineers queries.

Kind regards
Chris

OY042 Ballykilleen 25235 MHz to OY030 Ballinla 26243MHz
KE089 Christianstown Cellnex 18525MHz to KE012 Kilpatrick 19535MHz.

OY030 adjusted coordinates

Easting	Northing
257364	231903

From: Kevin Hayes <khayes@aibridges.ie>
Sent: Thursday 11 March 2021 15:53
To: Byrne, Gavin, Vodafone Ireland <gavin.byrne@vodafone.com>; Stephenson, Chris, Vodafone Ireland (External) <chris.stephenson2@vodafone.com>
Cc: Lyons, Sean, Vodafone Ireland (External) <sean.lyons@vodafone.com>; David McGrath <dmcgrath@aibridges.ie>; AIBridges - Engineering <engineering@aibridges.ie>
Subject: RE: Ballydermot Wind Farm Development, Co Offaly

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Hello Gavin,

Our engineers have completed the analysis for Ballydermot based on the four links identified by Chris in his correspondence below , I have included Chris on this email correspondence as well

Our engineers have highlighted that frequencies of the two links below have not been provided., would it be possible that you can provide these frequencies

- OY042 Ballykilleen to OY030 Ballinla
- KE089 Christianstown Cellnex to KE012 Kilpatrick

Also our engineers have observed that there does not appear to be any mast-structure at the co-ordinates provided for OY030 Ballinla, see screengrabs below. However, there does appear to be a new mast at the location indicated in the Satellite View below, is this the location that we should use and Would you be able to confirm the exact co-ordinate be able to confirm if this link is existing or planned ?

Street View of OY030 Ballinla Location :

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Satellite View of OY030 Ballinla Location :



Best Regards,
Kevin Hayes,
Ai Bridges Ltd.,
...Total Communications Solutions...
UNIT 9, BLOCK B,
Quin Rd. Business Park,
Ennis, Co. Clare,
Ireland.
Tel : +353 65 6848768
Mob : +353 86 1084703
FAX : +353 65 6848769

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Email : khayes@aibridges.ie
Web : www.aibridges.ie

From: Byrne, Gavin, Vodafone Ireland [mailto:gavin.byrne@vodafone.com]
Sent: 10 March 2021 09:43
To: Kevin Hayes <khayes@aibridges.ie>
Cc: Lyons, Sean, Vodafone Ireland (External) <sean.lyons@vodafone.com>; David McGrath <dmcgrath@aibridges.ie>
Subject: RE: Ballydermot Wind Farm Development, Co Offaly

Hi Kevin,

Please consider Chris' response as the most up to date topology in the area.

Thanks

Gavin Byrne
TX Planning & Design Engineer
Converged Transmission
+353876448159
gavin.byrne@vodafone.com

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MountainView, Leopardstown, Dublin 18,
Registered in Ireland: No. 326967

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From: Kevin Hayes <khayes@aibridges.ie>
Sent: Tuesday 9 March 2021 18:37
To: Byrne, Gavin, Vodafone Ireland <gavin.byrne@vodafone.com>
Cc: Lyons, Sean, Vodafone Ireland (External) <sean.lyons@vodafone.com>; David McGrath <dmcgrath@aibridges.ie>
Subject: RE: Ballydermot Wind Farm Development, Co Offaly

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Hello Gavin,

I am just following up with you in relation to our recent correspondence in relation to Ballydermot Wind Farm development, as per email below with yourself dated 14/01/21 . We have conducted our analysis based on the two links that you identified below.

It has been brought to our attention that the consultants with responsibility for the Environmental Impact Assessment (EIA) have also been progressing separate consultations with yourselves, Please see the attached email correspondence which identifies three Vodafone links.

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Would you be able to confirm if there are three links as per the email below from Chris Stephenson , dated 03/02/21 ?

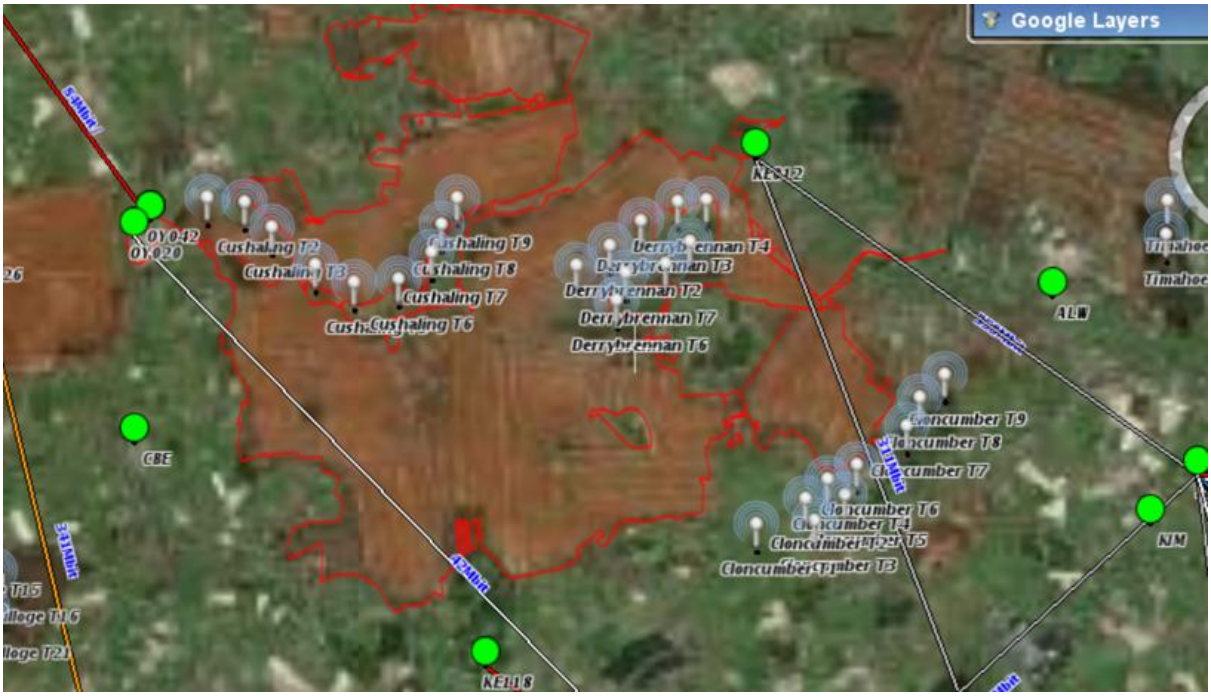
I would be grateful if you could revert with an update so that we can finalise our analysis for the wind farm developer

From: *Stephenson, Chris, Vodafone Ireland (External) <chris.stephenson2@vodafone.com>*
Sent: *Wednesday 3 February 2021 11:58*
To: *Karen Mulryan <kmulryan@mkoireland.ie>*
Cc: *Byrne, Gavin, Vodafone Ireland <gavin.byrne@vodafone.com>; Lyons, Sean, Vodafone Ireland (External) <sean.lyons@vodafone.com>*
Subject: *RE: 191136 Proposed Bord na Móna Powergen Ltd Wind Farm Development at Ballydermot, Co. Offaly & Co. Kildare*

Hi Karen,
Please find analysis below.

Kind regards
Chris

Site Name	Easting	Northing	Site Name	Easting	Northing	Antenna Height (M)	Antenna Height (M)	Area
KEDMH Dunmurry Hill	271318	216952	OY020 Bord Na Mona Edenderry	260921	227294	30	30	Ballydermot north & South, Codd 1
OY042 Ballykilleen	261248	227542	OY030 Ballinla	258156.85	231674.48	31	53	Codd1
KE012 Kilpatrick	271056	228736	KE013 Coolaght Kilmeague	278340	223632	30	30	Killina
KE089 Christianstown Cellnex	274835	219295	KE012 Kilpatrick	271115	228710	24	20	Derrybrennan, Killina & Lodge



Best Regards,
Kevin Hayes,
Ai Bridges Ltd.,
...Total Communications Solutions...
UNIT 9, BLOCK B,

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Ireland.
Tel : +353 65 6848768
Mob : +353 86 1084703
FAX : +353 65 6848769
Email : khayes@aibridges.ie
Web : www.aibridges.ie

From: Byrne, Gavin, Vodafone Ireland <gavin.byrne@vodafone.com>
Sent: Wednesday 27 January 2021 13:47
To: Kevin Hayes <khayes@aibridges.ie>; David McGrath <dmcgrath@aibridges.ie>
Cc: McHugh, Brian, Vantage Towers Ireland <brian.mchugh@vantagetowers.com>; Dennehy, Darragh, Vantage Towers Ireland <darragh.dennehy@vantagetowers.com>; Murphy, Daragh, Vodafone Ireland <daragh.murphy@vodafone.com>; Lyons, Sean, Vodafone Ireland (External) <sean.lyons@vodafone.com>; Neill o', Shane, Vodafone Ireland <shane.oneill2@vodafone.com>; Cassidy, Emma, Vodafone Ireland <emma.cassidy@vodafone.com>
Subject: RE: Ballydermot Wind Farm Development, Co Offaly

Hi Kevin,

Apologies for the delay. The dish is installed at 53.289402, -7.085333 at approx 14m height.

Gavin Byrne
TX Planning & Design Engineer
Converged Transmission
+353876448159
gavin.byrne@vodafone.com

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MountainView, Leopardstown, Dublin 18,
Registered in Ireland: No. 326967

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From: Kevin Hayes <khayes@aibridges.ie>
Sent: Monday 25 January 2021 13:32
To: Byrne, Gavin, Vodafone Ireland <gavin.byrne@vodafone.com>; David McGrath <dmcgrath@aibridges.ie>
Cc: McHugh, Brian, Vantage Towers Ireland <brian.mchugh@vantagetowers.com>; Dennehy, Darragh, Vantage Towers Ireland <darragh.dennehy@vantagetowers.com>; Murphy, Daragh, Vodafone Ireland <daragh.murphy@vodafone.com>; Lyons, Sean, Vodafone Ireland (External) <sean.lyons@vodafone.com>; Neill o', Shane, Vodafone Ireland <shane.oneill2@vodafone.com>; Cassidy, Emma, Vodafone Ireland

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<emma.cassidy@vodafone.com>
Subject: RE: Ballydermot Wind Farm Development, Co Offaly

CYBER SECURITY WARNING: This email is from an external source - be careful of attachments and links. Please follow the Cyber Code and report suspicious emails.
Hello Gavin,

I am just following up on the email below. Would you be able to confirm the exact location where the dish is located at the Edenderry Power Station.

Our client, Bord Na Mona, is finalising their site layout designs today and they have requested that we close out all open consultations

Best Regards,
Kevin Hayes,
Ai Bridges Ltd.,
...Total Communications Solutions...
UNIT 9, BLOCK B,
Quin Rd. Business Park,
Ennis, Co. Clare,
Ireland.
Tel : +353 65 6848768
Mob : +353 86 1084703
FAX : +353 65 6848769
Email : khayes@aibridges.ie
Web : www.aibridges.ie
From: Kevin Hayes
Sent: 14 January 2021 14:41
To: Byrne, Gavin, Vodafone Ireland <gavin.byrne@vodafone.com>; David McGrath <dmcgrath@aibridges.ie>
Cc: McHugh, Brian, Vantage Towers Ireland <brian.mchugh@vantagetowers.com>; Dennehy, Darragh, Vantage Towers Ireland <darragh.dennehy@vantagetowers.com>; Murphy, Daragh, Vodafone Ireland <daragh.murphy@vodafone.com>; Lyons, Sean, Vodafone Ireland (External) <sean.lyons@vodafone.com>; Neill o', Shane, Vodafone Ireland <shane.oneill2@vodafone.com>; Cassidy, Emma, Vodafone Ireland <emma.cassidy@vodafone.com>
Subject: RE: Ballydermot Wind Farm Development, Co Offaly

Hello Gavin,

Thank you for your email below.

Just to confirm that we have identified one of the link sites as the main site entrance at Edenderry Power Station.

We surveyed this site and there was no evidence of a dish at this location. There is a telecoms mast structure within the power station with a single dish and this has been identified as a Three Ireland dish

Would you be able to confirm the exact co-ordinate \ location with the site where the link dish is located

Best Regards,
Kevin Hayes,

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Mob : +353 86 1084703
FAX : +353 65 6848769
Email : khayes@aibridges.ie
Web : www.aibridges.ie

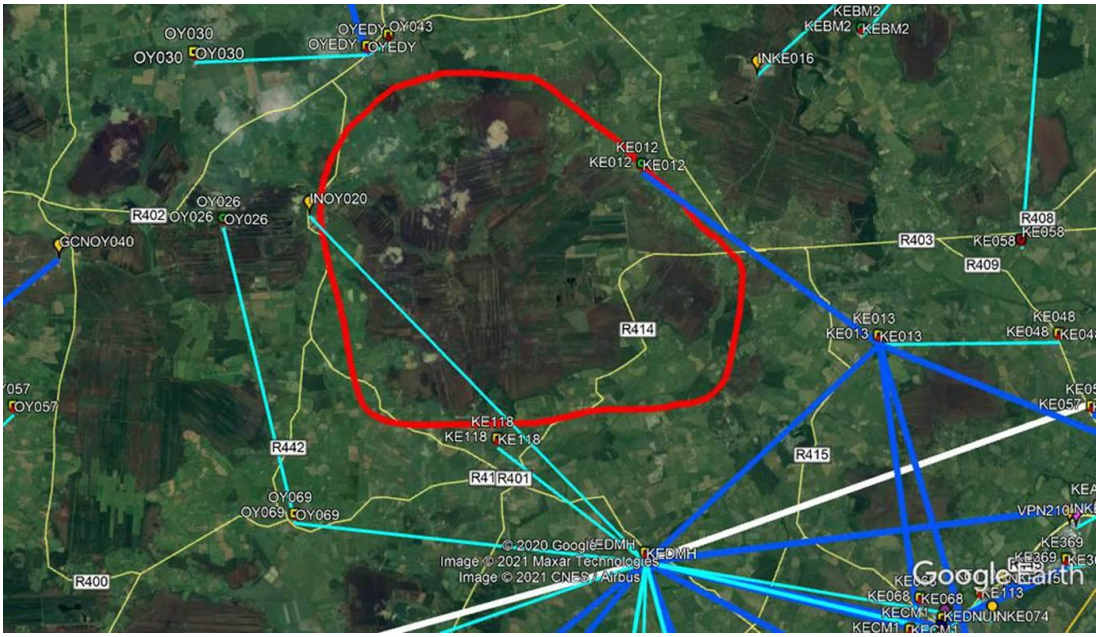
From: Byrne, Gavin, Vodafone Ireland [mailto:gavin.byrne@vodafone.com]
Sent: 14 January 2021 11:40
To: David McGrath <dmcgrath@aibridges.ie>
Cc: Kevin Hayes <khayes@aibridges.ie>; McHugh, Brian, Vantage Towers Ireland <brian.mchugh@vantagetowers.com>; Dennehy, Darragh, Vantage Towers Ireland <darragh.dennehy@vantagetowers.com>; Murphy, Daragh, Vodafone Ireland <daragh.murphy@vodafone.com>; Lyons, Sean, Vodafone Ireland (External) <sean.lyons@vodafone.com>; Neill o', Shane, Vodafone Ireland <shane.oneill2@vodafone.com>; Cassidy, Emma, Vodafone Ireland <emma.cassidy@vodafone.com>
Subject: RE: Ballydermot Wind Farm Development, Co Offaly

Hi David,

There a two microwave systems in the area indicated, please see details below. Please ensure a minimum clearance of 30m perpendicular between the maximum 1st Fresnel zone and the rotor edge. If you have precise turbine locations, please send to us for assessment.

LinkID	ComReg Licence No.	Link Deployment Type	Radio Config Status	BW + Ref Mod	Freq Band	National Block Allocation	ACM	Lower Modulation	Upper Modulation	Max Ethernet Capacity (Mbps)	B-End IDU	B-End HW IDU Type	B-End Latitude	B-End Longitude	B-End Bearing	A-End IDU	A-End HW IDU Type	A-End Latitude	A-End Longitude	A-End Bearing	RAN Site Aggregation	Access RAN Site Dependents	Hop Distance (km)
KE013KE012_S0	PP20447/1	RAN	radio XPIC single pipe	bw56MHz-16QAM	18 GHz	No	enable	acm-4QAM	acm-256QAM	682	KE013702	ALCplus2e	53.25751899	6.826922537	306.03	KE012700	ALCplus2e	53.30439435	6.954903498	125.94	1	KE012	8.87
KEDMHINOY020_S0	PP24976/5	Corporate	radio 1+0	bw14MHz-4QAM	15 GHz	No	enable	acm-4QAM	acm-256QAM	85	KEDMH720	ALCplus2e	53.19850647	6.933594904	315.77	INOY020700	ALCplus2e	53.292704	-7.087162	135.65	0	Corporate	14.63

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The future is exciting.
Ready?

From: David McGrath <dmcgrath@aibridges.ie>
Sent: Monday 4 January 2021 17:21
To: Byrne, Gavin, Vodafone Ireland <gavin.byrne@vodafone.com>
Cc: Kevin Hayes <khayes@aibridges.ie>
Subject: Ballydermot Wind Farm Development, Co Offaly

CYBER SECURITY WARNING: This email is from an external source - be careful of attachments and links. Please follow the Cyber Code and report suspicious emails.
04th January 2021

RE: Ballydermot Wind Farm Development

Hello Gavin ,

Ai Bridges Limited has been requested to follow up on the consultation requests that were sent to you (by MKO) in July 2020 regarding the proposed Ballydermot Wind Farm development.

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As we are to conduct a detailed technical analysis of the radio links in the vicinity of the proposed wind farm, we would be grateful if you could forward the following information:

21. Indication of any LOS microwave links that maybe affected by the proposed wind farm development.
22. Site co-ordinates of the telecoms tower locations of microwave links that may be impacted by the proposed development.
23. Antenna mast heights for both ends of each link.
24. Frequency of operation of radio links.
25. Network \ Overlay maps showing impacted telecoms infrastructure traversing the proposed wind farm development.

The proposed wind farm site is located approximately 5km south of Edenderry in Co. Offaly. Refer to the attached; Site Location Map and KMZ file.
We would be grateful if you reply to us before the 13rd January 2021. You can do this by way of email response to info@aibridges.ie.

Yours sincerely,

_____

Kevin Hayes
For and on behalf of **Ai Bridges Limited**
Ai Bridges Ltd.,
UNIT 9, BLOCK B,
Quin Rd. Business Park,
Ennis, Co. Clare,
Ireland.
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Encl.
Ballydermot Wind Farm Development - Site Location Map

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APPENDIX A

LETTER OF RELIANCE

AiBridges
Total Communications Solutions
Unit 9, Block B, Quin Road Business Park, Ennis, Co. Clare
Tel: 353 (0) 65 684 8768 Fax: 353 (0) 65 684 8769 Email: info@aibridges.ie

Bord na Móna PLC.
Main Street,
Newbridge,
Co.Kildare
W12 XR59
Ireland

23rd October 2026.

Re: Development of Ballydermot Windfarm (the **"Project**")

To Whom It May Concern

We, Ai Bridges Limited, confirm that we were commissioned by Bord na Móna PLC (the "**Client**") to prepare the following report in relation to wind farm interference impacts to Telecommunications Networks:

- *Ballydermot Wind Farm Telecommunications Impact Assessment Report (R9)*

(the "Report")

The purpose of this Letter is to enable Bord na Móna PLC (the "**Addressee**") to rely on the findings contained in the Report in relation to the Software Modelling Analysis of the interference impact assessments of the Virgin Media Telecommunications Network traversing the proposed Ballydermot Wind Farm development site.

Executive Summary

Ai Bridges were commissioned to carry out an independent Telecommunications Impact Assessment Study to assess the possible impacts to telecommunications transmission infrastructure due to the proposed Wind Farm development. The objectives of the Telecommunications Impact Study Report are as follows:

i) Assess existing telecommunications operator networks in the area.
ii) Predict if any existing telecoms infrastructure could be impacted by interference attributable to the proposed wind turbines.
iii) Confirm available mitigation measure options to offset impacts attributable to the proposed wind turbines.
iv) Present viable mitigation measure proposals to relevant Telecom Operators for consideration.

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Mitigation Measure Proposal – Virgin Media Radio Transmission Network :

The findings of the Report indicated that three Virgin Media microwave radio links could be impacted by the proposed development.

- Gaelscoil Eadan Doire to VM Dunmurry (Potentially impacted by T02, T06, T07 & T24)
- St Etchens NS to VM Dunmurry (Potentially impacted by T34 & T36)
- Cloch Rinnce NS to VM Dunmurry (Potentially impacted by T01)

Based on the Telecommunications Impact Report, the potential impact of the proposed turbines could be offset by the technically viable mitigation measures as outlined in Table 1 below.

The mitigation measure proposal should be effected as a condition of planning in the event of a consent of planning.

In the case of a consented planning application, it is recommended that additional consultations with Virgin Media are undertaken to discuss and agree on the technical details of the proposed mitigation measure solution.

All costs of the mitigation measure strategy would be agreed and covered by the Applicant, based on industry standard costs. The Applicant would co-operate with Virgin Media to ensure that the agreed mitigation measures would be implemented in advance of the construction and operation of the proposed wind farm development.

Radio Link	Mitigation Measures
VM_L2 (Gaelscoil Eadan Doire to VM Dunmurry) VM_L5 (St Etchens N.S. to VM Dunmurry) VM_L6 (Cloch Rinnce N.S. to VM Dunmurry)	**Option 1.** Re-route the impacted radio links via an alternative Virgin Media POP Site. (i.e. the existing telecoms mast-site at Saggart could potentially be used to route the Virgin Media service into their customer sites, instead of a radio link from Dunmurry.)
	Option 2. Relay Mast located within the proposed wind farm site. (i.e. relaying the Virgin Media radio link via a new relay mast structure that would be erected at a suitable location within the proposed wind farm development site.)
	Option 3. Replace the impacted radio link(s) with a fibre broadband connection.

During additional consultations (October 2026) with Virgin Media (*Ref. Ballydermot Wind Farm Telecommunications Impact Assessment Report (R9), Section 3.1.18*, Virgin Media stated that one of the radio links had been decommissioned, and another was likely to be decommissioned in the coming weeks.

At the time of submission of the Telecommunications Impact Assessment Report, Virgin Media were not able to confirm if the third radio link was scheduled to be decommissioned in the foreseeable future, however agreement was reached as to the proposed migration strategy as set out above

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Summary :

Based on professional experience and previous precedents of similar mitigation proposals, Ai Bridges confirm that the most technical viable mitigation measures have been outlined and are considered to be the best technical options for both the telecoms operator and the Applicant.
The proposed measures will offset the potential impacts of the proposed turbines of the proposed development on the existing telecommunications network infrastructure. The Applicant in this instance will be responsible for all costs associated with the mitigation measures set out.

Ai Bridges recommends that a protocol agreement will be put in place between the Applicant and the telecoms operator (Virgin Media), prior to the construction of the proposed wind farm to agree terms such as estate planning, operator access, electricity supply etc. Based on the implementation of the mitigation measures outlined in this report it is considered that there will be no residual adverse effects on the existing telecommunication infrastructure network as a result of the proposed wind farm.

Yours Sincerely



Kevin Hayes
For and on behalf of
Ai Bridges Limited