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Appendix 17.2

EMI Impact Assessment Report

Report

Shancloon Wind Farm
EMI Impact Assessment
Report

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Executive Summary

Ai Bridges was commissioned to evaluate the possible impacts that the proposed wind farm at Shancloon, Co Galway could have on 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, fourteen 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 during the field survey assessments and consultation process a desktop impact analysis was carried out and all of the telecommunication operator networks were analysed using radio planning \ modelling software.

There are two radio network (listed below) in the vicinity of the of the proposed wind farm that required network analysis. The analysis results indicate that neither radio network would be impacted by the proposed turbine layout.

Operator Network	Link Description	Impact of Proposed Turbine Layout
Enet	PTP radio link between Tuam and St Patrick's N.S.	No impacts
	PTP radio link between Abbeyknockmoy and Ballycusheen N.S.	No impacts
CIE	Analogue radio network along Athenry and Claremorris rail track.	No impacts

Table 1. Microwave radio links in vicinity of proposed wind farm.

It should be noted that Virgin Media did raise a concern regarding one of their radio links; however, field surveys indicate that the radio link in question was previously installed at a temporary construction compound (at an existing wind farm at Magheramore, Co Mayo) , but the radio link has since been decommissioned.

None of the Telecommunication Operators contacted during the consultation process raised any concerns regarding telecommunications networks operating in the licence-exempt frequency bands. Also there was no impacts reported by any of the telecommunications operators operating GSM Radio Access, Mobile Broadband Data Access, Tetra, Telemetry or TV/Radio Transmission networks.

Sections

Appendix

Section 1 - Wind Farm Site Information

1. Introduction

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

1.1 Wind Farm Site Information

The proposed wind farm development is located in County Galway approximately 8 km 8 km northwest of Tuam. The development is in the pre-planning stage and exact details regarding the quantity, location and turbine dimension have yet to be finalized.

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

Wind Farm	Number of Turbines	Turbine Hub Height	Turbine Rotor Diameter
Shancloon	11	102.5 m	155 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.

Section 2 - Methodology

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 Shancloon. Figure 2 below shows the proposed wind farm site boundary plotted in the radio planning tool.

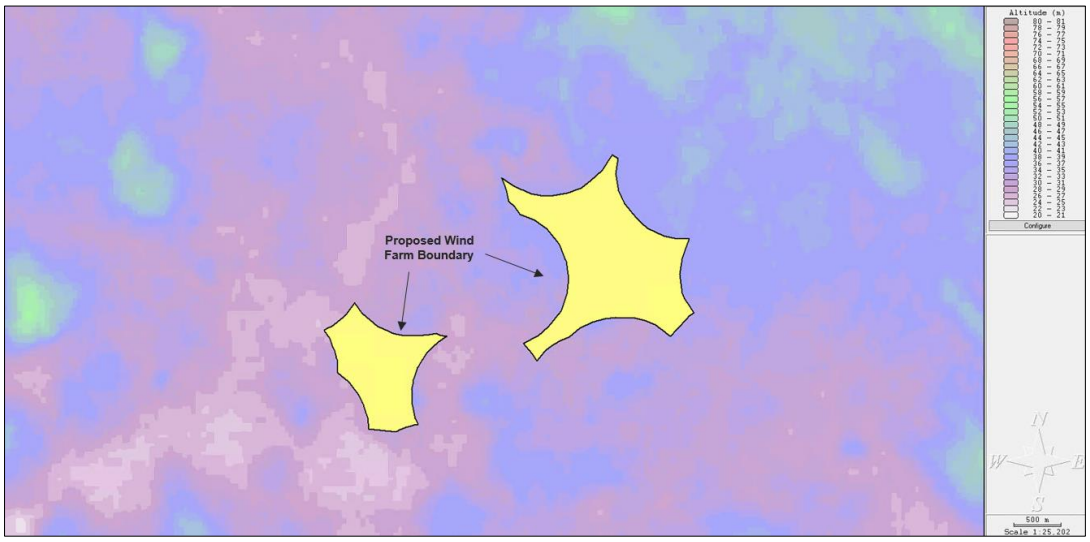


Figure 2. Wind Farm Boundary plotted in Radio Planning Software

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/near the wind farm site boundary modelled in radio planning software.

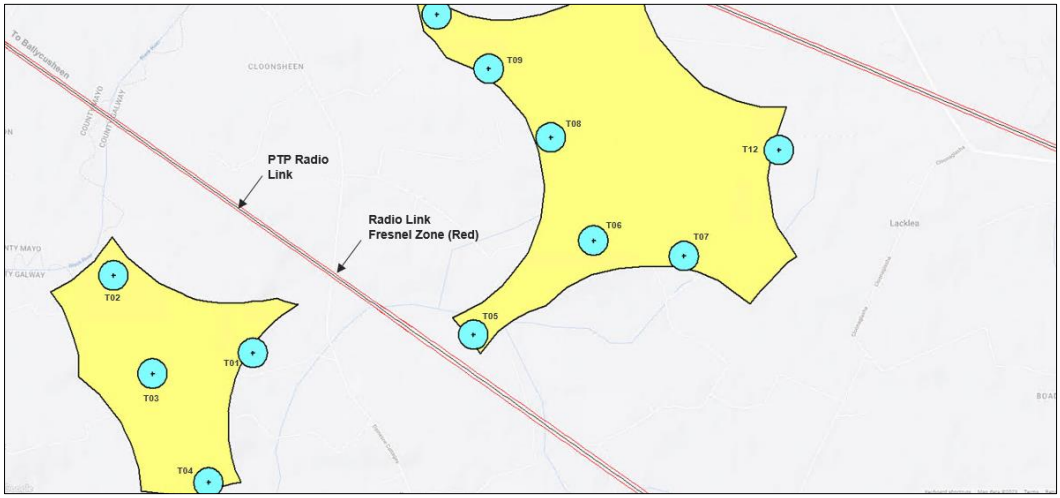


Figure 3. Example of microwave radio link crossing over/near the proposed wind farm site boundary modelled in radio planning software.

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.

Section 3 - Telecom Operator Consultations

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 October 2023 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 responses received from each of the Telecom Operators are provided in Sections 3.1.1 to 3.1.19.

ID	Operator	Response Received (Yes/No)	Issues raised by Operator \ Observations.
1	2RN	Yes	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	Yes	No issues.
3	An Garda Síochána	Yes	No issues.
4	Coimisiún na Meán	Yes	No issues.
5	BT Ireland	Yes	No issues.
6	CIE/Irish Rail	Yes	CIE raised a concern regarding the proximity of the proposed wind farm to the rail line between Athenry and Claremorris (not currently active).
7	Dept. of Defence	No	No response. (DoD is a statutory consultee and have previously stated that they will only respond to the Planning Authority under an RFI at Planning Application Stage.)
8	Eir	Yes	No issues.
9	Enet	Yes	Enet have raised a concern regarding two Licensed PTP microwave radio links.
10	ESB Networks	No	No response. (2nd Reminder issued)
11	Imagine Broadband	Yes	No issues
12	Air Navigation Ireland	No	No response. (No issues expected.)
13	Uisce Éireann	Yes	No issues.
14	Galway County Council	Yes	No issues.
15	Tetra Ireland (TI)	No	No response. (2nd Reminder issued)
16	Three Ireland	Yes	No issues.
17	Viatel	Yes	No issues.
18	Virgin Media	Yes	Virgin Media have raised a concern regarding one Licensed PTP microwave radio link. However, field survey results indicate that this radio link has been decommissioned.
19	Vodafone Ireland	Yes	No issues.

Table 3. Telecom Operators Consulted

3.1.1 2RN Response to Consultations

2RN provided the following email response to consultations:

> *"The proposed windfarm will not affect 2rn's fixed linking.*
> *There is however a risk of interference to broadcast services in the area. We would therefore ask that a protocol be signed between 2rn and the developer should the site go ahead."*

3.1.2 Airwave Response to Consultations

To date no response has been received.

3.1.3 An Garda Síochána Response to Consultations

An Garda Síochána provided the following email response to consultations:

> *"TETRA Ireland* (Garda Service Provider) *carried out an RF Impact assessment of the proposed site. No issues were found, kiopla shrule is nearest site from boundary over 3km away."*

3.1.4 Coimisiún na Meán 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:

> *"BT no longer have a radio microwave network."*

3.1.6 CIE/Irish Rail Response to Consultations

CIE provided the following email response to consultations:

> *"This limits of the proposed development fall within the 5km exclusion zone form the Claremorris to Athenry Railway Line that is not currently active but has been identified in the All-Island Strategic Rail Review as a possible future Rail Corridor."*

3.1.7 Department of Defence Response to Consultations

To date no response has been received.

3.1.8 Eir Response to Consultations

Eir provided the following email response to consultations:

> *"We have no transmission links within the proposed area and it has no risk to the network."*

3.1.9 Enet Response to Consultations

Enet provided the following email response to consultations:

> *"We have the below links in this area:"*

Link Name / ID	Band MHz\GHz	Link Length	Site A			Site B		
			Lat	Long	Ant Height	Lat	Long	Ant Height
TC Tuam / St Patricks Central NS - Claremorris	11GHz	19.3km	53.515542	-8.853719	47m	53.582722	-9.122278	6m
ESB Abbeyknockmoy / SCP0930 - Ballycusheen NS	11 GHz	26.6km	53.420236	-8.742161	20m	53.557821	-9.069519	10m

3.1.10 ESB Networks Response to Consultations

To date no response has been received.

3.1.11 Imagine Broadband Response to Consultations

Imagine Broadband provided the following email response to consultations:

> *"At present Imagine have no microwave links affected by this development.*
> *Your mail has been forwarded to our radio planning department. They will respond directly if they have any concerns."*

3.1.12 Air Navigation Ireland (AirNav) 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 Uisce Éireann do not have any communications links which traverse the proposed development."*

3.1.14 Galway County Council Response to Consultations

Galway County Council provided the following email response to consultations:

> *"Galway County Council is longer using microwave transmission facilities."*

3.1.15 Tetra Ireland (TI) Response to Consultations

To date no response has been received.

3.1.16 Three Ireland Response to Consultations

Three Ireland provided the following email response to consultations:

> *"I have reviewed the Proposed Wind Turbine Shancloon, Co. Galway. These locations will have no impact on the Three Ireland Microwave Transmission network."*

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:

"Virgin Media Do Have a radio link in this area details below"

Link Name / ID	Band MHz\GHz	Link Length	Site A			Site B		
			Lat	Long	Ant Height	Lat	Long	Ant Height
Magheramore WF	7GHz	54.3km	53° 45.827'N	8° 54.274'W	10mts	53° 17.489'N	9° 6.677'W	15mts

18.10.23 - AiBridges Ltd response to Virgin Media

Hello Kieran,

From our surveys of the Magheramore wind farm site, there is no radio currently installed at the co-ordinates provided (See screengrabs below).

It appears that a radio link to the site was previously installed at a temporary compound, but has been un-installed.

We would be grateful if you could confirm that this radio link has been decommissioned.

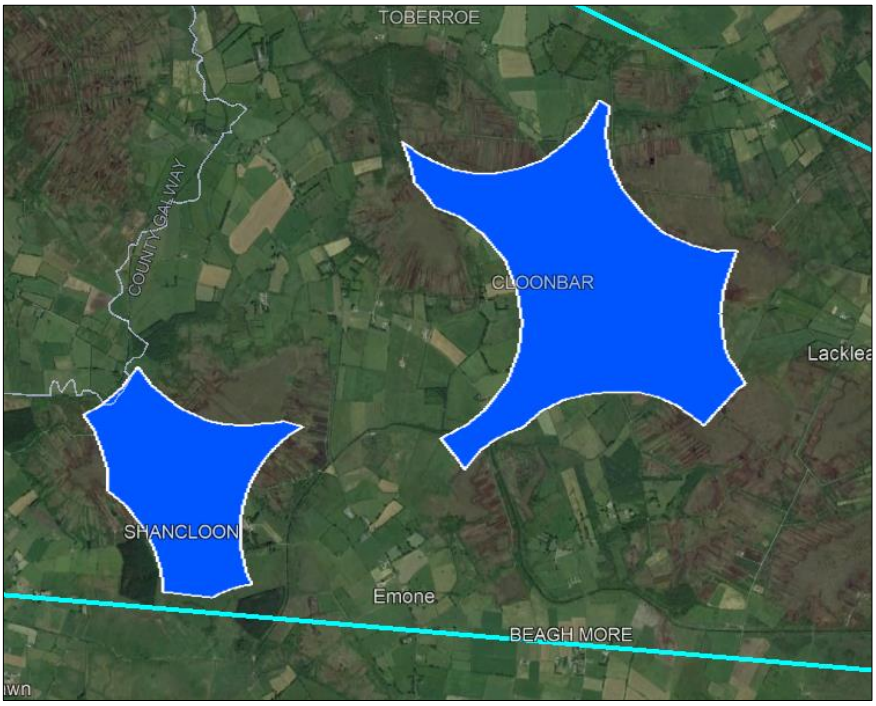
Satellite View – Magheramore WF

Roadside View – Magheramore WF

3.1.19 Vodafone Ireland Response to Consultations

Vodafone provided the following email response to consultations:

"Vodafone does not have any transmission within the proposed area. See screen shot below."



Section 4 - Field Surveys

4. Introduction

To assist in identifying telecommunications networks that may be impacted and to assess the accuracy of the information (radio link co-ordinates, antenna heights etc.) provided by the telecom operators, field surveys of the telecom-mast sites in the vicinity of the proposed wind farm were carried out. During the field surveys, radio antennas with bearings in the direction of the wind farm were recorded.

The telecom mast-sites surveyed for this study (labelled Mast-Site A, B, C, D, E and F) 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.

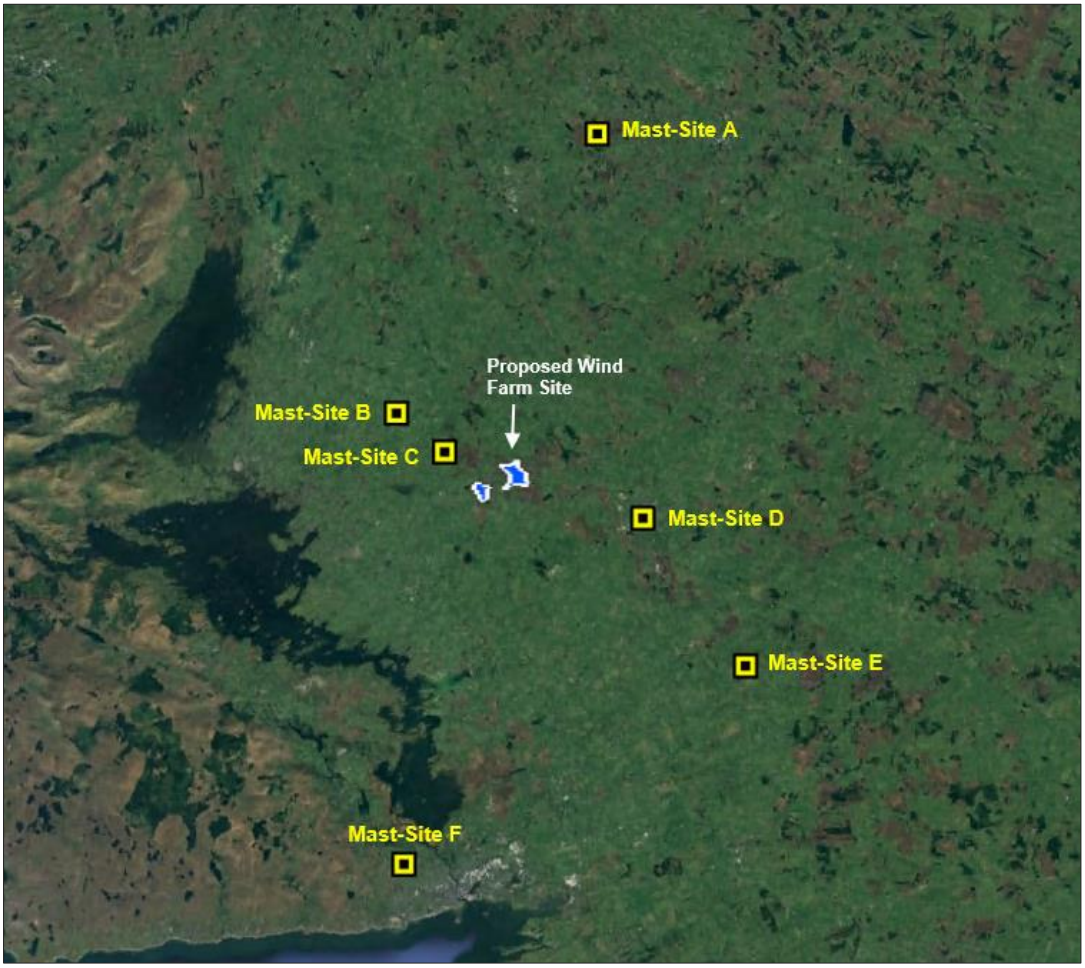


Figure 4. Telecom Mast-Sites Surveyed.

Section 5 - Desktop Survey Analysis

5. Introduction

Based on the findings of the consultation process and field surveys, there are two Telecom Operator with networks in the vicinity of the proposed wind farm that require a detailed technical analysis:

- Enet Network
- CIE Network

Sections 5.1 and 5.2 below outlines the desktop survey analysis findings* for the Telecom Operator networks listed above.

5.1 Enet Network Analysis

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

Link ID	Operator	Link Description
1	Enet	PTP microwave radio link from Tuam to St Patricks Central N.S.
2	Enet	PTP microwave radio link from Abbeyknockmoy to Ballycusheen N.S.

Table 4. Enet Radio Links requiring Analysis

Figure 5. Enet 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.*

Figure 6 below shows a close-up view of the Enet microwave radio links relative to the proposed wind farm site. Desktop survey analysis indicates that neither of the radio links will be impacted by the proposed turbine layout.

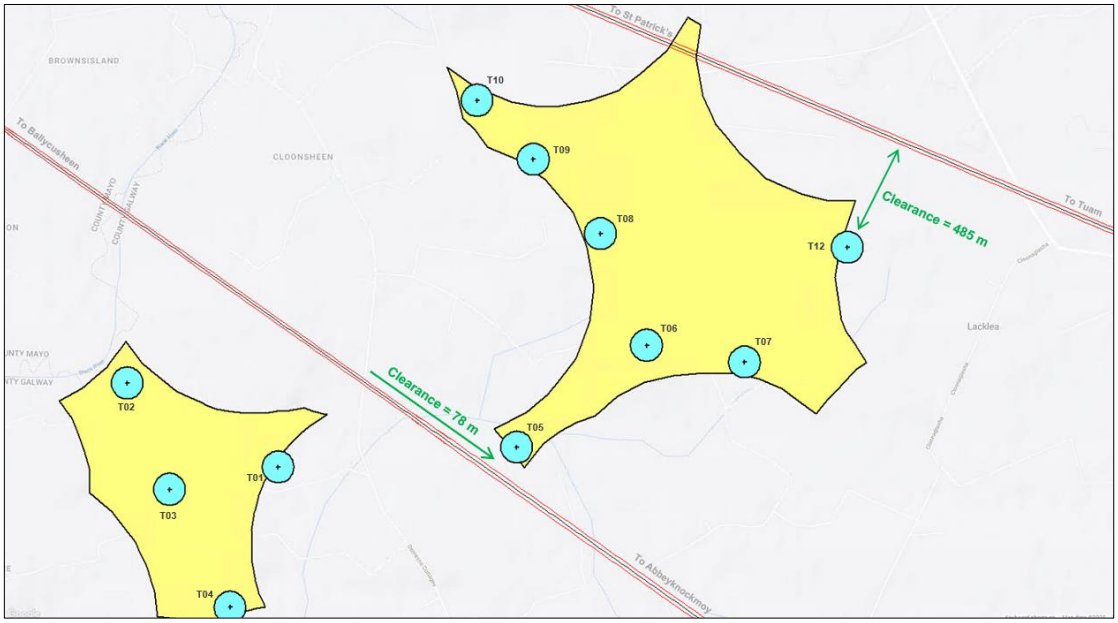


Figure 6. Enet Network – Close-up Plan View.

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

Radio Link ID	Link Description	Nearest Turbine	Fresnel Zone (F2) Clearance / Interference	Wind Farm Impacts
Enet Link 1	Tuam - St Patricks Central N.S.	T12	Clearance > 50m	No impacts.
Enet Link 2	Abbeyknockmoy - Ballycusheen N.S.	T05	Clearance > 50m	No impacts.

Table 5. Enet Network – Analysis Summary

5.2 CIE Network Analysis

CIE operate a radio network for communications along their network of rail-lines. CIE / Iarnród Éireann (IE) have previously stated the following regarding their radio network:

> *"IÉ have Analogue Train Radio (TX: 456.175-456.450 MHz, RX: 461.675-461.95 MHz) and GSM-R Train Radio (TX: 876-880 MHz, RX: 921-925 MHz) in service. Additionally, in the future may have FRMCS (1900–1910 MHz) in service."*

A Plan View of the CIE rail network relative to the proposed wind farm is shown below. As the figure shows, the proposed wind farm is over 4 km from the nearest CIE rail line. At this distance, there will be no impact to CIE's radio network (Analogue, GSM-R or FRMCS). It should also be noted the rail track (and associated radio network) between Athenry and Claremorris is not currently operational.

For these reasons, the proposed wind farm will have no impacts on the CIE radio network. A photograph of one of CIE's radio base stations is provided in Appendix C and as shown the GSM-R base station coverage is along the railway line and not in the direction of the proposed development. As CIE are currently using analogue UHF frequencies and GSM-R train radio frequencies it would be proposed to observe an exclusion zone of up to 500m from any CIE GSM-R base station transmitter along the railway. CIE do not operate point to point radio links on their network in the 7GHz to 38GHz bands. A more detailed technical assessment would be required, including field surveys of the railway line in the vicinity of the proposed development to fully assess the potential impacts. However, it is highly unlikely that there will be any impacts to CIE GSM-R network

Figure 7. CIE Network – Plan View

Table 6 below provides a summary of the network analysis findings for the CIE network in the vicinity of the proposed wind farm.

ID	Network Description	Nearest Turbine	Clearance / Interference	Wind Farm Impacts
CIE	Analogue Train Radio / GSM-R / FRMCS	T12	Clearance > 4 km	No impacts. (Railway line not operational)

Table 6. CIE Network – Analysis Summary

Section 6 - Conclusions

6. Conclusions

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

- Results from telecom operator consultations, field and desktop surveys found that there is are Telecom Operators (Enet and CIE) with radio networks in the vicinity of the proposed wind farm that required analysis.

- Virgin Media did raise a concern regarding a microwave radio link to an existing wind farm (Magheramore, Co Mayo), however, results from the field survey indicate that this radio link has been decommissioned.

- The results of the network analysis indicate that the proposed turbine layout will not impact the Enet or CIE radio networks.

Operator	Link/Network Description	Impact of Proposed Turbine Layout
Enet	PTP radio link between Tuam and St Patrick's N.S.	No impacts.
Enet	PTP radio link between Abbeyknockmoy and Ballycusheen N.S.	No impacts.
CIE	Analogue Train Radio network along Athenry and Claremorris railway track.	No impacts.

Table 7. Radio Links in vicinity of proposed wind farm.

- Figure 8 below has been provided to illustrate each of the Telecommunication links that cross over / near the proposed wind farm site boundary. Operator links crossing over the site boundary could possibly be impacted by the wind farm development (dependent on wind turbine network layout).

Figure 8. Telecommunication links that cross over/near the proposed wind farm site.

APPENDIX A – Wind Farm Turbine Coordinates

Appendix A – Wind Farm Turbine Co-ordinates

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

Turbine ID	Co-ordinates (WGS 84)	
	Latitude	Longitude
T01	53 31 56.18 N	9 01 25.34 W
T02	53 32 09.48 N	9 02 05.66 W
T03	53 31 52.62 N	9 01 54.38 W
T04	53 31 33.93 N	9 01 38.20 W
T05	53 31 59.32 N	9 00 21.63 W
T06	53 32 15.46 N	8 59 46.97 W
T07	53 32 12.79 N	8 59 20.80 W
T08	53 32 33.16 N	8 59 59.32 W
T09	53 32 44.95 N	9 00 17.22 W
T10	53 32 54.29 N	9 00 32.24 W
T12	53 32 30.99 N	8 58 53.34 W

Table 8. Turbine Co-ordinates (03.10.23 Turbine Layout)

APPENDIX B – Field Survey Findings

Appendix B – Field Survey Findings

The telecom mast-sites surveyed are shown relative to the proposed wind farm site in Figure 9 below.

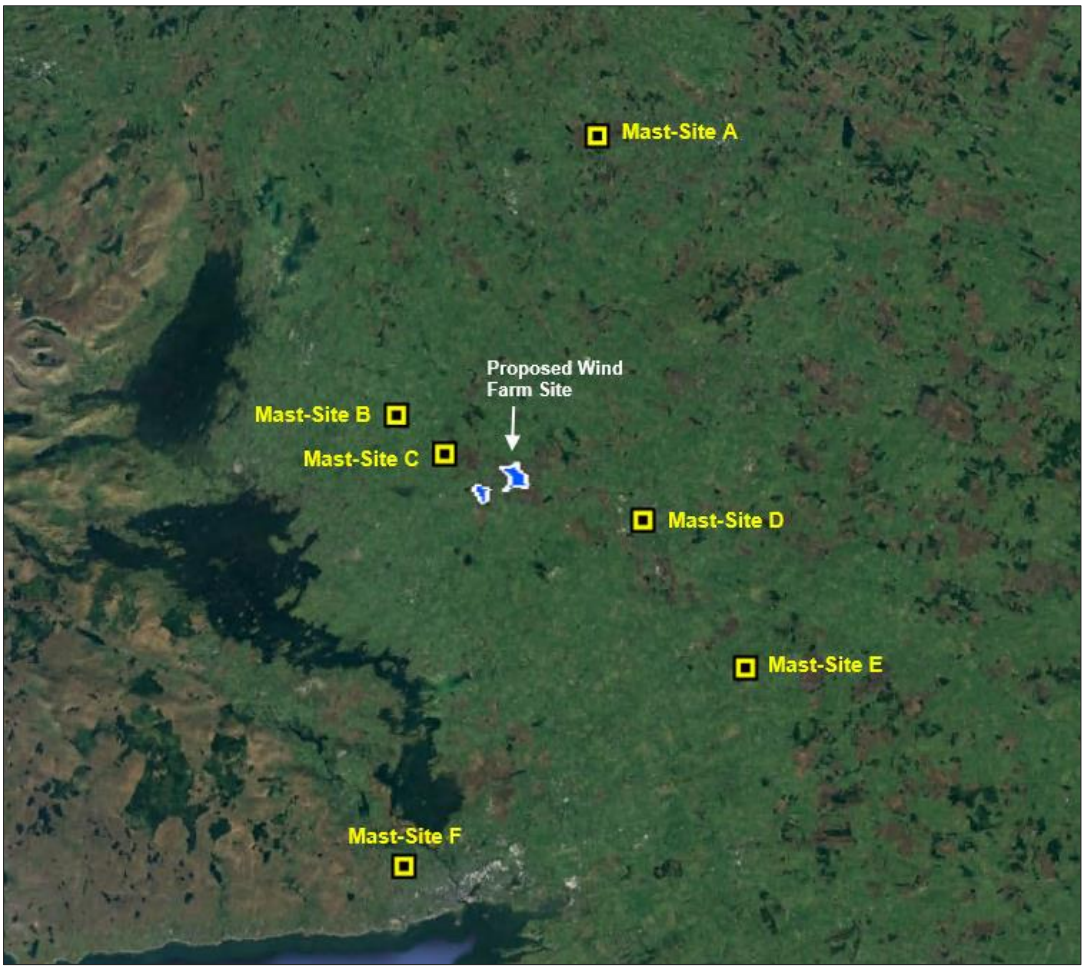


Figure 9. Telecom Mast-Sites shown relative to proposed wind farm.

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

Mast-Site A (Magheramore Wind Farm)

Telecommunications Mast-Site A is located at Magheramore wind farm in Co. Mayo and is approximately 25 km northeast of the proposed wind farm at Shancloon. A satellite view and a roadside view of the site location is shown below.

The findings of the field survey indicate that there was previously a radio link to a temporary construction compound at this site but the radio link has been decommissioned.

The Telecom Operators who have radio links operating from this mast-site in the direction of the wind farm are listed in Table 9.

Figure 10. Mast-site A – Satellite View

Figure 11. Mast-site A – Roadside View

Mast ID	Telecom operators with radio links in direction of proposed wind farm
Mast A1	N.A. (The Virgin Media radio link at this site has been decommissioned)

Table 9. Field Survey Summary – Mast A1

Mast-Site B (St Patrick's Central N.S.)

Telecommunications Mast-Site B is located at St Patrick's National School, Kilmaine, Co Mayo and is approximately 8 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 10.

Figure 12. Mast-site B1

Mast ID	Telecom operators with radio links in direction of proposed wind farm
Mast B1	Enet

Table 10. Field Survey Summary – Mast B1

Mast-Site C (Ballycusheen N.S.)

Telecommunications Mast-Site C is located at Ballycusheen National School, Co Mayo and is approximately 3 km northwest of the proposed wind farm. The radio antenna at this location is installed at the rear of the school building shown below. Access into the school grounds was not possible on the day of survey.

The Telecom Operators who have radio links operating from this mast-site in the direction of the wind farm are listed in Table 11.

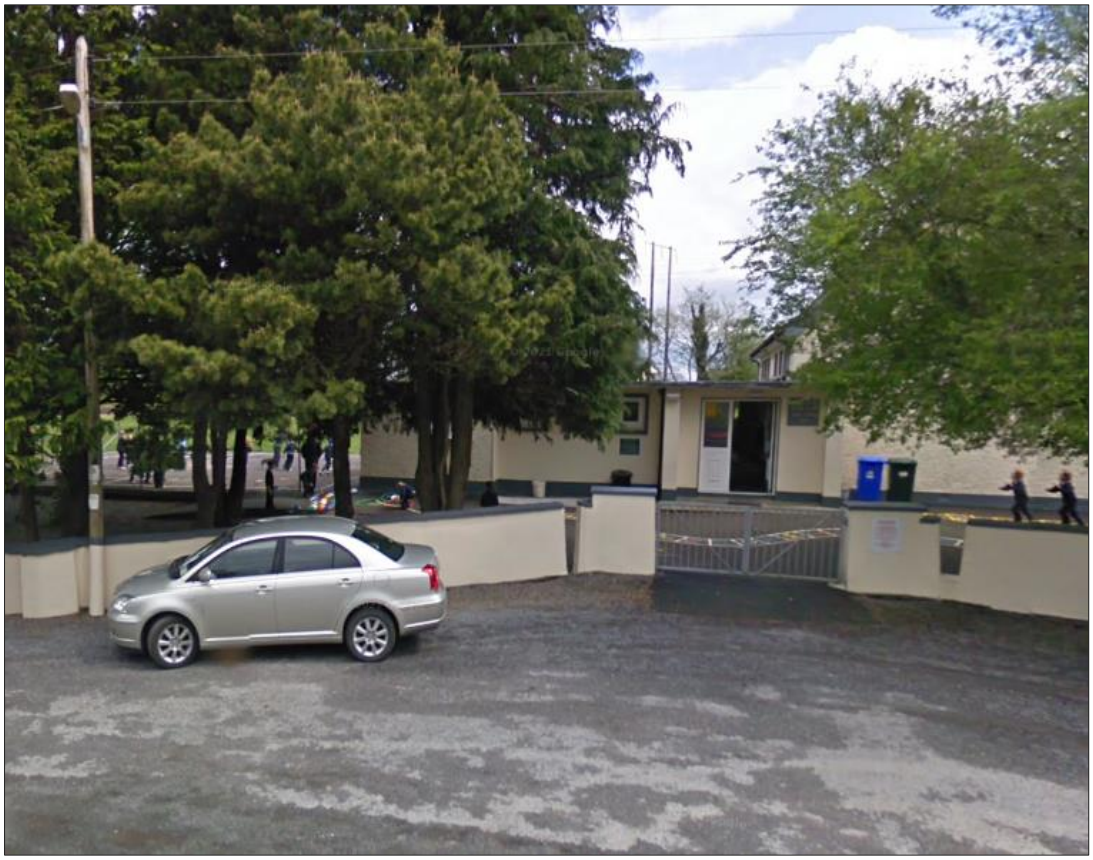


Figure 13. Mast-site C1

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

Table 11. Field Survey Summary – Mast C1

Mast-Site D (Tuam)

Telecommunications Mast-Site D is located in Tuam, Co Galway and is approximately 9 km southeast 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 12.

Figure 14. Mast D1

Mast ID	Telecom operators with radio links in direction of proposed wind farm
Mast D1	Enet

Table 12. Field Survey Summary – Mast D1

Mast-Site E (Abbeyknockmoy)

Telecommunications Mast-Site E is located in the townland of Abbeyknockmoy, Co Galway and is approximately 20 km southeast 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 13.

Figure 15. Mast E1

Mast ID	Telecom operators with radio links in direction of proposed wind farm
Mast E1	Enet

Table 13. Field Survey Summary – Mast E1

Mast-Site F (Tonabrocky)

Telecommunications Mast-Site F is located in the townland of Tonabrocky, Co Galway and is approximately 26 km southwest 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 14.

Figure 16. Mast E1

Mast ID	Telecom operators with radio links in direction of proposed wind farm
Mast E1	N.A. (The Virgin Media radio link from this mast-site to Magheramore wind farm has been decommissioned)

Table 14. Field Survey Summary – Mast E1

APPENDIX C – CIE Radio Basestation

Appendix C – CIE Radio Basestation

Figure 17 below shows an example of one of CIE's radio basestations. As the figure shows the radio antennas are aligned in the direction of the rail line route.

These radios operate at relatively low frequencies which are generally less susceptible to interference than radios that operate on higher frequencies. Interference to the CIE radio network is highly unlikely unless an obstacle e.g. wind turbine, is in very close proximity to the transmitting basestation.

Note: Operators with similar low frequency base stations (e.g. Emergency Services operators) typically request an exclusion zone of no more than 500m around their respective base stations.

Figure 17. CIE Radio Basestation