




APPENDIX 15-7

**IRISH RAIL
TELECOMMUNICATIONS
IMPACT ASSESSMENT**

	Procedure: 001	Rev: 1.0
Title: Lemanaghan Wind Farm – Irish Rail Telecoms Impact Assessment	Approved: KH	Date: 25/07/25

Report


Lemanaghan Wind Farm Irish Rail Telecommunications Impact Assessment Report

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Executive Summary

During Telecom Operator Consultations in May 2025, Irish Rail were contacted by Ai Bridges Ltd by determine if they had any concerns in relation to the proposed wind farm at Lemanaghan (Co Westmeath and Co Offaly). To date, Ai Bridges have not received a response from Irish Rail regarding the proposed development at Lemanaghan. However, from the standard Irish Rail / CIE consultation response regarding wind farm developments, Irish Rail state that they operate a GSM-R Train Radio communications system along their rail lines. They also request a 5 km Exclusion Zone around their (GSM-R) transmitting radio antennas.

Although no response has been received from Irish Rail regarding Lemanaghan, Ai Bridges have been commissioned to evaluate the Irish Rail communications network in the vicinity of the proposed development and to assess the possible impacts that the proposed turbines could have on the Irish Rail radio network. Field and desktop surveys of the Irish Rail network in the vicinity of Lemanaghan were carried for the telecommunications assessment.

GSM-R Train Radio is an international standard used by rail operators and operates in the UHF band of frequencies. Obstacles generally do not interfere with radio signals in this band of frequencies unless the obstacle (e.g. wind turbine) is very near to the transmitting antenna (e.g. less than 500m) when it can inhibit the radio signals ability to “launch” correctly.

Results from the field survey found that there are four CIE masts along the rail-line north of Lemanaghan. GSM-R radio antennas were installed on each of the four mast-structures identified during the field survey. The GSM-R radio antennas are aligned in the direction of the rail lines to provide targeted signal coverage along the rail network. The nearest of the proposed turbines to an Irish Rail GSM-R basestation is T15, which would be over 4 km from the basestation at Cranasallagh. At this distance, it is highly unlikely that there would be any impacts on the Irish Rail communications network due to the proposed turbines.


The results of the desktop surveys indicate that the 5 km Exclusion Zone requested by Irish Rail is excessive. Other state operators (Emergency Services, Garda Síochána, etc) and commercial operators (Vodafone, Three Ireland and Eir), only raise concerns when proposed turbines are very close to their transmitters, typically less than 500m. It should also be noted that Vodafone operate a GSM service from one of the Irish Rail telecoms masts (i.e. Clonydonnin) and have raised no concerns about the proposed wind farm development.

It should also be noted that there are existing wind farms throughout Ireland with turbines that are less than 5 km from Irish rail tracks. These existing wind farms have no detrimental impact on the Irish rail telecommunications network.

For the reasons outlined above, the proposed wind farm development at Lemanaghan is expected to have no impacts on the Irish Rail communications network.

Network Description	Comments	Wind Farm Impacts
GSM-R Train Radio	<p>The nearest of the proposed turbines to a GSM-R basestation is T15 which would be over 4 km from the basestation at Cranasallagh. At this distance, it is highly unlikely that there would be any impacts on the Irish Rail communications network due to the proposed turbines.</p> <p>It should also be noted that there are existing wind farms throughout Ireland with turbines that are less than 5 km from Irish rail tracks. These wind farms appear to have had no detrimental impact to the Irish Rail communications network.</p>	No impacts

Table 1. Irish Rail Network Impact Summary.

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Section 1 - Wind Farm Site Information

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1. Introduction

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

1.1 Wind Farm Site Information

The proposed wind farm development is located in County Offaly approximately 14 km west of Tullamore. The proposed turbine dimensions are shown below in Table 2. The coordinates of the turbines assessed in this report are provided in Appendix A.


Wind Farm	Number of Turbines	Turbine Hub Height	Turbine Rotor Diameter
Lemanaghan	15	145 m	150 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 - Irish Rail Communications Network

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2. Introduction

Irish Rail operate a communications network along their rail tracks to facilitate communications between drivers and signallers. This communications network is used to increase safety, reduce delays and improve the general performance of the rail network. For their communications network Irish Rail use the following technologies:

- Analogue Train Radio
- GSM-R Train Radio

A description of each of these technologies is provided below in Section 2.1 and Section 2.2.

2.1 Analogue Train Radio

Analogue Train Radio operates in the UHF band of radio frequencies and is the older of the two technologies currently used by Irish Rail. Radio antennas, installed adjacent to the tracks, are used provide targeted radio coverage along the rail network.

Figure 2 below shows an example of a UHF antenna installed at an Irish Rail control building.

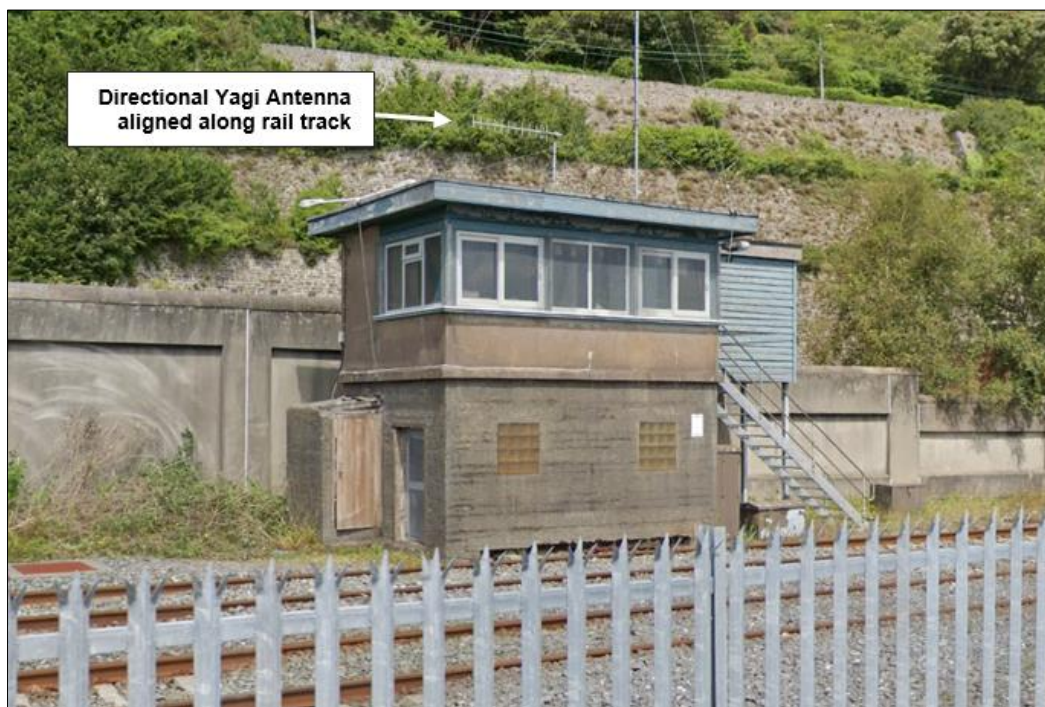



Figure 2. Example of Analogue Train Radio installation using a Yagi Directional Antenna

These analogue radio networks have limited functionality and had become increasingly expensive to maintain. As with other telecommunication networks, in recent years, there has been a move away from analogue systems in favour of digital systems which provide increased functionality and reliability. Irish Rail are currently phasing out their Analogue Train Radio system and migrating to the newer GSM-R radio technology.

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2.2 GSM-R Train Radio


GSM-R is an international standard used by rail operators for communication between trains, signallers and rail control centres. As previously mentioned, Irish Rail are currently migrating their communications network away from the older Analogue Train Radio system to this newer GSM-R Train Radio system. The benefits of GSM-R include:

- Digitally enabled.
- Increased safety features
- Improved performance
- Voice and data services over circuit switching
- Based on GSM technology
- Can roam onto public GSM networks


Figure 3 below shows an example of a GSM-R Train Radio installation in which directional sector antennas are used. The antennas are aligned in the direction of the rail line to provide targeted coverage and range along the rail line.



Figure 3. Example of GSM-R Train Radio installation using Directional Sector Antennas

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Section 3 - Irish Rail Consultations

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3. Introduction

Consultations beginning in March 2025 were undertaken by AiBridges Ltd, 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.

To date Irish Rail have not responded to the (Ai Bridges) consultation request regarding Lemanaghan; however, from the standard Irish Rail / CIE consultation response regarding other wind farm developments, Irish Rail state that they operate a GSM-R Train Radio communications system along their rail lines. They also request a 5 km Exclusion Zone around their (GSM-R) transmitting radio antennas.


The standard Irish Rail consultation response regarding proposed wind farm developments is provided in Section 3.1 below.

3.1 Irish Rail (Standard) Response to Consultations


The standard Irish Rail consultation response regarding proposed wind farm developments is provided 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, between operators is required to fix any issue and impact on the signal propagation”*

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Section 4 - Field Surveys

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4. Introduction

To assess the Irish Rail communication network in the Lemanaghan area, field surveys were undertaken at locations along the rail track situated north of the proposed wind farm. The field survey map and survey results are presented in Section 4.1 that follows.

4.1 Field Survey


Figure 4 below shows the proposed wind farm site relative to the Irish Rail track which runs between Tullamore and Athlone. The rail line was surveyed for the presence of telecommunications equipment (i.e. telecoms mast and/or radio antenna).

During the field survey of the rail line in the vicinity of Lemanaghan, Irish Rail telecommunication masts were identified at four locations: Clara, Cranasallagh, Clonydonnin, and Kilgarvan Glebe.



Figure 4. Irish Rail Network - Field Survey Map.

A survey of all four of the telecom mast-sites (Survey Point 1, Survey Point 2, Survey Point 3, and Survey Point 4) was carried out, the results of which are presented below in Section 4.1.1 to Section 4.1.4.

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4.1.1 Survey Point 1 (Clara Train Station)


Survey Point 1 is located at Clara Train Station. A photograph of the telecoms mast at this location is shown in the figure below. A summary of the field survey findings at this location are provided in Table 3.



Figure 5. Survey Point 1 – Clara Train Station

Survey Point ID	IR Network Type	Observations
SP 1 – Clara Train Station	GSM-R	Two directional GSM-R directional Panel Antennas installed at top of 15m telecoms mast. GSM-R antennas aligned in direction of the rail lines.

Table 3. Field Survey Summary – SP1

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4.1.2 Survey Point 2 (Cranasallagh (OBA 58))


Survey Point 2 is located at the rail track in the townland of Cranasallagh. A photograph of the telecoms mast at this location is shown in the figure below. A summary of the field survey findings at this location are provided in Table 4.



Figure 6. Survey Point 2 – Cranasallagh (OBA 58)

Survey Point ID	IR Network Type	Observations
SP 2 – Cranasallagh (OBA 58)	GSM-R	Two directional GSM-R directional Panel Antennas installed on new telecoms mast at 19m AGL. GSM-R antennas aligned in direction of the rail lines.

Table 4. Field Survey Summary – SP2

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4.1.3 Survey Point 3 (Clonydonnin)

Survey Point 3 is located at the rail track in the townland of Clonydonnin. A photograph of the telecoms mast at this location is shown in the figure below. A summary of the field survey findings at this location are provided in Table 5.

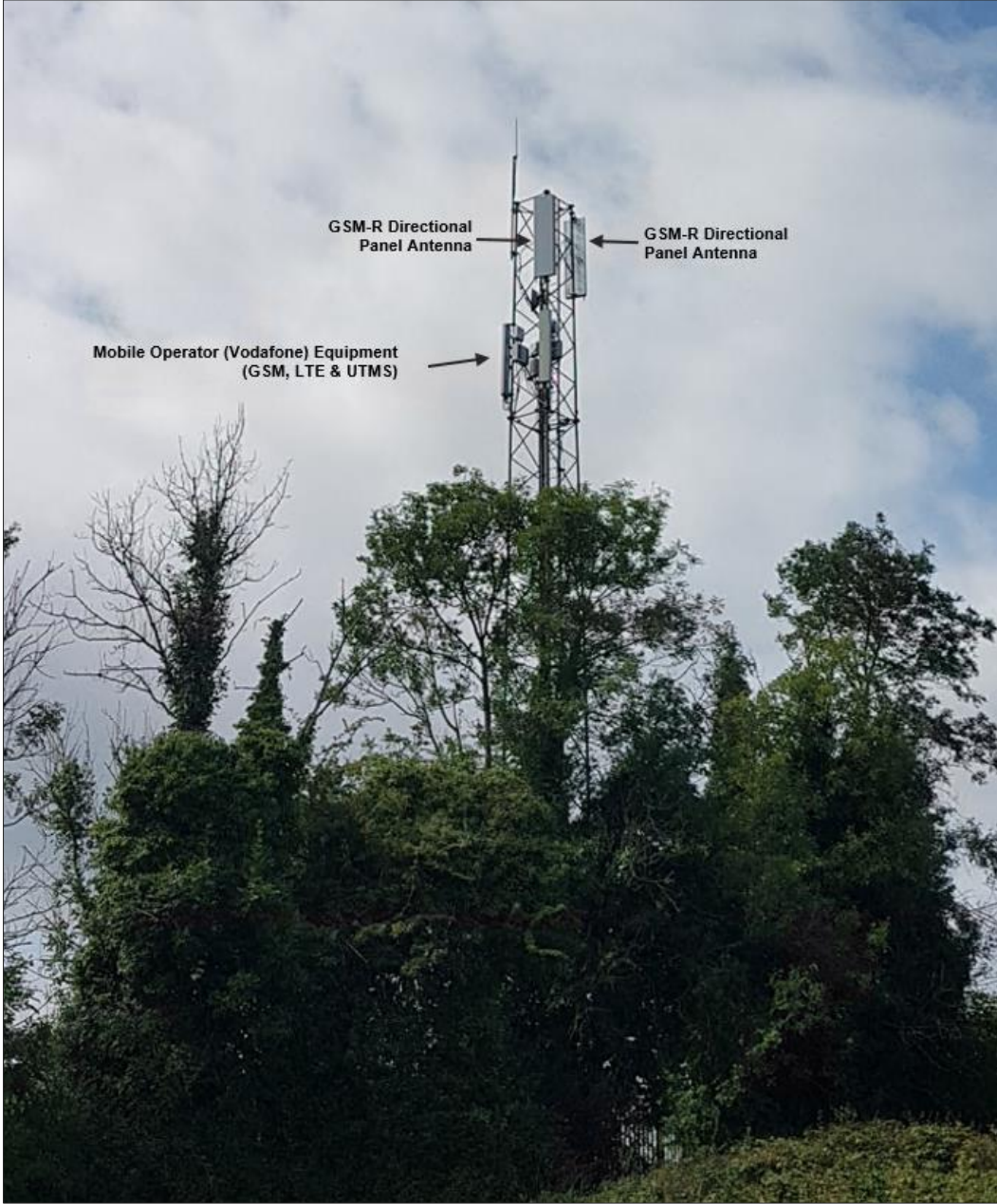



Figure 7. Survey Point 3 – Clonydonnin

Survey Point ID	IR Network Type	Observations
SP 3 – Clonydonnin	GSM-R	Two directional GSM-R directional Panel Antennas installed at top of 24 m telecoms mast. GSM-R antennas aligned in direction of the rail lines. Vodafone also operate a cellular service from this telecoms mast.

Table 5. Field Survey Summary – SP3

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4.1.4 Survey Point 4 (Kilgarvan Glebe (OBA 75))


Survey Point 4 is located at the rail track in the townland of Kilgarvan Glebe. A photograph of the telecoms mast at this location is shown in the figure below. A summary of the field survey findings at this location are provided in Table 6.




Figure 8. Survey Point 4 – Kilgarvan Glebe

Survey Point ID	IR Network Type	Observations
SP 4 – Kilgarvan Glebe	GSM-R	Two directional GSM-R directional Panel Antennas installed at top of 30m telecoms mast. GSM-R antennas aligned in direction of the rail lines.

Table 6. Field Survey Summary – SP4

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Section 5 - Desktop Survey Analysis

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5. Introduction

Based on the findings of the field surveys, there is one Irish Rail communication network type that requires a detailed technical analysis:

- GSM-R Train Radio

Section 5.1 below outlines the desktop survey analysis findings for the communication networks listed above.

5.1 GSM-R Train Radio Analysis

From the findings of the field surveys, the antennas used by CIE for their GSM-R rail network are directional sector panel antennas which are aligned in the direction of the rail tracks. From a Freedom of Information (FOI) request which was made to CIE, the make and model of the antennas used for GSM-R in the Republic of Ireland have been determined to be a Kathrein K80010456V02. The antenna specification can be found in Appendix D.

Once the antenna characteristics were determined (make, model, bearing, etc.) were determined, Radio Planning software was used to plot the network service coverage from the GSM-R basestations at Clara, Cranasallagh (OBA 58), Clonydonnin, and Kilgarvan Glebe (OBA 75).

The GSM-R network coverage plot is shown below in Figure 9. As the plot shows, targeted GSM-R radio coverage extends from each basestation along the rail tracks.

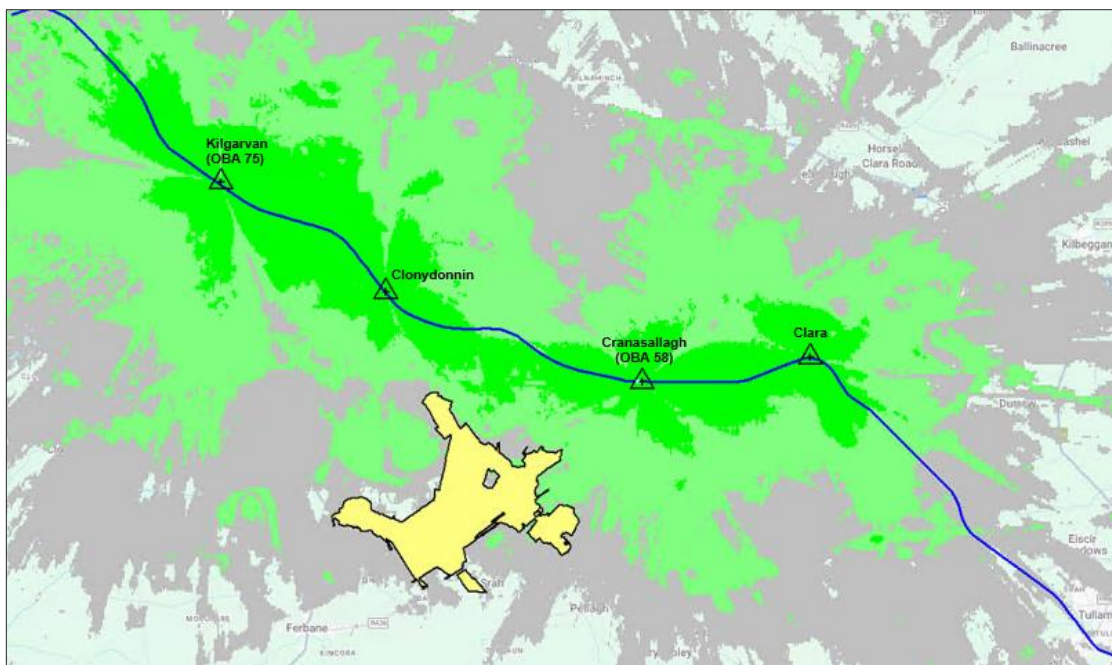



Figure 9. Irish Rail Network – Predicted Service Coverage from GSM-R Network

In the standard response to consultations Irish Rail / CIE refer to recommendations from the ANFR, which is a government agency that manages radio frequencies in France. This agency (which has no authority in the Republic of Ireland), recommends an Exclusion Zone of 5 km from GSM-R antennas. However, wind turbines generally do not interfere with GSM /GSM-R radio signals unless they are in close proximity to the transmitter. Commercial service

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operators do not raise any concerns regarding GSM access networks unless proposed turbines are very near their transmitters (e.g. less than 500m). Figure 10 below shows that the nearest of the proposed turbines at Lemanaghan to any of the GSM-R basestaions is Turbine T15, which would be over 4 km from the basestaion at Cranasallagh. At this distance, it is highly unlikely that there would be any significant impact to the Irish Rail GSM-R radio network.




Figure 10. Nearest turbine to Irish Rail GSM-R Basestaion

It should be noted that, a search of the online ANFR database of documents / studies found no reference to a 5 km Exclusion Zone for GSM-R networks. In France there are numerous wind farms that are located well within 5 km of rail lines. Figure 11 below shows an example of a wind turbine in northern France that is less than 200m from a rail line.



Figure 11. Example of existng wind tubrines near rail line

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In Ireland too, there are existing wind farms that are less than 5 km to CIE rail lines. These operational wind farms in the Republic of Ireland (e.g. Monaincha, Richfield, Cloontooa, etc.) appear to have had no detrimental impact to the Irish Rail communications network.

It should also be noted that Vodafone operate a cellular service (including GSM) from the telecoms mast at Clonydonnin and they have raised no concerns regarding impacts to GSM service coverage.




Figure 12. Vodafone services from Clonydonnin telecoms mast – GSM


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

Network Type	Comments	Wind Farm Impacts
GSM-R Train Radio	<p>The nearest of the proposed turbines to a GSM-R basestation is T15, which would be over 4 km from the basestation at Cranasallagh. At this distance, it is highly unlikely that there would be any impacts on the Irish Rail communications network due to the proposed turbines.</p> <p>It should also be noted that there are existing wind farms throughout Ireland with turbines that are less than 5 km from Irish rail tracks. These wind farms appear to have had no detrimental impact to the Irish Rail communications network.</p>	No impacts.

Table 7. GSM-R Train Radio – Analysis Summary

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Section 6 - Conclusions

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6. Conclusions

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


- Results from the field survey indicate that Irish Rail operate a GSM-R network along the rail line between Tullamore and Athlone.
- GSM-R Radio operates in the UHF band of frequencies. Wind turbines generally do not cause interference to radio signals in this band, unless they are in close proximity to the transmitter (e.g. less than 500m).
- As the nearest of the proposed turbines would be located over 4 km from the GSM-R Train Radio transmitter at the Cranasallagh telecoms mast-site, it is highly unlikely that there would be any impacts on the Irish Rail communications network due to the proposed turbines.
- It should also be noted that there are existing wind farms in Ireland with turbines that are located within 5 km of Irish Rail tracks (e.g. Monaincha, Richfield, Cloontooa, etc.) These wind farms appear to have had no detrimental impact to the Irish Rail communications network.

Network Description	Comments	Wind Farm Impacts
GSM-R	<p>GSM-R Train Radio operates in the UHF band of frequencies. Transmitters in this band are generally not impacted by obstacles (e.g. wind turbine) unless the obstacle is less than 500m from the transmitter.</p> <p>The nearest of the proposed turbines to a GSM-R basestation is T15 which would be over 4 km from the basestation at Cranasallagh. At this distance, it is highly unlikely that there would be any impacts on the Irish Rail communications network due to the proposed turbines.</p>	No impacts

Table 8. Irish Rail Network Impact Summary.

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APPENDIX A – Wind Farm Turbine Coordinates


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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)	
	Latitude	Longitude
T01	53.29647	-7.78701
T02	53.29256	-7.78279
T03	53.28875	-7.77833
T04	53.29409	-7.7703
T05	53.29828	-7.7603
T06	53.30148	-7.76525
T07	53.29803	-7.77546
T08	53.30517	-7.76931
T09	53.30876	-7.7596
T10	53.31463	-7.76413
T11	53.31416	-7.75419
T12	53.30349	-7.75372
T13	53.30749	-7.745
T14	53.30366	-7.73959
T15	53.31014	-7.73465

Table 9. Wind Farm Layout - Turbine Co-ordinates

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APPENDIX B – GSM-R Antenna Specification

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Appendix B – GSM-R Antenna Specification

The antenna used by CIE for GSM-R networks in the republic of Ireland is manufactured by Kathrein (Model K80010456V02). The antenna specification is shown below.

Panel 790-960


Dual Polarization X

Half-power Beam Width 30°

Adjust. Electrical Downtilt 0°-10°

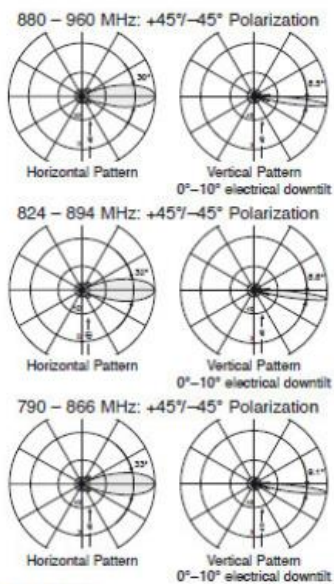
set by hand or by optional RCU (Remote Control Unit)

KATHREIN
Antennen · Electronic



XPol Panel 790-960 30° 20.5dBi 0°-10°T

Type No.	80010456v02		
Frequency range	790 – 862 MHz	790-960	880 – 960 MHz
Polarization	+45°, -45°	+45°, -45°	+45°, -45°
Gain at 0° T	2 x 20.0 dBi	2 x 20.2 dBi	2 x 20.5 dBi
Horizontal Pattern:			
Half-power beam width	33°	32°	30°
Front-to-back ratio, copolar	> 28 dB	> 29 dB	> 30 dB
Cross polar ratio Maindirection	0° Typically: 25 dB	Typically: 23 dB	Typically: 20 dB
Tracking, Avg.	2.5 dB		
Squint	±2.0°		
Vertical Pattern:			
Half-power beam width	9.1°	8.8°	8.5°
Electrical tilt	0.5°-10°, continuously adjustable		
Sidelobe suppression for first sidelobe above main beam	0° ... 5° ... 10° T > 16 ... 13 ... 13 dB	0° ... 5° ... 10° T > 18 ... 18 ... 17 dB	0° ... 5° ... 10° T > 18 ... 16 ... 15 dB
Impedance	50 Ω		
VSWR	< 1.5		
Isolation, between ports	> 30 dB		
Intermodulation IM3	< -150 dBc (2 x 43 dBm carrier)		
Max. power per input	500 W (at 50 °C ambient temperature)		



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790-960
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Mechanical specifications	
Input	2 x 7-16 female
Connector position	Rearside
Adjustment mechanism	1x, Position bottom continuously adjustable
Wind load	Frontal: 1760 N (at 150 km/h) Lateral: 330 N (at 150 km/h) Rearside: 2040 N (at 150 km/h)
Max. wind velocity	200 km/h
Height/width/depth	2254 / 576 / 99 mm
Category of mounting hardware	H (Heavy)
Weight	22 kg / 24 kg (clamps incl.)
Packing size	2500 x 600 x 150 mm
Scope of supply	Panel and 2 units of clamps for 50 – 115 mm diameter