APPENDIX 15-5

AI BRIDGES TELECOMS REPORT

Report

Gannow Wind Farm

Irish Rail Telecommunications Impact Assessment Report

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Executive Summary

During Telecom Operator Consultations in August 2023, Irish Rail were contacted by MKO by determine if they had any concerns in relation to the proposed wind farm at Gannow (Co Galway). In the respond received from Irish Rail, it was stated that they operate a GSM-R Train Radio communications system in the vicinity of Gannow. Irish Rail also requested a 5 km Exclusion Zone around their transmitting radio antennas.

Ai Bridges Ltd were subsequently commissioned to evaluate the Irish Rail communications network and to assess the possible impacts that the proposed wind farm at Gannow could have on the Irish Rail radio network. Field and desktop surveys of the Irish Rail network in the vicinity of Gannow 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 GSM-R radio antennas installed at three mast locations along the rail line between Woodlawn Train station and Athenry Train Station. 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 GSM-R basestations to the proposed wind farm is located at the telecoms mast-site at Attymon and is 0.6 km from the nearest turbine (T03). At this distance, there would be no impacts due to the proposed wind 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 (i.e. less than 500m).

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 Gannow is expected to have no impacts on the Irish Rail communications network.

Network Description	Comments	Wind Farm Impacts
GSM-R Train Radio	The nearest turbine to a GSM-R basestation is T03 which is 0.6 km from the basestation at Attymon. At this distance, 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 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.	No impacts

Table 1. Irish Rail Network Impact Summary.

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 approximately 10 km east of Athenry in County Galway. The development is in the pre-planning stage and exact details regarding the quantity, location and turbine dimensions have yet to be finalized.

For the purpose of this study, an 8-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 (max)	Blade Length (max)
Gannow	08	103.5 m	81.5 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 - Irish Rail Communications Network

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.

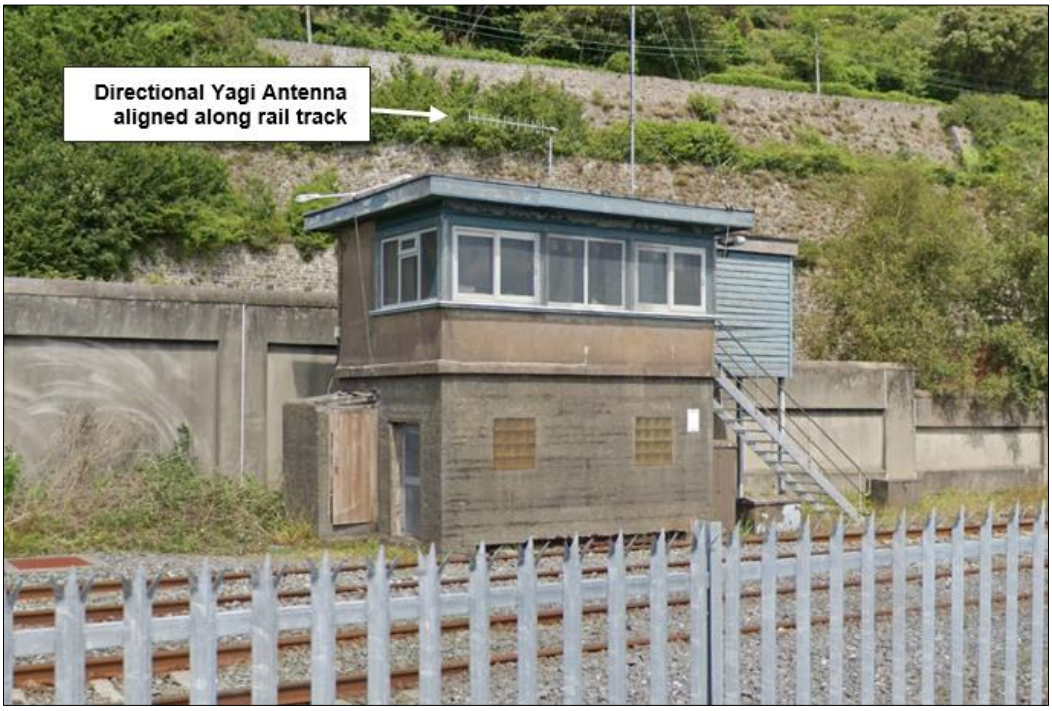


Figure 2. Example of Analogue Train Radio installation using a Yagi Directional Antenna

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.

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.

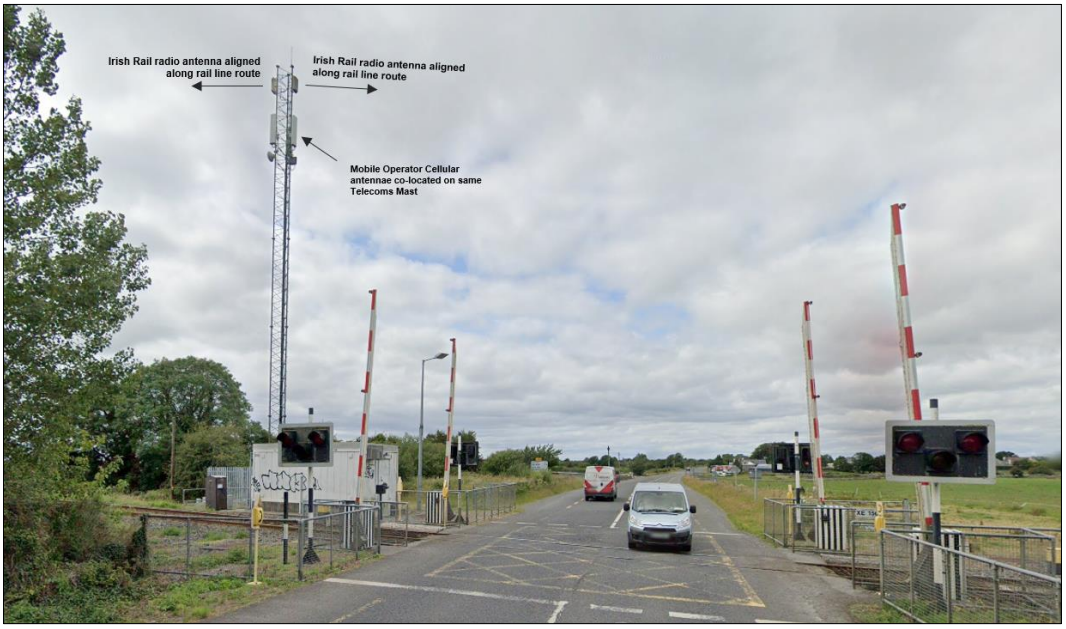


Figure 3. Example of GSM-R Train Radio installation using Directional Sector Antennas

Section 3 - Irish Rail Consultations

3. Introduction

Consultations beginning in August 2023 were undertaken by MKO, 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.

Irish Rail responded to their consultation request stating that they operate an Analogue Train Radio and a GSM-R Train Radio network in the Gannow area. The correspondences between Irish Rail and MKO are provided in Section 3.1 below.

3.1 Irish Rail Response to Consultations

The correspondences between Irish Rail and MKO are provided below:

29.08.23 - Email sent by Irish Rail to MKO

"Hi,

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 along the operational railway line that transverses the proposed area.

Additionally, in the future may have FRMCS (1900–1910 MHz) in service along the operational railway line that transverses the proposed area.

Regards,
Thomas Quigley,
National Telecoms Manager,

12.09.23 - Email sent by Irish Rail to MKO

"Hi Brandon,

Following up on the below, we have been provided recommendations from our GSM-R OEM concerning setback requirements as, in the case of wind turbines, it can be a desensitization effect with a reflection of GSM-R antenna signals by fixed surfaces or false echoes by reflection.

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*

Regards,
Thomas Quigley,
National Telecoms Manager,

Section 4 - Field Surveys

4. Introduction

To assess the Irish Rail communication network in the Gannow area, field surveys were undertaken at locations along the rail track adjacent to 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 turbine locations relative to the Irish Rail track which runs between Woodlawn and Athenry. The rail line was surveyed for the presence of telecommunications equipment (i.e. telecoms mast and/or radio antenna). During the field survey, Irish Rail GSM-R basestations were identified at three locations: Woodlawn Train Station, Attymon Train Station and Athenry Train Station.

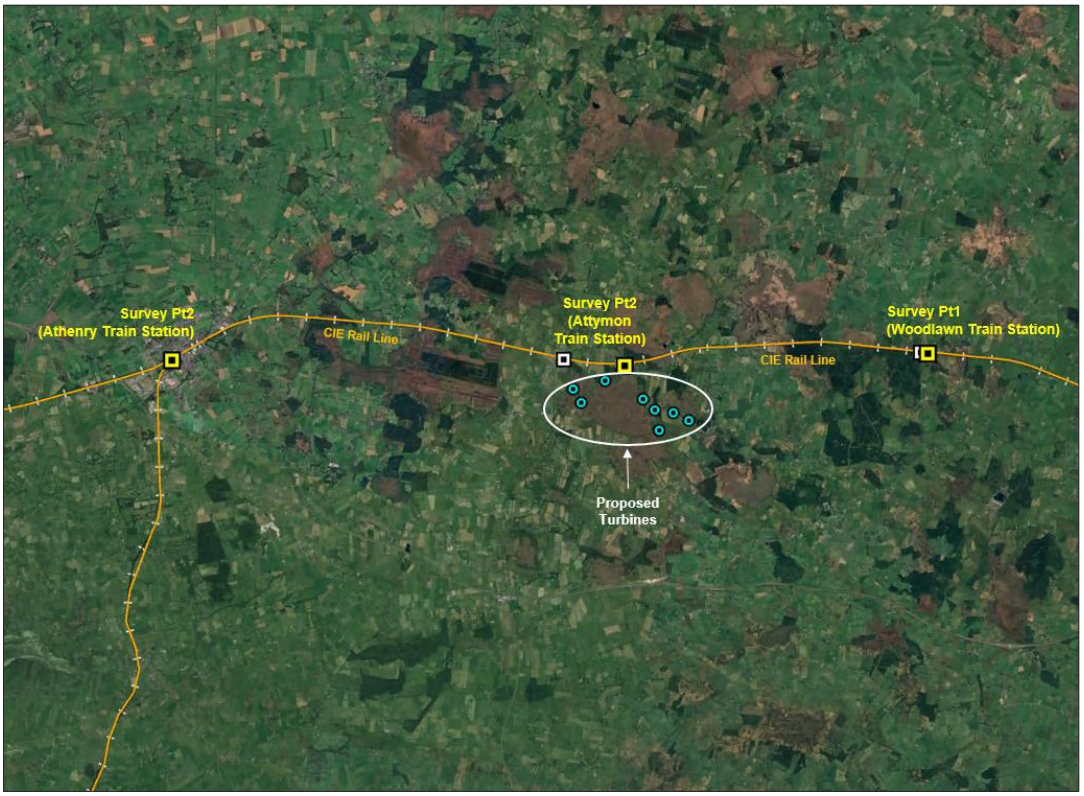


Figure 4. Irish Rail Network - Field Survey Map.

A survey of all three GSM-R mast-sites (Survey Point 1, Survey Point 2, and Survey Point 3) was carried out, the results of which are presented below in Sections 4.1.1 to 4.1.3.

4.1.1 Survey Point 1 (Woodlawn Train Station)

Survey Point 1 is located at Woodlawn 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 – Woodlawn Train Station

Survey Point ID	IR Network Type	Observations
SP 1 – Woodlawn Train Station	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 3. Field Survey Summary – SP1

4.1.2 Survey Point 2 (Attymon Train Station)

Survey Point 2 is located at the rail track in the townland of Cappanasruhaun, just to the east of Attymon 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 4.

Figure 6. Survey Point 2 – Attymon Train Station

Survey Point ID	IR Network Type	Observations
SP 2 – Attymon Train Station	GSM-R	Two directional GSM-R directional Panel Antennas installed on new telecoms mast at 15m AGL. GSM-R antennas aligned in direction of the rail lines.

Table 4. Field Survey Summary – SP2

4.1.3 Survey Point 3 (Athenry Train Station)

Survey Point 3 is located at Athenry Train Staiton . 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.

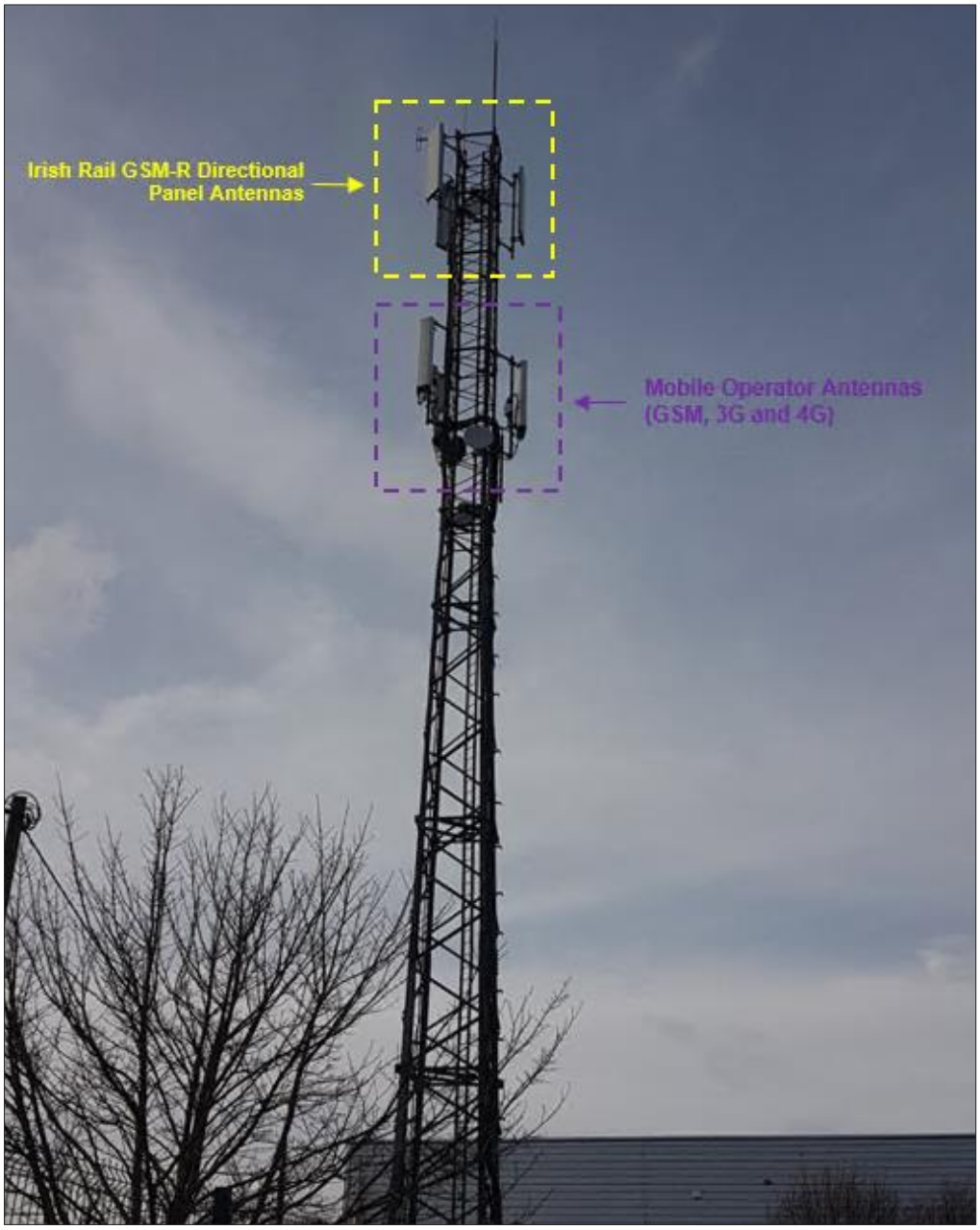


Figure 7. Survey Point 3 – Athenry Train Station

Survey Point ID	IR Network Type	Observations
SP 3 – Athenry Train Station	GSM-R	Three directional GSM-R directional Panel Antennas installed at top of 30m telecoms mast. GSM-R antennas aligned in direction of the rail lines.

Table 5. Field Survey Summary – SP3

Section 5 - Desktop Survey Analysis

5. Introduction

Based on the consultation responses received from Irish Rail, there is one communication network type that require 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.), Radio Planning software was used to plot the network service coverage from the GSM-R basestations at Woodlawn, Attymon, and Athenry.

The GSM-R network coverage plot is shown below in Figure 8. As the plot shows, targeted GSM-R radio coverage extends from each basestation along the rail tracks.

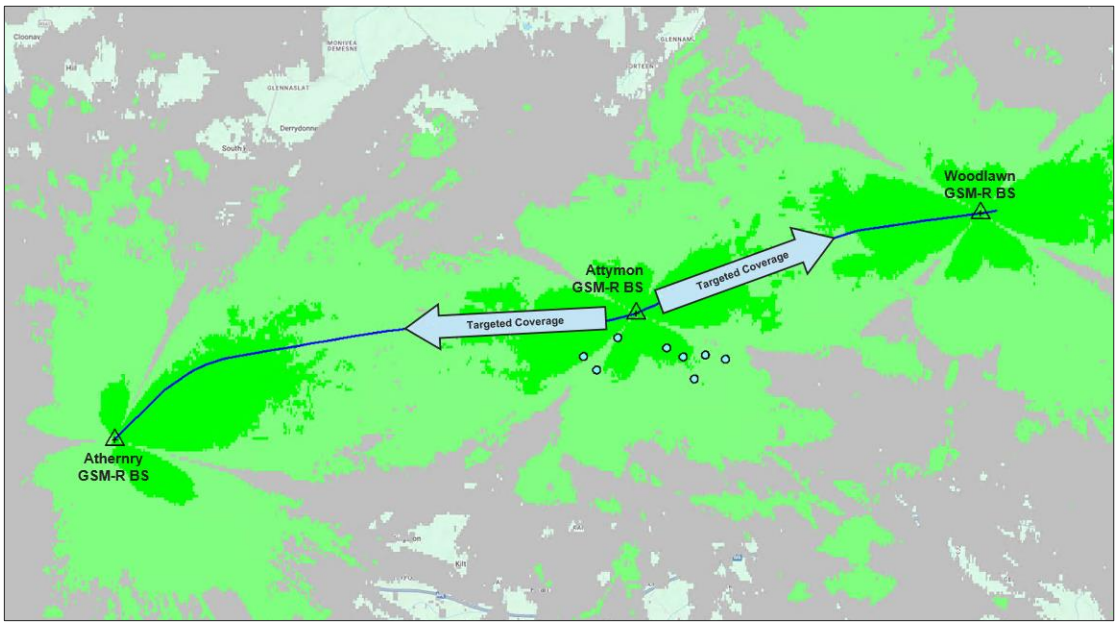


Figure 8. Irish Rail Network – Predicted Service Coverage from GSM-R Network

In their response to consultations CIE referenced 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 interference with GSM /GSM-R radio signals unless they are in close proximity to the transmitter.

Commercial service operators do not raise any concerns regarding GSM access networks unless proposed turbines are very near their transmitters (e.g. less than 500m). Figure 9 below shows that the nearest of the proposed turbines to any of the GSM-R basestaions is turbine T03, which is 0.6 km from the basestaion at Attymon. At this distance, it is highly unlikely that there would be any significant impact on the GSM-R radio network.

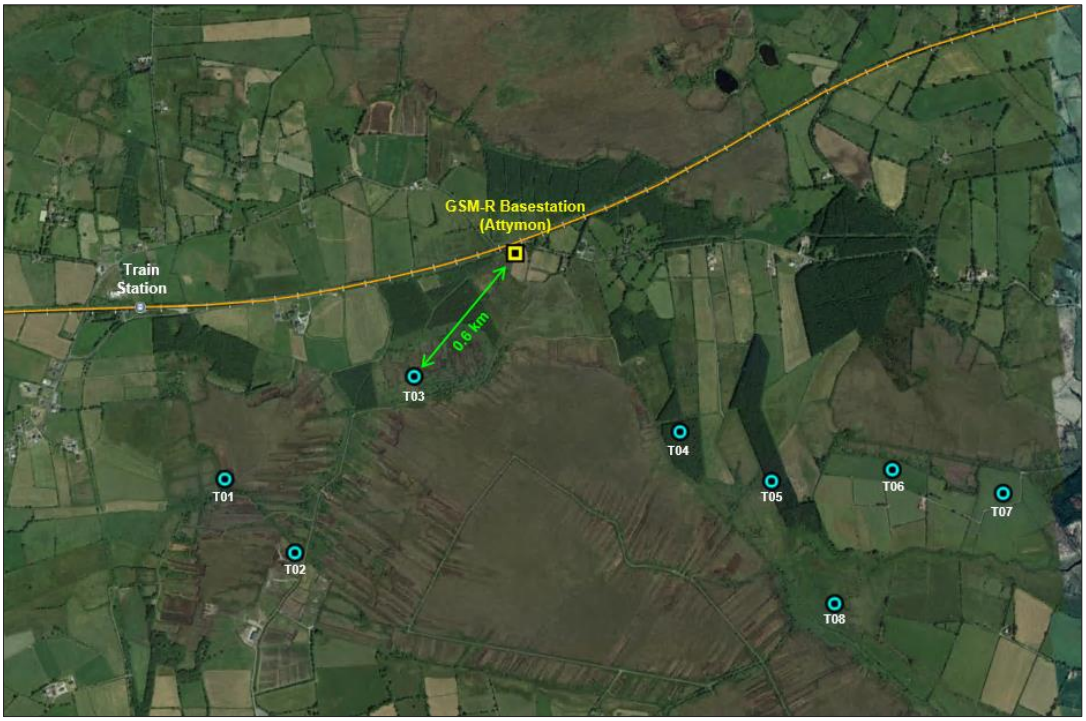


Figure 9. Nearest turbine to Irish Rail GSM-R Basestaion

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 10 below shows an example of a wind turbine in northern France that is less than 200m from a rail line.

Figure 10. Example of at wind tubrine near rail line

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.

Table 6 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	The nearest of the proposed turbine to a GSM-R basestation is T03 which is 0.6 km from the basestation at Attymon. At this distance, 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 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.	No impacts.

Table 6. GSM-R Train Radio – Analysis Summary

Section 6 - Conclusions

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 Woodlawn and Athenry.
- 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 is located 0.6 km from the GSM-R Train Radio transmitter at the Attymon 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	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. The nearest turbine to a GSM-R basestation is T03 which is 0.6 km from the basestation at Attymon. At this distance, it is highly unlikely that there would be any impacts on the Irish Rail communications network due to the proposed turbines.	No impacts

Table 7. Irish Rail Network Impact Summary.

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 co-ordinates of turbines assessed in this Telecommunications Impact Study are provided in the Table below.

Turbine ID	Co-ordinates (ITM)	
	X	Y
T01	560006	729599
T02	560288	729308
T03	560736	729992
T04	561808	729771
T05	562167	729573
T06	562645	729614
T07	563080	729518
T08	562403	729094

Table 8. Turbine Co-ordinates (Proposed Turbine Layout 20.03.2025)

APPENDIX B – GSM-R Antenna Specification

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.

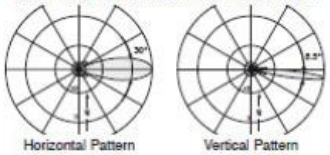
Panel 790–960
Dual Polarization X
Half-power Beam Width 30°
Adjust. Electrical Downtilt 0°–10°
set by hand or by optional RCU (Remote Control Unit)

KATHREIN
Antennen · Electronic

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

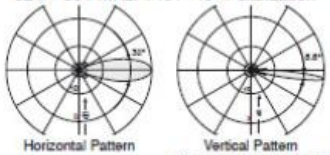
Type No.	80010456V02		
Frequency range	790 – 862 MHz	790–960 824 – 894 MHz	880 – 960 MHz
Polarization	+45°, –45°	+45°, –45°	+45°, –45°
Gain at 0° T	2 x 20.0 dBi	2 x 20.2 dBi	2 x 20.5 dBi
Horizontal Pattern:			
Half-power beam width	33°	32°	30°
Front-to-back ratio, copolar	> 28 dB	> 29 dB	> 30 dB
Cross 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)		

880 – 960 MHz: +45°/–45° Polarization



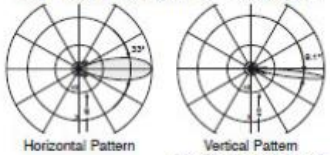
Horizontal Pattern — Vertical Pattern 0°–10° electrical downtilt

824 – 894 MHz: +45°/–45° Polarization

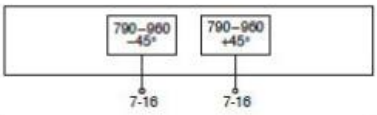


Horizontal Pattern — Vertical Pattern 0°–10° electrical downtilt

790 – 866 MHz: +45°/–45° Polarization



Horizontal Pattern — Vertical Pattern 0°–10° electrical downtilt



Mechanical specifications	
Input	2x 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

Subject to alteration.
906 39076

Internet: www.kathrein.de
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KATHREIN-Werke KG · Anton-Kathrein-Straße 1 – 3 · P.O. Box 10 04 44 · 83004 Rosenheim · Germany · Phone +49 8031 184-0 · Fax +49 8031 184-973