

Appendix 14-2: Communications Technical Report





ORIEL WIND FARM PROJECT

Environmental Impact Assessment Report Appendix 14-2: Communications Technical Report

MDR1520B
EIAR – Appendix 14-2
A1 C01
March 2024

ORIEL WIND FARM PROJECT – COMMUNICATIONS TECHNICAL REPORT

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Glossary

Term	Meaning
Boresight	The straight line between the two antennae.
Ellipsoid	A three-dimensional geometric figure resembling a flattened sphere.
Fresnel Zone	An ellipsoid surrounding a link path.
Lowest Astronomical Tide	The lowest tide level which can occur under normal conditions.
Point-to-point / Wireless communication links	Used to transmit information between two antennae via radio waves within a particular frequency band, including Very High Frequency (VHF) (30 to 300 MHz), Ultra High Frequency (300 to 3,000 MHz) (International Telecommunication Union, 2015) and microwave (typically 1 GHz to 100 GHz).

Acronyms

Term	Meaning
AMSL	Above Mean Sea Level
LAT	Lowest Astronomical Tide
MOU	Memorandum of Understanding
UHF	Ultra High Frequency

Units

Unit	Description
GHz	Gigahertz
km	Kilometre
m	Meters
m LAT	Metres above Lowest Astronomical Tide
MHz	Megahertz

1 INTRODUCTION

1.1 Purpose and scope

The purpose of the Communications Technical Report is to identify the potential effects that the Oriel Wind Farm Project (hereafter referred to as the 'Project') may have on communications. The Project is located in the Irish Sea off the coast of County Louth approximately 22 km east of Dundalk town centre, in County Louth, Ireland.

The assessment has been undertaken by completing consultation with the relevant stakeholders to identify the relevant communication infrastructure, including microwave and telemetry links, which may be operated in the vicinity of the Project. An assessment has then been undertaken to determine whether any impact is expected. Finally, an overview of mitigation options is presented. The analysis is based on the proposed Project layout and dimensions (see volume 2A, chapter 5: Project Description).

1.2 Interference mechanisms

1.2.1 Overview

Wireless communication links are used to transmit information between two antennae via radio waves within a particular frequency band. Wind turbines may cause interference to wireless communication signals through diffraction and reflection, as described below.

1.2.2 Diffraction

Wind turbines that are sited in between two link antennae can partially block the radio signal passing between them, thereby reducing the functionality of the link. This can occur even if the wind turbine is not directly between the antennae but close to the link boresight¹. This kind of blocking is called "diffraction".

1.2.3 Reflection

In some instances line of sight is not required for interference to occur. This kind of interference is caused by a "reflection" of the signal and only affects Ultra-High Frequency (UHF) links.

Wind turbines can affect UHF links by reflecting the signal between transmitter and receiver. UHF links do not require radio line of sight to operate, therefore if a wind turbine is located close (e.g. typically within 100 m) to the link pathway², the wind turbine may reflect the direct signal as it travels from transmitter to receiver thus creating interference.

Microwave links require radio line of sight and therefore are not significantly affected by reflections.

1.3 Safeguarding

1.3.1 Fresnel zones – overview

A Fresnel Zone takes the form of an ellipsoid surrounding a link path and represents the area in which obstructions should not be sited in order to avoid diffraction losses. The width of the zone at any point along the link path is determined by the Fresnel Zone number, the frequency of the link and the distance from each link end. The width of the zone is maximal at the midpoint of the link path.

¹ This is the straight line between the two antennae.

² However, a wind developments impact is affected by the number of wind turbines.

1.3.2 Exclusion zones – communication links

It has been proposed in literature (i.e. Bacon, 2002) that the Second Fresnel Zone would be an appropriate and conservative basis for the exclusion zone around a microwave link with regard to diffraction losses caused by wind turbines when the link end positions are known. This approach has been recommended by Ofcom in the UK. In addition to the Second Fresnel Zone, an additional 25 m buffer zone to account for uncertainties in the link end locations has been included. The exclusion zone therefore consists of the Second Fresnel Zone, the rotor radius and 25 m buffer zone.

Where a UHF link is identified and safeguarded, the 0.6th Fresnel Zone is used for safeguarding against diffraction effects. Reflection effects do not strictly have an exclusion zone associated and therefore further detailed calculations may be required at a later stage.

2 METHODOLOGY

Where required, the 2-dimensional exclusion zone (as described above) is calculated for any identified links. This report uses a link clearance methodology (based upon the Ofcom methodology in the UK) which includes the relevant Fresnel Zone, rotor radius and an additional 25 m buffer zone to account for uncertainties in the link end locations.

The coordinates of each point location are shown in appendix A.1.

The specific wind turbine dimensions assessed are presented in Table 2-1 below.

Table 2-1: Wind turbine dimensions assessed.

Hub Height (m LAT)	Rotor Diameter (m)	Upper Blade Tip Height (m LAT)
145-152 ³	236	270

³ Wind turbine hub height will vary within the range stated across the offshore wind farm area. The design and height of each wind turbine foundation is specific to the subsoil geology and geotechnical properties at each wind turbine location. The foundation height will affect the hub height of each wind turbine.

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3 COMMUNICATIONS CONSULTATION SUMMARY

Consultation with identified communication stakeholders was undertaken in two phases in late 2019 and early 2021. The purpose of consultation in 2019 was to provide an opportunity for stakeholders to comment on the EIA scoping report. In 2021 consultation was undertaken to update stakeholders on proposed changes to the project design and to seek responses from stakeholders that did not respond as part of scoping phase prior to submission of the planning application. Table 3-1 below presents a summary of the consultation carried out to date. The response to this consultation has been used as a basis for the analysis undertaken and presented in this report.

Table 3-1: Summary of key consultation undertaken with communication stakeholders on the Project.

Date	Consultee	Infrastructure	Summary
September 2019 - February 2021	2RN	Microwave/UHF/ Television	Response received stating no impact upon microwave links however potential impact upon television signals. Discussed further in section 4. February 2021 – reconsulted – no objection.
2019 - February 2021	Airwave / Motorola Solutions	Microwave/UHF	No response received to date. March 2021 – reconsulted – no response.
2019 - February 2021	Airspeed	Microwave/UHF	No response received to date. March 2021 – reconsulted – no response.
September 2019 - February 2021	Arqiva	Microwave/UHF	No objection. February 2021 – no change anticipated and therefore not reconsulted.
September 2019 - February 2021	Atkins	Microwave/UHF	Response received stating no objection from all but one stakeholder consulted (see “Northern Ireland Water”). February 2021 – to follow up with Northern Ireland Water.
September 2019 - February 2021	BT	Microwave/UHF	No objection. February 2021 – no change anticipated and therefore not reconsulted.
2019 - February 2021	Comreg	Microwave/UHF	No response received. February 2021 – reconsulted – no objection.
September 2019 - February 2021	EIR (formerly Meteor)	Microwave/UHF	No objection. February 2021 – no change anticipated and therefore not reconsulted.
2019 - February 2021	Eircom	Microwave/UHF	No response received. February 2021 – reconsulted – no objection.
October 2019 - March 2021	Ericsson	Microwave/UHF	No objection. Noted that if any details of the application change, it will be necessary to re-evaluate the proposal. March 2021 – reconsulted – no objection.
September 2019 - February 2021	ESB	Microwave/UHF	No objection. February 2021 – no change anticipated and therefore not reconsulted.
September 2019 - February 2021	Imagine Group	Microwave/UHF	No objection. February 2021 – no change anticipated and therefore not reconsulted.

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Date	Consultee	Infrastructure	Summary
October 2019 - February 2021	JRC	Microwave/UHF	No objection. February 2021 – no change anticipated and therefore not reconsulted.
2019	Ofcom	Microwave/UHF	No response received. February 2021 – no change anticipated and therefore not reconsulted.
2019 - February 2021	Netshare	Microwave/UHF	No response received. February 2021 – reconsulted – no response.
2019 - February 2021	Northern Ireland Water	Microwave/UHF	No response received (see “Atkins”). March 2021 – reconsulted – no response.
October 2019 - February 2021	Tetra Ireland	Microwave/UHF	No objection. February 2021 – no change anticipated and therefore not reconsulted.
September/ October 2019 - February 2021	Three (Ireland)	Microwave/UHF	No objection. February 2021 – no change anticipated and therefore not reconsulted.
2019 - February 2021	Viatel	Microwave/UHF	No response received. February 2021 – reconsulted – no response.
September 2019 - February 2021	Vodafone (Ireland)	Microwave/UHF	No objection. February 2021 – reconsulted – no objection.
October 2019 - February 2021	Vodafone (UK)	Microwave/UHF	No objection. February 2021 – no change anticipated and therefore not reconsulted.

4 RESULTS

4.1 Effects on communications infrastructure

Links that pass within 1 km of the offshore wind farm area were considered. There are no UHF or microwave links within 1 km of the offshore wind farm area identified through the consultation and therefore no impact on UHF or microwave point-to-point infrastructure from the physical presence of the wind turbines within the offshore wind farm area is expected.

4.2 Other effects

Communications stakeholder 2RN, who operate television and radio networks in Ireland, highlighted the potential for impact upon broadcast television services for viewers that receive their signal from Kippure, Co. Wicklow. The indicative assessment carried out by 2RN has identified the potential for impact along a localised coastal stretch of Northern Ireland, approximately between Ballymartin and Newcastle, and between Dundrum and Kilclief. While the viewers are outside the Republic of Ireland, 2RN have an obligation to provide coverage in Northern Ireland as per the Memorandum of Understanding (MOU) “Coordination of Digital Switchover with Northern Ireland” (Government of the United Kingdom of Great Britain and Northern Ireland and the Government of Ireland, 2010).

Due to the Project location between two areas of land over which television services are broadcast, it is possible that interference across the bay could occur. The latest consultation with 2RN (see Table 3-1) has revealed no objection to the Project based on the potential interference being received in a different country to where it is broadcast but their concern regarding potential interference remains.

5 MITIGATION OPTIONS

5.1 Point-to-point links

The aim of this investigation was to identify the potential effects that the Project may have on communications links within or traversing the offshore wind farm area.

Currently, there has been no requirement for mitigation considering the consultation responses. If new communications infrastructure is identified during the consenting process, the most appropriate mitigation options for impact to communications links from wind turbines are considered to be:

- Layout optimisation;
- Re-networking of the link via existing telecommunications sites; and
- Use of a leased line.

5.2 Television services

Typical mitigation solutions for interference to television services are the re-orientation of aerials towards an alternate transmitter or the provision of Freesat television services. Consultation with 2RN has revealed they have no objection based on the potential interference being received in a different country to where it is broadcast, however it is best practice to mitigate any effects should they be attributable to the Project and any interference should be appropriately mitigated.

6 CONCLUSIONS

Consultation to date with the network operators has identified no communications infrastructure in the vicinity of the offshore wind farm area.

Communications stakeholder 2RN highlighted the potential impact upon terrestrial television services broadcast from a transmitter in the Republic of Ireland and being received in Northern Ireland. Due to the Project location between two areas of land over which television services are broadcast, it is possible that interference across the bay could occur. 2RN have however confirmed they have no objection based on the potential interference being received in a different country to where it is broadcast. Any interference should be appropriately mitigated and would be managed through a planning condition. Typical mitigation solutions for interference to television services are the re-orientation of aerials towards an alternate transmitter or the provision of Freesat television services. Mitigation for point-to-point communications links can involve redesigning the wind farm so that wind turbines are clear of point to point communications links. Mitigation can also involve decommissioning or re-routing links to remove communication link constraints. At this point, no mitigation requirement is anticipated.

7 SUMMARY AND RECOMMENDATIONS

Consultation responses to date show that the Project is not constrained by point-to-point communications infrastructure in the vicinity of the offshore wind farm area.

Should new communications infrastructure be identified during or post the consenting process, further consultation with the communications provider will be undertaken.

References

Bacon, D. F. (2002). A proposed method for establishing an exclusion zone around a terrestrial fixed radio link outside of which a wind turbine will cause negligible degradation of the radio link performance, Radio Communications Agency.

Government of the United Kingdom of Great Britain and Northern Ireland and the Government of Ireland (2010). Memorandum of Understanding between the Government of the United Kingdom of Great Britain and Northern Ireland and the Government of Ireland regarding the Digital Switchover and the provision of digital television services in Northern Ireland and Ireland. Available online at: <https://www.dccae.gov.ie/documents/UKNIROIIMOUFeb2010.pdf>.

International Telecommunication Union (2015) Recommendation ITU-R V.431-8 (08/2015) Nomenclature of the frequency and wavelength bands used in telecommunications, V Series, Vocabulary and related subjects. Available online at: <https://www.itu.int/pub/R-REC/en>. Accessed 18/12/2019.

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A.1 Oriel Wind Farm Project Layout Coordinates

Point	Latitude (°)	Longitude (°)
ORI-A01	53.915167	-6.102477
ORI-A02	53.924904	-6.094756
ORI-A03	53.934256	-6.088268
ORI-A04	53.943666	-6.078149
ORI-A05	53.945955	-6.059518
ORI-B01	53.912002	-6.085403
ORI-B02	53.923302	-6.077714
ORI-B03	53.932828	-6.072022
ORI-B04	53.936448	-6.053531
ORI-B05	53.945172	-6.042308
ORI-C01	53.908247	-6.071480
ORI-C02	53.917838	-6.064263
ORI-C03	53.927031	-6.059756
ORI-C04	53.924432	-6.042517
ORI-C05	53.934134	-6.036687
ORI-D01	53.899219	-6.076248
ORI-D02	53.902179	-6.057484
ORI-D03	53.914341	-6.049277
ORI-D04	53.909440	-6.036430
ORI-D05	53.920007	-6.029646
ORI-E01	53.900294	-6.094598
ORI-E02	53.889121	-6.084943
ORI-E03	53.889885	-6.065905
ORI-E04	53.888102	-6.049571
ORI-E05	53.899154	-6.042756