

# Chapter 14

## Aviation, Military, and Communications





# ORIEL WIND FARM PROJECT

## Environmental Impact Assessment Report Chapter 14: Aviation, Military and Communications

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## ORIEL WIND FARM PROJECT – AVIATION, MILITARY AND COMMUNICATIONS

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## 14 CHAPTER 14 – AVIATION, MILITARY AND COMMUNICATIONS

### 14.1 Introduction

This chapter of the EIA assesses the potential impacts of the Oriel Wind Farm Project (hereafter referred to as “the Project”) on aviation, military and communications during the construction, operational and maintenance, and decommissioning phases for both the onshore and offshore elements of the Project.

Article 3 of Directive 2011/92/EU requires that the EIA identifies, describes and assesses, the direct and indirect significant effects of a project on material assets. The EPA EIA Guidelines (2022) cite these assets to mean transportation assets (such as roads, rail, shipping, aviation) and built services such as utilities.

Terrestrial transportation assets are addressed in volume 2C, chapter 28: Traffic and Transport, while the marine based transport and commercial assets are mainly addressed within chapter 12: Commercial Fisheries and in chapter 13: Shipping and Navigation.

Subsea telecommunication cables are addressed in chapter 16: Infrastructure, Marine Recreation and Other Users while onshore utilities are addressed in volume 2C, chapter 29: Material Assets.

This chapter considers the impact of the Project on existing aviation, military and communications receptors within the vicinity of the Project. The receptors which are considered in this chapter include:

- Airspace Designations;
- Military Aviation Operations;
- Military Exercise and Training Areas;
- Civil Airports;
- Helicopters;
- Gliding, Hang Gliding and Paragliding;
- Civil and Military Radar; and
- Communications.

This chapter summarises information contained within the following Technical Reports:

- Appendix 14-1: Aviation Technical Report; and
- Appendix 14-2: Communications Technical Report.

The details and competencies of the specialists who prepared this chapter can be found in volume 2A, chapter 1: Introduction (volume 2A).

### 14.2 Purpose of this chapter

The primary purpose of the EIA chapter is to provide an assessment of the likely direct and indirect significant effects of the Project on aviation, military and communications. In particular, this EIA chapter:

- Presents the existing environmental baseline established from desk studies and site-specific surveys (section 14.7);

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- Identifies any assumptions and limitations encountered in compiling the environmental information (section 14.7.10)
- Presents an assessment of the potential likely significant effects on aviation, military and communications arising from the Project (section 14.10) based on the information gathered and the analysis and assessments undertaken. An assessment of potential cumulative impacts is provided in section 14.11 and an assessment of transboundary effects is outlined in section 14.12; and
- Highlights any necessary monitoring (section 14.10.4) and/or mitigation measures (see section 14.8.2 and section 14.10.3) to prevent, minimise, reduce or offset the likely significant environmental effects identified in the assessment (section 14.10).

### 14.3 Study area

The Aviation, Military and Communications Study Area is shown in Figure 14-1. This includes the offshore wind farm area and offshore cable corridor, as well as all areas that are within the zone of impact of the Project that are of relevance to aviation, military and communications receptors. This includes:

- The airspace area designations including military exercise areas that intersect or are adjacent to the offshore wind farm area and offshore cable corridor;
- The airspace used by helicopters on routes which may cross the offshore wind farm area (no helicopters will be used to service the Project during the operational and maintenance phase however, emergency helicopters may require access to the offshore wind farm area in the event of life-critical Search and Rescue (SAR) operations);
- Radars on the east coast of Ireland (Dublin Airport) and Northern Ireland (Belfast International Airport) that could potentially detect wind turbines with tip heights of 270 m above Lowest Astronomical Tide (LAT) within the offshore wind farm area;
- The area within 9 Nautical Miles (nm) of the offshore wind farm area boundaries (based on the potential for offshore oil and gas platforms and their associated 9 nm consultation zones); and
- Microwave, Very High Frequency (VHF) and Ultra High Frequency (UHF) links within 1 km of the offshore wind farm area.





**Legend**

- Offshore Wind Farm Area
- Offshore Cable Corridor
- Gormanston Military Airbase and Firing Range
- Major Civil Airports
- Civil Airports/ Military Aerodromes
- CTA **C** 4500'-FL245
- CTR **D** 2500'-3500'

Areas of Controlled Airspace

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**Client**

ORIEL WINDFARM  
OFFSHORE RENEWABLE ENERGY

**Project**

**Oriel Wind Farm Project**

**Title**

**Figure 14-1  
Aviation, Military and  
Communications Study Area**

**RPS**  
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Issue Details	
Drawn By: NA	Project No. EOR822 (MDR1520B)
Checked By: EP	File Ref: EOR822_COF_T_1050_FINAL
Approved By: EP	Projection: ITM (IRENET95)
Scale: 1:1,000,000@A4	Geographic Co-ordinates: ETRS89
Date: 16/03/2023	

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### 14.4 Policy context

Planning policy on renewable energy infrastructure is presented in volume 2A, chapter 2: Policy and Legislation. This section presents planning policy that specifically relates to aviation, military and communications, which is contained in the Offshore Renewable Energy Development Plan (OREDPA) (DCCA, 2014) and the National Marine Planning Framework (NMPF) (Department of Housing, Planning and Local Government (DHPLG), 2021). The OREDPA and NMPF include guidance on what matters are to be considered in the assessment. These are summarised in Table 14-1 and Table 14-2 below.

In February 2023, the 'OREDPA II - National Spatial Strategy for the transition to the Enduring Regime' was published in draft and subject to consultation. The draft OREDPA II does not define specific provisions similar to OREDPA I. The key objectives of OREDPA II are:

- *“Assess the resource potential for ORE in Ireland’s maritime area.*
- *Provide an evidence base to facilitate the future identification of Broad Areas of Interest most suitable for the sustainable deployment of ORE in Ireland’s maritime area*
- *Identify critical gaps in marine data or knowledge and recommend prioritised actions to close these gaps”*

The OREDPA II will provide an evidence base to facilitate the future identification of Broad Areas of Interest most suitable for the sustainable deployment of ORE in Ireland’s maritime area, to be assessed in greater detail at regional scale. This assessment will subsequently inform the identification of more refined areas as part of the designation process for Designated Maritime Area Plans (DMAP).

When published, the OREDPA II will update the original OREDPA published in 2014.

**Table 14-1: Summary of OREDPA provisions relevant to aviation, military and communications.**

Summary of OREDPA - suggested project-level mitigation measures	How and where considered in the EIAR
<b>Aviation Radar</b>	
<p><b>Collision – suggested Project level mitigation measures:</b> Ensure wind devices are lit with aviation lights in accordance with Operations Advisory Memorandum (OAM) 09/02 “Offshore Wind Farms Conspicuity Requirements”. As required under the Obstacles to Aircraft in Flight Order, Statutory Instrument (S.I.) 215 of 2005, provide notification of the erection of wind devices to the Irish Aviation Authority (IAA).</p>	<p>The Project will comply with IAA requirements on lighting. It is understood that the current guidance is set out in IAA Aeronautical Services Advisory Memorandum (ASAM) No: 018 (IAA, 2015a). This is considered in Table 14-6. Also a Lighting and Marking Plan has been prepared and this is included in appendix 5-8 (volume 2A of the EIAR).</p>
<p><b>Radar interference:</b> Consultation with the IAA will be required and the location of wind devices supplied so they can be accurately plotted on the radar and any signals received from that area will not be confused with aeroplanes.</p>	<p>Consultation with the IAA has been carried out (see Table 14-3). The final location of each wind turbine will be supplied to the IAA. This is considered in section 14.8.2.</p>
<b>Military Exercise Areas</b>	
<p><b>Disruption to General Activities – suggested Project level mitigation measures:</b> Avoidance of bye-lawed and danger sites. Carry out site selection studies in conjunction with liaison with the Department of Defence (DoD) and the Ministry of Defence (MOD), UK where applicable.</p>	<p>Consultation with the DoD has been carried out (see Table 14-3). The Project is outside any promulgated military exercise areas. This is considered in section 14.7.3.</p>



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**Table 14-2: Summary of NMPF provisions relevant to aviation, military and communications.**

Summary of NMPF provision	How and where considered in the EIAR
<b>Defence and Security</b>	
<p><b>Defence and Security Policy:</b> Any proposal that has the potential to interfere with the performance by the Defence Forces of their security and non-security related tasks must be subject to consultation with the Defence Organisation.</p> <p>This includes potential interference with:</p> <ul style="list-style-type: none"> <li>• Safety of navigation and access to naval facilities;</li> <li>• Firing, test or exercise areas;</li> <li>• Communication, and surveillance systems; and</li> <li>• Fishery protection functions.</li> </ul> <p>Proposals should only be supported where, having consulted with the Defence Organisation, they are satisfied that it will not result in unacceptable interference with the performance by the Defence Forces of their security and non-security related tasks.</p> <p>Any proposal will be subject to the relevant Environmental Assessments, as set out in the introduction to this NMPF.</p>	<p>Defence interests are discussed in section 14.7 and section 14.8.</p> <p>Details on consultation with the DoD are outlined in Table 14-3.</p> <p>As outlined in section 14.8.3, impacts from the Project on the performance of the Defence Forces has been scoped out of the assessment as the Project will not result in unacceptable interference with the performance by the Defence Forces of their security and non-security related tasks.</p>

## 14.5 Consultation

Consultation with identified aviation, radar and communications stakeholders was undertaken in 2019 - 2024. 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 the project design and to seek responses from stakeholders that did not respond as part of scoping phase or were not contacted as part of the scoping phase. Stakeholders were consulted individually through direct contact from the project team following a request for engagement in 2022-2024.

Table 14-3 summarises the issues raised relevant to aviation, military and communications, which have been identified during consultation activities undertaken to date, together with how these issues have been considered in the production of this EIAR chapter. Further detail is presented within appendix 14-1: Aviation Technical Report and appendix 14-2: Communications Technical Report.

**Table 14-3: Summary of key consultation issues raised during consultation activities undertaken for the Project relevant to aviation, military and communications.**

Date	Consultee and type of response	Issues raised	Response to issue raised and/or where considered in this chapter
<b>Civil Aviation Interests<sup>1</sup></b>			
September 2019 February 2021	Belfast International Airport – EIA scoping response; pre-planning response	Consultation response confirming that the Project would have no effect on operations at this airport and therefore no objections.	N/A
September/ November 2019	National Air Traffic Services (NATS) - scoping response	No impact on radar anticipated based on turbine height of 250 m above mean sea level (amsl).	N/A

<sup>1</sup> Civil Aviation Authority (CAA), CHC Helicopters (SAR), Weston Airport and Irish Powered Paragliding and Hang Gliding Association (IPPHA) were also consulted but no response was received.

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Date	Consultee and type of response	Issues raised	Response to issue raised and/or where considered in this chapter
February 2021	NATS – pre-planning response	Reconsulted. No objection. The turbines are beyond the range of visibility to NATS’ nearest radar considering a tip height of 270M LAT	Civil aviation interests are discussed in section 14.7.4.
September / October 2019	IAA – scoping response	No impact on Navigation Aids (NAVAIDs).	Civil aviation interests are discussed in section 14.7.4
November 2019	IAA – scoping response	Consultation response confirming status of IAA guidance and confirming acceptability of CAP 764. Marking and lighting requirements to be in accordance with IAA ASAM No. 018.	Marking and lighting requirements are presented in section 14.8.2.
February 2021	IAA – pre-planning response	Reconsulted. No objection on radar, NA or operations. Requests for lighting and marking.	Marking and lighting requirements are presented in section 14.8.2 and volume 2A, appendix 5-10: Lighting and Marking Plan.
March 2021	IAA – pre-planning response	Discussion on lighting and marking. Recommendation for a high-level report to inform lighting requirements although no issues anticipated.	Marking and lighting requirements are presented in volume 2A, appendix 5-10: Lighting and Marking Plan.
November 2019	Irish Hang Gliding and Paragliding Association (IHPA) – email	Response to consultation identifying launch sites close to offshore cable corridor around Dundalk Bay, including at Dunany Point, Gyles Quay/Grasshoppers, and Slievenaglogh. Advised that during winter, hang gliders may fly at 1 km over the sea.	Hang gliding and paragliding sites are discussed in section 14.7.6 and 14.10.1.
November 2019; March 2021	DAA (Dublin Airport) – EIA scoping; pre-planning	Reconsulted. Response received stating their position is in line with that of IAA.	Civil aviation interests are discussed in section 14.7.4 and 14.8.2.
November/ December 2019	Belfast City Airport – scoping response	Response confirming that the Project is outside of Belfast City Airport’s Obstacle Limitation Surfaces, >30 km from the airfield and not in line of sight of the radar. Therefore, no aerodrome safeguarding related concerns.	N/A
November 2022 March 2024	Irish Coast Guard – pre-planning response	Requirements from MGN 654 should be used for SAR helicopters to enter the wind farm.	SAR helicopter interests are discussed in section 14.7.4 and 14.8.2.
September 2023	Isle of Man, Department of Infrastructure	Potential for Project to impact on Primary Surveillance Radar (PSR) and Instrument Flight Procedures (IFPs).	Due to the distance between the Project and Ronaldsway Airport (52 nm), it is not expected that the Project will impact on the PSR or IFPs. The Applicant will continue to engage with the airport’s air traffic services and Department of Infrastructure and if required radar mitigation will be considered.
February 2024	Ronaldsway Airport –meeting		
<b>Military Aviation Interests</b>			
February 2021	DoD – pre-planning	No objection on radar, NAVAIDs or operations. Requests for aviation lighting and marking.	Military aviation interests are discussed in sections 14.7.2 and 14.7.3.
February 2021	UK MoD – pre-planning	No objection on radar, NAVAIDs or operations. Requests for aviation lighting and marking.	Military aviation interests are discussed in sections 14.7.2 and 14.7.3.

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Date	Consultee and type of response	Issues raised	Response to issue raised and/or where considered in this chapter
<b>Communication Systems<sup>2</sup></b>			
September/October 2019	Arqiva, BT, EIR, ESB, Imagine Group, JRC, Three (Ireland), Vodafone (Ireland), Vodafone (UK), Tetra (Ireland) – scoping response	No objections raised.	N/A
February 2021	Vodafone (Ireland) - email	Reconsulted. No objection.	N/A
October 2019	Ericsson - email	No objection. Noted that if any details of the application change, it will be necessary to re-evaluate the proposal (see entry below)	N/A
March 2021	Ericsson/MBNL – email	Reconsulted. No objection.	N/A
September 2019	Atkins - email	Response received. No objection.	N/A
September to November 2019	2RN – email – scoping response	No impact on fixed microwave linking but potential interference to the television signal on the coast between Kilkeel and Newcastle, County Down identified.	Potential effects on television signals are discussed in section 14.10.2.
December 2019	2RN – meeting	Telecon to discuss potential impact on television signal and identification of potential mitigation measures.	
February 2021	2RN – email	Reconsulted. No objection however potential for interference identified.	
October 2019	Ofcom – email	No response. Ofcom have suspended consultation associated with impacts from microwaves due to GDPR.	Other sources of information have been used to replace expected results from consultation with Ofcom. See appendix 14-2: Communications Technical Report.

## 14.6 Methodology to inform the baseline

### 14.6.1 Desktop study

Information on aviation, military and communications within the Aviation, Military and Communications Study Area was collected through a detailed desktop review of existing datasets and through consultation. The key sources (i.e. data and reports) used to inform the baseline characterisation of the Aviation, Military and Communications Study Area are summarised in Table 14-4 below. Further references are provided in appendix 14-1: Aviation Technical Report and appendix 14-2: Communications Technical Report.

<sup>2</sup> Airspeed, Comreg, Eir, Netshare, Northern Ireland Water, Viatel, Airwave/Motorola Solutions, Meteor were also consulted by email in February 2021, but no relevant response was received.



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**Table 14-4: Summary of key data sources.**

Title	Source	Year	Author
ENR 1.6: Radar services and procedures	IAA Integrated Aeronautical Information Package (IAIP)	2022a	IAA
ENR 2.1: Air traffic services airspace	IAA IAIP	2022b	IAA
ENR 5.2: Military exercise and training areas	IAA IAIP	2023a	IAA
ENR 5.5: Aerial sporting and recreational activities	IAA IAIP	2023b	IAA
ENR 6.1: Lower ATS routes	IAA IAIP	2023c	IAA
Oil and Gas Latest Licence Acreage Report and Concession Map	Department of Communications, Climate Action and Environment	2022	DCCAE

### 14.6.2 Site-specific surveys

No site-specific surveys have been undertaken to inform the assessment for aviation, military and communications. This is because the baseline characterisation developed through existing data sources and consultation is considered sufficient to inform the assessment.

## 14.7 Baseline environment

### 14.7.1 Airspace designations

Ireland operates under the Flexible Use of Airspace (FUA) management concept, described by the International Civil Aviation Organisation (ICAO) and developed by the European Organisation for the Safety of Air Navigation (Eurocontrol). The main principle of the FUA concept is that airspace should not be designated as civil or military airspace but is considered as one continuum in which all users' requirements are accommodated to the maximum extent possible. Any necessary airspace reservation or segregation is temporary, based on real-time usage within a specific time period (Department of Transport, Tourism and Sport (DTTAS *et al.*, 2014).

The offshore wind farm area is located underneath the Dublin Control Area (CTA) within which the IAA is the main provider of air navigation services. The IAA is a commercial semi-state company under the Department of Transport. The principal statutory functions of the IAA are: to provide or make arrangements for the provision of air navigation services in Ireland's airspace (including adjacent airspace under international agreements) and to provide communication services over the eastern part of the North Atlantic Region; to provide terminal (air traffic control) services at Cork, Dublin and Shannon airports; to regulate the safety of Ireland's civil aviation industry and to oversee civil aviation security in the state.

In line with international aviation regulations, airspace in Ireland is categorised into seven classifications (Class A to Class G); the services provided within each classification are based on speed limitations, types of flights and rules for separation of aircraft. The offshore wind farm area is located in an area of Class G uncontrolled airspace which is established from the surface to 4,500 ft amsl. Above this altitude, Class C controlled airspace is established up to Flight Level (FL) 245 (24,500 ft) which forms part of the Dublin CTA; see Figure 14-1. Within these classifications of airspace, the following rules apply:

- Class G Airspace: aircraft can operate in this area of uncontrolled airspace without any mandatory requirement to be in communication with, or receive a radar service from, an ATC unit. Pilots of aircraft operate under Visual Flight Rules (VFR) in Class G airspace and are ultimately responsible for seeing and avoiding other aircraft and obstacles; and
- Class C Airspace: aircraft operating within Class C controlled airspace must be in receipt of an Air Traffic Service (ATS) from an appropriate ATC unit.

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The offshore wind farm area is located entirely in Irish airspace within the Shannon Flight Information Region (FIR). The FIR boundary between Irish and UK airspace is located 5 nm to the north of the offshore wind farm area where the Shannon FIR borders the Scottish FIR (see Figure 14-1).

### 14.7.2 Military aviation operations

Ireland's DoD Air Corps operate a fleet of fixed and rotary wing aircraft providing military support to the Army and Naval services, together with non-military tasks such as Garda air support, air ambulance, fisheries protection and the Ministerial Air Transport Service. The nearest DoD aerodrome to the offshore wind farm area is the Casement Aerodrome (70 km southwest); the Gormanston Aerodrome (29 km southwest) is disused (IAA, 2021b).

The UK Low Flying System (UKLFS) is used for military low flying activity and covers the entire UK land mass (outside regulated airspace) and surrounding sea areas out to 2 nm (3.7 km) from the coastline, from surface level to 2,000 ft above ground level. The UK MOD operates a small fleet of Gazelle helicopters and Tutor training aircraft at Joint Helicopter Command Flying Station Aldergrove which is located at Belfast International Airport.

### 14.7.3 Military exercise and training areas

The nearest military exercise and training area is the Gormanston Military Aerial Firing Range located 9.8 km to the south of the offshore wind farm area and 6.5 km from the offshore cable corridor. Although Gormanston Aerodrome is disused, the IAIP states that the firing range operates from the site of Gormanston Aerodrome and extends seaward; it is used for air-ground firing training, air-defence training and general military training. It does not overlap with the offshore wind farm area or offshore cable corridor (IAA, 2015b) (see Figure 14-1).

### 14.7.4 Civil airports

In Ireland, the major civil airport located closest to the offshore wind farm area is Dublin Airport (51 km south-southwest). There are also several smaller civil airports including Weston Airport which is located to the west of Dublin, 65 km to the southwest of the offshore wind farm area (see Figure 14-1). Weston Airport caters for business and general aviation including light aircraft, helicopters and jets. The offshore wind farm area and offshore cable corridor are outside the safeguarding zone for both of these civil airports.

Trim (55.18 km) and Ballyboy (58.98 km) airfields are licensed aerodromes located to the northwest of Dublin Airport (Figure 14-1). These aerodromes are safeguarded in the same manner as civil airports however, the Project is outside the safeguarding zone of all of these airfields. Ballybougall (40.4 km), Moyglare (64.86 km) are unlicensed aerodromes located respectively to the north and west of Dublin Airport respectively. These aerodromes are safeguarded in a similar manner to civil licensed aerodromes but not to the same exacting standards. The Project is outside the recommended consultation distance for airfields of this nature.

In Northern Ireland, Belfast City Airport and Belfast International Airport are located 75 km north-northeast and 78 km north-northwest respectively from the offshore wind farm area (see Figure 14-1).

Newtownards Airport is located in Northern Ireland, to the east of Belfast and 74.2 km to the north of the offshore wind farm area. This airport is operated by the Ulster Flying Club and caters for light aircraft and helicopter flights. The nearest unlicensed airport is Derryogue Airport which is located 11 km to the north of the offshore wind farm area (see Figure 14-1). The Project is outside the recommended consultation distance for both these aerodromes. Additionally, there are several minor airfields located along the coastline of County Louth (including one at Giles Quay) however, the Project is not within the recommended consultation distances for any of these airfields.

### 14.7.5 Helicopters

Helicopters must avoid vessels and structures by keeping a minimum distance of 500 ft. In visual conditions, pilots may use designated helicopter routes or they may opt to fly direct to their destination in open air space. When operating in poor weather, pilots must fly in accordance with Instrument Flight Rules (IFR) in which helicopters require a Minimum Safe Altitude (MSA) of 1,000 ft height clearance from obstacles within 5 nm of the aircraft (IAA, 2018b).

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To help achieve a safe operating environment, UK guidance requires a consultation zone of 9 nm radius around offshore helicopter destinations (CAA, 2016). No comparable guidance has been identified for Ireland and therefore UK guidance has been considered for the Project, which has been agreed with the IAA. There are presently no helicopter routes or offshore helicopter destinations in the vicinity of the offshore wind farm area (IAA, 2006). There is no oil and gas infrastructure including platforms, subsea facilities or wells which may require helicopter access within 9 nm of the offshore wind farm area. There is currently no licenced oil and gas acreage in the vicinity (see chapter 16: Infrastructure, Marine Recreation and Other Users). No regular helicopter flight paths servicing the oil and gas industry are therefore anticipated to cross the offshore wind farm area.

In Ireland, the Irish Coast Guard operates five helicopters deployed at bases in Dublin, Waterford, Shannon and Sligo, which respond to emergencies at sea, inland waterways, offshore islands and mountains of Ireland (DTTAS, 2019). In the UK, the Maritime and Coastguard Agency (MCA) operate SAR helicopters from ten strategically located bases on the UK mainland. The nearest SAR bases to Northern Ireland are at Prestwick and Caernarfon (MCA, 2017).

Any civilian helicopter activity in the area will be planned and managed as single flights, likely operating out of Dublin Airport, Belfast City Airport, Belfast International Airport and other regional aerodromes.

### 14.7.6 Gliding, hang gliding and paragliding

The east coast of Ireland has several popular locations for hang gliding and paragliding. The IAIP lists known sites for aerial sporting and recreational activities, including glider flying in ENR 5.5 (IAA, 2022). Glider flying takes place in uncontrolled airspace or controlled airspace with prior permission. None of the sites listed for glider flying and hang gliding in ENR 5.5 are within the vicinity of the Project (IAA, 2022).

Paragliding sites around Dundalk Bay have been identified through consultation with the Irish Hang Gliding and Paragliding Association (IHPA) and the Irish Powered Paragliding and Hang-gliding Association (IPPHA) (see Table 14-3). These sites are at Dunany Point, Giles Quay and Slievenagloagh (see Figure 14-1). Hang gliders and paragliders are likely to remain close to the coast (within approximately 100 m) when flying coastal sites, to exploit air currents in the vicinity of the cliffs or slopes. However, during the winter, pilots may exploit thermals over the warmer sea, and may fly 1 km from the coast.

### 14.7.7 Civil and military radar

Civil airspace and air traffic surveillance and management infrastructure is comprised of the following systems:

- Primary Surveillance Radar (PSR);
- Secondary Surveillance Radar (SSR); and
- Aeronautical Navigation Aids (NAVAIDs).

These are discussed in turn below, followed by military and meteorological radar systems.

#### Primary Surveillance Radar (PSR)

PSRs are used for non-co-operative surveillance and to provide ATS to aircraft arriving and departing to/from aerodromes and airports and in the en-route phase of flight. The IAA use PSR primarily for civil airport and military airfield operations in Ireland. There are three PSRs in Ireland located at Cork, Dublin and Shannon airports (IAA, 2022). The nearest PSR to the offshore wind farm area is located at Dublin Airport. Dublin Airport is approximately 51 km south-southwest of the offshore wind farm area and the PSR has a line-of-sight distance of 54.9 km (see Figure 14-1).

In the UK, NATS use PSRs to support their provision of navigational services to aircraft operating between the UK and mainland Europe and to those overflying the UK FIR. Surveillance data from NATS PSRs is also used by other ATS providers such as the UK MoD and civilian airports. UK military ATC units are based in NATS Control Centres to facilitate the control of aircraft that require ATC services outside the civil airspace structure. In Northern Ireland, NATS provide ATS at Belfast International Airport and Belfast City Airport.



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### Secondary Surveillance Radar (SSR)

SSR is used in conjunction with PSR to provide additional information about aircraft. SSR is used for co-operative surveillance of aircraft arriving and departing to/from aerodromes and airports and in the en-route phase of flight. Only aircraft with a transponder can be detected by SSR.

The nearest SSR to the offshore wind farm area are located at Dublin Airport, approximately 51 km south-southwest of the offshore wind farm area which is outside the relevant safeguarding distances as per ICAO EUR DOC 015 (ICAO, 2015) and CAP 670 (CAA, 2019).

### NAVAIDS

No aeronautical radio navigation beacons have been identified in proximity to the offshore wind farm area (appendix 14-1: Aviation Technical Report). In Ireland and Northern Ireland, all NAVAIDS are located on land and the offshore wind farm area is outside the relevant safeguarding distances as per ICAO EUR DOC 015 (ICAO, 2015) and CAP 670 (CAA, 2019).

### Military Radar

In Ireland, military ATS are provided by the Irish Air Corps using radar data fed directly from IAA-operated PSRs. At Casement Aerodrome for example (70 km southwest of the offshore wind farm area), military controllers provide ATS using radar data from the Dublin Airport PSR. Ireland's DoD has no dedicated PSRs that require safeguarding from the potential effects of the offshore wind farm area.

The UK MOD is responsible for defence and security of UK airspace. The closest Air Defence (AD) radar in the UK to the Project is at Brizlee Wood, over 300 km away in the northeast of England. There are no AD, or ATC, radars on the west coast of mainland UK that could have line of sight to the Project.

### Meteorological radar

Meteorological radar detects precipitation and estimates its type, severity and often its motion. They are typically safeguarded within 30 km of their location (Meteo France, 2010). Met Eireann has operational radars at Dublin and Shannon airports, and there is also a meteorological radar at Castor Bay in Northern Ireland. No meteorological radar has been identified within 30 km of the offshore wind farm area.

## 14.7.8 Communications

Communication devices considered within this chapter include, satellite communication, VHF radio, UHF communication, offshore microwave fixed links and television.

Military and civil aviation rely on Communications, Navigational and Surveillance (CNS) infrastructure to support airspace and air traffic management. Satellite communication users include surface vessels or rigs/platforms. VHF radio is used by large commercial container ships, offshore service vessels, fishing vessels and pleasure craft in the marine band (approximately 156 to 174 MHz) for ship-to-ship, ship-to-platform and ship-to-shore voice communication. Vessel communications are considered within chapter 13: Shipping and Navigation.

UHF wireless point-to-point links and offshore microwave links in the vicinity of the Project have been identified through consultation (see Table 14-3). There are no UHF or microwave fixed links within 1 km of the offshore wind farm area (see appendix 14-2: Communications Technical Report).

Digital terrestrial television services, Saorview, are transmitted by 2RN. Digital satellite and digital cable are also widely used. The closest Saorview transmitter to the Project is at Clermont Carn which also covers part of Northern Ireland. Terrestrial television signals from this transmitter will not be affected. There are also local relay transmitters at Greenore to the north and Drogheda to the south (FreeTV, 2019), however terrestrial television signals from these transmitters will not be affected. The Kippure transmitter in County Wicklow also provides coverage to households in Northern Ireland and is the transmitter most likely to be affected by the Project. This is because its signals are received beyond the location of the Project i.e. the transmissions pass over the wind turbines.

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### 14.7.9 Future baseline scenario

The European Union (Planning and Development) (Environmental Impact Assessment) Regulations 2018 (hereafter the EIA Regulations 2018) require that “a description of the relevant aspects of the current state of the environment (baseline scenario) and an outline of the likely evolution thereof without development as far as natural changes from the baseline scenario can be assessed with reasonable effort on the basis of the availability of environmental information and scientific knowledge” is included within the EIAR.

In the event that the Project is not constructed, an assessment of the future baseline conditions has been carried out and is described within this section.

A Government decision was made in September 2019 to stop accepting new applications for oil exploration, leading to authorisations for oil exploration dropping by 45% between September 2019 and December 2020 (DCCA, 2021). In addition, the Climate Action and Low Carbon development (Amendment) Act 2021, signed into law in July 2021, commits the Government to moving to a climate-neutral economy by 2050 and formalises a ban on authorisations for oil exploration and prospecting. The Programme for Government: our Shared Future sets a clear pathway towards less reliance on fossil fuels and specifically contains commitments to end the issuing of licences to explore and extract gas (DCCA, 2021). Given the clear pathway set by Government, and the absence of gas fields and associated exploration activity (see section 14.7.5), there is no indication that the area in the vicinity of the offshore wind farm area will be targeted for oil or gas exploration in the future and therefore won't result in increase in helicopter services.

There is potential for considerable growth in offshore wind energy. Ireland's Climate Action Plan 2023 sets out a target for at least 7 GW of electricity generated from offshore renewable sources by 2030 (Department of the Environment, Climate and Communications, 2022). In the UK, new leasing sites for offshore wind through Round 4 and ScotWind Leasing now being offered. This development may see an increase in helicopter service provision in the Irish Sea for other offshore wind farms, however new marine technology using marine service and accommodation vessels equipped with walk-to-work systems is offering an alternative to helicopters for the wind energy and oil and gas industries which may reduce the potential for any future helicopter activity in this area.

The national aviation policy was launched in 2015 with goals to enhance Ireland's connectivity by ensuring safe, secure and competitive access responsive to the needs of business, tourism and consumers; foster the growth of aviation enterprise in Ireland to support job creation and position Ireland as a recognised global leader in aviation; and maximise the contribution of the aviation sector to Ireland's economic growth and development. In line with this policy, plans for airport expansion are underway; this includes a new runway at Dublin Airport (opened in August 2022) which is set to increase the capacity of the airport by 10 million passengers and the number of commercial flights using the airport.

### 14.7.10 Data validity and limitations

The data used in this chapter is detailed in 14.6.1 above. The data used are the most up to date publicly available information which can be obtained from the applicable data sources as cited. Data has also been provided through consultation as detailed in section 14.5. It is considered that the data employed in the assessment are robust and sufficient for the purposes of the impact assessment presented.

## 14.8 Key parameters for assessment

### 14.8.1 Project design parameters

The project description is provided in volume 2A, chapter 5: Project Description. Table 14-5 outlines the project design parameters that have been used to inform the assessment of potential impacts on the construction, operation and maintenance and decommissioning phases of the Project on aviation, military and communications.

The final height of each WTG will be confirmed following detailed geotechnical investigations and analysis of ground conditions (see design flexibility details in chapter 5: Project Description (volume 2A)). For the purposes of the assessment presented in section 14-10, the maximum height of WTG has been considered to ensure the potential for maximum impact on communications is assessed. Should the WTGs be less than those specified, then the potential for effects will be less than what is outlined in section 14.10.

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**Table 14-5: Project design parameters considered for the assessment of potential impacts on aviation, military and communications.**

Potential impact	Phase <sup>1</sup>			Project design parameters	Justification
	C	O	D		
Cable installation activities at the landfall may restrict hang gliding and paragliding activities	✓	✗	✓	<b>Construction and Decommissioning Phase</b> <ul style="list-style-type: none"> <li>Installation of offshore cable via open trenching;</li> <li>Landfall installation over a period of three months.</li> </ul>	Cable installation at the landfall via open trenching over a period of three months represents the maximum duration.
Presence of wind turbines may interfere with television signals	✗	✓	✗	<b>Operational and Maintenance Phase</b> <ul style="list-style-type: none"> <li>25 wind turbines with a maximum tip height of 270 m above LAT within an area of 27.7 km<sup>2</sup>; and</li> <li>Operational phase of 40 years.</li> </ul>	Wind turbine tip height leading to maximum potential for interference with television broadcast systems.

1. C= Construction, O = Operation, D = Decommissioning.

### 14.8.2 Measures included in the Project

As part of the project design process, a number of measures have been proposed to reduce the potential for impacts on aviation, military and communications (see Table 14-6). These measures include designed-in and management measures (controls). As there is a commitment to implementing these measures, they are considered inherently part of the design of the Project and have therefore been considered in the assessment presented in section 14.10 below (i.e. the determination of magnitude and therefore significance assumes implementation of these measures). These measures are considered standard industry practice for this type of development.

**Table 14-6: Measures included in the Project.**

Measures includes in the Project	Justification
<b>Civilian and Military Aviation Interests</b>	
All significant peripheral structures, to the highest point of the structure, will be fitted with high intensity warning lighting. Specific requirements are listed in IAA ASAM No: 018 (IAA, 2015a).	To meet IAA requirements as listed in IAA ASAM No:18 (IAA, 2015a) and to ensure appropriate lighting is in place to facilitate aeronautical safety.
Implementation of a Lighting and Marking Plan (LMP) (see appendix 5-8 in volume 2A of the EIAR) setting out specific requirements in terms of aviation lighting to be installed on the turbines. The LMP will be prepared in consultation with the IAA, DoD and IRCG.	To ensure appropriate lighting is in place to facilitate aeronautical safety.
The IAA will be informed of the locations, heights and lighting status of the wind turbines, including estimated and actual dates of construction and the maximum heights of any construction equipment to be used, prior to the start of construction, to allow inclusion on Aviation Charts and in the IAA IAIP.	To comply with OREDP (DCCAE, 2014) which requires the IAA to be notified of the construction and location of wind turbines.
During the operational phase, the Project operator will issue, as necessary, requests to the IAA to submit Aeronautical Information Circulars (AIC) in the event of any failure of aviation lighting. Any light which fails shall be repaired or replaced as soon as is reasonably practicable. An alerting system for light failure will be put in place, such as remote monitoring or other suitable method agreeable to the IAA.	To comply with IAA ASAM No.18 (IAA, 2015a) which contains the policy on actions in the event of the failure of aviation warning lights on offshore wind turbines listed in the IAA IAIP.
All structures > 90 m amsl in height will be charted on aeronautical charts and reported to the IAA at least three	An object which is higher than 90 m in height is considered to have significance for the en-route operations of aircraft in Irish airspace.



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Measures includes in the Project	Justification
months prior to construction, for input into the IAA's database of tall structures in Ireland.	
IAA and IRCG will be consulted on the final layout of the Project to ensure compatibility with SAR helicopter operations in the event of rescue missions within the wind farm.	To ensure compatibility between marine navigation and SAR helicopter operations in terms of lighting requirements.
A minimum spacing of 500 m will be maintained between blade tip to blade tip of all surface infrastructure (for OSS, this shall be taken as the outermost point of the infrastructure).	To facilitate access by SAR helicopters operating under Instrument Meteorological Conditions (IMC) flight rules, in line with UK guidance (MCA, 2020, Offshore Renewable Energy Installations: Requirements, Guidance and Operational Considerations for SAR and Rescue and Emergency Response).
An Emergency Response and Cooperation Plan (ERCoP) will be in place for the operational and maintenance phase of the Project (see appendix 5-7 in volume 2A). The ERCoP details specific marking and lighting of the wind turbines and will consider helicopters undertaking SAR operations when rendering assistance to vessels and persons in the offshore wind farm area.	To ensure appropriate lighting is in place to facilitate aeronautical safety during SAR operations.
Promulgation of information advising on the nature, timings and location of construction and decommissioning activities at the landfall location. Information and notices will be posted at the landfall location.	To help ensure that as many interested parties as possible are aware of the landfall installation activities and the need to avoid the area during the construction/decommissioning period.
The Applicant will continue to consult with the DoD to better understand their aviation lighting requirements.	This will maintain safety in relation to defence aviation activities undertaken in the vicinity of the Project.

### 14.8.3 Impacts scoped out of the assessment

On the basis of the baseline environment and the project description outlined in volume 2A, chapter 5: Project Description, a number of impacts are proposed to be scoped out of the assessment for aviation, military and communications. These impacts are outlined, together with a justification for scoping them out, in Table 14-7.

**Table 14-7: Impacts scoped out of the assessment for aviation, military and communications.**

Potential Impact	Justification
Impact on aviation, military and communications from onshore elements of the Project.	Onshore infrastructure of the Project includes the onshore substation site and the onshore cable, which is buried. The highest part of the onshore infrastructure will be the substation terminal tower/line-cable interface mast which will be 27 m tall. There are no airports or aerodromes within a dedicated safeguarding area 20 km from the onshore substation site with several large towns between the onshore substation site and nearest aviation facilities which are likely to contain building of greater height than the Project infrastructure. The onshore elements of the Project will not cause a safeguarding or safety issue to surrounding aviation facilities. This impact has therefore been scoped out of further assessment.
Helicopter operations may affect the available air space for other users	Helicopters will be used for emergency purposes only. Due to the very low level of activity anticipated, and as no regular users of the airspace over the offshore wind farm area have been identified, this impact has been scoped out of further assessment.
Project activities and associated vessel movements may interfere with operations within the military firing range at Gormanston	Gormanston Military Aerial Firing Range is located 6.5 km from the offshore cable corridor and 9.8 km from the offshore wind farm area; consequently, there is no spatial overlap with the Project construction, operational and maintenance or decommissioning activities.
Wind turbines will form an aerial obstruction resulting in disruption to helicopter traffic	The presence of wind turbines during the operational and maintenance phase, beneath a helicopter route could result in helicopters either being required to fly at a higher MSA in order to maintain a safe vertical separation from the wind turbines or to deviate around the wind turbines. There are no identified routine flight paths from any of the Irish east coast helicopter bases that cross the offshore wind farm area. As no

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Potential Impact	Justification
	regular users of the airspace have been identified, and due to the measures included in the Project, which ensure that wind turbines are lit in accordance with IAA ASAM No.18 (IAA, 2015a) and informing the IAA of the locations, heights and lighting status of the wind turbines (Table 14-6: Measures included in the Project.), this impact has been scoped out of further assessment.
Impact of physical presence of the wind turbines on fixed wing aircraft	Military and civilian aircraft will be made aware of the location of the Project as all structures will appear in the IAIP and will be marked and lit in accordance with the measures included in the Project (Table 14-6). This impact has therefore been scoped out of further assessment.
Impact of wind turbines on meteorological radar	Meteorological radars in Ireland and Northern Ireland are located onshore and have a safeguarding range of 30 km. As there are no meteorological radars within 30 km of the offshore wind farm area, this impact has been scoped out of further assessment.
Impact of wind turbines on civilian ATC operations and NAVAIDs	<p>Civilian ATC radar within possible line of sight of the Project have been identified and considered within appendix 14-1: Aviation Technical Report and section 14.7.7 of this chapter; this includes PSR and SSR. IAA, the owner and operator of radar systems and NAVAIDs in Ireland, were consulted and confirmed that there will be no impact on IAA operations or NAVAIDs but that the turbines will need to be lit and marked in accordance with published IAA guidance. The IAA has further requested that a high-level IFP assessment be carried out in order to inform the lighting requirements; it was also noted that no issues are anticipated (see Table 14-1). The Applicant has undertaken to commission an IFP assessment at a suitable time to be agreed with IAA.</p> <p>NATS were consulted with respect to their UK-based ATC radar. Their response identified no key issues, and review of the NATS safeguarding maps, confirmed that no impact is expected on any NATS radar systems.</p> <p>No other PSR or SSR are considered relevant based on their distance from the offshore wind farm area; consequently, this impact has been scoped out of further assessment.</p>
Impact of wind turbines on military radar systems and landing aids	<p>The closest Military AD radar is in the northeast of England (over 300 km away). Wind turbines (270 m in height above LAT) within the offshore wind farm area will not be visible to this radar. No AD radars are located in the Republic of Ireland or Northern Ireland. The MOD has been consulted on the Project and confirmed that there would no impact caused by the offshore wind farm area and offshore cable corridor on their operations; (see Table 14-3).</p> <p>There are no military radar systems in the Republic of Ireland. Military air traffic controllers provide ATS using radar data fed from IAA PSR systems. DoD has been consulted on the potential impact of the offshore wind farm area and offshore cable corridor and they have confirmed that there will be no impact on their operations and landing aids (Table 14-3); consequently, this impact has been scoped out of further assessment.</p>
Impact of wind turbines on cellular telephones	There will be no users of cellular telephones within in the vicinity of the wind turbines within the offshore wind farm area in the operational and maintenance phase. Consultation has been carried out with BT, Ericsson, Three, Vodafone (UK) and Vodafone (Ireland) who confirmed that the Project will have no impact on their telephone services (Table 14-3). This impact has therefore been scoped out of further assessment.
Impact of wind turbines on microwave links	There are no identified microwave links in the vicinity of the offshore wind farm area. Consultation has been carried out with Imagine Group, Ericsson, ESB and EIR, who all confirmed that the Project will have no impact on their microwave links (Table 14-3). This impact has therefore been scoped out of further assessment.
Impact of wind turbines on offshore communications systems	The North Hoyle trials (DfT, 2004) indicated that wind turbines had no noticeable effects upon any voice communication system, vessel-to-vessel or vessel-to-shore station; these included ship-borne, shore-based and hand-held VHF transceivers and mobile telephones. Digital selective calling (DSC) was also satisfactorily tested. There are no other radio systems operated by utility companies within the vicinity of the Project (Table 14-3). This impact has therefore been scoped out of further assessment.
Impact of wind turbines on Dublin Airport, Belfast International and Belfast City airport operations	The Project wind turbines will not affect operations at Dublin Airport, Belfast City Airport or Belfast International Airport as they are located beyond the 30 km safeguarding distance as defined in CAP 738 (CAA, 2016). Consultation with Dublin Airport, Belfast International Airport and Belfast City Airport has advised that the Project will not have any adverse impact on airport operations and that the turbines

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Potential Impact	Justification
Impact of wind turbine turbulence on gliding, parachuting, hang gliding, paragliding or microlight operations	<p>will be outside the line of sight of the Belfast City Airport radar (Table 14-3). This impact has therefore been scoped out of further assessment.</p> <p>Turbulence may affect aircraft during critical stages of flight, or those involved in very light sport aviation such as gliding, parachuting, hang gliding, paragliding or microlight operations. Turbulence is caused by the wake of the turbine which extends downwind behind the blades and the tower. CAP 764 advises that turbulence affects from wind turbines should be considered for light aircraft. There is no defined separation distance for turbulence as it depends on convection, turbulence diffusion, topography, obstacles and atmospheric conditions. From modelled data, a worst-case scenario of 16 x the rotor diameter is cited as the distance required to avoid the effects of turbulence.</p> <p>Consultation has taken place with the IHPA which indicated that during winter, hang gliders may fly out 1 km over the sea. Considering this distance, the Project wind turbines may create turbulence effects which may be detectable to light aircraft at 3.5 km from the offshore wind farm area boundary. At a distance of 5 km from the shore, the potential turbulence is not considered to extend to these flying sites; consequently, turbulence impact on gliding, parachuting, hang gliding, paragliding or microlight operations has been scoped out of further assessment.</p>
Wind turbines may affect SAR helicopter operations	<p>SAR flights are not restricted by the normal rules of flight and can fly closer to wind turbines than other aircraft. The offshore wind farm area covers a relatively small area (27.7 km<sup>2</sup>) therefore there is limited potential for disorientation. As part of the measures included in the Project, IAA and IRCG will be consulted on the final layout of the offshore wind farm area to ensure compatibility with SAR helicopter operations in the event of rescue missions within the wind farm. This will ensure compatibility between marine navigation and SAR helicopter operations in terms of lighting requirements. Furthermore, a minimum spacing of 500 m will be maintained between blade tip to blade tip of all surface infrastructure (for the OSS, this will be taken as the outermost point of the infrastructure).</p> <p>Consultation with the IRCG will also include development of an ERCoP (see appendix 5-8 in volume 2A of the EIAR) which will be finalised in advance of construction of the Project; this will consider helicopters undertaking SAR operations when rendering assistance to vessels and persons in the offshore wind farm area (see Table 14-6). This impact has therefore been scoped out of further assessment.</p>

## 14.9 Impact assessment methodology

### 14.9.1 Overview

The assessment on aviation, military and communications has followed the methodology set out in volume 2A, chapter 3: Environmental Impact Assessment Methodology. Specific to the aviation, military and communications EIA, the following guidance documents have also been considered:

- IAA (2015a) ASAM, Guidance Material on Offshore Wind Farms, ASAM No 018;
- Guidance on EIS and NIS Preparation for Offshore Renewable Energy Projects (DCCAE and SEAI, 2017);
- RenewableUK (2016) RenewableUK Members' Briefing Note, Aviation Safeguarding and Radar Mitigation: Introductory Overview, Issue 1;
- Guidance Documents for Offshore Renewable Energy Developers (DECC, 2021);
- Civil Aviation Publication (CAP) (2016) 764 CAA Policy and Guidelines on Wind Turbines, Sixth Edition; and
- Offshore Renewable Energy Development Plan (DCCAE, 2014).



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### 14.9.2 Impact assessment criteria

Determining the significance of effects involves defining the magnitude of the impacts and the sensitivity of the receptors. This section describes the criteria applied in this chapter to assign values to the magnitude of potential impacts and the sensitivity of the receptors. The terms used to define magnitude and sensitivity are based on those which are described in further detail in volume 2A, chapter 3: Environmental Assessment Methodology.

The criteria for defining impact magnitude in this chapter are outlined in Table 14-8 below.

**Table 14-8: Definition of terms relating to the magnitude of an impact.**

Magnitude of impact	Definition
High	Total loss of ability to carry on activities and/or impact is of extended physical extent and/or long-term duration (i.e. total life of project and/or frequency of repetition is continuous and/or effect is not reversible for project).
Medium	Loss or alteration to significant portions of key components of current activity and/or physical extent of impact is moderate and/or medium-term duration (i.e. operational period) and/or frequency of repetition is medium to continuous and/or effect is not reversible for project phase.
Low	Minor shift away from baseline, leading to a reduction in level of activity that may be undertaken and/or physical extent of impact is low and/or short to medium term duration (i.e. construction period) and/or frequency of repetition is low to continuous and/or effect is not reversible for project phase.
Negligible	Very slight change from baseline condition and/or physical extent of impact is negligible and/or short-term duration (i.e. less than two years) and/or frequency of repetition is negligible to continuous and/or effect is reversible.

The criteria for defining receptor sensitivity in this chapter are outlined in Table 14-9 below.

**Table 14-9: Definition of terms relating to the sensitivity of the receptor.**

Sensitivity	Definition
High	Receptor or the activities of the receptor, is of high value to the local, regional or national economy and/or the receptor or the activities of the receptor, is generally vulnerable to impacts that may arise from the project and/or recoverability is slow and/or costly.
Medium	Receptor or the activities of the receptor, is of moderate value to the local, regional or national economy and/or the receptor or the activities of the receptor, is somewhat vulnerable to impacts that may arise from the project and/or has moderate to high levels of recoverability.
Low	Receptor or the activities of the receptor, is of low value to the local, regional or national economy and/or the receptor or the activities of the receptor, is not generally vulnerable to impacts that may arise from the project and/or has high recoverability.
Negligible	Receptor or the activities of the receptor, is of negligible value to the local, regional or national economy and/or the receptor or the activities of the receptor, is not vulnerable to impacts that may arise from the project and/or has high recoverability.

The significance of the effect upon aviation, military and communications is determined by correlating the magnitude of the impact and the sensitivity of the receptor. The particular method employed for this assessment is presented in Table 14-10.

Where a range of significance of effect is presented in Table 14-10, the final assessment for each effect is based upon expert judgement. For the purposes of this assessment, any effects with a significance level of slight or less have been concluded to be not significant in terms of the EIA Regulations.

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**Table 14-10: Matrix used for the assessment of the significance of the effect.**

		Magnitude of impact			
		Negligible	Low	Medium	High
Sensitivity of receptor	Negligible	Imperceptible	Imperceptible or slight	Imperceptible or slight	Slight
	Low	Imperceptible or slight	Imperceptible or slight	Slight	Slight or moderate
	Medium	Imperceptible or slight	Slight	Moderate	Moderate or major
	High	Slight	Slight or moderate	Moderate or major	Major or Profound

### 14.10 Assessment of significance

The potential impacts arising from the construction, operational and maintenance and decommissioning phases of the Project are listed in Table 14-5, along with the project design parameters against which each impact has been assessed.

A description of the potential effect on aviation, military and communications receptors caused by each identified impact is given below.

#### 14.10.1 Cable installation activities at the landfall may restrict hang gliding and paragliding activities

##### Construction phase

##### Magnitude of impact

Installation of the offshore cable at the landfall may restrict hang gliding and paragliding activities. The project design includes for installation of the offshore cable via open trenching, over a period of three months.

An approximate hang gliding and paragliding launch and landing site has been identified in the vicinity of the cable landfall at Dunany Point (Figure 14-1), however consultation with the IHPA has advised that landings could occur anywhere along the coast in this area.

During the construction phase, there will be temporary restriction on activities at this site during cable installation. There are likely to be temporary restrictions on access to the beach which will prevent use of this area of the beach as a landing site. The temporary restriction will be of short-term duration during the installation period of three months. Hang gliding and paragliding recreational activities will be able to resume immediately once cable installation is complete.

The impact is predicted to be of local spatial extent, short term duration, continuous and high reversibility. It is predicted that the impact will affect the receptor directly. The magnitude is therefore, considered to be negligible.

##### Sensitivity of the receptor

There are several other launch and landing sites that can be used by hang gliders and paragliders around Dundalk Bay that are in close proximity and make use of similar wind directions. These sites are located at Gyles Quay and Slievenaglogh. As part of the pre-application consultation process, IHPA were consulted and confirmed the existence of these sites that are regularly used around Dundalk Bay.

The nature, timings and location of installation activities at the landfall will be promulgated and information and notices will be posted at the landfall location to help ensure that as many interested parties as possible are aware of the activities and the need to avoid the area during the construction period.

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The recreational receptor is deemed to be of medium vulnerability, high recoverability and low value. The sensitivity of the receptor is therefore, considered to be low.

### Significance of the effect

Overall, the magnitude of the impact is deemed to be negligible and the sensitivity of the receptor is considered to be low. The effect will, therefore, be of **slight adverse significance**, which is not significant in EIA terms.

### Decommissioning phase

The effects of decommissioning activities are expected to be the same or similar to the effects from construction. The effect will therefore be of **slight adverse significance**, which is not significant in EIA terms.

## 14.10.2 Presence of wind turbines may interfere with television signals

### Operational and maintenance phase

#### Magnitude of impact

The presence of wind turbines within the offshore wind farm area may interfere with terrestrial television signals. The project design includes for 25 wind turbines of 270 m in height above LAT, within the offshore wind farm area of 27.7 km<sup>2</sup>. The Project operational phase is 40 years.

As described in Section 14.7.8, the national digital terrestrial television service in Ireland is transmitted by 2RN. Consultation with 2RN has advised the potential for the Project to impact upon broadcast television services in coastal areas of Northern Ireland, where some viewers receive their signal from a transmission hub in Kippure, County Wicklow. Whilst these viewers are outside the Republic of Ireland, they have the expectation of coverage due to 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).

As part of pre-application consultation, 2RN has conducted a television interference assessment adapting simple models used to assess the impacts of onshore wind farm projects. The results of this modelling have shown that the line-of-sight path from the transmitter passes directly through the offshore wind farm area. There is potential for the Project to block the path for viewers along a localised coastal stretch of Northern Ireland, approximately between Ballymartin and Newcastle, and between Dundrum and Kilclief. No other television signal operator identified any potential for interference (see Table 14-3).

The affected areas are mainly rural in nature, and 2RN anticipate that the number of potential viewers affected would be low. An initial review of satellite imagery for the area has identified a small number of households with antennas pointing south towards the Kippure transmitter.

Impacts upon affected dwellings could vary depending on the orientation of the wind turbines and the weather conditions. Impacts could range from:

- A drop in the terrestrial television signal strength with no noticeable effect upon the television services received;
- Minor pixilation resulting in watchable services and intermittent disruption; and
- Complete loss of terrestrial television signal.

Any impacts are typically managed post-consent through the appropriate planning conditions and should any new communications infrastructure be identified prior to construction, further consultation with the communications provider will be undertaken.

The impact is predicted to be of local spatial extent, long term duration, continuous and high reversibility. It is predicted that the impact will affect the receptor directly. The magnitude is therefore, considered to be low.

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### Sensitivity of the receptor

Terrestrial television signals and receivers have a certain ability to withstand interference effects. For example, a signal which was previously of high signal strength may be reduced to moderate signal strength without there being any impact upon the services received. 2RN stated that receivers will likely receive their signal from the Kippure mast in County Wicklow, or from Three Rock. There are no other local transmitters as the sites at Clermont Carn and Greenore are screened by terrain. Therefore, there is no terrestrial alternative should the Kippure signals be received and be affected by the Project. There are however alternative transmission options (such as the use of free-to-air satellite television services) that would mitigate any significant impact upon terrestrial television services. Solutions include the installation of SAORSAT or a Freesat dish.

Based on the ability for a terrestrial television signal and receivers to absorb effects, there being very few predicted receivers and mitigation being available the receptors are deemed to be of medium vulnerability, high recoverability and low value. The sensitivity of the receptor is therefore, considered to be low.

### Significance of the effect

Overall, the magnitude of the impact is deemed to be low and the sensitivity of the receptor is considered to be low. The effect will, therefore, be of **slight adverse significance**, which is not significant in EIA terms.

### 14.10.3 Mitigation and residual effects

For cable installation activities, the assessment of impacts has concluded that there are no significant effects and therefore it is considered that no measures over those included in the Project (as outlined in section 14.8.2) are required. To mitigate potential effects on television services for households in coastal areas of Northern Ireland, the Applicant will carry out a survey prior to construction to confirm the number of households potentially affected by interference to television signals, and further discussions will take place with 2RN to agree a plan to either improve terrestrial television receiving reception equipment, or transfer of terrestrial television antennae to free to air satellite dishes if required.

### Residual effects

With the implementation of the mitigation outlined above, the residual effect on terrestrial television signals will be Imperceptible, which is not significant in EIA terms.

### 14.10.4 Future monitoring

No further aviation, military and communications monitoring to test the predictions made within the impact assessment is considered necessary.

## 14.11 Cumulative Impact Assessment (CIA)

### 14.11.1 Methodology

The Cumulative Impact Assessment (CIA) takes into account the impact associated with the Project together with other projects. The projects selected as relevant to the CIA presented within this chapter are based upon the results of a screening exercise (see volume 2A, appendix 3.1: CIA Screening Annex). Each project has been considered on a case-by-case basis for screening in or out of this chapter's assessment based upon data confidence, effect-receptor pathways and the spatial/temporal scales involved.

The approach to CIA examines the effects of the Project alongside the following projects if they fall within the study area for communications.

- Other projects with consent but not yet constructed/construction not completed:
- Other projects in a consent application process but not yet determined (including planning applications, foreshore lease/licence applications, Dumping at Sea Permit applications)
- Other projects currently operational that were not operational when baseline data were collected, and/or those that are operational but have an ongoing impact; and



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- Projects, which satisfy the definition of ‘relevant maritime usage’ under the Maritime Area Planning Act (2021) (i.e. wind farm projects designated as ‘Relevant Projects’ or ‘Phase 1 Projects’) including Arklow Bank II, Bray Bank and Kish Bank; North Irish Sea Array, Codling Wind Park (I and II.)

As impacts on aviation were scoped out, there is no potential for cumulative effects. No projects were screened in for the CIA for communications as no projects were located within the 1 km study area.

### 14.12 Transboundary effects

The Aviation, Military and Communications Study Area extends into Northern Ireland and the UK. However, there is no potential for significant transboundary effects with regard to aviation upon the interests of the United Kingdom and EEA States as aviation impacts have been scoped out. The Applicant will continue to engage with the relevant aviation stakeholders to ensure no issues arise.

There is potential for the Project to impact upon broadcast television services in coastal areas of Northern Ireland (see section 14.10.2). The effect is considered to be of **slight adverse significance**, which is not significant in EIA terms.

### 14.13 Interactions

A description of the likely interactions arising from the Project on aviation, military and communications is provided in volume 2C, chapter 32: Interactions.

### 14.14 Conclusion and summary of impacts, mitigation measures and residual effects

Information on aviation, military and communications receptors within the Aviation, Military and Communications Study Area was collected through a desk top study (Table 14-4) and consultation (Table 14-3). Line of sight analysis was undertaken to assess potential impacts on aviation radar (see appendix 14-1 Aviation Technical Report).

Table 14-11 presents a summary of the potential impacts, mitigation measures and residual effects in respect to aviation, military and communications.

The impacts assessed include:

- Cable installation activities at the landfall may restrict hang gliding and paragliding activities; and
- Presence of wind turbines may interfere with television signals.

Overall, it is concluded that there will be no significant effects arising from the Project during the construction, operational and maintenance or decommissioning phases.

A screening exercise was carried out to inform the CIA. No other projects or plans were screened into the assessment.

Potential transboundary impacts have been identified in relation to the potential for impact upon broadcast television services for viewers in Northern Ireland. Overall, it is concluded that there will be no significant transboundary effects arising from the Project.

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**Table 14-11: Summary of potential environment effects, mitigation and monitoring.**

Description of impact	Phase			Measures included in the Project	Magnitude of impact	Sensitivity of receptor	Significance of effect	Additional measures	Residual effect	Proposed monitoring
	C	O	D							
Cable installation activities at the landfall may restrict hang gliding and paragliding activities.	✓	✗	✓	Promulgation of information advising on the nature, timings and location of activities at the landfall. Information and notices will be posted at the landfall location. To help ensure that as many interested parties as possible are aware of the activities and the need to avoid the area during the construction/decommissioning period.	C: Negligible D: Negligible	Low	C: Slight adverse D: Slight adverse	None	Slight adverse	None
Presence of wind turbines may interfere with television signals.	✗	✓	✗	None	O: Low	Low	O: Slight adverse	The Applicant will carry out a survey prior to construction to confirm the number of households potentially affected by interference to television signals, and further discussions will take place with 2RN to agree mitigation if required.	Imperceptible	None

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### References

CAA (2016) CAP 764 Policy and Guidelines on Wind Turbines, Sixth Edition. Available at 14561 (caa.co.uk). Accessed 07/03/2024.

CAA (2019) CAP 670, Air Traffic Services Safety Requirements, Third Issue. Available at: 17362 (caa.co.uk). Accessed 07/03/2024.

Department of Communications, Climate Action & Environment (DCCAE) and Sustainable Energy Authority of Ireland (SEAI) (2017) Guidance on EIS and NIS preparation for Offshore Renewable Energy Projects. Available at MDB Report Template - 6a82b451-e09f-483b-849e-07d4c7baa728.pdf (www.gov.ie). Accessed 07/03/2024.

DCCAE (2014) Offshore Renewable Energy Development Plan. Available at: <https://www.dccae.gov.ie/documents/20140204%20DCENR%20-%20Offshore%20Renewable%20Energy%20Development%20Plan.pdf>. Accessed 07/03/2024.

Department of Communications, Climate Action & Environment (DCCAE) (2021) Amendments to the Petroleum and Other Minerals Development Act 1960. Available at: <https://www.gov.ie/ga/foilsiuochan/a77ee-amendments-to-the-petroleum-and-other-minerals-development-act-1960/>. Last updated 07/03/2024.

Department of Communications, Climate Action & Environment (DCCAE) (2022) Acreage Reports and Concession Maps. Available at <https://www.gov.ie/en/publication/10d43-acreage-reports-and-concession-maps/#2022>. Accessed 07/03/2024.

Department of Defence (2019) Role of the Department of Defence. Available at: <https://www.gov.ie/en/organisation-information/b168ab-role-of-the-department-of-defence/>. Accessed 07/03/2024.

Department of the Environment, Climate and Communication (DECC) (2021). Guidance Documents for Offshore Renewable Energy Developers. Available at: gov.ie - Guidance Documents for Offshore Renewable Energy Developers (www.gov.ie) Accessed 07/03/2024.

Department of Transport, Tourism and Sport (DTTAS), Department of Defence (DoD), Irish Aviation Authority (IAA) and Irish Air Corps (IAC) (2014) Application of flexible use of airspace in Ireland, Inter Agency Agreement, Version 2.0. Available at: [https://www.iaa.ie/docs/default-source/misc/application-of-flexible-use-of-airspace-in-ireland.pdf?sfvrsn=8c630df3\\_0](https://www.iaa.ie/docs/default-source/misc/application-of-flexible-use-of-airspace-in-ireland.pdf?sfvrsn=8c630df3_0). Accessed 07/03/2024.

DTTAS (2019). The Irish Coast Guard. Available at: gov.ie - The Irish Coast Guard (www.gov.ie). Accessed 07/03/2024.

Department of Housing, Planning and Local Government (DHPLG) (2021) National Marine Planning Framework. Available at: <https://www.gov.ie/en/publication/60e57-national-marine-planning-framework/>. Accessed 07/03/2024.

Environmental Protection Agency (EPA) (2022) Guidelines on the information to be contained in Environmental Impact Assessment Reports (EIAR). Available at: <https://www.epa.ie/publications/monitoring--assessment/assessment/guidelines-on-the-information-to-be-contained-in-environmental-impact-assessment.php>. Accessed 07/03/2024.

FreeTV (2019) Saorview Transmitter & Substation Map. Available at: <https://www.freetv.ie/saorview-coverage>. Accessed 07/03/2024.

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 at: <https://www.dccae.gov.ie/documents/UKNIROIMOUFeb2010.pdf>. Accessed 07/03/2024.

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IAA (2006) AIP Ireland, ENR 3.4 Helicopter Routes. Available at: [http://iaip.iaa.ie/iaip/Published%20Files/AIP%20Files/ENR/EI\\_ENR\\_3\\_4\\_EN.pdf](http://iaip.iaa.ie/iaip/Published%20Files/AIP%20Files/ENR/EI_ENR_3_4_EN.pdf). Accessed 07/03/2024.

IAA (2015a) Aeronautical Services Advisory Memorandum (ASAM), Guidance Material on Offshore Wind Farm, ASAM No 018. Available at: [https://www.iaa.ie/docs/default-source/publications/advisory-memoranda/aeronautical-services-advisory-memoranda-\(asam\)/guidance-material-on-off-shore-wind-farms.pdf?sfvrsn=5aad0df3\\_6](https://www.iaa.ie/docs/default-source/publications/advisory-memoranda/aeronautical-services-advisory-memoranda-(asam)/guidance-material-on-off-shore-wind-farms.pdf?sfvrsn=5aad0df3_6). Accessed 07/03/2024.

IAA (2019) Use of an unlicensed aerodrome by aircraft engaged in instruction in flying, Aeronautical Notice T.15, Issue 1, 06/09/19. Available at: [https://www.iaa.ie/docs/default-source/publications/aeronautical-notices/t---notices-to-aerodrome-licence-holders/use-of-an-unlicensed-aerodrome-by-aircraft-engaged-in-instruction-in-flying.pdf?sfvrsn=664f00f3\\_4](https://www.iaa.ie/docs/default-source/publications/aeronautical-notices/t---notices-to-aerodrome-licence-holders/use-of-an-unlicensed-aerodrome-by-aircraft-engaged-in-instruction-in-flying.pdf?sfvrsn=664f00f3_4). Accessed 07/03/2024.

IAA (2021a) AIP Ireland, ENR 1.3 Instrument Flight Rules. Available at: [EI\\_ENR\\_1\\_3\\_EN.pdf](#) (airnav.ie). Accessed 07/03/2024.

IAA (2021b) AIP Ireland, AD 1.3, Index to aerodromes and heliports. Available at: [EI\\_AD\\_1\\_3\\_EN.pdf](#) (airnav.ie). Accessed 07/03/2024.

IAA (2022a) AIP Ireland, ENR 1.6 Radar Services and procedures. Available at: [EI\\_ENR\\_1\\_6\\_EN.pdf](#) (airnav.ie). Accessed 07/03/2024.

IAA (2022b) AIP Ireland, ENR 2.1 Air Traffic Services Airspace. Available at: [EI\\_ENR\\_2\\_1\\_EN.pdf](#) (airnav.ie). Accessed 07/03/2024.

IAA (2023a) AIP Ireland, ENR 5.2: Military exercise and training areas. Available at: [EI\\_ENR\\_5\\_2\\_EN-\(1\).pdf](#) (airnav.ie). Accessed 07/03/2024.

IAA (2023b) AIP Ireland, ENR 5.5 Aerial sporting and recreational activities. Available at: [EI\\_ENR\\_5\\_5\\_EN-\(1\).pdf](#) (airnav.ie). Accessed 07/03/2024.

IAA (2023c) AIP Ireland, ENR 6.1: Lower ATS routes. Available at: [EI\\_ENR\\_6\\_1\\_EN.pdf](#) (airnav.ie). Accessed 07/03/2024.

ICAO (2015) European Guidance material on managing building restricted areas, third edition. Available at: <https://www.icao.int/EURNAT/EUR%20and%20NAT%20Documents/EUR%20Documents/EUR%20Documents/015%20-%20Building%20Restricted%20Areas/ICAO%20EUR%20Doc%20015%20Third%20Edition%20Nov2015.pdf>. Accessed 07/11/2022.

MCA (2017) Strategic Overview of Search and Rescue in the United Kingdom of Great Britain and Northern Ireland, January 2017, Available at: [mca\\_uksar.pdf](#) (publishing.service.gov.uk), Accessed 07/11/2022.

MCA, (2021) Offshore Renewable Energy Installations: Guidance on UK Navigational Practice, Safety and Emergency Response. Available at: [MGN 654 \(M+F\)](#) (publishing.service.gov.uk). Accessed 07/11/2022.

MCA, (2024) Offshore Renewable Energy Installations: Requirements, Guidance and Operational Considerations for Search and Rescue and Emergency Response (MGN 654 Annex 5), Available at: [OREI\\_SAR\\_Requirements\\_v4\\_.pdf](#) (publishing.service.gov.uk), Accessed 06/03/2024.

Meteo France (2010) OPERA III, WORK PACKAGE 1.5b - Site protection (wind turbines) OPERA deliverable: OPERA\_2010\_05. Available at: [https://www.eumetnet.eu/wp-content/uploads/2017/01/OPERA\\_2010\\_05\\_Wind\\_turbines-1.pdf](https://www.eumetnet.eu/wp-content/uploads/2017/01/OPERA_2010_05_Wind_turbines-1.pdf). Accessed 07/11/2022.