Environmental Impact Assessment Report

NISA

North Irish Sea Array

Volume 3: Offshore Chapters

Chapter 19
Aviation and Radar

Statkraft

CIP
Copenhagen Infrastructure Partners

GoBe
APEM Group

ARUP

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19.1 Introduction

This chapter of the Environmental Impact Assessment Report (EIAR) presents an assessment of likely significant effects from the North Irish Sea Array (NISA) Offshore Wind Farm (hereafter referred to as the 'proposed development') in relation to aviation and radar during the construction, operation and decommissioning phases.

This chapter sets out the methodology followed (Section 19.2), describes the baseline environment (Section 19.3) and summarises the main characteristics of the proposed development which are of relevance to aviation and radar (Section 19.4), including any embedded mitigation. Potential impacts and relevant receptors are identified, and an assessment of likely significant effects on aviation and radar is undertaken, details of which are provided (Section 19.5).

Additional measures are proposed to mitigate and monitor these effects if required (Section 19.6) and any residual likely significant effects are then described (Section 19.7). Transboundary effects are considered (Section 19.8), and cumulative effects are considered in Section 19.9 and are summarised in Volume 6, Chapter 38 Cumulative and Inter-Related Effects (hereafter referred to as the 'Cumulative and Inter-Related Effects Chapter'). The chapter then provides a reference section (Section 19.10).

The EIAR also includes the following:

- Detail on the competent experts that have prepared this chapter is provided in Volume 9, Appendix 1.1: Competent Experts;
- Detail on the extensive consultation that has been undertaken with a range of stakeholders during the development of the EIAR is set out in Volume 9, Appendix 1.2: Consultation Report; and
- A glossary of terminology, abbreviations and acronyms is provided at the beginning of Volume 2 of the EIAR.

A detailed description of the proposed development including construction, operation and decommissioning is provided in Volume 2, Chapter 6: Description of the Proposed Development – Offshore (hereafter referred to as the 'Offshore Description Chapter') and Volume 2, Chapter 8: Construction Strategy – Offshore (hereafter referred to as the 'Offshore Construction Chapter').

The assessment should be read in conjunction with following linked EIAR chapters within Volume 3:

- Chapter 20: Infrastructure and Other Users

This chapter should also be read alongside the following appendices:

- Volume 9, Appendix 19.1: Airspace Analysis and Radar Modelling; identifies the radars liable to detect wind turbine generators (WTGs) within the array area and gives details of the Radar Line of Sight (RLoS) analyses. It also sets out a detailed analysis of the airspace occupied by the array area and outlines the impacts that the proposed development is likely to have on aviation activities in the vicinity; and

All figures within this Chapter are provided in Volume 7A.

19.2 Methodology

19.2.1 Introduction

The assessments of aviation and radar are consistent with the EIA methodology presented in Volume 2, Chapter 2: EIA and Methodology for the preparation of an EIAR (hereafter referred to as the EIAR Methodology chapter).

19.2.2 Study Area

The aviation and radar study area was initially identified at the proposed development scoping stage (See Scoping Report: Appendix 2.1), in line with the Department of Communications, Climate Action and Environment (DCCAE) (now the Department of the Environment, Climate and Communications; DECC) Guidance (DCCAE, 2017).

In considering the spatial coverage of the aviation and radar study area, the overriding factor is the potential for WTGs within the array area to have an impact on civil and military radars, taking into account required radar operational ranges. The study area focusses on the WTG which are situated seaward of the High Water Mark (HWM) within the offshore development area, which comprises the array area and offshore Export Cable Corridor (ECC). The WTGs are situated within the array area.

The operational range considered for the study area includes the Primary Surveillance Radars (PSRs) installed on civil and military airfields which have a range of between 40 nautical miles (nm) (approximately 74km) and 60nm (111km). All radar equipped airfields within 60nm (111km) of the array area are therefore included in the study area, which is presented in Volume 7A, Figure 19.1. The aviation and radar study area also covers designated airspace in the immediate vicinity of the offshore development area, including airspace associated with Dublin Airport and military Danger Areas.

19.2.3 Relevant Guidance and Policy

This section outlines guidance and policy specific to aviation and radar, including best practice guidelines. Overarching guidance on EIA is presented in the EIAR Methodology Chapter. Furthermore, policy applicable to the proposed development is detailed in Volume 2, Chapter 3: Legal and Policy Framework.

The assessment of likely significant effects upon aviation and radar has been made with specific reference to the following identified relevant legislation and guidance:

- Irish Aviation Authority (IAA) Aeronautical Services Advisory Memorandum (ASAM): Guidance Material on Off-Shore Wind Farms ASAM No. 018 Issue 2, 2015;
- IAA Aerodrome Licensing Memorandum (ALM): Aerodrome Licensing Manual ALM No. 002, 2014;
- IAA (En Route Obstacles To Air Navigation) Order, 1999 (S.I. No. 423/1999);
- IAA (Obstacles to Aircraft in Flight) Order, 2005 (S.I. No. 215/2005);
- IAA (Standardised Rules Of The Air) Order, 2019 (S.I. No. 266/2019);
- AirNav Ireland Aeronautical Information Publication (AIP) Ireland, 2023;
- International Civil Aviation Organization (ICAO) Annex 14: Aerodrome Design and Operations, 2022;
- ICAO EUR DOC 015: European Guidance Material on Managing Building Restricted Areas, 2015;
- Eurocontrol Guidelines for Assessing the Potential Impact of Wind Turbines on Surveillance Sensors, 2014;
- Civil Aviation Authority (CAA) CAP 032: United Kingdom (UK) AIP, 2022; (Provides details of adjacent UK airspace);
- CAA CAP 764: Policy and Guidelines on Wind Turbines, 2016; (UK guidance used when no equivalent Irish guidance available);
- Maritime and Coastguard Agency (MCA) Marine Guidance Note 654: Safety of Navigation: OREIs (Offshore Renewable Energy Installations) – Guidance on UK Navigational Practice, Safety and Emergency Response, 2021; (UK guidance on SAR operations used in absence of Irish guidance);
- World Meteorological Organization (WMO) Commission for Instruments and Methods of Observation Fifteenth session, Abridged Final Report with Resolutions and Recommendations, WMO-No. 1064, Annex VI WMO Guidance Statement on Weather Radar/Wind Turbine Siting, 2010;

- Operational Programme for the Exchange of Weather Radar Information (OPERA) OPERA III Work Package 1.5b Site Protection (wind turbines), 2010; and
- OPERA OPERA-4: On the Coexistence of Weather Radars and Wind Turbines, 2022

The key National Marine Planning Framework (NMPF) policy that is applicable to the assessment of aviation and radar is summarised in Table 19.1. NMPF policies are addressed in their entirety in Appendix 3.1: NMPF Compliance Report.

Table 19.1 Key NMPF policies relevant to the assessment

Policy name	Policy description	Where addressed
National Marine Planning Framework (2021) Defence and Security – Policy 1	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. This includes potential interference with: • Safety of navigation and access to naval facilities; • Firing, test or exercise areas; • Communication, and surveillance systems; • Fishery protection functions. 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. Any proposal will be subject to the relevant Environmental Assessments, as set out in the introduction to the NMPF	Section 19.5 Potential Effects Consultation with the Department of Defence (DoD) has been limited to date: Information regarding the proposed development was provided to DoD in October 2021, and DoD responded in November 2021 with concerns over the potential impact on current and future Air Corps flight operations at Gormanston and interference to air navigation infrastructure at Gormanston. DoD also stated that wind farms should not interfere with Naval Service ships freedom of navigation and sea lines of communication, and that the proposed area should be outside the range of any munitions in the adjacent firing range. Further engagement with DoD was initiated in November 2022 and a response received in January 2023 that the DoD safeguards EI-D1 as a live firing range and Gormanston Aerodrome for use as a military airfield. The DoD further confirmed that a Non Direction Beacon and Distance Measure Equipment are both present and operational at the Gormanston Aerodrome. Further detail on consultation is provided in Appendix 1.2. This information is considered within the assessment in Sections 19.3 and 19.5.

19.2.4 Data Collection and Collation

The primary source of aviation related data used for the desk-based studies in support of the EIAR is the Aeronautical Information Publication (AIP). The AIP contains details on airspace and en route procedures as well as charts and other air navigation information. Similarly, details of the adjacent UK airspace are available in the UK AIP. Relevant consultation is described separately in Appendix 1.2.

19.2.5 Methodology for Assessment of Effects

EIA significance criteria for aviation and radar follows Environmental Protection Agency (EPA) guidance:

- EPA (2022) Guidelines on the information to be contained in Environmental Impact Assessment Reports.

The criteria for determining the sensitivity of the receiving environment and the magnitude of impacts for the aviation and radar assessment are defined in Table 19.2 and Table 19.3 respectively. A matrix was used for the determination of significance in EIA terms (Table 19.4). The combination of the magnitude of the predicted impact with the sensitivity of the receptor determines the assessment of significance of effect.

19.2.5.1 Sensitivity Criteria

The sensitivity criteria for aviation and radar receptors are provided in Table 19.2.

Table 19.2 Sensitivity of the receiving environment

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 proposed development 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 proposed development 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 proposed development 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 proposed development and/or has high recoverability.

19.2.5.2 Magnitude of Impact Criteria

The magnitude criteria for aviation and radar are provided in Table 19.3. In determining magnitude, each assessment considered the spatial extent, duration, frequency, and reversibility of impact and these are outlined within the magnitude section of each assessment of impact (e.g., a duration of hours or days would be considered for most receptors to be of short-term duration, which is likely to result in a low magnitude of impact).

Table 19.3 Magnitude of the impact

Magnitude	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 proposed development) and/or frequency of repetition is continuous and/or effect is not reversible for proposed development.
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 proposed development 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 proposed development 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.

19.2.5.3 Defining the Significance of Effect

The significance of effect associated with an impact will be dependent upon the sensitivity of the receptor and the magnitude of the impact. The assessment methodology for determining the significance of likely significant effects is described in Table 19.4. Effects defined as significant, very significant or profound are considered significant in EIA terms. An effect that has a significance of moderate, slight, not significant or imperceptible is not considered to be significant in EIA terms.

Table 19.4 Significance of likely significant effects upon aviation and radar

			Existing Environment - Sensitivity			
			High	**Medium**	**Low**	**Negligible**
Description of Impact Magnitude	**Adverse impact**	**High**	Profound or very significant (significant)	Significant	Moderate	Imperceptible
		Medium	Significant	Moderate	Slight	Imperceptible
		Low	Moderate	Slight	Slight	Imperceptible
		Negligible	Not significant	Not significant	Not significant	Imperceptible

Where relevant, mitigation measures that are incorporated as part of the proposed development design process and/ or can be considered to be industry standard practice (referred to as 'embedded mitigation') are considered throughout the chapter and are reflected in the outcome of the assessment of effects, described in Section 19.6. Additional mitigation measures that are not embedded and are considered as part of the residual effects assessment and are described separately (Section 19.7).

19.3 Baseline Environment

19.3.1 Civil Aviation

19.3.1.1 Airspace

Ireland is within a region of airspace known as the Shannon Flight Information Region (FIR). The Shannon FIR airspace is regulated by the IAA and AirNav Ireland is responsible for providing Air Traffic Control (ATC) services within it. The offshore development area is within the Shannon FIR. The Shannon FIR is adjacent to the London FIR, the boundary of which is found 22km east of the array area, and the Scottish FIR, the boundary of which is 25km to the north of the array area. Both the London and Scottish FIRs are regulated by the UK CAA. The FIR boundary is depicted in Figure 19.2.

Airspace is classified as either controlled or uncontrolled. Within controlled airspace aircraft are monitored and instructed by ATC, whereas in uncontrolled airspace aircraft are not subject to ATC instruction but rather operate according to a set of regulations. ATC may still provide information, if requested, to ensure flight safety. Airspace is further divided into a number of classes depending on what kind of Air Traffic Service (ATS) is provided and under what conditions. Within Irish airspace, the Shannon FIR, there are three classes: A, C and G. Class A airspace is high level en route controlled airspace used predominantly by commercial and passenger jets. Class C airspace is controlled airspace above 7,500 feet (ft) (2,286m) and surrounding major airports. Class G airspace is uncontrolled.

Aircraft operate under one of two flight rules: Visual Flight Rules (VFR) or Instrument Flight Rules (IFR). VFR flight is conducted with visual reference to the natural horizon while IFR flight requires reference solely to aircraft instrumentation. Class A airspace is restricted to IFR flights only, while both IFR and VFR flights are permitted within class C and class G airspace.

The proposed offshore development area is below the Dublin Control Area (CTA), a defined area of class C controlled airspace around Dublin Airport with varying lower limits but a common upper limit of Flight Level (FL) 245, approximately 24,500ft (7,468m) above mean sea level (amsl)[1]. Below the CTA and in the immediate vicinity of Dublin Airport is the Dublin Control Zone (CTR). This class C airspace has vertical limits from the ground up to 5,000ft (1,524m) amsl. Both the Dublin CTA and CTR are shown in Volume 7A, Figure 19.2.

IFR aircraft traffic predominates within the CTR and CTA, while VFR traffic tends to be low-level fixed-wing aircraft and helicopters. VFR pilots must maintain a minimum safe visual distance from terrain, obstacles and other aircraft. The offshore development area lies outside the CTR. WTGs with the proposed tip height will be below the CTA and in class G uncontrolled airspace.

19.3.1.2 Dublin Airport

Dublin Airport is the nearest licensed aerodrome and lies 31.6km south-west of the array area. It is a busy international airport with parallel east-west runways and a third runway oriented north-south. Within the airspace associated with Dublin Airport are several IFPs which are defined paths that aircraft follow when departing, arriving, and landing at the airport. IFPs are designed to achieve and maintain an acceptable level of safety in operations and keep aircraft clear of all known obstacles. Some of these IFPs pass either directly over or in close proximity to the offshore development area.

All the published Dublin IFPs have associated Minimum Sector Altitudes (MSAs). An MSA defines the minimum safe altitude an aircraft can descend to within a sector of radius 25nm, approximately 46km. These sectors provide vertical obstacle clearance protection of at least 300m (approximately 1,000ft) to aircraft within that area. This gives pilots of aircraft flying under IFR the reassurance of properly designated obstacle and terrain clearance protection while descending to an airport in poor visibility. The proposed offshore development area is within a sector where the MSA is 2,400ft (732m) amsl.

Dublin Airport also publishes an ATC Surveillance Minimum Altitude Chart (ATCSMAC). This chart is divided into 14 sectors, as shown in Volume 7A, Figure 19.3, each of which has an associated minimum radar vectoring altitude. Vectoring altitudes are the lowest altitude to which a radar controller may clear an aircraft during vectoring/direct routing of aircraft. The minimum vectoring altitude in each sector provides 300m (approximately 1,000ft) clearance above the highest known obstacle, similarly to an MSA.

The array area is within ATCSMAC sector 7 which has a minimum vectoring altitude of 3,000ft (914m) amsl.

A 3nm (5.6km) buffer is applied around each sector when validating minimum altitudes against the highest known obstacles. The south-western corner of the array area is within the 3nm buffers of sectors 1 and 2 which have a minimum vectoring altitude of 2,000ft (610m) amsl .

19.3.1.3 Search and Rescue

The Irish Coast Guard provides helicopter Search and Rescue (SAR) services from four bases across the country including one at Dublin Airport. SAR operations are a highly specialised undertaking involving aviation assets, small boats, ships and shore-based personnel. SAR operations are generally carried out in extremely challenging conditions and at all times of the day and night. The random nature of people, watercraft or aircraft in distress makes it very difficult to determine the routes taken by SAR aircraft. Fixed-wing SAR aircraft tend to stay at higher altitudes in a command-and-control role during major incidents, whilst helicopters are used in a low-level role, sometimes in support of small rescue boats.

19.3.1.4 Other Major Airports

Major Airports beyond Dublin are Belfast City Airport, 97km from the array area, Belfast Aldergrove Airport, 103km from the array area and Isle of Man Airport, 89km from the array area. The nearest airport on the UK mainland is Caernarfon Airport, approximately 114km to the south-east.

[1] Note that WTG dimensions are referenced to Lowest Astronomical Tide (LAT). The reference for aviation altitudes is mean sea level, which is 2.85m above LAT within the array area.

19.3.1.5 General Aviation

General Aviation (GA) is served by several airfields around the Dublin area. GA varies from private pleasure flights to commercial charter and corporate aviation. Low altitude helicopter operations also cater for a variety of roles from charter and aerial work to emergency SAR and medical service flights. GA airfields identified within the study area include Ballyboughal Airfield (24km from the array area), Weston Airport (47km from the array area) Trim Aerodrome (53km from the array area), Newcastle Aerodrome (60km from the array area) and Athboy Aerodrome (60km from the array area).

19.3.2 Military Aviation

19.3.2.1 Airspace

Special Use Airspace (SUA) is airspace designated for specific activities such that limitations on airspace access may be imposed on other non-participatory aircraft. SUA in the form of the Gormanston Danger Area EID1 lies to the immediate west of the array area, as shown in Figure 19.4. This airspace extends vertically from the surface up to 40,000ft (12,192m) amsl and is used by the Irish Air Corps (IAC) as a firing range at times and dates notified by the Department of Defence (DoD).

Firing range activities include air-to-air and air-to-ground firing, and the use of rockets and heavy machine guns. Activity within EID1 is promulgated to aviation stakeholders via Notice to Airmen (NOTAM)[2], and to the maritime community by issuing a Notice to Mariners (NtM).

The lateral extent of EID1 overlaps with the offshore ECC but not the array area.

19.3.2.2 Gormanston Aerodrome

Gormanston Aerodrome lies 19km west of the array area. Although officially closed from 2002, it is in continuous use by the IAC for air operations and live firing. There are two operational radio navigation aids installed at the airfield, a Non-Directional Beacon (NDB) and a Distance Measuring Equipment (DME) facility. Navigation aid signals are protected by safeguarded areas established around the facility sites. The NDB and DME safeguarded areas do not overlap with the offshore development area.

19.3.2.3 Casement Aerodrome

Casement Aerodrome lies 50km south-west of the offshore development area and is the IAC headquarters. Fixed-wing and rotary-wing aircraft based at Casement are used in training as well as military and civil defence roles. The Garda Air Support Unit is based at Casement.

Casement has specific flight training airspace known as Military Operating Areas 3, 4 and 5 which are south-west of the aerodrome. Casement also has published IFPs for departures from and approaches to the aerodrome, one of which crosses the south-eastern corner of the array area.

19.3.3 Radars

AirNav Ireland, the national Air Navigation Service Provider (ANSP), manages the ATS within the Shannon FIR which is facilitated by a network of radar facilities at nine sites across Ireland. Primary coverage for the Dublin, Shannon and Cork terminal areas is provided by PSRs and longer-range Secondary Surveillance Radars (SSRs) provide coverage for enroute airspace.

The closest licensed civil airfields with radar are at Dublin, Isle of Man, Belfast City and Belfast Aldergrove. The closest radar equipped military airfields are at Casement, and Royal Air Force (RAF) Valley, 95km south-east of the offshore development area on the island of Anglesey, Wales.

There are currently two weather radars operated by Met Éireann in Ireland, located at Dublin Airport and Shannon Airport. The Dublin weather radar is approximately 30km south-west of the proposed offshore development area. The Shannon weather radar is outside the study area.

[2] A notice distributed by means of telecommunication containing information concerning the establishment, condition or change in any aeronautical facility, service, procedure or hazard, the timely knowledge of which is essential to personnel concerned with flight operations.

19.4 Characteristics of the Proposed Development

This section outlines the characteristics of the proposed development that are relevant to the identification and assessment of likely significant effects on aviation and radar during each phase of the proposed development. In this chapter this is limited to activities and infrastructure occurring in the offshore environment and it considers both Project Option 1 and Project Option 2 (the key characteristics of which are provided in Table 19.5, and are detailed in full in the Offshore Description Chapter). Onshore elements are scoped out of assessment as the height of onshore infrastructure is not sufficient to have any impact on aviation and radar receptors.

Table 19.5 Key characteristics of Project Option 1 and Project Option 2

Key Offshore Characteristics	Project Option 1	Project Option 2
Array area	88.5km^2	88.5km^2
ECC	36.45km^2	36.45km^2
Landfall (Encompassing both the HDD entrance pit and HDD exit pit)	One landfall site, immediately south of Bremore Point, which includes two subtidal exit pits within the ECC	One landfall site, immediately south of Bremore Point, which includes two subtidal exit pits within the ECC
Wind Turbine Generator (WTG)	49 WTGs with 250m rotor diameter and 290m tip height at Lowest Astronomical Tide (LAT)	35 WTGs with 276m rotor diameter and 316m tip height at LAT outside the aviation restricted zone, 311 inside the aviation restricted zone (refer to Table 19.6)
WTG Foundations	49 monopiles of 12.5m diameter requiring seabed preparation	35 monopiles of 12.5m diameter or jacket foundations (three or four leg configurations), with 6m diameter pin piles requiring seabed preparation
Offshore Substation Platform (OSP) Foundations (array area)	One OSP, with either a four-legged jacket foundation with pin piles, or one monopile; or two monopiles	One OSP, with either a four-legged jacket foundation with pin piles, or one monopile; or two monopiles
Cables	Installation of 111km of array cables within the array area and installation of two 18km export cables within the ECC	Installation of 91km of array cables within the array area and installation of two 18km export cables within the ECC

A presentation of the potential impacts in relation to Project Option 1 and Project Option 2 is provided, and the magnitude of those impacts in relation to the size and scale of the proposed development parameters. This enables the identification of the Project Option that will result in the greatest magnitude of impact on receptors and will therefore present the greatest potential for a likely significant effect (

Table 19.7).

To determine the magnitude of the impact level, modelling, calculations and mapping have been undertaken for the project option with the greatest magnitude of impact, for all impacts for the relevant receptor/s.

The significance of effect assessment is then undertaken for both project options, which considers both receptor sensitivity and the magnitude of the impact and is detailed in Section 19.5. Given the similarity of the project options, in most instances the conclusions are the same. In some instances, the difference in magnitude of impact between project options results in a different categorisation of significance.

19.4.1 Parameters for Assessment

The below activities, infrastructure and key design parameters have been considered within this chapter when determining the potential impacts. Further detail on the offshore elements of the proposed development is provided in the Offshore Description Chapter and Offshore Construction Chapter. These parameters apply to both project options and any differences in values that may require consideration have been identified in Table 19.5.

19.4.2 Construction

During construction the following activities and infrastructure have the potential to impact on aviation and radar:

- Installation of the offshore export cable
- Construction of the WTGs and foundation installation
- Construction of the OSP topside and foundation installation
- Tall crane installation vessels
- Progressive presence of WTG infrastructure
- Vessels engaged in installation of offshore export cable; and
- Helicopter traffic engaged in construction activity.

19.4.3 Operational Phase

During operation, the following activities and infrastructure have the potential to impact on aviation and radar:

- Presence of WTG infrastructure

19.4.4 Decommissioning

During decommissioning, the following activities and infrastructure have the potential to impact on aviation and radar:

- Removal of the WTGs;
- Tall crane decommissioning vessels; and
- Helicopter traffic engaged in project works.

19.4.5 Embedded Mitigation Measures

The following embedded mitigation measures in Table 19.6 have been identified through the design and consultation process and are incorporated as part of the proposed development. The embedded mitigation measures will not be considered again at the residual effect stage.

Table 19.6 Embedded mitigation measures relating to aviation and radar

Measure	Mitigation description
Construction	
Compliance with IAA lighting and marking requirements	The offshore infrastructure would be designed and constructed in accordance with the requirements of the IAA and the Commissioners of Irish Lights (CIL) in terms of the notification, charting, marking and lighting of obstacles in order to protect air and marine navigation. Refer to Section 19.4.5.1. for further details and Volume 9, Appendix 17.3: Lighting and Marking Plan.
Compliance with IAA requirements for the promulgation of obstacle locations	At least three months before the erection of offshore infrastructure, the required obstacle parameters will be supplied to the IAA and the CIL. Refer to Section 19.4.5.2 for further details.
WTG design parameters within aviation restricted zone	Project Option 2 WTGs within the 3nm buffer areas of Dublin Airport's ATCSMAC sectors 1 and 2 will have a reduced air draft and corresponding reduced tip height of 311m above LAT. This is to ensure that the minimum required obstacle clearances of sectors 1 and 2 are not infringed.
Compliance with relevant regulator guidance (MGN 654 requirements)	The proposed development will be compliant with the relevant regulator guidance noting that the draft version published by DoT is generally aligned with UK Marine Guidance Note (MGN) 654.Refer to Volume 3, Chapter 17: Shipping and Navigation for further details.

Measure	Mitigation description
Consultation with the DoD Adherence to DoD issued NOTAMs and NtMs, and DoT issued Marine Notices	Prior to installation of the offshore export cable, engagement will be undertaken with the DoD and the following of NOTAMs, NtMs and Marine Notices relating to Gormanston Danger Area EID1 will ensure that installation schedules do not conflict with IAC firing range activities.
Operation	
Compliance with IAA lighting and marking requirements	The offshore infrastructure would continue to be lit during operation in accordance with the requirements of the IAA and the CIL in terms of the notification, charting, marking and lighting of obstacles in order to protect air and marine navigation. Refer to Section 19.4.5.1. for further details and Appendix 17.3.
Compliance with IAA requirements for the promulgation of obstacle locations	Within three months of construction completion, updated obstacle information will be supplied to the IAA and the CIL. Refer to Section 19.4.5.2 for further details.
WTG design parameters within aviation restricted zone	Project Option 2 WTGs within the 3nm buffer areas of Dublin Airport's ATCSMAC sectors 1 and 2 will have a reduced air draft and corresponding reduced tip height of 311m above LAT.
Compliance with MGN 654 requirements	The fixed layouts for Project Option 1 and Project Option 2 comply with MGN 654 requirements with regards to SAR emergency access to the array area.
Decommissioning	
Compliance with IAA lighting and marking requirements	The offshore infrastructure would continue to be lit through the decommissioning phase in accordance with the requirements of the IAA and the CIL in terms of the notification, charting, marking and lighting of obstacles in order to protect air and marine navigation. Refer to Section 19.4.5.1. for further details and Appendix 17.3.
Compliance with IAA requirements for the promulgation of obstacle locations	Updated relevant information will be supplied to the IAA and the CIL, as detailed in Section 19.4.5.2.
WTG design parameters within aviation restricted zone	Project Option 2 WTGs within the 3nm buffer areas of Dublin Airport's ATCSMAC sectors 1 and 2 will have a reduced air draft and corresponding reduced tip height of 311m above LAT.
Compliance with MGN 654 requirements	The fixed layouts for Project Option 1 and Project Option 2 comply with MGN 654 requirements with regards to SAR emergency access to the array area.
Assessment of impacts and best practice environmental management	Prior to decommissioning a study of the potential impacts to aviation and radar receptors from the proposed decommissioning activities would be undertaken, considering the baseline environment at the pre-decommissioning stage. All mitigation measures to be captured would be captured within the decommissioning strategy within Appendix 6.1: Offshore Environmental Management Plan (EMP; hereafter Offshore EMP). Any licences or authorisations that might be required would be identified and obtained prior to decommissioning, including any validation, updating or new submission of an EIAR, as required.

19.4.5.1 Lighting and Marking Requirements

The proposed development would create an obstacle environment which will be mitigated by compliance with appropriate international and national requirements for the permanent marking and lighting of obstacles. ASAM No. 018 (IAA, 2015) states that for offshore wind farms within 32nm (59km) of Air Navigation Services Radar, the marking, lighting and radar enhancing requirements will require to be assessed on an individual basis. The offshore development area is within 16nm (30km) of Dublin 2 PSR/SSR.

Notwithstanding the requirement for assessment on an individual basis, the guidance within ASAM No.018 (IAA, 2015) states the following lighting requirements to protect air navigation:

"Yellow lights will be fixed to all machines and shall be located appropriately at a point(s) on the structure above the Highest Astronomical Tide but below the lowest point of the arc of the structure's rotor blades. Such lights will be visible through 360° in azimuth and will have vertical divergence of 5° above and below the horizontal, 5 nautical miles visibility and a minimum of 99% availability.

Structures chosen as suitable for representing the periphery of wind farms are termed Significant Peripheral Structures. Such structures will be spaced along the periphery of wind farms at intervals of no more than 3 nautical miles, where practicable. Such structures will be lighted with flashing lights of distinctive navigational characteristic fitted above the Highest Astronomical Tide but below the lowest point of the arc of the structure's rotor blades. Such lights will be visible through 360° in azimuth and have a vertical divergence of 5° above and below the horizontal, 10 nautical miles visibility and a minimum of 99% availability."

"All Significant Peripheral Structures, of height ≥90m, to the highest point of the structure including the top of blade spin where appropriate, above Mean Sea Level; will be fitted with high intensity warning lighting meeting the following requirements:

- *the lighting must be mounted on the highest point practicable of the fixed structure;*
- *be in accordance with the International Civil Aviation Organisation (ICAO) Annex 14 standards, on a H24 basis, for High Intensity Type A lighting:*
  - *colour white with a flash rate of 40~60fpm;*
  - *have an effective intensity, with background luminance above 500cd/m², of 200,000cd ± 25%;*
  - *have an effective intensity, with background luminance 50~500cd/m², of 20,000cd ± 25%;*
  - *have an effective intensity, with background luminance below 50cd/m², of at least 2,000cd;*
  - *light fittings will be fully cut off so that practically no light will be emitted below the horizontal, or as otherwise agreed with the IAA;*
  - *all lights across the farm should flash in synchronisation and reductions in light intensity should occur simultaneously, if practicable; and*
  - *be visible through 360° in azimuth.*
- *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."*

The document states the following marking requirements to protect air navigation safety:

- *"high-visibility yellow from high water mark to the specified level of the marine navigation protection lights, or;*
- *double yellow bands as specified; and*
- *fog signals may be required to be fitted on Significant Peripheral Structures in wind farm developments."*

The document also states that:

- *"Significant Peripheral Structures must be fitted with Radar Reflectors."*

The proposed development will be designed and constructed in compliance with the requirements of the IAA and the CIL in terms of marking and lighting in order to protect air and marine navigation. A Lighting and Marking Plan is included in Appendix 17.3.

19.4.5.2 Promulgation of Obstacle Locations

The proposed development would create an obstacle environment which will be mitigated by compliance with appropriate international and national requirements for the promulgation of obstacle locations on charts and in aeronautical documentation.

In accordance with IAA ASAM No.018 (IAA, 2015), information required for promulgation of offshore wind farms that are within 32nm (59km) of Air Navigation Services Radar must be assessed by the IAA on an individual basis.

However, the guidance within the document states the following information is required by IAA prior to the erection of structures:

"At least three months in advance of the erection of wind machines or associated structures, the following information shall be supplied to the Irish Aviation Authority for promulgation in a manner considered appropriate by the Authority:

- *positional data representing the Estimated Position of each machine or structure to be erected. The geodetic datum to which all obstructions shall be referred is the World Geodetic System of 1984 (WGS-84). Co-ordinates should be provided in degrees, minutes, seconds, and decimals of a second, as appropriate.*
- *the estimated maximum elevation of each structure in feet and metres*
- *proposed lighting details for each structure*
- *proposed marking details for each structure.*
- *whether it is proposed that a Radar Enhancer / Transponder / Reflector or Radar AIS be fitted.*
- *minimum and maximum spacing between structures*
- *planned earliest date of erection, and*
- *Any other information considered relevant for air navigation."*

Information required after the erection of structures is as follows:

"Within three months of the completion of the development of a wind farm or part of a wind farm, updated information, as per above, shall be supplied to the Irish Aviation Authority. The positional data will be derived by survey in accordance with the IAA Guidance Material for Obstruction Surveys (ASAM No.023), which is available on IAA web site.

The developer will thereafter be required to provide updated relevant information on any subsequent alterations to the wind farm.

This information shall also be supplied to the Commissioners of Irish Lights."

The proposed development will comply with the requirements for the promulgation of offshore wind farms in accordance with IAA ASAM No.018.

19.4.6 Potential Impacts

The identification of potential impacts has been undertaken by considering the relevant characteristics from both project options (refer to Section 19.4.1) and the potential for a pathway for direct and indirect effects on known receptors (as identified in Section 19.3). Each identified impact relevant to aviation and radar is presented in

Table 19.7.

For each impact, the relevant characteristics of Project Option 1 and Project Option 2 are presented to determine the magnitude (size or extent) of the potential impact, defined by the proposed development parameters in the Offshore Description Chapter and in consideration of the WTG Limits of Deviation (LoD[3]), in line with the approach detailed in the EIAR Methodology Chapter. A comparison of the project options has then been undertaken to determine which project option has the greatest magnitude of impact.

[3] Both Project Option 1 and Project Option 2 layouts have a 500m Limit of Deviation (LoD).

Table 19.7 Potential impacts and magnitude of impact per project option. The project option that has the greatest magnitude of impact is identified in blue

Potential impact	Project Option 1 (49 WTG)	Project Option 2 (35 WTG)	Rationale for the project option with the greatest magnitude of impact
Construction			
1. Impacts on civil and military PSR and weather radar due to tall construction vessels/cranes and partially complete structures.	49 WTGs with a blade tip height of 290m above LAT. Tall crane installation vessels.	35 WTGs with a blade tip height of 316m above LAT outside the 3nm buffer areas of Dublin Airport's ATCSMAC sectors 1 and 2, and 311m above LAT within the 3nm buffer areas of ATCSMAC sectors 1 and 2. Tall crane installation vessels.	**Project Option 2 represents the greatest magnitude of impact in relation to this impact** ATC may be unable to provide an effective surveillance service due to interference on radar displays. Ability of Met Éireann to detect impending severe weather may be impaired. The taller the obstacle the more likely it is to be in RLoS, therefore Project Option 2 is considered to have the greatest magnitude of impact.
2. Creation of an aviation obstacle environment.	49 WTGs with a blade tip height of 290m above LAT. Offshore Substation Platform highest point 67m above LAT. Tall crane installation vessels.	35 WTGs with a blade tip height of 316m above LAT outside the 3nm buffer areas of Dublin Airport's ATCSMAC sectors 1 and 2, and 311m above LAT within the 3nm buffer areas of ATCSMAC sectors 1 and 2. Offshore Substation Platform highest point 67m above LAT. Tall crane installation vessels.	**Project Option 2 represents the greatest magnitude of impact in relation to this impact** Physical obstruction to aviation operations due to above sea level infrastructure within the offshore development area. Impact starting from a point of zero infrastructure to full presence over the construction period. The tallest obstacles are more likely to impact low flying aircraft, therefore Project Option 2 is considered to have the greatest magnitude of impact.
3. Increased air traffic in the array area related to construction and installation activities.	WTG installation: Up to ten helicopter return trips.	WTG installation: Up to ten helicopter return trips.	**Project Option 1 and Project Option 2 represent the greatest magnitude of impact in relation to this impact** Helicopter trips as a result of being engaged in works on the proposed development causing increased likelihood of aircraft-to-aircraft collision. The number of helicopter trips is the same for both project options, therefore Project Option 1 and Project Option 2 are considered to have the same magnitude of impact.

Potential impact	Project Option 1 (49 WTG)	Project Option 2 (35 WTG)	Rationale for the project option with the greatest magnitude of impact
Operation			
4. WTGs causing long term interference on civil and military PSR and weather radar.	49 WTGs with a blade tip height of 290m above LAT.	35 WTGs with a blade tip height of 316m above LAT outside the 3nm buffer areas of Dublin Airport's ATCSMAC sectors 1 and 2, and 311m above LAT within the 3nm buffer areas of ATCSMAC sectors 1 and 2.	**Project Option 2 represents the greatest magnitude of impact in relation to this impact** ATC may be unable to provide an effective surveillance service due to interference on radar displays. Ability of Met Éireann to detect impending severe weather may be impaired. Impact present for operational lifespan of up to 35 years. The taller the obstacle the more likely it is to be in RLoS, therefore Project Option 2 is considered to have the greatest magnitude of impact.
5. Creation of an aviation obstacle environment.	49 WTGs with a blade tip height of 290m above LAT. Offshore Substation Platform highest point 67m above LAT.	35 WTGs with a blade tip height of 316m above LAT outside the 3nm buffer areas of Dublin Airport's ATCSMAC sectors 1 and 2, and 311m above LAT within the 3nm buffer areas of ATCSMAC sectors 1 and 2. Offshore Substation Platform highest point 67m above LAT.	**Project Option 2 represents the greatest magnitude of impact in relation to this impact** Physical obstruction to aviation operations due to above sea level infrastructure within the offshore development area. Impact present for operational lifespan of up to 35 years. The tallest obstacles are more likely to impact low flying aircraft, therefore Project Option 2 is considered to have the greatest magnitude of impact.
Decommissioning			
6. Impacts on civil and military PSR and weather radar due to tall decommissioning vessels/cranes and partially dismantled structures.	49 WTGs with a blade tip height of 290m above LAT. Tall crane decommissioning vessels.	35 WTGs with a blade tip height of 316m above LAT outside the 3nm buffer areas of Dublin Airport's ATCSMAC sectors 1 and 2, and 311m above LAT within the 3nm buffer areas of ATCSMAC sectors 1 and 2. Tall crane decommissioning vessels.	**Project Option 2 represents the greatest magnitude of impact in relation to this impact** ATC may be unable to provide an effective surveillance service due to interference on radar displays. Ability of Met Éireann to detect impending severe weather may be impaired. The taller the obstacle the more likely it is to be in RLoS, therefore Project Option 2 is considered to have the greatest magnitude of impact.

Potential impact	Project Option 1 (49 WTG)	Project Option 2 (35 WTG)	Rationale for the project option with the greatest magnitude of impact
7. Removal of aviation obstacle environment.	49 WTGs with a blade tip height of 290m above LAT. Offshore Substation Platform highest point 67m above LAT. Tall crane decommissioning vessels.	35 WTGs with a blade tip height of 316m above LAT outside the 3nm buffer areas of Dublin Airport's ATCSMAC sectors 1 and 2, and 311m above LAT within the 3nm buffer areas of ATCSMAC sectors 1 and 2. Offshore Substation Platform highest point 67m above LAT. Tall crane decommissioning vessels.	**Project Option 2 represents the greatest magnitude of impact in relation to this impact** Physical obstruction to aviation operations due to above sea level infrastructure within the offshore development area. Impact starting from a point of full presence of infrastructure to zero presence over the decommissioning period. The tallest obstacles are more likely to impact low flying aircraft, therefore Project Option 2 is considered to have the greatest magnitude of impact.
8. Increased air traffic in the area related to decommissioning activities.	Assumed as per the construction phase, however a decommissioning strategy has been produced in the Offshore EMP. The Offshore EMP is a live document that will continue to be developed throughout the lifecycle of the proposed development. More details will be included closer to the time of decommissioning. Maximum number of return trips per helicopter during decommissioning: 10	Assumed as per the construction phase, however a decommissioning has been produced in the Offshore EMP. The Offshore EMP is a live document that will continue to be developed throughout the lifecycle of the proposed development. More details will be included closer to the time of decommissioning. Maximum number of return trips per helicopter during decommissioning: 10	**Project Option 1 and Project Option 2 represent the greatest magnitude of impact in relation to this impact** Helicopter trips as a result of being engaged in works on the proposed development causing increased likelihood of aircraft-to-aircraft collision. The number of helicopter trips is assumed to be the same for both project options, therefore Project Option 1 and Project Option 2 are considered to have the same magnitude of impact.

19.5 Potential Effects

The likely significant effects, both beneficial and adverse, on aviation and radar receptors for each stage of the proposed development are considered, specifically, the likely significant effects of the proposed development during its construction, operational and decommissioning phases associated with the offshore development area. The environment in the vicinity of the proposed development is naturally dynamic, and as such will exhibit some level of natural variation and change over time whether the proposed development proceeds or not. Consequently, the identification and assessment of likely significant effects must be done in the context of natural change, both spatial and temporal.

WTGs have the potential to cause a variety of adverse effects on aviation and radar interests. They can cause issues for PSRs used by civil and military air traffic controllers because the characteristics of moving turbine blades are similar to those of aircraft, leading to spurious returns, or clutter, on radar displays. This can affect the safe provision of air traffic services.

The effects of WTGs on SSRs are considerably less than effects on PSRs. WTG towers can obstruct and diffract SSR signals, but these effects are typically only considered when turbines are within 10km of the facility. At greater ranges, SSR signals reflected from WTGs can result in the radar generating a false target in a direction that is different to where the intended aircraft target is. WTGs can also have a detrimental effect on weather radar measurements. Finally, WTGs can present a physical obstruction for aviation activities such as military low flying or helicopter SAR operations.

An initial desktop study was undertaken to determine those aviation stakeholders that were likely to be affected by the proposed development, including all radar systems within operational range. The main issue identified is associated with potential WTG interference of PSRs and weather radars. Due to the physical size of the WTGs proposed, there is also potential for the WTGs to become aviation obstacles or obstructions, particularly to low flying military aircraft or helicopters engaged in offshore SAR operations. This is considered within the impact assessment.

19.5.1 Do-Nothing Scenario

Should the proposed development not be constructed, the existing aviation and radar baseline environment is unlikely to change substantially.

Dublin Airport has seen an increase in passenger numbers from 28.1 million in 2022 to approximately 32 million in 2023 and is expanding and improving its infrastructure to grow its capacity to a projected 40 million passengers per year.

The Irish Air Corps provides military air support to the Irish Army and Naval Service but currently has no jet aircraft. The Irish Government is considering the purchase of jet fighter aircraft to enable the Air Corps to intercept high altitude Russian aircraft in Irish airspace. To further enhance state security, the Irish Defence Forces aim to purchase new generation air defence radar to be sited at three or more strategic locations, with delivery expected by 2028.

19.5.2 Construction Phase

This section presents the assessment of impacts arising from the construction phase of the proposed development.

19.5.2.1 Impact 1 - Impacts on Civil and Military PSR and Weather Radar due to Tall Construction Vessels/Cranes and Partially Complete Structures

WTGs and other tall obstacles have the potential to impact PSRs which could in turn affect the effectiveness of surveillance services due to interference on radar displays, as radar operators are unable to distinguish between those primary radar returns generated by obstacles and those generated by aircraft. As a general rule, controllers are required to provide 5nm lateral separation between traffic receiving an ATS and ‘unknown’ primary radar returns in class G airspace.

To discriminate wanted aircraft targets from unwanted clutter, PSRs ignore static objects and only display moving targets. The rotating blades of WTGs impart a Doppler frequency shift to the reflected radar pulse, which the radar receiver ‘sees’ as a moving target; these targets are then presented on the radar display as primary radar returns, indistinguishable from those returns originating from aircraft. This is not a steady effect but has dependency on the axis of rotation of the WTG in relation to the radar. Such unwanted radar returns are known as ‘clutter’.

Until such time as WTG blades are allowed to rotate, PSRs would ignore the partially completed structures. In the same way, tall construction vessels and cranes in RLoS would not be moving fast enough to generate PSR clutter.

Similarly, the impacts on weather radar caused by WTGs would largely be due to the rotating blades. During the construction phase the main impact of the proposed development on weather radar will be as physical obstructions resulting in beam blocking, however this impact is generally only an issue when WTGs are within 10km of the radar which will not be the case here.

During the construction phase there will be minor commissioning works where some WTG blades will be turning; however, the project will not be considered to be operational until all the WTGs are in operation, which is assessed in Section 19.5.3.1.

Sensitivity of the Receptor

Civil and military PSR and weather radar are deemed to be of high vulnerability, high recoverability, and high value. The sensitivity of the receptor is therefore considered to be high.

Magnitude of Impact

PSR and weather radar will not display static obstacles and the array area is beyond the range for significant beam blocking of weather radar. Consequently, the magnitude of impact on civil and military PSR and weather radar from Project Option 1 and Project Option 2 would be negligible.

Significance of the Effect

Overall, it is predicted that the sensitivity of the civil and military PSR and weather radar receptors for Project Option 1 and Project Option 2 is high and the magnitude of the impact is negligible. The high sensitivity and negligible magnitude of the impact on civil and military PSR and weather radar receptors would result in a not significant effect, which is not significant in EIA terms.

19.5.2.2 Impact 2 - Creation of an Aviation Obstacle Environment

Construction of the proposed development will involve the installation of infrastructure above sea level which could pose a physical obstruction to aircraft utilising the airspace in the vicinity of the array area. From a starting point of no infrastructure within the offshore development area, the infrastructure outlined in Table 19.5 will gradually be installed over the period of the construction phase.

Specifically, permanent, or temporary obstacles could increase collision risk for:

- Military low flying training and operations within the Gormanston Danger Area EID1; and
- Other offshore fixed-wing and helicopter operations, including those undertaking SAR missions over the Irish Sea.

Several of Dublin Airport's IFPs pass either directly over or in close proximity to the offshore development area, an analysis of the IFPs is presented in Appendix 19.1. To reflect an aviation restricted zone within the Dublin CTA, the tip height of Project Option 1 and Project Option 2 WTGs have been designed to avoid infringing minimum required obstacle clearance in sectors 1, 2 and 7 on Dublin Airport's ATCSMAC (refer to

Table 19.7).

The offshore development area is beyond the range at which WTGs could have any impact on IFPs associated with any other major airports. Smaller GA airfields identified in county Meath and Fingal do not have associated IFPs and are not considered to be impacted by the proposed development.

Sensitivity of the Receptor

Military low flying and other offshore fixed-wing and helicopter operations are deemed to be of low vulnerability, high recoverability and high value. The sensitivity of the receptor is therefore considered to be medium.

Magnitude of Impact

Embedded mitigation including the promulgation, charting, marking and lighting of obstacles, is outlined in Section 19.4.5. This will make pilots aware of the addition of infrastructure within the array area, and pilots will always comply with aviation regulatory requirements.

Project Option 2 WTGs within the 3nm buffer areas of Dublin Airport's ATCSMAC sectors 1 and 2 will have a reduced air draft and corresponding reduced tip height of 311m above LAT to ensure that required obstacle clearances are not infringed.

The fixed WTG layouts for Project Option 1 and Project Option 2 comply with MGN 654 requirements to enable safe SAR access to the array area in the event of an emergency.

Consequently, the magnitude of impact on military low flying and other offshore fixed-wing and helicopter operations from Project Option 1 and Project Option 2 will be negligible.

Significance of the Effect

Overall, it is predicted that the sensitivity of the military low flying and other offshore fixed-wing and helicopter operations receptors for Project Option 1 and Project Option 2 is medium, and the magnitude of the impact is negligible. The medium sensitivity and negligible magnitude of the impact on military low flying and other offshore fixed-wing and helicopter operations receptors could result in a not significant effect, which is not significant in EIA terms.

19.5.2.3 Impact 3 – Increased Air Traffic in the Array Area Related to Construction and Installation Activities

The use of helicopters to support construction activities within the array area could impact on existing air traffic in the area. However, it should be noted that there is only expected to be helicopters used for one element of construction, the WTG installation, and there are only 10 return trips expected.

The possible increase in air traffic associated with construction support activities brings with it a potential increased risk of aircraft collision in the airspace around the proposed development.

The increase in air traffic would be managed by the existing ATS infrastructure, provided in accordance with national procedures, and pilots will be expected to operate in accordance with regulatory requirements and standard operating procedures.

Sensitivity of the Receptor

Helicopter support operations and existing air traffic are deemed to be of low vulnerability, high recoverability and high value. The sensitivity of the receptor is therefore considered to be medium.

Magnitude of Impact

Due to the predicted low number of movements during the construction phase and expected pilot compliance with regulatory requirements and national procedures, the magnitude of impact on helicopter support operations and existing air traffic from Project Option 1 and Project Option 2 would be negligible.

Significance of the Effect

Overall, it is predicted that the sensitivity of the helicopter support operations and existing air traffic receptors for Project Option 1 and Project Option 2 is medium, and the magnitude of the impact is negligible. The medium sensitivity and negligible magnitude of the impact on helicopter support operations and existing air traffic receptors could result in a not significant effect, which is not significant in EIA terms.

19.5.3 Operational Phase

19.5.3.1 Impact 4 – WTGs Causing Long Term Interference on Civil and Military PSR and Weather Radar

The array area will be within the operational range of PSRs serving both civil and military agencies, and within the range of weather radar.

An RloS assessment for all potentially impacted radars from Project Option 1 and Project Option 2 was undertaken by modelling 3D digitised terrain with a specialist software tool, as detailed in Appendix 19.1. The assessment results are provided in the following sections.

Dublin Airport

Dublin Airport has three radar sites: Dublin Head 2 and Dublin Head 3 are combined PSR/SSRs while Forrest Little is an SSR only facility.

All WTGs within the array area will be within operational range and in RLoS of the Dublin PSRs, and likely to generate clutter on radar displays from rotating WTG blades, irrespective of blade tip height.

The document Eurocontrol Guidelines for Assessing the Potential Impact of Wind Turbines on Surveillance Sensors (Eurocontrol, 2014) recommends an SSR protection range of 16km, beyond which the impact of WTGs on SSR is considered to be tolerable. However, this is based on WTGs with tip heights of up to only 200m.

In the UK, NATS (formerly National Air Traffic Services) does not specify a WTG tip height limit but extends the SSR protection range to 15nm (28km) for its SSR facilities. There is no current equivalent Irish guidance available, and engagement with the radar operator, AirNav Ireland, has to date been limited to the provision of information on the proposed development. As such, it is considered appropriate to follow UK guidance regarding the required SSR protection range.

Given that the closest SSR facility (Dublin Head 2) to the array area is more than 29km away, further consideration of impacts on SSR is not considered necessary.

Isle of Man Airport

All WTGs within the array area will be within operational range and in RLoS of the Isle of Man PSR, and likely to generate clutter on radar displays from rotating WTG blades, irrespective of blade tip height.

Belfast City Airport

No WTGs within the array area will be in RLoS of the Belfast City PSR, irrespective of blade tip height. It is highly unlikely that WTGs will be detected by the Belfast City PSR. Further consideration of impacts on Belfast City PSR is not considered necessary.

Belfast Aldergrove Airport

No WTGs within the array area will be in RLoS of the Belfast Aldergrove PSR, irrespective of blade tip height. It is highly unlikely that WTGs will be detected by the Belfast Aldergrove PSR. Further consideration of impacts on Belfast Aldergrove PSR is not considered necessary.

Casement Aerodrome

All WTGs within the array area will be within operational range and in RLoS of the Casement PSR, and likely to generate clutter on radar displays from rotating WTG blades, irrespective of blade tip height.

RAF Valley

No WTGs within the array area will be in RLoS of the Valley PSR, irrespective of blade tip height. It is highly unlikely that WTGs will be detected by the Valley PSR. Further consideration of impacts on Valley PSR is not considered necessary.

Weather Radar

The three main impacts of WTGs on weather radar are beam blocking, reflections causing clutter, and impact on Doppler data and wind fields measurements. Such impacts can impair the ability of meteorologists to detect impending severe weather. Current guidelines (OPERA, 2010, 2022; WMO, 2010) recommend an impact study for wind farm projects that are within 20km of C-band weather radars. In the UK, the Met Office has established 20km consultation zones around its weather radar sites for wind farm developments.

There are two C-band weather radars in Ireland, at Dublin Airport and Shannon Airport. The Dublin weather radar is approximately 29.8km south-west of the array area. All WTGs within the array area will be in RLoS of the Dublin weather radar and highly likely to be detected, irrespective of blade tip height.

No WTGs within the array area will be in RLoS of the Shannon weather radar, irrespective of blade tip height. It is therefore highly unlikely that WTGs will be detected by the Shannon weather radar.

WTGs that are between 20km and 45km from a weather radar are considered to be in a Low Impact Zone according to WMO guidelines, and notification is recommended. Consultation with Met Éireann has been initiated in order to make them aware of the proposed development, as detailed in Appendix 1.2. Verbal feedback from Met Éireann states that they do not foresee the proposed development as being an issue as the location is not within the prevailing wind direction.

There is no specific Met Éireann guidance regarding WTG impacts on weather radar, therefore it is considered appropriate to follow OPERA, WMO and UK guidance which only recommends an impact study for developments within 20km of weather radars. Given that the closest weather radar, at Dublin Airport, is 29.8km from the array area, further consideration of impacts on weather radar is not considered necessary.

The following radars are potentially affected by WTGs in the array area:

- Dublin Head 2 PSR;
- Dublin Head 3 PSR;
- Isle of Man PSR; and
- Casement PSR

The following radars are scoped out of the assessment of likely significant effects:

- Dublin Head 2 SSR;
- Dublin Head 3 SSR;
- Forrest Little SSR;
- Belfast City PSR;
- Belfast Aldergrove PSR;
- RAF Valley PSR; and
- Dublin weather radar

Sensitivity of the Receptor

Civil and military PSR are deemed to be of high vulnerability, high recoverability and high value. The sensitivity of the receptor is therefore considered to be high.

Magnitude of Impact

When operational, WTGs have the potential to generate 'clutter' (or false targets) upon radar displays because current generation PSRs are unable to differentiate between the moving blades of WTGs and aircraft. As a consequence, radar operators can be unable to distinguish between primary radar returns generated by WTGs and those generated by aircraft.

As a general rule controllers are required to provide 5nm (9.3km) lateral separation between traffic receiving an ATS and 'unknown' primary radar returns in class G airspace. This may therefore produce an adverse effect on the provision of a safe and effective ATS by those ANSPs that utilise the impacted PSRs.

Dublin Head 2 PSR and Dublin Head 3 PSR

In Ireland all class C controlled airspace is designated as a Transponder Mandatory Zone (TMZ). Aircraft operating within a TMZ are required to carry and operate SSR transponders so that they can be detected by SSR and thus appear on ATC radar displays. Aircraft with temporarily unserviceable transponders may be admitted into class C airspace only on an exceptional case by case basis. Furthermore, the IAA have introduced monitoring codes/listening squawks to help reduce the number of airspace infringements in both the Shannon FIR and Dublin CTA, which requires aircraft to have an operating transponder. This implies that even aircraft in class G uncontrolled airspace are expected to have operating transponders.

Given the use of SSR transponders, ATC units in Ireland are able to monitor, track and control aircraft using SSR. This greatly reduces the reliance on PSR for providing a safe and effective ATS. Consequently, the magnitude of impact on Dublin Head 2 PSR and Dublin Head 3 PSR from Project Option 1 and Project Option 2 would be low.

Isle of Man PSR

Consultation has taken place with the Head of ATS at Isle of Man Airport who stated that, as Isle of Man ATC do not control aircraft within the Shannon FIR, the impact of Project Option 1 and Project Option 2 on Isle of Man PSR would have no effect on their provision of ATS.

The airspace above the offshore development area is not operationally significant to Isle of Man Airport for the safe provision of an ATS, consequently, the magnitude of impact on Isle of Man PSR from Project Option 1 and Project Option 2 would be negligible.

Casement PSR

Both the IAC and the DoD have been informed by the proposed development of the potential impact that WTGs within the array area may have on Casement PSR (refer to Appendix 1.2). Radar vectoring of aircraft by Casement ATC is used predominantly to the south-west of the aerodrome and not in the vicinity of the offshore development area, therefore it appears, from the available IFPs (refer to Appendix 19.1) that the airspace above the offshore development area is not operationally significant. Consequently, the magnitude of impact on Casement PSR from Project Option 1 and Project Option 2 would be low.

Significance of the Effect
Dublin Head 2 PSR and Dublin Head 3 PSR

Overall, it is predicted that the sensitivity of the Dublin Head 2 PSR and Dublin Head 3 PSR receptors for Project Option 1 and Project Option 2 is high and the magnitude of the impact is low. The high sensitivity and low magnitude of the impact on the Dublin Head 2 PSR and Dublin Head 3 PSR receptors would result in a moderate effect, which is not significant in EIA terms.

Isle of Man PSR

Overall, it is predicted that the sensitivity of the Isle of Man PSR receptor for Project Option 1 and Project Option 2 is high, and the magnitude of the impact is negligible. The high sensitivity and negligible magnitude of the impact on the Isle of Man PSR receptor would result in a not significant effect, which is not significant in EIA terms.

Casement PSR

Overall, it is predicted that the sensitivity of the Casement PSR receptor for Project Option 1 and Project Option 2 is high, and the magnitude of the impact is low. The high sensitivity and low magnitude of the impact on the Casement PSR receptor would result in a moderate effect, which is not significant in EIA terms.

19.5.3.2 Impact 5 - Creation of an Aviation Obstacle Environment

During the operational phase of the proposed development the infrastructure outlined in Table 19.5 will be present within the array area. This could pose a physical obstruction to aircraft utilising the airspace in the vicinity of the offshore development area.

Specifically, permanent obstacles could increase collision risk for:

- Military low flying training and operations within the Gormanston Danger Area EID1; and
- Other offshore fixed-wing and helicopter operations, including those undertaking SAR missions over the Irish Sea

WTGs within the western section of the array area will be immediately adjacent to, but outside of, the mapped Danger Area.

Several of Dublin Airport's IFPs pass either directly over or in close proximity to the offshore development area. Project Option 2 WTGs with a blade tip height of 316m above LAT would infringe the required 300m (approximately 1,000ft) obstacle clearance of Dublin Airport's ATCSMAC, necessitating an increase to minimum vectoring altitudes.

Sensitivity of the Receptor

Military low flying and other offshore fixed-wing and helicopter operations are deemed to be of low vulnerability, high recoverability and high value. The sensitivity of the receptor is therefore considered to be medium.

Magnitude of Impact

Embedded mitigation including the promulgation, charting, marking and lighting of obstacles, is outlined in Section 19.4.5. This will make pilots aware of the addition of infrastructure within the array area, and pilots will always comply with aviation regulatory requirements.

The review of Dublin Airport's IFPs detailed in Appendix 19.1 concludes that WTGs within the array area will not impact the currently published IFPs.

Project Option 2 WTGs within the 3nm buffer areas of Dublin Airport's ATCSMAC sectors 1 and 2 will have a reduced air draft and corresponding reduced tip height of 311m above LAT to ensure that required obstacle clearances are not infringed.

The fixed WTG layouts for Project Option 1 and Project Option 2 comply with MGN 654 requirements to enable safe SAR access to the array area in the event of an emergency.

Consequently, the magnitude of impact on military low flying and other offshore fixed-wing and helicopter operations from Project Option 1 and Project Option 2 would be negligible.

Significance of the Effect

Overall it is predicted that the sensitivity of the military low flying and other offshore fixed-wing and helicopter operations receptors for Project Option 1 and Project Option 2 is medium, and the magnitude of the impact is negligible. The medium sensitivity and negligible magnitude of the impact on military low flying and other offshore fixed-wing and helicopter operations receptors would result in a not significant effect, which is not significant in EIA terms.

19.5.4 Decommissioning

19.5.4.1 Impact 6 - Impacts on Civil and Military PSR and Weather Radar due to Tall Decommissioning Vessels/Cranes and Partially Dismantled Structures

During the gradual removal of above surface structures within the offshore development area, the impact on PSR and weather radar will be removed. WTGs will cease to operate and the blades of WTGs will cease rotating, before being removed from within the array area.

Although some WTG blades may still be turning during the decommissioning phase, in the case that all the WTGs are operational, it is assessed in Section 19.5.3.1.

Sensitivity of the Receptor

Civil and military PSR and weather radar are deemed to be of high vulnerability, high recoverability and high value. The sensitivity of the receptor is therefore considered to be high.

Magnitude of Impact

PSR and weather radar will not display static obstacles and the array area is beyond the range for significant beam blocking of weather radar. Tall decommissioning vessels/cranes in RLoS would not be moving fast enough to generate PSR clutter. Consequently, the magnitude of impact on civil and military PSR and weather radar from Project Option 1 and Project Option 2 would be negligible.

Significance of the Effect

Overall, it is predicted that the sensitivity of the civil and military PSR and weather radar receptors for Project Option 1 and Project Option 2 is high and the magnitude of the impact is negligible. The high sensitivity and negligible magnitude of impact on civil and military PSR and weather radar receptors could result in a not significant effect, which is not significant in EIA terms.

19.5.4.2 Impact 7 - Removal of Aviation Obstacle Environment

During the decommissioning phase, the above surface structures outlined in Table 19.5 will be removed. This will gradually reduce the physical obstruction to aircraft utilising the airspace in the vicinity of the offshore development area.

Specifically, permanent, or temporary obstacles could increase collision risk for:

- Military low flying training and operations within the Gormanston Danger Area EID1; and
- Other offshore fixed-wing and helicopter operations, including those undertaking SAR missions over the Irish Sea

Sensitivity of the Receptor

Military low flying and other offshore fixed-wing and helicopter operations are deemed to be of low vulnerability, high recoverability and high value. The sensitivity of the receptor is therefore considered to be medium.

Magnitude of Impact

Embedded mitigation including the promulgation, charting, marking and lighting of obstacles, as summarised in Section 19.4.5 will be retained until decommissioning was completed. The effect on the aviation sector during the decommissioning phase will be reduced to pre-development conditions. Consequently, the magnitude of impact on military low flying and other offshore fixed-wing helicopter operations from Project Option 1 and Project Option 2 will be negligible.

Significance of the Effect

Overall, it is predicted that the sensitivity of the military low flying and other offshore fixed-wing and helicopter operations receptors for Project Option 1 and Project Option 2 is medium, and the magnitude of the impact is negligible. The medium sensitivity and negligible magnitude of the impact on military low flying and other offshore fixed-wing and helicopter operations receptors could result in a not significant effect, which is not significant in EIA terms.

19.5.4.3 Impact 8 - Increased Air Traffic in the Area Related to Decommissioning Activities

The use of helicopters during the decommissioning phase of the proposed development could impact on existing air traffic in the area. However, it should be noted that there is only expected to be helicopters used for one element of decommissioning, the WTG removal, and there are only 10 return trips expected.

The possible increase in air traffic associated with decommissioning support activities brings with it a potential increased risk of aircraft collision in the airspace around the proposed development.

The safety of aircraft operating in uncontrolled airspace ultimately resides with the aircrew who will be expected to operate in accordance with regulatory requirements and who may request the provision of an ATS that would be provided in accordance with national procedures.

Sensitivity of the Receptor

Helicopter support operations and existing air traffic are deemed to be of low vulnerability, high recoverability and high value. The sensitivity of the receptor is therefore considered to be medium.

Magnitude of Impact

Due to the predicted low number of movements during the decommissioning phase and expected pilot compliance with regulatory requirements and national procedures, the magnitude of impact on helicopter support operations and existing air traffic from Project Option 1 and Project Option 2 will be negligible.

Significance of the Effect

Overall, it is predicted that the sensitivity of the helicopter support operations and existing air traffic receptors for Project Option 1 and Project Option 2 is medium, and the magnitude of the impact is negligible.

The medium sensitivity and negligible magnitude of the impact on helicopter support operations and existing air traffic receptors will result in a not significant effect, which is not significant in EIA terms.

19.6 Mitigation and Monitoring Measures

Mitigation measures that were identified and adopted as part of the evolution of the proposed development design (embedded into the proposed development design) and that are relevant to aviation and radar are listed in Table 19.6 and not considered again here. Effects during construction, operation and decommissioning are not considered to be significant, therefore no further mitigation or monitoring measures are considered necessary.

19.7 Residual Effects

This section presents the residual effects of the proposed development once the mitigation outlined in Section 19.6 has been applied. o additional measures are considered necessary to mitigate against potential significant effects on aviation and radar receptors, and therefore there is no difference between the pre-mitigation effects outlined in Section 19.5 and the residual effects. Table 19.8 provides a summary of the impact assessment outcomes.

Table 19.8 Residual effects relating to aviation and radar

Potential Impact	Likely Significant Effect (pre-mitigation) – Project Option 1	Likely Significant Effect (pre-mitigation) – Project Option 2	Residual Effect – Project Option 1	Residual Effect – Project Option 2
Construction				
1. Impacts on civil and military PSR and weather radar due to tall construction vessels/cranes and partially complete structures	Not significant	Not significant	Not significant	Not significant
2. Creation of an aviation obstacle environment	Not significant	Not significant	Not significant	Not significant
3. Increased air traffic in the array area related to construction and installation activities	Not significant	Not significant	Not significant	Not significant
Operation				
4. WTGs causing long term interference on civil and military PSR and weather radar	**Dublin Airport** Moderate (not significant in EIA terms) **Isle of Man Airport** Not significant **Casement Aerodrome** Moderate (not significant in EIA terms)	**Dublin Airport** Moderate (not significant in EIA terms) **Isle of Man Airport** Not significant **Casement Aerodrome** Moderate (not significant in EIA terms)	**Dublin Airport** Moderate (not significant in EIA terms) **Isle of Man Airport** Not significant **Casement Aerodrome** Moderate (not significant in EIA terms)	**Dublin Airport** Moderate (not significant in EIA terms) **Isle of Man Airport** Not significant **Casement Aerodrome** Moderate (not significant in EIA terms)
5. Creation of an aviation obstacle environment	Not significant	Not significant	Not significant	Not significant
Decommissioning				
6. Impacts on civil and military PSR and weather radar due to tall decommissioning vessels/cranes and partially dismantled structures	Not significant	Not significant	Not significant	Not significant

Potential Impact	Likely Significant Effect (pre-mitigation) – Project Option 1	Likely Significant Effect (pre-mitigation) – Project Option 2	Residual Effect – Project Option 1	Residual Effect – Project Option 2
7. Removal of aviation obstacle environment	Not significant	Not significant	Not significant	Not significant
8. Increased air traffic in the area related to decommissioning activities	Not significant	Not significant	Not significant	Not significant

19.8 Transboundary Effects

Transboundary effects are defined as those effects upon the receiving environment of other states, whether occurring from the proposed development alone, or cumulatively with other projects in the wider area.

The airspace around the offshore development area is used by international civil aviation; however, the potential impacts of WTGs as obstacles to aviation are localised and confined to within the array area. The distance between the offshore development area and the London FIR boundary is 22km and the Scottish FIR is 25km.

The proposed development is within the 60nm (111km) range of UK PSRs at Belfast Aldergrove Airport, Belfast City Airport, Isle of Man Airport and RAF Valley. Of these PSRs, only Isle of Man PSR would have RLoS of WTGs within the offshore development area. Although the proposed development is visible on the Isle of Man Airport PSR, this has no effect on the safe provision of ATS within UK airspace as the proposed development is wholly within Irish airspace, within which Isle of Man ATC do not control aircraft. The cumulative assessment of the effects on the Isle of Man Airport PSR with other projects is assessed in Section 19.9.

It is considered that the residual transboundary effects of the proposed development alone, or cumulatively with other projects, in terms of aviation and radar are not significant in EIA terms.

19.9 Cumulative Effects

Likely significant cumulative effects of the proposed development in-combination with existing and/or approved projects for aviation and radar have been identified, considered, and assessed. The methodology for this cumulative assessment is a three-stage approach which is presented in the Cumulative and Inter-Related Effects Chapter.

The Cumulative and Inter-Related Effects Chapter contains the outcome of Stage 1 Establishing the list of ‘Other Existing and/or Approved Projects’; and Stage 2 ‘Screening of ‘Other Existing and/or Approved Projects’. This section presents Stage 3, an assessment of whether the proposed development in combination with other projects, grouped in tiers, would be likely to have significant cumulative effects.

The assessment of cumulative effects specifically considers whether any of the approved developments in the local or wider area have the potential to alter the significance of effects associated with the proposed development. Developments which are already built and operating, and which are not identified in this chapter, are included in the baseline environment or have been screened out as there is no potential to alter the significance of effects.

The assessment of cumulative effects has considered likely significant effects that may arise during construction, operation and decommissioning of the proposed development. Cumulative effects were assessed to a level of detail commensurate with the information that has either been directly shared with the proposed development or was publicly available at the time of assessment.

Given the location and nature of the proposed development, a tiered approach to establishing the list of other existing and/or approved projects has been undertaken in Stage 1 of the cumulative effects assessment. The tiering of projects is based on project relevance to the proposed development, and it is not a hierarchical approach nor based on weighting. Further information on the tiers is provided in Section 19.9.2 and in the Cumulative and Inter-Related Effects Chapter.

19.9.1 Aviation and Radar Cumulative Screening Exercise

The existing and/or approved projects selected as relevant to the cumulative effects assessment of impacts to aviation and radar are based on an initial screening exercise undertaken on a long list (see Cumulative and Inter-Related Effects Chapter) based on spatial distance to the proposed development Consideration of effect-receptor pathways, data confidence and temporal and spatial scales has then allowed the selection of the relevant projects to the aviation and radar cumulative short-list.

When assessing likely significant effects for aviation and radar, projects were screened into the assessment based on a 100km screening range surrounding the array area. The potential cumulative effect of radar impacts diminishes as the separation between projects increases. A separation distance of 100km is considered to be a pragmatic range beyond which cumulative effects will be negligible and therefore encompasses the extent of impacts to aviation and radar receptors from the proposed development.

For the full list of projects considered, including those screened out, please see the Cumulative and Inter-Related Effects Chapter and Volume 9, Appendix 38.2: Offshore cumulative screening and stage 1 and 2 assessments (including offshore cumulative longlist).

19.9.2 Projects Considered Within the Cumulative Effects Assessment

The planned, existing and/or approved projects selected through the screening exercise as potentially relevant to the assessment of impacts to aviation and radar are presented in Table 19.11.

The tiers for the assessment are:

- Tier 1 is limited to the Operation and Maintenance Facility (OMF) for the proposed development. The OMF option being considered involves the adaption and leasing part of an existing port facility at Greenore. Further detail is provided in the Offshore Description Chapter.
- Tier 2 is the east coast Phase One Offshore Wind Farms (OWFs).
- Tier 3 is all other projects that have been screened in for this topic.

The tiering structure is intended to provide an understanding of the potential for likely significant effects of the proposed development with the construction of its OMF (tier one); followed by a cumulative assessment of the likely significant effect of that scenario combined with the east coast Phase One OWFs (tier two); and lastly the combination of tier one and tier two with all other existing and/or approved projects that have been screened in (tier three).

Table 19.9 Projects and plans considered within the cumulative impact assessment

Development Type	Project	Status	Data Confidence	Distance to the proposed development		Justification for screening into the cumulative effects assessment
				Array area	ECC	
Tier 1						
Proposed development offshore maintenance facility	OMF	The OMF at Greenore has not been screened into the cumulative effects assessment as it is not anticipated there will be any physical effect overlap and no pathway to effect receptors due to the nature of the works being undertaken for the OMF (i.e. no works will impact on aviation and radar).				
Tier 2						
Phase One Offshore wind farm	Oriel Wind Park	Pre-consent	Medium– scoping report available at time of writing. A foreshore licence has been granted for site investigations (2022-2027). Reference FS007383	16.9km	21.6km	Overlap in construction period, Oriel Wind Park due to construct during 2026-2028

Development Type	Project	Status	Data Confidence	Distance to the proposed development		Justification for screening into the cumulative effects assessment
				Array area	ECC	
	Dublin Array Offshore Wind Farm	Pre-consent	Medium – scoping report available at time of writing. A foreshore licence has been granted for site investigations (2022-2027). Reference FS007188. Site investigations have been undertaken and EIA in prep.	32.9km	37.6km	Overlap in construction period, Dublin Array due to construct during 2028-2032
	Codling Wind Park	Pre-consent	Medium – Scoping Report available at the time of writing. A foreshore licence has been granted for site investigations. Reference FS007045	50.9km	56.9km	Overlap in construction period, with Codling Wind Park due to construct during 2027-2028
	Arklow Bank Phase 2	Pre-consent	Medium – scoping report available at time of writing. A foreshore licence has been granted for site investigations (2022-2027). Reference FS007339. Site investigations have been undertaken and EIA in prep.	76.4km	80.0km	Overlap in construction period with Arklow Bank Phase 2 due to construct during 2026-2030
Tier 3						
Operational offshore wind farm	Arklow Bank Phase 1	Operational	High - consented	88.3km	91.3km	Proximity to the proposed development

19.9.3 Project Impacts Included in the Assessment

The identification of potential impacts has been undertaken by considering the outcome of the residual effects assessment (Section 19.7) and the potential for a pathway for those impacts to have direct and/or indirect effects on known receptors (as identified in Section 19.3) when combined with the impacts from other projects. Each identified impact relevant to the cumulative assessment of aviation and radar is presented in Table 19.11.

The potential impact on firing-range activities within Gormanston Danger Area EID1 is screened out because the impact is spatially localised with no potential pathway for cumulative impact. As the residual effects for Project Option 1 and Project Option 2 are the same (as identified in Section 19.7), the cumulative effects assessment presented in this section applies to both options.

Table 19.10 Potential cumulative impacts and tiers for assessment

Potential cumulative impact	Phase	Tiers and Projects	Justification for inclusion in cumulative effects assessment
1. Creation of an aviation obstacle environment	Construction/ Operation/ Decommissioning	Tier 2 – Phase One OWFs Tier 3 – Operational Offshore Wind Farms	Other OWF have the potential for creating an aviation obstacle environment due to the presence of WTGs.
2. Increased air traffic in the area related to wind farm activities	Construction/ Decommissioning	Tier 2 – Phase One OWFs Tier 3 – Operational Offshore Wind Farms	Other OWF have the potential for requiring helicopters during the construction and operation of the projects.
3. WTGs causing permanent interference on civil and military PSR and weather radar.	Operation	Tier 2 – Phase One OWFs Tier 3 – Operational Offshore Wind Farms	Other OWF within the RLoS of receptors have the potential for impacting on ATC activities.

19.9.4 Cumulative Impact 1 – Creation of an Aviation Obstacle Environment

19.9.4.1 Tier 1

The OMF at Greenore has not been screened into the cumulative effects assessment as it is not anticipated there will be any physical effect overlap and no pathway to effect receptors due to the nature of the works being undertaken for the OMF (i.e. no works will impact on aviation and radar).

19.9.4.2 Tier 1 and 2

Construction of the proposed development will involve the installation of infrastructure above sea level which could pose a physical obstruction to military low flying and other offshore fixed-wing and helicopter operations, including those undertaking SAR missions over the Irish Sea. There is potential for cumulative effects when also considering other offshore projects, the construction of which will also involve the installation of infrastructure above sea level.

Military low flying and other offshore fixed-wing and helicopter operations are deemed to be of low vulnerability, high recoverability and high value. The sensitivity of the receptor is therefore considered to be medium.

Through the use of embedded mitigation measures such as obstacle notification, the charting, marking and lighting of obstacles, and reliance on pilot requirements to avoid any obstacle by legislated minimum distances, the magnitude of the cumulative impact on military low flying and other offshore fixed-wing and helicopter operations will be negligible.

The medium sensitivity and negligible cumulative impact on military low flying and other offshore fixed-wing and helicopter operations receptors could result in a not significant cumulative effect, which is not significant in EIA terms.

19.9.4.3 Tier 1 and 2 and 3 (All tiers)

Construction of the proposed development will involve the installation of infrastructure above sea level which could pose a physical obstruction to military low flying and other offshore fixed-wing and helicopter operations, including those undertaking SAR missions over the Irish Sea. There is potential for cumulative effects when also considering the infrastructure associated with other offshore projects, such as Arklow Bank Phase 1.

Military low flying and other offshore fixed-wing and helicopter operations are deemed to be of low vulnerability, high recoverability and high value. The sensitivity of the receptor is therefore considered to be medium.

Through the use of embedded mitigation measures such as obstacle notification, the charting, marking and lighting of obstacles, and reliance on pilot requirements to avoid any obstacle by legislated minimum distances, the magnitude of the cumulative impact of all tiers on military low flying and other offshore fixed-wing and helicopter operations will be negligible.

The medium sensitivity and negligible cumulative impact on military low flying and other offshore fixed-wing and helicopter operations receptors would result in a not significant cumulative effect of all tiers, which is not significant in EIA terms.

19.9.5 Cumulative Impact 2 - Increased Air Traffic in the Area Related to Wind Farm Activities

19.9.5.1 Tier 1

The OMF at Greenore has not been screened into the cumulative effects assessment as it is not anticipated there will be any physical effect overlap and no pathway to effect receptors due to the nature of the works being undertaken for the OMF (i.e. no works will impact on aviation and radar).

19.9.5.2 Tier 1 and 2

During the construction and decommissioning phases of the proposed development there is likely to be an increase in helicopter air traffic over the current baseline levels due to the use of helicopters in the provision of support in the airspace around the proposed development.

The predicted number of daily helicopter movements is considered to be low, however the cumulative effect of this activity and similar activities associated with the other projects included in the assessment will create a greater potential risk of mid-air collision between aircraft engaged in such operations and/or aircraft in transit across the study area.

Helicopter support operations and existing air traffic are deemed to be of low vulnerability, high recoverability and high value. The sensitivity of the receptor is therefore considered to be medium.

Any increase in air traffic will be managed by the existing ATS infrastructure, provided in accordance with national procedures, and pilots will be expected to operate in accordance with civil and military regulatory requirements. The magnitude of the cumulative impact on helicopter support operations and existing air traffic will be negligible.

The medium sensitivity and negligible cumulative impact on helicopter support operations and existing air traffic would result in a not significant cumulative effect, which is not significant in EIA terms.

19.9.5.3 Tier 1 and 2 and 3 (All Tiers)

During the construction and decommissioning phases of the proposed development there is likely to be an increase in helicopter air traffic over the current baseline levels due to the use of helicopters in the provision of support in the airspace around the array area.

The predicted number of daily helicopter movements is considered to be low, however the cumulative effect of this activity and similar activities associated with the other projects included in the assessment will create a greater potential risk of mid-air collision between aircraft engaged in such operations and/or aircraft in transit across the study area.

Helicopter support operations and existing air traffic are deemed to be of low vulnerability, high recoverability and high value. The sensitivity of the receptor is therefore considered to be medium.

Any increase in air traffic will be managed by the existing ATS infrastructure, provided in accordance with national procedures, and pilots will be expected to operate in accordance with civil and military regulatory requirements. The magnitude of the cumulative impact of all tiers on helicopter support operations and existing air traffic will be negligible.

The medium sensitivity and negligible cumulative impact on helicopter support operations and existing air traffic could result in a not significant cumulative effect of all tiers, which is not significant in EIA terms.

19.9.6 Cumulative Impact 3 – WTGs Causing Long Term Interference on Civil and Military PSR and Weather Radar

19.9.6.1 Tier 1

The OMF at Greenore has not been screened into the cumulative effects assessment as it is not anticipated there will be any physical effect overlap and no pathway to effect receptors due to the nature of the works being undertaken for the OMF (i.e. no works will impact on aviation and radar).

19.9.6.2 Tier 1 and 2

There is potential for a cumulative effect where radars detect the rotating blades of WTGs from multiple offshore wind developments that are in their operational phase. This could result in a significant increase in clutter being generated on radar displays over a larger area.

Civil and military PSR are deemed to be of high vulnerability, high recoverability and high value. The sensitivity of the receptor is therefore considered to be high.

Dublin Head 2 PSR and Dublin Head 3 PSR

Given the use of SSR transponders in Irish airspace, ATC units in Ireland are able to monitor, track and control aircraft using SSR. This greatly reduces the reliance on PSR for providing a safe and effective ATS. Consequently, the magnitude of the cumulative impact on Dublin Head 2 PSR and Dublin Head 3 PSR will be low.

The high sensitivity and low cumulative impact on the Dublin Head 2 PSR and Dublin Head 3 PSR receptors would result in a moderate cumulative effect, which is not significant in EIA terms.

Isle of Man PSR

The Head of ATS at Isle of Man Airport has stated that the airspace above the offshore development area is not operationally significant to Isle of Man Airport for the safe provision of ATS. Consequently, the magnitude of the cumulative impact on Isle of Man PSR will be negligible.

The high sensitivity and negligible cumulative impact on the Isle of Man PSR receptor would result in a not significant cumulative effect, which is not significant in EIA terms.

Casement PSR

Radar vectoring of aircraft by Casement ATC is used predominantly to the south-west of the aerodrome and not in the vicinity of offshore developments, therefore it appears, from the available IFPs (refer to Appendix 19.1) that the airspace above all offshore developments is not operationally significant. Consequently, the magnitude of the cumulative impact on Casement PSR will be low.

The high sensitivity and low cumulative impact on the Casement PSR receptor would result in a moderate cumulative effect, which is not significant in EIA terms.

19.9.6.3 Tier 1 and 2 and 3 (All Tiers)

There is potential for a cumulative effect where radars detect the rotating blades of WTGs from multiple offshore wind developments that are in their operational phase. This could result in a significant increase in clutter being generated on radar displays over a larger area.

Civil and military PSR are deemed to be of high vulnerability, high recoverability and high value. The sensitivity of the receptor is therefore considered to be high.

Dublin Head 2 PSR and Dublin Head 3 PSR

Given the use of SSR transponders in Irish airspace, ATC units in Ireland are able to monitor, track and control aircraft using SSR. This greatly reduces the reliance on PSR for providing a safe and effective ATS. Consequently, the magnitude of the cumulative impact of all tiers on Dublin Head 2 PSR and Dublin Head 3 PSR will be low.

The high sensitivity and low cumulative impact on the Dublin Head 2 PSR and Dublin Head 3 PSR receptors would result in a moderate cumulative effect of all tiers, which is not significant in EIA terms.

Isle of Man PSR

The Head of ATS at Isle of Man Airport has stated that the airspace above the offshore development area is not operationally significant to Isle of Man Airport for the safe provision of ATS. Consequently, the magnitude of the cumulative impact of all tiers on Isle of Man PSR will be negligible.

The high sensitivity and negligible cumulative impact on the Isle of Man PSR receptor would result in a not significant cumulative effect of all tiers, which is not significant in EIA terms.

Casement PSR

Radar vectoring of aircraft by Casement ATC is used predominantly to the south-west of the aerodrome and not in the vicinity of offshore developments, therefore it appears, from the available IFPs (refer to Appendix 19.1) that the airspace above all offshore developments is not operationally significant. Consequently, the magnitude of the cumulative impact of all tiers on Casement PSR will be low.

The high sensitivity and low cumulative impact on the Casement PSR receptor would result in a moderate cumulative effect of all tiers, which is not significant in EIA terms.

19.10 References

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