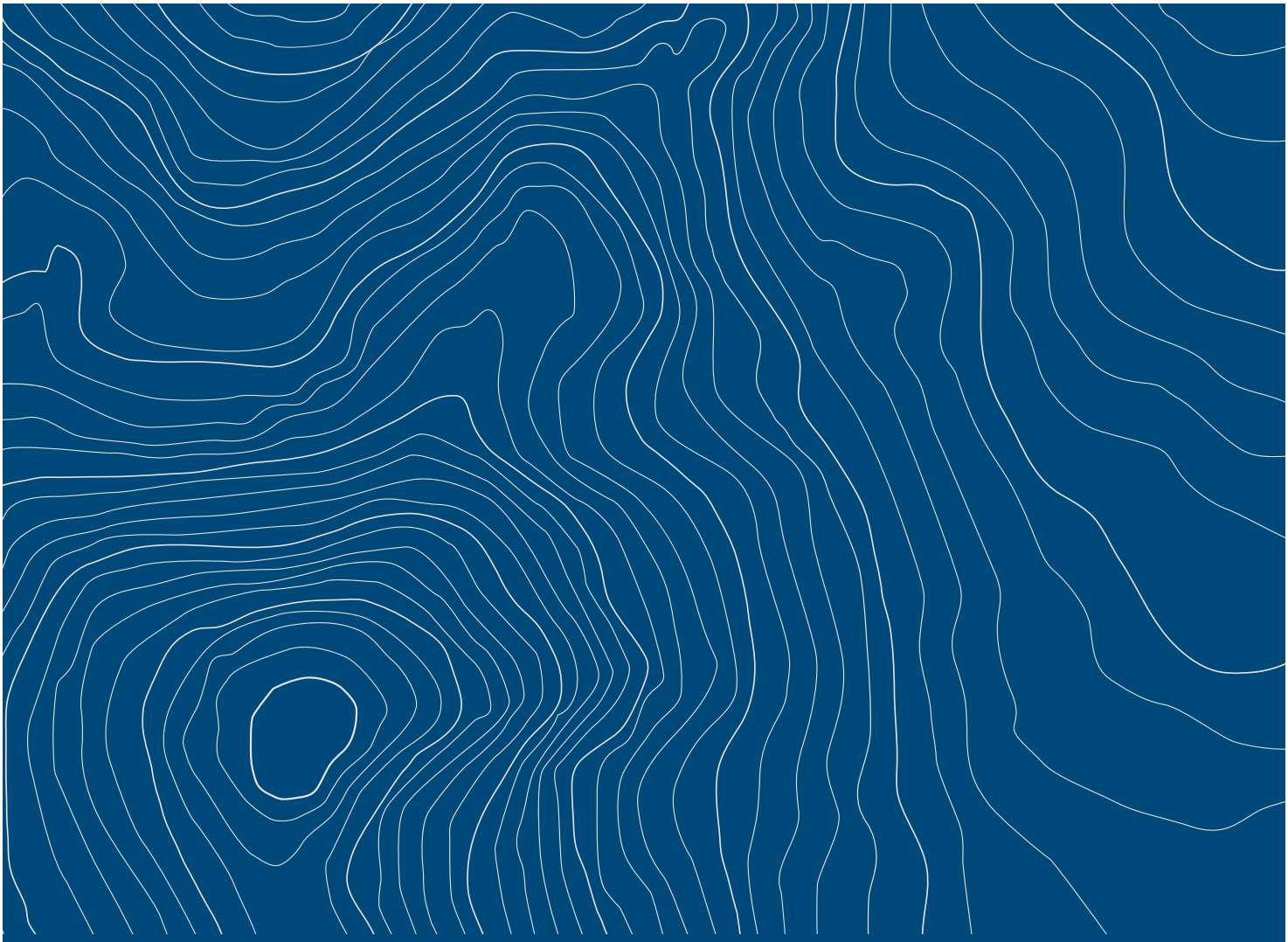

Dublin Array
Generation for generations

EIAR Volume 3: Offshore Infrastructure Assessment Chapters
Chapter 12: Aviation and Radar

Kish Offshore Wind Ltd.

RWE SLR GoBe APEM Group

www.dublinarray-marineplanning.ie

Dublin Array Offshore Wind Farm

Environmental Impact Assessment Report

Volume 3, Chapter 12: Aviation and Radar

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Glossary

Term	Meaning
Automatic Dependent Surveillance-Broadcast (ADS-B)	ADS-B is a surveillance technology in which an aircraft determines its position via satellite navigation or other sensors and periodically broadcasts it, enabling it to be tracked.
ARTAS	ARTAS is a distributed system composed of a number of identical subsystems co-operating together. Each subsystem, called an ARTAS Unit, will process all surveillance sensor data to form a best track estimate of the current air traffic situation within a given domain of interest.
CAS	Airspace in which Air Traffic Control exercises authority. Within controlled airspace flights are subject to air traffic control service with standard separation maintained between aircraft.
FIR	In aviation and airspace terms the world is divided into FIRs for the responsibility of the provision of an air traffic service to aircraft. The boundary between London FIR (under the regulation of the United Kingdom (UK) CAA) and Shannon FIR (under the regulation of the Irish Aviation Authority (IAA)) is located 25kilometres (km) to the east of the edge of Dublin Array offshore development area at it closest point.
FL	A standard nominal altitude of an aircraft, in hundreds of feet, based upon a standardised air pressure at sea-level.
IFP	An Instrument Flight Procedure is a published procedure used by aircraft flying in accordance with the instrument flight rules which is designed to achieve and maintain an acceptable level of safety in operations and includes an instrument approach procedure, a standard instrument departure, a planned departure route and a standard instrument arrival.
Instrument Flight Rules (IFR)	The rules governing procedures for flight conducted on aircraft instruments.
Instrument Meteorological Conditions (IMC)	Weather conditions which would preclude flight by the Visual Flight Rules (VFR) (i.e. conditions where the aircraft is in or close to cloud or flying in visibility less than a specified minimum).
Minimum Sector Altitude (MSA)	Under aviation flight rules, the altitude below which it is unsafe to fly in IMC owing to presence of terrain or obstacles within a specified area.
Non-Directional Beacon (NDB)	An NDB radio beacon is a radio beacon which does not include inherent directional information. NDB are used as an aviation or marine navigational aid and transmissions can be received at much greater distances at lower altitudes.
Obstacle Limitation Surfaces (OLS)	The OLS represent the lower limit of the blocks of protected airspace around an aerodrome. They form a set of 3 dimensional surfaces which extend upwards and outwards from the runways encompassing the critical airspace utilised by air traffic. OLS are designed to protect aircraft from obstacles when maneuvering on the ground, taking off, landing or flying in the vicinity of the aerodrome.
Transponder Mandatory Zone (TMZ)	Designated volumes of airspace which require aircraft to be appropriately equipped with and operating an aircraft transponder. Exceptionally, non-equipped aircraft may be permitted to enter the zones subject to compliance with pre-agreed specific criteria.
Visual Flight Rules (VFR)	The rules governing flight conducted in Visual Meteorological Conditions (VMC) utilising outside visual reference, maintaining separation from

Term	Meaning
	obstacles and other aircraft visually. Clouds, heavy precipitation, low visibility, and otherwise adverse weather conditions should be avoided under VFR.
Visual Meteorological Condition (VMC)	A flight category which allows flight to be conducted under Visual Flight Rules (VFR) in flight conditions where pilots have sufficient visibility to fly and maintain separation from the terrain and other aircraft (as opposed to exclusive reliance on flight instruments).
Wide Area Multilateration (WAM)	WAM is a distributed surveillance technology that works by deploying multiple sensors throughout an area to provide coverage of the desired airspace. WAM can be installed in areas of challenging terrain which limits the use of secondary radar. It can also be used as a replacement for secondary radar or complementary surveillance to ADS-B.

Acronyms

Term	Definition
3D	Three Dimensional
ACC	Area Control Centre
ADS-B	Automatic Dependent Surveillance – Broadcast
AIS	Aeronautical Information Service
amsl	above mean sea level
ANSP	Air Navigation Service Providers
APDO	Approved Procedure Design Organisation
ARP	Airfield Reference Point
ARTAS	Air Traffic Management Surveillance Tracker & Server
ASAM	Aeronautical Services Advisory Memorandum
ATC	Air Traffic Control
ATM	Air Traffic Management
ATS	Air Traffic Service
Bae	British Aerospace
CAA	Civil Aviation Authority
CAP	Civil Aviation Publication
CAS	Controlled Air Space
CIL	Commissioners of Irish Lights
CNS	Communication Navigation and Surveillance
CTA	Control Area
CWP	Codling Wind Park
DAA	Dublin Airport Authority
DoD	Department of Defence
DPHLG	Department for Housing, Planning, Community and Local Government
EASA	European Union Aviation Safety Agency
ECC	Export Cable Corridor
EIA	Environmental Impact Assessment
EIAR	Environmental Impact Assessment Report
EIS	Environmental Impact Statement
ENR	En Route
ERP	Emergency Response Plan

Term	Definition
EU	European Union
FIR	Flight Information Region
FL	Flight level
ft	feet
GPS	Global Positioning System
IAA	Irish Aviation Authority
IAC	Irish Air Corps
IIAIP	Irish Integrated Aeronautical Information Package
IALA	International Association of Marine Aids to Navigation and Lighthouse Authorities
ICAO	International Civil Aviation Organisation
IFP	Instrument Flight Procedure
IFR	Instrument Flight Rules
IMC	Instrument Meteorological Conditions
IRCG	Irish Coast Guard
km	kilometre
LAT	Lowest Astronomical Tide
LMP	Lighting and Marking Plan
LoS	Line of Sight
m	metre
MCA	Maritime and Coastguard Agency
MDO	Maximum Design Option
MDS	Maximum Design Scenario
Met	Meteorological
MHWS	Mean High Water Springs
MOA	Military Operating Area
MSA	Minimum Sector Altitude
MSSR	Monopulse Secondary Surveillance Radar
NAVAIDs	Navigation Aids
NDB	Non-Directional Beacon
NIS	Natura Impact Statement
NISA	North Irish Sea Array
NM	Nautical Mile

Term	Definition
NOTAM	Notice to Airmen
NVD	Night Vision Device
O&M	Operation and Maintenance
OLS	Obstacle Limitation Surfaces
OPERA	Operational Programme for the Exchange of weather Radar information
OREDP	Onshore Renewable Energy Development Plan
OREI	Offshore Renewable Energy Installations
OSP	Offshore Substation Platform
OWF	Offshore Wind Farm
PEXA	Practice and Exercise Area
PMB	Property Management Branch
PSR	Primary Surveillance Radar
RAF	Royal Air Force
RCS	Radar Cross Section
RDP	Radar Data Processor
RoI	Republic of Ireland
rpm	revolutions per minute
SAR	Search and Rescue
SARPS	Standards and Recommended Practices
SARR	Search and Rescue Region
SI	Statutory Instrument
SIB	Safety Information Bulletin
SME	Subject Matter Expert
TMZ	Transponder Mandatory Zone
UFIR	Upper Flight Information Region
UK	United Kingdom
VFR	Visual Flight Rules
VMC	Visual Meteorological Conditions
WAM	Wide Area Multilateration
WTG	Wind Turbine Generator

12 Aviation and Radar

12.1 Introduction

12.1.1 This chapter presents the result of the assessment undertaken on behalf of the Applicant of the potential impacts on aviation and aviation radar. Specifically, this chapter considers the potential impact of the offshore infrastructure (defined as Wind Turbine Generators (WTG), Offshore Substation Platform (OSP), inter array cables, offshore export cable and landfall works below Mean High Water Spring (MHWS) during construction, Operation and Maintenance (O&M) and decommissioning phases.

12.1.2 This Environmental Impact Assessment Report (EIAR) chapter is not supported by a separate technical baseline document and therefore presents a comprehensive characterisation of the Aviation and Radar receptors, in support of the assessment.

12.1.3 This EIAR chapter should be read with reference to the following documents included within the EIAR, due to interactions between the technical aspects:

- Volume 4, Appendix 4.3.12-1: Instrument Flight Procedure (IFP) Assessment (Osprey, 2024) (hereafter referred to as the IFP Assessment). This report, at the date of publication, assesses the maximum tip height that can be accommodated without affecting any published IFPs at the assessed aerodromes;
- Volume 4, Appendix 4.3.12-2: The Potential Impact of the offshore infrastructure on Helicopter Operations to the Kish Tower – Helicopter One Engine Inoperative Case (Anatec, 2024) (hereafter referred to as the Helicopter Access Assessment). This document considers helicopter operations to the Kish Tower in the context of the presence of the array area, specifically for the most adverse condition, which is an engine failure following a helicopter take-off;
- Volume 4, Appendix 4.3.12-3: Radar Line of Sight Assessment (hereafter referred to as the Radar Line of Sight). This report assesses the Republic of Ireland (RoI) and UK based aviation radar systems that may theoretically detect the operational wind turbines placed within the array area at the maximum blade tip height.
- Volume 3, Chapter 11: Shipping and Navigation (hereafter referred to as the Shipping and Navigation Chapter) should be referred to for consideration of emergency capabilities in the context of Search and Rescue (SAR) operations; and
- Volume 3, Chapter 12: Marine Infrastructure and Other Users (hereafter referred to as the Infrastructure and Other Users Chapter) should be referred to for consideration of non-aviation military exercise areas.

12.2 Regulatory background

12.2.1 The legislation, policy and guidance relevant to the whole planning application is set out in Volume 2, Chapter 2: Consents, Legislation, Policy & Guidance (hereafter referred to as the Policy Chapter). The principal legislation, policy and guidance relevant to this chapter is set out in Annex A.

12.2.2 The assessment of potential impacts upon aviation and radar receptors has been made with specific reference to the relevant regulations, guidelines and guidance, which include:

- The Irish Integrated Aeronautical Information Package (IAIP) which is published by the Aeronautical Information Service (AIS) of Ireland on behalf of the IAA. It is prepared in accordance with the Standards and Recommended Practices (SARPS) of Annex 15 to the ICAO1 Convention on International Civil Aviation and the Aeronautical Information Services Manual (Doc 8126)2 (AirNav, IAIP, 2025);
- The IAA Aeronautical Services Advisory Memorandum (ASAM) Number 018 Issue 2 which provides guidance material for certain minimum requirements for the lighting, marking, radar enhancing and supply of information for promulgation to ensure the conspicuity of off-shore WTGs and associated structures (IAA, ASAM, 2015);
- European Union Aviation Safety Agency3 (EASA) Common Regulation (EU) 923/012 which is prepared for those concerned with day-to-day matters relating to procedures in air navigation and operational ATC service provision including the common rules of the air and operational provisions. (EASA, 2012);
- ICAO Annex 14 Aerodromes Design and Operations contains SARPs that prescribe the physical characteristics and obstacle limitation surfaces to be provided for at aerodromes and certain facilities, and technical services normally provided at an aerodrome. It also contains specifications dealing with obstacles outside those limitation surfaces. It is not intended that these specifications limit or regulate the operation of an aircraft (ICAO, 2022);
- EASA Common Regulation (EU) 2016/1199 amending Regulation (EU) No 965/2012 as regards operational approval of performance-based navigation, certification and oversight of data services providers and helicopter offshore operations (ICAO, 2016);
- EASA Safety Information Bulletin (SIB) 2019-04: Avoiding Obstacles Lighted with Light-Emitting Diode Obstacle Lights whilst operating Night Vision Goggles, provides recommendations to mitigate any safety risk related to the use of LED obstacle lights and is applicable to air operators and competent authorities.

[1] ICAO is a United Nations organisation that recommends air traffic standards for over 190 individual countries. Ireland is a member state of ICAO.
[2] https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=CELEX:32012R0923
[3] EASA is the centrepiece of the European Union's strategy for aviation safety. Its mission is to promote the highest common standards of safety and environmental protection in civil aviation. The Agency develops common safety and environmental rules at the European level.

- Operational Programme for the Exchange of weather Radar information (OPERA). This document describes how wind turbines affect weather radar measurements and the impact that this has on end users (Leijnse, 2022); and
- Statement of the OPERA group on the cohabitation between weather radars and wind turbines. Adopted at the 16th meeting of the OPERA Programme on 18-20 October 2006 (OPERA, 2006).

12.2.3 In addition, other documents specific to the consideration of the interaction of aviation and offshore wind developments are available from the UK Civil Aviation Authority (CAA) and the UK Maritime and Coastguard Agency (MCA). These documents provide comprehensive guidance on the potential impact wind farm development may have on aviation radar and adjacent aviation activities. This guidance will be used to inform the assessment of the potential impacts:

12.2.4 Civil Aviation Publication (CAP) 764 Policy and Guidelines on Wind Turbines[4] aids aviation stakeholders to help understand and address wind energy related issues, thereby ensuring greater consistency in the consideration of the potential impact of proposed wind farm developments (CAA, 2016); and

12.2.5 MCA MGN 654: Safety of Navigation Offshore Renewable Energy Installations (OREIs) – Guidance on UK Navigational Practice, Safety and Emergency Response (MCA, 2021) contains information for operators and developers in formulating their emergency response plans and site safety management.

12.2.6 For consideration of potential transboundary effects the UK CAA CAP 032 Aeronautical Information Publication contains information on facilities, services, rules, regulations and restrictions in UK airspace (NATS, 2024).

12.2.7 The relevance of specific policies or guidance and their key provisions with regards to aviation and aviation radar, and how these have been addressed within this assessment are presented in Annex A.

12.3 Consultation

12.3.1 As part of the EIA for Dublin Array, non-statutory consultation has been undertaken with various statutory and non-statutory bodies. A Scoping report (RWE, 2020) was made publicly available and issued to statutory consultees on 9th October 2020. Table *1* provides a summary of the consultation undertaken for aviation and aviation radar to date for Dublin Array.

[4] CAP 764 available at https://publicapps.caa.co.uk/docs/33/CAP764%20Issue6%20FINAL%20Feb.pdf

12.3.2 In accordance with recommendations outlined in the DCCAE guidance[5] the Applicant sought to consult during the scoping stage with the IAA. The air navigation services of the IAA became a new organisation called AirNav Ireland on 30 April 2023. AirNav Ireland provide air traffic management and related air traffic and other services in airspace controlled by Ireland, The IAA merged with the Commission for Aviation Regulation and retains responsibility for regulation. Relevant responses from consultees received to date are summarised in Table 1.

[5] Guidance on Environmental Impact Statement (EIS) and Natura Impact Statement (NIS) Preparation for Offshore Renewable Energy Projects (Environmental Working Group of the Offshore Renewable Energy Steering Group and the DCCAE, 2017)

Table 1 Summary of consultation relating to aviation and radar

Date	Consultation type	Consultation and key issues raised	Section where provision is addressed
Department of Defence (DoD) Property Management Branch			
3 July 2019	Email to the Safeguarding Agency of the DoD	Information on the design parameters of the array area was provided to the Property Management Branch (PMB) of the DoD. The PMB stated that the information would be provided to the Irish Air Corp (IAC) for their observations to be provided.	N/A – no action required
26 September 2020	Email to the DoD PMB	No response was received from the DoD from the email contact of the 3 July 2019. An array area IFP analysis of potentially impacted DoD procedures was completed and provided to PMB for comment by the DoD and the IAC.	The IFP Assessment provided at Volume 4, Appendix 4.3.12-1 of the EIAR considers the safeguarding of the en-route aviation environment.
18 November 2020	Email with letter attachment from the DoD PMB	The DoD responded from the request of the 26 September 2020 with the following observations: ▪ All WTG should be illuminated with high intensity aviation obstacle lighting. ▪ Aviation lighting should be incandescent or of a type visible to Night Vision Devices (NVD) compatible with EASA Safety Information Bulletin (SIB) 2019-04.	Section 12.13.1 provides commentary of the specific lighting requirements that will be agreed with stakeholders before operation of the WTGs.
January 2021	Email	In January 2021 a Project Update was sent to the Minister of Defence, requesting any final pre-application observations on the proposed offshore development and operations and maintenance base and offering the opportunity of a meeting. No further comments were received.	Engagement with the DoD will continue where required within the Planning Application process.
02 January 2024	Letter sent	All prescribed persons as per Schedule 1 of the Planning and Development (Maritime Development) Regulations, 2023 (Si 100 of 2023) were contacted to provide a brief update on the Project and provide	Letter acknowledged, no further correspondence.

Date	Consultation type	Consultation and key issues raised	Section where provision is addressed
		those consultees with an opportunity to make any final pre-application observations prior to finalising the application.	
Irish Aviation Authority			
17 July 2019	Meeting with the IAA	▪ The IAA stated that an array area WTG blade tip height of 257 metres (m) above mean sea level (amsl) would provide no effect to IAA Communication, Navigation or Surveillance (CNS) or Navigation aids (NAVAIDs) operated by the IAA however, that opinion was subject to change based on any increase in WTG blade tip height for the development. AirNav Ireland confirmed on the 20th January 2025 that CNS and NAVAIDs would not be impacted by the Project (see AirNav Ireland in this table). ▪ Operations to the Kish Lighthouse are conducted under Visual Flight Rules (VFR)[6]. ▪ Lighting of the wind farm should be compatible with NVD.	Section 12.5.26 considers operations to the Kish Lighthouse. Section 12.13.1 provides commentary of the specific lighting requirements that will be agreed with stakeholders before operation of the WTGs.
29 August 2019	Email to the IAA	Although the final blade tip height was not decided upon, a Maximum Design Option blade tip height of 320m[7] above Mean High Water Springs (MHWS) (321.5 m amsl, 323.6m above LAT) was provided to the IAA together with a request of confirmation that this Maximum Design Option scenario blade tip height would not impact IAA CNS and NAVAIDs.	The IAA did not respond to the request of confirmation that the increased blade tip height would not impact IAA CNS and NAVAIDs. AirNav Ireland confirmed on the 20th January 2025 that there would be impact to CNS and NAVAIDS (see AirNav response this table).

[6] Visual Flight Rules are a set of regulations in which a pilot operates the aircraft with visual reference to the ground and visually avoiding terrain, obstacles and other aircraft.
[7] Since 2019 the design has undergone further iteration. The maximum blade tip height is now 307.5m (MHWS), (309.6m (LAT)).

Date	Consultation type	Consultation and key issues raised	Section where provision is addressed
17 June 2020	Email to the IAA	In response to the email request to the IAA on the 29 August 2019, the IAA stated that in principle the increased tip height should not impact IAA systems, based on the location of the array area. The IAA stated that they may have concerns regarding the potential for impact to radar surveillance equipment.	Following a meeting with the IAA on the 3 March 2021, notes from the meeting were sent to the IAA attendees for agreement. The meeting notes stated that there will be no predicted impact to IAA CNS systems, the IAA was requested to provide a formal response in agreement of this point. AirNav Ireland confirmed on the 20th January 2025 that there will no impact to Irish CNS systems and NAVAIDs systems.
24 September 2020	Email to the IAA	The IAA were provided with the conclusions of the completed IFP analysis which requires a limit in maximum blade tip height of 309.6 m amsl (311.7 m above LAT) in the northern part of the array area. The reduction in blade tip height will remove any impact to IFPs at Dublin Airport and Casement Aerodrome. The IAA was requested to provide their position regarding any other potential aviation safeguarding matters related to the development on aircraft operations within the IAA area of concern. As no response was received a chase email was sent on the 5 January 2021.	The IFP Assessment provided at Volume 4, Appendix 4.3.12-1 of the EIAR considers the safeguarding of the en-route aviation environment.
3 March 2021	Virtual Meeting with the IAA	A virtual meeting was held between the IAA in which the Applicant confirmed the following: ▪ A maximum blade tip height below 309.6 m amsl (311.7 m above LAT) will apply throughout the array.	This Chapter considers all of the observations made by the IAA during the meeting.

Date	Consultation type	Consultation and key issues raised	Section where provision is addressed
		▪ Cranes used in construction and decommissioning will not be above the maximum blade tip height. The IAA stated that: ▪ The conclusions of the IFP analysis are accepted subject to IAA internal discussion. ▪ The new Dublin North Runway will utilise the present point merge; impact to the associated procedures being developed for the new runway is unlikely and not expected.	
28 April 2021	Email with letter attachment from the IAA Operations Directorate	The IAA accepted the findings of the IFP Assessment in that flight procedures would not be impacted by the array area at the maximum blade tip height of below 309.6m amsl (311.7 m above LAT) or below and did not foresee any objections to the proposed project.	N/A – no action required.
5 April 2024	Email with attachment of the IFP Assessment and table of engagement with the IAA to date	No response received.	Air traffic management and related services is the primary function of AirNav Ireland from whom response was received.
AirNav Ireland			
5 April 2024	Email with attachment of the IFP Assessment and table of engagement with the IAA to date	AirNav Ireland provided a response dated 9th April 2024 which stated that the IFP Assessment sufficiently addressed any issues AirNav Ireland may have regarding the Project.	The IFP Assessment provided at Volume 4, Appendix 4.3.12-1 of the EIAR considers the safeguarding of the en-route aviation environment.
21 October 2024	Email requesting radar operating parameters for updated radar line of sight analysis.	AirNav Ireland provided the requested radar parameters together with details of a soon to be commissioned PSR known as the Tooman radar.	The radar Line of sight analysis provided at Volume 4, Appendix 4.3.12-3: Radar Line of Sight Assessment considers theoretical

Date	Consultation type	Consultation and key issues raised	Section where provision is addressed
			radar detection by AirNav Ireland aviation radar systems.
9 January 2025	Email requesting confirmation that the new Weston Airport IFP will not be impacted by the project.	AirNav Ireland provided an email response on the 10 January 2025. The new Weston IFPs are awaiting regulatory approval. However, AirNav Ireland confirmed during a meeting held on the 20th January 2025 that a review of the newly published procedures indicates that the maximum tip height can be accommodated without affecting the procedures.	At the time of completion of the IFP Assessment, Weston Airport did not possess IFPs. The response as of 10th January 2025 has been considered in forming the conclusions set out in this chapter.
20 January 2025	Virtual meeting with representatives of AirNav Ireland and Dublin and Weston Airports	AirNav Ireland, Dublin Airport, Casement Airport and Weston Airport confirmed during the meeting that IFP for the airports would not be impacted by the Project. Confirmation was also provided by AirNav Ireland that CNS systems would not be impacted by the Project.	The radar line of sight analysis provided at Volume 4, 4.3.12-3 Radar Line of Sight Assessment considers theoretical radar detection by AirNav Ireland aviation radar systems.
Dublin Airport Authority			
24 September 2020	Email to the Dublin Airport Planning Department	Information on the design parameters of the array area was provided to the Dublin Airport Authority [8](DAA). The DAA stated that providing that all issues regarding IFPs are resolved to the satisfaction of the IAA, DAA would have no further observations or comment to make.	The IFP Assessment provided at Volume 4, Appendix 4.3.12-1 of the EIAR considers the safeguarding of the en-route aviation environment and considers the Dublin Airport IFP.

[8] Dublin Airport Authority has been renamed as Dublin Airport plc.

Date	Consultation type	Consultation and key issues raised	Section where provision is addressed
Newcastle Airfield			
13 April 2021	Email to the licensee of Newcastle Airfield	The operators of Newcastle Airfield have been contacted to ensure that no impact to operations conducted at the aerodrome are envisaged.	N/A – see further consultation notes.
15 April 2021	Email from the licensee of Newcastle Airfield	The licensee of Newcastle Airfield responded stating that the array area is of concern to them and requested a telephone call to discuss.	The licensee, in a further consultation confirmed that Newcastle Airfield is in support of the Planning Application.
28 April 2021	Telephone call with the licensee of Newcastle Airfield	The licensee and operator of Newcastle Airfield was contacted to discuss the operations conducted at the airfield which are as follows: ▪ The airfield has 50+ based aircraft. ▪ The Irish Coastguard operate from the airfield on an occasional basis. ▪ Drone aircraft operate offshore remaining within line of sight. On conclusion of the discussion points, the licensee stated that with the further information presented, Newcastle Airfield supported the Project.	Section 12.5.25considers the operations conducted from Newcastle Airfield.
10 October 2023	Email to licensee of Newcastle Airport	An update was provided based on the results of preliminary environmental and technical studies which have been completed since the last correspondence with the airfield. The location and extent of the array area and maximum blade tip height of the WTGs has not changed since previous contact. The licensee of the airfield has stated previously that they supports the application. Subsequent to the most recent correspondence the airport have not responded with an objection or a request for further information.	Section 12.5.25considers the operations conducted from Newcastle Airfield.

Date	Consultation type	Consultation and key issues raised	Section where provision is addressed
Bray Air Display			
26 August 2020	Email to the Director of the Bray Air Display	Information on the design parameters of the array area was provided to the organisers of the Bray Air Display. The response was received by email on the 17 October 2020 in which the organisers of the Bray Airshow stated that as the aircraft partaking in the Airshow are operating under VFR, Bray Airshow have no objection to the location of the array area.	Section 12.5.24 considers the Bray Air Display.
10 October 2023	Email to the Director of the Bray Air Display	An update was provided based on the results of preliminary environmental and technical studies which have been completed since the last correspondence with the Bray Air Display organisers. The location and extent of the array area and maximum blade tip height of the WTGs has not changed since previous contact. The organisers of the Bray Air Display have stated previously that no impact would be created on the Air Display operation. Subsequent to the most recent correspondence the organisers of the Bray Air Display have not responded .	Section 12.5.24 considers the Bray Air Display.
Commissioner of Irish Lights and PDG Helicopters			
24 April 2019	Meeting with Commissioner of Irish Lights (CIL)	Meeting primarily to discuss Shipping and Navigation assessment. The Applicant requested permission to contact the helicopter operator for CIL directly to discuss helicopter operations at the Kish Lighthouse. CIL requested the applicant wait a while due to on-going discussions regarding implications of Brexit.	Section 12.5.26 et seq and Volume 4, Appendix 4.3.12-2: 'The Potential Impact of the offshore infrastructure on Helicopter Operations to the Kish Tower – Helicopter One Engine Inoperative Case' (Anatec, 2024) which accompanies the EIAR
23 October 2019	Email to CIL	Email follow up to earlier meeting with CIL to request contact details of helicopter operator PDG Aviation	

Date	Consultation type	Consultation and key issues raised	Section where provision is addressed
		Services (PDG) and confirmation that timing was suitable.	considers helicopter operations to the Kish Lighthouse.
08 January 2020	Meeting with PDG	Discussed current helicopter operations at the Kish Lighthouse and agreed scope of assessment.	
30 June 2020	PDG correspondence	PDG Chief Pilot confirmed acceptance of the proposals and highlighted no concerns	
20 July 2020	Email to CIL	Completed Helicopter Access Assessment provided to CIL for comment.	
14 January 2021	Email from CIL	CIL confirmed that having discussed internally, with PDG and with CIL's aviation consultant they accepted the findings of the attached report and have no further comments in relation to the helicopter.	
January 2024	E-mail to CIL and PDG	Both the Commissioner of Irish Lights and PDG were contacted in January 2024 to confirm their position had not changed. The response received from PDG on the 27th January 2024 raised no concerns about helicopter access to the Kish Tower.	
14 February 2024	Meeting with CIL	CIL confirmed that they are not aware of any updates to the aviation lighting requirements for the project. However, discussions between the IAA and CIL were planned for the near future.	Section 12.13.1 provides commentary of the specific lighting requirements that will be agreed with stakeholders before operation of the WTGs.
5 June 2024	Email to CIL	The Helicopter Access Assessment (Anatec 2024): Volume 4, Appendix 4 3.12-2 of the EIAR was resent to CIL for comment.	CIL confirmed on 26 June 2024 that they had no further comment to make on the assessment.

Date	Consultation type	Consultation and key issues raised	Section where provision is addressed
Met Éireann			
13 March 2023	Email to Met Éireann	Information on the design parameters of the array area was provided to Met Éireann. As no response was received a follow up email was provided on the 10 October 2023. The follow up email provided an update on design parameters based on the results of preliminary environmental and technical studies which have been completed since the last correspondence with Met Éireann.	Section 12.5.26 considers Meteorological Radar systems.
4 November 2023	Email from Met Éireann	Met Éireann responded stating that guidance as provided by the Operational Programme for the Exchange of weather Radar information (OPERA) applies to Met Éireann weather radar systems. Wind farm projects within 20km of C-band radars should undertake a study into the impact of the wind turbines on weather radar operations and requested if the array area would be within 20km of the Dublin Airport weather radar location. Furthermore, Met Éireann noted the recommendation from OPERA of the use of non-reflective materials in wind turbine construction.	Met Éireann were contacted on a number of occasions post the response received from them on the 4 November 2023. Confirmation was requested that Met Éireann weather radars would not be impacted by the Dublin Array WTGs. No response was received. The array area is located more than 20km from the location of the C band Dublin weather radar location. As the Dublin Array area will be outside of the requirement to assess potential impact, Met Éireann weather radar systems are not considered further in the assessment.

12.4 Methodology

12.4.1 For a full description of the methodology as to how this EIAR was prepared, see Volume 2 Chapter 3, EIA Methodology (hereafter referred to as the EIA Methodology Chapter. The methodology that follows below is specific to this chapter.

12.4.2 The assessment has been informed by the conclusions of a desk-based study and with reference to the existing evidence base regarding the effects that the development of offshore wind farms can create for aviation stakeholders.

12.4.3 IAA guidance in terms of wind energy developments in proximity to aviation surveillance radar related aviation infrastructure is limited. The UK CAA CAP 764 Policy and Guidelines on Wind Turbines (CAA, 2016) contains such consultation guidance which is typically applied in the UK. The guidance pertaining to radar infrastructure and as contained in CAP 764 has been utilised as a minimum during the assessment of the array area. The recommended consultation zone within the vicinity of an aerodrome with a surveillance radar facility is 30 km, with a range of 17 km recommended for a non-radar equipped aerodrome. It is acknowledged, and known, that aviation stakeholder objections from beyond the recommended aviation stakeholder distances provided in CAP 764 can occur, and this has been considered during the assessment of potential radar impact.

Radar Assessment Method

12.4.4 A Primary Surveillance Radar (PSR) system operates by alternately transmitting a stream of high-power radio frequency pulses and 'listening' to echoes received back from targets within its radar Line of Sight (LoS). Generally, air surveillance (aviation) radars employ a rotating antenna that provides 360° coverage in azimuth; the typical scan rate is 15 rotations per minute (rpm) thus illuminating a given target every four seconds.

12.4.5 A PSR can distinguish between moving and static targets; for targets that are moving towards or away from the radar, the frequency of the reflected signal from a moving target changes between each pulse (transmit and receive) which is known as the 'Doppler' shift. This can be most practically explained by considering the change in frequency of the engine sound heard by a pedestrian when a car passes by on the road – the sound as the car approaches is higher than the sound heard by the pedestrian as it travels away. The Doppler shift has the effect of making the sound waves appear to bunch up in front of the vehicle (giving a higher frequency) and spread out behind it (lower frequency). The true frequency of the engine is only heard when the car is immediately next to the pedestrian. The aviation radar receiver is 'listening' to the radio waves reflected from the moving object and working out whether the returned signal is of a higher/lower frequency (moving object) or if the returned frequency is the same as the transmitted signal (a stationary object).

12.4.6 This assessment considers all aviation radar systems within operational range of the proposed project, as well as military areas of operation and those UK PSRs that may be impacted. For each identified receptor, the physical obstruction and/or radar effect, and then subsequently the operational impacts were considered. Any other potential impacts such as aerodrome IFPs, orientation of approach and departure flight paths, physical safeguarding of flight, airspace characteristics and flight procedures are also considered within this and the IFP assessment.

Wind Turbine Generator (WTG) Potential Affect to Aviation Radar

12.4.7 WTGs can be a cause of PSR false plots, or clutter, as radar detectable rotating blades can trigger the Doppler threshold (minimum shift in signal frequency) of the Radar Data Processor (RDP) and therefore may be interpreted as aircraft movements. Effects have been observed on radar sensitivity caused by the substantial Radar Cross Section (RCS) of the WTG structural components (blades, tower and nacelle) which can exceed that of a large aircraft; the effect 'blinds' the radar (or the operator) to wanted targets in the immediate vicinity of the WTG. False plots and reduced radar sensitivity may reduce the effectiveness of a PSR to an unacceptable level and compromise the provision of a safe radar service to participating aircraft, particularly within the vicinity of a wind farm development.

12.4.8 It is mainly for the above reasons that Air Navigation Service Providers (ANSP) can raise concerns regarding wind farm developments that are within radar LoS to their radar. However, there are a number of relevant examples where the impact of offshore sites is managed on an operational basis, in agreement with the ANSP, and without the need for technical mitigation.

12.4.9 Monopulse Secondary Surveillance Radar (MSSR) measures the bearing and distance of aircraft targets and relies on aircraft being equipped with a radar transponder that replies to each interrogation signal by transmitting encoded data which includes identity of the target, altitude, speed and other information depending on its chosen mode (Mode S being the most common and containing the greatest level of information). When several aircraft (or targets) are in close proximity to each other, the possibility exists of confusion of data received, the ground decoder may be overloaded (garbling). MSSR provides an improved accuracy over legacy types of SSR through signal processing which removes the possibility of garbling.

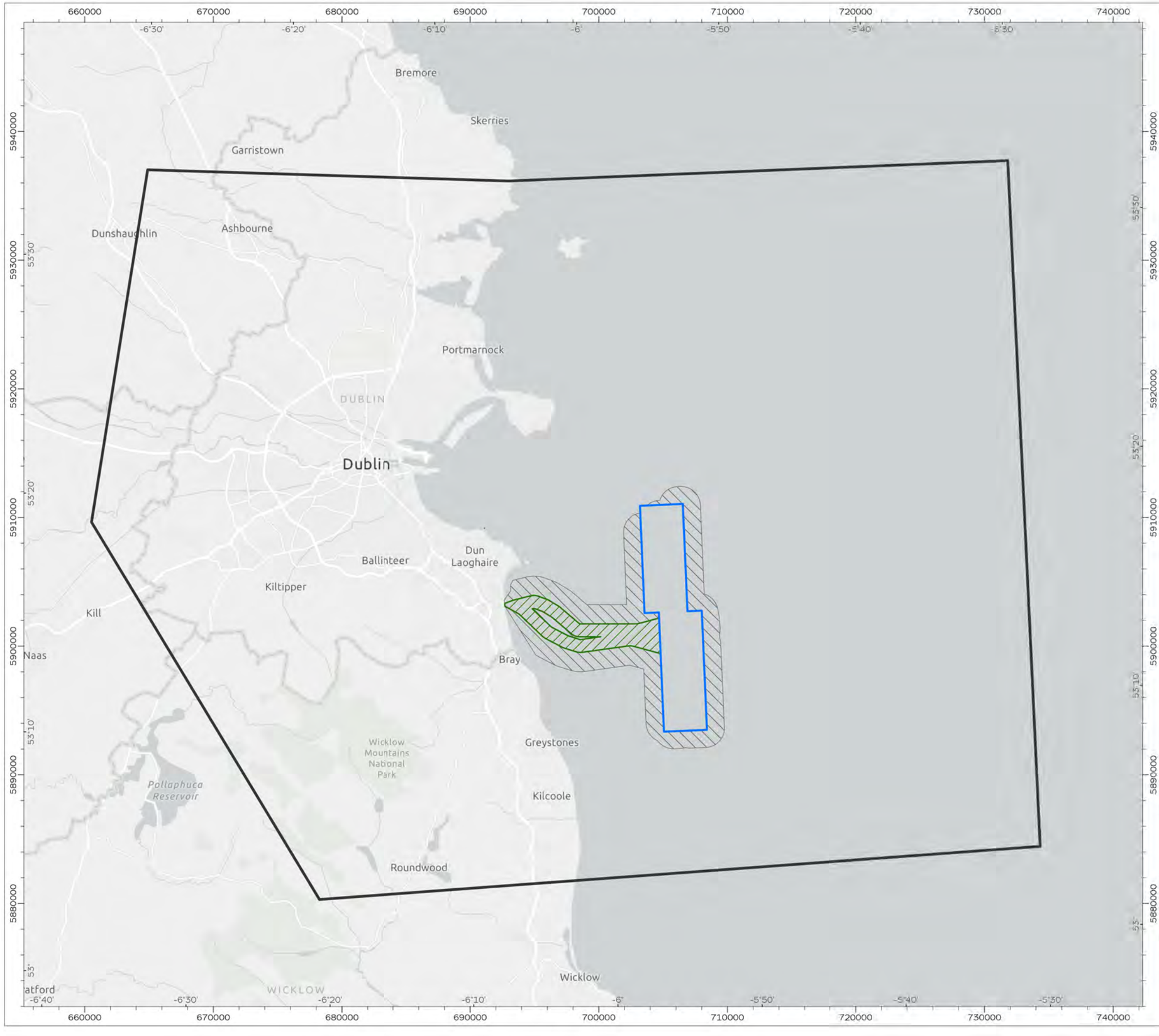
Study area

12.4.10 The information sources provided in Section 12.2 have been utilised in establishing the study area however, as aviation radar related stakeholder objections may occur from beyond the recommended aviation stakeholder distances, the study area has been extended. The offshore aviation and radar study area includes the array area as well as the offshore ECC[9], and the airspace between the array area and points on the Irish mainland from Point Rush in the north, to contain Casement Aerodrome in the west, Newcastle Airfield to the south and east to the Shannon Flight Information Region (FIR) boundary, shown in Figure 2. The offshore aviation and radar study area contains all the airfields that have the potential to be affected by the offshore infrastructure together with the aviation radar systems and procedures associated with the airfields.

12.4.11 For the completion of the radar line of sight analysis (Volume 4, Appendix 4.3.12-3 of the EIAR) consideration was given to the relative likely detection range, altitude of the radar site, mode of operation (airfield operations or area control) and Declared Operational Coverage (DOC) of radars in a wider region (extending to the UK). This resulted in the inclusion of selected UK located military and civil aviation radar systems which have the potential to detect the operational WTGs placed in the array area.

12.4.12 Figure 1 below provides an illustration of the offshore aviation and radar study area defined by a black polygon boundary line surrounding the array area. Volume 4, Appendix 4.3.12-3 of the EIAR should be referred to for the scope and locations of UK radars included in the assessment.

[9] All distances are taken from the outer boundary of all offshore works incorporating the offshore infrastructure, the buffer also incorporates the temporary occupation area and as such are inherently precautionary.



- Array Area
- Temporary Occupation Area
- Export Cable Corridor
- Aviation and Radar Study Area

DRAWING STATUS

FINAL

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MAP NOTES / DATA SOURCES:

PROJECT TITLE

Dublin Array

DRAWING TITLE

Aviation and Radar Study Area

DRAWING NUMBER: **1**

PAGE NUMBER: **1 of 1**

VER	DATE	REMARKS	DRAW	CHEK	APRD
01	2024-05-08	For Issue	GB	BB	SS

0 3 6 9 12 km
0 1.5 3 4.5 6 nm

GRID NORTH

SCALE 1:300,000 PLOT SIZE A3
DATUM WGS 1984 VERTICAL REF LAT
PRJ WGS 1984 UTM Zone 29N

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12.5 Receiving Environment

12.5.1 This section summarises information relevant to aviation and radar and the relevant stakeholders that may be affected by offshore infrastructure. Aviation operations in Ireland are highly regulated; the offshore aviation and radar study area is located in airspace where the provision of an Air Traffic Service (ATS) is routine. The same rules of the air which maintain a safe operating environment currently will apply in the Irish Sea during all phases of the Project and the provision of the ATS will not be affected.

12.5.2 The IAA[10] has nine radar sites across Ireland, spanning from Malin, Co. Donegal in the north to Mount Gabriel, Co Cork in the south. At these sites, the IAA has eight new Mode-S Radars and three new Solid State PSR systems. There are two PSR systems located in the region of Dublin Airport known as 'Dublin 3' and 'Tooman'. Additionally, a number of UK based PSR systems have the potential to detect the array Area WTGs at the maximum blade tip height.

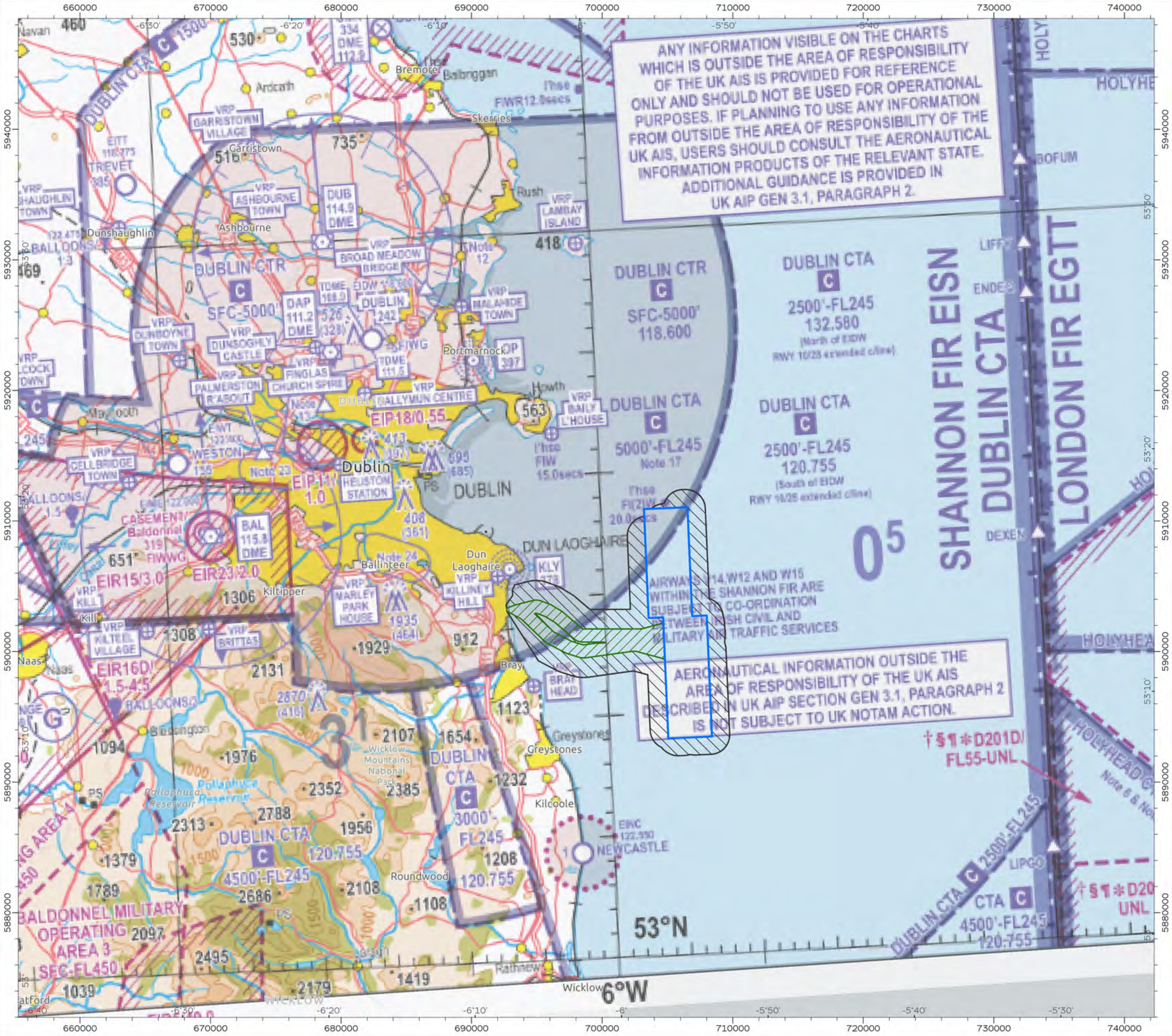
12.5.3 The northwestern sector of the array area will be located within Class C Controlled Airspace (CAS), the Dublin Control Zone (CTR) which extends from the surface to 5,000 feet (ft) amsl in the northern part of the offshore development area. Above the Dublin CTR in the northwestern sector of the array area, the Dublin Control Area (CTA), CAS is established from the ceiling of the Dublin CTR (5,000 ft) to Flight Level (FL) 245, (approximately 24,500 ft).

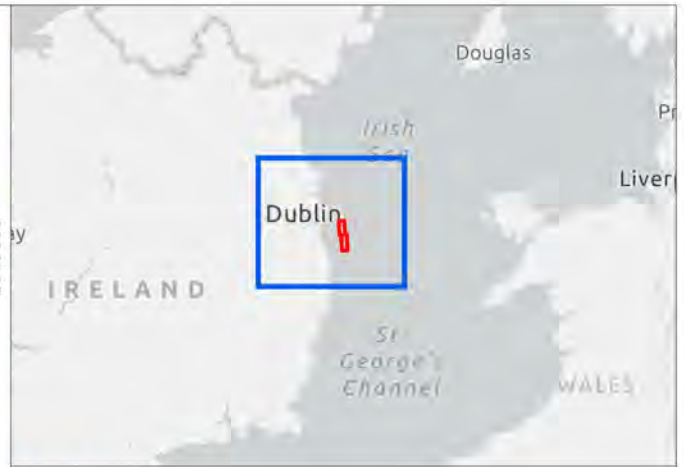
12.5.4 The remainder of the array area lies outside of the Dublin CTR, in Class G airspace, but underneath the extended Dublin Control Area (CTA), CAS from 2,500 ft up to FL 245. Within Class G airspace, any aircraft can enter and transit the airspace without ATC clearance and subject only to a small set of mandatory rules, as stipulated in the AirNav Ireland IAIP en route (ENR) Section 1.4-1 Air Traffic Service (ATS) Airspace Classification (AirNav, Integrated Aeronaurical Information Package, 2024). Aircraft operating in this area may be in receipt of an ATS; however, within this classification of airspace, pilots are ultimately responsible for their own terrain and obstacle clearance [ENR Section 1.4-1].

12.5.5 Located above the Class G airspace, Class C CAS of the Dublin CTA, is established from various lower designated altitudes up to FL 245 (approximately 24,500 ft) as shown in Figure 2 below. Above FL245 Class C airspace forms the Shannon Upper Flight Information Region (UFIR) which is utilised by en route air traffic flying between Europe and further afield to the Americas. Control of these aircraft is provided by the Shannon Air Control Centre (ACC).

12.5.6 Within Class C airspace all flights are subject to an air traffic control service with standard separation maintained between aircraft dependent on whether they are flying under Instrument Flight Rules[11] (IFR) or VFR (ENR Section 1.2/3). Airspace classified as Class C within the Shannon FIR and UFIR is designated as a Transponder Mandatory Zone (TMZ) (IAA, 2019a). A TMZ requires that all flights operating within it shall carry and operate a SSR Transponder which reduces the dependency on PSR systems.

[10] AirNav Ireland provide air traffic management services in the airspace controlled by Ireland.
[11] Instrument Flight Rules (IFR) - is when the pilot is flying the aircraft in reference to cockpit instruments under weather conditions where visual references are not possible to maintain VFR flight.





Array Area

Temporary Occupation Area

Export Cable Corridor

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PROJECT TITLE

Dublin Array

DRAWING TITLE

Details of Established Airspace in the Vicinity of the Dublin Array

DRAWING NUMBER: **2** PAGE NUMBER: **1 of 1**

VER	DATE	REMARKS	DRAW	CHEK	APRD
01	2024-05-08	For Issue	GB	BB	SS

0 3 6 9 12 km
0 1.5 3 4.5 6 nm

N

SCALE	1:300,000	PLOT SIZE	A3
DATUM	WGS 1984	VERTICAL REF	LAT
PRJ	WGS 1984 UTM Zone 29N		

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Receiving Environment Conclusions

Aerodromes

12.5.7 There are a number of aerodromes within the offshore aviation and radar study area; distance measurements are taken from the closest boundary of the array area to the aerodromes Airfield Reference Point (ARP) where one exists.

- Dublin Airport located on a bearing of 300°/24.7 km;
- Weston Airport located on a bearing of 278°/36.2 km;
- Casement (Baldonnel) Aerodrome located on a bearing of 270°/33 km; and
- Newcastle Airfield located on a bearing of 218°/11.3 km.,

Instrument Flight Procedures

12.5.8 An IFP is a published procedure and describes the routes used by aircraft flying IFR and are designed to achieve and maintain an acceptable level of safety in operations. IFP include an instrument approach procedure, a standard instrument departure, a planned departure route and a standard instrument arrival. There are no published IFP for Newcastle Airfield where operations are conducted VFR; therefore, no assessment of IFP was necessary for this location.

12.5.9 In October 2024, after the completion of the IFP report which accompanies this chapter, Weston Airport added a number of IFP to the IAIP[12]. As of January 2025, the new procedures are still awaiting Regulatory Approval. A high level AirNav Ireland review of the newly published procedures indicates that the maximum tip height can be accommodated without affecting the procedures. AirNav Ireland and Weston Airport confirmed during a meeting held on the 20th January 2025 that Weston IFPs would not be impacted by the Project (see Table 1).

12.5.10 The array area will be located adjacent to and underneath the IFP for the following aerodromes which are assessed within the IFP assessment (noting that the point above that Weston Airport was not included at the time of assessment due to there being no relevant IFPs):

- Dublin Airport; and
- Casement (Baldonnel) Aerodrome.

[12] https://www.airnav.ie/air-traffic-management/aeronautical-information-management/aip-package/weston-chart-information Published: October 2024

12.5.11 The IFP Assessment (Osprey, 2024): Volume 4, Appendix 4.3.12-1 of the EIAR, considers potentially affected airports and provides the conclusions of the analysis completed on the IFPs that were relevant at the date of publication. The purpose of the IFP assessment is to inform the project design, specifically to determine the maximum tip height that can be accommodated without affecting any published IFPs. The IFP assessment was provided to the IAA and the DoD to facilitate consultation and agreement on the acceptability of turbine design parameters. Table 1 provides a summary of consultation for aviation and radar to date.

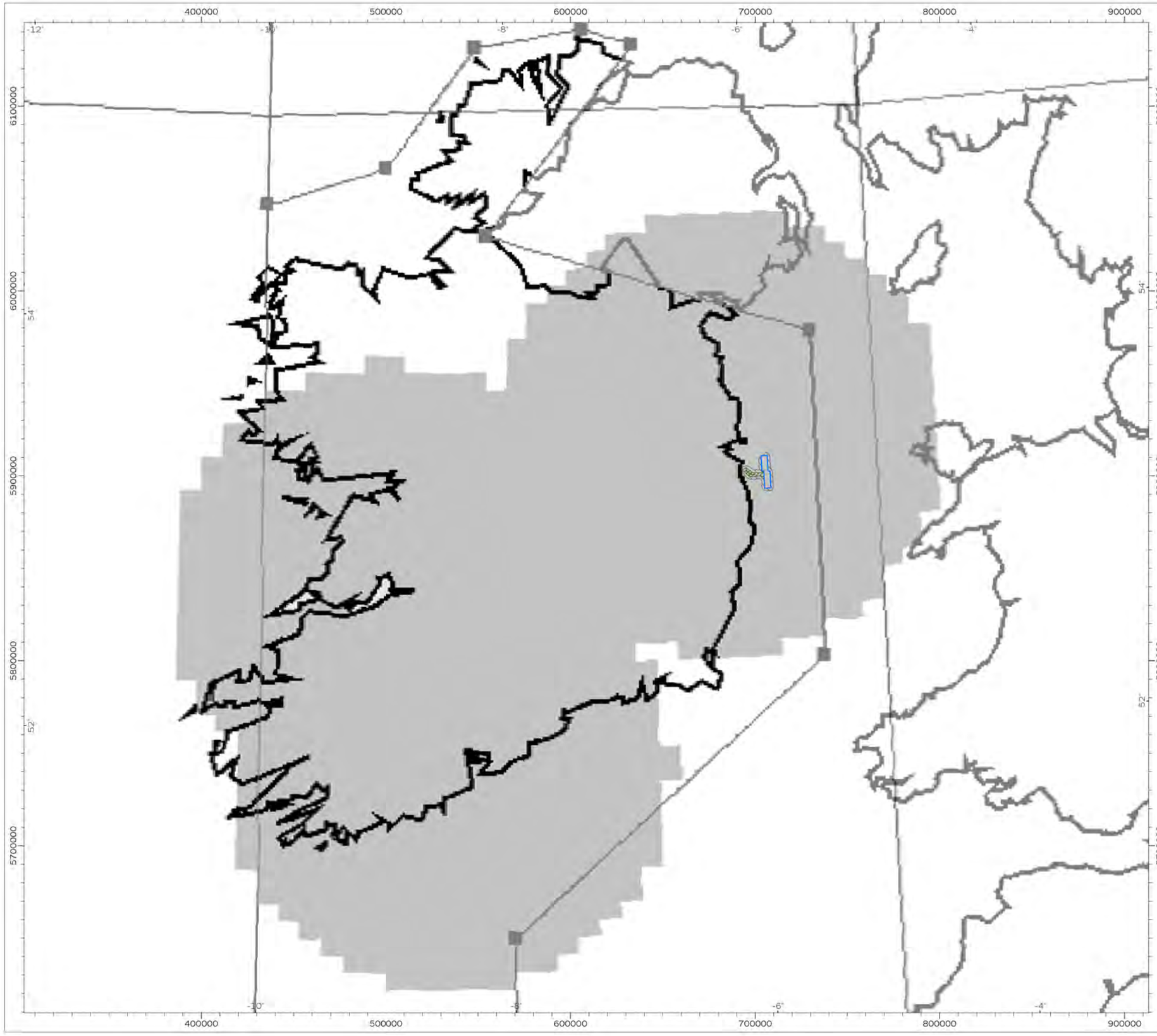
Aviation radar

12.5.12 IAA PSR facilities are located at Cork, Shannon and Dublin. AirNav Ireland provide ATC services at the three airports.

12.5.13 Figure 3 shows the areas of PSR cover provided within Irish airspace. The Project is outside of the radar coverage area of the Shannon and Cork PSRs however, the Dublin PSRs provide radar coverage over the array area and theoretically may be affected by the radar detection of the operational array. Table 1 provides a summary of aviation and radar consultation completed. During a meeting with the IAA on the 3rd March 2021, the IAA were requested to confirm that the original position of the IAA that no impact is predicted to occur to CNS equipment; no response contrary to the original opinion provided was received. During a meeting with AirNav Ireland on the 20th January 2025; AirNav Ireland confirmed that no impact to IAA CNS equipment will occur due to the development of the Project.

12.5.14 Sections 12.4.7 and 12.5.16 detail how the radar detection of operational WTGs can impact aviation radar systems. WTGs detectable by a PSR system may degrade the system by creating false targets, reducing system sensitivity, creating radar shadowing behind the WTGs and potentially saturating the radar receiver leading to clutter potentially concealing real aircraft targets.

12.5.15 Figure 4 shows the areas of SSR coverage provided within Irish airspace. Table 1 provides a summary of aviation and radar consultation completed.



Array Area
Export Cable Corridor
Temporary Occupation Area

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PROJECT TITLE

Dublin Array

DRAWING TITLE

Primary Radar Coverage within Ireland

DRAWING NUMBER: **3**

PAGE NUMBER: **1 of 1**

VER	DATE	REMARKS	DRAW	CHEK	APRD
01	2024-05-08	For Issue	GB	BB	SS

0 20 40 60 80 km
0 10 20 30 40 nm

N (GRID NORTH)

SCALE 1:2,100,000 PLOT SIZE A3
DATUM WGS 1984 VERTICAL REF LAT
PRJ WGS 1984 UTM Zone 29N

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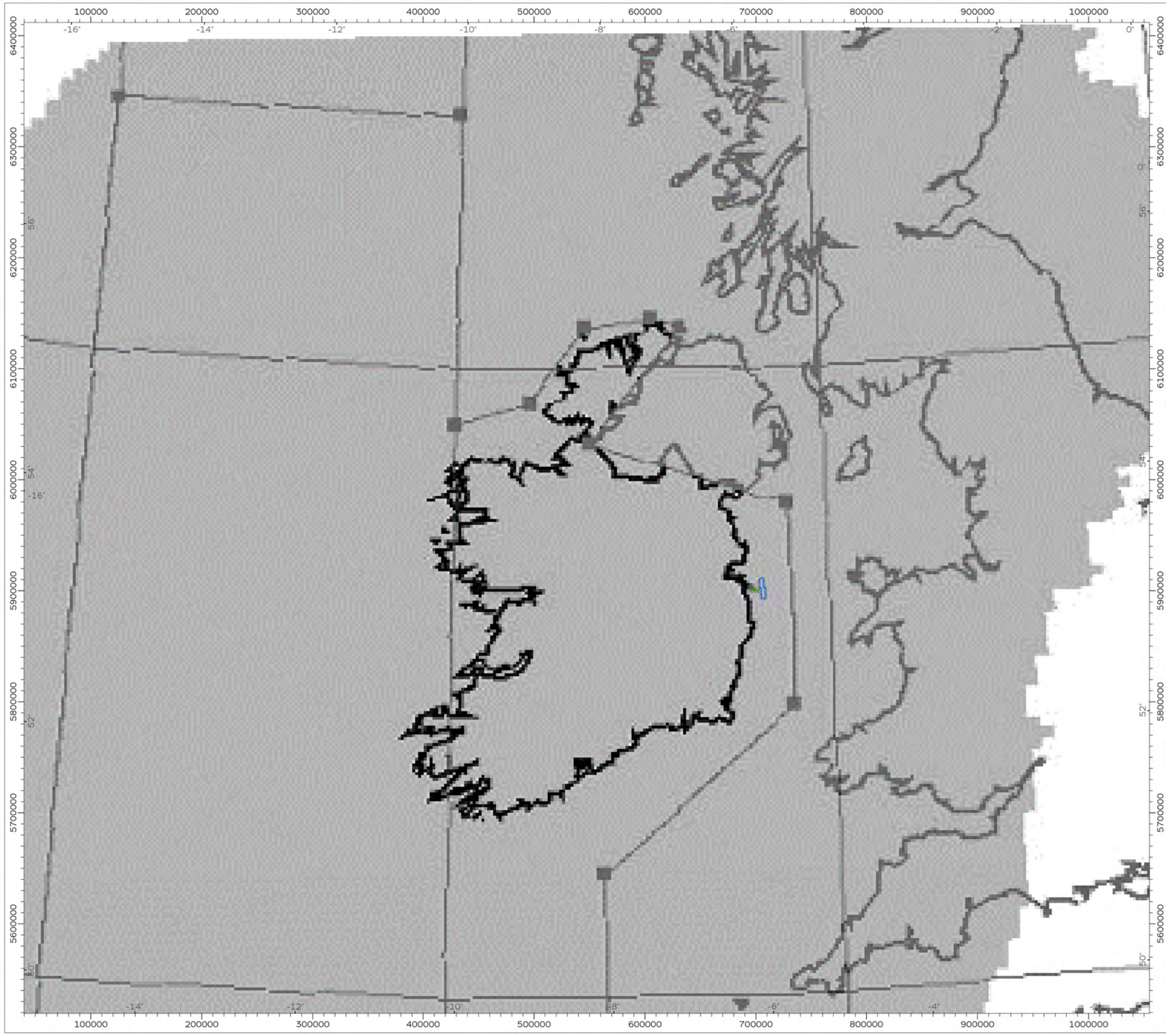

Array Area

Export Cable Corridor

Temporary Occupation Area

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PROJECT TITLE

Dublin Array

DRAWING TITLE

Secondary Radar Coverage within Ireland

DRAWING NUMBER: **4**

PAGE NUMBER: **1 of 1**

VER	DATE	REMARKS	DRAW	CHEK	APRD
01	2024-05-08	For Issue	GB	BB	SS

0 30 60 90 120 km

0 15 30 45 60 nm

N GRID NORTH

SCALE 1:3,500,000 PLOT SIZE A3

DATUM WGS 1984 VERTICAL REF LAT

PRJ WGS 1984 UTM Zone 29N

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12.5.16 The radar systems employed by AirNav Ireland deliver full duplicated coverage of the IAA's airspace to advanced Air Traffic Management (ATM) Surveillance Tracker & Server (ARTAS) surveillance data processing systems located in the Shannon ACC and Dublin ATC centre. The ARTAS systems merge the radar data from across IAA airspace and distribute the appropriate air situation picture to IAA controllers in Shannon, Dublin and Cork.

12.5.17 Radar line of sight analysis at a maximum blade tip height of 257 m amsl (259.1 m above LAT) was competed during 2019, conclusions of the analysis indicated that the Dublin based PSR systems would theoretically detect all WTG locations in the array area. During 2019, the IAA concluded that a blade tip height of 257m amsl, will not impact IAA CNS systems.

12.5.18 A radar line of sight analysis at an increased blade tip height of 307.5 m amsl (309.6m above LAT) confirmed that the Dublin Airport PSRs will theoretically detect all WTGs locations in the array area. Table 1An assessment of aviation radar systems that are located in the RoI and the UK were assessed for the potential to detect the operational WTGs placed within the array area at the increased maximum blade tip height of 307.5 m amsl (309.6 m above LAT). Those RoI and UK based aviation radar systems that have the potential to detect the array area WTGs at the maximum blade tip height have been assessed.

12.5.19 The following RoI PSR systems were assessed:

- Dublin Airport – Tooman PSR.
- Dublin Airport – Dublin 3 PSR.

12.5.20 Those UK based PSR systems assessed are as follows:

- NATS – St Annes.
- NATS – Great Dun Fell.
- NATS – Lowther Hill.
- NATS – Clee Hill.
- Isle of Man Airport.
- Royal Air Force (RAF) Valley.
- British Aerospace (BAe) Warton Airport.

12.5.21 There will be no relative increase in radar detection (and therefore impact) to the RoI Dublin PSR systems at a blade tip height of 307.5 m amsl (as radar detectability existed at the lower assessed blade tip height of 257m amsl). AirNav Ireland confirmed during a meeting held on the 20th January 2025 that Irish CNS equipment would not be impacted by the Project; therefore, Irish PSR systems are not considered further. None of the UK based PSR systems will theoretically detect the array area WTGs at the assessed blade tip height. Results of the analysis are included within Volume 4, Appendix 4.3.12-3: Radar Line of Sight.

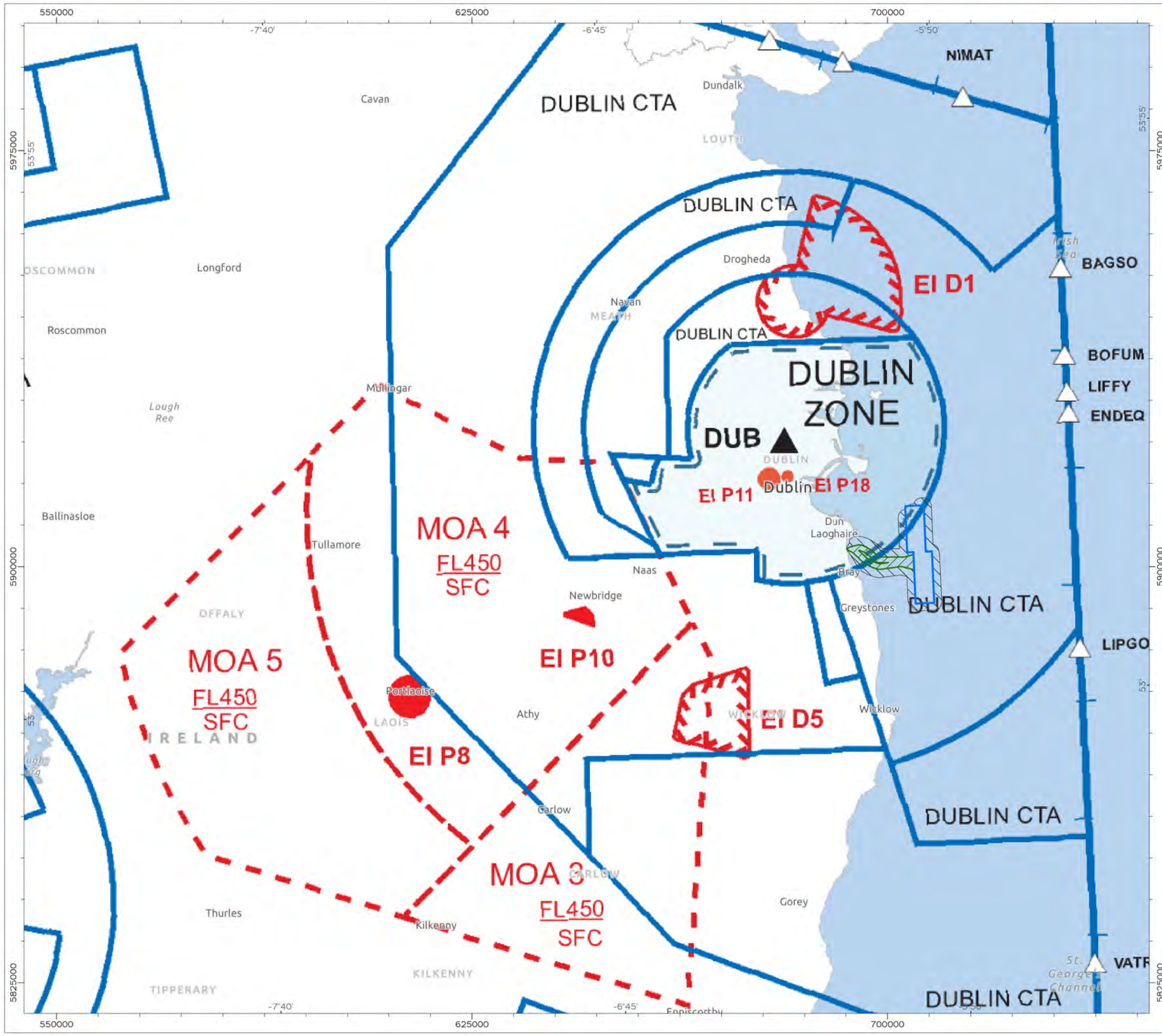
12.5.22 As none of the UK based PSR systems assessed will theoretically detect the array area WTGs; these UK radar systems are not considered further.

Military Operations

12.5.23 In the portion of Class G airspace above and surrounding the array area, aircraft (including military aircraft operations) may operate autonomously without instruction from ATC. In line with EASA standards (EASA, 2012), the IAA Standardised Rules of The Air Order (IAA, SI 266, 2019) aircraft operating VFR shall not be flown closer than 500 ft vertically or laterally, to any person, vehicle, obstacle, or structure. The Irish IAIP[13] provides an illustration of the published military and exercise aviation training areas within Irish airspace. Figure 5 below provides an excerpt of the illustration of the airspace on the eastern seaboard of Ireland; the array area is not within any of the military aviation exercise training areas which are illustrated in the figure below as areas bounded by red lines[14]. In addition, no reference to impact was made to military and exercise aviation training areas in the DoD response dated 18th November 2019 (Table 1). Non-aviation military and exercise training areas are considered in Volume 3, Chapter 11: Marine Infrastructure and Other Users (MI&OU).

[13] Available at https://www.airnav.ie/air-traffic-management/aeronautical-information-management/aip-package

[14] The training areas in Figure 5 below are illustrated with red boundary lines and hashed areas which provide a visual indication of the extent of each area together with the operating altitudes of the area (e.g. Surface (SFC to Flight Level (FL) 450 (approximately 45,000 feet)) as in the case of Military Operating Area (MOA) 3, 4 and 5.



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Data Source: Base image from Irish Aviation Authority, AIRAC AMDT 002/21, ENR 5.2 - 2, 25 February 2021

PROJECT TITLE

Dublin Array

DRAWING TITLE

Military Exercise and Training Areas on the Eastern Side of Ireland

DRAWING NUMBER: **5**

PAGE NUMBER: **1 of 1**

VER	DATE	REMARKS	DRAW	CHEK	APRD
01	2024-05-08	For Issue	GB	BB	SS

0 6 12 18 24 km
0 3 6 9 12 nm

N (GRID NORTH)

SCALE 1:700,000 PLOT SIZE A3
DATUM WGS 1984 VERTICAL REF LAT
PRJ WGS 1984 UTM Zone 29N

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Bray Air Display

12.5.24 The Bray Air Display is an annual two-day event which takes place in the airspace above the Bray Seafront, Co. Wicklow and is Ireland's largest air festival event. The town of Bray is located approximately six nautical miles (NM) from the closest development boundary of the array area. Procedures for the Air Display will require pre notified airborne procedures, holding areas and display lines. The Director of the Bray Airshow has stated during engagement that no impact will be created to the operation of the Air Display (Table 1).

Newcastle Airfield

12.5.25 Newcastle Airfield is located at Greystones, Co Wicklow on a bearing of 218°/11.3 km from the southern edge of the array area. The aerodrome is licensed by the IAA and has one runway designated 18/36 measuring 690 m in length to which VFR flight operations are conducted. Aircraft based at the airfield are predominately a mixture of flex-wing microlight aircraft to light single engine aircraft. Flight training is conducted from the aerodrome from helicopters of the Irish Coastguard and the IAC. There is no runway lighting at Newcastle Airfield and flights are conducted under VFR and during daylight hours. Pilots of aircraft operating under VFR in Class G airspace are required to plan their flying activities in advance and to be familiar with any en-route obstacles they may encounter and are ultimately responsible for seeing and avoiding other aircraft, terrain and obstructions. The licensee has raised no objection to the proposed project (Table 1).

The Kish Lighthouse

12.5.26 The Kish Lighthouse is located on the Kish Bank on the northern edge of the array area. The lighthouse is operated by CIL and monitored via a telemetry link from Dún Laoghaire. The lighthouse is fitted with a helideck on the top of the structure and operations are currently conducted under contract by PDG Helicopters. Obstructions such as WTGs close to a helideck may restrict certain operations and approach and departure to the helideck which must be conducted into wind. Operations to the lighthouse are conducted under VFR and as such the pilot is responsible for the safe conduct of flight in avoiding the WTGs. Volume 4, Appendix 4.3.12-2, Helicopter Access Assessment (Anatec, 2024), considers helicopter operations to the Kish Lighthouse. Table 1 provides a summary of the consultation completed with CIL and PDG Helicopters.

Meteorological (Met) Radar

12.5.27 The closest meteorological radar system to the array area is located at Dublin Airport (bearing 304°/24.5 km) from the northwest tip boundary of the array area. WTGs have the potential to block a portion of the electronic signal which may lead to an under estimation of precipitation measurements and loss of sensitivity to the radar system. Table 1 provides a summary of the engagement completed with Met Éireann. Wind farm projects within 20km of C-band weather radars should undertake a study into the impact of the wind turbines on weather radar operations. Met Éireann were contacted on a number of occasions post the response received from them on the 4 November 2023. Confirmation was requested that Met Éireann weather radars would not be impacted by the Dublin Array WTGs. No response was received. The array area is located more than 20km from the location of the C band Dublin weather radar location (which is the only met radar which may be impacted by operation of the array WTGs). As the Dublin Array area will be outside of the requirement to assess potential impact, met radar is not considered further.

Airborne Search and Rescue

12.5.28 The development of offshore infrastructure will lead to a change of the operating environment should an airborne SAR operation be required within or close to the array area. Other winching operations would be constrained by the individual operator licenses; detailed assessment of the potential impact of offshore infrastructure on helicopter operations to the Kish Tower is provided in the Helicopter Access Assessment (Anatec, 2024) (Volume 4, Appendix 4.3.12-2).

12.5.29 The civil aviation operator Bristow Ireland are contracted to conduct maritime SAR operations in the Irish Search and Rescue Region (SARR) on behalf of the Irish Coast Guard. The Irish Coast Guard controls the day-to-day SAR operations; Safety Regulation Division of the IAA maintains regulatory oversight of SAR helicopter operations.

12.5.30 When on an operational mission, SAR aircraft rescuing persons from the sea are not constrained by the normal rules of the air. This allows SAR pilots total flexibility to manoeuvre using best judgement thus making them highly adaptable to the environment and conditions in which they are operating. While the SAR operations are of extreme importance, the SAR helicopter may adapt to the environment in which they operate as they are not constrained by the normal rules of the air (where not considered to be Commercial Air Transport by the IAA).

12.6 Future Baseline

12.6.1 The preceding aviation baseline description above provides an accurate reflection of the current state of the existing environment. The earliest possible date for the start of construction is 2029, with an expected operational life of 35 years, and therefore there exists the potential for the baseline to evolve between the time of assessment and point of impact. Outside of short-term or seasonal fluctuations, changes to the baseline in relation to aviation and radar usually occurs over an extended period. Based on current information regarding reasonably foreseeable events, the baseline of aviation stakeholders and receptors is not anticipated to have fundamentally changed from its current state at the point in time when impacts occur.

12.6.2 To augment en route radar systems, the IAA is operating and are evaluating the next generation of surveillance sensor systems; Automatic Dependent Surveillance – Broadcast (ADS-B) and Wide Area Multilateration (WAM). The IAA is also evaluating the next generation of ARTAS to enable the use of the new sensors. The Eurocontrol document (Eurocontrol, 2014) states that ADS-B and WAM are likely to be less susceptible to the effect of WTGs.

12.6.3 Dublin Airport plc (formally the Dublin Airport Authority or DAA) have submitted plans for investment to commence the next stage of Dublin Airport's development which includes the improvement of terminal facilities and other airport infrastructure. Dublin Airport plc have been granted approval and are operating an additional runway (known as the North runway) which is located north of Runway 28/10, construction was completed during 2021 (DAA, 2021). The IFP Assessment provided at Volume 4, Appendix 4.3.12-1 of the EIAR, at the date of publication, has considered all published IFP procedures in use at Dublin Airport including the second runway operation.

12.6.4 The aviation receiving environment for operational/decommissioning impacts is expected to evolve with the additional consideration that any changes during the construction phase will have altered the receiving environment to a degree (as set out in this chapter).

12.7 Assessment criteria

12.7.1 The criteria for determining the significance of effects is a two-stage process that involves defining the sensitivity of the receptors and the magnitude of the impacts. This section describes the criteria applied in this chapter to assign values to the sensitivity of receptors and the magnitude of potential impacts. A matrix was used for the determination of significance in EIA terms (see Table 4). The combination of the magnitude of the impact with the sensitivity of the receptor determines the assessment of significance of effect.

Sensitivity of receptor criteria

12.7.2 The criteria for defining sensitivity in this chapter are outlined in Table 2.

Table 2 Sensitivity/ importance of the environment

Receptor sensitivity	Definition
High	The value of the receptor or the activities of the receptor, is of high importance to the local, regional or national economy and/or the receptor or the activity of the receptor is highly vulnerable to impacts that may arise from the project and/or recoverability is long term or not possible.
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 generally vulnerable to impacts that may arise from the project and/or recoverability is slow and/or costly.
Low	Receptor provides a service which is of low value to the local, regional or national economy, and/or the receptor is not generally vulnerable to impacts that may arise from the project, and/or has high recoverability.
Negligible	Receptor provides a service which is of negligible value to the local, regional or national economy, and/or the receptor is not vulnerable to impacts that may arise from the project, and/or has high recoverability.

Magnitude of impact criteria

12.7.3 The magnitude criterion of the potential effects on aviation receptors is assessed using the method and terminology provided in Table 3.

Table 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 project and/or frequency of repetition is continuous and/or effect is not reversible for project).
Medium	Loss or alteration to significant portions of key components of current activity and/or physical extent of impact is moderate and/or medium-term duration (i.e., O&M period) and/or frequency of repetition is medium to continuous and/or effect is not reversible for project phase.
Low	Minor shift away from baseline, leading to a reduction in level of activity that may be undertaken and/or physical extent of impact is low and/or short to medium term duration (i.e., construction period) and/or frequency of repetition is low to continuous and/or effect is not reversible for project phase.
Negligible	Very slight change from baseline condition and/or physical extent of impact is negligible and/or short-term duration (i.e., less than two years) and/or frequency of repetition is negligible to continuous and/or effect is reversible.

Defining the significance of effect

12.7.4 Significance of aviation impacts are not strictly based on the sensitivity of the receptor or magnitude of change, but on whether the industry regulations for safe obstacle avoidance or radar separation (from radar clutter) can be maintained in the presence of operational WTGs. The determined effects have been informed by the results of the desktop assessment, professional opinion of the author gained from extensive years within Air Traffic Management and the aviation industry, and additional stakeholder consultation and with reference to the existing evidence base regarding the effects of wind farm infrastructure on aviation receptors. Any anticipated operational impact upon aviation stakeholders which results in restricted operation is considered to be of significance. The definition of terms relating to the scale of significance of potential effects are detailed in Table 4.

Table 4 Significance of potential effects

			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
	Neutral impact	Negligible	Not significant	Not significant	Not significant	Imperceptible
	Positive impact	Low	Moderate	Slight	Slight	Imperceptible
		Medium	Significant	Moderate	Slight	Imperceptible
		High	Profound or Very Significant (significant)	Significant	Moderate	Imperceptible

* Effects deemed to be of Moderate significance have the potential to be significant in EIA terms, subject to the assessor's professional judgement. Moderate effects are determined to be significant or not significant in EIA terms, depending on the sensitivity and potential magnitude of change. These evaluations are explained as part of the assessment, where they occur.

12.8 Do nothing environment

12.8.1 In the event that the development of the Dublin Array did not proceed, no alterations to the receiving environment are anticipated in addition to those presented in the future receiving environment section above.

12.9 Defining the sensitivity of the baseline

12.9.1 The sensitivity for the receptors for each potential effect, using the criteria outlined in Section 12.6.4, are presented in Section 12.14 to 12.16.

12.10 Uncertainties and technical difficulties encountered

12.10.1 No technical limitations or difficulties were encountered in compiling the information required for the completion of this aviation and radar chapter. After completion of the IFP Report which accompanies this chapter, Weston Airport added a number of IFPs to the IAIP. Discussions with AirNav Ireland and Weston Airport have concluded that the new Weston Airport IFP will not be impacted by the project.

12.11 Scope of the assessment

12.11.1 The impacts that will be assessed for aviation and radar receptors are detailed in Table 5 below.

Aviation Radar

12.11.2 There are a limited number of PSR and MSSR systems in operation in the RoI, due to the location of the offshore array and the operational coverage of the PSR systems in use, potential effects are limited to the operation of the Dublin PSRs created by the theoretical detectability of the array area WTGs. Dublin Airport utilise radar systems operated by AirNav Ireland on behalf of the IAA. Radar Line of Sight analysis indicates theoretical detectability by radar systems operated by the IAA. Effects to MSSR are only of consideration when the WTGs are located close to the MSSR station, typically within 10 km; therefore, no impact is predicted to MSSR in operation in the RoI. AirNav Ireland have provided confirmation that aviation CNS and NAVAIDs (including primary and secondary radar systems) will not be impacted by the proposed development (Table 1).

IFP

12.11.3 The results of consultation are provided within Table 1 which provides the results of engagement with Dublin Airport. Dublin Airport plc have stated that as long as the IAA are content that Dublin Airport IFP are not adversely impacted they have no further observations or comments to make. The IAA accepted the findings of the IFP Assessment i.e. that WTGs with a tip height below 309.6 m amsl (311.1 m LAT)[15] would not impact flight procedures and on this basis the IAA foresaw no objections to the proposed project. AirNav Ireland also provided confirmation that the IFP Assessment addressed all concerns. The IFP assessment is included in Volume 4, Appendix 4.3.12-1 of the EIAR. As previously noted, in October 2024, after the completion of the IFP report which accompanies this Planning Application, Weston Airport added a number of IFP to the IAIP[16]. A AirNav Ireland review of the newly published procedures indicates that the maximum tip height can be accommodated without affecting the procedures. AirNav Ireland confirmed during a meeting held on the 20th January 2025 that Dublin, Casement and Weston Airport IFPs will not be impacted by the Project (see Table 1).

12.11.4 Newcastle Airfield is operated under VFR conditions with flights conducted visually, no IFPs are published for the airfield. Table 1 provides the engagement response from the licensee of Newcastle Airfield. Based on the engagement response from stakeholders and considering the distance of the airfield from the array area and the VFR nature of operations conducted at the airfield, no impact is concluded.

DoD

12.11.5 The DoD have not indicated an impact to Casement Aerodrome in their response to engagement (Table 1). The IAC requested the fitment of aviation lighting incandescent or of a type visible by NVD. Analysis of Casement Aerodrome IFP is considered in Volume 4, Appendix 4.3.12-1of the EIAR. The IFP Assessment has concluded that at a blade tip height of 309.6 m amsl (311.1 m LAT), or below, Casement Airfield IFP will not be impacted. The maximum blade tip height (Option C WTG) is 307.5 m asml (309.6m above LAT) and therefore will not impact Casement Airfield IFP. The potential impact to military low-flying operations from the creation of an en-route obstacle created by the array area, is considered in assessment.

12.11.6 As there will be no predicted impact to Irish aviation radar systems (Table 1), no cumulative effects are expected to occur.

12.11.7 Specifically, the offshore aviation and radar study area covers:

- Safeguarded OLS established at Dublin Airport, Casement (Baldonnel) and Weston Airports;
- IFPs which are adjacent to the array area;

[15] WTG option C has a blade tip height of 309.6 m LAT (307.5 m amsl) and is therefore below the blade tip height which has been confirmed as having no impact on IFPs.

[16] https://www.airnav.ie/air-traffic-management/aeronautical-information-management/aip-package/weston-chart-information Published: October 2024

- An extended study area that includes aviation PSRs that have the potential to detect 307.5m amsl (309.6m LAT) high (blade tip) operational WTGs placed within the array area;
- Military aviation operations including low flying and OLS and IFP established at Casement Airfield;
- Meteorological radar systems;
- The Bray Air Display;
- Aviation operations conducted at Newcastle Airfield;
- Helicopter operations to the Kish Lighthouse; and
- The offshore ECC.

Scoped Out

12.11.8 The following impacts will not be assessed as they are scoped out:

- Potential impacts from the onshore infrastructure on aviation and radar receptors as identified in Section 12.4.10 are assessed within the Onshore Volume of the EIAR: (Volume 5: Onshore Infrastructure) and are therefore not repeated within this chapter.
- All offshore ECC associated with offshore infrastructure will be buried below the sea, they will not have an impact on aviation interests and therefore are not assessed in this chapter.
- Stationary or near stationary objects are removed from the aviation radar data display during radar signal processing and will therefore not impact aviation PSR systems. Stationary offshore substation platforms do not pose any issue for radar systems as aviation radar processing techniques remove stationary or slow-moving objects from the radar display and therefore these are not considered further.
- Impact to OLS - The IAA issues regulatory guidance in the IAA, Aerodrome Licensing Manual, 2014 (IAA, 2014) for aerodrome operations in relation to obstacles, stating that certain areas of an aerodrome's local airspace must be defined, to assess the significance of existing or proposed obstacles, known as Obstacle Limitation Surfaces (OLS), the maximum extent of the IAA's safeguarding of OLS is 15 km radius centred on the midpoint of the runway, (or runway threshold whichever is relevant). Due to the offshore location of Dublin Array being outside of all aerodrome OLS safeguarded areas, no OLS will be affected and aerodrome safeguarding (outside of IFP analysis) is not considered further in this chapter.
- Impact to IFPs - The Applicant has consulted with AirNav Ireland (who provide air traffic management services in the airspace controlled by Ireland) and the IAA who regulate the airspace.

- The Applicant commissioned an IFP Assessment ((Osprey, 2024)): Volume 4, Appendix 4.3.12-1, which assessed the maximum blade tip height that can be accommodated without affecting any published IFPs. As a result of this process the maximum blade tip height was set at a point where there would be no significant impacts to IFP. The IAA confirmed by letter (28 April 2021, Table 1) that they accepted the findings of the IFP Assessment and agreed that flight procedures would not be impacted by the offshore infrastructure and on this basis the IAA has no objections to the proposed project as IFP's would not be affected.

- The IFP Assessment was reviewed and updated during January 2024 following the introduction of new IFP to accommodate the new Dublin Airport north runway. AirNav Ireland provided a response on the 5th April 2024, which stated that the IFP Assessment sufficiently addressed any issues AirNav Ireland may have regarding the new IFP (see Table 1). As previously noted, In October 2024, after the completion of the IFP report which accompanies this chapter, AirNav Ireland added a number of Weston Airport IFP to the IAIP[17]. As of January 2025, the new procedures are still awaiting Regulatory Approval. AirNav Ireland have completed an assessment of the new Weston Airport IFPs and confirmed by email on the 10th January 2025 and during a meeting on the 20 September 2025 that no impact would be created by the project to IFP at Dublin, Casement and Weston Airports (see Table 1).

- Impact to CNS and NAVAIDs - The IAA have previously completed their own CNS and NAVAIDs assessment at a blade tip height of 257m amsl and stated on the 1st July 2019 that there would be no impact to IAA CNS. There will be no relative increase in radar detection (and therefore impact) to the Dublin PSR systems at a blade tip height of 307.5m amsl (as radar detectability existed at the lower assessed blade tip height of 257m amsl). AirNav Ireland have confirmed during a meeting held on the 20th January 2025 no impact will occur to Irish CNS and NAVAIDs systems therefore; Irish CNS systems are not considered further.

- Impact to military aviation Practice and Exercise Areas (PEXAs). –The array area is outside of military aviation related PEXA and will not impact aviation activity in PEXA. The DoD have not highlighted any potential issue to aviation activity in PEXA (Table *1*) and therefore aviation activity in PEXA is not considered further in this chapter and is scoped out.

- Impact to Bray Air Display - Organisers of the Bray Air Display stated that the aircraft partaking in the Airshow are operating under VFR and the organising/coordinating operator will amend any procedures that might be required. Bray Air Display have confirmed that they have no objection to the Project and therefore the Airshow is not considered further in this chapter.

[17] https://www.airnav.ie/air-traffic-management/aeronautical-information-management/aip-package/weston-chart-information Published: October 2024

- Impact to Newcastle Airfield - On conclusion of the discussion points listed in Table 1, the licensee of Newcastle Airfield stated that with the further information presented during consultation, Newcastle Airfield supported the proposed development and therefore Newcastle Airfield is not considered further in this chapter.

- Impact to Kish Lighthouse - The Helicopter Access Assessment (Anatec, 2024) (Volume 4, Appendix 4.3.12-2) of the EIAR states that the location and proximity of the offshore infrastructure will have no major operational impact on VFR operations to the Kish Tower helipad. The conclusions of the Report have been accepted by the CIL; therefore, the Kish Lighthouse is not considered further in this chapter and is scoped out.

- Guidance provided by OPERA includes information on the effects WTGs have on Meteorological (Met) Office radar. This includes the distances from met radar from which a WTG could be anticipated to have an impact. The recommendation is that no WTGs should be located within 5 km of a met radar antenna as WTGs can cause unacceptable beam blockage. OPERA recommends an impact study should be conducted for WTGs less than 20 km from a met office radar antenna.

- Impact to Meteorological (Met) Office Radar - Met Éireann were contacted on a number of occasions post the response received from them on the 4 November 2023 and contained in Table *1*. Confirmation was requested that Met Éireann weather radars would not be impacted by the Dublin Array WTGs. No response was received. The closest Met Office radar system is at Dublin Airport and is outside of the distances required by OPERA for consultation; therefore, Met Office weather radar is not discussed further within this chapter and is scoped out.

- The Shipping and Navigation Chapter should be referred to for consideration of emergency capabilities in the context of SAR operations.

12.11.9 Statutory Instruments S.I. 215 (IAA, SI 215, 2005) and S.I. 423 (IAA, SI 423, 1999) provides IAA guidance applicable to the assessment of obstacles to flight. To facilitate safe visual flight, day or night, in the vicinity of obstacles appropriate information about the construction and any associated lighting (where applicable) should be promulgated in IAIP and applicable aviation publications, with notification at least 30 days prior to obstacle construction. Before beginning a flight, pilots shall be familiar with all en-route information including forecasted weather information for the period of the flight, applicable guidance is provided in S.I. 266 (IAA, SI 266, 2019).

12.11.10 The impacts within Table 5 have been assessed for aviation and radar receptors.

Table 5 Potential impacts identified considered within the aviation and radar assessment

Potential impact	Impact
Construction	
Creation of an aviation obstacle	Impact 1
Use of helicopters in the construction phase	Impact 2
Operation and Maintenance (O&M)	
Creation of an aviation obstacle	Impact 3
Decommissioning	
Creation of an aviation obstacle	Impact 4
Cumulative effects	
Creation of an aviation obstacle	Impact5

12.12 Key parameters for assessment

12.12.1 As set out in the Application for Opinion under Section 287B of the Planning and Development Act 2000, flexibility is being sought where details or groups of details may not be confirmed at the time of the Planning Application. In summary, and as subsequently set out in the ABP Opinion on Flexibility (detailed within the EIA Methodology Chapter) the flexibility being sought relates to those details or groups of details associated with the following components (in summary - see further detail in see Volume 2, Chapter 6: Project Description [hereafter referred to as the Project Description Chapter):

- WTG (model – dimensions and number);
- OSP (dimensions);
- Array layout;
- Foundation type (WTG and OSP; types and dimensions and scour protection techniques); and
- Offshore cables (IAC and ECC; length and layout).

12.12.2 To ensure a robust, coherent, and transparent assessment of the proposed Dublin Array project for which development consent is being sought under section 291 of the Planning Act, the Applicant has identified and defined a Maximum Design Option (MDO) and Alternative Design Option(s) (ADO) for each environmental topic/receptor. The MDO and ADO have been assessed in the EIAR to determine the full range and magnitude of effects, providing certainty that any option within the specified parameters will not give rise to environmental effects more significant than that which could occur from those associated with the MDO. The extent of significant effects is therefore defined and certain, notwithstanding that not all details of the proposed development are confirmed in the application.

12.12.3 The range of parameters relating to the infrastructure and technology design allow for a range of options in terms of construction methods and practices, which are fully assessed in the EIAR. These options are described in the project description and are detailed in the MDO and ADO tables within each offshore chapter of the EIAR. This ensures that all aspects of the proposed Dublin Array project are appropriately identified, described and comprehensively environmentally assessed.

12.12.4 In addition to the details or groups of details associated with the components listed above (where flexibility is being sought), the confirmed design details and the range of normal construction practises are also assessed within the EIAR (see the Project Description Chapter). Whilst flexibility is not being sought for these elements (for which plans and particulars are not required under the Planning Regulations), the relevant parameters are also incorporated into the MDO and alternative option(s) table (Table 6, with details provided in Appendix B) to ensure that all elements of the project details are fully considered and assessed.

12.12.5 With respect to project design features where flexibility is not being sought, such as trenchless cable installation techniques at the landfall, the MDO and alternative design option(s) are the same (as there is no alternative). With respect to the range of normal construction practises that are intrinsic to installation of the development, such as the nature and extent of protection for offshore cables and the design of cable crossings, but which cannot be finally determined until after consent has been secured and detailed design is completed, the parameters relevant to the receptor being assessed are quantified, assigned and assessed as a maximum and alternative, as informed by the potential for impact upon that receptor. In the event of a favourable decision on the Planning Application they will be agreed prior to the commencement of the relevant part of the development by way of compliance with a standard 'matters of detail' planning condition (see the Policy Chapter). Throughout, an explanation and justification is provided for the MDO and alternative(s) within the relevant tables, as it relates the details or groups of details where statutory design flexibility is being sought, and wider construction practises where flexibility is provided by way of planning compliance condition.

12.12.6 The assessment of potential impacts of the creation of an obstruction to flight is based on the MDO as identified from a design envelope and is specific to the potential impacts identified in this chapter. The MDS for impacts on low flying aircraft through the creation of an obstruction in all phases of development assumes that the array area will be populated with WTGs (39) at the maximum blade tip height of 307.5m amsl (309.6 m LAT). This is because the tallest WTGs will create the largest impact from a physical obstruction perspective when spread across the array area, as this will define, apart from SAR operations, the lowest operational altitude for aircraft above or in the vicinity of the array area; lower altitude being denied by operational flight regulation. Alternative design options have a lower blade tip height and therefore present a lesser obstruction potential for impact to aviation.

12.12.7 Any aspects of the offshore infrastructure that is lower in height than the WTGs (including the Offshore Substation Platform (OSP)) will not create an incremental effect on aviation interests as aviators will consider the tallest infrastructure established along their route of flight. The maximum height of the array area WTGs of 307.5m amsl (309.6 m LAT) is within the ceiling of 309.6 m amsl (311.1 m LAT) below which IFP safeguarding is not breached and this presents the MDO assessed.

12.12.8 Pilots are required to provide a regulated distance from aviation obstruction and will consider the maximum height of the obstruction (WTG) and the extent of the area of obstruction however, the primary concern is maintaining a safe height above the WTGs throughout the full extent of the area that they cover therefore, the highest blade tip height will create the greatest potential obstruction to aviation.

12.12.9 The MDO are the parameters which are judged to give rise to the maximum levels of effect for the assessment undertaken, as set out in the Project Description Chapter. Should the Project be constructed to different parameters within the design envelope, then impacts would not be any greater than those set out below using the MDS presented in Table 6.

Table 6 Maximum and Alternative Design Options assessed

Maximum design option	Alternative design options	Justification
Construction		
Impact 1: Creation of an aviation obstacle		
Option C: 39 WTGs Blade tip height of 309.6 m LAT; 1 x OSP Up to three large installation vessels and associated support craft operating simultaneously with a total of 66 vessels on site at any time Construction period: 30 months	Option A: 50 WTGs Blade tip height of 267.6 mLAT or Option B: 45 WTGs Blade tip height of 281.6 mLAT 1 x OSP Up to three large installation vessels and associated support craft operating simultaneously with a total of 51 vessels on site at any time; Construction period: 18 months	The tallest permissible WTGs in the array area to remain below IFP. Maximum physical obstruction to aviation operations due to the height of above sea level infrastructure within the array area
Impact 2: Use of helicopters in the construction phase		
Option C: 39 WTGs with a maximum blade tip height of 309.6 m LAT Up to 180 helicopter return trips in the construction phase. Use of helicopter for crew transfer up to maxium of 6 trips every two weeks	 All crew transfers undertaken by vessel (e.g. no helicopter use).	Maximum number of helicopter return trips as a result of being engaged on works causing an increased possibility of aircraft collision
Operation and Maintenance		
Impact 3: Creation of an aviation obstacle		
Option C: 39 WTGs Blade tip height of 309.6 m LAT; 1 x OSP Operational lifetime: 35 years	Option A: 50 WTGs Blade tip height of 267.6 mLAT or Option B: 45 WTGs Blade tip height of 281.6 mLAT 1 x OSP Operational lifetime: 35 years	The tallest permissible WTGs in the array area to remain below IFP. Maximum physical obstruction to aviation operations due to the height of above sea level infrastructure within the array area.

Maximum design option	Alternative design options	Justification
Decommissioning		
Impact 4: Creation of an aviation obstacle		
Array Option C: 39 WTGs Sequential removal of WTGs at a height of 309.6 m LAT. 1 x Offshore Substation Platform (OSP) Decommissioning period: 36 months Decommissioning infrastructure including installation vessels and cranes.	**Array** Option A: 50 WTGs Sequential removal with a blade tip height of 267.6 mLAT Option B: 45 WTGs or Sequential removal with a blade tip height of 281.6 mLAT 1 x OSP Decommissioning period: 24 months As MDO	The tallest permissible WTGs in the array area to remain below IFP. Maximum physical obstruction to aviation operations due to height of above sea level infrastructure within the array area.

12.13 Project Design Features and Avoidance and Preventative Measures

12.13.1 As outlined within the EIA Methodology Chapter and in accordance with the EPA Guidelines (2022), this EIAR describes the following:

- Project Design Features: These are features of the Dublin Array project that were selected as part of the iterative design process, which are demonstrated to avoid and prevent significant adverse effects on the environment in relation to aviation. These are presented within Table 7.
- Other Avoidance and Preventative Measures: These are measures that were identified throughout the early development phase of the Dublin Array project, also to avoid and prevent likely significant effects, which go beyond design features. These measures were incorporated in as constituent elements of the project, they are referenced in the project description chapter of this EIAR and they form part of the project for which development consent is being sought. These measures are distinct from design features and are found within our suite of management plans. These are also presented within Table 7.
- Additional Mitigation: These are measures that were introduced to the Dublin Array project after a likely significant effect was identified during the EIA assessment process. These measures either mitigate against the identified significant adverse effect or reduce the significance of the residual effect on the environment. The assessment of impacts is presented in Sections 12.14, 12.15 and 12.16 of this EIAR chapter.

12.13.2 Mitigation measures are recorded within Volume 8, Chapter 2: Schedule of Commitments.

12.13.3 Where additional mitigation is identified as being required to reduce the significance of any residual effect in EIA terms, this is presented in Sections 12.14, 12.15 and 12.16.

12.13.4 A range of Project Design Features and Avoidance and Preventative Measures to minimise effects have been applied to the development of Dublin Array and have been designed into the development. These mitigation measures comply with current guidelines and have been agreed with the appropriate stakeholders during non-statutory consultation, as follows:

- The maximum blade tip height of the WTGs has been restricted to 309.6 m LAT to remain below published IFP for Dublin Airport and the military airfield at Casement. AirNav Ireland have completed an assessment of the new Weston Airport IFPs and confirmed by email on the 10th January 2025 and during a meeting on the 20th January 2025 that an impact would not be created to Dublin, casement and Weston Airports IFPs by the project.

- Aviation lighting will be in compliance with the latest Irish Guidance at the time of construction. ASAM 018 provides certain minimum requirements for the lighting and marking of WTGS to ensure conspicuity of offshore infrastructure. Discussions on specific lighting requirements continue with relevant stakeholders. The DoD have requested specific lighting compatible with NVD. European Commission harmonisation of aviation and navigation lighting for wind farms is on-going. The requirements for the marking of offshore structures are contained in IALA O-139, (IALA, 2021); during consultation CIL stated that they were content that IALA O-139 is the required guidance and that final lighting and marking will then be defined post consent once a final layout is determined. CIL preference would be for a flashing Morse 'W' to be fitted to the WTGs, specific lighting requirements will be agreed with the CIL, the IAA and the DoD before operation of the WTGs. A Lighting and Marking Plan (LMP) is contained in Volume 7, Appendix 5.

- Agreement of Emergency Response Plans with relevant parties (IRCG) in the form of an Emergency Response Cooperation Plan in IRCG template. The Applicant will work with the Irish Coastguard (IRCG) post consent and pre-construction to develop a document that bridges Dublin Array's emergency response plans and those of the IRCG. This document will detail the procedures by which the Applicant will cooperate with IRCG in the event of an emergency incident.

- Aviation stakeholders will be informed of the locations, heights, and lighting status of the WTGs, including estimated and actual dates of construction and the maximum height of any construction equipment to be used, prior to the start of construction, to allow inclusion on Aviation Charts and within other appropriate publications. The SAR helicopter bases will be supplied with an accurate chart of the array area WTG Global Positioning System (GPS) positions and also provided in a format compatible with on-board aviation navigation and terrain awareness warning systems.

- There is a requirement for the Applicant to obtain a 'crane licence' before operating cranes in the construction and decommissioning phases; licences will be obtained from the appropriate authority ahead of requirement.

Table 7 Project Design Features and Avoidance and Preventative Measures relating to aviation and radar

Project Design Feature / Avoidance and Preventative Measure	Where secured
The fitment of appropriate aviation lighting will enable the obstruction to be visually acquired and avoided by aircraft.	Measures captured within the Lighting and Marking Plan
Agreement of Emergency Response Plans with relevant parties (IRCG) in the form of an Emergency Response Cooperation Plan in IRCG template.	The Applicant will work with the Irish Coastguard (IRCG) post consent and pre-construction to develop a document that bridges Dublin Array's emergency response plans and those of the IRCG. This document will detail the procedures by which the Applicant will cooperate with IRCG in the event of an emergency incident
Project Design with a maximum WTG blade tip height of 309.6 m LAT.	Outlined within the Project Description Chapter
Prior notification through Notice to Aviators[18] (NOTAM) of construction and decommissioning together with the notification and charting of the array area prior to and during the operation and maintenance phase will enable aviators to be aware of the location and development parameters (height, lighting).	Outlined within the Project Description Chapter
Crane operation will be conducted under a Licence issued by the appropriate authority.	Outlined within the Project Description Chapter

12.14 Environmental Assessment: Construction phase

12.14.1 The impacts arising from the construction of Dublin Array are listed in Table 6 along with the MDO against which each construction phase impact has been assessed. The MDO for the creation of an obstacle to aviation activity throughout the lifetime of Dublin Array assumes that the array area will be populated with 39 WTGs at the maximum permissible blade tip height of 309.6 mLAT. This is because the highest WTGs will create the largest impact from a three-dimensional (3D) airspace obstruction perspective, leading to a potentially greater impact on aviation activity. Any aspects of the infrastructure that are lower in height than the WTGs and that are located within the offshore aviation and radar study area will not create an incremental effect on aviation interests.

[18] NOTAM – Notice to Aviators is a notice which is completed by an aviation authority to alert all pilots of potential hazards, conditions or change in any aeronautical service and procedures along a flight route or within specific airspace that could affect the safety of flight and to which the timely knowledge is essential to personnel and systems concerned with flight operations.

12.14.2 A description of the potential effect on aviation and radar receptors caused by each identified impact is given below.

Impact 1: Creation of an aviation obstacle

Magnitude of Impact

12.14.3 WTG construction infrastructure above sea level could pose a physical obstruction to flight operations in the vicinity of array area. An object which is higher than 90 m in height is considered to have significance for the en route operations of aircraft in Irish airspace (IAA, ASAM, 2015). WTGs can be difficult to see from the air, particularly in poor meteorological conditions leading to potential increased obstacle collision risk. Furthermore, during the construction phase, the presence and movement of construction infrastructure may present a potential obstacle collision risk to aircraft flight operations.

12.14.4 WTG construction infrastructure together with the creation of multiple obstacles above sea level could pose a physical obstruction to flight operations in the vicinity and specifically to low flying aircraft including those operated by the IAC. The DoD responded to consultation with a request for the fitment of specific aviation lighting which should be incandescent or of a type visible to Night Vision Equipment (DoD, 2020) and compliant with EASA SIB 2019-04. Appropriate charting and aviation lighting will satisfy national and international aviation notification requirements, this will address any concerns for low level flight and ensure that the WTGs are identified and avoided by aircraft in flight.

12.14.5 Apart from occasional flights to the Kish Lighthouse, there are presently no established offshore helicopter operations conducted in the location of the array area. The IAA, DoD, the Irish Coast Guard (IRCG) and offshore helicopters operators to the Kish Lighthouse have been consulted to establishif a perceived impact would be created to low-level aviation operations operating in the region of Dublin Array. The DoD advised that the lighting of Dublin Array will need to be compatible with NVD and that the specification for the NVD would be available from the IAC[19]. The IAA have advised that the Aeronautical Services Advisory Memorandum (ASAM) 018 (IAA, ASAM, 2015) contains the current guidance on aviation lighting. The IAA has advised that the guidance provided in ASAM 018 may be brought in line with neighbouring and other European jurisdictions in due course.

[19] The DoD (responding on behalf of the IAC) provided specific NVD lighting requirements.

12.14.6 A range of mitigation measures for the offshore infrastructure, as detailed in section12.13, in the form of appropriate notification to aviation stakeholders, lighting and marking as per the guidance material provided in ASAM 018 (IAA, ASAM, 2015) to minimise effects to aviation flight operations will apply to the development of the offshore infrastructure. ASAM 018 states that each wind farm development will be assessed on an individual basis, any enhancement to conspicuity will reduce impact to low flying aircraft operating in the vicinity of the array area. Mitigation measures through the charting and notification procedures will comply and satisfy national and international aviation notification requirements. Consultation on individual aviation stakeholder specific requirements for the fitment of aviation lighting will continue with CIL and the IAA.

12.14.7 Pilots are required to plan their flying activities in advance and to be familiar with any en route obstacles they may encounter; however, during flight, weather conditions or operational requirements may necessitate route adjustments. In Visual Meteorological Conditions (VMC), pilots are ultimately responsible for seeing and avoiding obstructions such as WTGs and construction infrastructure and will be aware of the location of these through the aviation notification procedures for the offshore infrastructure. Furthermore, when flying in Instrument Meteorological Conditions[20] (IMC), pilots will be utilising specific project information previously provided (including high fidelity individual WTG positional data included in on-board flight management systems) and on-board radar which detects obstructions. When operating in IMC, pilots would be flying above the Minimum Sector Altitude[21] (MSA) and will be under the control of ATC with an appropriate level of ATS, which may include the provision of an ATC radar service.

12.14.8 Receptors will be notified of construction activity which together with the Project Design Feature and Avoidance and Preventative Measures provided in Table 7 will provide the ability of aviation receptors to continue to operate safely in the airspace surrounding the project construction areas.

12.14.9 The impact is predicted to be of regional spatial extent and of short-term duration and intermittent. It is predicted that the impact will affect receptors directly, the magnitude is considered to be Low.

[20] Instrument Meteorological Conditions - weather conditions which would preclude flight by the Visual Flight Rules, i.e., conditions where the aircraft is in or close to cloud or flying in visibility less than a specified minimum.

[21] Minimum Safe Altitude - Under aviation flight rules, the altitude below which it is unsafe to fly in IMC owing to presence of terrain or obstacles within a specified area.

Sensitivity of the receptor

12.14.10 Project Design Features and Avoidance and Preventative Measures and notification of construction, operation and decommissioning of the offshore infrastructure; the lighting of structures to meet national and aviation stakeholder specifications together with the promulgation of the wind farm on aviation charts and other appropriate documentation will reduce any physical obstruction effect to aviation activities identified within the offshore aviation and radar study area. The Applicant will complete appropriate liaison to ensure information on the construction and decommissioning of the offshore infrastructure is circulated by NOTAM and other appropriate media.

12.14.11 The ability of aviation stakeholders to continue using the portion of the Irish Sea airspace above and surrounding the array area is deemed to be of low vulnerability, high recoverability and high value. The sensitivity of aviation receptors is therefore, considered to be **Medium**.

Significance

12.14.12 When operating VFR, EASA Document 923 Safety Instruction Bulletin (EASA, 2012) states that aircrews are responsible for avoiding obstructions. Aircrew situational awareness will be provided by prior notification of the development to aviation stakeholders, the fitment of appropriate lighting and the inclusion on appropriate aviation charts and publications. The magnitude of the impact has been assessed as Low, with the maximum sensitivity of the receptors being medium. Therefore, the significance of effect by the creation of an aviation obstacle in the array area is Slight adverse, which is not significant in EIA terms.

12.14.13 The alternative design options (any other option within the range of parameters set out in the project description) will not give rise to an effect which is more significant than the maximum design option.

Residual effect assessment

The significance of effect from changes in the obstruction environment is not significant in EIA terms. Therefore, no additional mitigation to that already identified in Table 7 is considered necessary. Therefore, ***no significant adverse residual effects*** *have been predicted in respect of the creation of an aviation obstruction.*

Impact 2: Use of helicopters in the construction phase

Magnitude of Impact

12.14.14 Use of helicopters in the construction phase may present a small increase in helicopters routinely operating to and from the array area which could affect existing air traffic operating VFR in the area of the array. The airspace surrounding the array area is well serving by ATC and pilots may request an ATS if required. The existing safe Planning Application of the rules of the air for VFR flight in uncontrolled airspace and the 'see and be seen principle' will not change with the relatively small increase in air traffic associated with the use of helicopters in support of the construction of the array. When helicopters are operating under VFR rules and VMC, aircraft may request and be in receipt of an ATS and may be provided with traffic information on other aircraft, but ultimately pilots are responsible for their own separation from other aircraft, obstacles and terrain. Due to the low number of helicopter movements predicted in support of the construction of the proposed project, the procedures existing and the availability of existing ATS, the magnitude of impact to aircraft operators in the vicinity of the array area is considered to be of medium term duration and the small increase in helicopter activity continuous during the construction phase. It is predicted that that the impact will affect the receptor directly through the requirement of increased lookout. The magnitude is therefore considered to be Low.

Sensitivity of the receptor

12.14.15 The ATS provided in the Irish Sea, observation of the MSA by aircrews in poor weather conditions and standard operating procedures of aircraft operation ensure a continued safe separation distance to be maintained between aircraft, obstacles and terrain. Radar surveillance and sufficient radio coverage infrastructure will enhance the offshore ATC service provided. The same rules of the air and ATC services will continue to apply to helicopter operators operating in support of construction activities. The availability and provision of an ATS to helicopters completing activities in support of the Project is not considered to affect the provision of a service to another user of the airspace.

12.14.16 The ability of aviation stakeholders to continue using the portion of the Irish Sea airspace above and surrounding the array area is deemed to be of low vulnerability, high recoverability and high value. The sensitivity of aviation receptors is therefore, considered to be **Medium**.

Significance

12.14.17 When helicopters are operating under VFR rules and VMC, aircraft can be in receipt of an ATS and may be provided with traffic information on other aircraft, but ultimately pilots are responsible for their own separation from other aircraft, obstacles and terrain. Due to the low number of helicopter movements predicted in support of the construction of the offshore infrastructure, the procedures existing and the availability of existing ATS, the magnitude of the impact has been assessed as Low, with the maximum sensitivity of the receptors being Medium Therefore, the significance of effect by the increased use of helicopters in support of the array area construction is Slight adverse, which is not significant in EIA terms.

12.14.18 The alternative design options (any other option within the range of parameters set out in the project description) will not give rise to an effect which is more significant than the maximum design option.

Residual effect assessment

The significance of effect from the increase in helicopter movements during construction is not significant in EIA terms. Therefore, no additional mitigation to that already identified in Table 7 is considered necessary. Therefore, ***no significant adverse residual effects*** *have been predicted in respect of increase in helicopter movements.*

12.15 Environmental assessment: operational phase

12.15.1 The potential impacts of the offshore operation and maintenance of the offshore infrastructure have been assessed on aviation. These impacts arising from the operation and maintenance of the array area are listed in Section 12.11 along with the MDO against which the operation and maintenance phase impact has been assessed (Table 6). A description of the potential effect on aviation receptors caused by each identified impact is given below.

Impact 3: Creation of an aviation obstacle

12.15.2 Statutory Instrument S.I. 215 provides IAA guidance applicable to the assessment of obstacles to flight. An en-route obstacle is defined as an object that is which is outside of the airspace defined by an aerodromes OLS, extending to a height of 90m above ground level or water surface level at the site of the object, thereby having a significance for the en-route operation of aircraft. Information regarding operation will be passed to the IAA, DoD, CIL, IRCG and relevant helicopter operators at least ten weeks in advance of the erection of the first WTG and will be followed up on the day with a confirmation that the activity has taken place. The data will include the location, height, (of all structures over 90 m), dates of erection, dates of removal and lighting type. It is good practice to notify aviation stakeholders of the location and dimension of a wind energy development and the associated activities during all phases of development (construction, operation and decommissioning).

12.15.3 The IAA publish an electronic Air Navigation Obstacle data set[22] which lists all obstacles that are at a height, at or above 100 m which affect air navigation within the entire territory of the Shannon FIR to which details of the offshore infrastructure will be added. All aviation stakeholders will have access to the aeronautical NOTAM system which will also detail the location and maximum height and lateral spread of the obstruction.

12.15.4 Information will be circulated to relevant aviation stakeholders and information on potential aviation obstructions will be promulgated within the IAIP (AirNav, IAIP, 2025) and notified to the DoD and IAA for marking on civil and military aeronautical related charts and documentation.

Magnitude of impact

12.15.5 During the operational phase of the array area, WTGs could pose a physical obstruction to the flight of aircraft operating in the vicinity of the offshore infrastructure, specifically to low flying aircraft. Civil and military aviation stakeholders have been consulted with regard to the potential for the array area to create an obstruction to aviation activities conducted in the vicinity of the WTGs. The addition of lighting as specified by the CIL and IAA together with the addition of infra-red lighting which is compatible for NVD equipment (and the inclusion of the array area on aviation charts and documentation) will enhance visual acquisition of the WTGs by aircraft operating at low level leading to an increase in aircrews situational awareness.

12.15.6 The same mitigation measures applied during the construction phase will also apply during the operation and maintenance phase. Appropriate notification to aviation stakeholders and the lighting and marking to minimise effects to aviation flight operations would apply to the offshore infrastructure, as included in the Project Design Features and Avoidance and Preventative Measures commitments set out within Table 7. These commitments will comply with current guidelines, should there be changes to current guidelines prior to the operation and maintenance phase, the most up to date guidelines will be followed in agreement with appropriate stakeholders.

12.15.7 Pilots are required to plan their flying activities in advance and to be familiar with any en route obstacles they may encounter; however, during flight, weather conditions or operational requirements may necessitate route adjustments. In VMC, pilots are ultimately responsible for seeing and avoiding obstructions such as WTGs and associated infrastructure and will be aware of the location of these through the aviation notification procedures for the offshore infrastructure (specific individual WTG positional data will be included in on-board flight management systems). Furthermore, when flying in IMC, pilots will be utilising on-board radar which detects obstructions, or would be flying above the MSA which is the altitude below which it is unsafe to fly in IMC (i.e., in poor visibility/cloud) and will be under the control of ATC with an appropriate level of ATS which may include the provision of an ATC radar service.

[22] Available at https://www.iaa.ie/commercial-aviation/airspace/air-navigation-obstacles

12.15.8 The impact is predicted to be of regional spatial extent and of medium-term duration and intermittent. It is predicted that the impact will affect receptors directly, the magnitude is considered to be Low.

Sensitivity of the receptor

12.15.9 Aviation receptors that have the potential to operate within proximity to the array area have been consulted with regard to the potential for WTGs to create an obstruction to aviation activities conducted in the vicinity.

12.15.10 The ability of aviation stakeholders to continue to safely operate in the airspace available is deemed to be of low vulnerability, high recoverability and high value. The sensitivity of the receptor is therefore, considered to be **Medium**.

Significance

12.15.11 Aircrews are responsible for avoiding obstructions; situational awareness will be provided by prior notification of the development to aviation stakeholders, the fitment of appropriate lighting and the inclusion on appropriate aviation charts and publications (with high fidelity individual WTG positional data provided in a suitable digital format for inclusion in on-board flight management systems). The magnitude of the impact has been assessed as Low, with the maximum sensitivity of the receptors being Medium. Therefore, the significance of effect by the creation of an aviation obstacle in the array area is Slight adverse, which is not significant in EIA terms.

12.15.12 The alternative design options (any other option within the range of parameters set out in the project description) will not give rise to an effect which is more significant than the maximum design option.

Residual effects assessment

The significance of effect from changes in the obstruction environment is not significant in EIA terms. Therefore, no additional mitigation to that already identified in Table 7 is considered necessary. Therefore, ***no significant adverse residual effects*** *have been predicted in respect of the creation of an aviation obstruction.*

12.16 Environmental assessment: decommissioning phase

12.16.1 The impacts arising from the decommissioning of Dublin Array against which each decommissioning phase impact has been assessed. A description of the potential effect on aviation receptors caused by each identified impact is given below.

12.16.2 The Decommissioning and Restoration Plan outlines the process for decommissioning of the WTG, foundations, scour protection, OSP, inter array cables and Offshore ECC. The plan outlines the assumption that the most practicable environmental option is to leave certain structures in situ (e.g. inter array cables, scour protection), however the general principle for decommissioning is for all surface structures to be removed and it is assumed that the wind turbine generators (WTG's) will be dismantled and completely removed to shore. Piled foundations will be cut at a level below the seabed, buried cables and scour and cable protection left in situ.

Impact 4: Creation of an aviation obstacle

Magnitude of impact

12.16.3 During the decommissioning phase, the presence and movement of decommissioning vessels may present a potential collision risk to low flying aircraft operating in the vicinity of decommissioning infrastructure. A range of mitigation measures as listed in Table 7 to minimise environmental effects would apply to the decommissioning of the offshore infrastructure. These will comply with national and international guidelines and be agreed with the appropriate stakeholders. Pilots are required to plan their flying activities in advance and to be familiar with any en route obstacles they may encounter; however, during flight, weather conditions or operational requirements may necessitate route adjustments. Pilots are ultimately responsible for seeing and avoiding obstructions such as WTGs and decommissioning vessels and other structures and will be aware through notification procedures of the applicable phase of development of the array area. Mitigation implemented will remain in place until the last WTG and above sea level infrastructure has been removed. The impact is predicted to be of regional spatial extent and of short-term duration and intermittent. It is predicted that the impact will affect receptors directly, the magnitude is considered to be Low.

Sensitivity of the receptor

12.16.4 Aviation stakeholders have been consulted with regard to the potential for the array area to create an obstruction to aviation activities. Project Design Features and Avoidance and Preventative Measures together with the notification of the decommissioning of the wind farm and promulgation on aviation charts and appropriate publications will reduce any physical obstruction effect to aviation activities in the region of the offshore infrastructure. Appropriate liaison will be undertaken to ensure information on the decommissioning of the wind farm is circulated in a NOTAM and other appropriate media.

12.16.5 The ability of aviation stakeholders to continue using the portion of the Irish Sea airspace above and surrounding the array area is deemed to be of low vulnerability, high recoverability and high value. The sensitivity of aviation receptors is therefore, considered to be Medium.

Significance

12.16.6 Aircrews are responsible for avoiding obstructions; situational awareness will be provided by prior notification of the development to aviation stakeholders, the fitment of appropriate lighting and the inclusion on appropriate aviation charts and publications. The magnitude of the impact has been assessed as Low, with the maximum sensitivity of the receptors being Medium. Therefore, the significance of effect by the creation of an aviation obstacle in the array area is **Slight adverse**, which is not significant in EIA terms.

12.16.7 The alternative design options (any other option within the range of parameters set out in the Project Description Chapter) will not give rise to an effect which is more significant than the maximum design option.

Residual effects assessment

The significance of effect from changes in the obstruction environment is not significant in EIA terms. Therefore, no additional mitigation to that already identified in Table 7 is considered necessary. Therefore, ***no significant adverse residual effects*** *have been predicted in respect of the creation of an aviation obstruction.*

12.17 Environmental assessment: cumulative effects

12.17.1 This section outlines the cumulative effect assessment on aviation and radar and takes in account the impacts of the proposed development alone, together with other plans and projects. As outlined in Volume 2, Chapter 4: Cumulative Effect Assessment Methodology (hereafter referred to as the Cumulative Effect Assessment Methodology Chapter), the screening process involved determination of appropriate search areas for projects, plans and activities and Zones of Influence (ZoIs) for potential cumulative effects. These were then screened according to the level of detail publicly available and the potential for interactions with regard to the presence of an impact pathway as well as spatial and temporal overlap. Each project or plan has been considered on a case-by-case basis for screening in or out of this chapter's assessment based on effect-receptor pathways and the spatial/temporal scales involved.

12.17.2 Plans and projects screened in, together with their allocated tier as defined in the Cumulative Effects Assessment Methodology Chapter that reflects their current stage within the planning and development process are presented in Table 8. For the purposes of the cumulative effect assessment, a precautionary construction period has been assumed between the years 2029 to 2032, with offshore construction (excluding preparation works) lasting up 30 months as a continuous phase within this period (refer to the Project Description Chapter).

12.17.3 Projects screened out based on the criteria outlined in the Cumulative Effect Assessment Methodology Chapter and presented in the cumulative long list (Volume 2, Chapter 4, Annex A: Offshore Long-list), the following projects were scoped out of the Cumulative Effect Assessment (CEA) as not having a cumulative effect to aviation activities and therefore have not been considered further:

- Oil and Gas (pipelines and subsurface);

- Shipping (routes and ports);
- Telecommunications and Broadcasting;
- Tidal power systems; and
- Wave power systems.

Projects for cumulative assessment

12.17.4 Based on the three staged approach described in the Cumulative Effect Assessment Methodology, the specific projects scoped into this cumulative effect assessment, and the tiers into which they have been allocated are presented in Table 8 below. The projects included within the table are included due to their completion/ commission subsequent to the assessment of the receiving environment for the Project and as such not included within the receiving environment characterisation.

12.17.5 There is potential for cumulative effect as a result of construction activities associated with the Project and those projects listed in Table 8. For the purposes of this EIAR, this additive effect has been assessed within 40 km from the array area. 40 km is considered (based on expert judgement) to be the maximum range where the creation of an aviation obstacle to fixed wing and rotary aircraft operating offshore may occur although some impacts are likely to be localised to the array area dependent on the range and speed of the aircraft, aircrew pre-planning and assimilation of charting information for navigation at low level at representative speeds (240-360 knots).

Table 8 Projects for cumulative assessment

Development type	Project Name	Current Status of Development	Data confidence assessment/ phase	Planned programme
Tier 1				
N/A				
Tier 2				
N/A				
Tier 3				
Offshore Wind Farm	Arklow Bank Wind Park 2	Submitted	High	Construction 2026-2030
	Codling Wind Park (CWP)	Submitted	High	Construction commencing 2027
	North Irish Sea Array (NISA)	Submitted	High	Construction commencing 2027
	Oriel	Submitted	High	Construction commencing 2026

Effect 5: Creation of an aviation obstacle

12.17.6 Other offshore projects that will contribute to a reduction of available airspace for low flying aircraft in the region of the array area include Tier 3 projects, Arklow Bank Phase 2 Wind Farm, Oriel, the North Irish Sea Array and Codling Wind Park. An increase in helicopter operations to support construction, operation and maintenance phases for the project alone and in combination may reduce available airspace further, particularly as flights will be concentrated in a regional area and may impact other users of the airspace including military low flying aircraft.

12.17.7 Aviation operations in Ireland are highly regulated. The offshore aviation and radar study area is located in airspace where the provision of an ATS is routine. The same rules of the air which maintain a safe operating environment in the current receiving environment will apply in the portion of the Irish Sea during all phases of the Project and of the other projects being considered cumulatively. Provision of the ATS will not be affected, with the magnitude considered to be Low.

12.17.8 The impact is predicted to be of regional spatial extent, medium-term duration and continuous. It is predicted that the impact will affect aviation receptors operating in the airspace at low level directly, the sensitivity of the receptors is considered to be Medium.

12.17.9 Aircrews are responsible for avoiding obstructions; situational awareness will be provided by prior notification of the development to aviation stakeholders, the fitment of appropriate lighting and the inclusion on appropriate aviation charts and publications (provision of with high fidelity individual WTG positional data provided in a suitable digital format for inclusion in on-board flight management systems). The magnitude of the impact has been assessed as Low. Sensitivity of the receptor is assessed as Medium. Therefore, the significance of effect by the creation of an aviation obstacle in the array area is **Slight adverse**, which is not significant in EIA terms.

12.17.10 The alternative design options (any other option within the range of parameters set out in the project description) will not give rise to an effect which is more significant than the maximum design option.

12.18 Interaction of environmental factors

12.18.1 A matrix illustrating where interactions between effects on different factors have been addressed is provided in Volume 8, Chapter 1: Interactions of the Environmental Factors.

12.18.2 Inter-related effects consider impacts from the construction, operation or decommissioning of the array area on the same receptor (or group). WTGs placed within the array area will present a possible obstacle to aviation throughout the construction, operation and decommissioning phases of the wind farm, due to the presence of construction/decommissioning vessels and equipment and/or offshore WTGs. Pilots are required to plan their flying activities in advance and to be familiar with any en route obstacles they may encounter and will be notified of all project phases through notification procedures outlined in Section 12.13. Therefore, across the project lifetime, the effects on aviation receptors are not anticipated to interact in such a way as to result in combined effects of greater significance than the assessments presented for each individual phase.

12.18.3 The greatest potential for spatial and temporal interactions is likely to occur due to interaction of an aviation obstacle and the reduction of airspace due to increased wind farm related air traffic for other users. No receptor interactions are expected. The rules of air and actions to be completed to maintain safe flight operations are applicable individually to all airspace users. The individual standalone impacts were assigned significance of **Low**. ATS provision and the rules of air, including the see and be seen principle, will mean reduced potential for interaction between inter-related effects. It is therefore anticipated the significance of these combined effects on airspace users will not be of any greater significance than the effects when assessed in isolation (i.e., **Slight Adverse** (not significant).

12.19 Transboundary statement

12.19.1 The offshore infrastructure is located in the Shannon FIR where the control of aviation is regulated by the IAA. No aviation related transboundary effects will arise.

12.20 Summary of effects

12.20.1 Table 9 presents a summary of the impacts assessed within this EIAR, including any mitigation and residual effects.

Table 9 Summary of potential impacts assessed for aviation

Description of effect	Effect	Additional mitigation measures	Residual effect
Construction			
Creation of an aviation obstacle Use of helicopters in the construction phase	**Slight adverse** **Slight adverse**	No additional mitigation required above Project Design Features and Avoidance and Preventative Measures. No additional mitigation required above embedded mitigation.	No residual effect
Operation and maintenance			
Creation of an aviation obstacle	**Slight adverse**	No additional mitigation required above Project Design Features and Avoidance and Preventative Measures.	No residual effect
Decommissioning			
Creation of an aviation obstacle	**Slight adverse**	No additional mitigation required above Project Design Features and Avoidance and Preventative Measures.	No residual effect
Cumulative effects			
Creation of an aviation obstacle	**Slight adverse**	No additional mitigation required above Project Design Features and Avoidance and Preventative Measures.	No residual effect
Transboundary			
None	N/A	N/A	N/A

12.21 References

Anatec (2024), The Potential Impact of the Dublin Array on Helicopter Operations to the Kish Tower – Helicopter One Engine Inoperative Case. 11th June 2020.
CAA (2016), Civil Aviation Publication (CAP) 764 CAA Policy and Guidelines on Wind Turbines.
DAA (2021), Dublin Airport North Runway. Updated during 2022.
https://www.dublinairport.com/corporate, Accessed 04/2024Gov.ie (2021) (Department of the Environment Climate and Communications (2017). Guidance on Environmental Impact Statement (EIS) and Natura Impact Statement (NIS) Preparation for Offshore Renewable Energy Projects. https://www.gov.ie/en/publication/3d6efb-guidance-documents-for-offshore-renewable-energy-developers/, Accessed 04/2024.
DoD (2020), Dublin Array Offshore Wind Farm observations.
EASA (2019), SIB 2019-04 Avoiding Obstacles Lighted with Light-Emitting Diode Obstacle Lights whilst Operating with Night Vision Goggles. https://ad.easa.europa.eu/ad/2019-04, Accessed 04/2024.
EASA (2020), Commission Implementing Regulation No 923/2012 www.easa.europa.eu/en/document-library, Accessed 04/2024.
EASA Common Regulation (EU) 2016/1199 amending Regulation (EU) No 965/2012 https://eur-lex.europa.eu/legal-content/EN/TXT/HTML/?uri=CELEX:32016R1199&from=EN, Accessed 04/2024.
Eurocontrol (2014), Guidelines for Assessing the Potential Impact of Wind Turbines on Surveillance Sensors.
https://www.eurocontrol.int/sites/default/files/publication/files/20140909-impact-wind-turbines-sur-sensors-guid-v1.2.pdf, Accessed 04/2024.
IAA (1999), SI 423 En Route Obstacles to Air Navigation.
IAA (2005), Obstacles to Aircraft in Flight.
https://www.iaa.ie/publications/docs/default-source/publications/legislation/statutory-instruments-(orders)/irish-aviation-authority-(obstacles-to-aircraft-in-flight)-order, Accessed 04/2024.
IAA (2014), Aerodrome Licensing Manual.
https://www.iaa.ie/docs/default-source/publications/licensing-requirements-for-public-aerodromes.pdf?sfvrsn=5f990af3_0, Accessed 04/2024.
IAA (2015), Guidance Material on Offshore Wind Farms ASAM018.
https://www.iaa.ie/publications/docs/default-source/publications/advisory-memoranda/aeronautical-services-advisory-memoranda-(asam)/guidance-material-on-off-shore-wind-farms, Accessed 04/2024.
IAA (2019), SI 266 Standardised Rules of the Air.
https://www.iaa.ie/publications/docs/default-source/publications/legislation/statutory-instruments-(orders)/irish-aviation-authority-(standardised-rules-of-the-air)-order-2019-(si-266-of-2019), Accessed 04/2024.IAA (2019a). Aeronautical Notice No R04 Issue 2.
direction-transponder-mandatory-zone-sera-6005-aero-notice-final-080319-pdf.pdf. Accessed 11/2024
AirNav Ireland (2025), Irish Integrated Aeronautical Information Package
https://www.airnav.ie/air-traffic-management/aeronautical-information-management/aip-package. Accessed 04/2024.
IALA (2021), R0139 The Marking of Man-made Offshore Structures.
https://www.iala-aism.org/product/marking-of-man-made-offshore-structures-o-139/, Accessed 04/2024.
ICAO (2016), Commission Regulation (EU) 2016/1199.
ICAO (2018), Doc 8168 Procedures for Air Navigation Services.
ICAO (2022), Annex 14 Aerodromes Design and Operation.

ICAO (2015), European Guidance Material on Managing Building Restricted Areas.
MCA (2021), MGN 654 Safety of Navigation: Offshore Renewable Energy Installations - Guidance on UK Navigational Practice, Safety and Emergency Response.
https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/980898/MGN_654_-_FINAL.pdf, Accessed 04/2024.
NATS (2024) UK Integrated Aeronautical Information Package.
Osprey (2024) Dublin Array Instrument Flight Procedure Report.
Leijnse et al (2022), (Leijnse, 2022) Operational Programme for the Exchange of weather Radar information. (Leijnse, 2022).
OPERA (2006), Statement of the OPERA group on the cohabitation between weather radars and wind turbines. Adopted at the 16th meeting of the OPERA Programme on 18-20 October 2006.

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Annex A: Aviation and Radar Policy

Legislation, Policy and Guidance

Policy/Legislation	Key provisions	Section where provision is addressed
Legislation and Policy		
The Planning and Development Regulations, 2001, as amended (S.I. No. 600/2001)	Where a planning authority receives a planning application and where it appears to the authority that the development might endanger or interfere with the safety of, or the safe and efficient navigation of aircraft, the Irish Aviation Authority (IAA) shall be notified.	Informal engagement with the IAA has and is continuing to be completed. Specific details of engagement are provided in Table 1.
The Department for Housing, Planning, Community and Local Government (DPHLG) National Marine Planning Framework (DPHLG, 2021)	Chapter 10, Defence and Security defines the Irish Defence Forces objectives for the military defence of the State. Unimpeded access and the ability to deploy throughout the Irish maritime area is required to maintain operational effectiveness.	Informal engagement with the DoD has and is continuing to be completed. Specific details are provided in Table 1.
EU Guidance		
ICAO European Guidance Material on Managing Building Restricted Areas (ICAO, 2015)	Guidance material is provided in order to ensure signal in space requirements are maintained within specification for the respective Communication, Navigation and Surveillance (CNS) facilities used in support of all-weather operations.	The IFP Assessment provided at Volume 4, Appendix 4.3.12-1 of the EIAR considers the safeguarding of the en-route aviation environment.
Eurocontrol Guidelines for Assessing the Potential Impact of Wind Turbines on Surveillance Sensors (Eurocontrol, 2014)	The document provides guidelines for Air Traffic Control (ATC) service providers and wind energy developers on how to assess whether or not WTGs could impact upon the provision of surveillance services currently provided and identifies some possible means of mitigation.	This chapter considers the potential for the operational WTGs within the array area to impact aviation radar.
EASA Common Regulation (EU) 923/012 (EASA, 2012)	Prepared for those concerned with day-to-day matters relating to procedures in air navigation and operational ATC service provision including the common rules of the air and operational provisions	Document 923/012 is referenced within section 12.15.12 in assistance of the establishment of significance of the stakeholders potentially impacted by the project.

Policy/Legislation	Key provisions	Section where provision is addressed
EASA Common Regulation (EU) 965/2012 (EASA, 2018)	Regards operational approval of performance-based navigation, certification and oversight of data services providers and helicopter offshore operations.	The document has provided information in compilation of the Helicopter Access Assessment which forms Appendix 4. 3.12-2 of the EIAR.
EASA Safety Information Bulletin 2019-04 (EASA, 2019).	Provides recommendations to mitigate any safety risk related to the use of LED obstacle lights and is applicable to air operators and competent authorities.	Referenced in engagement with the DoD (Table 1) and referenced in section 12.15.4
Irish Guidance and Policy		
Offshore Renewable Energy Development Plan (OREDP) (OREDP, 2014)	Provides suggested project level mitigation measures for the fitment of aviation lighting to WTGs and the requirement to consult with the IAA for potential effect to aviation radar systems. The DoD are to be consulted to avoid impact to military PEXA and restricted sites.	Section 12.13.1 provides commentary of the specific lighting requirements that will be agreed with stakeholders before operation of the WTGs. The DoD have been consulted with regard to impact to military PEXA, details are provided in Table 1 and section 0.
Draft of the Offshore Renewable Energy Development Plan II (OREDP) (OREDP II, 2023)	Responses to public consultation of this document are being considered. Consideration of effect to aviation military activities are to be considered in defining a collaborative approach to the effective development of renewable energy.	Informal engagement with the DoD has and is continuing to be completed. Specific details are provided in Table 1.
IAA Aerodrome Licensing Manual (IAA, 2014)	Chapter 5 considers the assessment and treatment of obstacles. Paragraph 5.1.1 and 5.1.2 states the use of an aerodrome may be limited due to the creation of obstacles inside and outside the aerodrome boundary and that an assessment of any proposed project should consider the OLS as defined in the document.	Instrument Flight Procedures (IFP) Assessment considers the safeguarding of aerodromes.
Irish Integrated Aeronautical Information Package (IAIP) (IAA, 2024)	Published by the Aeronautical Information Service (AIS) of Ireland on behalf of the IAA. It is prepared in accordance with the Standards and Recommended Practices (SARPS) of Annex 15 to the ICAO1 Convention on International Civil Aviation and the Aeronautical Information Services Manual.	The IAIP has been utilised throughout this chapter specifically in establishing the receiving environment at section 12.5.
IAA ASAM 018 (IAA, ASAM, 2015)	Provides guidance material for certain minimum requirements for the lighting, marking, radar enhancing	Section 12.14.7 provides the conclusion of IAA engagement in which reference to ASAM 018 is made.

Policy/Legislation	Key provisions	Section where provision is addressed
	and supply of information for promulgation to ensure the conspicuity of offshore WTGs and associated structures.	
Guidance on Environmental Impact Statement (EIS) and Natura Impact Statement (NIS) Preparation for Offshore Renewable Energy Projects (Department of the Environment Climate and Communications, 2017)	Section 4.4, paragraph 4.5.5: Offshore renewable energy facilities may represent a risk to aviation safety, radar and military exercise areas.	This chapter comprises an aviation and radar assessment (including military operations) of the offshore infrastructure.
Statutory Instruments		
Irish Aviation Authority (Obstacles to Aircraft in Flight) Order 2005 (IAA, SI 215, 2005)	The S.I. defines what constitutes an aviation obstacle. Section 4, paragraph 4.1 (b) states that an 'aeronautical study' shall be completed to analyse that the required obstacle clearance of Instrument Flight Procedures is maintained.	This chapter considers the creation of an obstacle to an aerodrome and/or the en-route environment where low flying aviation activity may take place. The IFP Assessment provided at Volume 4, Appendix 4.3.12-1 of the EIAR considers the creation of obstacles to aircraft in flight.
Irish Aviation Authority (en-route Obstacles to Air Navigation) Order 1999 (IAA, SI 423, 1999)	To facilitate safe visual flight, day or night, in the vicinity of obstacles appropriate information about the construction and any associated lighting (where applicable) should be promulgated in the Irish Integrated Aeronautical Information Package (IAIP) and applicable aviation publications, with notification at least 30 days prior to obstacle construction.	Section 12.13.1 and Table 7 details the notification procedures that will be applicable to the Project.
Irish Aviation Authority (Standardised Rules of the Air) Order 2019 (IAA, SI 266, 2019)	Before beginning a flight, pilots shall be familiar with all en-route information including forecasted weather information for the period of the flight.	Table 7 details the notification procedures that will be applicable to the offshore infrastructure,, the notification will enable pilots to 'self-brief' ahead of flight.

Policy/Legislation	Key provisions	Section where provision is addressed
International Guidance		
International Association of Marine Aids to Navigation and Lighthouse Authorities (IALA), Recommendation 0-139, The Marking of Man-Made Offshore Structures. (IALA, 2021).	The document provides recommendations for the marking of offshore structures which are considered a minimum requirement to ensure the safety of navigation in the vicinity of structures.	Section 12.13.1 provides commentary of the specific lighting requirements that will be agreed with stakeholders before operation of the WTGs.
International Civil Aviation Authority (ICAO), Document 8168 Ops/611 Procedures for Air Navigation Services Aircraft Operations (ICAO, 2006)	This document considers the procedures for Air Navigation Services. Section 5 Chapter 1.2 and 1.4 considers the en-route criteria for obstacle clearance and how it is applied.	The IFP Assessment provided at Volume 4, Appendix 4.3.12-1 of the EIAR considers the safeguarding of the en-route aviation environment.
ICAO Annex 14 Aerodromes Design and Operations (ICAO, 2022).	Contains SARPs that prescribe the physical characteristics and obstacle limitation surfaces to be provided for at aerodromes and certain facilities, and technical services normally provided at an aerodrome. It also contains specifications dealing with obstacles outside those limitation surfaces.	The document has been utilised throughout this chapter specifically in establishing the receiving environment at section 12.5 and in establishment of criteria for the IFP analysis.
Operational Programme for the Exchange of weather Radar information (OPERA) (OPERA, 2016)	Provides guidance on the range WTGs may impact weather radar systems.	Table 1 provides the conclusion of engagement with Met Eireann.

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