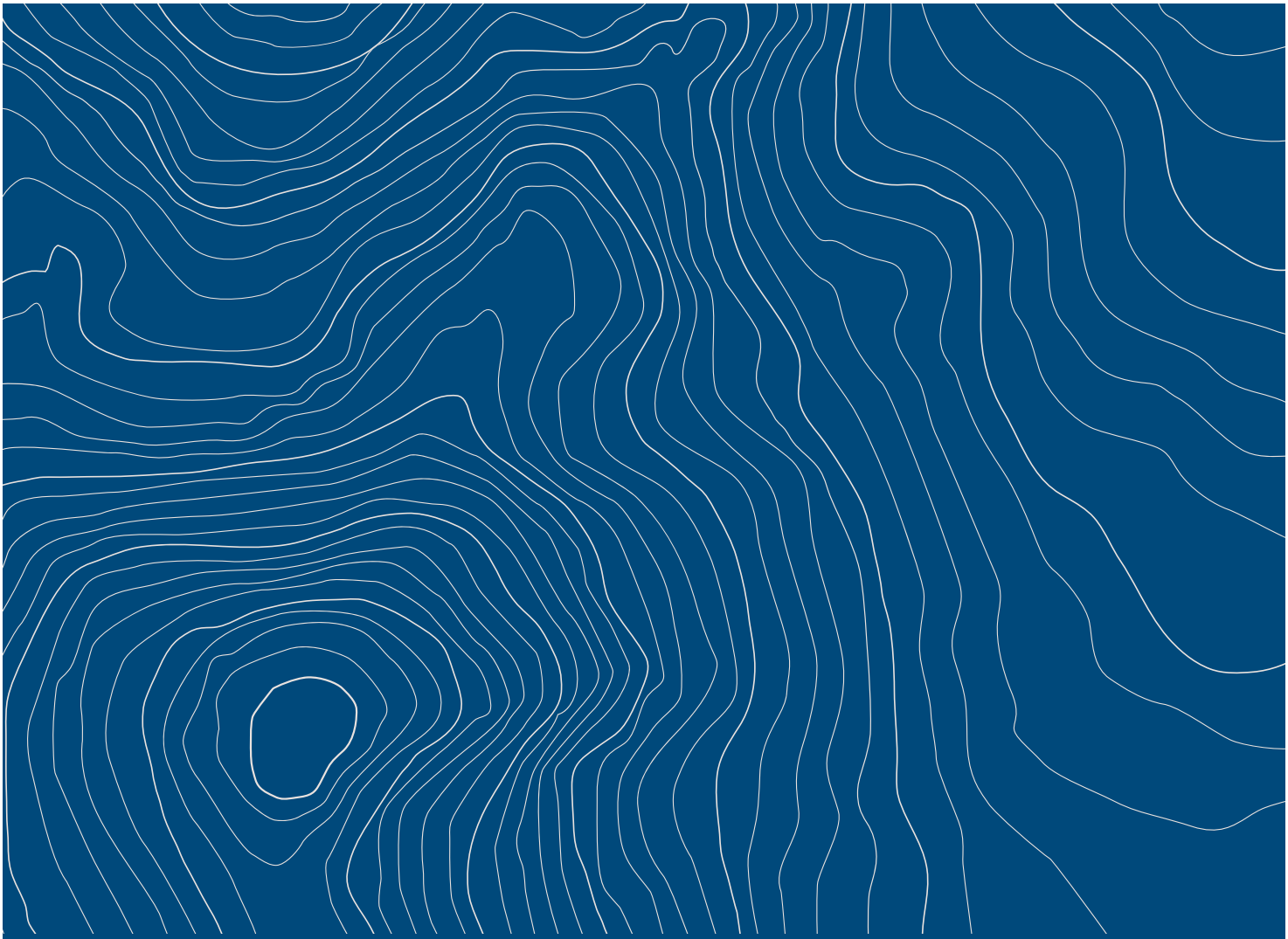


DublinArray
Generation for generations

EIAR Volume 3: Offshore Infrastructure Assessment Chapters
Chapter 10: Shipping and Navigation

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 10: Shipping and Navigation

Contents

Appendices

Volume 4, 4.3.10-1: Dublin Array Offshore Wind Farm Navigation Risk Assessment

Volume 4, 4.3.10-2: Dublin Array Offshore Wind Farm Marine Traffic Survey Report Winter Survey 2019

Volume 4, 4.3.10-3: Dublin Array Offshore Wind Farm Marine Traffic Survey Report Summer 2021

Volume 4, 4.3.10-4: Dublin Array Offshore Wind Farm Marine Traffic Survey Report Winter 2022

Volume 4, 4.3.10-5: Dublin Array Offshore Wind Farm Vessel Traffic Survey Report Summer 2023

Volume 4, 4.3.10-6: Dublin Array Offshore Wind Farm Long-Term Data Annex

Annexes

Annex A: Shipping and Navigation Policy

Figures

Tables

Glossary

Term	Definition
Abundance	Number of individuals in a community.
Aids to Navigation	Aids to Navigation (AtoNs) are devices, systems or services designed to enhance safe and efficient navigation of individual vessels and vessel traffic
Array area	The area within which the WTGs and OSP's will be located.
Benthic ecology	Benthic ecology encompasses the study of the organisms living in and on the sea floor, the interactions between them and impacts on the surrounding environment.
Biotope	A region of habitat associated with a particular ecological community.
Diversity	Number of different species in a community.
Drop Down Video (DDV)	A non-invasive, passive survey method in which imagery of habitat is collected, used predominantly to survey marine environments.
EIAR	Environmental Impact Assessment Report – a report to inform an Environmental Impact Assessment.
Offshore Export Cable Corridor (Offshore ECC)	Corridor for an export transmission cable to be installed from the array area to landfall.
Intertidal	The area of the shoreline which is covered at high tide and uncovered at low tide.
Single line of orientation	A single line of orientation refers to a single consistent transit line on the same bearing throughout the array. This is relevant to passage planning for vessels and aircraft to safely transit through the array.
Lowest astronomical tide	The lowest tide level which can be predicted to occur under average meteorological conditions and under any combination of astronomical conditions.
Macro	Large scale.
Mean High-Water Springs (MHWS)	MHWS is the highest level that spring tides reach on the average over a period of time (often 19 years). The height of MHWS is the average throughout the year (when the average maximum declination of the moon is 23.5°) of two successive high waters during those periods of 24 hours when the range of the tide is at its greatest.
Mean Low Water Springs (MLWS)	MLWS is the average of the levels of each pair of successive low waters when the range of the tide is greatest. The height of MLWS is the average throughout a year of the heights of two successive low waters during those periods of 24 hours (approximately once a fortnight) when the range of the tide is greatest.
Navigational Risk Assessment (NRA)	The NRA identifies impacts and which forms the technical supporting appendix to this Chapter and is designed to collate and assess the baseline data and consultation for the purposes of determining which impacts should be screened into the Chapter
Notable	Important and deserving attention. Used in this chapter where the term significant cannot be used due to the potential to confuse with assessment methodology terminology.

Term	Definition
Study area	10 nautical mile (nm) buffer around the array area boundary
Subtidal	The region where the seabed is below the lowest tide
Total Organic Carbon (TOC)	The total amount of carbon found within an organic compound.
Zone of Influence (ZoI)	The area or 'zone' where impacts from the proposed development may impact upon benthic and intertidal ecology receptors.

Acronyms

Term	Definition
AIS	Automatic Identification System
ALARP	As Low As Reasonably Practicable
ARPA	Automatic Radar Plotting Aid
AtoN	Aid to Navigation
CBA	Cost Benefit Analysis
CEA	Cumulative Effect Assessment
COLREGS	Convention on International Regulations for Preventing Collisions at Sea
DCCAE	Department for Environment, Climate, and Communications
DHPLG	Department of Local Government and Heritage
DoD	Department of Defence
DOT	Department of Transport
DP	Dynamic Positioning
ECC	Export Cable Corridor
EIAR	Environmental Impact Assessment Report
FLO	Fisheries Liaison Officer
FSA	Formal Safety Assessment
GT	Gross Tonnage
HAS	Health and Safety Authority
IAA	Irish Aviation Authority
IALA	International Association of Marine Aids to Navigation and Lighthouse Authorities
IMO	International Maritime Organization
IRCG	Irish Coastguard
ISORA	Irish Sea Offshore Racing Association
m	Metre
MAC	Maritime Area Consent
MAIB	Marine Accident Investigation Branch
MCA	Maritime and Coastguard Agency
MCIB	Marine Casualty Investigation Board
MEPC	Marine Environment Protection Committee
MGN	Marine Guidance Note
MHWS	Mean High Water Springs
MIDA	Marine Irish Digital Atlas
MSC	Maritime Safety Council
MSO	Marine Survey Office
NIS	Natura Impact Statement
Nm	Nautical Mile
NRA	Navigation Risk Assessment
NUC	Not Under Command
OREI	Offshore Renewable Energy Installation
OSP	Offshore Substation Platform
RAM	Restricted in Ability to Manoeuvre
RIYC	Royal Irish Yacht Club
RNLI	Royal National Lifeboat Institution
RYA	Royal Yachting Association

Term	Definition
SAR	Search and Rescue
SOLAS	Safety of Life at Sea
TSS	Traffic Separation Scheme
UK	United Kingdom
UKHO	UK Hydrographic Office
VMS	Vessel Monitoring System
WTG	Wind Turbine Generator

10 Shipping and Navigation

10.1 Introduction

10.1.1 This chapter presents the results of the Environmental Impact Assessment (EIA) for the potential impacts of the construction, operation and maintenance (O&M), and decommissioning phases of the array area and offshore Export Cable Corridor (the latter referred to as the Offshore Export Cable Corridor (Offshore ECC)) on shipping and navigation.

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

- Volume 4, Appendix 4.3.10-1: Navigation Risk Assessment (hereafter referred to as the NRA) identifies impacts and which forms the technical supporting appendix to this Chapter and is designed to collate and assess the baseline data and consultation for the purposes of determining which impacts should be screened into the Chapter;
- Volume 3, Chapter 9: Commercial Fisheries (hereafter referred to as the Commercial Fisheries Chapter). it is noted that this Chapter includes assessment of impacts to fishing vessels in transit. Commercial fishing impacts and impacts associated with deployed gear are assessed within the Commercial Fisheries chapter; and
- Volume 3, Chapter 11: Infrastructure and Other Users (hereafter referred to as Infrastructure and Other Users Chapter). The Chapter should also be read in conjunction noting overlap between certain navigational features and users (e.g., Oil and Gas).

10.2 Regulatory background

10.2.1 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.

10.2.2 The assessment of potential impacts upon shipping and navigation receptors has been made with specific reference to the relevant regulations, guidelines and guidance, which are detailed below.

10.2.3 It has been agreed with key statutory marine stakeholders (notably the Marine Survey Office (MSO) and Irish Lights as per Section 10.3) that the relevant Marine Guidance Note (MGN) from the Maritime and Coastguard Agency (MCA), should be considered as the primary guidance document to be considered throughout the NRA process. At the time of consultation this was MGN 543 (MCA, 2016), however it is noted that this has since been superseded by MGN 654 (2021). There is a general understanding that equivalent Irish guidance will be published in the near future, and that it is likely to closely resemble MGN 654. A draft version of this guidance was issued for consultation in January 2024 by the Department of Transport (DOT), which closely resembled MGN 654. The IRCG also referenced MGN 654 within email correspondence with the Applicant dated 3rd January 2024 (see Section 10.3).

10.2.4 On this basis, and in lieu of equivalent Irish guidance, the use of MGN 654 is therefore considered an appropriate approach given its extensive utilisation within the United Kingdom where the offshore wind industry is now well established, and key consultees input to date indicating how it should be used. MGN 654 underpins the approach to assessment of potential impacts associated with navigational practice, safety and emergency response for offshore renewable energy installations, and is therefore referred to throughout this chapter. Where reference is made to MGN 654, this should be read in the context of the above detail, particularly that it has been applied in lieu of equivalent Irish guidance.

10.2.5 MGN 654 is supplemented by the MCA Methodology (Annex 1 to MGN 654) which sets out the methodology by which an NRA should be undertaken. The methodology requires Formal Safety Assessment (FSA) approach (International Maritime Organisation (IMO), 2018) be utilised when undertaking associated risk assessment. This is the international industry standard for marine risk assessment and therefore has been applied for shipping and navigation assessment.

10.3 Consultation

10.3.1 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 shipping and navigation to date for Dublin Array.

10.3.2 In accordance with recommendations outlined in the DCCAE guidance[1] the Applicant sought to consult during the scoping stage with the Department of Defence, Royal National Lifeboat Institute, Royal Irish Yacht Club, Dublin Port and Irish Lights.

10.3.3 Consultation is a key part of the EIA process, encompassing informal topic specific consultation with statutory and non-statutory bodies, consultation with the public and EIAR scoping with key stakeholders. Consultation responses inform the site layout and design, baseline characterisation and assessment methods where required. The hazard workshop is an important aspect of the NRA process, and full details are provided in the NRA.

[1] 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 Shipping and Navigation

Date	Consultation type	Consultee	Consultation and key issues raised	Response and Section where addressed
Scoping Responses				
18th November 2020	Letter response to Scoping	Department of Defence (DoD)	All turbines should be illuminated by high intensity obstacle lights allowing the hazard to be identified and avoided by aircraft in flight.	Aviation lighting will be discussed and agreed with Irish Aviation Authority (IAA) and DoD as per Section 10.10.
			Where obstruction lights are used these should be incandescent or of a type visible to Night Vision Equipment. Obstruction lighting fitted to obstacles must emit light at the near Infra-Red range of the electromagnetic spectrum specifically at or near 850 nanometres of wavelength. Light intensity to be of similar value to that emitted in the visible spectrum of light.	Aviation lighting will be discussed and agreed with Irish Aviation Authority (IAA) and DoD as per Section 10.10.
			Notice To Mariners should be created prior to commencement of any construction. These NTM's should indicate any restrictions around the area during construction, such as a minimum restricted proximity to the site.	As per Section 10.10, notices to mariners will be promulgated as required. Advisory safe passing distances may be utilised, but there will be no formal restrictions on access.
			Is there going to be a speed restriction around the area and how close is this restriction to construction?	There are no planned intentions to enforce speed reductions, however advisory safe passing distances may be utilised (see Section 10.10).

Date	Consultation type	Consultee	Consultation and key issues raised	Response and Section where addressed
25th November 2020	Letter response to Scoping	Royal National Lifeboat Institution (RNLI)	The RNLI raises no objections, or additional observations to the project.	Noted.
			The RNLI wishes to remain positively engaged with RWE, and requests that we are included in appropriate engagement activities and communications. Led by our Community Engagement team, the RNLI seeks to explore community partnership opportunities with RWE.	The Applicant will continue to engage with the RNLI, noting promulgation of information is considered Project Design Features and Avoidance and Preventative Measures as per Section 10.10.
			The RNLI is interested in which harbour location(s) RWE Renewables (henceforth RWE) chooses as its engineering support base(s), as this may have secondary impact for the RNLI. We would be most grateful if kept informed when a final decision is published.	The Applicant will continue to engage with the RNLI including in relation to working ports, noting promulgation of information is considered Project Design Features and Avoidance and Preventative Measures as per Section 10.10.
			In conjunction with the Irish Coast Guard (IRCG), the RNLI is keen to engage with RWE in developing appropriate Emergency Response Plans. Potentially including joint emergency response exercising and operational familiarisation activity.	Emergency response planning is considered Project Design Features and Avoidance and Preventative Measures as per Section 10.10. The Applicant will continue to engage with the RNLI in this regard.

Date	Consultation type	Consultee	Consultation and key issues raised	Response and Section where addressed
18th October 2020	Email response to Proposed Action Plan	Dublin Port	Dublin Port will require access to the hydrographic soundings and nature of seabed data undertaken for the project. The appropriate measure is to submit the data to the UK Hydrographic Office (UKHO) for the benefit of all marine users.	The stated data will be provided to UKHO and can be made available to Dublin Port where relevant (noting that in 2020 the Applicant was considering a number of possible offshore ECCs, including options relating to making landfall at the Poolbeg Peninsula which is no longer an option being taken forward).
			During the vibrocore and grab sampling periods the vessel / jack- up will require a significant communications plan for passing shipping and Dublin Port Vessel Traffic Service. This should include transmission via Automatic Identification System (AIS).	As per Section 10.14 it proposed that: A communications plan with Dublin Port will be in place; and All vessels associated with the offshore infrastructure will broadcast via AIS.
			Dublin Port noted the area south of the outer channel and Great South Wall is dense with yacht racing marks (seasonal – April to October) and with fishing pots. Considerable consultation will be required with relevant fishing and recreational stakeholders.	The cable route option into Dublin Bay has now been dropped.is no longer part of the project design, see Volume 2, Chapter 5: Consideration of Alternatives (hereafter referred to as the Consideration of Alternatives Chapter. As detailed in the NRA, an extensive recreational consultation campaign was undertaken, and with the fishing community as per the Commercial Fisheries Chapter. Representatives from the recreational and fishing sector were also present at the Hazard Workshop.
			Consultation should be undertaken with Irish Sea Offshore Racing Association (ISORA).	ISORA were consulted including participation in the Hazard Workshop. Full details are provided in the NRA.

Date	Consultation type	Consultee	Consultation and key issues raised	Response and Section where addressed
			As cable operations take place close or within the southern Traffic Separation Scheme (TSS) of Dublin Bay, there will be disruption to shipping in that the route may be closed or the Pilot stations will not be accessible for ships to manoeuvre and embark / disembark pilots. It is not the case that these vessels can route out via the north as the overriding factor is the wind, sea and swell directions that lead to the choosing of the safest aspect to conduct pilot operations. They will need to know; the weather and sea limitations of the craft so we can plan bad weather pilotage, and if the southern TSS is blocked or partially blocked there will be considerable routing of vessels to the northern TSS which is a busier transit as it already accommodates all the UK ferry traffic.	In 2020 the Applicant was considering a number of possible Offshore ECCs, including options relating to making landfall at the Poolbeg Peninsula, which is no longer an option being taken forward. The cable route option referred to during consultation is therefore no longer part of the project design, see the Consideration of Alternatives Chapter.
17th November 2020	Letter response to Scoping	Royal Irish Yacht Club (RIYC)	RIYC fully support the notion and principles of energy conservation and wind energy generation, however are aware of the potential for technical issues and details which may develop and change over time (e.g., layout, cable landfall). Noted importance of a full and detailed decommissioning plan.	Impacts associated with recreational users of relevance to shipping and navigation are assessed in Section 10.11, 10.13, and 10.14.

Date	Consultation type	Consultee	Consultation and key issues raised	Response and Section where addressed
25th November 2020	Letter response to Scoping	Irish Lights	Irish Lights would consider it prudent to conduct this further 14 days of summer data survey in order to definitively ascertain if there are any notable changes from the baseline given the volume of recreational and non-AIS fishing activity in this particular area during this seasonal period.	Two additional up to date 14-day vessel traffic surveys have been undertaken (see Section 10.4).
			Vessel displacement, cumulative impacts, proximity to aids to navigation (AtoN), vessel drifting, reductions in navigable depth and cable and vessel anchoring hazards should all be assessed	Impacts are assessed in Sections 10.8, 10.11, 10.12 10.13 and 10.15.
Informal Consultation				
23rd April 2019	Meeting / Teleconference	IRCG	IRCG confirmed that they would like to be kept informed but at present had no specific guidance. Guidance was likely to be similar to that published by the MCA.	MGN 654 has been used as primary guidance as detailed in Section 10.2
24th April 2019	Meeting / Teleconference	Irish Lights	Key guidance is IALA-O139. Agreed that marine traffic survey requirements contained within MGN 543 would be sensible in the absence of any specific Irish guidance.	Most up to date versions of referenced guidance have been applied as per Section 10.2
24th April 2019	Meeting / Teleconference	MSO	NRA will follow the requirements detailed within MGN 543.	Most up to date version of referenced guidance (MGN 654) has been applied as per Section 10.2.

Date	Consultation type	Consultee	Consultation and key issues raised	Response and Section where addressed
18th September 2020	Meeting / Teleconference	MSO	Noted that "the wind farm may dissuade vessels from attempting to cross the bank, and would therefore be of a benefit to navigational safety".	Associated impacts and considerations are assessed in Section 10.8, 10.11, 10.12 10.13 and 10.15.
18th January 2021	Meeting / Teleconference	Irish Lights	Agreed that construction buoyage requirements would be discussed and agreed once a layout was confirmed.	Section 10.10 details Project Design Features and Avoidance and Preventative Measures, noting further details are provided in the Lighting and Marking Plan (LMP) (Volume 7, Appendix 5).
18th January 2024	Meeting / Teleconference	IRCG	IRCG noted importance of 500m width SAR lanes. Prior to the meeting the IRCG requested via email (dated 3rd January 2024) that layout compliance with MGN 654 (MCA, 2021) was shared.	Associated content to demonstrate how MGN 654 (MCA, 2021), including 500m SAR lanes was shared in the meeting and provided to the IRCG post meeting.
14th February 2024	Meeting / Teleconference	Irish Lights	Noted that discussions around buoyage would be needed once a layout was selected. Indicative discussions around lighting and marking were held.	Section 10.10 details Project Design Features and Avoidance and Preventative Measures, noting further details are provided in the LMP (Volume 7, Appendix 5).
10th April 2024	Meeting / Teleconference	Dublin Port Company	General discussion held around potential mitigations that could be implemented to manage risks to vessels on approach to Dublin Port past the array area including promulgation of information and use of guard vessels.	See Section 10.10 that details Project Design Features and Avoidance and Preventative Measures.
June 2024	Meeting / Teleconference	Irish Lights	Irish Lights requested a commitment to engage with Irish Lights in the event of any wind farm activities within the Temporary Occupation Area	Associated impacts and considerations are assessed in Section 10.11, 10.12 and 10.13. This commitment has been made.

Date	Consultation type	Consultee	Consultation and key issues raised	Response and Section where addressed
			encroaching within 500m from the centre point of the Kish Light. A work plan, including risk assessment and detailed method statement will be provided within a suitable time frame to inform Irish Lights approval process and adoption of any further mitigations that are considered necessary.	
18th July 2024	Meeting / Teleconference	IRCG	IRCG stated that a SAR checklist process should be undertaken with IRCG post consent.	Associated impacts and considerations are assessed in Section 10.11, 10.12 and 10.13.
17th December 2024	Email Correspondence	IRCG	Documentation was provided to IRCG summarising the layout design process undertaken to optimise SAR access.	Associated impacts and considerations are assessed in Section 10.11, 10.12 and 10.13.
5th December 2024	Email Correspondence	MSO	A draft version of the NRA was provided to the MSO via email.	NRA available in Volume 4, Appendix 4.3.10-1.

10.4 Methodology

10.4.1 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.

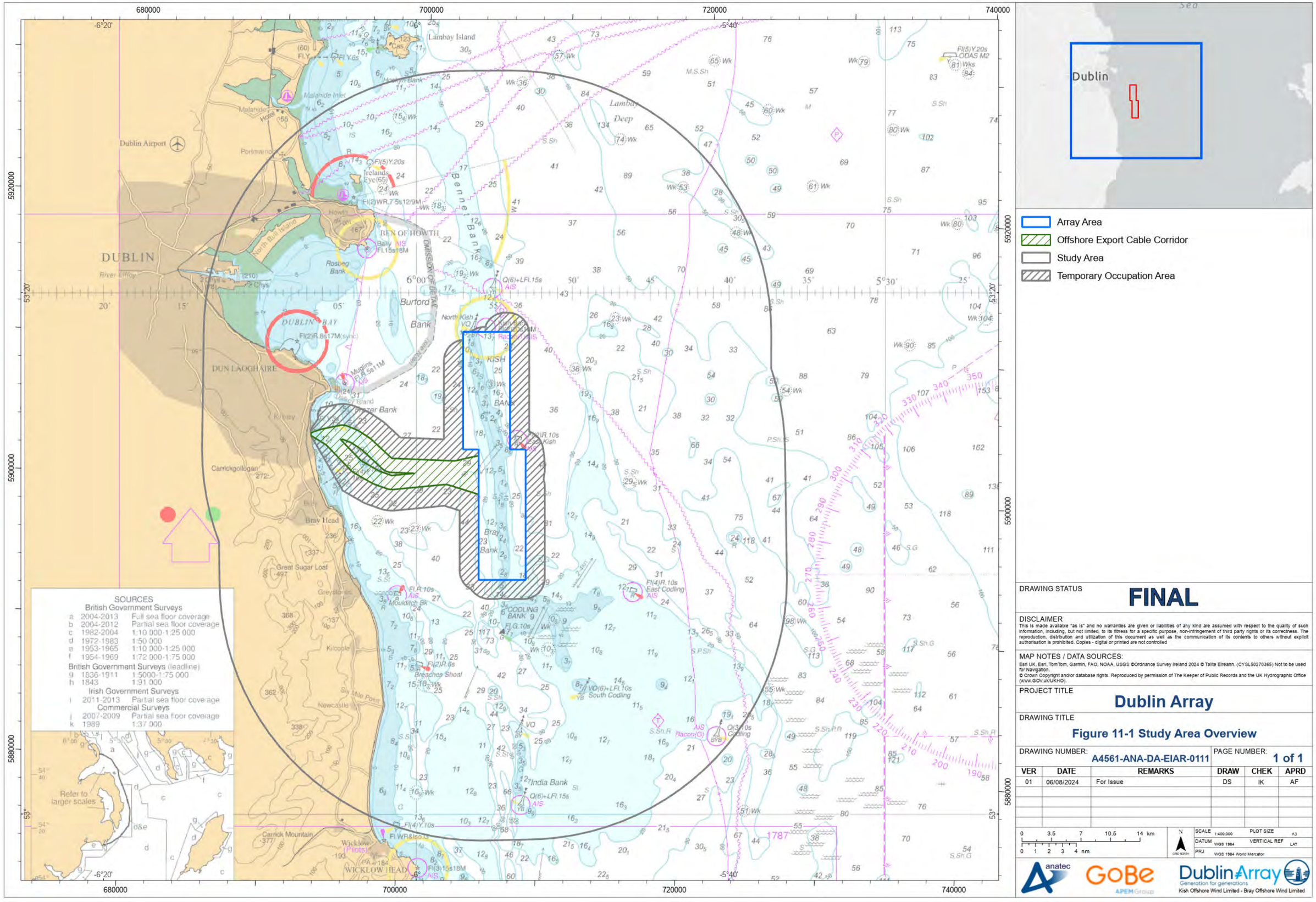
Study area

10.4.2 As shown in Figure 1, analysis within the NRA and this Chapter has primarily been undertaken within the shipping and navigation study area (henceforth the 'study area') defined as a 10[2] nautical mile (nm) buffer around the array area boundary. This radius is considered large enough to capture relevant passing traffic while still remaining site specific to the offshore infrastructure and is the standard radius to apply for shipping and navigation assessments of this nature. It is noted that where appropriate, assessment of navigational features has been extended beyond this study area, given certain features can dictate vessel routeing beyond a 10 nm threshold.

10.4.3 The shipping and navigation study area also fully captures the Offshore ECC and Temporary Occupation Area[3].

[2] 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

[3] Activities undertaken within the temporary occupation area, namely the use of jack-up vessels and anchors during the construction, O&M, and decommissioning phases have been screened out within the physical processes chapter for suspended sediment and deposition with their use not resulting in notable changes in SSC and associated sediment deposition, however the use of a buffer ensures a precautionary approach is taken.



- Array Area
- Offshore Export Cable Corridor
- Study Area
- Temporary Occupation Area

DRAWING STATUS

FINAL

DISCLAIMER

This is made available "as is" and no warranties are given or liabilities of any kind are assumed with respect to the quality of such information, including, but not limited, to its fitness for a specific purpose, non-infringement of third party rights or its correctness. The reproduction, distribution and utilization of this document as well as the communication of its contents to others without explicit authorisation is prohibited. Copies - digital or printed are not controlled

MAP NOTES / DATA SOURCES:

Esri UK, Esri, TomTom, Garmin, FAO, NOAA, USGS ©Ordnance Survey Ireland 2024 © Tailte Eireann. (CYSL50270365) Not to be used for Navigation.
© Crown Copyright and/or database rights. Reproduced by permission of The Keeper of Public Records and the UK Hydrographic Office (www.GOV.uk/UKHO).

PROJECT TITLE

Dublin Array

DRAWING TITLE

Figure 11-1 Study Area Overview

DRAWING NUMBER: A4561-ANA-DA-EIAR-0111

PAGE NUMBER: 1 of 1

VER	DATE	REMARKS	DRAW	CHEK	APRD
01	06/08/2024	For Issue	DS	IK	AF

0 3.5 7 10.5 14 km
0 1 2 3 4 nm

SCALE 1:400,000 PLOT SIZE A3
DATUM WGS 1984 VERTICAL REF LAT
PRJ WGS 1984 World Mercator

anatec GoBe APEM Group Dublin Array Generation for generations

Kish Offshore Wind Limited - Bray Offshore Wind Limited

Baseline data

10.4.4 The key data sources considered within the shipping and navigation impact assessment are summarised in Table 2. This includes data collected from multiple vessel traffic surveys for the purposes of defining a vessel traffic baseline. Full details of the vessel traffic surveys are provided in the NRA, noting that the approach to data collection has been discussed and agreed with the relevant stakeholders.

Table 2 Data Sources

Data	Source
Vessel Traffic	14 days of AIS, Radar and visual observation data collected during March 2022.
	14 days of AIS, Radar and visual observation data collected during August 2023.
	14 days of AIS, Radar and visual observation data collected during November 2019.
	14 days of AIS, Radar and visual observation data collected during August/September 2021.
	Six Months AIS, February to July 2024
	Vessel Monitoring System (VMS) data - 2017
	VMS data from 2014 to 2018 – Marine Institute Ireland Marine Atlas
	2023 Race Route Data – ISORA
Maritime Incidents	Marine Casualty Investigation Board (MCIB) incident reports (1992 to 2022)
	RNLI incident data (2013 to 2022)
Navigational Features	Admiralty Sailing Directions Irish Coast Pilot NP40 (United Kingdom Hydrographic Office (UKHO), 2019)
	Marine Irish Digital Atlas (MIDA) (MIDA, revised 2018)
	East & North Coasts of Ireland Sailing Directions (Irish Cruising Club, 2014)
	UK Admiralty Charts 1410, 1411, and 1415 (United Kingdom Hydrographic Office (UKHO), 2023)
Weather Data	Wind data collected from Kish Lighthouse – 2011 to 2015
	Wave data collected from Marine Ireland M2 buoy
	Visibility data taken from Admiralty Sailing Directions Irish Coast Pilot NP40 (UKHO, 2019)
	Tidal stream data taken from Admiralty Charts 1411 and 1415 (UKHO, 2023)

Assessment methodology

10.4.5 As per Section 10.2, in line with the industry standard approach to marine risk assessment, the shipping and navigation Impact Assessment will use the IMO FSA process (IMO, 2018) approved by the IMO in 2018 under Maritime Safety Council (MSC) Marine Environment Protection Committee (MEPC).2/Circ.12/Rev.2. The FSA is a structured and systematic methodology based upon risk analysis and Cost Benefit Analysis (CBA) (if applicable) to reduce the impacts to As Low as Reasonably Practicable (ALARP).

10.4.6 It is noted that the FSA approach differs to that utilised within other Chapters (see the EIA Methodology Chapter). This is due to the utilisation of MGN 654 and the associated NRA methodology as primary guidance (see Section 11.2), which requires the use of FSA for impact assessment. This approach has been agreed with the MSO and Irish Lights as per Section 10.3.

10.4.7 The five basic steps for the IMO FSA process are presented in Figure 2and detailed in the following list;

- Step 1 – Identification of hazards (a list is produced of hazards prioritised by risk level specific to the problem under review);
- Step 2 – Risk analysis (investigation of the causes and initiating events and consequences of the more important hazards identified in Step 1);
- Step 3 – Risk control options (identification of measures to control and reduce the identified hazards);
- Step 4 – CBA (identification and comparison of the benefits and cost associated with the risk control options identified in step 3); and
- Step 5 – Recommendations for decision-making (defining of recommendations based upon the outputs of steps 1-4).

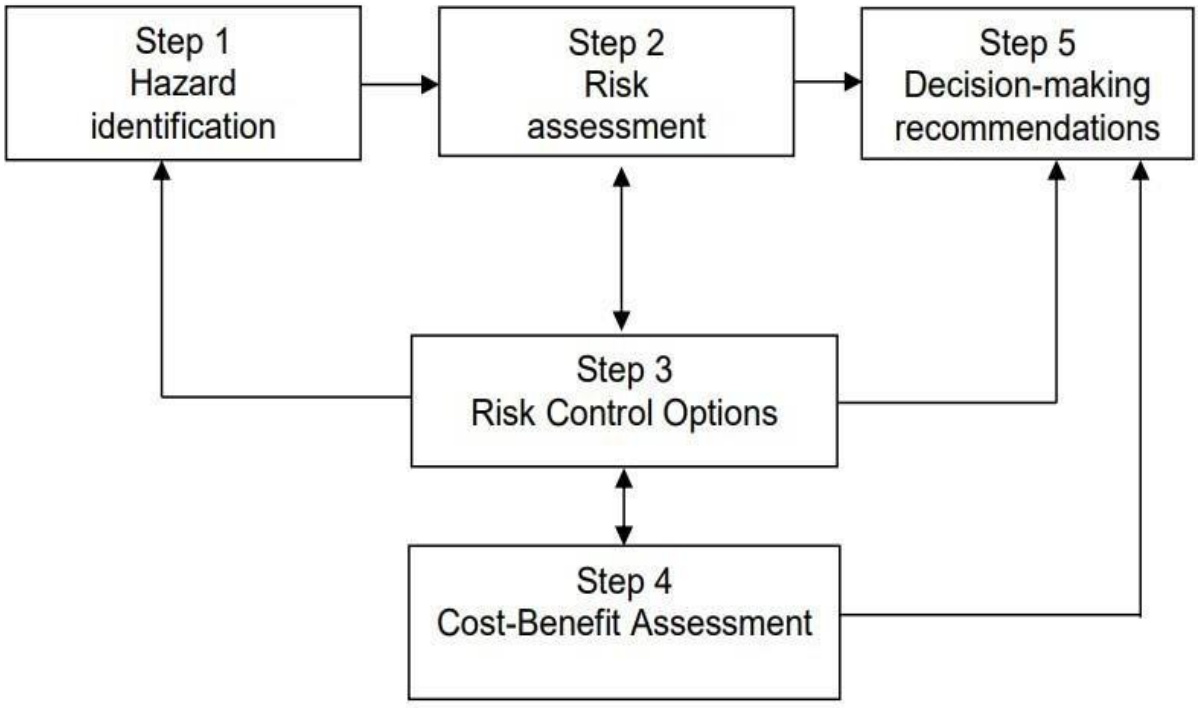


Figure 2 Flow Chart of the FSA Methodology (IMO, 2018)

10.4.8 The impacts identified in the FSA are also assessed for cumulative effects with the inclusion of other projects and proposed developments in Section 10.15 known as the Cumulative Effect Assessment (CEA). For shipping and navigation, given the international nature of shipping, other developments within 50 nm are considered, screened, and for any development where an impact pathway is identified an impact assessment is undertaken. This radius is considered an appropriate threshold to capture other developments which may have the potential to impact vessel routeing on a cumulative basis.

10.4.9 It is noted that overarching cumulative assessment methodology is provided in Volume 2, Chapter 4: Cumulative Effect Assessment Methodology (hereafter referred to as the Cumulative Effects Assessment Methodology Chapter.

10.5 Assessment criteria

10.5.1 As per Section 10.4, the IMO FSA approach (IMO, 2018) has been utilised to assess impacts relevant to shipping and navigation (see NRA for a full methodology). In summary, the FSA is a structured and systematic methodology based upon risk analysis and CBA (if applicable) to reduce the impacts to ALARP parameters. This approach aligns with the assessment undertaken to produce the Hazard Log based upon the outputs of the Hazard Workshops, as required under the NRA methodology (MCA, 2021).

10.5.2 The criteria for determining the significance of effects is a two-stage process that involves defining the frequency of occurrence and the severity of consequence of the impact, both of which are outlined in the proceeding sections.

Frequency of receptor occurrence criteria

10.5.3 Table 3 details the definitions of terms relating to the frequency of occurrence of an impact.

Table 3 Frequency of Occurrence

Rank	Description	Definition
1	Negligible	<1 occurrence per 10,000 years
2	Extremely Unlikely	1 per 100 – 10,000 years
3	Remote	1 per 10 – 100 years
4	Reasonably Probable	1 per 1 year – 10 years
5	Frequent	Yearly

Consequence of impact criteria

10.5.4 Table 4 details the definitions of terms relating to the consequence of occurrence of an impact.

Table 4 Severity of Consequence

Rank	Magnitude	Definition
1	Negligible	▪ People: no perceptible effect ▪ Property: no perceptible effect ▪ Environment: no perceptible effect ▪ Business: no perceptible effect
2	Minor	▪ People: slight injurie(s) ▪ Property: minor damage to property i.e., superficial damage ▪ Environment: Tier 1 local assistance required ▪ Business: minor reputational impact - limited to users
3	Moderate	▪ People: multiple moderate or single serious injury ▪ Property: damage not critical to operations ▪ Environment: Tier 2 limited external assistance required ▪ Business: local reputational impacts
4	Serious	▪ People: multiple serious injuries or single fatality ▪ Property: damage resulting in critical impact on operations ▪ Environment: Tier 2 regional assistance required ▪ Business: local reputational impacts
5	Major	▪ People: multiple fatalities ▪ Property: total loss of property ▪ Environment: Tier 3 national assistance required ▪ Business: international reputational impacts

Defining the significance of effect

10.5.5 The severity of the frequency (Table 3) and consequence (Table 4) of occurrence are considered collectively using the ranking system to provide the level of tolerability of an impact based on the tolerability matrix as presented in Table 5. The tolerability of an impact is defined as Broadly Acceptable (low risk), Tolerable (moderate risk), or Unacceptable (high risk).

10.5.6 Once identified, the tolerability of an impact is assessed to ensure it is ALARP. Further risk control measures may be required to further mitigate an impact in accordance with the ALARP principles, noting that unacceptable risks are not considered to be ALARP (see further detail in the NRA).

Table 5 Significance of potential effects

Consequence						
	Major					
	Serious					
	Moderate*					
	Minor					
	Negligible					
		Negligible	Extremely Unlikely	Remote	Reasonably Probable	Frequent
		Frequent				

Key:

	Broadly Acceptable (low risk)
	Tolerable (intermediate risk)
	Unacceptable (high risk)

* Moderate levels of effect have the potential, subject to the assessor's professional judgement, to be significant. Moderate will be considered as significant or not significant in EIA terms, depending on the sensitivity and magnitude of change factors evaluated. These evaluations are explained as part of the assessment, where they occur.

10.6 Receiving environment

10.6.1 A full assessment of the available data sources has been undertaken as part of the NRA process to establish the receiving environment, noting that any relevant input received during consultation has also been considered. A review of the key findings from that study has been incorporated into the description of the receiving environment. This section is not intended to repeat or to carry out any additional assessment of impacts within the technical report.

The array area

10.6.2 Figure 3 presents an overview plot of the key navigational features in the vicinity of the array area and Offshore ECC, identified using the most detailed UKHO Admiralty Charts and data available. Of note is the location of the array area on the Kish and Bray Banks, which are considered to be key navigational features in the area noting the associated shallow water depths. These shallows mean the majority of vessel traffic in the area already avoids the majority of the array area (Figure 4).

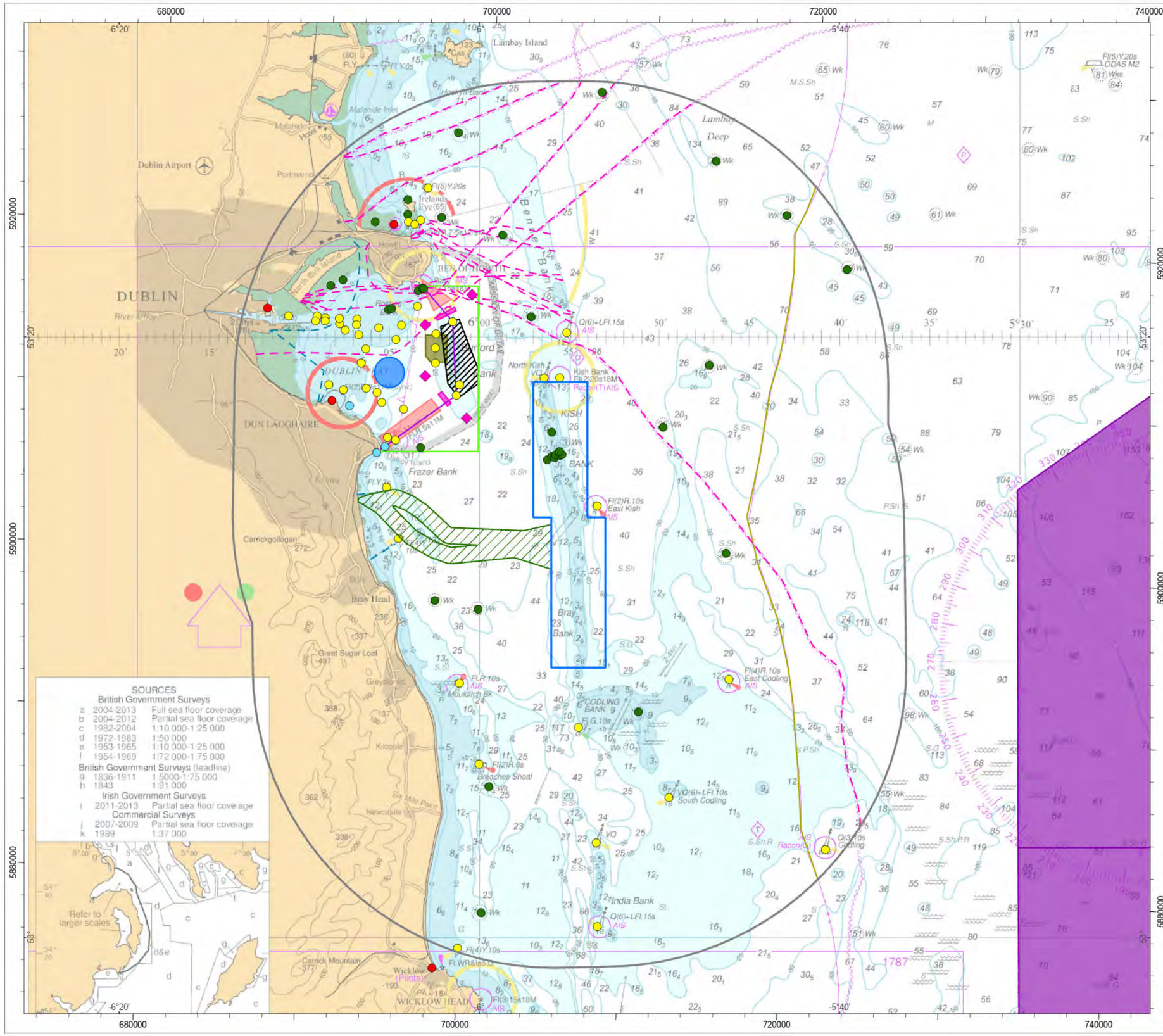
10.6.3 The key port or harbour in the area is considered to be the Dublin Port, noting that a significant proportion of the commercial traffic within the study area is transiting to and from the Dublin Port limits. Other ports, harbours and marinas of relevance in proximity to the offshore infrastructure include Dun Laoghaire, Wicklow, and Howth with each of these primarily used by fishing and recreational vessels.

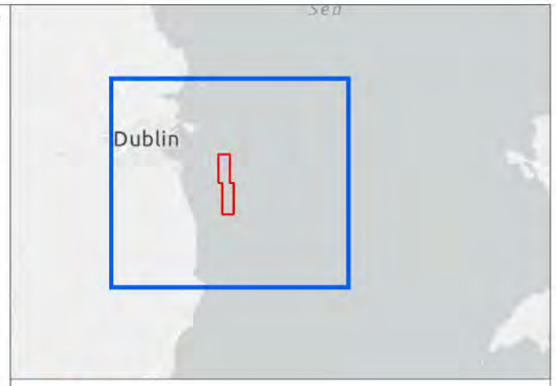
10.6.4 Access to the Dublin Port limits is available through the South Burford TSS and North Burford TSS and associated inshore traffic zones. There are four charted pilot boarding areas in proximity to the two TSS (see Figure 3). The area between the South Burford and North Burford TSS is marked as An Area to be Avoided (ATBA) on nautical charts to alert mariners to the Burford Bank, overfalls and shallow depths.

10.6.5 A total of eight charted wrecks are located within the array area, and the RMS Leinster[4] is also located to the east of the array area. It was raised during consultation that dive boats associated with local clubs regularly visit both the wrecks within the array area and the RMS Leinster. Full details of wrecks and other subsea obstructions are provided in Volume 4, Appendix 4.3.13-1: Marine Archaeology Technical Baseline.

10.6.6 A total of four anchorage areas were identified within the study area. It was raised during consultation that since 2020, the Dublin anchorage has often been at capacity, and as such commercial vessels have been observed to anchor off the coast further to the south (noting this activity was reflected in the most up to date vessel traffic surveys). The remaining three anchorages were historic / preferred anchorages.

[4] On 10 October 1918, in the final weeks of the First World War, the City of Dublin Steam Packet Company steamship RMS Leinster was torpedoed and sunk by German submarine UB-123.





- Array Area
- Offshore Export Cable Corridor
- Study Area

Navigational Features

- Aid to Navigation
- Charted Anchorage
- Charted Wreck
- Harbour / Marina
- Pilot Boarding Station
- Subsea Cable
- Subsea Pipeline
- Territorial Sea Limit
- Pilotage Limit
- Dublin Port Limit
- Area to be Avoided
- Anchorage Area
- Traffic Separation Scheme
- Inshore Traffic Area
- Spoil Ground
- Firing Practice Area

DRAWING STATUS

FINAL

DISCLAIMER

MAP NOTES / DATA SOURCES:

PROJECT TITLE

Dublin Array

DRAWING TITLE

Figure 11-3 Navigational Features

DRAWING NUMBER: A4561-ANA-DA-EIAR-0113

PAGE NUMBER: 1 of 1

VER	DATE	REMARKS	DRAW	CHEK	APRD
01	06/08/2024	For Issue	DS	IK	AF

0 3.5 7 10.5 14 km
0 1 2 3 4 nm

SCALE 1:400,000 PLOT SIZE A3
DATUM WGS 1984 VERTICAL REF LAT
PRJ WGS 1984 World Mercator

anatec GoBe APEM Group Dublin Array Generation for generations

Kish Offshore Wind Limited - Bray Offshore Wind Limited

10.6.7 The NRA assessed available local incident data from the RNLI and MCIB to establish baseline incident rates for the purpose of determining to what degree the offshore infrastructure associated with Dublin Array could impact these rates. The paragraphs below summarise the incidents reported to MCIB or RNLI which have occurred in proximity to the array area and offshore ECC, full details are available in the NRA.

10.6.8 The MCIB have published incident reports for seven incidents in the study area that are deemed of particular relevance, assessment of the published data showed three grounding incidents, three collision incidents and one capsize were recorded in the area between 1992 and 2020.

10.6.9 The RNLI data showed that between 2013 and 2022[5], an average of 84 unique incidents per year were responded to within the study area. The majority of these incidents occurred within coastal regions, with only a limited number occurring further offshore. The most frequent incident type throughout the study area was 'machinery failure' (41%) followed by 'person in danger' (29%) and 'other' (11%). Excluding 'person in danger' and non-vessel incidents, the most frequent casualty type was powered recreational vessels (57%) followed by personal craft (19%), fishing vessels (8%), and recreational sailing vessels (8%).

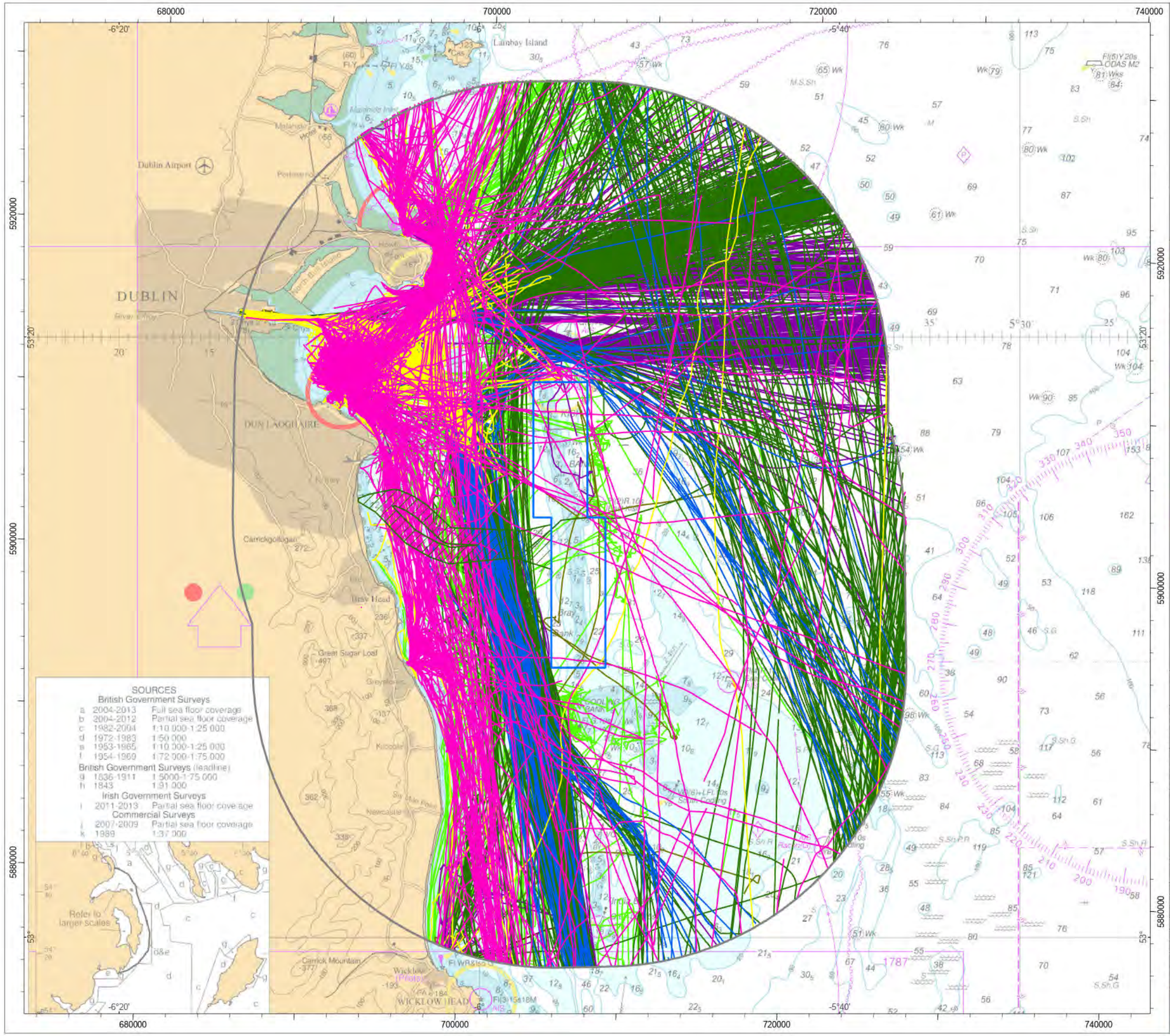
10.6.10 The majority of RNLI lifeboat launches were from three stations – Dún Laoghaire (54%), Howth (37%), and Wicklow (9%).

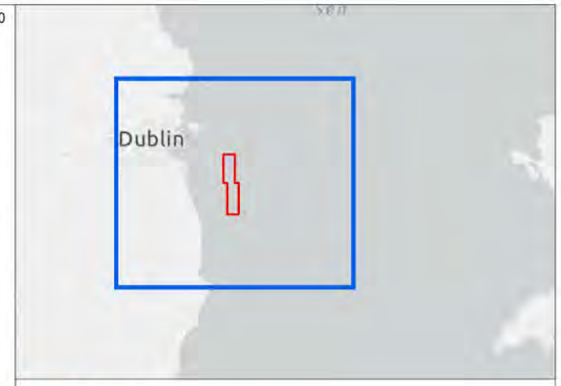
10.6.11 The vessel traffic receiving environment has primarily been based upon 28 days of marine traffic survey data collected during 2022 and 2023 (Table 2). It is noted that previous surveys were undertaken in 2019 and 2021, and a long-term AIS only validation exercise[6] has also been undertaken using six months of AIS from 2024. This additional data has been assessed in full within the NRA and is referenced where applicable within this Chapter.

10.6.12 Figure 4 presents the vessels, excluding temporary traffic (non-routine e.g., survey vessels), recorded during the winter 2022 and summer 2023 study periods.

[5] At the time of the assessment, data was only available up until end of 2022. It is considered unlikely that newer data would indicate any significant changes to the conclusions of the NRA given an extended dataset of ten years has already been assessed.

[6] As part of the NRA process assessment of long-term AIS data has been undertaken. The assessment is designed to supplement the primary analysis within the NRA, which is based on shorter-term AIS, Radio Detection and Ranging (Radar) and visual observation data collected over four vessel traffic surveys.





Array Area
Offshore Export Cable Corridor
Study Area

Vessel Type
- Unspecified
- Fishing
- Military
- Dredger/Underwater Ops
- Tug
- Passenger
- Cargo
- Tanker
- Other
- Recreational

DRAWING STATUS

FINAL

DISCLAIMER

MAP NOTES / DATA SOURCES:

PROJECT TITLE

Dublin Array

DRAWING TITLE

Figure 11-4 28 Days Vessel Traffic (Winter 2022 and Summer 2023)

DRAWING NUMBER: **A4561-ANA-DA-EIAR-0114** PAGE NUMBER: **1 of 1**

VER	DATE	REMARKS	DRAW	CHEK	APRD
01	06/08/2024	For Issue	DS	IK	AF

0 3.5 7 10.5 14 km
0 1 2 3 4 nm

SCALE 1:400,000 PLOT SIZE A3
DATUM WGS 1984 VERTICAL REF LAT
PRJ WGS 1984 World Mercator

anatec GoBe APEM Group Dublin Array Generation for generations

Kish Offshore Wind Limited - Bray Offshore Wind Limited

10.6.13 There was an average of 58 unique vessels recorded per day during the 14-day winter 2022 study period across the study area. This rose to an average of 81 unique vessels per day during the summer 2023 survey period. This increase in the number of vessels recorded was observed to be primarily due to lower volumes of recreational vessels (see further detail in the NRA) being present during the winter period.

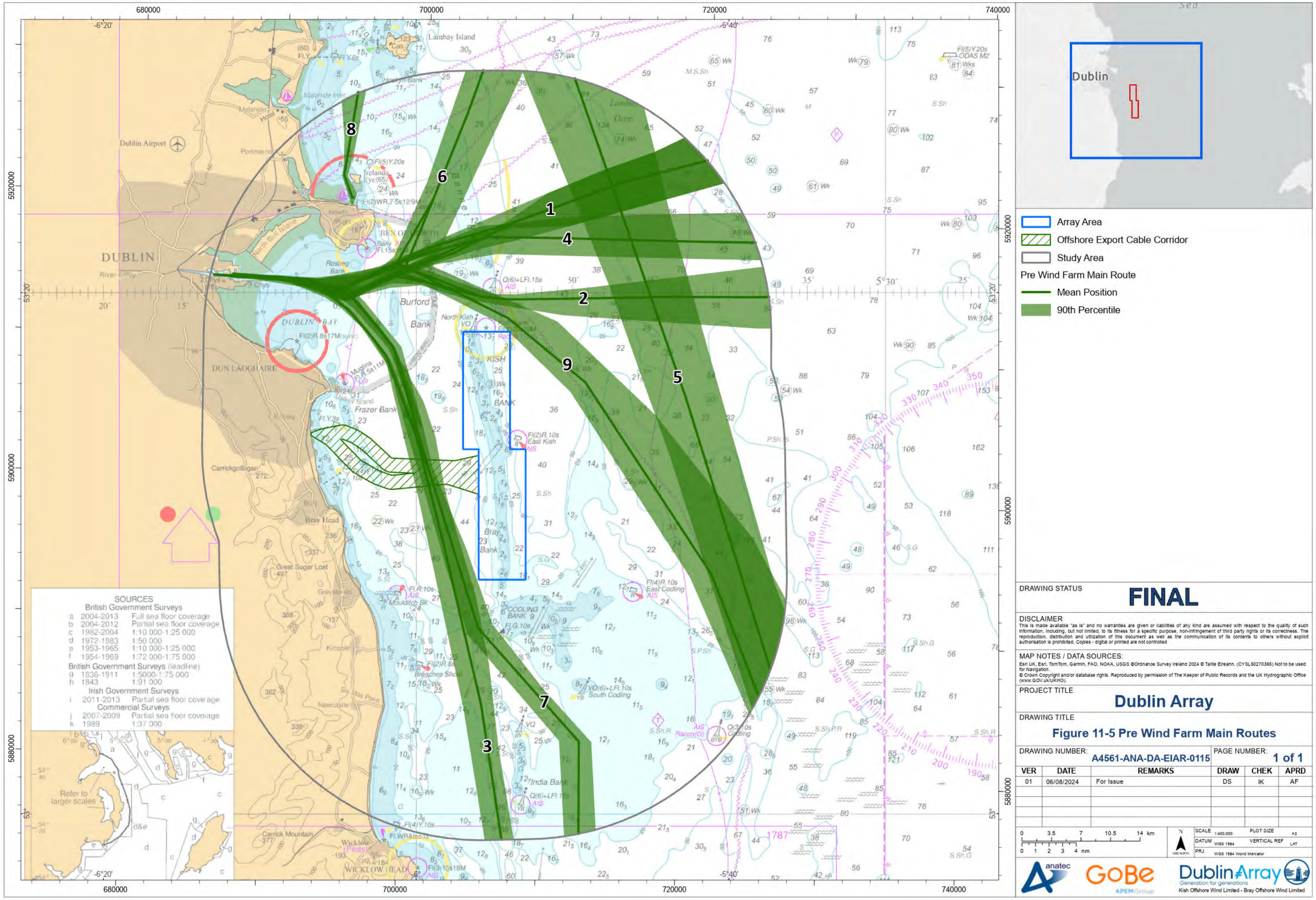
10.6.14 The most common vessel types recorded within the study area during the winter 2022 survey period were cargo vessels (46%), passenger vessels (15%), fishing vessels (11%), and recreational vessels (11%). The most common vessel types recorded within the study area during the summer 2023 study period were recreational vessels (36%), cargo vessels (24%), passenger vessels (15%), and fishing vessels (10%).

10.6.15 The majority of the commercial vessels recorded were observed to be transiting to or from Dublin Port to the northwest of the study area. Recreational and fishing vessels were generally recorded within coastal regions with many utilising the ports at Dun Laoghaire, Wicklow, and Howth.

10.6.16 An anchoring assessment of the available datasets (based on the information transmitted via AIS and a high-level behavioural analysis) identified vessels to be at anchor within the charted Dublin Bay near the pilot boarding station, and also further south outside of Dublin Bay.

10.6.17 The vessel traffic data was used to identify the main vessel routes within the study area. A total of nine main routes were identified on this basis, as shown in Figure 5. The busiest of vessel route was Dublin (Ireland) to Liverpool (UK), with approximately 14 transits per day. Other routes within the study area were mostly between Ireland and Northern Ireland ports, to ports on the west UK coastline and to Rotterdam (Netherlands).

10.6.18 It is noted that while commercial vessels were observed to avoid the Bray and Kish Banks (and hence the array area), a limited number of smaller recreational and fishing vessels were observed to cross the shallows. This aligns with consultation input, in that the banks are visited by smaller vessels including dive boats, racing yachts, and that potting and recreational angling is known to occur over the banks. The VMS data studies showed that active dredge fishing activity is known to occur in proximity to the banks.



DRAWING STATUS

FINAL

DISCLAIMER

This is made available "as is" and no warranties are given or liabilities of any kind are assumed with respect to the quality of such information, including, but not limited, to its fitness for a specific purpose, non-infringement of third party rights or its correctness. The reproduction, distribution and utilization of this document as well as the communication of its contents to others without explicit authorisation is prohibited. Copies - digital or printed are not controlled

MAP NOTES / DATA SOURCES:

Esri UK, Esri, TomTom, Garmin, FAO, NOAA, USGS ©Ordnance Survey Ireland 2024 © Tailte Eireann. (CYSL50270365) Not to be used for Navigation.
© Crown Copyright and/or database rights. Reproduced by permission of The Keeper of Public Records and the UK Hydrographic Office (www.GOV.uk/UKHO).

PROJECT TITLE

Dublin Array

DRAWING TITLE

Figure 11-5 Pre Wind Farm Main Routes

DRAWING NUMBER: A4561-ANA-DA-EIAR-0115

PAGE NUMBER: 1 of 1

VER	DATE	REMARKS	DRAW	CHEK	APRD
01	06/08/2024	For Issue	DS	IK	AF

0 3.5 7 10.5 14 km
0 1 2 3 4 nm

SCALE 1:400,000 PLOT SIZE A3
DATUM WGS 1984 VERTICAL REF LAT
PRJ WGS 1984 World Mercator

anatec GoBe APEM GROUP Dublin Array Generation for generations

Kish Offshore Wind Limited - Bray Offshore Wind Limited

The Offshore ECC

10.6.19 As per Section 10.4, the Offshore ECC is located within the 10 nm radius of the study area. Key points of relevance are summarised as follows:

- Previous iterations of the Offshore ECC (when the Applicant was considering a number of possible offshore ECC's) passed in proximity to the Dublin Bay anchorage and the south Burford TSS, however the Offshore ECC that is the subject of this application does not enter into Dublin Bay;
- Vessel anchoring occurs in the vicinity of the Offshore ECC, with the area known to be used when the Dublin Bay anchorage is at capacity; and
- The two main commercial shipping routes identified intersect the Offshore ECC (see Figure 5).

10.7 Uncertainties and technical difficulties encountered

10.7.1 Key technical uncertainties and difficulties associated with the shipping and navigation assessment are detailed as follows:

- The carriage of AIS is required on board all vessels of greater than 300 Gross Tonnage (GT) engaged on international voyages, cargo vessels of more than 500 GT not engaged on international voyages, passenger vessels irrespective of size built on or after 1 July 2002, and fishing vessels over 15 m length overall. Therefore, for the vessel traffic surveys, larger vessels were recorded on AIS, while smaller vessels without AIS installed (including fishing vessels under 15 m in length and recreational craft) were recorded, where possible, on the Automatic Radar Plotting Aid (ARPA). A proportion of smaller vessels also carry AIS voluntarily, typically utilising a Class B device;
- VMS data is only comprehensive for vessels 12 m and above;
- MCIB incident data does not include precise geographical information, thus a conservative approach has been taken to include any incidents which may be within the study area;
- The RNLI incident data cannot be considered comprehensive of all incidents in the study area. Although hoaxes and false alarms are excluded, any incident to which an RNLI resource was not mobilised has not been accounted for in this dataset; and
- The UKHO admiralty charts are updated periodically and therefore the information shown may not reflect the real time features within the region with total accuracy. Similarly, Admiralty Sailing Directions are updated periodically. However, during consultation, input has been sought from relevant stakeholders regarding the navigational features baseline.

10.8 Scope of the assessment

10.8.1 Based on the screening process within the NRA (which includes consideration of the baseline assessment, consultation including the Hazard Log, and quantitative modelling (see further detail in NRA)), the impacts within Table 6 have been assessed.

10.8.2 It is noted that the impacts to communications and position fixing equipment have been scoped out as part of the NRA process. Full details are provided within the NRA.

Table 6 Potential impacts identified considered within the shipping and navigation assessment

Potential impact	Impact
Construction	
Displacement of vessels leading to increased encounters, vessel squeeze and collision risk	Impact 1
Displacement of historic recreational sailing races	Impact 2
Increased collision risk from construction related vessels	Impact 3
Allision with wind farm infrastructure from vessel under power	Impact 4
Allision with wind farm infrastructure from vessel Not Under Command (NUC)	Impact 5
Port access restrictions	Impact 6
Reduction of emergency response capabilities	Impact 7
Operation and Maintenance (O&M)	
Displacement of vessels due to presence of wind farm infrastructure leading to increased encounters, vessel squeeze and collision risk	Impact 8
Displacement of historic recreational sailing races	Impact 9
Increased collision risk from O&M vessels	Impact 10
Allision with wind farm infrastructure from vessel under power	Impact 11
Allision with wind farm infrastructure from vessel NUC	Impact 12
Increased grounding / under keel risk to passing vessels	Impact 13
Increased anchor snagging risk from presence of subsea cables	Impact 14
Reduction of emergency response capabilities	Impact 15
Decommissioning	
Displacement of vessels leading to increased encounters, vessel squeeze and collision risk	Impact 16
Displacement of historic recreational sailing races	Impact 17
Increased collision risk from decommissioning vessels	Impact 18
Allision with wind farm infrastructure from vessel under power	Impact 19
Allision with wind farm infrastructure from vessel NUC	Impact 20
Port access restrictions	Impact 21
Increased grounding / under keel risk to passing vessels	Impact 22
Increased anchor snagging risk from presence of subsea cables	Impact 23
Reduction of emergency response capabilities	Impact 24
Cumulative effects	
Displacement of vessels leading to increased encounters, vessel squeeze and collision risk	Effect 25
Increased collision risk from project vessels	Effect 26
Allision with wind farm infrastructure from vessel under power	Effect 27
Allision with wind farm infrastructure from vessel NUC	Effect 28
Reduction of emergency response capabilities	Effect 29

10.9 Key parameters for assessment

10.9.1 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).

10.9.2 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.

10.9.3 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. 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 herein Table 7 to ensure that all elements of the project details are fully considered and assessed.

10.9.4 It is noted that full details of how the Maximum Design Option for shipping and navigation has been defined are provided in the NRA. In summary, the design option from a shipping and navigation perspective leading to the greatest impact is the maximum number of structures over the widest area. It should therefore be considered that the structure parameters shown in Table 7 are for the smallest WTGs under consideration (as this corresponds to the option where the maximum number of WTGs will be constructed).

Table 7 Maximum and Alternative Design Options assessed

Maximum design option	Alternative design options	Justification
Construction		
Impact 1: Displacement of vessels leading to increased encounters / collision risk		
Full build out of the array area Option A: 50 Wind Turbine Generators (WTGs), and one Offshore Substation Platform (OSP), comprising **51** pre commissioned structures. Buoyed construction area around array area; Advisory safe passing distances around all active works (array and ECC); WTGs with multileg foundations, dimensions at sea surface of **45 m x 45 m**; OSPs with multileg foundations, dimensions at sea surface of **50 m x 50 m**; and Construction period lasting a maximum of **30 months**.	All design option layouts represent similar spatial use of the array area; Option B: 45 or Option C: 39 WTGs and one OSP, comprising **46** or **40** pre commissioned structures All design scenario layouts may entail similar buoyed construction areas given similar build out scenarios. As MDO WTGs with monopile foundations, maximum dimensions at sea surface of **15m** to account for the pile diameter combined with the external working platform; OSPs with multileg foundations, dimensions at sea surface of **50 m x 50 m**; and Construction period lasting **18 months**.	**Bounding spatial area covered:** There is not considered to be any change in bounding area covered between the design scenario layouts or potential buoyed construction areas, and therefore the maximum design option results in the greatest displacement given it contains the most number of structures (more structures are more likely to dissuade vessel entry into the array area). **Size of Structures:** WTGs with multileg foundations are larger at sea surface than monopiles, and therefore the maximum design option results in the greatest displacement potential (larger structures are more likely to dissuade vessel entry into the array area). OSP dimensions are unchanged between design scenarios. **Temporal extent:** The longest construction period will lead to the greatest period of deployment of the buoyed construction area, and therefore the maximum design option results in the greatest displacement.
Impact 2: Displacement of historic recreational sailing races		
Full build out of the array area Option A: 50 WTGs, and one OSP, comprising **51** pre commissioned structures. Buoyed construction area around array area; Advisory safe passing distances around all active works; WTGs with multileg foundations, dimensions at sea surface of **45 m x 45 m**; OSPs with multileg foundations, dimensions at sea surface of **50 m x 50 m**; and Construction period lasting a maximum of **30 months**.	All design option layouts represent similar spatial use of the array area; Option B: 45 or Option C: 39 WTGs and one OSP, comprising **46** or **40** pre commissioned structures All design scenario layouts may entail similar buoyed construction areas given similar build out scenarios. Alternatively discrete zones around active construction areas will be buoyed for shorter periods; Advisory safe passing distances applied to discrete zones around active construction areas; WTGs with monopile foundations, maximum dimensions at sea surface of **15m** to account for the pile diameter combined with the external working platform; OSPs with multileg foundations, dimensions at sea surface of **50 m x 50 m**; and Construction period lasting a minimum of **18 months**.	**Bounding spatial area covered:** There is not considered to be any change in bounding area covered between the design scenario layouts or potential buoyed construction areas, and therefore the maximum design option results in the greatest displacement given it contains the most number of structures (more structures are more likely to dissuade vessel entry into the array area). **Size of Structures:** WTGs with multileg foundations are larger at sea surface than monopiles, and therefore the maximum design option results in the greatest displacement potential (larger structures are more likely to dissuade vessel entry into the array area). OSP dimensions are unchanged between design scenarios. **Temporal extent:** The longest construction period will lead to the greatest period of deployment of the buoyed construction area, and therefore the maximum design option results in the greatest displacement.

Maximum design option	Alternative design options	Justification
Impact 3: Increased collision risk from construction related vessels		
Full build out of the array area; Option C: 39 WTGs, and one OSP, comprising **40** pre commissioned structures. Two export cable circuits, with maximum length of **18.35 km** per cable circuit; Construction period lasting a maximum of **30 months**; Construction vessels will comprise of installation vessels and smaller support vessels. Installation vessels include those for foundation, WTG and OSP installation and cable lay vessels. The foundation, WTG and OSP installation vessels will include cranes, which when fully extended will be 220 m in height. Up to three large installation vessels and associated support craft operating simultaneously with a total of **66** vessels on site at any time; and Up to **813** round trips to port from construction vessels and an additional 1,825 round trips from small vessels such as CTVs during construction period.	All design option layouts represent similar spatial use of the array area; Option A: 50 WTGs or Option B: 45 WTGs and one OSP, comprising **51** or **46** pre commissioned structures. Two export cables circuits, with maximum length of **17.95 km** per cable circuit; Construction period lasting **18 months**; Construction vessels will comprise of installation vessels and smaller support vessels. Installation vessels include those for foundation, WTG and OSP installation and cable lay vessels. The foundation, WTG and OSP installation vessels will include cranes, which when fully extended will be 220 m in height. Up to three large installation vessels and associated support craft operating simultaneously with a total of **51** vessels on site at any time; and Up to **774** round trips to port from construction vessels and an additional 538 round trips from small vessels such as CTVs during construction period.	**Structure Numbers:** The turbine and foundation components and the volume of scour associated with the larger of the turbine options result in a greater number of total vessel trips which will lead to largest potential increase in collision risk. The larger size of turbine and foundation components and the volume of scour protection material required per foundation result in fewer components loaded onto an individual vessel. The consequent increase in trips outweighs the reduced number of turbine locations associated with this option. **Length / Duration of export cable installation:** Largest length of export cable route will lead to greatest duration of cable laying, meaning the maximum design option will lead to largest potential increase in collision risk. **Temporal extent:** The longest construction period will lead to the greatest period of presence of construction vessels, meaning the maximum design option will lead to largest potential increase in collision risk. **Vessel Numbers:** The greatest number of project vessel movements represented by the maximum design option will lead to largest potential increase in collision risk.
Impact 4: Allision with wind farm infrastructure from vessel under power		
Full build out of the array area; Option A: 50 WTGs, and one OSP, comprising **51** pre commissioned structures. WTGs with multileg foundations, dimensions at sea surface of **45 m x 45 m**; OSPs with multileg foundations, dimensions at sea surface of **50 m x 50 m**; and Construction period lasting a maximum of **30 months**.	All design option layouts represent similar spatial use of the array area; Option B: 45 or Option C: 39 WTGs and one OSP, comprising **46** or **40** pre commissioned structures WTGs with monopile foundations, maximum dimensions at sea surface of **15m** to account for the pile diameter combined with the external working platform; OSPs with multileg foundations, dimensions at sea surface of **50 m x 50 m**; and Construction period lasting **18 months**.	**Bounding spatial area covered:** There is not considered to be any change in bounding area covered between the design scenario layouts or potential buoyed construction areas, and therefore the maximum design option results in the greatest allision risk given it contains the most number of structures (more structures leads to greater allision risk). **Size of Structures:** WTGs with multileg foundations are larger at sea surface than monopiles, and therefore the maximum design option results in the greatest allision risk (the larger the structure the greater the allision risk). OSP dimensions are unchanged between design scenarios. **Temporal extent:** The longest construction period will lead to the greatest period of pre commissioned structures within the buoyed construction area, and therefore the maximum design option results in the greatest allision risk.

Maximum design option	Alternative design options	Justification
Impact 5: Allision with wind farm infrastructure from vessel NUC		
Full build out of the array area; Option A: 50 WTGs, and one OSP, comprising **51** pre commissioned structures. WTGs with multileg foundations, dimensions at sea surface of **45 m x 45 m**; OSPs with multileg foundations, dimensions at sea surface of **50 m x 50 m**; and Construction period lasting a maximum of **30 months**.	All design option layouts represent similar spatial use of the array area; Option B: 45 or Option C: 39 WTGs and one OSP, comprising **46** or **40** pre commissioned structures WTGs with monopile foundations, maximum dimensions at sea surface of **15m** to account for the pile diameter combined with the external working platform; OSPs with multileg foundations, dimensions at sea surface of **50 m x 50 m**; and Construction period lasting of **18 months**.	**Bounding spatial area covered:** There is not considered to be any change in bounding area covered between the design scenario layouts or potential buoyed construction areas, and therefore the maximum design option results in the greatest allision risk given it contains the most number of structures (more structures leads to greater allision risk). **Size of Structures:** WTGs with multileg foundations are larger at sea surface than monopiles, and therefore the maximum design option results in the greatest allision risk (the larger the structure the greater the allision risk). OSP dimensions are unchanged between design scenarios. **Temporal extent:** The longest construction period will lead to the greatest period of pre commissioned structures within the buoyed construction area, and therefore the maximum design option results in the greatest allision risk.
Impact 6: Port Access Restrictions		
Full build out of the array area; Two export cable circuits, with maximum length of **18.35 km** per cable circuit. Construction period lasting a maximum of **30 months**; Construction vessels will comprise of installation vessels and smaller support vessels. Installation vessels include those for foundation, WTG and OSP installation and cable lay vessels. The foundation, WTG and OSP installation vessels will include cranes, which when fully extended will be **220 m** in height. Up to three large installation vessels and associated support craft operating simultaneously with a total of **66** vessels on site at any time. Up to **813** round trips to port from construction vessels and an additional **1,825** round trips from small vessels such as CTVs during construction period (CTVs likely to be to/from Dún Laoghaire).	All design option layouts represent similar spatial use of the array area; Two export cable circuits, with maximum length of **17.95 km** per cable circuit; Construction period lasting a minimum of **18 months**; Construction vessels will comprise of installation vessels and smaller support vessels. Installation vessels include those for foundation, WTG and OSP installation and cable lay vessels. The foundation, WTG and OSP installation vessels will include cranes, which when fully extended will be **220 m** in height. Up to three large installation vessels and associated support craft operating simultaneously with a total of **51** vessels on site at any time; and Up to **774** round trips to port from construction vessels and an additional **538** round trips from small vessels such as CTVs during construction period (CTVs likely to be to/from Dún Laoghaire).	**Bounding spatial area covered:** There is not considered to be any change in bounding area covered between the design scenario layouts or potential buoyed construction areas, and therefore the maximum design option results in the greatest potential for port access restriction given it contains the most number of vessel trips. **Length / Duration of export cable installation:** Largest length of export cable route will lead to greatest duration of cable laying, meaning the maximum design option will lead to largest potential for port access impacts. **Temporal extent:** The longest construction period will lead to the greatest period of installation works and construction vessel movements, and therefore the maximum design option results in the greatest potential for port access. **Project vessels:** The greatest number of project vessel movements to and from port represented by the maximum design option will lead to largest potential increase in port access restriction.
Impact 7: Reduction of emergency response resource capabilities		
Full build out of the array area, with layout including a single line of orientation; Option A: 50 WTGs, and one OSP, comprising **51** pre commissioned structures.	All design option layouts represent similar spatial use of the array area and include a single line of orientation; Option B: 45 or Option C: 39 WTGs and one OSP, comprising **46** or **40** pre commissioned structures	**SAR access / lines of orientation:** All layouts include a single line of orientation, and therefore the maximum design option results in the greatest potential for SAR access restriction given it contains the most number of structures (more structures leads to lower minimum spacing as does use of

Maximum design option	Alternative design options	Justification
Two export cable circuits, with maximum length of **18.35 km** per cable circuit; Construction period lasting a maximum of **30 months** Up to **813** round trips to port from construction vessels and an additional **1,825** round trips from small vessels such as CTVs during construction period.	Two export cable circuits, with maximum length of **17.95 km** per cable circuit; Construction period lasting a minimum of **18 months** Up to **774** round trips to port from construction vessels and an additional **538** round trips from small vessels such as CTVs during construction period.	smaller structures which is more likely to impact SAR access). **Structure Numbers:** The greatest number of structures and longest cable routeing leads to the greatest potential for additional allision incidents, and therefore the maximum design option results in the greatest potential for impact on SAR capability. Further, more structures leads to lower minimum spacing as does use of smaller structures which is more likely to impact SAR access. **Temporal extent:** The longest construction period will lead to the greatest period of installation works and construction vessel movements, and therefore the greatest potential for increased incidents associated with construction. **Project vessels:** The greatest number of project vessel movements to and from port represented by the maximum design option will lead to largest potential increase in incidents.
Operation and Maintenance		
Impact 8: Displacement of vessels due to presence of wind farm infrastructure leading to increased encounters / collision risk		
Full build out of the array area; Advisory safe passing distances around all active maintenance works; Option A: 50 WTGs, and one OSP, comprising **51** structures. WTGs with multileg foundations, dimensions at sea surface of **45 m x 45 m**; Minimum WTG spacing of **944 m**; OSP with multileg foundations, dimensions at sea surface of **50 m x 50 m**; and Operational period lasting **35 years**.	All design option layouts represent similar spatial use of the array area; No advisory safe passing distances used; Option B: 45 or Option C: 39 WTGs and one OSP, comprising **46** or **40** structures WTGs with monopile foundations, maximum dimensions at sea surface of **15 m** diameter; Minimum WTG spacing of **1,112 m**; OSPs with multileg foundations, dimensions at sea surface of **50 m x 50 m**; and Operational period lasting **35 years**.	**Bounding spatial area covered:** There is not considered to be any change in bounding area covered between the design scenario layouts, and therefore the maximum design option results in the greatest potential for displacement given it contains the most number of structures (more structures are more likely to dissuade vessel entry into the array area). **Size of Structures:** WTGs with multileg foundations are larger at sea surface than monopiles, and therefore the maximum design option results in the greatest displacement potential (larger structures are more likely to dissuade vessel entry into the array area). OSP dimensions are unchanged between design scenarios. **Minimum spacing:** Lower minimum spacing will lead to greater displacement, and therefore the maximum design option results in the greatest displacement potential. **Temporal extent:** Longest operational period leading to greatest displacement potential.

Maximum design option	Alternative design options	Justification
Impact 9: Displacement of historic recreational sailing races		
Full build out of the array area; Advisory safe passing distances around all active maintenance works; Option A: 50 WTGs, and one OSP, comprising **51** structures. WTGs with multileg foundations, dimensions at sea surface of **45 m x 45 m;** Minimum WTG spacing of **944 m**; OSP with multileg foundations, dimensions at sea surface of **50 m x 50 m**; and Operational period lasting **35 years**.	All design option layouts represent similar spatial use of the array area; No advisory safe passing distances used; Option B: 45 or Option C: 39 WTGs and one OSP, comprising **46** or **40** structures Minimum WTG spacing of **1,112 m**; WTGs with monopile foundations, maximum dimensions at sea surface of **15 m** diameter; OSPs with multileg foundations, dimensions at sea surface of **50 m x 50 m**; and Operational period lasting **35 years**.	**Bounding spatial area covered:** There is not considered to be any change in bounding area covered between the design scenario layouts, and therefore the maximum design option results in the greatest potential for displacement given it contains the most number of structures (more structures are more likely to dissuade vessel entry into the array area). **Size of Structures:** WTGs with multileg foundations are larger at sea surface than monopiles, and therefore the maximum design option results in the greatest displacement potential (larger structures are more likely to dissuade vessel entry into the array area). OSP dimensions are unchanged between design scenarios. **Minimum spacing:** Lower minimum spacing will lead to greater displacement, and therefore the maximum design option results in the greatest displacement potential. **Temporal extent:** Longest operational period leading to greatest displacement potential.
Impact 10: Increased collision risk from O&M vessels		
Full build out of the array area; Option A: 50 WTGs, and one OSP, comprising **51** structures. Two export cable circuits, with maximum length of **18.35 km** per cable circuit; Operational period lasting **35 years**; and Three daily CTV trips with the addition of up to **100** vessels trips to support scheduled routine and non-routine maintenance per year.	All design option layouts represent similar spatial use of the array area; Option B: 45 or Option C: 39 WTGs and one OSP, comprising **46** or **40** structures Two export cable circuits, with maximum length of **17.95 km** per cable circuit; Operational period lasting **35 years**; and Two daily CTV trips with the addition of up to **75** vessels trips to support scheduled routine and non-routine maintenance.	**Structure Numbers:** Greatest number of structures will lead to most activity on site, meaning the maximum design option will lead to largest potential increase in collision risk. **Length / Duration of export cable installation:** Largest length of export cable route will lead to greatest potential of cable maintenance, meaning the maximum design option will lead to largest potential increase in collision risk. **Temporal extent:** Longest operational period leading to longer duration of O&M vessel presence. **Vessel Numbers:** The greatest number of project vessel movements represented by the maximum design option will lead to largest potential increase in collision risk.

Maximum design option	Alternative design options	Justification
Impact 11: Allison with wind farm infrastructure from vessel under power		
Full build out of the array area Option A: 50 WTGs, and one OSP, comprising **51** structures. WTGs with multileg foundations, dimensions at sea surface of **45 m x 45 m** OSPs with multileg foundations, dimensions at sea surface of **50 m x 50 m** Minimum WTG spacing of **944 m**; and Operational period lasting **35 years.**	All design option layouts represent similar spatial use of the array area; Option B: 45 or Option C: 39 WTGs and one OSP, comprising **46** or **40** structures WTGs with monopile foundations, maximum dimensions at sea surface of **15 m** diameter; OSPs with multileg foundations, dimensions at sea surface of **50 m x 50 m**; Minimum WTG spacing of **1,112 m**; and Operational period lasting **35 years**.	**Bounding spatial area covered:** There is not considered to be any change in bounding area covered between the design scenario layouts, and therefore the maximum design option results in the greatest allision risk given it contains the most number of structures (more structures leads to greater allision risk). **Size of Structures:** WTGs with multileg foundations are larger at sea surface than monopiles, and therefore the maximum design option results in the greatest allision risk (the larger the structure the greater the allision risk). OSP dimensions are unchanged between design scenarios. **Minimum spacing:** Lower minimum spacing will lead to greater allision risk, and therefore the maximum design option results in the greatest potential increase in allision risk. **Temporal extent:** Longest operational period leading to greatest allision risk potential.
Impact 12: Allision with wind farm infrastructure from vessel NUC		
Full build out of the array area; Option A: 50 WTGs, and one OSP, comprising **51** structures. WTGs with multileg foundations, dimensions at sea surface of **45 m x 45 m**; OSPs with multileg foundations, dimensions at sea surface of **50 m x 50 m**; Minimum WTG spacing of **944 m**; and Operational period lasting **35 years**.	All design option layouts represent similar spatial use of the array area; Option B: 45 or Option C: 39 WTGs and one OSP, comprising **46** or **40** structures WTGs with monopile foundations, maximum dimensions at sea surface of **15 m** diameter; OSPs with multileg foundations, dimensions at sea surface of **50 m x 50 m**; Minimum WTG spacing of **1,112 m**; and Operational period lasting **35 years**.	**Bounding spatial area covered:** There is not considered to be any change in bounding area covered between the design scenario layouts, and therefore the maximum design option results in the greatest allision risk given it contains the most number of structures (more structures leads to greater allision risk). **Size of Structures:** WTGs with multileg foundations are larger at sea surface than monopiles, and therefore the maximum design option results in the greatest allision risk (the larger the structure the greater the allision risk). OSP dimensions are unchanged between design scenarios. **Minimum spacing:** Lower minimum spacing will lead to greater allision risk, and therefore the maximum design option results in the greatest potential increase in allision risk. **Temporal extent:** Longest operational period leading to greatest allision risk potential.

Maximum design option	Alternative design options	Justification
Impact 13: Increased grounding / under keel risk to passing vessels		
12 km of 36.7km offshore export cable requiring remedial protection of height 1 m; 20% of cable route plus 100 m at each inter-array cable end requiring protection of a maximum of height 1 m equating to 34.2km; Protection at cable crossings via rock dumping, concrete mattress or concrete bridging to a maximum length of 400 m, per cable crossing up to 5% of water depth. (six export cable crossings and two inter-array cable crossings); and Operational life of **35 years**.	6 km of 17.95 km offshore export cable requiring remedial protection of height 1 m; Alternative options for cable crossings include reduction in cable crossing length and therefore rock volume and/or the use of alternative materials, such as concrete mattresses which may be used alone or in combination with reduced volume of rock compared to the maximum design option. 20% of the cable route 100 m at each inter-array cable end requiring protection of a maximum of height 1 m equating to 32km; The maximum total length of IAC has been identified as 120 km. Although the total length may be less than this, depending on final routeing options yet to be decided, the total value will not exceed 120 km. Protection at cable crossings via rock dumping alone the length will be 200 m per cable crossing in up to 5% of water depth (6 export cable crossings and 2 inter-array cable crossings); Protection at cable crossings via mattresses alone the length will be 108 m per cable crossing in up to 5% of water depth (6 export cable crossings and 2 inter-array cable crossings); Operational life of **35 years**.	**Length of export and inter array cables:** greatest length of subsea cables will maximise potential for underkeel clearance reduction, and therefore the maximum design option assessed will lead to greatest potential for underkeel interaction. **Length of cable requiring protection:** no change between options. Height of cable protection: no change between options. **Temporal extent:** Longest operational period leading to greatest under keel risk potential.
Impact 14: Increased anchor snagging risk from presence of subsea cables		
Two export cable circuits, with maximum length of 18.35 km per cable circuit. Offshore export cables with burial depth in standard conditions of between 1 and 3 m (excluding areas of high mobility as indicated by the presence of sandwaves, such areas will have site specific burial depths); 12 km of 36.7km offshore export cable requiring remedial protection of height 1 m; Maximum total length of 120 km IAC Inter-array cables with burial depth in standard conditions of between 1 and 3 m (excluding areas of high mobility as indicated by the presence of sandwaves, such areas will have site specific burial depths); 20% of cable route plus 100 m at each inter-array cable end requiring protection of a maximum of height 1 m equating to 34.2km; and Operational life of **35 years**.	Two export cables circuits, with maximum length of 17.95 km per cable circuit. Offshore export cables with burial depth in standard conditions of between 1 and 3 m (excluding areas of high mobility as indicated by the presence of sandwaves, such areas will have site specific burial depths); 6 km of 17.95 km offshore export cable requiring remedial protection of height 1 m; Protection at cable crossings via rock dumping, concrete mattress or concrete bridging to a maximum length of 400 m, per cable crossing up to 5% of water depth. (six export cable crossings and two inter-array cable crossings); Maximum total length of 120 km IAC Inter-array cables with burial depth in standard conditions of between 1 and 3 m (excluding areas of high mobility as indicated by the presence of sandwaves, such areas will have site specific burial depths); 20% of cable route plus 100 m at each inter-array cable end requiring protection of a maximum of height 1 m equating to 34.2km; and Operational life of **35 years**.	**Length of export and inter array cables:** greatest length of subsea cables will maximise potential for anchor interaction, and therefore the maximum design option assessed will lead to greatest potential increase in risk. **Length of cable requiring protection:** no change between options. **Burial Depth:** no change between options. **Temporal extent:** no change between options.
Impact 15: Reduction of emergency response resource capabilities		
Full build out of the array area with layout including a single line of orientation; Option A: 50 WTGs, and one OSP, comprising **51** structures. Minimum spacing of 944 m	All design option layouts represent similar spatial use of the array area and include a single line of orientation Option B: 45 or Option C: 39 WTGs and one OSP, comprising **46** or **40** structures	**SAR access / lines of orientation:** All layouts include a single line of orientation, and therefore the maximum design option results in the greatest potential for SAR access restriction given it contains the most number of structures (more structures leads to lower minimum spacing as does use of smaller structures which is more likely to impact SAR access).

Maximum design option	Alternative design options	Justification
Two export cable circuits, with maximum length of **18.35 km** per cable circuit; Operational period lasting **35 years**; and Three daily CTV trips with the addition of up to **100** vessels trips to support scheduled routine and non-routine maintenance per year.	Two export cable circuits, with maximum length of **17.95 km** per cable circuit; Operational period lasting **35 years**; and Two daily CTV trips with the addition of up to **75** vessels trips to support scheduled routine and non-routine maintenance.	**Structure Numbers:** The greatest number of structures leads to the greatest potential for additional allision incidents, and therefore the maximum design option results in the greatest potential for impact on SAR capability. Further, more structures leads to lower minimum spacing as does use of smaller structures which is more likely to impact SAR access. **Temporal extent:** no change between options. **Minimum spacing:** Lower minimum spacing will lead to greater impacts on SAR access, and therefore the maximum design option results in the greatest potential increase in impact. **Project vessels:** The greatest number of project vessel movements to and from port represented by the maximum design option will lead to largest potential increase in incidents.
Decommissioning		
Impact 16: Displacement leading to increased encounters / collision risk		
Full build out of the array area; Buoyed decommissioning area around array area; Advisory safe passing distances around all active works; Decommissioning of Option A: 50 WTGs, and one OSP, comprising **51** structures. WTGs with multileg foundations, dimensions at sea surface of **45 m x 45 m**; OSPs with multileg foundations, dimensions at sea surface of **50 m x 50 m**; and Decommissioning period of **three years**.	All design scenario layouts represent similar build out scenarios; All design scenario layouts will likely entail similar buoyed decommissioning areas given similar build out scenarios; No advisory safe passing distances utilised; Decommissioning of Option B: 45 or Option C: 39 WTGs and one OSP, comprising **46** or **40** structures WTGs with monopile foundations, dimensions at sea surface of **15 m** diameter; OSPs with multileg foundations, dimensions at sea surface of **50 m x 50 m**; and Decommissioning period of **three years**.	**Bounding spatial area covered:** There is not considered to be any change in bounding area covered between the design scenario layouts or potential buoyed decommissioning areas, and therefore the maximum design option results in the greatest displacement given it contains the most number of structures (more structures are more likely to dissuade vessel entry into the array area). **Size of Structures:** WTGs with multileg foundations are larger at sea surface than monopiles, and therefore the maximum design option results in the greatest displacement potential (larger structures are more likely to dissuade vessel entry into the array area). OSP dimensions are unchanged between design scenarios. **Temporal extent:** no change between options.
Impact 17: Displacement of historic recreational sailing races		
Full build out of the array area; Buoyed decommissioning area around array area; Advisory safe passing distances around all active works; Decommissioning of Option A: 50 WTGs, and one OSP, comprising **51** structures.	All design scenario layouts represent similar build out scenarios; All design scenario layouts will likely entail similar buoyed decommissioning areas given similar build out scenarios; No advisory safe passing distances utilised; Decommissioning of Option B: 45 or Option C: 39 WTGs and one OSP, comprising **46** or **40** structures	**Bounding spatial area covered:** There is not considered to be any change in bounding area covered between the design scenario layouts or potential buoyed decommissioning areas, and therefore the maximum design option results in the greatest displacement given it contains the most number of structures (more structures are more likely to dissuade vessel entry into the array area). **Size of Structures:** WTGs with multileg foundations are larger at sea surface

Maximum design option	Alternative design options	Justification
WTGs with multileg foundations, dimensions at sea surface of **45 m x 45 m**; OSP with multileg foundations, dimensions at sea surface of **50 m x 50 m**; and Decommissioning period of **three years**.	WTGs with monopile foundations, dimensions at sea surface of **15 m** diameter; OSPs with multileg foundations, dimensions at sea surface of **50 m x 50 m**; and Decommissioning period of **three years**.	than monopiles, and therefore the maximum design option results in the greatest displacement potential (the larger the structure the greater the allision risk). OSP dimensions are unchanged between design scenarios. **Temporal extent:** no change between options.
Impact 18: Increased collision risk from decommissioning vessels		
Full build out of the array area; Option C: 39 WTGs, and one OSP. Two export cable circuits, with maximum combined length of 18.35 km per cable including micrositing; Decommissioning period of **three years**; and Up to **813** round trips to port from decommissioning vessels and an additional **1,825** round trips from small vessels such as CTVs during decommissioning period.	All design scenario layouts represent similar build out scenarios; Option A: 50 WTGs and one OSP; or Option B: 45 WTGs and one OSP, Two export cables circuits, with maximum combined length of 17.95 km per cable including micrositing; Decommissioning period of **three years**; and Up to **774** round trips to port from decommissioning vessels and an additional **538** round trips from small vessels such as CTVs during decommissioning period.	**Structure Numbers:** The larger of the turbine options result in a greater number of total vessel trips which will lead to largest potential increase in collision risk. **Length / Duration of export cable decommissioning works:** Largest length of export cable route will lead to greatest potential for cable decommissioning works (noting assumption that cables will be left in situ if in compliance with local law), meaning the maximum design option will lead to largest potential increase in collision risk. **Temporal extent:** no change between options. **Vessel Numbers:** The greatest number of project vessel movements represented by the maximum design option will lead to largest potential increase in collision risk.
Impact 19: Allison with wind farm infrastructure from vessel under power		
Full build out of the array area; Option A: 50 WTGs, and one OSP WTGs with multileg foundations, dimensions at sea surface of **45 m x 45 m**; OSP with multileg foundations, dimensions at sea surface of **50 m x 50 m**; and Decommissioning period of **three years**.	Full build out of the array area; Option B: 45 WTGs and one OSP; or Option C: 39 WTGs and one OSP. WTGs with monopile foundations, dimensions at sea surface of **15 m** diameter; OSP with multileg foundations, dimensions at sea surface of **50 m x 50 m**; and Decommissioning period of **three years**.	**Bounding spatial area covered:** There is not considered to be any change in bounding area covered between the design scenario layouts and potential buoyed decommissioning areas, and therefore the maximum design option results in the greatest allision risk given it contains the most number of structures (more structures leads to greater allision risk). **Size of Structures:** WTGs with multileg foundations are larger at sea surface than monopiles, and therefore the maximum design option results in the greatest allision risk (the larger the structure the greater the allision risk). OSP dimensions are unchanged between design scenarios. **Minimum spacing:** Lower minimum spacing will lead to greater allision risk, and therefore the maximum design option results in the greatest potential increase in allision risk. **Temporal extent:** no change between options.

Maximum design option	Alternative design options	Justification
Impact 20: Allision with wind farm infrastructure from vessel NUC		
Full build out of the array area; Option A: 50 WTGs, and one OSP WTGs with multileg foundations, dimensions at sea surface of **45 m x 45 m**; OSP with multileg foundations, dimensions at sea surface of **50 m x 50 m**; and Decommissioning period of **three years**.	Full build out of the array area; Option B: 45 WTGs and one OSP; or Option C: 39 WTGs and one OSP. WTGs with monopile foundations, dimensions at sea surface of **15 m** diameter; OSP with multileg foundations, dimensions at sea surface of **50 m x 50 m**; and Decommissioning period of **three years**.	**Bounding spatial area covered:** There is not considered to be any change in bounding area covered between the design scenario layouts and potential buoyed decommissioning areas, and therefore the maximum design option results in the greatest allision risk given it contains the most number of structures (more structures leads to greater allision risk). **Size of Structures:** WTGs with multileg foundations are larger at sea surface than monopiles, and therefore the maximum design option results in the greatest allision risk (the larger the structure the greater the allision risk). OSP dimensions are unchanged between design scenarios. **Minimum spacing:** Lower minimum spacing will lead to greater allision risk, and therefore the maximum design option results in the greatest potential increase in allision risk. **Temporal extent:** no change between options.
Impact 21: Port Access Restrictions		
Full build out of the array area; Option A: 50 WTGs, and one OSP Two export cable circuits, with maximum combined length of **18.35 km** per cable including micrositing; Decommissioning period of **three years**; and Up to **813** round trips to port from decommissioning vessels and an additional **1,825** round trips from small vessels such as CTVs during decommissioning period.	All design scenario layouts represent similar build out scenarios; Option B: 45 WTGs and one OSP; or Option C: 39 WTGs and one OSP. Two export cables circuits, with maximum combined length of **17.95 km** per cable including micrositing; Decommissioning period of **three years**; and Up to **774** round trips to port from decommissioning vessels and an additional **538** round trips from small vessels such as CTVs during decommissioning period.	**Bounding spatial area covered:** There is not considered to be any change in bounding area covered between the design scenario layouts or potential buoyed decommissioning areas, and therefore the maximum design option results in the greatest potential for port access restriction given it contains the most number of vessel trips. **Length / Duration of export cable decommissioning works:** Largest length of export cable route will lead to greatest potential for cable decommissioning works (noting assumption that cables will be left in situ if in compliance with local law), meaning the maximum design option will lead to largest potential increase in collision risk. **Temporal extent:** no change between options. **Project vessels:** The greatest number of project vessel movements to and from port represented by the maximum design option will lead to largest potential increase in port access restriction.
Impact 22: Increased grounding / under keel risk to passing vessels		
Two export cable circuits, with maximum combined length of **18.35 km** per cable including micrositing; **12 km** of offshore export cable requiring remedial protection of height **1 m**; Protection at cable crossings via rock dumping, concrete mattress, steel bridging or concrete bridging;	Two export cables circuits, with maximum combined length of **17.95 km** per cable including micrositing; **12 km** of offshore export cable requiring remedial protection of height **1 m**; Protection at cable crossings via rock dumping, concrete mattress, steel bridging or concrete bridging;	**Length of export and inter array cables:** greatest length of subsea cables will maximise potential for underkeel clearance reduction, and therefore the maximum design option assessed will lead to greatest potential for underkeel interaction.

Maximum design option	Alternative design options	Justification
120 km maximum total length of IAC; 20% of cable route plus 100 m at each inter-array cable end requiring protection of a maximum of height 1 m equating to **34.2km**; Cables left in situ; and Decommissioning period of **three years**.	**120** km maximum total length of IAC; 100 m at each inter-array cable end requiring protection of a maximum of height 1 m; Cables left in situ; and Decommissioning period of **three years**.	**Length of cable requiring protection:** no change between options. **Height of cable protection**: no change between options. **Temporal extent:** no change between options.
Impact 23: Increased anchor snagging risk from presence of subsea cables		
Two export cable circuits, with maximum length of **18.35 km** per cable including micrositing; Offshore export cables with burial depth in standard conditions of between 1 and 3 m (excluding areas of high mobility as indicated by the presence of sandwaves, such areas will have site specific burial depths); 12 km of offshore export cable requiring remedial protection of height 1 m; Protection at cable crossings via rock dumping, concrete mattress, steel bridging or concrete bridging; **120 km maximum total length of IAC;** Inter-array cables with burial depth in standard conditions of between 1 and 3 m (excluding areas of high mobility as indicated by the presence of sandwaves, such areas will have site specific burial depths); 20% of cable route plus 100 m at each inter-array cable end requiring protection of a maximum of height 1 m equating to 34.2km; Cables left in situ; and Decommissioning period of **three years**.	Two export cables circuits, with maximum combined length of **17.95 km** per cable including micrositing; Offshore export cables with burial depth in standard conditions of between 1 and 3 m (excluding areas of high mobility as indicated by the presence of sandwaves, such areas will have site specific burial depths); 12 km of offshore export cable requiring remedial protection of height 1 m; Protection at cable crossings via rock dumping, concrete mattress, steel bridging or concrete bridging; **120 km maximum total length of IAC;** Inter-array cables with burial depth in standard conditions of between 1 and 3 m (excluding areas of high mobility as indicated by the presence of sandwaves, such areas will have site specific burial depths); 100 m at each inter-array cable end requiring protection of a maximum of height 1 m; Cables left in situ; and Decommissioning period of **three years**.	**Length of export and inter array cables:** greatest length of subsea cables will maximise potential for anchor interaction, and therefore the maximum design option assessed will lead to greatest potential increase in risk. **Length of cable requiring protection:** no change between options. **Burial Depth:** no change between options. **Temporal extent:** no change between options.
Impact 24: Reduction of emergency response resource capabilities		
Full build out of the array area; Option A: 50 WTGs, and one OSP Two export cable circuits, with maximum length of **18.35 km** per cable including micrositing; Decommissioning period of **three years**; and Up to **813** round trips to port from decommissioning vessels and an additional **1,825** round trips from small vessels such as CTVs during decommissioning period.	Full build out of the array area; Option B: 45 WTGs and one OSP; or Option C: 39 WTGs and one OSP. Two export cables circuits, with maximum combined length of **17.95 km** per cable including micrositing; Decommissioning period of **three years**; and Up to **774** round trips to port from decommissioning vessels and an additional **538** round trips from small vessels such as CTVs during decommissioning period.	**SAR access / lines of orientation:** All layouts include a single line of orientation, and therefore the maximum design option results in the greatest potential for SAR access restriction given it contains the most number of structures (more structures leads to lower minimum spacing as does use of smaller structures which is more likely to impact SAR access). **Structure Numbers:** The greatest number of structures leads to the greatest potential for additional allision incidents, and therefore the maximum design option results in the greatest potential for impact on SAR capability. Further, more structures leads to lower minimum spacing as does use of smaller structures which is more likely to impact SAR access. **Temporal extent:** no change between options. **Project vessels:** The greatest number of project vessel movements to and from port represented by the maximum design option will lead to largest potential increase in incidents.

10.10 Project Design Features and Avoidance and Preventative Measures

10.10.1 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 shipping and navigation. These are presented within Table 8.
- 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 10.11, 10.12 and 10.13 of this EIAR chapter.

10.10.2 Where additional mitigation is identified as being required to reduce the significance of any residual effect in EIA terms, this is presented in Sections 10.11, 10.12 and 10.13.

Table 8 Project Design Features and Avoidance and Preventative Measures relating to shipping and navigation

Project Design Feature / Avoidance and Preventative Measure	Where secured
Observe SAR lanes between discrete rows of wind farm structures of a minimum of 500 m width on a consistent line of orientation.	Commitment detailed within the NRA in line with existing guidance and standard practice
Navigational safety measures including: Compliance with COLREGs Marine coordination; Charting of infrastructure; Temporary lighting and marking; Operational lighting and marking; Use of guard vessels; Advisory safe passing distances; Emergency Response Cooperation Planning.	Measures contained within the Vessel Management Plan designed to prevent any risks of collision or disruption to other craft, all measures will ensure compliance with the Convention on the International Regulations for Preventing Collisions at Sea (COLREGS) (International Maritime Organization (IMO), 1972/77)
Appropriate health and safety including IMO conventions and Health and Safety Authority (HSA) requirements, and suitable vessel certification in line with MSO requirements	Measures contained within the Vessel Management Plan

Project Design Feature / Avoidance and Preventative Measure	Where secured
Applicant will implement the following, in line with the Sea Pollution Act 1991 and MARPOL convention and other similar binding rules and obligations imposed on ship owners and operators by inter alia the International Maritime Organisation as relevant: Marine Pollution Contingency Plan to cover accidental spills, potential contaminant release and include key emergency contact details (e.g., the Irish Coast Guard (IRCG) and will comply with the National Maritime Oil/ HNS Spill Contingency Plan (IRCG, 2020). Measures include Storage of all chemicals in secure designated areas with impermeable bunding (up to 110% of the volume); and double skinning of pipes and tanks containing hazardous materials to avoid contamination.	The PEMP includes measures outlined within the Marine Pollution Contingency Plan compliant with relevant legal obligations and frameworks
Project design was completed in compliance with the standard MGN 654. Includes the requirement to consult with MSO and Irish Lights in the event that water depths are reduced by more than 5% as a result of cable protection or other infrastructure, to ensure that navigational risk is minimised.	Project design in line with MGN 654 compliance.
Marking and lighting offshore infrastructure in accordance with relevant industry guidance and as advised by relevant stakeholders including in accordance with IALA G-1162 (IALA, 2021) and Irish lights requirements. In particular, the use of marine lighting to mark selected peripheral structures. All structures associated with Dublin Array will be adequately marked on nautical and electronic charts.	Measures captured within the Lighting and Marking Plan
Buoyed construction/ decommissioning area deployed as directed by Irish Lights. To include buoyage to demarcate the active construction / decommissioning works.	Measures captured within the Lighting and Marking Plan
Minimum WTG blade clearance of 28m above MHWS (exceeds minimum requirement of 22m).	Outlined within the Project Description Chapter
Provision for reporting and recovery of dropped objects where they pose a potential hazard to other marine users	Provision for reporting and recovery of dropped objects where they pose a potential hazard to other marine users
Installation of cables to an optimum cable burial depth - offshore cables will, where possible, be buried in the seabed to the optimal performance burial depth for the specific ground conditions. Where optimum burial depth cannot be achieved secondary protection measure will be deployed e.g. concrete mattress, rock berm, grout bags or an equivalent in key areas	The Project Description Chapter details the requirement for a Cable Installation Plan (CIP) and Cable Burial Risk Assessment (CBRA) which will be developed upon award of consent and in advance of construction. The CIP and CBRA will provide information on the installation plan for subsea cables. The CBRA, will provide a risk assessment

Project Design Feature / Avoidance and Preventative Measure	Where secured
	and evaluation for cable protection, unburied or shallow buried cables. The CIP will detail pertinent mitigation measures to be used during cable installation and will be applied throughout the construction phase. The CIP and CBRA will be submitted to the consenting authority in advance of construction phase.
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, including any self help capability.
Promulgation of Information via Notice to Mariners and other appropriate media including Fisheries Liaison Officer (FLO). Includes circulation relevant Leisure Almanac.	Commitment detailed within the NRA in line with existing guidance and standard practice
Commitment to undertake vessel traffic validation by AIS during the construction phase as required under MGN 654 to ensure the NRA for the project is accurate for all phases and that predictions made in the NRA with regards to traffic patterns are accurate	Commitment detailed within the NRA in line with existing guidance and standard practice.
Designated routes to/from array area for vessels associated with the project which avoid crossing main routes at the south west corner of the site. Where practicable, vessels operating on Dynamic Positioning (DP) will be used. If vessels using anchor spreads are required, the anchors (and hence marker buoys) will not be placed in the inshore shipping routes (Routes 3 and 7 percentiles) As for construction buoys, any use of temporary marker buoys will be discussed with Irish Lights.	Measures captured within the VMP
Details associated with any restrictions including any advisory safe passing distances will be provided to relevant recreational organisations and race organisers to ensure they can plan races accordingly, and liaison will be ongoing to ensure minimal disruption.	Commitment detailed within the NRA.

10.11 Environmental Assessment: Construction phase

10.11.1 This section assesses the impacts to shipping and navigation users that may arise as a result of the construction of the offshore infrastructure. The assessment has been informed by the NRA which as such should be read in conjunction.

Impact 1: Displacement of vessels leading to increased encounters and collision risk

10.11.2 The presence of the buoyed construction area within the Temporary Occupation Area, partially completed or pre-commissioned structures, and associated vessel operations may lead to displacement of baseline traffic. Any such deviations may lead to increases in vessel density in certain areas around the array area, resulting in increased encounters and potentially vessel to vessel collision risk.

10.11.3 As per Table 7, the Maximum Design Option for this impact has been identified as the maximum number of structures built out over the entire array area, given that this will create maximum displacement.

Commercial Vessel Routeing

10.11.4 Based on the vessel traffic data studied, a total of nine main routes utilised by commercial vessels were identified. Experience of other wind farm projects under construction within UK waters shows that commercial vessels will deviate to avoid buoyed construction areas, and on this basis two of the nine main routes identified were anticipated to deviate as a result of the array area. These deviations were observed to be limited and are considered to represent negligible shifts as opposed to large scale deviations. This is due to the majority of commercial vessels in the study area already avoiding the shallow waters associated with the Kish and Bray Banks (and it was confirmed during consultation that commercial vessels would not choose to transit through the array area).

10.11.5 Regardless, details of the proposed project will be promulgated in advance, and structure positions will be displayed on nautical charts ensuring vessels can passage, plan to account for the structures and associated construction work. A guard vessel will also be used during cable installation to warn approaching vessels of the ongoing works in the area inshore of the Kish and Bray Banks.

Available Searoom – South West Corner

10.11.6 It is noted that the shipping channel at the southwest corner of the array area was raised during consultation as an area of concern given that vessels could be “squeezed” at this point, due to the shallow sea area also to the west, which could lead to increased encounters. The use of buoyage in this area during construction will be discussed with Irish Lights to ensure the construction site can be effectively marked without adversely impacting the searoom, noting that there is considered to be adequate searoom to do so. This approach was agreed with Irish Lights (see section 10.310.3).

10.11.7 The approach to use of construction vessels in this area will follow the following principles, which are included as Project Design Features and Avoidance and Preventative Measures (noting the full list is provided in Section 10.10):

- Where practicable, vessels operating on Dynamic Positioning (DP) will be used;
- If vessels using anchor spreads are required, the anchors (and hence marker buoys) will not be placed in the inshore shipping routes (Routes 3 and 7 percentiles as shown in Figure 5).
- As for construction buoys, any use of temporary marker buoys will be discussed with Irish Lights.

Fishing and Recreation

10.11.8 The baseline vessel traffic data shows that, unlike larger commercial vessels, smaller vessels (fishing and recreation) do transit over the Kish and Bray Banks. This aligned with consultation output, with consultees confirming recreational vessels (including dive boats, vessels participating in races, and recreational angling) and fishing vessels do transit the banks. Such third party transits over the banks will not be excluded (including during construction), however advisory safe passing distances[7] will be utilised around vessels engaged in sensitive construction operations to ensure the safety of both project and third party vessels. Any such areas will be temporary, and limited spatially to the waters surrounding the operations, and detail would be promulgated in advance. As such no notable displacement for smaller vessels accessing the banks is anticipated.

10.11.9 Minimum WTG spacing of 944 m (see Table 7) is considered sufficient to accommodate smaller vessel transits through the pre-commissioned structures should such vessels choose to do so.

10.11.10 Project Design Features and Avoidance and Preventative Measures of relevance are considered as being (noting the full list is provided in Section 10.10):

- Charting of infrastructure;
- Emergency Response Cooperation Planning;
- Circulation of information, e.g. to relevant Leisure Almanacs; and
- Vessel traffic monitoring by AIS during the construction phase.

10.11.11 Given deviations/displacement are anticipated, the frequency of occurrence for this impact is considered to be reasonably probable. However, given deviations are anticipated to be minor (i.e., small, manageable, not leading to large increases in journey time) and not expected to lead to a notable increase in encounters (and hence collision risk), the severity of consequence is considered to be negligible. On this basis the impact is determined to be Broadly Acceptable and ALARP.

[7] Advisory safe passing distances would indicatively be 500m around active works subject to the nature of the works and 50m around infrastructure

10.11.12 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.

Proposed Mitigation

10.11.13 Given the impact is determined to be broadly acceptable and ALARP, no further mitigation beyond those assumed presented in Table 8 are necessary.

Residual effect assessment

10.11.14 Given no additional mitigation is necessary to that already identified in Table 8, the residual impact is determined to be Broadly Acceptable and ALARP. Therefore, no significant adverse residual effects have been predicted.

Impact 2: Displacement of historic recreational sailing races

10.11.15 The presence of the buoyed construction area within the Temporary Occupation Area, partially completed or pre-commissioned structures, and associated vessel operations may lead to displacement of recreational races that have historically utilised the area over and around the Kish and Bray Banks. Any changes in race patterns may lead to increased encounter and collision rates.

10.11.16 As per Table 7, the Maximum Design Option for this impact has been identified as the maximum number of structures built out over the entire array area, with advisory safe passing distances utilised around vessels where construction work is ongoing, given that this will maximise displacement.

10.11.17 The vessel traffic data studied and race route data provided by ISORA showed that recreational races do take place in the area, including across or in proximity to the Kish and Bray Banks.

10.11.18 Access to the array area will not be restricted including during construction, however advisory safe passing distances will be utilised around vessels engaged in sensitive construction operations to ensure the safety of both project and third party vessels. Any such areas will be temporary and limited spatially to the waters surrounding the operations. Details associated with any restrictions including any advisory safe passing distances will be provided to relevant recreational organisations and race organisers to ensure they can plan races accordingly, and liaison will be ongoing to ensure minimal disruption. This liaison between both parties will ensure activities are coordinated.

10.11.19 WTG spacing of 944 m (see Table 7) is considered sufficient to accommodate typical recreational transits, however race organisers may choose to deviate race routes to avoid the structures depending on the number and types of vessels participating.

10.11.20 Project Design Features and Avoidance and Preventative Measures of relevance are considered as being (noting the full list is provided in Section 10.10):

- Charting of infrastructure;

- Emergency Response Cooperation Planning;
- Circulation of information, e.g. to relevant Leisure Almanacs;
- Vessel traffic monitoring by AIS during the construction phase; and
- Details associated with any restrictions including any advisory safe passing distances will be provided to relevant recreational organisations and race organisers to ensure they can plan races accordingly, and liaison will be ongoing to ensure minimal disruption.

10.11.21 Given historic races are known to intersect the array area, the frequency of occurrence for this impact is considered to be reasonably probable. However, given limited expected effects on encounter rates and collision risk (i.e., navigational safety), severity of consequence is considered to be negligible. On this basis the impact is determined to be Broadly Acceptable.

10.11.22 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.

Proposed Mitigation

10.11.23 Given the impact is determined to be broadly acceptable and ALARP, no further mitigation beyond those presented in Table 8 are necessary.

Residual effect assessment

10.11.24 Given no additional mitigation is necessary to that already identified in Table 8, the residual impact is determined to be Broadly Acceptable and ALARP. Therefore, no significant adverse residual effects have been predicted.

Impact 3: Increased collision risk from construction related vessels

10.11.25 The vessels associated with construction may lead to increased collision risk to third party vessels. Collision risk to third-party vessels could increase either whilst a project vessel is transiting between the array area and the construction port, or whilst the project vessel is engaged in active construction work within the Temporary Occupation Area.

10.11.26 As per Table 7, the Maximum Design Option for this impact has been identified as being the maximum number of construction vessels utilised over the longest potential construction period, given this will maximise potential encounters with third party vessels.

10.11.27 Various ports and harbours are under consideration for use during the construction phase, including locations in Ireland, the UK and mainland Europe, and there may therefore be vessel transits required to site from various different locations.

10.11.28 All project vessels will comply with Convention on International Regulations for Preventing Collisions at Sea (COLREGs) (IMO, 1972/77) and Safety of Life at Sea (SOLAS) (IMO, 1974) regulations, and associated movements will be managed via central marine coordination. This will limit potential interactions with third party vessels whilst in transit.

10.11.29 It is also noted that following consultation with Irish Lights, it is concluded that there is not likely to be any impacts upon vessel access to the Kish Lighthouse located to the north of the array area. For assurance Irish Lights requested advance engagement from the Applicant on any project vessel activity occurring within 500 m of the centre point of the Kish Tower.

10.11.30 In terms of vessels engaged in active construction work, advisory safe passing distances will be utilised around vessels engaged in sensitive construction operation, including any involving a Restricted in Ability to Manoeuvre (RAM) vessel[8]. This will make it clear to third party traffic the areas which should be avoided to ensure collision risk is minimised. Details of construction operations will be promulgated, including with Dublin Port via an agreed communications plan.

10.11.31 Project Design Features and Avoidance and Preventative Measures of relevance are considered as being (noting the full list is provided in Section 10.10):

- Advisory safe passing distances;
- Appropriate vessel health, safety and certification;
- Emergency Response Cooperation Planning;
- Buoyed construction/decommissioning area;
- Marine coordination;
- Circulation of information, e.g. to relevant Leisure Almanacs; and
- Use of a temporary guard vessel where identified by risk assessment; and
- Vessel traffic monitoring by AIS during the construction phase.

10.11.32 Given the existing measures in place to manage project vessel traffic, the frequency of occurrence for this impact is considered to be remote, with severity of consequence considered to be moderate. On this basis the impact is determined to be Tolerable.

10.11.33 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.

Proposed Mitigation

10.11.34 The proposed mitigations for this impact are the following:

[8] the term "vessel restricted in her ability to manoeuvre " means a vessel which from the nature of her work is restricted in her ability to manoeuvre as required by these Rules and is therefore unable to keep out of the way of another vessel.

- Entry/exit points to the array area for vessels associated with construction activity;
- Designated routes to/from array area for vessels associated with construction activity which avoid crossing main routes at the south west corner of the site;
- Mandatory carriage of AIS for all vessels associated with construction activity;
- Communications Plan with Dublin Port; and
- Engagement from the Applicant with Irish Lights on any project vessel activity occurring within 500 m of the centre point of the Kish Tower.

Residual effect assessment

10.11.35 Assuming that the additional measures detailed above are implemented, the residual impact is considered as being Tolerable with Mitigation and ALARP. Therefore, no significant adverse residual effects have been predicted.

Impact 4: Allision with wind farm infrastructure from vessel under power

10.11.36 The presence of pre-commissioned or partially completed structures create an allision risk to passing third party vessels whilst under power.

10.11.37 As per Table 7, the Maximum Design Option for this impact has been identified as being the maximum number of structures built out over the entire site, and assuming the largest possible dimensions for this option (i.e., the smallest size of WTG).

Commercial Vessels

10.11.38 Given commercial vessels have been observed to avoid the Kish and Bray Banks, an allision from such a vessel is most likely to occur with a peripheral structure. It should be considered that given the shallow water depths in certain areas of the array, a larger commercial vessel may ground on the banks before colliding with a structure. Quantitative modelling within the NRA indicated a powered allision would occur once per 500,967 years, noting that this assumed all structures were in place.

Fishing and Recreation

10.11.39 Unlike larger commercial vessels, smaller vessels (fishing and recreation), are known to cross the banks. There will be no restrictions put in place on such transits ;noting advisory safe passing distances will be utilised around vessels engaged in sensitive construction operations. It should also be considered that, (which was raised during consultation), recreational vessels may choose to visit the array area out of curiosity, and therefore may approach structures.

10.11.40 On this basis, there is potential that a fishing or recreational vessel may collide with a structure internal to the array. The proposed minimum spacing of 944 m (see Table 7) is considered sufficient to allow safe navigation through the array for fishing and recreational vessels should they choose to transit through, and it is noted that there will be a minimum blade clearance of 28 m above Mean High Water Springs (MHWS).

Existing Buoyage

10.11.41 A concern was raised by Irish Lights during consultation over moving the existing buoyage marking the shallow banks as a result of establishing the array area. The raised concern for potential confusion to mariners familiar with the existing positions leading to a potential increase in allision risk with the buoys. Consultation will therefore be undertaken with Irish Lights prior to construction with regards to buoyage requirements, noting that statutory sanction from Irish Lights will be required. The commitments were made and agreed with Irish Lights as per Section 10.3 to ensure adequate clarity to mariners.

10.11.42 During the construction phase, operational mitigations most notably lighting and marking will not be established and operational. However, construction phase mitigations will be in place, including promulgation of information, charting of structures, and temporary lighting and marking (including buoyage), details of which will be discussed and agreed with Irish Lights. Where identified as necessary via risk assessment considering the other mitigations in place, a guard vessel may also be used.

10.11.43 Project Design Features and Avoidance and Preventative Measures of relevance are considered as being (noting the full list is provided in Section 10.10):

- Advisory safe passing distances;
- Charting of infrastructure;
- Compliance with MGN 654 with respect to WTG design and construction;
- Emergency Response Cooperation Planning;
- Buoyed construction/decommissioning area;
- Lighting and marking;
- Marine pollution contingency planning;
- Minimum WTG blade clearance;
- Circulation of information, e.g. to relevant Leisure Almanacs; and
- Use of a temporary guard vessel where identified by risk assessment.

10.11.44 Given the low likelihood of an allision, and noting the Project Design Features and Avoidance and Preventative Measures in place, frequency of occurrence is assessed as being extremely unlikely, with severity of consequences considered to be serious. On this basis the impact is determined to be Tolerable.

10.11.45 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.

Proposed Mitigation

10.11.46 The proposed mitigations for this impact are the following:

- Consultation with Irish Lights with regards to the need for alteration of existing buoyage positions; and
- Although not a documented requirement from Irish Lights, temporary lights will be deployed (following consultation) on partially constructed structures until main identification or navigation lights are active.

Residual effect assessment

10.11.47 Assuming that the additional measures detailed above are implemented, the residual impact is considered as being Tolerable with Mitigation and ALARP. Therefore, no significant adverse residual effects have been predicted.

Impact 5: Allision with wind farm infrastructure from vessel Not Under Command

10.11.48 The presence of pre-commissioned or partially completed structures create an allision risk to passing third party vessels whilst NUC (i.e. drifting).

10.11.49 As per Table 7, the Maximum Design Option for this impact has been identified as being the maximum number of structures built out over the entire site, and assuming the largest possible dimensions for this option (i.e., the smallest size of WTG).

Commercial Vessels

10.11.50 Given commercial vessels are already observed to avoid the Kish and Bray Banks, an allision from such a vessel is most likely to occur with a peripheral structure, and it should be considered that given the shallow water depths in certain areas of the array area, a drifting commercial vessel may ground on the banks before alliding with a structure. Quantitative modelling within the NRA indicated a drifting allision would occur once per 252 years, noting that this assumed all structures were in place.

Fishing and Recreation

10.11.51 Unlike larger commercial vessels, smaller vessels are observed to transit the banks, and therefore a drifting fishing or recreational vessel may allide with a structure internal to the array. Any such allisions are likely to be low speed and low impact given vessel size and likely drifting speed.

10.11.52 In the event that a vessel starts to drift towards a structure within the array area, either inside or outside of the array area, the vessel will initiate its own procedures for such an event, which may involve dropping anchor or the use of thrusters (depending on availability and power supply). It is also noted that any construction vessels on site may be able to provide assistance in liaison with IRCG and as required under SOLAS obligations (IMO, 1974).

10.11.53 Project Design Features and Avoidance and Preventative Measures of relevance are considered as being (noting the full list is provided in Section 10.10)

- Advisory safe passing distances;
- Charting of infrastructure;
- Compliance with MGN 654 with respect to WTG design and construction;
- Emergency Response Cooperation Planning;
- Buoyed construction/decommissioning area;
- Lighting and marking;
- Marine pollution contingency planning;
- Minimum WTG blade clearance;
- Circulation of information, e.g. to relevant Leisure Almanacs; and
- Use of a temporary guard vessel where identified by risk assessment.

10.11.54 Given the low likelihood of an allision, and noting the availability of self help resources, frequency of occurrence is assessed as being extremely unlikely, with severity of consequences considered to be serious. On this basis the impact is determined to be Tolerable.

10.11.55 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.

Proposed Mitigation

10.11.56 The proposed mitigations for this impact are the following:

- Cooperation agreements with IRCG in terms of emergency response procedures.

Residual effect assessment

10.11.57 Assuming that the additional measures detailed above are implemented, the residual impact is considered as being Tolerable with Mitigation and ALARP. Therefore, no significant adverse residual effects have been predicted.

Impact 6: Port / Anchorage access restrictions

10.11.58 The vessels, ongoing works, or partially complete or pre commissioned infrastructure may lead to restriction of port or anchorage access for third party vessels.

10.11.59 As per Table 7, the Maximum Design Option for this impact has been identified as the maximum number of construction vessels used over the longest construction period, and full build out within the array area assuming the maximum number of structures.

10.11.60 Given larger vessels already avoid the Kish and Bray Banks, and noting that minimum WTG spacing of 944 m (see Table 7) is considered sufficient to facilitate transit of smaller vessels that may choose to transit the banks, there is not considered likely to be any effect on port access from the wind farm structures themselves. For similar reasoning no effect is anticipated from works ongoing within the array area given access to the site will not be restricted, noting that while advisory safe passing distances will be used around vessels engaged in sensitive operations, these will be temporary and spatially limited.

10.11.61 In terms of project vessel transits, various construction ports are under consideration including in Ireland, the UK, and mainland Europe. CTV's are likely to be operating from Dún Laoghaire.

10.11.62 An increase in transits to or from any port utilised associated with project vessel traffic may impact upon third party vessel access. Regardless of ports utilised, all project vessel movements will be managed via marine coordination, and associated details would be promulgated including to relevant port and harbour authorities to ensure third party vessels were aware.

10.11.63 The vessel traffic data studied showed that vessels anchor south of Dublin Bay, with consultation input from Dublin Port indicating this occurs when the charted anchorage in Dublin Bay is at capacity. There may be some impact on this anchoring activity whilst cable installation is occurring however this would be spatially limited. Subsea cables will be charted, meaning mariners can account for their presence post laying. There will be no impact on the charted anchorage in Dublin Bay.

10.11.64 Project Design Features and Avoidance and Preventative Measures of relevance are considered as being (noting the full list is provided in Section 10.10):

- Cable burial risk assessment;
- Marine coordination; and
- Circulation of information, e.g. to relevant Leisure Almanacs.

10.11.65 Given the temporary nature of any potential restriction, and noting the Project Design Features and Avoidance and Preventative Measures in place, frequency of occurrence is assessed as being remote with severity of consequences (in terms of navigational safety) considered to be minor. On this basis the impact is determined to be Broadly Acceptable.

10.11.66 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.

Proposed Mitigation

10.11.67 Given the impact is determined to be broadly acceptable and ALARP, no further mitigation beyond those presented in Table 8 are necessary.

Residual effect assessment

10.11.68 Given no additional mitigation is necessary to that already identified in Table 8, the residual impact is determined to be Broadly Acceptable and ALARP. Therefore, no significant adverse residual effects have been predicted.

Impact 7: Reduction of emergency response resource capabilities

10.11.69 The construction phase may lead to an increase in baseline incident rates given an increase in vessel numbers and crews / personnel in the area. and the associated construction operations. This has potential to impact upon emergency response resources capability to respond to all incidents that arise. Furthermore the infrastructure may impact or limit access to the array area for Search and Rescue (SAR) resources.

10.11.70 As per Table 7, the Maximum Design Option for this impact has been identified as the maximum number of construction vessels used over the longest construction period, with full build out within the array area assuming the maximum number of structures.

10.11.71 Based on RNLI data assessed in the NRA, an average of 84 incidents per year occurred with the provision of a response in study area from 2013 to 2022. Based on incident rates observed arising from the construction or operational of other wind farms as detailed in the NRA, the likely incident rates from Dublin Array will unlikely to increase this notably (see further detail in the NRA).

10.11.72 Furthermore the vessels associated with the construction activity of offshore infrastructure will form an additional resource for use during SAR operations, noting that such vessels will likely be suitably equipped, and well placed to respond to nearby (i.e., offshore) incidents, including any associated with the shallows of the Kish and Bray Banks.

10.11.73 Emergency Response Cooperation Planning (in the form of appropriate plan(s)) will be developed in discussion with relevant SAR bodies notably the IRCG, and this will include cooperation procedures in relation to self-help resources. IRCG stated during consultation that a SAR checklist should be agreed with IRCG post consent.

10.11.74 It is noted that, as raised during consultation, recreational vessels may choose to visit the array area out of curiosity, and that this may lead to increased incidents. The potential and procedures for any such incidents will be discussed with the IRCG as part of the cooperation procedures.

10.11.75 Project Design Features and Avoidance and Preventative Measures of relevance are considered as being (noting the full list is provided in Section 10.10):

- Appropriate vessel health, safety and certification;
- Emergency Response Cooperation Planning;

- Marine pollution contingency planning;
- Marine coordination;
- Circulation of information, e.g. to relevant Leisure Almanacs;
- Observe SAR lanes between discrete rows of wind farm structures of a minimum of 500 m width on a consistent line of orientation; and
- Use of a temporary guard vessel where identified by risk assessment.

10.11.76 Noting limited anticipated effects on baseline incident rates and the available self-help resources associated with project vessels, frequency of occurrence is assessed as being extremely unlikely. Severity of consequences is assessed as being serious given potential for loss of life in a marine incident. On this basis the impact is determined to be Tolerable.

10.11.77 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.

Proposed Mitigation

10.11.78 The proposed mitigations for this impact are the following:

- Array design with consideration to SAR access in consultation with IRCG and RNLI, including consideration of MGN 654 (including the commitment to ensuring availability of 500 m SAR lanes); and
- Establish and agree with IRCG a Cooperation agreement in terms of emergency response procedures.

Residual effect assessment

10.11.79 In consideration of the additional measures detailed above (paragraph 10.11.78) are implemented, the residual impact is considered as being Tolerable with Mitigation and ALARP. Therefore, no significant adverse residual effects have been predicted.

10.12 Environmental assessment: operational phase

10.12.1 This section assesses the impacts to shipping and navigation users that may arise as a result of the operation and maintenance of the offshore infrastructure associated with Dublin Array.

Impact 8: Displacement of vessels due to presence of wind farm infrastructure leading to increased encounters and collision risk

10.12.2 The presence of the completed structures, or associated maintenance operations may lead to displacement of baseline traffic during the operational phase. Any such deviations may lead to increases in vessel density in certain areas around the array area, resulting in increased encounters and potentially vessel to vessel collision risk.

10.12.3 As per Table 7, the Maximum Design Option for this impact has been identified as the maximum number of structures built out over the entire array area, given that this will maximise displacement.

Commercial Vessels

10.12.4 Based on the vessel traffic data studied, a total of nine main routes utilised by commercial vessels were identified (see Figure 5). Experience of other operational UK wind farm projects shows that commercial vessels will deviate to avoid the structures. Therefore in consideration two of the nine main routes identified will require deviation as a result of the array area. deviations established during the construction phase around the buoyed construction area will likely be well established by the operational phase. It is expected that vessels will likely to remain (in the majority) on these established deviations even after the buoyed construction area is removed.

10.12.5 Expected deviations will be negligible, and are considered to represent minor shifts as opposed to large scale changes. This will be due to the majority of commercial vessels in the area already avoiding the shallow waters associated with the Kish and Bray Banks. During the consultation it was confirmed that commercial vessels will not choose to transit through the array area.

10.12.6 Details of the offshore infrastructure will be promulgated in advance, and structure positions will be displayed on nautical charts ensuring vessels can passage plan to account for the structures.

10.12.7 Based on the quantitative collision assessment undertaken in the NRA, a vessel on a main route is expected to be involved in a collision approximately once every 32 years. While relatively high, the proposed project was assessed as having limited impact on this projection. The collision risk is predicted to increase by less than 1% within the study area as a result of the proposed project. This is due to the limited deviations which are all expected to occur in vicinity of the array area. The majority of collision risk identified were associated with the area within the Dublin Port limits where routeing is unlikely to be affected.

10.12.8 It is also noted that following consultation with Irish Lights, it is concluded that there is not likely to be any impacts upon vessel access to the Kish Lighthouse located to the north of the array area. For assurance Irish Lights requested advance engagement from the Applicant on any project vessel activity occurring within 500 m of the centre point of the Kish Tower.

Available Searoom – South West Corner

10.12.9 The shipping channel at the south west corner of the array area was raised during consultation as an area of concern given that vessels could be "squeezed" at this location. This would arise due to the shallow sea area to the west, which may give increased encounters. Assessment of the vessel traffic data collected showed encounters in this area were lower than the surrounding areas to the north and south (despite sea room being lower). There will be reflective number of vessels being on alert when passing this area noting the nearby shallows. Further, assessment showed that typically, the maximum number of vessels concurrently passing between the southwest corner and the shallows to the west was one to two, and there will be sufficient searoom to accommodate this traffic within the narrower route.

Fishing and Recreation

10.12.10 The baseline vessel traffic data shows that, smaller vessels (fishing and recreation) do transit over the Kish and Bray Banks. This aligned with consultation output, with consultees confirming recreational vessels (including dive boats and vessels participating in races) and fishing vessels transit the banks. Such third party transits over the banks will not be excluded, advisory safe passing distances will be utilised around vessels engaged when required during maintenance operations. This will aim to ensure the safety of all party vessels. Any such areas will be temporary, and limited spatially to the waters surrounding the operations, and as such no notable displacement for smaller vessels accessing the banks is anticipated.

10.12.11 Minimum WTG spacing of 944 m (see Table 7) will be sufficient to accommodate smaller vessel transits through the structures should such vessels choose to do so.

10.12.12 Project Design Features and Avoidance and Preventative Measures of relevance are considered as being (noting the full list is provided in Section 10.10):

- Charting of infrastructure;
- Emergency Response Cooperation Planning;
- Circulation of information (including via Notice to Mariners); and
- Circulation of information to relevant Leisure Almanacs.

10.12.13 Given deviations/displacement will be expected, the frequency of this impact occurring will have a reasonably probability. The deviations are anticipated to be minor and will not lead to a notable increase in encounters (and hence collision risk). The severity of consequence are considered to be negligible. On this basis the impact is determined to be Broadly Acceptable and ALARP.

10.12.14 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.

Proposed Mitigation

10.12.15 Given the impact is determined to be broadly acceptable and ALARP, no further mitigation beyond those presented in Table 8 are necessary.

Residual effect assessment

10.12.16 Given no additional mitigation is necessary to that already identified in Table 8, the residual impact is determined to be Broadly Acceptable and ALARP. Therefore, no significant adverse residual effects have been predicted.

Impact 9: Displacement of historic recreational sailing races

10.12.17 The presence of the completed structures, or associated maintenance operations has potential to displace baseline traffic during the operational phase. This may lead to displacement of recreational races that have historically traversed the Kish and Bray Banks and around the bank, which may lead to increased encounter and collision rates as the recreational vessels are displaced to adjacent areas.

10.12.18 As per Table 8, the Maximum Design Option for this impact was identified as the maximum number of structures built out over the entire array area, with advisory safe passing distances utilised around vessels engaged in maintenance work, causing maximum displacement.

10.12.19 The vessel traffic data studied and race route data provided by ISORA showed that recreational races utilise the area, including across or in proximity to the Kish and Bray Banks.

10.12.20 Access to the array area will not be restricted, however advisory safe passing distances will be utilised around vessels engaged maintenance operations when required. Any such advisory areas will be temporary, and limited spatially to the waters surrounding the operations the frequency at which advisory safe passing distances will be used during the operational phase will likely to be significantly less than during the construction phase. Structure positions will be displayed on nautical charts, and relevant details including any maintenance operations utilising advisory safe passing distances. This information will be provided to relevant recreational organisations and race organisers to ensure race planning will take Dublin Array into consideration.

10.12.21 WTG spacing of 944 m (see Table 7) will be sufficient to accommodate typical recreational transits.

10.12.22 Project Design Features and Avoidance and Preventative Measures of relevance are considered as being (noting the full list is provided in Section 10.10):

- Charting of infrastructure;
- Emergency Response Cooperation Planning;
- Circulation of information, e.g. to relevant Leisure Almanacs; and

- Details associated with any restrictions including any advisory safe passing distances will be provided to relevant recreational organisations and race organisers to ensure they can plan races accordingly, and liaison will be ongoing to ensure minimal disruption.

10.12.23 Given deviations/displacement will be expected, the frequency of this impact occurring will have a reasonable probability. The deviations are anticipated to be minor and will not lead to a notable increase in encounters (and hence collision risk). The severity of consequence are considered to be negligible. On this basis the impact is determined to be Broadly Acceptable and ALARP.

10.12.24 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.

Proposed Mitigation

10.12.25 Given the impact is determined to be broadly acceptable and ALARP, no further mitigation beyond those presented in Table 8 are necessary.

Residual effect assessment

10.12.26 Given no additional mitigation is necessary to that already identified in Table 8, the residual impact is determined to be Broadly Acceptable and ALARP. Therefore, no significant adverse residual effects have been predicted.

Impact 10: Increased collision risk from O&M vessels

10.12.27 The vessels associated with the operation of the offshore infrastructure may lead to increased collision risk to third party vessels. Collision risk to third-party vessels may increase potential either Dublin Array vessel will be transiting to or from O&M base, or whilst vessel will be engaged in active maintenance work.

10.12.28 As per Table 7, the Maximum Design Option for this impact will be maximum number of vessels in use over the longest operational period, given this will maximise potential encounters with third party vessels.

10.12.29 There will be three daily CTV trips to the array area with the addition of up to 100 vessels trips to support scheduled routine and non-routine maintenance per year during the operational phase.

10.12.30 All project vessels will comply with COLREGS (IMO, 1972/77) and SOLAS (IMO, 1974) regulations, and associated movements will be managed via central marine coordination. This will limit potential interactions whilst in transit with third party vessels. In terms of vessels engaged in active maintenance work, advisory safe passing distances may be utilised around vessels engaged in sensitive operations, including any involving a RAM vessel. This will make it clear to third party traffic the areas which should be avoided to ensure collision risk is minimised.

10.12.31 Details of any maintenance works including that associated with the cables would be promulgated prior to commencement, ensuring third party vessels were aware of the works in advance.

10.12.32 Project Design Features and Avoidance and Preventative Measures of relevance are considered as being (noting the full list is provided in Section 10.10):

- Compliance with COLREGs and SOLAS regulations;
- Advisory safe passing distances;
- Appropriate vessel health, safety and certification;
- Emergency Response Cooperation Planning;
- Marine coordination; and
- Circulation of information, e.g. to relevant Leisure Almanacs.

10.12.33 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.

10.12.34 Given the existing measures in place to manage project vessel traffic, and noting reduced traffic when compared to the construction phase, the frequency of occurrence for this impact is considered to be extremely unlikely, with severity of consequence considered to be moderate. On this basis the impact is determined to be Broadly Acceptable.

Proposed Mitigation

10.12.35 Given the impact is determined to be broadly acceptable and ALARP, no further mitigation beyond those presented in Table 8 are necessary.

Residual effect assessment

10.12.36 Given no additional mitigation is necessary to that already identified in Table 8, the residual impact is determined to be Broadly Acceptable and ALARP. Therefore, no significant adverse residual effects have been predicted.

Impact 11: Allision with wind farm infrastructure from vessel under power

10.12.37 The presence of completed structures during the operational phase create an allision risk to passing third party vessels whilst under power.

10.12.38 As per Table 7, the Maximum Design Option for this impact has been identified as being the maximum number of structures built out over the entire site, and assuming the largest possible dimensions for Option A (i.e., the smallest size of WTG).

10.12.39 It is likely that by the commencement of the operational phase, vessels will already be familiar with the locations of the structures they will also be displayed on nautical charts. Operational mitigations will also be in place, in particular lighting and marking which will be agreed with Irish lights in consideration of the relevant guidance.

Commercial Vessels

10.12.40 As noted commercial vessels avoid the Kish and Bray Banks, an allision from such a vessel will most likely occur with a peripheral structure. It is likely that due to the shallow water depths, a larger commercial vessel may ground on the banks before making contact with a structure. Based on the quantitative allision modelling undertake within the NRA, a powered allision from a commercial vessel utilising a main route was estimated to occur once per 500,967 years. This is considered low risk, and is indicative of the majority of vessels already avoiding the banks. It is noted that the greatest risk was observed to be associated with the WTG on the southwest corner, however the individual risk to this structure was still considered low.

Fishing and Recreation

10.12.41 Smaller vessels such as fishing and recreation are known to cross the banks, it is not planned to place any restrictions on such transits. For the purpose of future WTG maintenance a advisory safe passing distances will utilised around vessels There is potential for recreational vessels choosing to visit the array area out of curiosity.

10.12.42 There is potential that a fishing or recreational vessel may allide with a structure internal to the array. Based on quantitative allision modelling undertaken within the NRA for fishing vessels, an allision was estimated to occur once every 17 years.

10.12.43 Minimum spacing of 944 m (see Table 7) is considered sufficient to allow safe navigation through the array for fishing and recreational vessels should they choose to transit through, and it is noted that there will be a minimum blade clearance of 28 m above MHWS.

10.12.44 Project Design Features and Avoidance and Preventative Measures of relevance are considered as being (noting the full list is provided in Section 10.10):

- Charting of infrastructure;
- Compliance with MGN 654 with respect to WTG design and construction;
- Emergency Response Cooperation Planning;
- Lighting and marking;
- Marine pollution contingency planning;
- Minimum WTG blade clearance; and
- Circulation of information, e.g. to relevant Leisure Almanacs.

10.12.45 Given the low likelihood of an allision, and noting the Project Design Features and Avoidance and Preventative Measures in place, frequency of occurrence is assessed as being extremely unlikely, with severity of consequences considered to be serious. On this basis the impact is determined to be Tolerable.

10.12.46 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.

Proposed Mitigation

10.12.47 The proposed mitigations for this impact are the following:

- Procedures for management of AtoN to be discussed with Irish Lights.

Residual effect assessment

10.12.48 Assuming that the additional measures detailed above are implemented, the residual impact is considered as being Tolerable with Mitigation and ALARP. Therefore, no significant adverse residual effects have been predicted.

Impact 12: Allision with wind farm infrastructure from vessel Not Under Command

10.12.49 The presence of completed structures during the operational phase create an allision risk to passing third party vessels whilst NUC (i.e., drifting).

10.12.50 As per Table 7, the Maximum Design Option for this impact was identified as being the maximum number of structures built out over the entire site, and assuming the largest possible dimensions (Option A, the smallest size of WTG).

Commercial Vessels

10.12.51 Given commercial vessels are already observed to avoid the Kish and Bray Banks, an allision from such a vessel is most likely to occur with a peripheral structure. It should be considered that given the shallow water depths, a drifting commercial vessel may ground on the banks before alliding with a structure. Based on the quantitative allision modelling undertaken within the NRA, a drifting allision from a commercial vessel utilising a main route was estimated to occur once per 252 years. The risk will be associated with the WTGs on the south west periphery, due to the dominant flood tidal direction and traffic levels in this area.

Fishing and Recreation

10.12.52 Smaller vessels are observed to transit the banks, and therefore a drifting fishing or recreational vessel may allide with a structure internal to the array. Any such allisions are likely to be a lower speed and therefore lower impact given vessel size and likely drifting speed.

10.12.53 In the event that a vessel starts to drift towards a structure within the array area, either internally or externally, the vessel will initiate its own procedures for such an event. This may involve dropping anchor or the use of thrusters depending on availability and power supply. It is also noted that any Dublin Array project vessels on site may also be able to provide assistance in liaison with IRCG and as required under SOLAS obligations (IMO, 1974).

10.12.54 Project Design Features and Avoidance and Preventative Measures of relevance are considered as being (noting the full list is provided in Section 10.10):

- Appropriate vessel health, safety and certification (including SOLAS (IMO, 1974) compliance);
- Charting of infrastructure;
- Emergency Response Cooperation Planning;
- Marine pollution contingency planning;
- Minimum WTG blade clearance; and
- Circulation of information, e.g. to relevant Leisure Almanacs.

10.12.55 Given the low likelihood of an allision, and noting the potential for availability of self help resources, frequency of occurrence is assessed as being extremely unlikely, with severity of consequences considered to be serious. On this basis the impact is determined to be Tolerable.

10.12.56 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.

Proposed Mitigation

10.12.57 The proposed mitigations for this impact are the following:

- Cooperation agreements with IRCG in terms of emergency response procedures.

Residual effect assessment

10.12.58 Assuming that the additional measures detailed above are implemented, the residual impact is considered as being Tolerable with Mitigation and ALARP. Therefore, no significant adverse residual effects have been predicted.

Impact 13: Increased grounding / under keel risk to passing vessels

10.12.59 The presence of offshore infrastructure associated with the project could reduce navigable water depths, leading to an increase in under keel clearance risk to passing traffic.

10.12.60 The foundations types proposed (see Project Description Chapter, and Table 7) are not anticipated to pose an under keel risk given that they do not require anchor / mooring lines or notably increase in width below the water line. Further, it is considered that the structures may be of benefit to grounding risk within the array area given they will form an additional AtoN over the shallows of the Kish and Bray Banks.

10.12.61 There may be increased under keel risks associated with any external protection installed over the subsea cables. On this basis and as per Table 7, the Maximum Design Option for this impact has been identified as being maximum cable build out and assuming the maximum potential height and maximum required amount of external protection including at cable crossings.

10.12.62 Areas where under keel risk is of concern will be identified as part of the cable burial risk assessment, however the greatest risk is likely to be either nearshore or in proximity to the Kish and Bray Banks given the shallow water depths in these areas, and as such smaller vessels capable of transiting shallower depths are likely to be most at risk.

10.12.63 The marine traffic data collected indicated that while all vessels tended to avoid the shallowest areas of the Offshore ECC, fishing and recreational vessels did transit in proximity to the landfall. This will be considered within the cable burial risk assessment, and consideration will also be given to any input received from fishing and recreational stakeholders. To identify areas of concern, the Applicant will apply the approach required under MGN 654 (MCA, 2021) whereby water depths relative to chart datum will not be reduced by more than 5% without consulting with the MSO and Irish Lights. This approach aligns with the wording of the draft DOT guidance (see detail in Section 10.2).

10.12.64 The cables will be displayed on nautical charts, and details will also be circulated including to the relevant leisure almanacs.

10.12.65 Project Design Features and Avoidance and Preventative Measures of relevance are considered as being (noting the full list is provided in Section 10.10):

- Cable burial risk assessment;
- Charting of infrastructure; and
- Circulation of information, e.g. to relevant Leisure Almanacs.

10.12.66 Noting the promulgation of information that will be undertaken and a cable burial risk assessment process completed in consultation with Irish Lights and MSO, frequency of occurrence is assessed as being extremely unlikely. Severity of consequence is considered to be minor. On this basis the impact is determined to be Broadly Acceptable and ALARP.

10.12.67 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.

Proposed Mitigation

10.12.68 Given the impact is determined to be broadly acceptable and ALARP, no further mitigation beyond those presented in Table 8 are necessary.

Residual effect assessment

10.12.69 Given no additional mitigation is necessary to that already identified in Table 8, the residual impact is determined to be Broadly Acceptable and ALARP. Therefore, no significant adverse residual effects have been predicted.

Impact 14: Increased anchor snagging risk from presence of subsea cables

10.12.70 The presence of subsea cables (export and inter array) associated with the project presents a risk of interaction with vessel anchors.

10.12.71 The Maximum Design Option for this impact has been identified as being the maximum cable build out. Burial depths and any external protection will be determined via the cable burial risk assessment.

10.12.72 There are various different options which could lead to cable interaction with a vessel anchor, including:

- A vessel drops anchor over a subsea cable in an emergency;
- The deployed anchor of a vessel fails to embed, and the vessel subsequently drags anchor over a subsea cable;
- A vessel departs an anchorage but neglects to raise anchor and subsequently drags anchor over a subsea cable;
- The anchor is deployed over a subsea cable negligently, with the vessel unaware of the subsea cable presence, or the vessel incorrectly judges the position/location of the subsea cable; or
- The anchor is deployed over a subsea cable accidentally via human error or mechanical failure.

10.12.73 The marine traffic data collected showed anchoring within the study area was primarily associated with the charted anchorage associated with Dublin Port (Dublin Anchorage), and located within Dublin Bay. Dublin anchorage is often at capacity during 2020, vessels have been observed to anchor outside of the Dublin port limits, further south down the coast (noting that this activity was reflected within the vessel traffic data studied). Such anchoring may therefore interact with the Offshore ECC.

10.12.74 In terms of the potential for emergency anchoring, the highest risk areas are considered to be those associated with the commercial traffic crossing the Offshore ECC (Routes 3 and 7 as per Figure 5). Noting the hazards posed by the shallow water depths, and other vessels given traffic volumes, a vessel in trouble is likely to drop anchor to avoid drifting into danger.

10.12.75 All cables will be displayed on nautical charts and should therefore be accounted for by vessels seeking to anchor (including in an emergency). Baseline traffic patterns (including in relation to emergency anchoring risk) and likely anchor sizes will also be considered as part of the cable burial risk assessment to ensure protection is appropriate.

10.12.76 In the event that the anchor from a large vessel interacts with a cable, a snagging or anchor damage is unlikely, with damage to the cable being the most likely outcome. However, a smaller vessel may at risk of snagging, which may lead to loss of stability of the vessel, and capsize as a worst case. While no anchoring from smaller vessels (i.e., fishing and recreation) was observed within the marine traffic data, such anchoring may still occur noting the prominence of recreational activity in particular within the area.

10.12.77 Project Design Features and Avoidance and Preventative Measures of relevance are considered as being (noting the full list is provided in Section 10.10):

- Cable burial risk assessment;
- Charting of infrastructure; and
- Circulation of information, e.g. to relevant Leisure Almanacs.

10.12.78 Given the low likelihood of a snagging and taking into account the cable burial risk assessment, frequency of occurrence is assessed as being negligible. Severity of consequences is considered to be serious. On this basis the impact is determined to be Broadly Acceptable.

10.12.79 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.

Proposed Mitigation

10.12.80 Given the impact is determined to be broadly acceptable and ALARP, no further mitigation beyond those presented in Table 8 are necessary.

Residual effect assessment

10.12.81 Given no additional mitigation is necessary to that already identified in Table 8, the residual impact is determined to be Broadly Acceptable and ALARP. Therefore, no significant adverse residual effects have been predicted.

Impact 15: Reduction of emergency response resource capabilities

10.12.82 The construction of the offshore infrastructure may lead to an increase in baseline incident rates given the increased number of vessels required during the operational phase. This has potential to impact upon emergency response resources capability to respond to all incidents that arise. and the infrastructure may impact upon access to the array area for SAR resources

10.12.83 As presented in Table 7, the Maximum Design Option for this impact has been identified as the maximum number of project vessels used during the operational period, and full build out within the array area assuming the maximum number of structures.

10.12.84 Based on RNLI data assessed within the NRA, an average of 84 incidents per year were responded to within the study area from 2013 to 2022. Based on incident rates observed at operational wind farms, the likely incident rates associated with the offshore infrastructure are unlikely to increase this notably as detailed in the NRA, noting that any increase over baseline within the operational phase will likely be lower than during construction.

10.12.85 The vessels associated with the operational phase of Dublin Array will provide an additional resource for use during SAR operations, noting that such vessels will likely be well equipped, and well placed to respond to nearby (i.e., offshore) incidents, including any associated with the shallows of the Kish and Bray Banks.

10.12.86 Emergency Response Cooperation Planning (in the form of appropriate plan(s)) will be developed in discussion with relevant SAR bodies, notably the IRCG. IRCG stated during consultation that a SAR checklist[9] will be agreed IRCG.

10.12.87 The three WTG options and associated layout under consideration will all maintain a single line of orientation as required under MGN 654 (MCA, 2021), to facilitate SAR access. Draft specific national guidance issued by DOT for consultation is currently under review (see Section 10.2) and may result in the requirement for supporting documentation (i.e., a Safety Justification) to be undertaken for the selected layout once finalised. This would be specifically for the IRCG's own access assessment and to ensure requirements within the guidance are complied with. A Safety Justification would normally include:

- Background of the layout design process and details of the site constraints that led to the layout design.
- Vessel traffic assessment, to show likely surface navigation patterns relative to the layout, noting that transits through the layout would be expected to be a low frequency occurrence and from small manoeuvrable vessels e.g., recreational vessels.
- Consideration of SAR assets that could respond to an incident, noting presence of RNLI stations at Dún Laoghaire and Wicklow mean local surface based assets are likely to be available.
- Consideration of baseline incident rates within the array area (which are low based on the incident data studied in the NRA.
- Detailing of the additional resources associated with Dublin Array which may be able to assist in liaison with IRCG the event of an incident.

[9] A SAR checklist is used by developers to record decisions made. The SAR checklist is intended to be a live document and will apply throughout the lifecycle of the development. It is anticipated that the checklist will be used by IRCG to ensure actions agreed pre-consent and pre-construction, are correctly implemented.

- Available SAR Access lanes for use by SAR helicopters as per the draft Department of Transport Marine Navigational Safety & Emergency Response Risk of Offshore Renewable Energy Installations and MGN 654 (MCA, 2021).
- Detailing of the additional SAR measures and mitigations that will be applied in liaison with the IRCG as part of the SAR Checklist process.

10.12.88 Project Design Features and Avoidance and Preventative Measures of relevance are considered as being (noting the full list is provided in Section 10.10):

- Compliance with MGN 654 with respect to WTG design and construction;
- Emergency Response Cooperation Planning;
- Marine pollution contingency planning;
- Marine coordination;
- Circulation of information;
- Observe SAR lanes between discrete rows of wind farm structures of a minimum of 500 m width on a consistent line of orientation; and
- Circulation of information to relevant Leisure Almanacs.

10.12.89 Noting limited anticipated effects on baseline incident rates and the available self-help resources associated with the project vessels, frequency of occurrence is assessed as being extremely unlikely. Severity of consequences is assessed as being serious given potential for loss of life in a marine incident. On this basis the impact is determined to be Tolerable.

10.12.90 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.

Proposed Mitigation

10.12.91 The proposed mitigations for this impact are the following:

- Array design with consideration to SAR access in consultation with IRCG and RNLI, including consideration of MGN 654 (including the commitment to ensuring availability of 500m SAR lanes); and
- Cooperation agreements with IRCG in terms of emergency response procedures.

Residual effect assessment

10.12.92 Assuming that the additional measures detailed above are implemented, the residual impact is considered as being Tolerable with Mitigation and ALARP. Therefore, no significant adverse residual effects have been predicted.

10.13 Environmental assessment: decommissioning phase

10.13.1 As referenced in the Project Description, the Decommissioning and Restoration Plan (Volume 7, Appendix 2), including the three rehabilitation schedules attached thereto, describes how the Applicant proposes to rehabilitate that part of the maritime area, and any other part of the maritime area, adversely affected by the permitted maritime usages that are the subject of the MACs (Reference Nos. 2022-MAC-003 and 004 / 20230012 and 240020).

10.13.2 It is based on the best scientific and technical knowledge available at the time of submission of this planning application. However, the lengthy passage of time between submission of the application and the carrying out of decommissioning works (expected to be in the region of 35 years as defined in the MDO) gives rise to knowledge limitations and technical difficulties. Accordingly, the Decommissioning and Restoration Plan will be kept under review by the Applicant as the project progresses, and an alteration application will be submitted if necessary. In particular, it will be reviewed having regard to the following:

- The baseline environment at the time rehabilitation works are proposed to be carried out,
- What, if any, adverse effects have occurred that require rehabilitation,
- Technological developments relating to the rehabilitation of marine environments,
- Changes in what is accepted as best practice relating to the rehabilitation of marine environments,
- Submissions or recommendations made to the Applicant by interested parties, organisations and other bodies concerned with the rehabilitation of marine environments, and/or
- Any new relevant regulatory requirements.

10.13.3 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, however the general principle for decommissioning and of particular relevance to shipping and navigation 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 16: Displacement of vessels leading to increased encounters and collision risk

10.13.4 The presence of the buoyed decommissioning area, structures, and associated vessel operations may lead to displacement of baseline traffic. Any such deviations may lead to increases in vessel density in certain areas around the array area, resulting in increased encounters and potentially vessel to vessel collision risk.

10.13.5 As per Table 7, the Maximum Design Option for this impact has been identified as the maximum number of structures built out over the entire array area, given that this will maximise necessary decommissioning operations and hence displacement.

10.13.6 In terms of commercial traffic on main routes, it is likely that commercial vessels will maintain the deviations already established during the operational phase. The presence of the buoyed decommissioning area may result in additional deviations dependent on the positions of the buoys, however any such deviations are likely to be minor and will be in line with those during the construction phase. Regardless, details of the decommissioning will be promulgated in advance, ensuring vessels can passage plan to account for the structures and associated decommissioning work.

10.13.7 Third party transits over the banks will not be excluded (including during decommissioning), however advisory safe passing distances may be utilised around vessels engaged in decommissioning operations to ensure the safety of both project and third-party vessels is maintained. Any such areas will be temporary, and limited spatially to the waters surrounding the operations, and as such no notable displacement for smaller vessels accessing the banks is anticipated during decommissioning.

10.13.8 It is considered most likely that piled foundations will be cut below seabed level, and as such there will be no displacement effect once decommissioning is completed.

10.13.9 Project Design Features and Avoidance and Preventative Measures of relevance are considered as being (noting the full list is provided in Section 10.10):

- Charting of infrastructure;
- Emergency Response Cooperation Planning; and
- Circulation of information, e.g. to relevant Leisure Almanacs.

10.13.10 Given deviations/displacement will occur, the frequency of occurrence of this impact is considered to be reasonably probable. However, given deviations are anticipated to be minor and not expected to lead to a notable increase in encounters, the severity of consequence considered to be to be negligible. On this basis the impact is determined to be Broadly Acceptable and ALARP.

10.13.11 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.

Proposed Mitigation

10.13.12 Given the impact is determined to be broadly acceptable and ALARP, no further mitigation beyond those presented in Table 8 are necessary.

Residual effect assessment

10.13.13 Given no additional mitigation is necessary to that already identified in Table 8, the residual impact is determined to be Broadly Acceptable and ALARP. Therefore, no significant adverse residual effects have been predicted.

Impact 17: Temporary displacement of historic recreational sailing races

10.13.14 The presence of the buoyed decommissioning area, structures, and associated vessel operations have the potential to displace recreational races that have historically utilised the area over and around the Kish and Bray Banks. Changes in race patterns have the potential to increase encounter and collision rates.

10.13.15 As per Table 7, the Maximum Design Option for this impact has been identified as the maximum number of structures built out over the entire array area, given that this will maximise necessary decommissioning operations and hence displacement.

10.13.16 Advisory safe passing distances may be deployed around vessels engaged in decommissioning operations to ensure the safety of both project and third-party vessels is maintained. Any such areas will be temporary, and limited spatially to the waters surrounding the operations, and details associated with the decommissioning including any advisory safe passing distances will be provided to relevant recreational organisations and race organisers to ensure they can plan races accordingly.

10.13.17 If piled foundations are utilised, it is intended that piles will be cut below the seabed, and if suction buckets are used that these will be removed in their entirety. Therefore, no displacement effect will be present following decommissioning.

10.13.18 Project Design Features and Avoidance and Preventative Measures of relevance are considered as being (noting the full list is provided in Section 10.10):

- Charting of infrastructure;
- Emergency Response Cooperation Planning;
- Circulation of information, e.g. to relevant Leisure Almanacs; and
- Details associated with any restrictions including any advisory safe passing distances will be provided to relevant recreational organisations and race organisers to ensure they can plan races accordingly, and liaison will be ongoing to ensure minimal disruption.

10.13.19 Given historic races are known to intersect the array area, the frequency of occurrence for this impact is considered to be reasonably probable. However, given limited expected effects on encounter rates, severity of consequence is considered to be negligible. On this basis the impact is determined to be Broadly Acceptable.

10.13.20 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.

Proposed Mitigation

10.13.21 Given the impact is determined to broadly acceptable and ALARP, no further mitigation beyond those presented in Table 8 are necessary.

Residual effect assessment

10.13.22 Given no additional mitigation is necessary to that already identified in Table 8, the residual impact is determined to be Broadly Acceptable and ALARP. Therefore, no significant adverse residual effects have been predicted.

Impact 18: Increased collision risk from decommissioning vessels

10.13.23 The vessels associated with the decommissioning may lead to increased collision risk to third party vessels. Collision risk to third-party vessels could increase either whilst a project vessel in transiting to or from a decommissioning port, or whilst the project vessel is engaged in active decommissioning work.

10.13.24 As per Table 7, the Maximum Design Option for this impact has been identified as being the maximum number of project vessels utilised over the longest potential decommissioning period, given this will maximise potential encounters with third party vessels.

10.13.25 All project vessels will comply with COLREGs (IMO, 1972/77) and SOLAS (IMO, 1974) regulations, and associated movements will be managed via central marine coordination. This will limit potential interactions with third party vessels whilst in transit. Advisory safe passing distances utilised around vessels engaged in sensitive operations will make it clear to third party traffic the areas which should be avoided to ensure collision risk is minimised. Details of decommissioning operations will also be promulgated to maximise awareness of the works to third party traffic.

10.13.26 Project Design Features and Avoidance and Preventative Measures of relevance are considered as being (noting the full list is provided in Section 10.10):

- Advisory safe passing distances;
- Appropriate vessel health, safety and certification;
- Emergency Response Cooperation Planning;
- Buoyed construction/decommissioning area;

- Marine coordination;
- Circulation of information; and
- Circulation of information to relevant Leisure Almanacs.

10.13.27 Given the existing measures in place to manage project vessel traffic, the frequency of occurrence for this impact is considered to be remote, with severity of consequence considered to be moderate. On this basis the impact is determined to be Tolerable.

10.13.28 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.

Proposed Mitigation

10.13.29 The proposed mitigations for this impact are the following:

- Entry/exit points to the array area for vessels associated with decommissioning;
- Designated routes to/from array area for vessels associated with decommissioning which avoid crossing main routes at the southwest corner of the site; and
- Mandatory carriage of AIS for all vessels associated with decommissioning.

Residual effect assessment

10.13.30 Assuming that the additional measures detailed above are implemented, the residual impact is considered as being Tolerable with Mitigation and ALARP. Therefore, no significant adverse residual effects have been predicted.

Impact 19: Allision with wind farm infrastructure from vessel under power

10.13.31 The presence of partially decommissioned structures or structures yet to begin decommissioning creates an allision risk to passing third party vessels whilst under power.

10.13.32 As per Table 7, the Maximum Design Option for this impact has been identified as being the maximum number of structures built out over the entire site, and assuming the smallest size of WTG.

10.13.33 As for the construction and operational phases, the periphery structures are still considered to be those most at risk of a commercial vessel allision during decommissioning given such traffic avoids the Kish and Bray Banks, noting that a larger commercial vessel may ground on the banks before making contact with a structure. However, it is likely that by the commencement of the decommissioning phase, vessels will already be familiar with the offshore infrastructure, notably the locations of the structures (which will also be displayed on nautical charts), noting that the promulgation of information of the details of the decommissioning phase will further raise awareness.

10.13.34 Unlike larger commercial vessels, smaller vessels (fishing and recreation), are known to cross the banks, and there will be no restrictions put in place on such transits as a result of the decommissioning. Advisory safe passing distances may be utilised around vessels engaged in sensitive operations, however transits through the array area are still expected during decommissioning. On this basis, there is potential that a fishing or recreational vessel may allide with a structure internal to the array during the decommissioning phase.

10.13.35 During the decommissioning phase, operational mitigations (most notably lighting and marking) may no longer be active. However, other mitigations will be in place, including promulgation of information, charting of structures, and temporary lighting and marking (including buoyage), details of which will be discussed and agreed with Irish Lights. Where identified as necessary via risk assessment considering the other mitigations in place, a guard vessel may also be used.

10.13.36 If piled foundations are utilised, it is intended that piles will be cut below the seabed, and if suction buckets are used that these will be removed in their entirety. Therefore, no allision risks will be present following decommissioning.

10.13.37 Project Design Features and Avoidance and Preventative Measures of relevance are considered as being (noting the full list is provided in Section 10.10):

- Advisory safe passing distances;
- Charting of infrastructure;
- Emergency Response Cooperation Planning;
- Buoyed construction/decommissioning area;
- Lighting and marking;
- Marine pollution contingency planning;
- Minimum WTG blade clearance;
- Circulation of information, e.g. to relevant Leisure Almanacs; and
- Use of a temporary guard vessel where identified by risk assessment.

10.13.38 Given the low likelihood of an allision, and noting the Project Design Features and Avoidance and Preventative Measures in place, frequency of occurrence is assessed as being negligible, with severity of consequences considered to be serious. On this basis the impact is determined to be Broadly Acceptable.

10.13.39 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.

Proposed Mitigation

10.13.40 Given the impact is determined to broadly acceptable and ALARP, no further mitigation beyond those presented in Table 8 are necessary.

Residual effect assessment

10.13.41 Given no additional mitigation is necessary to that already identified in Table 8, the residual impact is determined to be Broadly Acceptable and ALARP. Therefore, no significant adverse residual effects have been predicted.

Impact 20: Allision with wind farm infrastructure from vessel Not Under Command

10.13.42 The presence of partially decommissioned structures or structures yet to begin decommissioning creates an allision risk to passing third party vessels whilst NUC (i.e., drifting).

10.13.43 As per Table 7, the Maximum Design Option for this impact has been identified as being the maximum number of structures built out over the entire site, and assuming the largest possible dimensions for this option (i.e., the smallest size of WTG).

10.13.44 As for the construction and operational phases, the periphery structures are still considered to be those most at risk of a commercial vessel allision during decommissioning given such traffic avoids the Kish and Bray Banks, noting that a drifting commercial vessel may ground on the banks before making contact with a structure. However, smaller vessels may transit the banks and therefore may allide with an internal structure.

10.13.45 In the event that a vessel starts to drift towards a structure associated within the array area, either internally or externally, the vessel will initiate its own procedures for such an event, which may involve dropping anchor or the use of thrusters (depending on availability and power supply). It is also noted that any project vessels on site associated with the decommissioning may also be able to provide assistance in liaison with IRCG and as required under SOLAS obligations (IMO, 1974).

10.13.46 If piled foundations are utilised, it is intended that piles will be cut below the seabed, and if suction buckets are used that these will be removed in their entirety. Therefore no allision risks will be present following decommissioning.

10.13.47 Project Design Features and Avoidance and Preventative Measures of relevance are considered as being (noting the full list is provided in Section 10.10):

- Advisory safe passing distances;
- Charting of infrastructure;
- Emergency Response Cooperation Planning;
- Buoyed construction/decommissioning area

- Marine pollution contingency planning;
- Minimum WTG blade clearance;
- Circulation of information, e.g. to relevant Leisure Almanacs; and
- Use of a temporary guard vessel where identified by risk assessment.

10.13.48 Given the low likelihood of an allision, and noting the availability of self-help resources, frequency of occurrence is assessed as being negligible, with severity of consequences considered to be serious. On this basis the impact is determined to be Broadly Acceptable.

10.13.49 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.

Proposed Mitigation

10.13.50 Given the impact is determined to broadly acceptable and ALARP, no further mitigation beyond those presented in Table 8 are necessary.

Residual effect assessment

10.13.51 Given no additional mitigation is necessary to that already identified in Table 11.9, the residual impact is determined to be Broadly Acceptable and ALARP. Therefore, no significant adverse residual effects have been predicted.

Impact 21: Port / Anchorage access restrictions

10.13.52 The vessels, ongoing works, partially decommissioned structures or structures yet to begin decommissioning, may lead to restriction of port or anchorage access for third party vessels.

10.13.53 As per Table 7, the Maximum Design Option for this impact has been identified as the maximum number of decommissioning vessels used over the longest decommissioning period, and full build out within the array area assuming the maximum number of structures.

10.13.54 As for the construction phase, there is not considered likely to be any effect on port access from the wind farm structures (regardless of decommissioning status) and associated decommissioning operations themselves, given commercial vessels already avoid the banks, and smaller transits will not be prohibited (noting advisory safe passing distances may be used).

10.13.55 In terms of project vessel transits, the ports to be used during decommissioning are yet to be confirmed. An increase in transits to or from any port utilised associated with project vessel traffic may impact upon third party vessel access. Regardless of ports utilised, all project vessel movements will be managed via marine coordination, and associated details would be promulgated including to relevant port authorities to ensure third party vessels were aware.

10.13.56 Project Design Features and Avoidance and Preventative Measures of relevance are considered as being (noting the full list is provided in Section 10.10):

- Cable burial risk assessment;
- Marine coordination; and
- Circulation of information, e.g. to relevant Leisure Almanacs.

10.13.57 Given the temporary nature of any potential restriction, and noting the Project Design Features and Avoidance and Preventative Measures in place, frequency of occurrence is assessed as being remote, with severity of consequences considered to be minor. On this basis the impact is determined to be Broadly Acceptable.

10.13.58 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.

Proposed Mitigation

10.13.59 Given the impact is determined to broadly acceptable and ALARP, no further mitigation beyond those presented in Table 8 are necessary.

Residual effect assessment

10.13.60 Given no additional mitigation is necessary to that already identified in Table 8, the residual impact is determined to be Broadly Acceptable and ALARP. Therefore, no significant adverse residual effects have been predicted.

Impact 22: Increased grounding / under keel risk to passing vessels

10.13.61 The presence of any partially decommissioned structures or infrastructure left in situ could reduce navigable water depths, leading to an increase in under keel clearance risk to passing traffic.

10.13.62 Prior to decommissioning, an assessment will be undertaken to identify any potential hazards that may occur during the removal of infrastructure, with suitable mitigation then identified. This will include assessment of the option where partially decommissioned structures may pose an under-keel interaction risk.

10.13.63 If piled foundations are utilised, it is intended that piles will be cut below the seabed, and if suction buckets are used that these will be removed in their entirety. Therefore, no under keel interaction risks are anticipated from the WTGs or OSPs following decommissioning.

10.13.64 It is intended that cables and protection will be left in situ, however this will be discussed with the relevant stakeholders (MSO and Irish Lights) in advance of decommissioning to determine whether any risks would remain to shipping and navigation users. Should any areas of concern be identified, any appropriate mitigations beyond those presented in Table 8 will be discussed and agreed with the relevant stakeholders, again being MSO and Irish Lights. Regardless, any disused cables left in situ will be displayed on nautical charts, and details will also be circulated including to the relevant leisure almanacs.

10.13.65 Project Design Features and Avoidance and Preventative Measures of relevance is considered as being (noting the full list is provided in Section 10.10):

- Cable burial risk assessment;
- Charting of infrastructure; and
- Circulation of information, e.g. to relevant Leisure Almanacs.

10.13.66 Noting the promulgation of information that will be undertaken and a cable burial risk assessment process completed in consultation with Irish Lights and MSO, frequency of occurrence is assessed as being extremely unlikely. Severity of consequence is considered to be minor. On this basis the impact is determined to be Broadly Acceptable and ALARP.

10.13.67 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.

Proposed Mitigation

10.13.68 Given the impact is determined to broadly acceptable and ALARP, no further mitigation beyond those presented in Table 8 are necessary.

Residual effect assessment

10.13.69 Given no additional mitigation is necessary to that already identified in Table 8, the residual impact is determined to be Broadly Acceptable and ALARP. Therefore, no significant adverse residual effects have been predicted.

Impact 23: Increased anchor snagging risk from presence of subsea cables

10.13.70 The presence of subsea cables (export, platform connector, inter-array) associated with the project presents a risk of interaction with vessel anchors, noting the potential that cables and protection will be left in situ following the operational phase.

10.13.71 As per Table 7, the Maximum Design Option for this impact has been identified as being the maximum cable build out. Burial depths and any external protection will be determined via the cable burial risk assessment.

10.13.72 It is expected that cables and protection will be left in situ, and as such their continued presence may pose a snagging risk, in particular noting that the protection methods will no longer be monitored.

10.13.73 Interaction with a larger vessel anchor is considered inconsequential post decommissioning, given that the size of anchor of such a vessel means that the likely outcome is damage to the disused cable. However, there is the potential that interaction with the anchor of a smaller vessel may lead to snagging and loss of stability. Discussions will be held with the MSO and Irish Lights prior to decommissioning to determine whether the removal of any sections of cable is necessary on this basis.

10.13.74 Regardless, all disused cables left in situ will be displayed on nautical charts and should therefore be accounted for by vessels seeking to anchor.

10.13.75 Project Design Features and Avoidance and Preventative Measures of relevance are considered as being (noting the full list is provided in Section 10.10):

- Cable burial risk assessment;
- Charting of infrastructure; and
- Circulation of information, e.g. to relevant Leisure Almanacs.

10.13.76 Given the low likelihood of a snagging and taking into account the cable burial risk assessment, frequency of occurrence is assessed as being extremely unlikely. Severity of consequences is considered to be serious. On this basis the impact is determined to be Tolerable.

10.13.77 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.

Proposed mitigation

10.13.78 The proposed additional mitigations for this impact over that presented in Table 8 are as follows:

- Consideration given to consultation with fishing users on cable burial risk assessment; and
- Discussions with Irish Lights and MSO prior to decommissioning to determine any additional mitigation needed for subsea cables post decommissioning.

Residual effect assessment

10.13.79 Assuming that the additional measures detailed above are implemented, the residual impact is considered as being Tolerable with Mitigation and ALARP. Therefore, no significant adverse residual effects have been predicted.

Impact 24: Reduction of emergency response resource capabilities

10.13.80 The decommissioning has potential to increase in baseline incident rates given an increase in vessel numbers and crews / personnel in the area, and the associated decommissioning operations. This may impact upon emergency response resources capability to respond to all incidents that arise, and the partially decommissioned infrastructure may impact upon access to the array area for SAR assets.

10.13.81 As per Table 7, the Maximum Design Option for this impact has been identified as the maximum number of decommissioning vessels used over the longest decommissioning period, and full build out within the array area assuming the maximum number of structures.

10.13.82 Baseline incident rates are low within the study area, and it is considered unlikely that the offshore infrastructure will raise these to a notable level based on incident data from offshore wind farms studied in the NRA. It should also be considered that the vessels associated with the decommissioning of the offshore infrastructure will form an additional resource for use during SAR operations, noting that such vessels will likely be well equipped, and well placed to respond to nearby (i.e., offshore) incidents, including any associated with the shallows of the Kish and Bray Banks.

10.13.83 Emergency Response Cooperation Planning (in the form of appropriate plan(s)) will be developed in discussion with relevant SAR bodies notably the IRCG and other relevant bodies with regards to layout effects on access for SAR assets prior to all structures being removed (noting that once structures are removed the layout will not impact SAR access).

10.13.84 Project Design Features and Avoidance and Preventative Measures of relevance are considered as being (noting the full list is provided in Section 10.10):

- Appropriate vessel health, safety and certification;
- Compliance with MGN 654 with respect to WTG design and construction;
- Emergency Response Cooperation Planning;
- Marine pollution contingency planning;
- Marine coordination;
- Circulation of information, e.g. to relevant Leisure Almanacs;
- Observe SAR lanes between discrete rows of wind farm structures of a minimum of 500 m width on a consistent line of orientation; and
- Use of a temporary guard vessel where identified by risk assessment.

10.13.85 Noting limited anticipated effects on baseline incident rates and the available self-help resources, frequency of occurrence is assessed as being negligible, with severity of consequences is assessed as serious. On this basis the impact is determined to be Broadly Acceptable.

10.13.86 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.

Proposed Mitigation

10.13.87 Given the impact is determined to broadly acceptable and ALARP, no further mitigation beyond those presented in Table 8 are necessary.

Residual effect assessment

10.13.88 Given no additional mitigation is necessary to that already identified in Table 8, the residual impact is determined to be Broadly Acceptable and ALARP. Therefore, no significant adverse residual effects have been predicted.

10.14 Summary of additional impact specific mitigations

10.14.1 A summary of the proposed additional mitigation required to being impacts to within ALARP parameters as per the FSA approach is given in Table 9.

Table 9 Additional Mitigation

Mitigation Measure	Where Addressed
Entry/exit points to the array area for vessels associated with the construction and decommissioning phases and designated routes to/from array area for vessels associated with construction activity which avoid crossing main routes at the south west corner of the site.	VMP (Volume 7, Appendix 6)
Mandatory carriage of AIS for all vessels associated with the proposed project.	VMP (Volume 7, Appendix 6)
Use of temporary lighting on all structures during construction (noting requirements for decommissioning phase will be discussed with Irish Lights prior to commencement of decommissioning activities).	LMP (Volume 7, appendix 5)
Procedures for management of AtoN to be discussed with Irish Lights.	LMP (Volume 7, Appendix 5)
Consultation with Irish Lights with regards to the need for alteration of existing buoyage positions	LMP (Volume 7, Appendix 5)
Consideration given to consultation with fishing users on cable burial risk assessment	
Cooperation agreements with IRCG in terms of emergency response procedures and agreement of a SAR checklist.	
Discussions with Irish Lights and MSO prior to decommissioning to determine any additional mitigation needed for subsea cables post decommissioning.	
Communications Plan with Dublin Port.	
Engagement from the Applicant with Irish Lights on any project vessel activity occurring within 500 m of the centre point of the Kish Tower.	
Array design with consideration to SAR access in consultation with IRCG and RNLI including consideration of MGN 654 (including the commitment to ensuring availability of 500m SAR lanes).	

10.15 Environmental assessment: cumulative effects

10.15.1 This section outlines the Cumulative Effect Assessment on shipping and navigation and takes in account the impacts of the proposed development alone, together with other plans and projects. As outlined in the Cumulative Effect Assessment Methodology Chapter (Volume 2, Chapter 4, Annex A: Offshore Long-list), 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.

10.15.2 As per the NRA, a 50 nm buffer has been applied for the purposes of cumulative screening to capture relevant projects requiring inclusion. This radius ensures projects which may impact on cumulative routeing are captured. Projects further than 50 nm from the array area have been scoped out.

10.15.3 Plans and projects screened in, together with their allocated tier as defined in the Cumulative Effect Assessment Methodology Chapter that reflects their current stage within the planning and development process are presented in Table 10 below. For the purposes of the cumulative impact 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). After construction, Dublin Array will be operational for 35 years.

Projects scoped out

10.15.4 Projects not included in the longlist revised for shipping and navigation include those:

- Outside of 50 nm of the Dublin Array Offshore Wind Farm development boundary;
- Projects that are currently operational with no continued impact that may occur in combination with Dublin Array Offshore Wind Farm;
- Projects where there is low data confidence and so an accurate assessment cannot be made;
- Where there is no temporal overlap; and
- Projects that are currently operational and therefore included in the baseline, which are not assessed as having an ongoing impact.

Offshore Projects for cumulative assessment

10.15.5 The specific projects scoped into this Cumulative Effect Assessment, and the tiers into which they have been allocated are presented in Table 10. The full list of plans and projects considered, including those screened out, are presented in Volume 2, Chapter 4, Annex A: Offshore Long-list.

Table 10 Projects for cumulative assessment

Development type	Project Name	Current Status of Development	Data confidence assessment/ phase	Planned programme
Tier 1				
No screened projects classed as Tier 1				
Tier 2				
No screened projects classed as Tier 2.				
Tier 3				
Offshore Wind Farm	North Irish Sea Array	Submitted	High	Construction commencing 2027
	Oriel	Submitted	High	Construction commencing 2026
	Codling Wind Park	Submitted	High	Construction commencing 2027
	Arklow Bank Phase 2	Submitted	High	Construction commencing 2026

10.15.6 As per Section 10.8, the following impacts are assessed cumulatively:

- Displacement leading to increased encounters, vessel squeeze and collision risk;
- Increased collision risk from project vessels;
- Allison with wind farm infrastructure from vessel under power;
- Allision with wind farm infrastructure from vessel NUC; and
- Reduction of emergency response capabilities.

10.15.7 The following impacts have been scoped out due to their localised nature, hence the cumulative impact will be equivalent to the impact of the project in isolation:

- Displacement of historic sailing races;
- Increased grounding / under keel risk to passing vessels;
- Increased anchor snagging risk from presence of subsea cables; and
- Port access restrictions.

Effect 25: Displacement of vessels leading to increased encounters, vessel squeeze and collision risk

10.15.8 Noting the proximity of Codling Bank Wind Park and Arklow Bank Phase 2, there is potential for cumulative deviation effects on commercial vessel routeing. In consideration of the limited effects of the proposed project on deviations when is considered in isolation, noting the location of the proposed offshore wind projects in proximity on existing shallow banks, there is not likely to be any notable effect on routeing over that assessed for the in isolation case. In particular, commercial vessels are not expected to pass between the Bray Bank and Codling Bank Wind Park, instead passing further west from the banks. Any changes associated with Arklow Bank Phase 2 or Codling Bank Wind Park will occur to the south of the array area and on this basis, there are not anticipated to be any notable cumulative changes to routeing in the vicinity of the south west corner over those seen on for the in isolation case.

10.15.9 Similarly for transits over the Kish and Bray Banks from smaller vessels, no notable levels of displacement are expected given that access will not be prohibited. Advisory safe passing distances when required will be utilised around vessels engaged in operations to ensure the safety of all vessels. Any such areas will be temporary, and limited spatially to the waters surrounding the operations, and as such no notable displacement for smaller vessels accessing the banks is anticipated. Approaches taken to site access cannot be confirmed for other projects, however current Irish legislation does not allow for statutory safety zones, and as such the use of advisory safe passing distances as opposed to 'prohibiting' vessel access is assumed likely.

10.15.10 The NISA project is located 11.5 nm to the north of the array area, with Oriel being located 34.9 nm further north. These projects may interact with the established routes that also pass offshore of the array area. Similar to consideration of the Codling Bank Wind Park and Arklow Bank Phase 2, any deviations associated with the array area will be minimal and as such will not be a large contributor to the cumulative deviations.

10.15.11 Given low levels of cumulative displacement anticipated, it is not considered likely that there will be any notable cumulative effects on encounter rates.

10.15.12 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.

10.15.13 Given deviations / displacement are anticipated, the frequency of occurrence for this impact is considered to be reasonably probable. Given deviations are anticipated to be minor and not expected to lead to a notable increase in encounters, the severity of consequence considered to be to be negligible. On this basis the cumulative impact is determined to be Broadly Acceptable and ALARP.

Effect 26: Increased collision risk from project vessels

10.15.14 All project vessels associated with the Project will comply with COLREGs (1972/77) and SOLAS (IMO, 1974) regulations, and associated movements will be managed via central marine coordination. This will limit potential interactions with third party vessels whilst in transit. Furthermore, as detailed in the in isolation assessment, the following additional mitigations in relation to vessel management are proposed (see Table 9):

- Entry/exit points to the array area for vessels associated with the proposed project;
- Designated routes to/from array area for vessels associated with the Project which avoid crossing main routes at the south west corner of the site; and
- Mandatory carriage of AIS for all vessels associated with the Project.

10.15.15 Approaches at other projects with regards to operational procedures, and the ports to be used cannot be confirmed, however there may be an increase in project vessels within the area should construction periods in particular overlap.

10.15.16 Given the existing measures in place to manage project vessel traffic but noting uncertainty over approaches from other projects, the frequency of occurrence for this impact is considered to be remote, with severity of consequence considered to be moderate. On this basis the impact is determined to be tolerable.

10.15.17 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.

10.15.18 Assuming that the additional measures detailed above are implemented, the residual impact is considered as being Tolerable with Mitigation and ALARP. Therefore, no significant adverse residual effects have been predicted.

Effect 27: Allision with wind farm infrastructure from vessel under power

10.15.19 The presence of existing or partially decommissioning structures create an allision risk to passing third party vessels whilst under power.

10.15.20 Given the proximity of the Codling Bank Wind Park and Arklow Bank Phase 2 offshore Wind projects to the south, there is potential for a cumulative increase in powered allision risk to passing traffic , given an increase in exposure time to nearby structures. Commercial vessels are not expected to transit through the arrays based on experience of other constructing or operational wind farms, and noting the presence of the shallow banks. On this basis, the peripheral structures of the projects are most at risk of an allision from a commercial vessel.

10.15.21 As assessed within the in-isolation case, the majority of powered allision risk is to the structure in the south west corner of the site, and there is not anticipated to be a notable increase in risk to this area on a cumulative routeing basis.

10.15.22 The NISA project is located 11.5nm to the north of the array area, with Oriel being located 34.9nm to the north. Both are north of Dublin Bay, and therefore any transits passing these projects will likely pass east of the array area, where there is open searoom available.

10.15.23 In terms of internal transits, allision risk is considered to be localised to the projects on an in-isolation basis, and therefore no cumulative increase is anticipated.

10.15.24 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.

10.15.25 Given the low likelihood of an allision and noting the cumulative area considered, frequency of occurrence is assessed as being negligible, with severity of consequences considered to be serious. On this basis the impact is determined to be Broadly Acceptable and ALARP.

Effect 28: Allision with wind farm infrastructure from vessel Not Under Command

10.15.26 Given the proximity of the Codling Bank Wind Park and Arklow Bank Phase 2 projects to the south, there may be a cumulative increase in drifting allision risk to passing traffic, given an increase in exposure time to nearby structures. Commercial vessels are not expected to transit through the arrays based on experience of other constructing or operational wind farms, and noting the presence of the shallow banks. On this basis, the peripheral structures of the projects are most at risk of an allision from a commercial vessel.

10.15.27 As assessed within the in-isolation case, the majority of powered allision risk is to the structure in the southern area of the array area (due to traffic volume relative to peak tidal direction), and there is not anticipated to be a notable increase in risk to this area on a cumulative routeing basis.

10.15.28 The NISA project is located 11.5nm to the north of the array area, with Oriel being located 34.9nm to the north. Both are north of Dublin Bay, and therefore any transits passing these projects will likely pass east of the array area, where there is open searoom available.

10.15.29 In terms of internal transits, drifting allision risk is considered to be localised to the projects on an in-isolation basis, and therefore no cumulative increase is anticipated.

10.15.30 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.

10.15.31 Given the low likelihood of an allision and noting the cumulative area considered, frequency of occurrence is assessed as being negligible, with severity of consequences considered to be serious. On this basis the impact is determined to be Broadly Acceptable and ALARP.

Effect 29: Reduction of emergency response resource capabilities

10.15.32 Given low baseline incident rates (see summary in Impact 7: Reduction of emergency response resource capabilities and Impact 15: Reduction of emergency response resource capabilities), and noting the additional self help resources that would be available at both Dublin Array and other cumulative developments, there is not considered likely to be an adverse effect on emergency response resources on a cumulative level.

10.15.33 Upon agreement on the final WTG selected and layout Dublin Array will consult with IRCG on emergency response access requirements. The current three proposed layouts design options all maintain a single line of orientation and as such are considered MGN 654 (MCA, 2021) compliant.

10.15.34 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.

10.15.35 On this basis, frequency of occurrence is assessed as being extremely unlikely, and severity of consequences is assessed as moderate. On this basis the cumulative impact is determined to be Broadly Acceptable and ALARP.

10.16 Interaction of environmental factors

10.16.1 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 (hereafter referred to as the Interactions Chapter).

10.16.2 Interactions are considered effects of different aspects of the proposal on different environmental factors[10] (EPA guidelines, 2022). These are considered to be:

- Project lifetime effects: Assessment of the scope for effects that occur throughout more than one phase of the project (construction, O&M and decommissioning) to interact and potentially create a more significant effect on a receptor than if just assessed in isolation in these three key project phases; and
- Receptor led effects: Assessment of the scope for all effects to interact, spatially and temporally, to create inter-related effects on a receptor. As an example, all effects on benthic ecology such as direct habitat loss or disturbance, sediment plumes, scour, jack up vessel use etc., may interact to produce a different, or greater effect on this receptor than when the effects are considered in isolation. Receptor-led effects might be short-term, temporary or transient effects.

10.16.3 As indicated in the interactions matrix within the Interactions Chapter there are linkages between the topic-specific chapters presented within this EIAR, whereby the effects assessed in one chapter have the potential to result in secondary effects on another receptor.

[10] Interactions of environmental factors are also commonly referred to as 'interactions of the foregoing'. The EPA guidelines (2022) refer to interactions as 'Interactions Between Impacts on Different Factors'.

10.16.4 The potential effects on shipping and navigation during construction, operational and maintenance and decommissioning phases of the Project have been assessed in sections 10.11 –10.13 above.

10.16.5 Effects on shipping and Navigation (i.e. from effects to increased vessel numbers) also have the potential to have secondary effects on other receptors which have been fully assessed in the topic-specific chapters. These receptors are:

- Chapter 10: Commercial Fisheries. Effects on commercial fisheries receptors also have the potential to have secondary effects on shipping and navigation. Those potential effects are considered within Chapter 10.
- Chapter 12: Infrastructure and Other Users. Effects on infrastructure and other users including recreational users, also have the potential to have secondary effects on shipping and navigation. Those potential effects are considered within Section 10.11 – 10.13 above, and in Chapter 12.

10.16.6 For shipping and navigation receptors, the following potential impacts have been considered within the interactions assessment:

- Displacement leading to increased encounters and collision risk;
- Displacement of historic recreational races;
- Increased collision risk from project vessels with third-party vessels;
- Allision with wind farm infrastructure from vessel under power;
- Allision with wind farm infrastructure from vessel Not Under Command;
- Port / Anchorage access restrictions; and
- Impact on emergency response resource capabilities.

Project lifetime effects

10.16.7 Project lifetime effects consider impacts from the construction, operation or decommissioning of Dublin Array on the same receptor (or group). The potential inter-related effects that could arise in relation to shipping and navigation are presented in Table 11.

Table 11 Project lifetime effects assessment for potential inter-related effects on shipping and navigation

Impact Type	Effects (Assessment Alone)			Interaction Assessment
	C	O&M	D	Project lifetime effects
Displacement leading to increased encounters and collision risk	Broadly Acceptable	Broadly Acceptable	Broadly Acceptable	Due to the shallow nature of the Kish and Bray Banks, typically larger commercial vessels within the Shipping and Navigation Study Area already avoid the array area. It was confirmed during consultation that commercial vessels would not choose to transit through the array area. As such, deviations from typical routes as a result of the proposed development were observed to be limited and are considered to represent negligible shifts as opposed to large scale deviations. Regarding smaller vessels, the baseline vessel traffic data shows that smaller vessels (fishing and recreation) do transit over the Kish and Bray Banks. However, such third party transits over the banks will not be excluded (including during construction). Advisory safe passing distances will be utilised around vessels engaged in sensitive construction, O&M and decommissioning operations to ensure the safety of both project and third party vessels. Any such areas will be temporary, and limited spatially to the waters surrounding the operations, and detail would be promulgated in advance. As such no notable displacement for smaller vessels accessing the banks is anticipated. Due to the significant majority of vessels not being displaced by the proposed development, in addition to factored-in measures to chart infrastructure at all phases, provide early promulgation of construction and maintenance activities through Notices to Mariners, it is unlikely across the project lifetime that effects on shipping and navigation will act together. Any interactions between effects will not be of any greater significance than those already assessed in isolation (i.e. broadly acceptable significance).

Impact Type	Effects (Assessment Alone)			Interaction Assessment
	C	O&M	D	Project lifetime effects
Displacement of historic recreational races	Broadly Acceptable	Broadly Acceptable	Broadly Acceptable	recreational races take place in the area, including across or in proximity to the Kish and Bray Banks. Access to the array area will not be restricted at any phase, including during construction, however advisory safe passing distances will be utilised around vessels engaged in sensitive construction, O&M and decommissioning operations to ensure the safety of both project and third party vessels. Any such areas will be temporary and limited spatially to the waters surrounding the operations. Details associated with any restrictions including any advisory safe passing distances will be provided to relevant recreational organisations and race organisers to ensure they can plan races accordingly, and liaison will be ongoing to ensure minimal disruption. This liaison between both parties will ensure activities are coordinated. Furthermore, the proposed WTG spacing of 944 m (see Table 7) is considered sufficient to accommodate typical recreational transits, however race organisers may choose to deviate race routes to avoid the structures depending on the number and types of vessels participating. As such, due to the significant majority of vessels not being displaced by the proposed development, in addition to factored-in measures to chart infrastructure at all phases, provide early promulgation of construction and maintenance activities through Notices to Mariners, it is unlikely across the project lifetime that effects on shipping and navigation will act together. Any interactions between effects will not be of any greater significance than those already assessed in isolation (i.e. broadly acceptable significance).

Impact Type	Effects (Assessment Alone)			Interaction Assessment
	C	O&M	D	Project lifetime effects
Increased collision risk from project vessels with third-party vessels	Tolerable	Broadly Acceptable	Tolerable	It is recognized that whilst collision risk to third-party vessels increasing as a result of the proposed development is possible, the risk is more likely to increase during the construction and decommissioning phases of the development either whilst a project vessel is transiting to or from the construction port, or whilst the project vessel is engaged in active construction or decommissioning work. However, the factored-in measures, including advisory safe passing distances will be utilised around vessels engaged in sensitive construction and decommissioning operations, making it clear to third party traffic the areas which should be avoided to ensure collision risk is minimised. Further factored-in measures including compliance with Convention on International Regulations for Preventing Collisions at Sea (COLREGs) (IMO, 1972/77) and Safety of Life at Sea (SOLAS) (IMO, 1974) regulations, and promulgation of information relevant to each phase of development with relevant stakeholders will ensure the safety of vessels operating in close proximity to the Proposed Development (see section 10.10 for full list of factored-in measures). Although the temporal effect is lengthened, with the implementation of the factored-in measures, across the project lifetime, the effects on shipping and navigation 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.

Impact Type	Effects (Assessment Alone)			Interaction Assessment
	C	O&M	D	Project lifetime effects
Allision with wind farm infrastructure from vessel under power	Tolerable	Tolerable	Broadly Acceptable	It is recognized that whilst allision risk between smaller vessels under power and the development infrastructure is possible at all phases, the risk is more likely to occur during construction and O&M phases. However, it is noted that any such allisions are likely to be low speed and low impact given vessel size and likely drifting speed. It is considered that that by the commencement of the decommissioning phase, vessels will already be familiar with the Project, notably the locations of the structures (which will also be displayed on nautical charts). Larger vessels avoid the shallower waters of the Kish and Bray Banks and would possibly ground on the banks before alliding with a structure. Factored-in mitigations will be in place (see section 10.10 for full list), including promulgation of information, charting of structures, advisory safe passing distances and temporary lighting and marking (including buoyage), details of which will be discussed and agreed with Irish Lights. These measures will serve to reduce the likelihood of allision from a powered vessel. Although the temporal effect is lengthened, with the factored-in measures implemented, across the project lifetime, the effects on shipping and navigation 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.
Allision with wind farm infrastructure from vessel Not Under Command	Tolerable	Tolerable	Broadly Acceptable	It is recognized that whilst allision risk between smaller vessel not under power and the development infrastructure is possible at all phases, the risk is more likely to occur during construction and O&M phases. However, it is noted that any such allisions are likely to be low speed and low impact given vessel size and likely drifting speed. It is considered that that by the

Impact Type	Effects (Assessment Alone)			Interaction Assessment
	C	O&M	D	Project lifetime effects
				commencement of the decommissioning phase, vessels will already be familiar with the Project, notably the locations of the structures (which will also be displayed on nautical charts). Larger vessels avoid the shallower waters of the Kish and Bray Banks and would possibly ground on the banks before alliding with a structure. In the event of a potential allision, the vessel will initiate its own procedures for such an event, which may involve dropping anchor or the use of thrusters (depending on availability and power supply). Factored-in mitigations will be in place (see section 10.10 for full list), including promulgation of information, charting of structures, Emergency Response Cooperation Planning, advisory safe passing distances and provision of self-help capability. These measures will serve to reduce the likelihood of allision from a vessel not under power. Although the temporal effect is lengthened, with the factored-in measures implemented, across the project lifetime, the effects on shipping and navigation 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.
Port / Anchorage access restrictions and anchor snagging risks	Broadly Acceptable	Broadly Acceptable	Tolerable	Regarding port restrictions, given larger vessels already avoid the Kish and Bray Banks, and noting that minimum WTG spacing of 944 m (see Table 7) is considered sufficient to facilitate transit of smaller vessels that may choose to transit the banks, there is not considered likely to be any effect on port access from the wind farm structures themselves. For similar reasoning no effect is anticipated from works ongoing within the array area given access to the site will not be restricted, noting that while

Impact Type	Effects (Assessment Alone)			Interaction Assessment
	C	O&M	D	Project lifetime effects
				advisory safe passing distances will be used around vessels engaged in sensitive operations, these will be temporary and spatially limited. Notwithstanding, all project vessel movements will be managed via marine coordination, and associated details will be promulgated including to relevant port and harbour authorities to ensure third party vessels are aware of vessel traffic relating to the development. Regarding anchor snagging risks, all cables will be displayed on nautical charts and should therefore be accounted for by vessels seeking to anchor (including in an emergency). Baseline traffic patterns (including in relation to emergency anchoring risk) and likely anchor sizes will also be considered as part of the cable burial risk assessment to ensure protection is appropriate. Furthermore, discussions will be held with the MSO and Irish Lights prior to decommissioning to determine whether the removal of any sections of cable is necessary on the basis of potential interference with smaller vessels. As such, across the project lifetime, the effects on shipping and navigation 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.
Impact on emergency response resource capabilities	Tolerable	Tolerable	Broadly Acceptable	Activities occurring across all phases of the Proposed Development could both increase the occurrence of incidents requiring emergency response in the area and diminish the capability of emergency response operations to respond to emergency situations by restricting access. However, the presence of construction, operational and maintenance and decommissioning vessels and the requirement for the agreed emergency response procedures in consultation with the Irish Coast Guard at each project phase, will provide additional

Impact Type	Effects (Assessment Alone)			Interaction Assessment
	C	O&M	D	Project lifetime effects
				emergency response support capabilities that had not previously existed. Therefore, across the project lifetime, the effects on shipping and navigation 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.

Receptor led effects

10.16.8 The potential exists for spatial and temporal interactions between deviations resulting in vessel collision risk, vessel to structure allision risk and diminished emergency response capability. The greatest scope for potential interactions between impacts could arise from the following:

- The interaction of collision risk and displacement of vessel traffic on shipping receptors; and
- The interaction of vessel allision risk and displacement vessel traffic on shipping receptors.

10.16.9 With regards to interaction of collision risk and displacement of vessel traffic on shipping receptors, the displacement of routeing vessel traffic may lead to an increase in encounters and therefore vessel to vessel collisions, however this has been assessed in Volume 4, Appendix 4.3.10-1: Navigational Risk Assessment. Whilst impacts to vessels may interact, this would not be in such a way as to increase the significance of any of the individual effect significances (i.e. broadly acceptable).

10.16.10 With regard to interaction of vessel allision risk and displacement vessel traffic on shipping receptors, impacts to vessels arising from allision with offshore structures and also from displacement of routeing vessel traffic, are mutually exclusive as a vessel will not simultaneously exhibit a high level of displacement from the area around the wind farm, and a high level of allision risk with the wind farm structures. Impacts to vessels would not therefore interact.

10.16.11 Therefore, overall, any inter-related effect will not be of any greater significance than those already assessed in isolation. All inter-related effects result in a neutral significance of effect, which is not significant in EIA terms.

10.17 Transboundary statement

10.17.1 Transboundary impacts of offshore wind farms with regards to vessel routeing including to international ports are considered to have been assessed within the cumulative assessment in Section 10.15. Individual vessel transits although they have the potential to be internationally owned or located, have been considered as part of the baseline assessment.

10.17.2 Therefore, a screening of transboundary impacts has been carried out and has identified that there was no potential for significant transboundary effects with regard to shipping and navigation upon the interests of other states outside of what has already been assessed.

10.18 Summary of effects

10.18.1 A summary of the significance of impacts to shipping and navigation users as assessed within this chapter is given in Table 12.

Table 12 Impact Assessment Summary

Description of effect	Effect	Additional mitigation measures	Residual effect
Construction			
Impact 1: Displacement of vessels leading to increased encounters and collision risk	Broadly acceptable	Not applicable (risk is ALARP)	Broadly acceptable
Impact 2: Displacement of historical recreational sailing races	Broadly acceptable	Not applicable (risk is ALARP)	Broadly acceptable
Impact 3: Increased collision risk from construction vessels	Tolerable	▪ Entry/exit points to the array area for vessels associated with the Project; ▪ Designated routes to/from array area for vessels associated with the Project which avoid crossing main routes at the south west corner of the site; ▪ Mandatory carriage of AIS for all vessels associated with the Project; ▪ Communications Plan with Dublin Port; and ▪ Engagement from the Applicant with Irish Lights on any project vessel activity occurring within 500 m of the centre point of the Kish Tower.	Tolerable with mitigation and ALARP
Impact 4: Allision with wind farm infrastructure from vessel under power	Tolerable	▪ Consultation with Irish Lights with regards to the need for alteration of existing buoyage positions; and ▪ Procedures for temporary AtoN to be discussed with Irish Lights.	Tolerable with mitigation and ALARP
Impact 5: Allison with wind farm infrastructure from vessels NUC	Tolerable	▪ Cooperation agreements with IRCG in terms of emergency response procedures.	Tolerable with mitigation and ALARP
Impact 6: Port / Anchorage access restrictions	Broadly acceptable	Not applicable (risk is ALARP)	Broadly acceptable
Impact 7: Reduction of emergency response capabilities	Tolerable	▪ Array design with consideration to SAR access in consultation with IRCG and RNLI including consideration of MGN 654; and ▪ Cooperation agreements with IRCG in terms of	Tolerable with mitigation and ALARP

Description of effect	Effect	Additional mitigation measures	Residual effect
		emergency response procedures.	
Operation and maintenance			
Impact 8: Displacement of vessels due to presence of wind farm infrastructure leading to increased encounters and collision risk	Broadly acceptable	Not applicable (risk is ALARP)	Broadly acceptable
Impact 9: Displacement of historical recreational sailing races	Broadly acceptable	Not applicable (risk is ALARP)	Broadly acceptable
Impact 10: Increased collision risk from O&M vessels	Broadly acceptable	Not applicable (risk is ALARP)	Broadly acceptable
Impact 11: Allision with wind farm infrastructure from vessel under power	Tolerable	▪ Procedures for management of AtoN to be discussed with Irish Lights.	Tolerable with mitigation and ALARP
Impact 12: Allision with wind farm infrastructure from vessel NUC	Tolerable	▪ Cooperation agreements with IRCG in terms of emergency response procedures.	Tolerable with mitigation and ALARP
Impact 13: Increased grounding / under keel risk to passing vessels	Broadly acceptable	Not applicable (risk is ALARP)	Broadly acceptable
Impact 14: Increased anchor snagging risk from presence of subsea cables	Broadly acceptable	Not applicable (risk is ALARP)	Broadly acceptable
Impact 15: Reduction of emergency response capabilities	Tolerable	▪ Cooperation agreements with IRCG in terms of emergency response procedures.	Tolerable with mitigation and ALARP
Decommissioning			
Impact 16: Displacement of vessels leading to increased encounters and collision risk	Broadly acceptable	Not applicable (risk is ALARP)	Broadly acceptable
Impact 17: Temporary displacement of historic recreational sailing races	Broadly acceptable	Not applicable (risk is ALARP)	Broadly acceptable
Impact 18: Increased collision risk from decommissioning vessels	Tolerable	▪ Entry/exit points to the array area for vessels associated with the project; ▪ Designated routes to/from array area for vessels associated with the project	Tolerable with mitigation and ALARP

Description of effect	Effect	Additional mitigation measures	Residual effect
		which avoid crossing main routes at the south west corner of the site. ▪ Where practicable, vessels operating on Dynamic Positioning (DP) will be used. ▪ If vessels using anchor spreads are required, the anchors (and hence marker buoys) will not be placed in the inshore shipping routes (Routes 3 and 7 percentiles); and ▪ Mandatory carriage of AIS for all vessels associated with associated with the Project.	
Impact 19: Allision with wind farm infrastructure from vessel under power	Broadly acceptable	Not applicable (risk is ALARP)	Broadly acceptable
Impact 20: Allision with wind farm infrastructure from vessel NUC	Broadly acceptable	Not applicable (risk is ALARP)	Broadly acceptable
Impact 21: Port / Anchorage access restrictions	Broadly acceptable	Not applicable (risk is ALARP)	Broadly acceptable
Impact 22: Increased grounding / under keel risk to passing vessels	Broadly acceptable	n/a (risk is ALARP)	Broadly acceptable
Impact 23: Increased anchor snagging risk from presence of subsea cables	Tolerable	▪ Discussions with Irish Lights and MSO prior to decommissioning to determine any additional mitigation needed for subsea cables post decommissioning.	Tolerable with mitigation and ALARP
Impact 24: Reduction of emergency response capabilities	Broadly acceptable	Not applicable (risk is ALARP)	Broadly acceptable
Cumulative effects			
Effect 25: Displacement of vessels leading to increased encounters, vessel squeeze and collision risk	Broadly acceptable	Not applicable (risk is ALARP)	Broadly acceptable
Effect 26: Increased collision risk from project vessels	Tolerable	▪ Entry/exit points to the array area for vessels associated with the Project; ▪ Designated routes to/from array area for vessels	Tolerable with mitigation and ALARP

Description of effect	Effect	Additional mitigation measures	Residual effect
		associated with the Project which avoid crossing main routes at the south west corner of the site.	
Effect 27: Allision with wind farm infrastructure from vessel under power	Broadly acceptable	Not applicable (risk is ALARP)	Broadly acceptable
Effect 28: Allision with wind farm infrastructure from vessel NUC	Broadly acceptable	Not applicable (risk is ALARP)	Broadly acceptable
Effect 29: Reduction of emergency response capabilities	Broadly acceptable	Not applicable (risk is ALARP)	Broadly acceptable
Transboundary			
None anticipated as per Section 10.17			

10.19 References

Department of the Environment, Climate and Communications (2017). Guidance on EIS and NIS Preparation for Offshore Renewable Energy Projects. Dublin: Department of the Environment, Climate and Communications.

Department of the Environment, Climate and Communications (2018). Offshore Renewable Energy Development Plan. Dublin: Department of the Environment, Climate and

Department of Housing, Local Government and Heritage (2018). Guidelines for Planning Authorities and An Bord Pleanála on carrying out Environmental Impact Assessment.

Wexford: Department of Housing, Local Government and Heritage.

Department of Housing, Local Government and Heritage (2021). National Marine Planning Framework. Wexford: Department of Housing, Local Government and Heritage.

Environmental Protection Agency (2015). Draft Advice Notes for Preparing Environmental

Environmental Protection Agency (2017). Draft Guidelines on the Information to be contained in Environmental Impact Assessment Reports.

International Association of Marine Aids to Navigation and Lighthouse Authorities (2021). Marking of Man-Made Offshore Structures G1162. Edition 2. Saint Germain en Laye, France: International Association of Marine Aids to Navigation and Lighthouse Authorities.

International Maritime Organization (1972/77). Convention on International Regulations for Preventing Collisions at Sea – Annex 3. London: IMO.

International Maritime Organization (1974). International Convention for the Safety of Life at Sea (SOLAS). London: IMO.

International Maritime Organization (2018). Revised Guidelines for Formal Safety Assessment (FSA) for Use in the Rule-Making Process. MSC-MEPCC.2/Circ.12/Rev.2. London, UK: International Maritime Organization.

Irish Cruising Club (2014). East & North Coasts of Ireland Sailing Directions. 12th Edition, revised 2018. Antrim, UK: W&G Baird.

Irish Sea Offshore Racing Association (2023). Race Tracker and Statistics. Dun Laoghaire: Irish Sea Offshore Racing Association.

Maritime and Coastguard Agency (2016). MGN 543 (M+F) Safety of Navigation: OREIs - Guidance on UK Navigational Practice, Safety and Emergency Response. Southampton: Maritime and Coastguard Agency.

Maritime and Coastguard Agency (2021). MGN 654 (M+F) Safety of Navigation: OREIs - Guidance on UK Navigational Practice, Safety and Emergency Response. Southampton: Maritime and Coastguard Agency.

Maritime and Coastguard Agency (2022). MGN 372 Amendment 1 - Guidance to mariners operating in vicinity of UK OREIs. Southampton: Maritime and Coastguard Agency.

OECD/ITF (2015). The Impact of Mega-Ships. Case Specific Policy Analysis. Paris: OECD/ITF.

Renewable UK, (2013). Guiding Principles for Cumulative Impact Assessments in Offshore Wind Farms

Royal Yachting Association (2019). The RYA Position on Offshore Renewable Energy Developments: Paper 1 (of 4) – Wind Energy. 5th Edition. Southampton, UK: Royal Yachting Association.

United Kingdom Hydrographic Office (2019). Admiralty Sailing Directions Irish Coast Pilot NP40. Taunton, UK: United Kingdom Hydrographic Office.

Dublin Array Offshore Wind Farm

Environmental Impact Assessment Report

Annex A: Shipping and Navigation Policy

Legislation, Policy and Guidance

Policy / Legislation	Key provisions	Section where provision is addressed
Legislation		
European Communities (Marine Strategy Framework) Regulations 2011 (S.I. No. 249 of 2011)	Table 2, pressures and impacts associated with contamination by hazardous substances including from vessels.	A marine pollution contingency plan is contained within the outline PEMP for Dublin Array included as part of the Planning Application. A summary of mitigations that deal with pollution are also outlined in section 10.10.
Convention on the International Regulations for Preventing Collisions at Sea 1972	Rules relating to: Lookouts; Safe speed; Risk of collision; Action to avoid collision; Narrow channels; Traffic separation schemes; Sailing vessels; Overtaking; Head-on situations; Crossing situations; Action by give-way vessels; Action by stand-on vessels; and Responsibilities between vessels. Conduct of vessels in restricted visibility; Visibility of lights; Power-driven vessels underway; Towing and pushing; Sailing vessels underway and vessels under oars; Fishing vessels; Vessels not under command or restricted in their ability to manoeuvre; Vessels constrained by their draught;	Consideration of mitigation methods to avoid collisions between multiple vessels or vessels and infrastructure are considered throughout this chapter, and are described in Table 8 and Table 9within this Shipping and Navigation Chapter. Additional information relating to vessel collisions is contained in the Military Exercise Chapter, infrastructure and other users, and the Major Accidents Chapter.

Policy / Legislation	Key provisions	Section where provision is addressed
	Pilot vessels; Anchored vessels and vessels aground; and Seaplanes. Equipment four sound signals; Manoeuvring and warning signals; Sound signals in restricted visibility; Signals to attract attention; Distress signals; and Exemptions.	
Sea Pollution Act (1999)	Gives effect to the International Convention on Oil Pollution Preparedness, Response and Co-operation, 1990 (OPRC). Details requirements of offshore developments on pollution emergency plans.	A marine pollution contingency plan is contained within the outline PEMP for Dublin Array included as part of the Planning Application. A summary of mitigations that deal with pollution are also outlined in section 10.10.
Maritime Area Planning Act 2021	The Maritime Area Planning Act (MAPA), signed into law on December 23, 2021, establishes a new marine management regime for Ireland, covering forward planning, consenting, and enforcement in the maritime area. It also amends the Planning and Development (as amended) Act 2018 to facilitate development planning permission for maritime infrastructure.	The relevant policies have been considered through this Chapter and within the Policy Chapter.
National Marine Planning Framework (2021) Department of Housing, Local Government and Heritage (DHLGH)	Co-existence Policy 1 Proposals should demonstrate that they have considered how to optimise the use of space, including through consideration of opportunities for co-existence and co-operation with other activities, enhancing other activities where appropriate. If proposals cannot avoid significant adverse impacts (including displacement) on other activities	Details policy on impact to ports, harbours, shipping, marine safety, and sports and recreation from offshore developments. Relevant policies have been considered through this Chapter.

Policy / Legislation	Key provisions	Section where provision is addressed
	they must, in order of preference: a) minimise significant adverse impacts, b) mitigate significant adverse impacts, or c) if it is not possible to mitigate significant adverse impacts, proposals should set out the reasons for proceeding.	
	Safety at Sea Policy 1 Proposals for installation, operation, and decommissioning of Offshore Wind Farms must demonstrate how they will: ▪ Minimise navigational risk between commercial vessels arising from an increase in the density of vessels in maritime space as a result of wind farm layout; and ▪ Allow for recreational vessels within the Offshore Wind Farm (including consideration of turbine height) or redirect recreational vessels, minimising navigational risk arising between recreational and commercial vessels.	Associated hazards to navigational safety (including changes in vessel patterns leading to increased collision risk) have been assessed in Sections 10.11 (construction), 10.12 (operations and maintenance), and 10.13 (decommissioning). This includes assessment of hazards to recreational vessels, noting access will not be prohibited.
	Safety at Sea Policy 2 Proposals for infrastructure that have the potential to significantly reduce under-keel clearance must demonstrate how they will, in order of preference: a) avoid, b) minimise, c) mitigate adverse impacts, or d) if it is not possible to mitigate significant adverse impacts, proposals should set out the reasons for proceeding.	Associated hazards to navigational safety (including in terms of under-keel clearance) have been assessed in Sections 10.11 (construction), 10.12 (operations and maintenance), and 10.13 (decommissioning).

Policy / Legislation	Key provisions	Section where provision is addressed
	Safety at Sea Policy 3 All proposals for temporary or permanent fixed infrastructure in the maritime area must ensure navigational marking in accordance with appropriate international standards and ensure inclusion in relevant charts where applicable.	Lighting and marking in agreement with Irish Lights and in line with IALA G1162 (IALA, 2021) and marking on nautical charts has been assumed as a Project Design Feature / Avoidance and Preventative Measure (see Section 10.10).
	Safety at Sea Policy 4 Establishing, changing or disestablishing Aids to Navigation (AtoN) must be sanctioned, in advance of works, by the Commissioners of Irish Lights.	Lighting and marking plan as detailed in Section 10.10.
	Safety at Sea Policy 5 Proposals must identify their potential impact, if any, on Maritime Emergency Response (Search and Rescue (SAR), Maritime Casualty and Pollution Response) operations. Where a proposal may have a significant impact on these operations it must demonstrate how it will, in order of preference: a) avoid, b) minimise, c) mitigate adverse impacts, or d) if it is not possible to mitigate significant adverse impacts, proposals should set out the reasons for proceeding, supported by parties responsible for maritime SAR.	Associated hazards associated with impacts on emergency response and SAR have been assessed in Sections 10.11 (construction), 10.12 (operations and maintenance), and 10.13 (decommissioning).

Policy / Legislation	Key provisions	Section where provision is addressed
Guidelines and technical standards		
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 Department of Communications, Climate Action and Environment, 2017) (hereafter referred to as the DCCAE Guidance)	"Cumulative impact assessments only need to take account of existing and/or approved projects and not other projects within the planning process."	A precautionary approach was undertaken to consider and plans or projects which could result in a cumulative effect. The cumulative assessment is presented in 10.15 of this chapter. To account for the uncertainty associated with projects and plans which have not yet been consented a tiering system was adopted. Further details of the approach are available in the Cumulative Effect Assessment Methodology Chapter.
	Requires production of an NRA	An NRA has been produced to accompany this chapter and is available in Volume 4, Appendix 4.3.10-1.
MGN 654: (M+F) Offshore Renewable Energy Installations (OREI) safety response and its annexes. (MCA 2021)	Highlights issues to consider when assessing navigational safety and emergency response, caused by OREI in UK waters.	Use of MGN 654 was agreed with stakeholders during consultation. Provides guidance on the contents of an NRA. The NRA (Volume 4, Appendix 4.3.10-1) has therefore considered this guidance.
Revised Guidelines for FSA for Use in the Rule-Making Process (IMO, 2018)	International industry standard marine risk assessment approach.	Use of the FSA was agreed with stakeholders during consultation. FSA methodology is provided in Section 10.4.
MGN 372 Amendment 1 (M+F)	Highlights the issues to be considered when planning and undertaking voyages in the vicinity of OREIs in UK	The NRA (Volume 4, Appendix 4.3.10-1) has considered this guidance noting it is written for mariners transiting through or in proximity to offshore wind farms.

Policy / Legislation	Key provisions	Section where provision is addressed
Safety of Navigation: Guidance to Mariners Operating in the Vicinity of UK OREIs. (MCA, 2022)	waters.	
G1162 The Marking of Offshore Man-Made Structures. International Association of Marine Aids to Navigation and Lighthouse Authorities (IALA) 2021.	Details IALA guidance for the marking of different types of offshore structures for purposes of navigational safety.	Lighting and marking in agreement with Irish Lights and in line with IALA G1162 (IALA, 2021) and marking on nautical charts has been assumed as a Project Design Feature / Avoidance and Preventative Measure (see Section 10.10).
Position on Offshore Renewable Energy Developments: Paper 1 (of 4) – Wind Energy. 5th Edition. Royal Yachting Association's (RYA) 2019.	Sets out RYA policy on offshore wind developments.	Considered within the impact assessment in Sections 10.11 (construction), 10.12 (operations and maintenance), and 10.13 (decommissioning). Project Design Features and Avoidance and Preventative Measures (Section 10.10) include minimum blade clearance in excess of the required value under the RYA Position (RYA, 2019) of 22m.

Registered office:
Unit 5,
Desart House,
Lower New Street,
Kilkenny
www.RWE.com