Addendum to the Environmental Impact Assessment Report

NISA
North Irish Sea Array

Volume 9 - Offshore Appendices

Appendix A17.4
North Irish Sea Array Safety Justification for Single Line of Orientation Layout

Statkraft
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Appendix A17.4: North Irish Sea Array Offshore Wind Farm - Safety Justification for Single Line of Orientation Layout

North Irish Sea Array Windfarm Ltd (NISA, hereafter referred to as 'the Developer') has been considering the Request for Further Information (RFI) issued by An Bord Pleanála (now An Coimisiún Pleanála) as well as the third-party submissions received following public consultation. At An Coimisiún Pleanála's behest, the Developer has also continued to consult with stakeholders in respect of the 2024 planning application throughout 2024-2026. The Developer has refined elements of the design to respond to the third-party submissions, the continued public and stakeholder consultation and the RFI. Full details of consultation undertaken can be found in Appendix A.1.2 Consultation Report.

For the purposes of clarity, this document shall be read in conjunction with the Chapter 17: Shipping and Navigation submitted as part of the EIAR.

Any cross reference to a chapter, section, table, image, figure or appendix within this document is to another location within the Addendum to the EIAR unless explicitly stated otherwise. Any cross reference to anything included in the 2024 EIAR will be clearly labelled as such.

The sections relevant to Appendix A17.4: North Irish Sea Array Offshore Wind Farm – Safety Justification for Single Line of Orientation Layout in the RFI are included below.

RFI Section	RFI	Relevance to Chapter
1 (b)	The scientific information provided as part of the planning application documentation should be based on up-to-date survey reports and data. Accordingly, the applicant is requested to confirm/provide justification/verification that the information submitted in support of the planning application remains relevant and appropriate at the point of submitting further information or to update same as required.	The timeframes associated with the RFI have necessitated a review of the datasets previously used in the 2024 EIAR to ensure any necessary updates to the baseline environment are captured. However, the Marine Survey Office (MSO) confirmed the vessel traffic survey data analysed in the 2024 EIAR was suitable for Appendix A17.1: Navigational Risk Assessment (NRA) and so no further vessel traffic data has been collected. Therefore, a review of the baseline resources for navigational features and maritime incidents has been undertaken to comply with RFI Section 1 (b).
2 (a)	The IRCG, through the DoT, has raised concerns in relation to the layout of the proposed development with respect to search-and-rescue (SAR) access. The applicant is requested to consult with the IRCG, in addressing these concerns, and provide further information and clarification on such matters.	Continued consultation has occurred with the IRCG since the submission of the 2024 EIAR and the layouts have been revised in liaison with the IRCG in response to RFI Section 2 (a). These layouts include a single line of orientation (SLoO) with a linear configuration which is accompanied by a safety justification (this document) in line with the requirements of Marine Guidance Note (MGN) 654. IRCG have confirmed that with the linear alignment and consideration of SAR checklist matters that they are ontent that the safety justification meets the Irish guidance including SOP 07 2025 OREI Guidance and Operational Considerations for SAR and Emergency Response. Further details associated with the refined layouts are included in Appendix A5.1: Design Refinements. The Safety Justification in this document, prepared by the Developer demonstrates that in the case of the proposed

RFI Section	RFI	Relevance to Chapter
		development, hazards associated with a SLoO layout are as low as reasonably practicable (ALARP).
2 (b)	The EIAR under Chapter 17, Shipping and Navigation, states that as part of embedded mitigation, the fixed layouts for Project Option 1 and Project Option 2 comply with MGN 654 requirements (Marine Guidance Note (UK) guidance, Maritime and Coastguard Agency (MCA), 2021). The applicant is advised that the DoT MSO states that the proposed layout does not comply with guidance provided in MGN 654 and the MSO strongly disagrees with the summarisation of the risk to the safety of navigation posed to commercial shipping, fishing vessels, and recreational craft transiting in proximity to the southeastern corner and the Rockabill Gap. The applicant is requested to consult with the Department of Transport MSO in addressing these concerns and provide further information and clarification on such matters.	At the time of the 2024 EIAR, comprehensive Irish guidance was not in place and therefore use of the UK MGN 654 (MCA, 2021) was agreed for use by relevant stakeholders. Since then, the guidance has been published by Department of Transport (DoT) and in line with its requirements; the Navigational Risk Assessment (Appendix A17.1: NRA) is still informed by MGN 654. The refined layouts for Project Option 1 and Project Option 2 have a SLoO with a linear configuration which is accompanied by a safety justification (this document) in line with the requirements of MGN 654. The wind turbine (WTG) layouts for both Project 1 and Project Option 2 have also been set back from the south eastern corner which was central to the MSO's concerns. Continued consultation has occurred with the MSO since the submission of the 2024 EIAR in response to RFI Section 2 (b). The MSO has since confirmed (during a meeting in March 2026 as outlined in Section 4 of the NRA (Appendix A17.1)) their contentment and acceptance of the new proposed layouts noting that the PIANC guidance (PIANC, 2018) was also applied to the Rockabill Gap and resulted in an increased Structure Exclusion Zone to which the MSO have deemed suitable for safe navigation.

North Irish Sea Array Offshore Wind Farm – Safety Justification for Single Line of Orientation Layout

Prepared by	Anatec Limited
Presented to	North Irish Sea Array Windfarm Limited
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Revision Number	Date	Summary of Change
00	15th January 2026	Initial Draft
01	11th February 2026	Updated content
02	12th February 2026	Final for IRCG review

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Abbreviations Table

Abbreviation	Definition
ACP	An Coimisiún Pleanála
AIS	Automatic Identification System
ALARP	As Low as Reasonably Practicable
ALB	All-Weather Lifeboat
BFRRS	Boyne Fishermens Rescue and Recovery Service
CRBI	Community Rescue Boats Ireland
CTV	Crew Transfer Vessel
DoT	Department of Transport
EEZ	Exclusive Economic Zone
ERCoP	Emergency Response Cooperation Plan
FRB	Fast Rescue Boat
FSA	Formal Safety Assessment
HLV	Heavy Lift Vessel
HM	His Majesty's
ILB	Inshore Lifeboat
IMO	International Maritime Organization
IRCG	Irish Coast Guard
LAT	Lowest Astronomical Tide
LoD	Limit of Deviation
m	Metre
MCA	Maritime and Coastguard Agency
MCC	Marine Coordination Centre
MRCC	Marine Rescue Coordination Centres
NISA	North Irish Sea Array
nm	Nautical Mile
NMOC	National Maritime Operations Centre
NRA	Navigational Risk Assessment
OMF	Operations and Maintenance Facility

Abbreviation	Definition
OREI	Offshore Renewable Energy Installations
OSP	Offshore Substation Platforms
OWF	Offshore Wind Farm
PLB	Personal Locator Beacons
PoD	Probability of Detection
RAF	Royal Air Force
RIB	Rigid Inflatable Boat
RNLI	Royal National Lifeboat Institution
SAR	Search and Rescue
SCADA	Supervisory Control and Data Acquisition
SLoO	Single Line of Orientation
SLVIA	Seascape, Landscape and Visual Assessment
SOLAS	The International Convention for the Safety of Life at Sea
SOV	Service Operations Vessel
TETRA	Terrestrial Trunked Radio
UK	United Kingdom
UKHO	United Kingdom Hydrographic Office
US	United States
VHF	Very High Frequency
VTS	Vessel Traffic Service
WTG	Wind Turbine Generator

1 Introduction

North Irish Sea Array Windfarm Limited (the 'Developer') is the developer of the North Irish Sea Array (NISA) Offshore Wind Farm (OWF) (the 'proposed development'), a planned OWF located in Irish waters off the coat of Counties Dublin, Meath, and Louth.

The Department of Transport (DoT) Guidance on Safety of Navigation & Emergency Response: Offshore Renewable Energy Installations (OREI) (DoT, 2025a) states that:

> *In compliance with safety of navigation and search and rescue requirements developers of every offshore renewable energy project with floating and/or surface piercing devices should undertake a thorough appraisal of the safety benefits afforded by two consistent lines of orientation and based on this, either implement such layouts or, where appropriate, consider alternatives.*

Following detailed consideration of the site conditions for the proposed development including consideration of various wind turbine generator (WTG) layouts, it was determined that consideration of alternatives to two lines of orientation was required to ensure a commerically and technically viable project and therefore both layout options have only a single line of orientation (SLoO) available when considering the layout as a whole.

Two layout options ('Project Option 1' and 'Project Option 2') were deemed suitable for progression within the planning process and in line with the DoT Guidance (DoT, 2025a) a Safety Justification is required to support the application. The guidance states "*the DoT will not consider any layout proposals with just one line of orientation, without supporting documentation which fully justifies the proposed layout to the satisfaction of the DoT*".

The Safety Justification has therefore been prepared by the Developer to demonstrate that in the case of the proposed development, potential hazards associated with a SLoO layout are As Low as Reasonably Practicable (ALARP). The Safety Justification builds on work conducted as part of the Navigational Risk Assessment (NRA) and the mitigation measures identified as part of that process.

The Safety Justification structure and key aims and objectives are as follows:

- Profiles of key Authors (Section 1.3);
- Explanation as to why a SLoO is required i.e., why a grid layout is not possible (Section 1.1);
- Description of the Safety Justification process (Section 1.2);
- Overview of the relevant guidance and risk assessment methodology (Section 2).
- Project description (Section 3);
- Identification of likely users of the array area i.e., potential casualties that may require emergency response (Section 4);
- Risk assessment (Section 5):
  - Identification of potential scenarios resulting in a need for emergency response;

  - Mitigations; and
  - Formal Safety Assessment (FSA).
- Conclusion and ALARP statement (Section 6).

The following supporting appendices are also included:

- Appendix A: Search and Rescue (SAR) lane coverage; and
- Appendix B: Project vessel response precedent.

1.1 Overview of Need for Alternative Layout – Single Line of Orientation

The proposed layouts for Options 1 and 2 have been developed through consideration of ground conditions, buildable constraints (such as WTG technology and available water depth for installation vessels), archaeology, commercial fisheries, shipping and navigation, wake loss / energy production, and Seascape, Landscape and Visual Assessment (SLVIA).

As part of early layout assessment work, the Developer began by considering various layout options and determined that the significant site constraints present meant a regular grid layout was not achievable. A SLoO layout is therefore required to maintain project viability. Further details on this have been provided to the Irish Coast Guard (IRCG) in previous meetings including in December 2023 and June 2025, and therefore these have not been repeated within this document.

1.2 Layout Process – Now and Post Consent

This Safety Justification has been prepared on the basis of the Project Option 1 and Project Option 2 layouts included in the Developer's submission to An Coimisiún Pleanála (ACP) in response to the Request for Further Information (ACP, 2025) issued on the 10th April 2025. However, there is the potential that the positions in these layouts could change by up to 500 metres (m) through use of Limit of Deviation (LoD) i.e., a distance within which the Developer can move a structure from its intended position. LoD is necessary due to the possibility of final site investigations pre-construction identifying unexpected ground conditions, and would be applied pre-construction.

Additionally, micrositing may be required at the point of foundation installation to address any localised hard constraints not previously identified. It is currently anticipated a maximum of 100m micrositing may be required but this will require further consideration when the WTG technology is confirmed. Micrositing would be applied during construction.

Therefore, the Safety Justification is considered a live document that may require updates should layout positions change. Further details of LoD and micrositing are provided in Section 3.1.2, where it is noted that commitments have been made to manage any impact of LoD and micrositing on SAR access lanes.

This Safety Justification will consider the risk relating to the IRCG remit of emergency response and not general navigation safety.

1.3 Profiles of Authors

1.3.1 James Milne

James is a Principal Risk Analyst at Anatec Ltd and has a decade of experience in offshore marine risk. His speciality is in OWFs, including involvement in the layout approval process for numerous developments including SLoO layouts. James has worked with relevant regulators to agree suitable mitigation such that hazards associated with SLoO layouts are ALARP.

1.3.2 Sam Westwood

Sam is a Director of Anatec Ltd and has over 28 years' experience within the marine industry including in the Merchant Navy as a Vessel Traffic Service (VTS) operator and at the Maritime and Coastguard Agency (MCA) before moving into offshore renewables consulting 15 years ago. Sam specialises in offshore renewables including NRAs and post consent support including layout design.

1.3.3 Mark Prior

Mark is a highly experienced aviation professional with a wide range of expertise in certification, safety analysis, investigation, operations, technical issues and regulations. He has over 40 years' experience as a pilot, initially in the Royal Air Force (RAF) then as a civil pilot with SAR trials and certification experience. He was a licensed civil pilot with concurrently 20+ years of experience as a military and then a civil experimental test pilot. Since 2003 he has been an industry representative on a number of rule-making, operational and research groups. He has been an independent consultant since 2016.

2 Guidance and Methodology

2.1 Guidance

The principal guidance documents that have been considered and applied in the drafting of the Safety Justification are as follows:

- *DoT Guidance on Safety of Navigation & Emergency Response: Offshore Renewable Energy Installations (OREI)* (DoT, 2025a);
- *Standard Operating Procedure 07-2025 Offshore Renewable Energy Installations (OREI): Guidance and Operational Considerations for SAR and Emergency Response* (DoT, 2025b); and
- *Revised Guidelines for Formal Safety Assessment (FSA) for Use in the International Maritime Organization (IMO) Rule-Making Process* (IMO, 2018).

The Guidance on Safety of Navigation & Emergency Response (DoT, 2025a) references the IMO FSA (IMO, 2018) which is a marine standard for risk assessment. The FSA has therefore been applied within this Safety Justification.

2.2 Risk Assessment Methodology

The FSA process considers five main steps:

1. **Identification of hazard** scenarios building on the work of the NRA and in relation to the proposed SLoO layouts.
2. **Risk analysis** including consideration of embedded mitigations. This will be identified as severity of consequence versus frequency of occurrence. Consequence and frequency ranking are defined in Table 2.1 and Table 2.2, respectively. This step will separately consider risks in relation to the proposed SLoO.
3. **Identification of further mitigations** required to reduce the risk to ALARP, if required.
4. **Cost benefit analysis** – if required.
5. **Statement of risk** and determination of ALARP status. Overall significance of each impact is determined using a tolerability matrix as defined in Table 2.3. The risk of a hazard is defined as Broadly Acceptable (low risk), Tolerable with Mitigation (intermediate risk) or Unacceptable (high risk).

Unacceptable risks are not considered to be ALARP and will need additional mitigation.

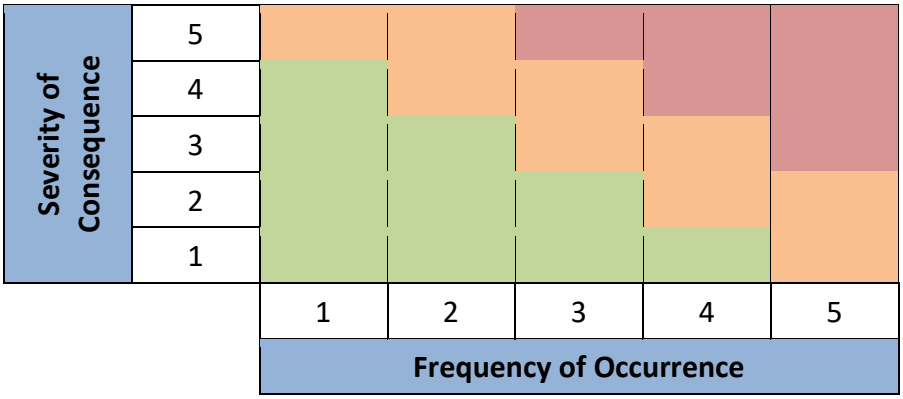
Table 2.1 Severity of Consequence Ranking Definitions

Rank	Description	Definition			
		People	Property	Environment	Business
1	Negligible	No perceptible impact	No perceptible impact	No perceptible impact	No perceptible impact
2	Minor	Slight injury(ies)	Minor damage to property, i.e., superficial damage	Local assistance required	Minor reputational risks – limited to users
3	Moderate	Multiple minor or single serious injury	Damage not critical to operations	Limited external assistance required	Local reputational risks
4	Serious	Multiple serious injuries or single fatality	Damage resulting in critical risk to operations	Regional assistance required	National reputational risks
5	Major	More than one fatality	Total loss of property	National assistance required	International reputational risks

Table 2.2 Frequency of Occurrence Ranking Definitions

Rank	Description	Definition
1	Negligible	< 1 occurrence per 10,000 years
2	Extremely unlikely	1 per 100 to 10,000 years
3	Remote	1 per 10 to 100 years
4	Reasonably probable	1 per 1 to 10 years
5	Frequent	Yearly

Table 2.3 Tolerability Matrix and Risk Rankings



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

3 Project Description

3.1 Layout Options

The array area is located within the Irish Sea with its closest point, from the south-west corner, approximately 6.1 nautical miles (nm) from Skerries on the coast of County Dublin. Charted water depths within the array area vary between 30 and 63 metres (m) below Lowest Astronomical Tide (LAT).

Figure 3.1 and Figure 3.2 present Project Option 1 (49 WTGs) and Project Option 2 (35 WTGs), respectively. Both current layout options include an Offshore Substation Platform (OSP) which are also shown in the figures.

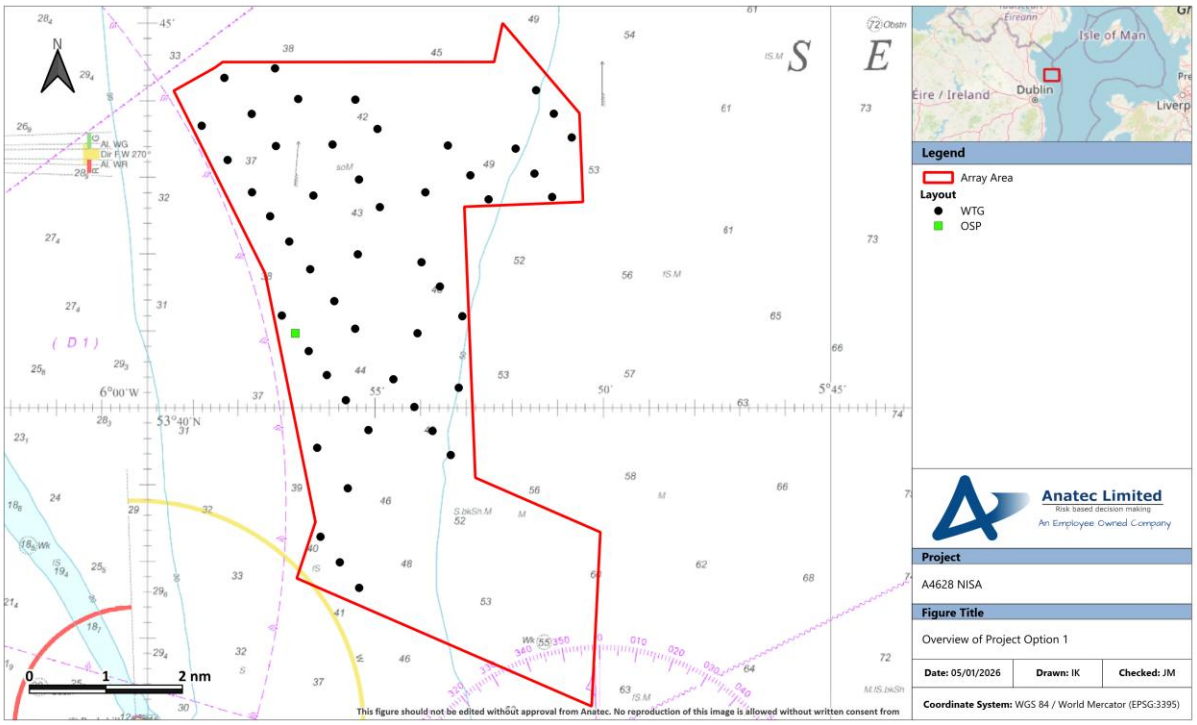


Figure 3.1 Overview of Project Option 1

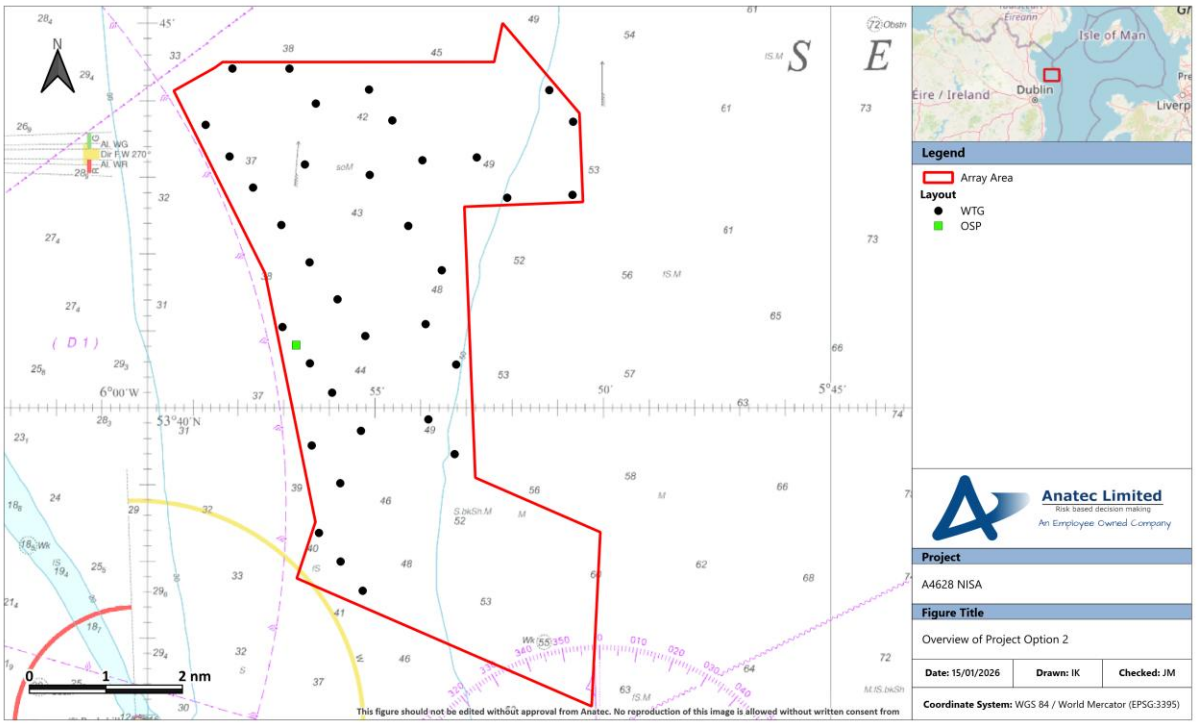


Figure 3.2 Overview of Project Option 2

3.1.1 Search and Rescue Access Lanes for the Proposed Development

For the purposes of maximising Probability of Detection (PoD), both layout options have been designed and refined in liaison with IRCG to ensure SAR access lanes are available in at least one line of orientation throughout the array area. This includes an update to the structure foundations to suction buckets, which introduces greater flexibility for placement with respect to seabed conditions, and subsequently allows the structures to be positioned in straight rows. The proposed four-legged suction bucket jackets are a shallower foundation compared to monopiles or pin piles and are installed via suction pressure through the use of high powered pumps which allows the structure to be installed without any use of mechanical force. These foundations will have a sea surface dimension of up to 25×25m and a maximum seabed dimension of 50×50m. An illustration of the proposed suction bucket jacket foundations is presented in Figure 3.3.

The SAR access lanes have been defined using the methodology described in the SOP 07 2025 OREI Guidance and Operational Considerations for SAR and Emergency Response (DoT, 2025b), i.e., all are at least 500m width measured tip to tip.

Full details and illustration of the SAR access lane coverage is provided in Appendix A.

Figure 3.3 Suction Bucket Jacket Foundations

3.1.2 Limit of Deviation and Micrositing

As introduced in Section 1.2, the Developer has sought LoD and micrositing capabilities for structures within the proposed layout. These are detailed further in the sections below with both scenarios indicatively illustrated for a WTG in the layout of Project Option 1 in Figure 3.4.

3.1.2.1 Limits of Deviation

The layouts have been defined based on the current understanding of ground conditions. The survey information used to date is primarily based on geophysical data, with only very limited ground truthing available.

Due to the uncertainty in the ground conditions at the proposed structure locations the use of 500m LoD will be needed to mitigate the risk of the geotechnical surveys identifying unexpected ground conditions which then require a structure relocation. As well as ground conditions other constraints such as archaeological features, UXO, bedforms, pockmarks, boulder or general debris could also be identified and may result in a need for relocation within the LoD.

Using LoD an individual structures within a layout could be sited in a position up to 500m from the consented position. This relocation will only occur whilst also retaining linear alignment along the row of structures. This is illustrated in Figure 3.4 where an indicative relocation using the maximum 500m LoD has been applied.

The final layout pre-construction with LoD applied (where required) will be discussed and agreed with IRCG as a post consent sign off.

The commitment to linear movement only ensures that sufficient SAR access and probability of detection is retained whilst still providing the necessary flexibility required during foundation installation in the event of unexpected constraints.

3.1.2.2 Micrositing

In addition to LoD, micrositing of structures at a localised extent may also be required upon foundation installation. This could be due to smaller localised hard constraints not previously identified such as boulders or hard lenses of sand. Due to the inclusion of suction bucket jacket foundations, there is also the potential for failure of installation due to the liquification of soil caused by the suction pressure or differential penetration leading to tilting.

This would require the foundation location to be relocated away from the previous bucket footprints (as shown in Figure 3.5). Given the dimensions of the foundation footprint (50m x 50m at the seabed) the Developer requires a maximum of 100m micro siting capabilities which if required would be applied during installation.

Micrositing required for an individual structure within a layout could be up to 100m from its consented position. Like LoD this relocation will only occur whilst also retaining linear alignment along the row of structures. This is illustrated in Figure 3.4 where an indicative relocation using the maximum 100m micrositing has been applied.

Unlike LoD the application of micrositing, as standard within the industry, will not be consulted upon at the time of installation but final as built locations will be reported. This is required given the onsite flexibility required during the installation activity when vessels will be active on site.

The commitment to linear movement only ensures that sufficient SAR access and probability of detection is retained whilst still providing the necessary flexibility required during foundation installation in the event of unexpected constraints.

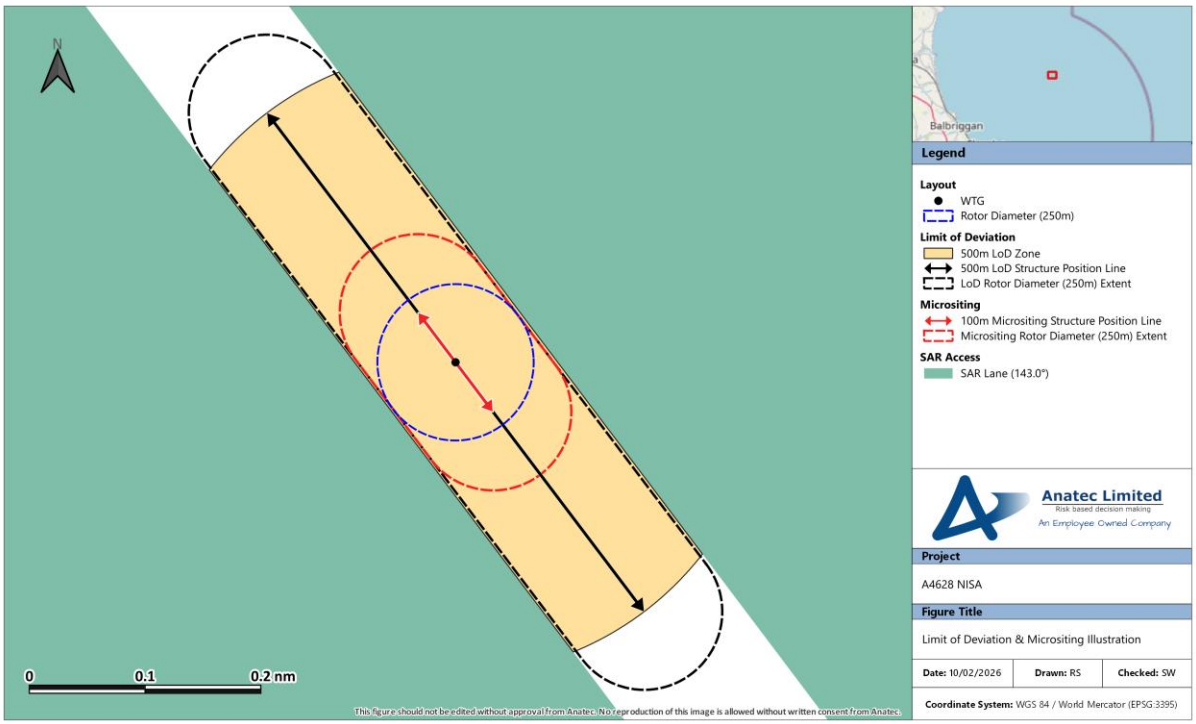


Figure 3.4 Limit of Deviation & Micrositing Illustration

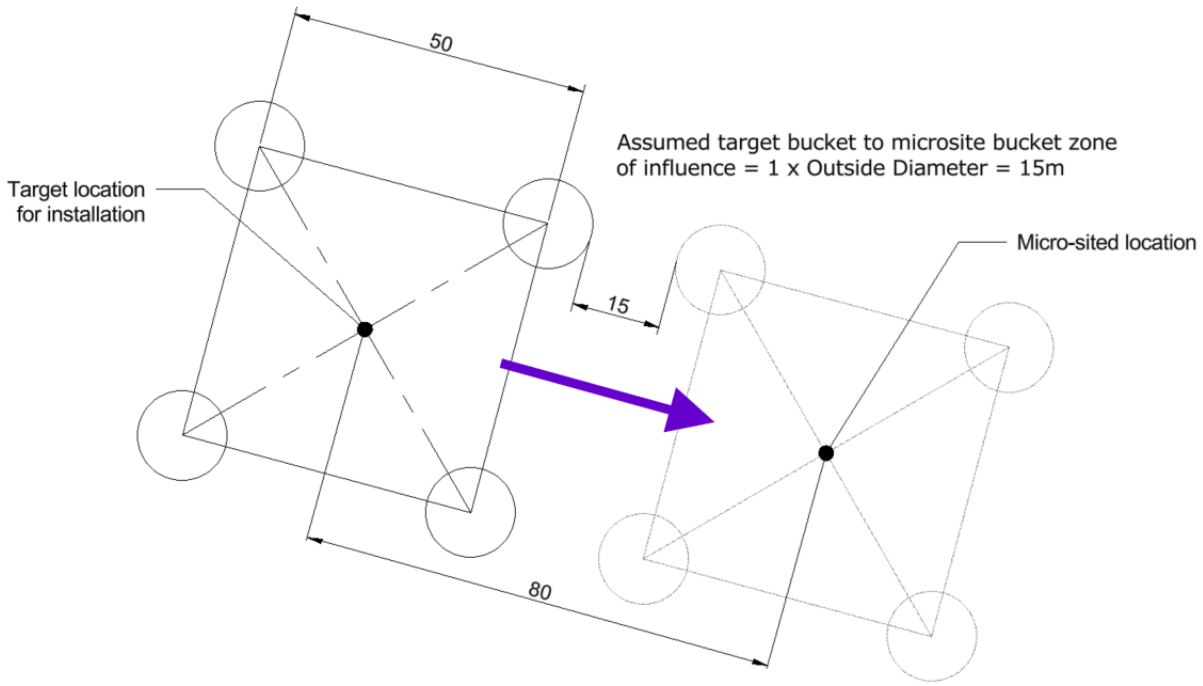


Figure 3.5 Suction Bucket Jacket Foundation Micrositing

3.2 Project Vessels

During each phase of the proposed development, various project vessels will transit to and from the Proposed Development and undertake numerous activities within the array area.

During the construction phase, the following vessel types are expected to be on-site during certain periods:

- Jack up vessels;
- Heavy Lift Vessels (HLV);
- Service Operations Vessels (SOV);
- Crew Transfer Vessels (CTV);
- Heavy Transport Vessels (HTV);
- Feeder barges;
- Tugs;
- Dredging vessels;
- Fall pipe vessels;
- Cable installation vessels;
- Offshore supply vessels; and
- Support vessels.

During the operation and maintenance phase, the following vessel types are expected to be on-site where required:

- CTVs;
- SOVs; and
- Jack up vessels.

All project vessels will broadcast positions via Automatic Identification System (AIS) data, and project personnel will wear Personal Locator Beacons (PLB) at all times.

Project vessels may be able to respond or react to maritime emergencies (e.g. pollution or a drifting vessel) which present an actual or possible threat to the safety of life or property. Project vessels will be well equipped and crewed by well trained professional mariners, and therefore are likely to be well placed to assist in SAR operations if requested by IRCG. Appendix B provides a list of instances of wind farm vessels responding to emergency incidents.

3.3 Construction Phase

During the construction phase, the Developer will establish a Marine Coordination Centre (MCC) which will be used during the construction and decommissioning phases. This will represent a central control base with overarching responsibility for managing and monitoring project vessels and personnel. Marine coordination will be in place 24/7 during construction. Key responsibilities for the MCC will include tracking vessel movements within the array area (project vessel and third party) and tracking project personnel locations. The MCC will also

establish and implement weather limits to ensure construction vessels are off-site in inclement conditions.

3.4 Operation and Maintenance

The location of the Proposed Development will be in proximity to the Operations and Maintenance Facility (OMF), with the adaption and leasing of an existing port facility at Greenore currently being considered. The OMF will include berthing facilities to support three to four CTVs as well as vessel bunkering services for fuel and potable water.

CTVs can provide daily access to the array area from the OMF, with the capability to carry around 12 passengers and transit at speeds of up to 25 knots when wave heights are typically below 1.5m. CTV movements will primarily occur during morning and evening with the CTV remaining on-site in between.

The WTGs will be remotely monitored and controlled by a central Supervisory Control and Data Acquisition (SCADA) system, which will be connected via fibre optic link. This will facilitate remote operation of the WTGs. Each WTG has its own control system which can enable, for example, yaw and brake control. Each WTG also can be manually controlled from within the WTG itself.

The principal wind farm management and marine coordination systems will be located at the OMF. This will include an emergency response control centre.

3.5 Site Location Relative to Existing Search and Rescue Resources

Figure 3.6 shows the locations of the IRCG SAR bases alongside the Marine Rescue Coordination Centres (MRCC) in Ireland relative to the proposed development.

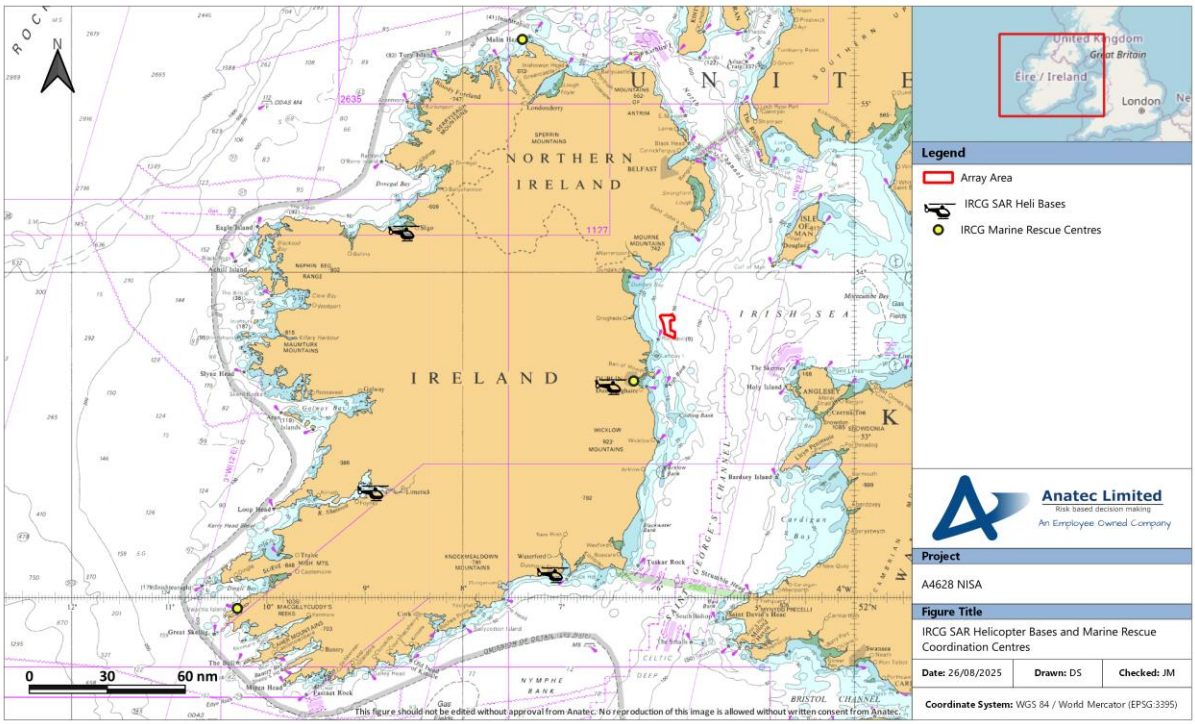


Figure 3.6 IRCG SAR Helicopter Bases and Marine Rescue Coordination Centres

The IRCG has four SAR helicopter bases around the country located at Weston, as well as at Waterford, Sligo, and Shannon. These bases are transitioning towards Bristow operations, from the previous operators CHC. This involves upgrading to AW189 helicopters from the Sikorsky S-92s, with Shannon the first to do so and the others to change by the end of 2026. The IRCG also operate a fixed wing service, provided by two King Air 200 aircraft based out of Shannon.

The closest IRCG SAR base to the array area is located at Weston Airport, approximately 26nm south-west from the array area.

The IRCG operates three MRCCs around Irish waters, based in Dublin, Malin Head, and Valentia Island. The locations of these bases are presented in Figure 3.6. The closest of these centres to the array area is Dublin (a National Maritime Operations Centre (NMOC)) which provides marine SAR response services and co-ordinates the response to marine casualty incidents within the Irish Exclusive Economic Zone (EEZ).

The IRCG also manages 44 Coast Guard Units throughout Ireland. These are volunteer cells which provide a localised focus for coastal search operations, with some units also capable of providing cliff rescues, boat rescues, and unmanned aerial vehicles searches. Of particular relevance to the proposed development are the Skerries, Clogherhead, Drogheda, Howth, and Greenore Coast Guard Units, which are situated approximately between 6 and 18nm from the array area.

Figure 3.7 presents the locations of Royal National Lifeboat Institution (RNLI) stations in proximity to the proposed development. Following this, Table 3.1 summarises the types of lifeboat operated by the RNLI out of these stations and the minimum distance from each station to the array area. Although a helicopter may be used for SAR operations within the array area, it is noted that there are RNLI stations located in closer proximity, notably at Skerries which means surface assets are located nearby. Annex I to DoT Guidance on Safety of Navigation & Emergency Response: OREI (DoT, 2025a) states that "*surface vessels, in most circumstances, will be the most appropriate means of rescue from within wind farms or close to other OREI*".

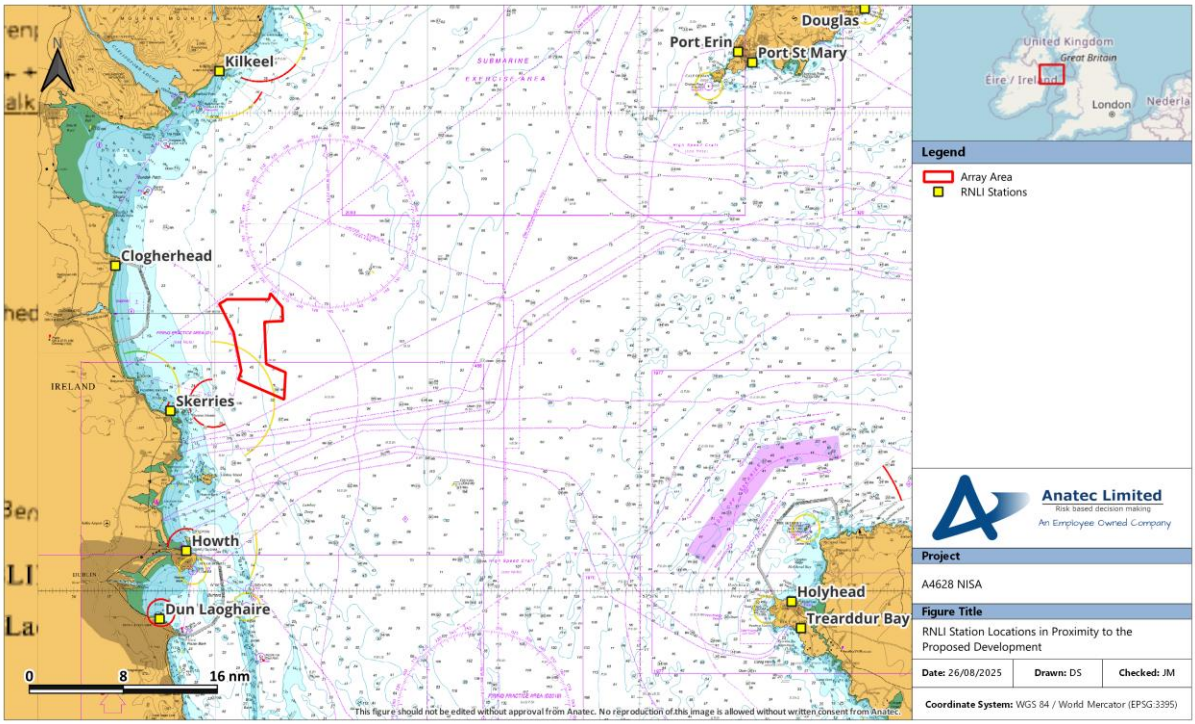


Figure 3.7 RNLI Station Locations in Proximity to the Proposed Development

Table 3.1 Types of Lifeboat Held at RNLI Stations in Proximity to the Proposed Development

Station	Lifeboat(s)	All-Weather Lifeboat (ALB) Class	Inshore Lifeboat (ILB) Class	Minimum Distance to Array Area (nm)
Skerries	ILB	-	B Class	6.3
Clogherhead	ALB	Shannon	-	9.2
Howth	ALB and ILB	Trent	D Class	15.1
Kilkeel	ILB	-	B Class	19.0
Dun Laoghaire	ALB and ILB	Trent	D Class	23.7

Also available to IRCG are Community Rescue Boats Ireland (CRBI), a group of independent volunteer rescue craft able to respond to emergencies in their vicinity. The relevant CRBI location for the proposed development is at Drogheda (the Boyne Fishermens Rescue and Recovery Service (BFRRS)). Based on location it is considered that an RNLI asset would be more likely to respond to an incident in the array area than a CRBI asset.

4 Users of the Array Area

This section assesses 28 days of Automatic Identification System (AIS) data (2022) and ten years of RNLI incident data (2015-2024) to identify likely users of the array area i.e., parties which may require an emergency response. These datasets have been assessed within a 10 nautical mile (nm) buffer of the array area (the 'study area').

4.1 Third Party Vessels

The majority of vessels transiting in proximity to the array area are fishing vessels with commercial vessels (cargo, tanker, and passenger) on more defined routeing. This is illustrated in Figure 4.1 which shows 28-days of seasonal varied vessel traffic survey data collected over two 14-day periods in summer and winter of 2022, colour coded by vessel type.

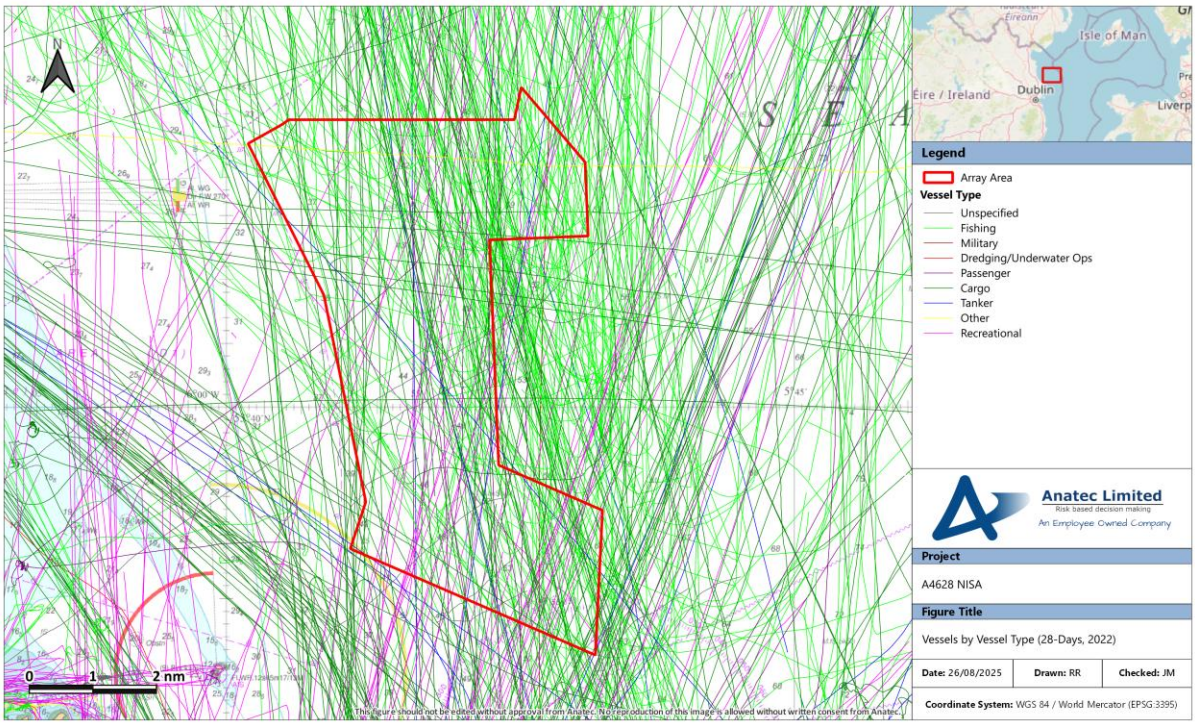


Figure 4.1 Vessels by Type (28 Days, 2022)

Commercial vessels are on defined routes primarily to the south-east and south-west of the array area with routes to/from Drogheda and Warrenpoint routeing through the array area. There is sufficient sea room both to the north and east of the array area for these vessels to undertake a minor deviation as it is considered extremely unlikely that a larger vessel would deliberately choose to transit through the array area given the presence of the structures associated with the proposed development.

Fishing vessels are widespread over the area covered by the array area, on transit to/from fishing grounds and local harbours such as Skerries Harbour or Port Oriel Harbour. The main fishing grounds to the east and north of the array area are highly seasonal nephrops fishing grounds and constitute the majority of the fishing activity, with this more prevalent in the

summer months. Other small craft such as recreational vessels were also commonly recorded transiting in proximity to and within the array area, especially during the summer months These are therefore the most likely third party vessels to be within the array area and require an emergency response in the event of an incident.

This aligns with a study of ten years of RNLI incident data from 2015 and 2024, which showed a total of one incident within the array area featuring a recreational vessel. The logged visibility was "*good*" with "*clear skies*" report for weather. A figure highlighting the RNLI incidents by vessel type in proximity to the array area is presented in Figure 4.2.

The only other casualty types in proximity to the array area during this period were from other recreational (sailing and powered), fishing vessels, and one motorboat – all of which were machinery/equipment failure. No commercial vessel casualties were recorded within the study area during the 10-year period.

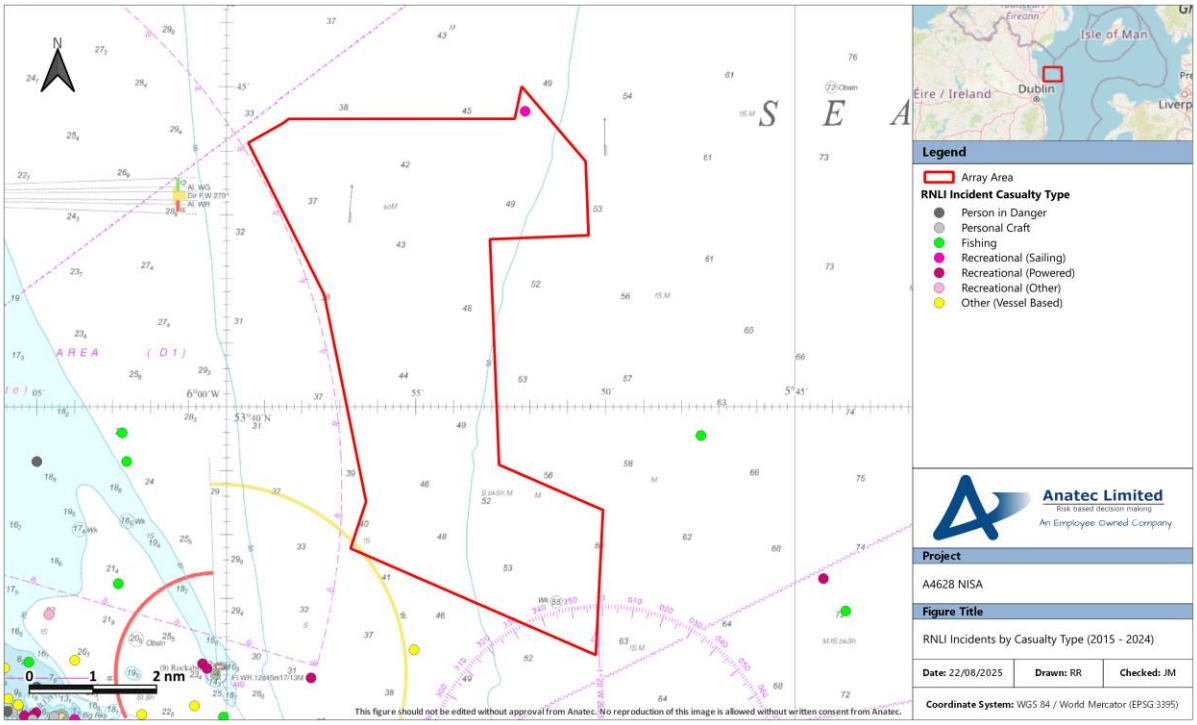


Figure 4.2 RNLI Incidents by Casualty Type (2015 - 2024)

4.2 Project Vessels

As per Section 3.2 there will be various project vessels on site during all phases of the proposed development. These vessels will need to be located within the array area to undertake the necessary works and therefore may require an emergency response within the array area in the event of an incident. It is noted that, as per Section 5.2, self-help procedures will be in place and project vessels may be able to assist in incidents associated with third parties in liaison with IRCG. Appendix B provides examples of cases where UK wind farm project vessels have assisted in incidents not associated with or caused by the wind farm.

4.3 Water Sports

In addition to vessel transits, there may be users engaged in water sports requiring SAR assistance in the vicinity of the array area. Figure 4.3 presents the locations of incidents within the study area from the RNLI dataset during activities classed as water sports (jet skiing, kayak/canoeing, kitesurfing, paddleboarding, use of an inflatable, and rowing boats) in proximity to the array area during a ten-year period from 2015 to 2024.

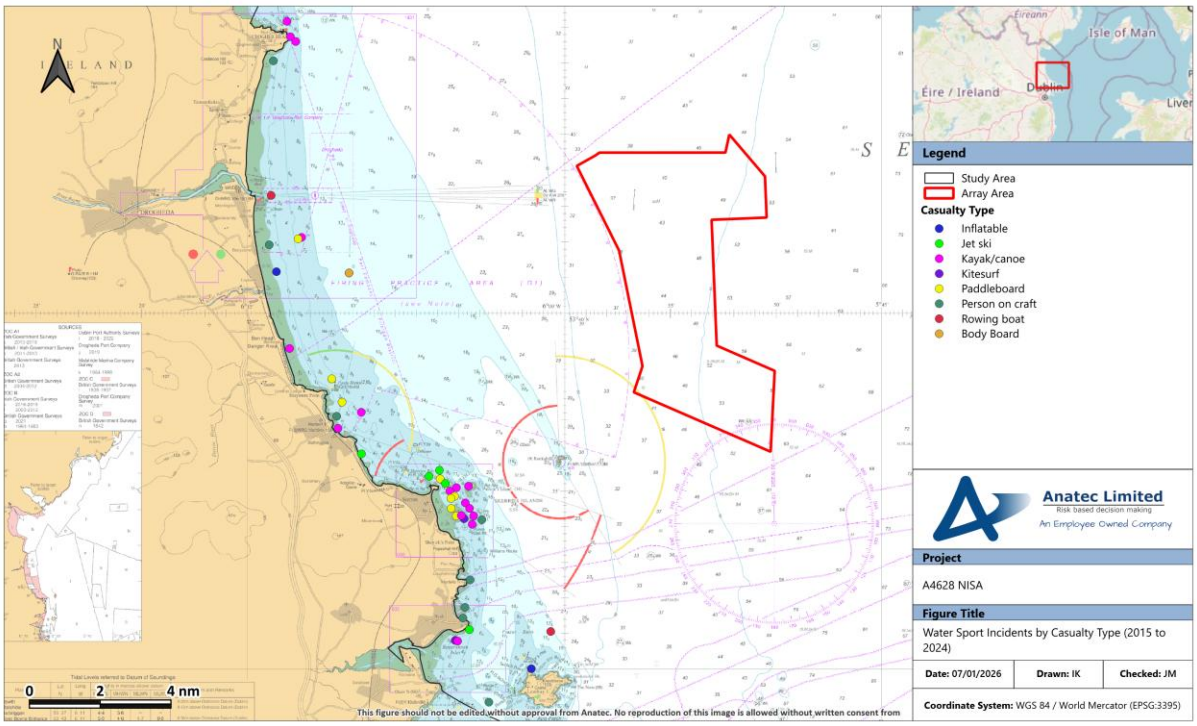


Figure 4.3 Water Sport Incidents by Casualty Type (2015 to 2024)

There were no water sports incidents within the array area from 2015 to 2024, nor in proximity. The closest involving a kayak/canoe was located 5.3nm to the west at St Patrick's Island.

Based on the distance from shore, and lack of recorded incidents within the array area, it is considered that water sports activities will be a very rare occurrence within the array area. Should they occur, they are likely to be undertaken when visibility conditions are good. This aligns with the RNLI data which shows the majority of water sports incidents within the study area all occurred in "*good*", "*fair*", or "*excellent*" visibility.

4.4 Non-Vessel Based Users

Figure 4.4 presents the locations of non-vessel based incidents involving swimmers in proximity to the array area during a ten-year period from 2015 to 2024. It is noted that no diving incidents were recorded within the study area. Given that there is only one charted wreck located within the array area, it is not anticipated the diving activity will occur regularly.

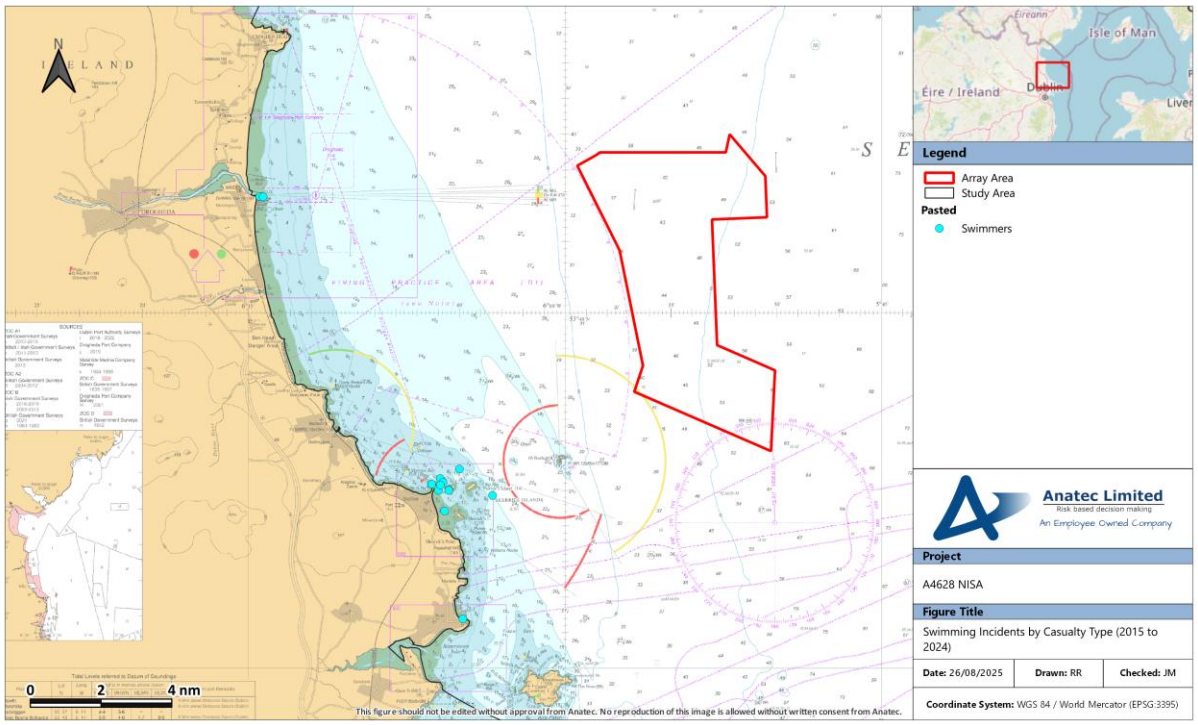


Figure 4.4 Swimming Incidents by Casualty Type (2015 to 2024)

There were no incidents involving a swimmer in the array area from 2015 to 2024, nor in proximity. The closest was located 4.9nm to the west around the Skerries Islands. This is as would be expected given the distance offshore of the array area. A total of 13 incidents involving swimmers were recorded within the study area across the 10-year period, all of which were reported in proximity to the Skerries Islands and occurred in "*good*" or "*excellent*" visibility based on the RNLI data.

Based on the distance from shore, and lack of recorded incidents within the array area, it is therefore considered highly unlikely that individuals swimming or diving will occur within the array area.

5 Risk Assessment

5.1 Hazard Identification

Based on the findings of Section 4, the following hazards have been identified as potentially occurring in or near the array area and therefore requiring an emergency response that may be impacted by a SLoO layout:

- **Person in the water**
  - Project personnel or crew member;
  - From third-party vessel; or
  - Third-party water sports, swimmer or diver.
- **Vessel capsize in array area**
  - Project vessel; or
  - Third-party vessel.
- **Oil spill**
  - Project vessel; or
  - Third-party vessel.
- **Vessel grounding**
  - Project vessel; or
  - Third-party vessel.
- **Injured person requiring extraction from array area**
  - Project personnel.
- **Drifting vessel**
  - Project vessel; or
  - Third-party vessel.
- **Fire**
  - WTG or OSP; or
  - On vessel.
- **Salvage operation**

5.2 Embedded Mitigation Measures

This section summarises the mitigation in place deemed of relevance to this Safety Justification. It is noted that other mitigations are in place to reduce the frequency of an on-site incident occurring (e.g., charting of infrastructure, marine Aids to Navigation); however, this section focuses on the mitigations in place that are of direct relevance to assisting an emergency response scenario i.e., assuming an incident has already occurred.

The proposed development will have capability of responding to Tier 1 incidents; Tier 2 and Tier 3 incidents may require support in line with the National Maritime Oil/HNS Spill Contingency Plan (DoT, 2020).

The mitigations are provided in Table 5.1. The mitigations shown are not intended to replace the SAR checklist process which will be undertaken at the appropriate time post consent.

Table 5.1 Embedded Mitigations

Embedded Mitigation Measure	Description
Emergency Response Cooperation Plan (ERCoP)	An ERCoP will be produced pre-construction that details the communication and cooperation procedures that will be in place between the Developer and IRCG. This will include an emergency contact list and be in IRCG template.
Emergency Response Plan (ERP)	The Developer will have its own internal response procedures in place via its ERP that will include: ▪ Roles and responsibilities; ▪ Facilities; ▪ Medical needs assessment and equipment; ▪ Reporting and Investigation; ▪ Media contacts; ▪ Next of Kin procedure; ▪ Procedures by incident type including escape and evacuation; and ▪ Flow diagram for when an incident exceeds Tier 1 capability.
Firefighting equipment	WTGs will be equipped with firefighting equipment and hatches on nacelles. WTG supplier will issue a fire risk assessment and evacuation plan.
Layout design and refinement	Layouts have been designed and refined to maximise SAR coverage as far as practicable. Available SAR access lane coverage is provided in Appendix A.
Lighting and marking	All WTGs will be fitted with SAR lights that emit in the infra-red. All structures will have lit Identification (ID) boards and navigational aids plus selected structures will broadcast AIS positions.
Medical advice	The project will ensure that all personnel have high level medical training. Dial A Doctor will also be available.
OMF Marine Coordination System (MCS)	Dedicated marine site monitoring and tracking from O&M for project vessels when personal on-site. MCS manned from the OMF when any wind farm/Eirgrid working party offshore. Remote access to MCS system will be provided to IRCG to provide live site traffic and weather/sea conditions.
OSP life rafts	The OSP will be equipped with life rafts, noting that these will be under the control of EirGrid.
Participation in joint exercises	The proposed development will work closely with the RNLI and IRCG and can offer vessels for winch training with the RNLI and IRCG.
Personnel location monitoring	Digital tracking of all personnel locations, activity, and certifications via a swipe-on/swipe-off system when boarding or disembarking a project vessel.
PLBs	All project personnel will be required to be fitted with PLB and a database will be maintained of their ownership.
Pollution contingency planning	In line with Project Oil/HNS Spill Contingency Plan, National Maritime Oil/HNS Spill Contingency Plan (DoT, 2020) and SOP 01-202 - Assessment and notification of a pollution incident (DoT, 2020b).
Pollution kits on project vessels	Personnel will be trained to MCA standards and once aware of pollutants, personnel will have relevant spill response training for response.

Embedded Mitigation Measure	Description
Project vessel compliance with international marine regulations	Compliance from all project vessels with Irish Law, international maritime regulations as adopted by the relevant flag state including the Convention on the International Regulations for Preventing Collisions at Sea (COLREGs) (IMO, 1972/77) and the International Convention for the Safety of Life at Sea (SOLAS) (IMO, 1974). Assistance under SOLAS will be undertaken in liaison with IRCG.
Project vessel location monitoring	All project vessels will broadcast positions via AIS to the MCS and monitored while on duty.
Remote WTG control	WTGs remotely controllable (i.e., on a full wind farm basis, individually, or predefined routes) including yaw and brake actions.
Self-help capability	Provision of project vessel(s) and other assets to respond or react to other maritime emergencies associated with the proposed development. Man overboard devices will be present onboard CTVs.
Support vessel	Support vessels will be present during any sensitive operations and will be based on risk assessment.
Survival suits	All personnel will be required to be fitted with survival suits in certain environmental conditions and when undertaking certain tasks while on-site.
Survival training	All personnel will be required to undertake survival training prior to working on-site.
Weather monitoring	On site monitoring via waveriders, Radar, and StormGeo. Vessel specific weather limits will be in place.
Wireless communications	Terrestrial Trunked Radio (TETRA) or equivalent i.e., closed system Very High Frequency (VHF)

5.3 Formal Safety Assessment

The risk assessment undertaken via the FSA is presented in Table 5.2.

Table 5.2 Risk Assessment

Hazard Scenario	Embedded Mitigation Measure	Does a SLoO Mean Additional Mitigation is Required	Likely Frequency	Likely Consequence	Significance of Risk	Are Additional Mitigation Required for ALARP as a result of SLoO
Person in the water – proposed development personnel	▪ ERCoP; ▪ ERP; ▪ Lighting and marking; ▪ Medical advice; ▪ OMF MCS; ▪ OSP life rafts; ▪ Personnel location monitoring; ▪ PLBs; ▪ Remote WTG control; ▪ Self Help capability; ▪ Support vessel; ▪ Survival suits; ▪ Survival training; and ▪ Wireless communications.	Noted that project personnel will have PLBs reducing the time of a search. This will permit a helicopter to transit direct to the casualty and minimise the search time and search area / use of SAR access lanes. If SAR access lanes are required, as per Appendix A the layouts have been defined such that a SLoO is available in all parts of the array area to maximise the POD in a search operation and allow access to all parts of the array area if an extraction is required. This includes the arrangement of the WTGs in straight rows (inclusive of LOD), which ensures that POD is optimised.	Extremely Unlikely *Project vessels considered most likely marine user of the array area based on the data studied (Section 4); however project personnel will have PLBs.*	Minor	Broadly Acceptable	N/A
Person in the water – third party overboard from vessel	▪ ERCoP; ▪ Layout design and refinement; ▪ Lighting and marking; ▪ Medical advice; ▪ OMF MCS; ▪ Participation in joint exercises; and	The most likely third-party vessel users in the array area expected to be smaller fishing or recreational vessels. Recreational vessels in particular are more likely to be out in good visibility meaning SAR access lanes may not be required.	Extremely Unlikely *No records of person overboard within array area in RNLI data studied i.e.,*	Major	Tolerable	Agreement with IRCG on access procedures for site monitoring (AIS, Radar, CCTV) through SAR Checklist process, noting appropriate maintenance and testing procedures will be in place.

Hazard Scenario	Embedded Mitigation Measure	Does a SLoO Mean Additional Mitigation is Required	Likely Frequency	Likely Consequence	Significance of Risk	Are Additional Mitigation Required for ALARP as a result of SLoO
	▪ Remote WTG control.	If SAR access lanes are required, as per Appendix A the layouts have been defined such that a SLoO is available in all parts of the array area to maximise the POD in a search operation and allow access to all parts of the array area if an extraction is required. Helicopters would only be exposed to WTGs for short periods in any given pass through the wind farm, and POD can also be achieved via flying over or around the array area and using the helicopter's onboard sensors. The IRCG King Air 200 aircraft could also be used to overfly the array and use its onboard sensors to locate the casualty. Unless the vessel had only one crew member, the remaining personnel on the vessel will likely be able to raise the alarm and provide an accurate location for the MOB. This will reduce the search area and permit the entry and transit through the array to be pre-planned.	*frequency low (Section 4.1).*			

Hazard Scenario	Embedded Mitigation Measure	Does a SLoO Mean Additional Mitigation is Required	Likely Frequency	Likely Consequence	Significance of Risk	Are Additional Mitigation Required for ALARP as a result of SLoO
		In poor visibility, SAR operations may be more complex due to the presence of a SLoO.				
Person in the water – third party water sports, swimmer or diver	▪ ERCoP; ▪ Layout design and refinement; ▪ Lighting and marking; ▪ Medical advice; ▪ OMF MCS; ▪ Remote WTG control; and ▪ Participation in joint exercises.	Water sports in the array area are considered to be a very rare occurrence and if they do occur are likely to be undertaken when conditions in particular visibility are good and therefore the SAR access lanes may not be required (Section 4.3). If SAR access lanes are required, as per Appendix A the layouts have been defined such that a SLoO is available in all parts of the array area to maximise the POD in a search operation and allow access to all parts of the array area if an extraction is required. Helicopters would only be exposed to WTGs for short periods in any given pass through the wind farm, and POD can also be achieved via flying over or around the array area and using the helicopter's onboard sensors.	Negligible *No records requiring emergency response in array area in RNLI data studied i.e., frequency low.*	Major	Tolerable	Agreement with IRCG on access procedures for site monitoring (AIS, Radar, CCTV) through SAR Checklist process, noting appropriate maintenance and testing procedures will be in place.

Hazard Scenario	Embedded Mitigation Measure	Does a SLoO Mean Additional Mitigation is Required	Likely Frequency	Likely Consequence	Significance of Risk	Are Additional Mitigation Required for ALARP as a result of SLoO
		In poor visibility, SAR operations may be more complex due to the presence of a SLoO.				
Vessel capsize in array area – project vessel	▪ ERCoP; ▪ ERP; ▪ Layout design and refinement; ▪ Medical advice; ▪ OMF MCS; ▪ OSP life rafts; ▪ PLBs (if man overboard); ▪ Pollution contingency planning; ▪ Pollution kits on project vessels; ▪ Project vessel compliance with international marine regulations; ▪ Project vessel location monitoring; ▪ Remote WTG control if helicopter requires access;	As per Appendix A the layouts have been defined such that a SLoO is available in all parts of the array area to maximise the POD in a search operation if required following a capsize and allow access to all parts of the array area for air and surface assets to reach the vessel. Noted that project vessels will have AIS and personnel will have PLBs reducing the area of the search and therefore time inside the array area (Section 3.2).	Extremely Unlikely *Project vessels considered most likely marine user of the array area based on the data studied (Section 4).*	Major	Tolerable	▪ Agreement with IRCG on access procedures for site monitoring (AIS, Radar, CCTV) through SAR Checklist process, noting appropriate maintenance and testing procedures will be in place. ▪ Plans for salvage operations for project vessels if required.

Hazard Scenario	Embedded Mitigation Measure	Does a SLoO Mean Additional Mitigation is Required	Likely Frequency	Likely Consequence	Significance of Risk	Are Additional Mitigation Required for ALARP as a result of SLoO
	▪ Participation in joint exercises; ▪ Self help capability; ▪ Support vessel; ▪ Survival suits; and ▪ Survival training.					
Vessel capsize in array area – third party vessel	▪ ERCoP; ▪ Layout design and refinement; ▪ Medical advice; ▪ OMF MCS; ▪ Participation in joint exercises; ▪ Pollution contingency planning; and ▪ Remote WTG control..	As per Appendix A the layouts have been defined such that a SLoO is available in all parts of the array area to maximise the POD in a search operation if required following a capsize and allow access to all parts of the array area for air and surface assets to reach the vessel.	Negligible *No records of capsize within array area in RNLI data studied i.e., frequency low (Section 4.1).*	Major	Tolerable	▪ Agreement with IRCG on access procedures for site monitoring (AIS, Radar, CCTV) through SAR Checklist process, noting appropriate maintenance and testing procedures will be in place.
Oil spill – Project vessel	▪ ERCoP; ▪ ERP; ▪ Fire fighting equipment; ▪ OMF MCS; ▪ Pollution contingency planning;	As per Appendix A the layouts have been defined such that a SLoO is available in all parts of the array area allowing access to all parts of the array area for air and surface assets to reach the oil spill. Search operations not required and therefore additional mitigation for a SLoO is not necessary.	Remote *Project vessels considered most likely marine user of the array area based on the data studied (Section 4).*	Minor	Broadly Acceptable	N/A

Hazard Scenario	Embedded Mitigation Measure	Does a SLoO Mean Additional Mitigation is Required	Likely Frequency	Likely Consequence	Significance of Risk	Are Additional Mitigation Required for ALARP as a result of SLoO
	▪ Pollution kits on vessels; ▪ Project vessel compliance with international marine regulations; and ▪ Self help capability.					
Oil spill – third party vessel	▪ ERCoP; ▪ OMF MCS; and ▪ Pollution contingency planning.	As per Appendix A the layouts have been defined such that a SLoO is available in all parts of the array area allowing access to all parts of the array area for air and surface assets to reach the oil spill. Search operations not required and therefore additional mitigation for a SLoO is not necessary.	Extremely Unlikely *No records of an oil spill within array area in RNLI data studied i.e., frequency low (Section 4.1).*	Serious	Tolerable with Mitigation	N/A
Vessel grounding – project vessel	▪ ERCoP; ▪ ERP; ▪ Medical advice; ▪ OMF MCS; ▪ Personnel location monitoring; ▪ PLBs (if man overboard); ▪ Pollution contingency planning;	As per Appendix A the layouts have been defined such that a SLoO is available in all parts of the array area to allow access to all parts of the array area for air and surface assets to reach the vessel.	Negligible *Water depths are sufficient such that likelihood of a grounding incident is very low.*	Minor	Broadly Acceptable	N/A

Hazard Scenario	Embedded Mitigation Measure	Does a SLoO Mean Additional Mitigation is Required	Likely Frequency	Likely Consequence	Significance of Risk	Are Additional Mitigation Required for ALARP as a result of SLoO
	▪ Pollution kits on vessels; ▪ Project vessel location monitoring; ▪ Project vessel compliance with international marine regulations; ▪ Remote WTG control; ▪ Self help capability; ▪ Support vessels; ▪ Survival suits; ▪ Survival training; and ▪ Wireless communications.					
Vessel grounding – third party vessel	▪ ERCoP; ▪ OMF MCS; ▪ Pollution contingency planning; and ▪ Remote WTG control.	As per Appendix A the layouts have been defined such that a SLoO is available in all parts of the array area to allow access to all parts of the array area for air and surface assets to reach the vessel.	Negligible *Water depths are sufficient such that likelihood of a grounding incident is very low.*	Minor	Broadly Acceptable	N/A
Injured person requiring extraction –	▪ ERCoP; ▪ ERP; ▪ Lighting and marking; ▪ Medical advice;	As per Appendix A the layouts have been defined such that a SLoO is available in all parts of the array area to allow access to all parts of the array area for air and surface	Reasonably probable	Moderate	Tolerable with Mitigation	N/A

Hazard Scenario	Embedded Mitigation Measure	Does a SLoO Mean Additional Mitigation is Required	Likely Frequency	Likely Consequence	Significance of Risk	Are Additional Mitigation Required for ALARP as a result of SLoO
proposed development personnel	▪ OMF MCS; ▪ Participation in joint exercises; ▪ Personnel Location Monitoring; ▪ PLBs; ▪ Project vessel location monitoring; ▪ Remote WTG control; ▪ Self help capability; ▪ Support vessel; ▪ Survival suits; ▪ Survival training; and ▪ Wireless communications.	assets to reach the casualty. This hazard assumes location of personnel known i.e., search operations not required and therefore additional mitigation for a SLoO is not necessary.	*Project vessels considered most likely marine user of the array area based on the data studied (Section 4).*			
Drifting vessel - project vessel	▪ ERCoP; ▪ ERP; ▪ OMF MCS; ▪ PLBs (if man-overboard); ▪ Pollution contingency planning (if any damage); ▪ Pollution kits on vessels (if any damage);	As per Appendix A the layouts have been defined such that a SLoO is available in all parts of the array area to allow access to all parts of the array area for air and surface assets to reach the vessel. Search operations not required and therefore additional mitigation for a SLoO is not necessary.	Remote *Project vessels considered most likely marine user of the array area based on the data studied (Section 4).*	Minor	Broadly Acceptable	N/A

Hazard Scenario	Embedded Mitigation Measure	Does a SLoO Mean Additional Mitigation is Required	Likely Frequency	Likely Consequence	Significance of Risk	Are Additional Mitigation Required for ALARP as a result of SLoO
	▪ Project vessel location monitoring; ▪ Project vessel compliance with international marine regulations; ▪ Remote WTG control; ▪ Self help capability; ▪ Support vessel; ▪ Weather Monitoring; and ▪ Wireless Communications.					
Drifting vessel - third party vessel	▪ ERCoP; ▪ OMF MCS; ▪ Remote WTG control; ▪ Pollution Contingency Planning (if any damage) ▪ Weather Monitoring	As per Appendix A the layouts have been defined such that a SLoO is available in all parts of the array area to allow access to all parts of the array area for air and surface assets to reach the vessel. Search operations not required and therefore additional mitigation for a SLoO is not necessary.	Extremely Unlikely	Major	Tolerable with Mitigation	N/A
Fire on WTG or OSP	▪ ERCoP; ▪ ERP; ▪ Fire fighting equipment; ▪ Medical advice;	As per Appendix A the layouts have been defined such that a SLoO is available in all parts of the array area to allow access to all parts of the array area for air and surface assets to reach the structure. Search	Remote	Minor	Broadly Acceptable	N/A

Hazard Scenario	Embedded Mitigation Measure	Does a SLoO Mean Additional Mitigation is Required	Likely Frequency	Likely Consequence	Significance of Risk	Are Additional Mitigation Required for ALARP as a result of SLoO
	▪ OMF MCS; ▪ OSP life rafts; ▪ PLBs; ▪ Personnel location monitoring; ▪ Pollution contingency planning; ▪ Pollution kits on vessels; ▪ Remote WTG control; ▪ Self help capability; and ▪ Wireless communications.	operations not required and therefore additional mitigation for a SLoO is not necessary.				
Fire on project vessel	▪ ERCoP; ▪ ERP; ▪ Fire fighting equipment; ▪ Medical advice; ▪ OMF MCS; ▪ PLBs; ▪ Project vessel location monitoring; ▪ Personnel location monitoring;	As per Appendix A the layouts have been defined such that a SLoO is available in all parts of the array area to allow access to all parts of the array area for air and surface assets to reach the vessel. Search operations not required and therefore additional mitigation for a SLoO is not necessary.	Extremely Unlikely	Serious	Tolerable with Mitigation	N/A

Hazard Scenario	Embedded Mitigation Measure	Does a SLoO Mean Additional Mitigation is Required	Likely Frequency	Likely Consequence	Significance of Risk	Are Additional Mitigation Required for ALARP as a result of SLoO
	▪ Pollution contingency planning; ▪ Pollution kits on vessels; and ▪ Self help capability.					
Salvage operations	▪ ERCoP; and ▪ ERP.	As per Appendix A the layouts have been defined such that a SLoO is available in all parts of the array area to allow access to all parts of the array area for air and surface assets to reach the salvage item (e.g., vessel). Search operations not required and therefore additional mitigation for a SLoO is not necessary.	Negligible	Major	Tolerable	Plans for salvage operations for project vessels if required.

6 Summary and Conclusion

The site conditions and constraints present make two lines of orientation of WTGs unachievable in the case of the proposed development and therefore a grid layout is not possible. This Safety Justification has been prepared by the Developer to demonstrate that in the case of the proposed development, hazards associated with a SLoO layout are ALARP.

A SAR access lane analysis has shown that all parts of the array area maintain at least a SLoO i.e., SAR lanes of at least 500m width (tip to tip, or tip to OSP topside). Further details are provided in Appendix A.

AIS and RNLI incident datasets have been analysed to determine likely users of the array area and therefore the potential casualties that may require an emergency response. An FSA has then been applied to show that, with a SLoO, all identified hazards are ALARP assuming the following additional mitigations are applied:

- Agreement with IRCG on access procedures for site monitoring (AIS, Radar) through SAR Checklist process, noting appropriate maintenance and testing procedures will be in place; and
- Plans for salvage operations for project vessels if required.

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Appendix A Search and Rescue Access Lanes

This appendix presents the SAR access lanes that have been identified based on the current layout options. The SAR access lanes have been defined using the methodology described in the SOP 07 2025 OREI Guidance and Operational Considerations for SAR and Emergency Response (DoT, 2025b), i.e., all are at least 500m width measured tip to tip.

A.1 SAR Access Lanes

An overview of the coverage of SAR access for Project Option 1 and Project Option 2 is provided in Figure A.1 and Figure A.2, respectively.

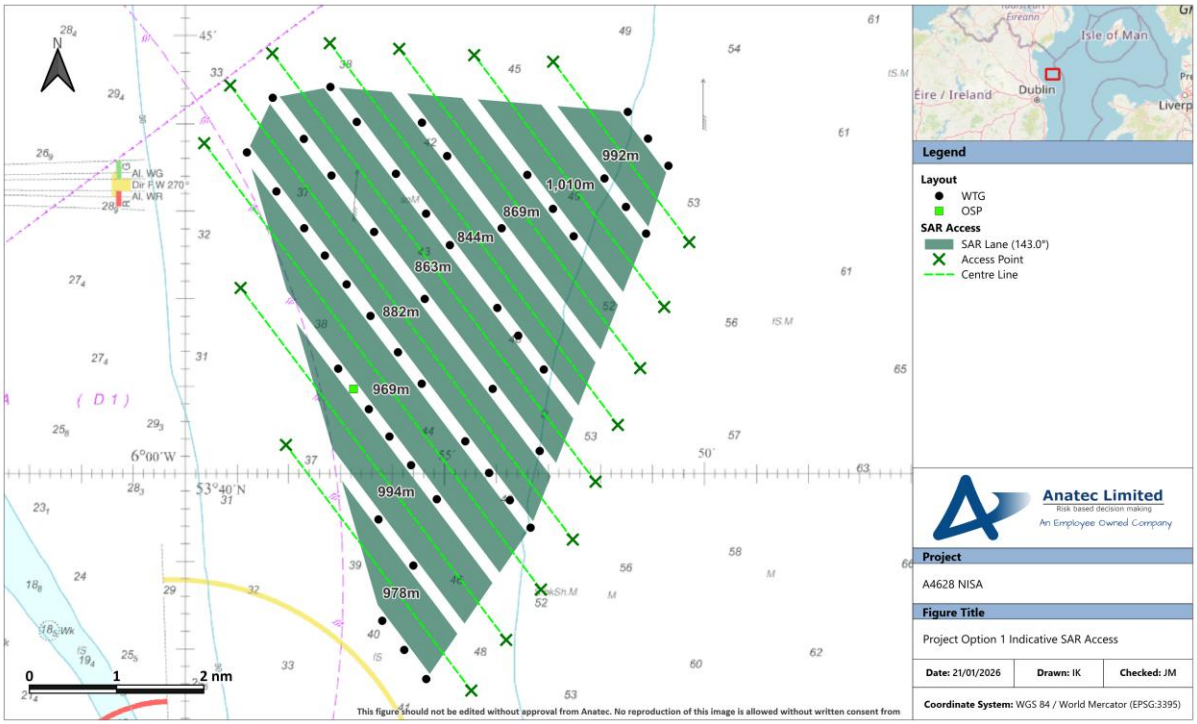

Figure A.1 Project Option 1 Indicative SAR Access

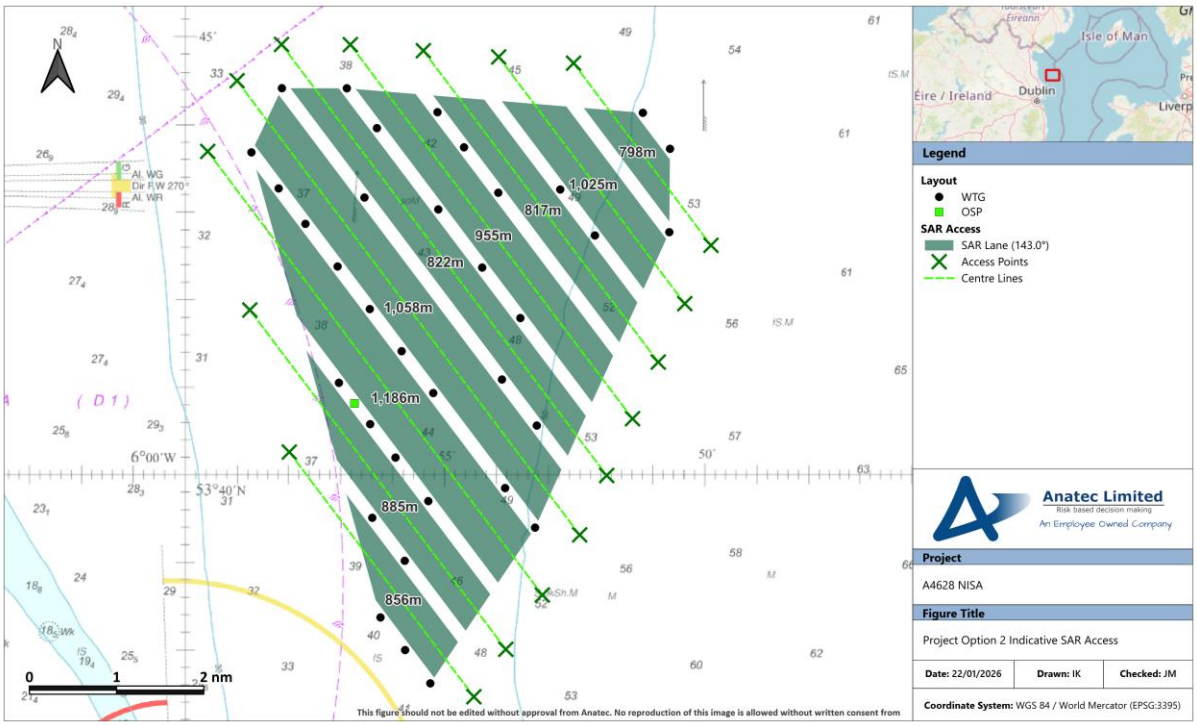

Figure A.2 Project Option 2 Indicative SAR Access

A.2 Search and Rescue Operation Overview

A.2.1 Search and Rescue Aviation Assets

The primary SAR aviation assets will be the SAR helicopters located at the four bases identified in Section 3.5. When construction of the proposed development commences, it is anticipated that all four bases will have transitioned to using the AW189 helicopter. In addition to helicopters, the IRCG can task their King Air 200 fixed wing to assist in searching, environmental monitoring, or to coordinate more complex rescues.

A.2.2 SAR Access Lanes

Section 1.1 identifies why a SLoO is required for the proposed development. The SAR access lanes are shown in Figure A.1 ad Figure A.2. The SAR access lanes must provide a passageway that is a minimum of 500m wide between WTG blade tips at their worst-case orientation.

Project Option 1 has a minimum SAR access lane width of 844m, with the widest SAR access lane having a width of 1,010m. These are oriented on an axis of 143°/323°.

Project Option 2 has a minimum SAR access lane width of 798m, with the widest SAR access lane having a width of 1,186m. These are also oriented on an axis of 143°/323°.

The SAR access lanes, which provide a SLoO, are all substantially in excess of the 500m standard identified in the DoT Guidance on Safety of Navigation & Emergency Response: Offshore Renewable Energy Installations (OREI) (DoT, 2025a).

A.2.3 Rescue Scenarios

Incidents that occur to the east of the array area can be accessed by overflying the WTGs. In good weather, the transit over the array area could be flown 500 feet (ft) above the WTGs under Visual Flight Rules (VFR). In poor weather, the transit over the array area would be made at a minimum of 1,000ft above the WTGs under Instrument Flight Rules (IFR). As the SAR helicopters are equipped for flight in full icing conditions, the WTGs would not impose any additional restrictions on an IFR transit to an incident. Under either VFR or IFR a transit over the WTGs would not require a deviation from a direct track, and so the array area would have no impact on SAR operations to the east of the array area.

Section 4 identifies previous incidents in the array area, using historical evidence. Section 5 identifies likely rescue scenarios inside the array area during construction and operation of the wind farm, as well as incidents to third party users of the area. Historically, all incidents in the array area have occurred in excellent, good or fair visibility, where a SAR helicopter could enter the array under day VFR.

A.2.4 Night and Poor Weather Operations

Using historical evidence, the probability is Extremely Unlikely that a SAR helicopter will be required to conduct a rescue from the array area in a Degraded Visual Environment (DVE), such as at night or in poor visibility. Nevertheless, a rescue in DVE is considered below.

Section 5 identifies that for most rescue scenarios, the location of the incident would be known due to an emergency call or personnel wearing PLBs. Therefore, the search element of a SAR mission would be minimal, with the SAR helicopter transiting direct to the casualty's location and thereby reducing their exposure to the WTGs. This lessens the requirement for the SAR helicopter to fly search patterns inside the array area and allows the crew to pre-plan their entry and exit routes, based on a known location of the casualty. If the location of a casualty is unknown, e.g., a fishing vessel is reported overdue, then in addition to using the SAR access lanes, the array area could be searched from the overhead using the IRCG King Air 200 fixed wing, which is equipped with advanced Radar and electro-optical (EO) sensors.

When entry in the array area is required under DVE, the following mitigation are available:

- The SAR lighting will emit in the infra-red and so will be visible to the EO turret fitted to the SAR helicopter. In particular, the European Aviation Safety Agency (EASA) regulations (EASA, 2019) require the lighting to emit at the 850 nanometre wavelength, which also visible to the crew's Night Vision Goggles (NVG). Imagery from the EO turret is available to the Technical Crew (TC) in the cabin and may be displayed to the pilots in the cockpit. However, EO and NVG vision may be degraded in rain or with visible moisture in the air.
- The location of WTGs, the OSP and any other obstacles will be made available to the IRCG during construction of the array. The location of each WTG can be added to the obstacle database installed on the AW189's Mission Management System. This will permit the TC to correlate the position of the WTGs with other sensor data and so

ensure that situational awareness is maintained during flight inside and adjacent to the array. In addition, the position of the WTGs may be added to the Helicopter Terrain Awareness Warning System (HTAWS), providing a study confirms this will not result in a High Nuisance Alert[1] rate. HTAWS can be displayed in the cockpit and provides an aural and visual alert of an impending collision to all crew members.

- In DVE it is anticipated that the SAR crew will make optimum use of the AW1989's autopilot upper modes in order to maintain a track along a SAR access lane and safe flight parameters. This will reduce crew workload, and so assist the crew in maintaining their situational awareness.
- In the unlikely event of a SAR helicopter malfunction, including an engine failure, the SAR access lanes provide a known obstacle-free escape route.

A.2.5 Summary

The following points have been considered:

- Annex I to DoT Guidance on Safety of Navigation & Emergency Response: Offshore Renewable Energy Installations (OREI) (DoT, 2025a) states that "surface vessels, in most circumstances, will be the most appropriate means of rescue from within wind farms or close to other OREI". Therefore, it is assumed that surface vessels, including RNLI lifeboats and project vessels, will be the primary responders to an incident, with IRCG SAR helicopters and aeroplanes secondary assets.
- The low probability of an incident occurring in DVE.
- The high probability that the location of a casualty will be known before the SAR helicopter enters the array, permitting prior planning of the SAR helicopter's routeing through the array;
- The equipment installed on the AW189 SAR helicopters, including a SAR autopilot, EO sensors, NVG, Radar and navigation systems.
- The position of each WTG being made available to a SAR crew inflight, on their moving maps, via their obstacle and terrain database(s).
- The integrated sensor data available to the crew, permitting them to correlate WTG positions with other sensor data.
- Infra-red emitting SAR lighting installed on each WTG and the OSP.

Both Project Options 1 and 2 provide a SLoO with SAR access lanes over 50% wider than 500m standard. Therefore, with considered of the above points, both layouts are assessed as having reduced the potential hazard associated with flying inside the array to ALARP.

[1] In aviation, a Nuisance Alert refers to an alert generated by a system that is functioning correctly but is inappropriate or unnecessary for the specific situation. These alerts can be distracting and reduce a crew's confidence in the alerting system, potentially delaying responses to legitimate alerts.

Appendix B Project Vessel Response Precedent

Companies operating offshore typically have resources including vessels, helicopters, and other equipment available for normal operations that can assist with emergencies offshore. All vessels under IMO obligations set out in the International Convention for the Safety of Life at Sea (SOLAS) (IMO, 1974) as amended, are required to render assistance to any person or vessel in distress if safely able to do so.

Table B.1 presents details of incidents which have occurred within the United Kingdom (UK) where a vessel associated with a nearby OWF has rendered assistance. It is noted that the initial cause of these incidents is not related to the OWF in question.

Table B.1 Incidents Responded to by Vessels Associated with UK OWFs

Incident Type	Date	Related Development	Description of Incident	Source
Capsize	21 June 2018	Walney	His Majesty's Coastguard (HMCG) issued mayday relay broadcast following trimaran capsize. Support vessel for Walney arrived and recovered two persons from the water who were then winched onboard a Coastguard helicopter.	Web search (4C Offshore, 2018)
Capsize	5 November 2018	Race Bank	Fishing vessel capsized resulting in two persons in the water. Vessel operating at the nearby Race Bank reported to have assisted with the rescue which also involved a Belgian military helicopter and the RNLI.	Web search (British Broadcasting Corporation (BBC), 2018)
Vessel in distress	15 May 2019	London Array	Yacht in difficulty sought shelter by tying up to a WTG but suffered damage and a person in the water. Support vessel for London Array identified and secured the casualty vessel and recovered the person in the water. The support vessel raised the alarm to the Coastguard. The Coastguard later instructed the support vessel to return to port and seek medical assistance for the casualty vessel's occupant.	Web search (The Isle of Thanet News, 2019)
Drifting	7 July 2019	Gwynt y Môr	Speedboat suffered mechanical failure stranding four persons. Support vessel for Gwynt y Môr responded to an 'all-ships' broadcast from the Coastguard and prevented the casualty vessel drifting into the Gwynt y Môr array. The support vessel later towed the casualty vessel back towards port.	Web search (Renews, 2019)

Incident Type	Date	Related Development	Description of Incident	Source
Machinery failure	28 September 2019	Race Bank	Fishing vessel suffered mechanical failure and launched flares. Guard vessel and Service Operations Vessel (SOV) for Race Bank both immediately offered assistance until the MCA's arrival on-scene.	Internal daily progress report received by Anatec
Vessel in distress	13 December 2019	Race Bank	Passing vessel got into difficulty and guard vessel for Race Bank was requested to assist. The Coastguard later requested that the guard vessel tow the casualty vessel into port.	Internal daily progress report received by Anatec
Search	21 May 2020	Walney	Coastguard contacted guard vessel for Walney reporting red flare sighting at the OWF. Guard vessel proceeded to undertake search but did not find anything to report.	Internal daily progress report received by Anatec
Aircraft crash	15 June 2020	Hornsea Project One	United States (US) jet crashed into sea during routine flight. CTVs and SOVs for Hornsea Project One joined the search for the missing pilot.	Web search (4C Offshore, 2020)
Fire / explosion	15 December 2020	Dudgeon	Fishing vessel experienced explosions on board with crew injured. SOV for Dudgeon deployed its Fast Rescue Boat (FRB) and evacuated the casualty vessel.	Web search (Offshore WIND, 2020)
Persons in distress	10 July 2021	Unknown (East Irish Sea)	Two swimmers were in difficulty near to Talacre beach and raised the alarm. An RNLI lifeboat was launched from West Kirkby although the swimmers were recovered from the water by a commercial wind farm vessel.	Web search (RNLI, 2021)
Drifting	17 July 2021	Neart na Gaoithe	Small dinghy with two children aboard drifted offshore due to strong winds. A guard vessel associated with Neart na Gaoithe was able to retrieve the children.	Web search (Edinburgh Evening News, 2021)
Machinery failure	1 September 2022	Rampion	A recreational motorboat experienced power failure and anchored near to an OWF. The anchor could not then be recovered and assistance was requested from the Coastguard. A CTV for the OWF responded and towed the vessel back to port.	Marine Accident Investigation Branch (MAIB) (Case ID 9900)
Machinery failure	1 December 2022	Unknown	A survey vessel suffered an engine failure and was towed back to port by an OWF Rigid Inflatable Boat (RIB).	MAIB (Case ID 10215)

Incident Type	Date	Related Development	Description of Incident	Source
Persons in distress	12 July 2024	Stromar	A deckhand on a fishing vessel became entangled in a creel rope and was pulled overboard. The vessel's crew alerted HM Coastguard and manoeuvred to attempt a rescue. The deckhand was recovered on board and attempts to revive were supported by a paramedic from a HM Coastguard helicopter, an RNLI lifeboat and crew from a nearby survey vessel for the Stromar OWF. The deckhand could not be revived and was declared deceased.	Web search (BBC, 2024)