Appendix 13-2:
Safety Justification for Single Line of Orientation

ORIEL WINDFARM
OFFSHORE RENEWABLE ENERGY

rps
A TETRA TECH COMPANY

JERA NEX BP

ESB Energy for generations

ORIEL WIND FARM PROJECT

Environmental Impact Assessment Report – Addendum
Appendix 13-2: Safety Justification for Single Line of Orientation

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EIAR –
Appendix 13-2
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Acronyms

Term	Meaning
AED	Automated External Defibrillator
AIS	Automatic Identification System
CTV	Crew Transfer Vessel
DECC	Department of Communications, Climate Action and Environment
DHLGH	Department of Housing, Local Government and Heritage
DoT	Department of Transport
EIAR	Environmental Impact Assessment Report
EPIRB	Emergency Position-Indicating Radio Beacon
ERCoP	Emergency Response Cooperation Plan
ERP	Emergency Response Plan
EU	European Union
GoI	Government of Ireland
GWO	Global Wind Organisation
IAMSAR	International Aviation and Maritime SAR
IOER	G+ Integrated Offshore Emergency Response guidelines
IRCG	Irish Coast Guard
LAT	Lowest Astronomical Tide
LOA	Length Overall
LoO	Line of Orientation
MAIB	Marine Accident Investigation Branch
MAC	Maritime Area Consent
MCC	Marine Coordination Centre
MGN	Marine Guidance Note
MRCC	Maritime Rescue Coordination Centre
MSO	Marine Survey Office
NRA	Navigation Risk Assessment
O&M	Operation and Maintenance
OREI	Offshore Renewable Energy Installation
OSS	Offshore Substation
OWF	Offshore Wind Farm
PoD	Probability of Detection
RNLI	Royal National Lifeboat Institution
SAR	Search and Rescue
SOLAS	International Convention for Safety of Life at Sea
SOV	Service Operations Vessel
STCW	Standards of Training, Certification and Watchkeeping
UK	United Kingdom
VHF	Very High Frequency
WTG	Wind Turbine Generator

Units

Unit	Description
GW	Gigawatt
km	kilometre
kt	Knot (unit of speed equal to nautical mile per hour, approximately 1.15 mph)
m	Metre
m/s	Metres per second
MW	Megawatt
nm	Nautical Mile (1 NM = 1,852 m)

1 INTRODUCTION

1.1 Background

The Oriel Wind Farm Project (hereafter referred to as "the Project") is located in the Irish Sea, off the coast of County Louth (approximately 22 kilometres (km) east of Dundalk town centre and 18 km east of Blackrock). The Project is proposed by Oriel Windfarm Limited (the "Applicant"), a joint venture of Parkwind NV (part of JERA Nex bp) and ESB. The offshore infrastructure will comprise 25 wind turbine generators (WTGs), inter-array cabling, an Offshore Substation (OSS) and an offshore cable to the landfall south of Dunany Point. The wind farm will have a capacity of up to 375 MW.

On 24 May 2024, the Application for the Project was submitted to An Bord Pleanála (now An Coimisiún Pleanála) for permission under Section 291 of the Planning and Development Act 2000 (as amended). The Application included an Offshore Wind Farm (OWF) Area layout with the arrangement of WTGs and the OSS "A02 ORI-00-0009 LAYOUT OF OFFSHORE INFRASTRUCTURE.pdf".

1.2 Response by IRCG

During the statutory consultation on the planning application (Case reference: OA15.319799) for the Project, a submission from the Department of Transport (DoT) on 30 July 2024 contained a response from the Irish Coast Guard (IRCG), that made observations relevant to the layout. The key points raised in this response are summarised in Table 1-1.

Table 1-1: Issues raised by IRCG.

Issues Raised	Response
Lines of Orientation • The turbine layout should have at least two consistent lines of orientation (LoOs) for Search and Rescue (SAR) operations within the wind farm. • Oriel OWF has only one LoO. • No justification was provided to IRCG on the decision for only one LoO during prior consultation.	Section 2.4 provides an explanation why two LoOs are not viable; and Section 5.3 provides a suitable safety justification and presents a possible second LoO.
Linearity of structures • It is clear that not all of the turbine positions are linear, which presents issues for SAR as it introduces the possibility of unswept areas in the wind farm by a helicopter carrying out SAR operations. • The location of the OSS is not aligned with the turbines thus creating an obstacle for a helicopter searching through a SAR Lane/corridor.	Section 5.5.2 demonstrates that there is good linearity which minimises unswept areas; and Section 5.4 and section 5.5.3 demonstrate that misalignment of OSSs are common and present minimal adverse impact on SAR.
Micro siting • The minimum distance of 500 metres (m) between turbines should not be compromised during micro sighting or turbines. • Linear layouts should not be compromised during micro sighting.	Section 6.3 demonstrates the potential benefit of optimised micro siting for SAR and the Project will ensure that 500 m SAR access lanes are not compromised by micrositing.

1.3 Scope and Objectives of the Safety Justification

Guidance provided in the DoT's Guidance on Safety of Navigation & Emergency Response: Offshore Renewable Energy Installations (OREI) (DoT, 2025) notes the benefits that multiple LoOs provide for navigation and Search and Rescue (SAR) and states that "*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*". "*Where a project proposed one line of orientation, this should be discussed with the DoT's MSO [Marine Survey Office] and IRCG and a safety justification must be prepared to support this reduction and submitted to the DoT for consideration*". This is further set out in Standard Operating

Procedure (SOP) 07-2025 (IRCG, 2025). Extracts from the relevant guidance are summarised below in Table 1-2.

It is noted that the Project EIAR was submitted in 2024, predating the DoT guidance that was published in June 2025, and therefore, as acknowledged within Section 1.4.3 of the DoT's guidance, had '*already been designed with reference to the UK MCA's Marine Guidance Notice MGN 654 (M+F))'*. Nevertheless, the provisions of MGN 654 (MCA, 2021) and its Annex 5 (MCA, 2024) are much the same as the DoT guidance (DoT & IRCG, 2025) with regard to the key principles (Section 1.2), and therefore this Safety Justification has provided references to the latest guidance only, unless otherwise stated.

Table 1-2: Guidance documents.

Guidance	Key provisions
DoT (2025). *Guidance on Safety of Navigation & Emergency Response: Offshore Renewable Energy Installations (OREI)*	• Two LoOs: "*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 layout assessment should start with a layout option with at least two consistent lines of orientation (which may include perimeter turbines with smaller spacing than internal turbines) and then be refined as appropriate for the project… Where a project proposes just one line of orientation, this this should be discussed with the DoT's MSO and IRCG … this discussion should include any potential secondary lines, and additional risk mitigation measures that may be required as a result".* • Risk mitigation measures: *"The safety justification should build on work conducted as part of the Navigation Risk Assessment and the mitigations identified as part of that process."* • Linearity of structures: "*structures (turbines, substations, platforms, and any other structure within the OREI site) that are aligned in straight rows and columns are considered the safest layout arrangement by Irish navigation stakeholders and IRCG contracted SAR helicopter pilots."* • Mitigation: "*Where a project proposes just one line of orientation, this discussion should include any potential secondary lines, and additional risk mitigation measures that may be required as a result.*"
IRCG (2025). Standard Operating Procedure 07-2025. *Offshore Renewable Energy Installations (OREI): Guidance and Operational Considerations for SAR and Emergency Response*	• Two LoOs: "*developers should start with a layout option with at least two consistent lines of orientation (which may include perimeter turbines with smaller spacing than internal turbines) and then be refined as appropriate for the project*". • Linearity of structures: "*The layout of a wind farm or other ORED should also be as regular as possible e.g. a grid pattern and take into consideration any lateral movement of floating devices."* • SAR Access Lanes: "*a SAR helicopter should be able to fly from one side of a windfarm to the other… [and] the aircraft will not enter the windfarm where turbines are located less than 500m apart*".

As recognised in the letter by the IRCG on 30 July 2024, the Project's layout has "*one consistent line of orientation*", and "*No justification was provided to IRCG in prior consultation*". As such, in response to the IRCG's letter submission, and in compliance with the relevant guidance, a Safety Justification has been prepared to demonstrate that the Project's layout is conducive to safe and effective navigation and SAR. This supports the assessment on shipping and navigation included in chapter 13: Shipping & Navigation of the Environmental Impact Assessment Report (EIAR) (volume 2B), whilst building upon the relevant information provided in appendix 13-1: Navigational Risk Assessment of the EIAR (hereafter referred to as the "NRA") and materials produced since the NRA was submitted as part of the examination process, to clearly demonstrate why the proposed layout can be considered acceptable and safe for SAR operations within the OWF. As such, the EIAR is referenced throughout this document, and readers are advised to consult the EIAR (Oriel Windfarm Limited, 2024) alongside this document.

Whilst no template or format for a Safety Justification exists, based on the guidance summarised in Table 1-2, the following elements are identified and are set out within this technical note:

- Demonstrate why a compliant two LoO layout cannot be achieved (section 2.4);

- Demonstrate that navigation within the Project is safe with a single LoO (section 3);
- Demonstrate that safe access can be maintained by SAR assets, including helicopters at low altitude in bad weather using single LoOs (section 3.5 and section 5);
- Demonstrate that the ability to conduct search and/or rescue is not compromised by the layout (section 5); and
- Demonstrate that appropriate and proportionate additional mitigations will be put in place by the Project (section 6).

Figure 1-1 describes the process through which this Safety Justification has been developed and its parallels to the Emergency Response Cooperation Plan (ERCoP) and Emergency Response Plan (ERP). This is based on the G+ Integrated Offshore Emergency Response guidelines (IOER) (Energy Institute, 2023). Whilst the ERCoP and ERP contain detailed information about the Project and its emergency response capabilities and plans, this Safety Justification is limited in its scope to consideration of the impact of a single LoO only. Furthermore, full details on IRCG provision, capabilities and Project construction methodologies are not known at the time of drafting. The key elements are:

- Collating project information to understand degree of compliance with guidance, and what capabilities are known at the time (both Project and national SAR provision);
- Determine what are the likely hazards and incidents which could occur at the Project;
- Filter to a representative list of credible hazards which encapsulate the types of incidents and responses required;
- Perform a gap analysis to understand how SAR activities would be conducted with the proposed layout and whether further mitigation is required; and
- Draft the Safety Justification to demonstrate whether the single LoO with appropriate mitigation reduces the risks to As Low As Reasonably Practicable.

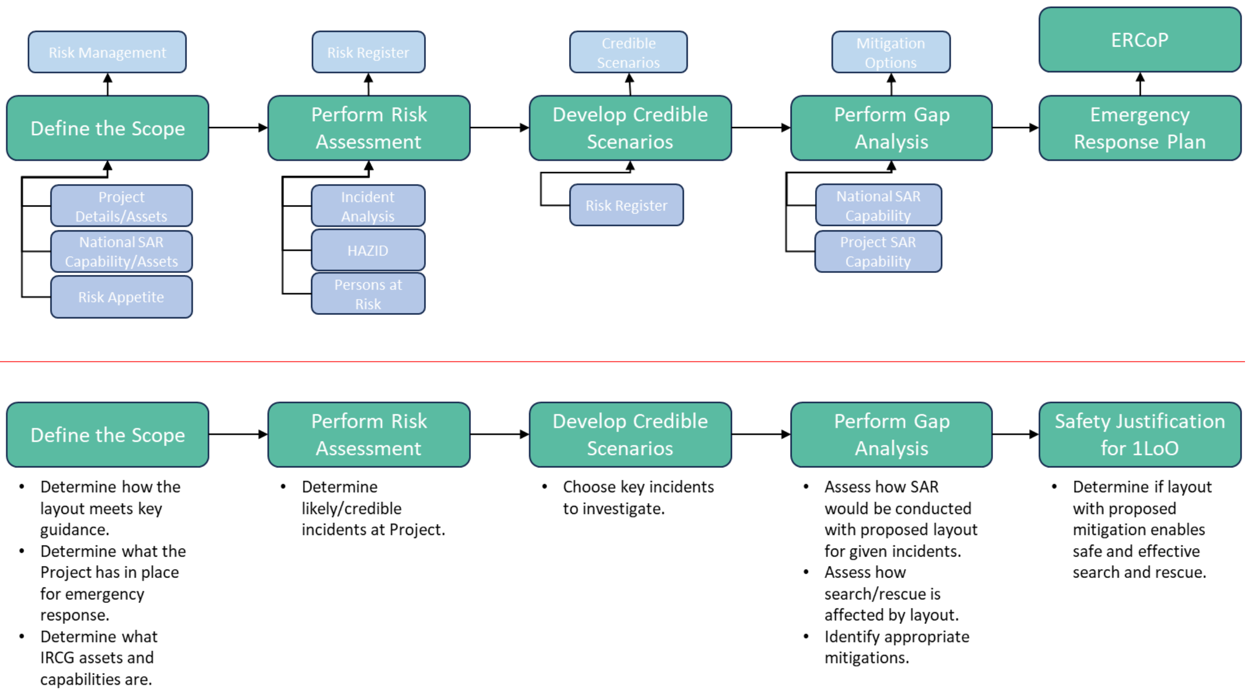


Figure 1-1: Approach to Safety Justification for single LoO.

1.4 Structure of the Document

This Safety Justification is structured as follows:

- Section 2: Overview of the Project and Development of Layout;
- Section 3: Surface Navigation Within Project;
- Section 4: Risk Profile of Project;
- Section 5: Helicopter Access and SAR in and Around Project;
- Section 6: Mitigation; and
- Section 7: Summary and Conclusions.

1.5 Statement of Competence

Dr Andrew Rawson PhD BA (Hons) FRGS CEng MIMarEST is a maritime consultant with more than 14 years of experience, specialising in data analysis, modelling and NRAs. He has worked on a multitude of projects for developers, ports and governments as a project manager or technical lead. His specialism lies in developing and applying innovative quantitative methods to measure the risk of maritime accidents and predict the impact of developments such as offshore renewables. Andrew has an extensive track record in authoring NRAs, EIA technical chapters, quantitative risk assessments (QRAs) and providing specialist technical advice to clients. Andrew has led the development of scientific approaches to navigation risk, with numerous peer-reviewed academic publications in high-impact journals. In 2022, Andrew was awarded a PhD from the University of Southampton investigating the use of machine learning and big data to support maritime risk assessment. In 2023, Andrew acted as Chair of the Technical Committee at the European, Safety and Reliability Conference (ESREL).

Pete Lloyd MBE FRAeS MBA MA spent a working career spanning two diverse professions with surprising parallels requiring similar competences and capabilities. The first career was built around military service as an officer in the Royal Air Force, with a core activity as a helicopter pilot, instructor, commander and staff officer delivering aviation SAR. Away from SAR, periods were spent establishing a helicopter training school, supporting United Kingdom (UK) industry within defence exports and actively involved in overseas defence conflicts. During his last tour of duty as Chief of Staff of the RAF SAR Force, Peter co-chaired the UK SAR Operations Group with the UK's Chief Coastguard and assisted Renewable UK in establishing Offshore Renewable Energy Emergency Forum (OREEF), becoming its first Chair. This led to a second career in the renewable wind industry focusing on health, safety, security, environmental protection and training. Specialising in risk management, as applied to the operation and maintenance (O&M) of WTGs both on and offshore; becoming the industry leader in offshore emergency response from wind farms, an activity that bridged both careers, leading to coordinating the creation of the UK's IOER – Renewable guidance. Latterly, activity has been dedicated in sharing knowledge and experiences as a volunteer Council Member with the Royal National Lifeboat Institution (RNLI).

2 OVERVIEW OF THE PROJECT AND DEVELOPMENT OF LAYOUT

2.1 Need for the Project

There is a clear need for increased offshore renewables in Ireland driven by the need for climate action. According to Met Éireann's Annual Climate Statement for 2023, 2023 was Ireland's warmest year on record, with above average rainfall. The energy sector is one of the main generators of greenhouse gas and consequently a significant cause of climate change and global warming. Offshore wind energy will play a key role in achieving national renewable energy and decarbonisation targets. An overall energy target of at least 42.5% binding at European Union (EU) level by 2030 was set by the Revised Renewable Energy Directive in November 2023 (EU, 2009), and the Department of the Environment, Climate and Communications (DECC) Climate Action Plan (CAP) 2024 targets 80% renewable electricity in Ireland by 2030 (DECC, 2023). Given that the demand for energy is increasing across all sectors in Ireland, these demands need to be offset by electricity generated from renewable sources and other key national plans (such as the Department of Housing, Local Government and Heritage (DHLGH) National Planning Framework and the Government of Ireland (GoI) National Development Plan 2018-2027) are calling for increased electrification of the heat and transport sectors (DHLGH, 2018 & GoI, 2019). Decarbonising Ireland's electricity generation would strengthen Ireland's sustainable development performance, in line with the United Nations Sustainable Development Goals – particularly Goal 7 (Affordable and Clean Energy) and Goal 13 (Climate Action) (UN, 2015), inevitably leading to improved environmental and societal wellbeing.

The development of the Project will also help Ireland meet national targets set by the government. A national target of at least 5 Gigawatts (GW) (i.e. 5,000 Megawatts (MW)) of offshore wind energy by 2030 in the CAP (DECC, 2023), of which, at present, none is being generated in Ireland. Hence, in proposing to generate up to 375 MW, which would represent approximately 7.5% of the 5 GW of offshore wind energy objective, the Project can help enable the achievement of the national target when operational.

The Project can also aid Ireland in its development of energy security. While the importance of energy security has long been understood at EU and national levels, recent events (including the Covid-19 pandemic and the Russian invasion of Ukraine) have reinforced the risks inherent in long supply chains and dependence upon other states for energy sources. The DECC published Energy Security in Ireland to 2030 in November 2023 which notes that Ireland is currently one of the most energy import dependent countries in the EU, having imported 77% of its energy supply in 2021 (DECC, 2023). As a result, by investing in multiple renewable energy sources (including offshore wind), Ireland will reduce its dependence on imported fossil fuels and, consequently, its vulnerability to energy shocks.

Moreover, from an economic perspective, OWFs (including the Project) can benefit Ireland's economy in multiple ways: broadly, through the provision of clean, reliable, cost-effective energy and a reduction in the need to import fossil fuels; and directly, through employment generation at construction, O&M, and decommissioning phases, while also generating indirect and induced employment. The EU Blue Economy Report 2023 (European Commission, 2023) identifies marine renewable energy (offshore wind) development to be an established sector in Europe since 2021 and an increasingly important area for employment, gross value addition, gross profit, net investment in tangible good and turnover.

2.2 Design Parameters

2.2.1 Wind Turbine Generators

The Project will include 25 WTGs with an upper blade tip height of 270 m above Lowest Astronomical Tide (LAT) (see Figure 2-2 and Table 2-1). The lowest point of the rotor sweep for the Project is 27 m above LAT, which is approximately 22 m above High-Water Mark in this location.

2.2.2 Offshore Substation

The Project will include one OSS, that will comprise a platform with decks, attached to the seabed by means of a monopile foundation, containing equipment required to switch and transform electricity generated by the wind turbines to a higher voltage and provide reactive power compensation. The OSS will house auxiliary equipment and facilities for operating, maintaining, and controlling the substation. There will be a telecommunications mast on one corner of the platform and a crane. The topside structure of the OSS will be 40 m in height above LAT (up to 56 m above LAT including the telecommunications mast), 40 m in length and 30 m in width.

2.2.3 Foundations

WTG and OSS foundations will comprise monopile foundations with associated scour protection.

2.2.4 Inter-array Cables and Offshore Cable

The project design includes for 41 km of inter-array cables installed within the OWF Area, with a minimum burial depth of 0.5 m, and associated cable protection along a maximum of 50% of the route. There will be one offshore cable of 16 km in length between the OSS and the landfall, with a minimum burial depth of 0.5 m, and associated cable protection along a maximum of 50% of the route. The project design allows for cable protection consisting of rock placement or concrete mattresses 10 m in width and 2 m in height above the seabed within the OWF Area (inter-array cables) and along the offshore cable route.

2.3 Site Selection

A wide range of factors were considered to select the location of the OWF Area, including wind resource, depth of water, shelter from high wave loads, seabed sediments, marine archaeology and principal shipping routes. These are described in chapter 4: Consideration of Alternatives of the EIAR (vol. 2A). Potential areas were therefore evaluated against a range of criteria that represented these factors, which included metocean criteria (wind resource > 9 metres per second (m/s) and shelter from high wave loads), marine processes criteria (seabed sediments, tidal streams <0.5 m/s and bathymetry water depths <30 m), and material assets (landing points with proximity to existing high voltage transmission grid network and proximity to ports suitable for construction and O&M).

Areas in the Atlantic (West) coast of Ireland were considered as alternative locations due to the excellent wind capacity (SEAI Wind Atlas, 2003), but deep nearshore water depths, extreme wave loads, and exposed bedrock on the seabed determined this location unsuitable for fixed bottom foundations. Moreover, given that the available electricity transmission capacity and existing infrastructure is severely limited along most of the Atlantic coast, and some of the main demand centres are on the east coast, these site locations would have required significant grid infrastructure development across the country. Therefore, the east coast (Irish Sea) became the preferred location for OWF project development.

The wind capacity on the east coast of Ireland also meets the Project’s criteria, with >9 m/s wind resource, and has a less severe wave climate compared to the Atlantic coast. Areas along the narrow sand banks along the Wicklow and Wexford coast were considered as potential sites, but ruled out due to the limited capacity of the grid infrastructure in these locations. Available grid capacity for a suitable scale of OWF was found in the area north of Dublin and, within this area, there were also a number of possible locations with extensive water depths suitable for the construction of current (fixed bottom) offshore wind technology and which provided opportunities to locate WTGs to minimise environmental effects. As a result, the north Irish Sea area was evaluated against detailed constraint mapping of the critical parameters such as metocean, bathymetry, existing fisheries and grid access and the assessment focused on a regional area between the entrance to Drogheda Harbour and the border with Northern Ireland, with a minimum area of ~30 km2 is required to generate the capacity available at the grid connection point (Woodlands to Louth 220 kV Overhead Powerline).

An area in the North Irish Sea to the east of Dundalk Bay that met the Project’s criteria was identified as the preferred regional area of interest for the Project location. Further investigations (including geophysical surveys, benthic samples, vessel traffic assessments and stakeholder consultations) were then undertaken into this area to determine its suitability and four options within this area were selected for further evaluation against the project location criteria. From this evaluation, the OWF Area was selected due to a series of advantages:

- Avoids areas of hard ground and shallower water to the northwest of the area;
- Avoids European designated sites;

- Avoids fisheries area in the mud beds to the south;
- Avoids shipping lanes;
- Has available grid capacity; and
- Is the appropriate size.

Following subsequent assessments of the baseline environments included in the EIAR, along with a review of relevant datasets and reports published since the location was first selected, the selected Project site was proposed.

2.4 Layout Development

Designing an OWF layout necessitates balancing multiple, often competing interests, constraints and preferred options. Chapter 4: Consideration of Alternatives of the EIAR (vol. 2A) presents the alternative layouts for the Project (see section 4.8) and details the considerations in the development of the site layout. These are summarised within this section.

2.4.1 Layout Constraints

Section 4.8.1 in chapter 4 of the EIAR outlines the key criteria used in determining the layout. It notes that "*The Project layout should be designed with a specific orientation for safe SAR helicopter and rescue boat operations".* Consistent with the SOP (DoT, 2025) guidance "*developers should start with a layout option with at least two consistent lines of orientation*", the following section describes why such a layout is not possible for the Project. Two fundamental engineering and consenting constraints would need to be adhered to:

- Infrastructure is required to be located within the application boundary. The OWF Area of the application boundary is defined by the Maritime Area Consent (MAC) granted to Oriel Windfarm Limited. This is a limited size for the development of an OWF being a hexagon shape of less than 28 km2 with a maximum width of 5.3 km and length of 6.7 km; and
- Maintain spacing between individual turbines is required to be four times the maximum rotor diameter (i.e. greater than 944 m) in order to minimise wake effects that might result in damage to WTGs and reduce yield. By increasing the spacing between WTGs in the prevailing direction, these impacts can be substantially reduced, but the small size of the Project's application boundary minimises this opportunity. This prevented WTGs from being placed too close together to correct misalignments caused by other constraints. Alternatively, a slight "staggering" of WTG positions can reduce these effects as WTGs are not completely downwind of one another.

Based on these two principal constraints and maintaining 2 LoO, Figure 2-1 demonstrates that were the Project to achieve its required generation capacity within the site boundary, multiple WTGs would be too close to the boundary or outside of the boundary, resulting in the loss of ten WTGs, 40% of the sites generating capacity and significantly affecting the viability of the Project.

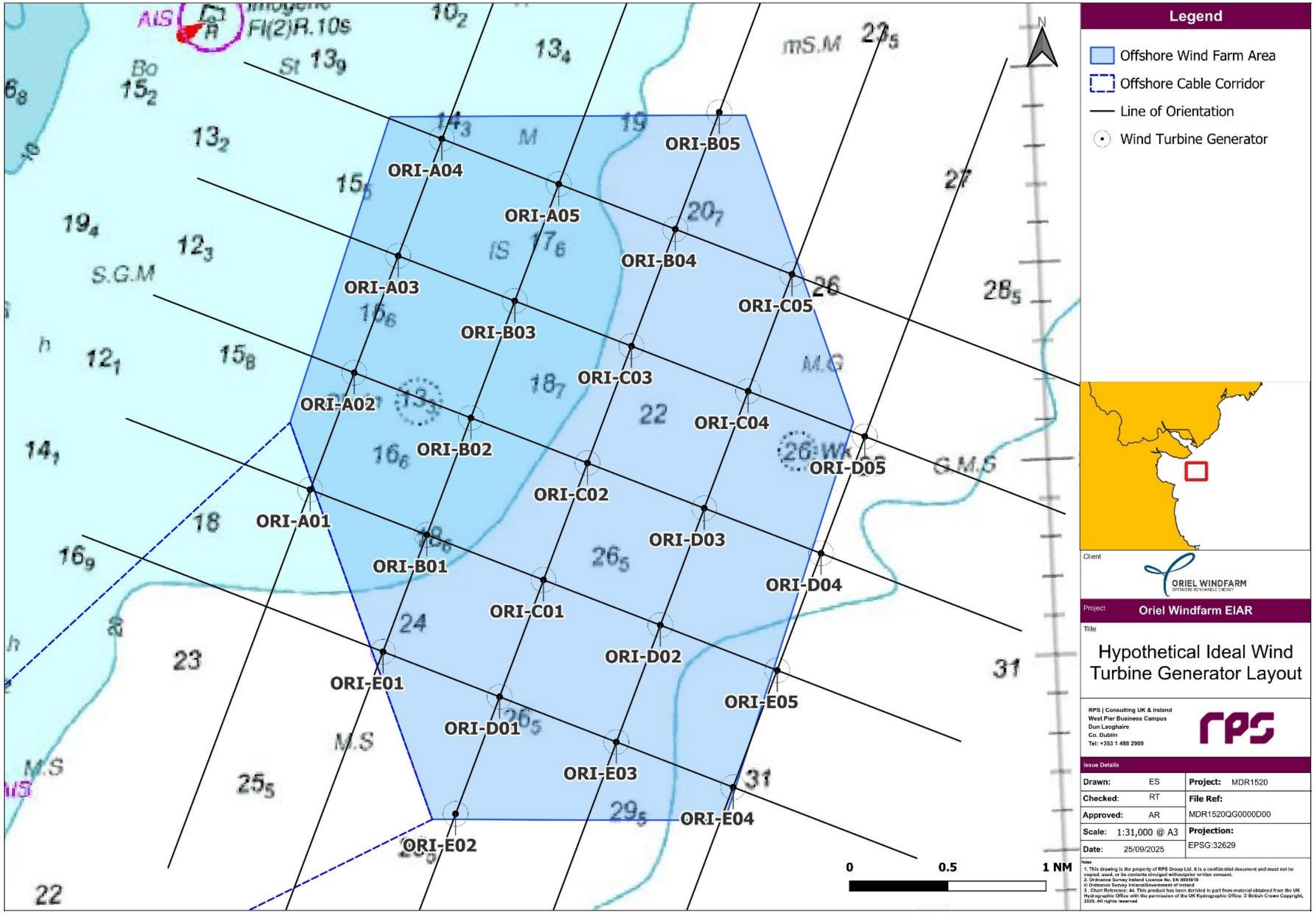


Figure 2-1: Hypothetical ideal layout for the Project.

Furthermore, section 4.8.1 in chapter 4 of the EIAR outlines further site constraints. These included seascape and landscape considerations and SAR access. Other factors were also important in the design of the layout of the Project including:

- Avoiding areas of shallow outcropping rock which prevent installation of preferred foundation types. Shallow bedrock is located in the north-west corner of the development area necessitating WTGs to be “compressed” towards the southeast of the site. This has enabled a greater area of searoom to the north-west of the site than full use of the MAC area;

- Avoiding specific seabed features (e.g. wrecks and archaeological anomalies – see EIAR chapter 15: Marine Archaeology and appendix 15-01: Marine Archaeology Technical Report (in vol. 2B). This necessitated micrositing of individual WTGs out of alignment, notably ORI-A04, ORI-A05, ORI-B04 and ORI-D01;

- Detailed geophysical and geotechnical investigations will be necessary but are typically taking post-consent due to the significant costs involved. Based on geophysical and geotechnical survey work undertaken to date and other sources, some geotechnical properties of the seabed have been identified that might prevent effective installation of foundations and these have been planned around. In addition, the Project must ensure sufficient flexibility in the design layout for any additional ground condition challenges identified during construction; and

- Wind yield assessment to maximise generation capacity of the site.

2.4.2 Application Layout

As a result of the layout constraints detailed in section 2.4.1, the resulting layout presented in Figure 5-6 of chapter 5: Project Description of the EIAR (vol. 2A) and shown also in Figure 2-2 was selected for the Project.

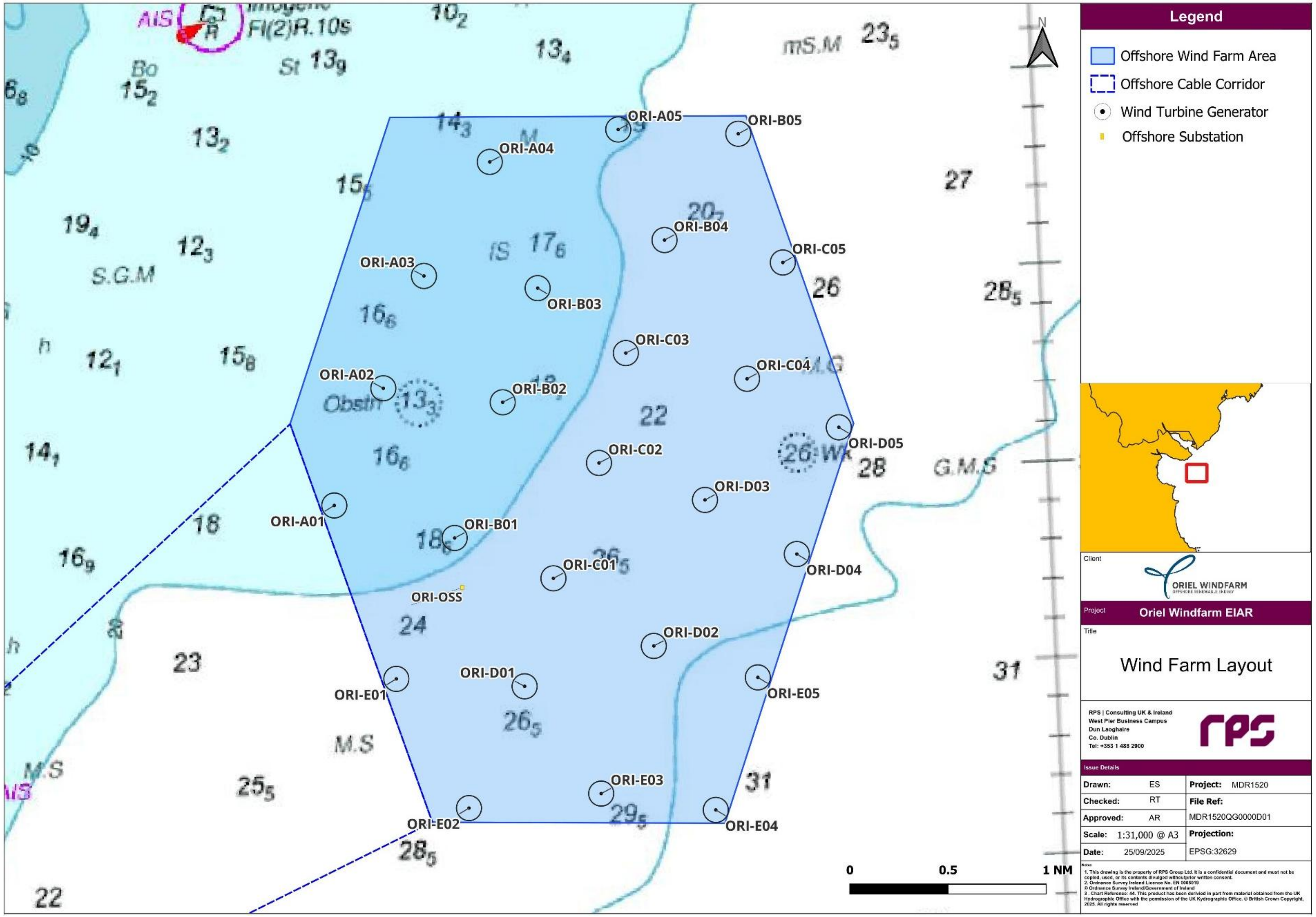


Figure 2-2: Proposed layout of the Project and infrastructure naming

Table 2-1: Infrastructure naming and coordinates.

Coordinate system	ITM - CRS: 2157		UTM-29N / CRS: 32629		WGS 84 / CRS: 4326	
WTG ID	Easting	Northing	Easting	Northing	Longitude	Latitude
ORI-A01	724655	797868	690292	5977973	-6.10248	53.90778
ORI-A02	725133	798965	690755	5979076	-6.09476	53.91517
ORI-A03	725531	800017	691138	5980134	-6.08827	53.93426
ORI-A04	726167	801082	691759	5981208	-6.07815	53.94367
ORI-A05	727383	801370	692970	5981513	-6.05952	53.94596
ORI-B01	725786	797546	691427	5977667	-6.08540	53.91200
ORI-B02	726257	798817	691881	5978944	-6.07771	53.92330
ORI-B03	726602	799887	692210	5980019	-6.07202	53.93283
ORI-B04	727805	800323	693407	5980472	-6.05353	53.93645
ORI-B05	728515	801314	694103	5981473	-6.04231	53.94517
ORI-C01	726712	797153	692359	5977287	-6.07148	53.90825
ORI-C02	727157	798233	692789	5978373	-6.06426	53.91784
ORI-C03	727425	799264	693042	5979408	-6.05976	53.92703
ORI-C04	728565	799006	694186	5979166	-6.04252	53.92443
ORI-C05	728918	800096	694523	5980261	-6.03669	53.93413
ORI-D01	726426	796140	692087	5976270	-6.07625	53.89922
ORI-D02	727650	796503	693306	5976650	-6.05748	53.90218
ORI-D03	728152	797871	693789	5978025	-6.04928	53.91434
ORI-D04	729011	797349	694655	5977515	-6.03643	53.90944
ORI-D05	729424	798537	695051	5978709	-6.02965	53.92001
ORI-E01	725217	796227	690877	5976340	-6.09460	53.90029
ORI-E02	725885	795001	691562	5975123	-6.08494	53.88912
ORI-E03	727134	795120	692810	5975260	-6.06591	53.88989
ORI-E04	728213	794951	693891	5975106	-6.04957	53.88810
ORI-E05	728627	796193	694287	5976354	-6.04276	53.89915
ORI-OSS	725851	797078	691500	5977200	-6.08496	53.90778

2.5 Guidance and Oriel's Compliance

Figure 2-3 shows the Project with the Single LoO drawn through the WTGs at a bearing of 200˚ and each WTG is shown as a circle with diameter of 236 m which represents the maximum blade area rotating 360˚. Table 2-2 summarises a number of key principles for OWFs outlined in the collective guidance (DoT & IRCG, 2025) alongside how the Project layout complies with each principle.

The guidance also notes that "*Where a project proposed one line of orientation, this should be discussed with the DoT's MSO and IRCG and a safety justification must be prepared to support this reduction and submitted to the DoT for consideration. The safety justification should build on work conducted as part of the Navigation Risk Assessment and the mitigations identified as part of that process*."

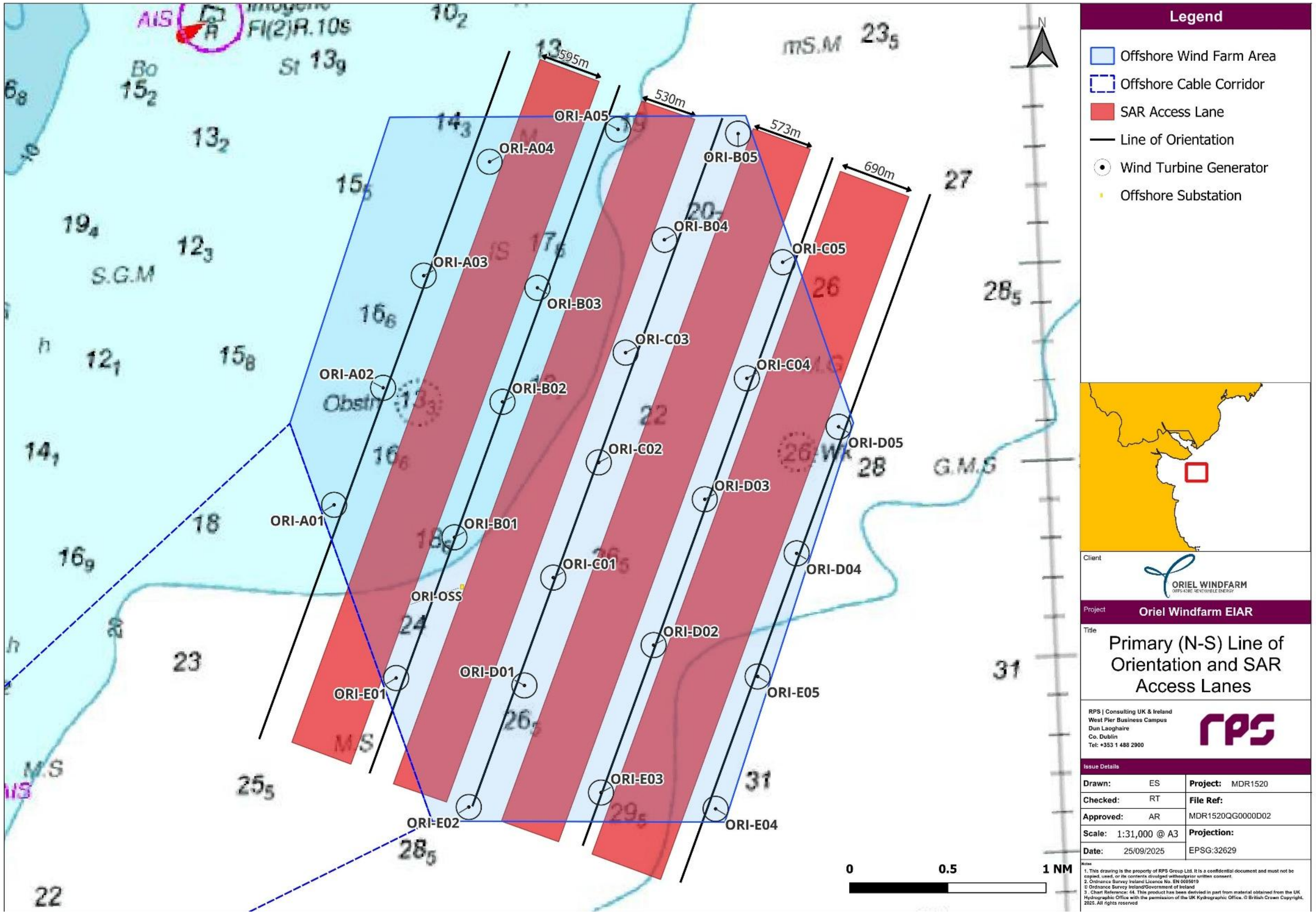


Figure 2-3: Lines of orientation and SAR access lanes (North-South).

Table 2-2: Summary of Project's layout compliance with guidance.

Layout Principle	Relevant Guidance	Applicability to the Project
LoOs	*"The layout assessment should start with a layout option with at least two consistent lines of orientation … and then be refined as appropriate for the project"* *"Multiple lines of orientation provide alternative options for passage planning and for vessels and aircraft to counter the environmental effects on manoeuvring"*	Oriel has one clear LoO from northeast to southwest (NE-SW) (see section 5.3.1). This is agreed in the feedback from the IRCG (30-July-2024).
Direction	*"The layout … should also be as regular as possible e.g. a grid pattern"…This regularity will also benefit the safer navigation of surface rescue craft or helicopters both within and outside a wind farm"*	The primary LoO enables SAR assets to enter from the NE into the prevailing SW conditions (see section 5.3.1).
Linearity	*"a SAR helicopter should be able to fly from one side of a windfarm to the other, or Helicopter Refuge Area in the case of larger windfarms, entering from outside the windfarm at altitudes below 500 feet, to either conduct searches amongst turbines or to access a location or turbine within the field, from low altitude e.g. in bad weather where cloud base and/or visibility is poor"* Straight alignment also accommodates maritime search patterns which are generally composed of patterns of straight lines in accordance with international standard practices contained in the International Aviation and Maritime SAR Manual (IAMSAR) (ICAO and IMO, 2016)	The proposed layout offers good linearity of WTGs along this primary axis (with the deviation from these lines typically less than 50 m in almost all cases). Noting micro-siting improvements significantly improving this (<1 blade length in worst case or nacelle size in majority). Deviations from the main LoO are principally on perimeter turbines and to the NE, such that it still offers clear linearity of all interior WTGs. (see section 5.3.1).
Perimeter turbines	"*[The] layout option …may include perimeter turbines with smaller spacing than internal turbines"*	Perimeter northerly/southerly WTGs are staggered from the internal WTGs in line with guidance (see section 5).
SAR Access Lanes	*"In situations where an aircraft captain is solely reliant on instruments to navigate through a windfarm, the aircraft will not enter the windfarm where turbines are located less than 500m apart (between blade tips, transverse to the turbine lanes unless nacelles can be rotated away from the lane to increase the distance to more than 500 metres)".*	Oriel's LoO and turbine lane spacing permit the establishment of SAR Access Lanes between all turbine rows which are in excess of 500 m when measured blade tip to blade tip, in compliance with guidance even in the worst-case orientation where blades are perpendicular to the LoOs (see section 5.3.2).
Secondary Access Direction	"*Where a project proposes just one line of orientation, this discussion [with the DoT's MSO and IRCG] should include any potential secondary lines, and additional risk mitigation measures that may be required as a result".*	500 m SAR access lanes do exist in the centre of the OWF in an east-west orientation as well (see section 5.3.2). Project mitigation measures are discussed in section 6.

2.6 Summary

This section has demonstrated that:

- The Project would meet a clear and pressing need for renewable energy generation in the Republic of Ireland;
- The OWF area is highly constrained, with multiple competing factors such as geotechnical constraints, fishing activity, landscape and visual and environmental designations which have resulted in a small parcel of sea capable of supporting the necessary infrastructure;
- It is demonstrated that it is not possible to have two LoO in the alignment of infrastructure without resulting in the loss of approximately 40% of the generating capacity of the site, due to the size of the OWF area, seabed constraints and archaeological features; and
- The Application layout, has attempted as far as possible to conform with the relevant guidance to promote SAR access into the Project, including maintaining a single LoO, regularity in structure arrangement, 500 m SAR access lanes and secondary SAR access lanes.

3 SURFACE NAVIGATION WITHIN PROJECT

3.1 Vessel Traffic at Project Site

Chapter 13: Shipping and Navigation of the EIAR (vol. 2B) presents the movements of vessels across a total of four months: two months in 2019 and two months in 2022 (both January and July). Supplementary vessel traffic data (comprising March to August 2024 has also been used to ensure recency and validity of the NRA's conclusions. Overall, the tracks from 2024 are broadly consistent with those presented within the EIAR.

All vessel movements within the NRA Study Area (see Figure 1-1 in the NRA [EIAR appendix 13-1]) across 15 months (458 days: Jan and Jul 2019, Jan-Jul 2022 and Mar-Aug 2024) are presented spatially in Figure 3-1 (commercial tracks) and Figure 3-2 (small craft), and quantified by type and area in Figure 3-3. Key findings are that:

- Cargo vessels are the most frequent vessel type to transit through the Study Area, mostly transiting to and from Carlingford Lough, to the east of the Project. As a result, the majority (> 95%) of cargo vessels that transit within the Study Area pass clear of the proposed OWF Area. A small number of cargo vessels transit into Dundalk;

- Fishing vessels account for 2,963 transits through the entire Study Area over the 15 months, only 145 (< 5%) intersected the OWF Area;

- Recreational vessels account for 8% of the total traffic, exhibited on coastal cruising routes through the OWF area, between Carlingford Lough and Drogheda. On average, two recreational vessel transits were recorded by Automatic Identification System (AIS) data on this route. It is noted that not all recreational vessels would carry AIS and therefore this is an underestimate;

- Very few tanker vessels navigate the Study Area, and well clear of the OWF area; and

- Passenger vessel transits are few and concentrated on Carlingford Lough.

Vessel transits within the NRA Study Area during the 15 months is presented by length overall (LOA) in Figure 3-4. The chart shows the prevalence of small craft (< 50m LOA) in the both the Study Area and the OWF Area, mostly driven by fishing vessels (~54%) and service vessels (~27%). Only 11 vessels (accounting for 15 vessel transits) >100 m LOA were recorded transiting through the OWF Area during the 15 months, the greatest of which were Seatruck vessels (*Seatruck Pace* and *Seatruck Precision)* of 142 m LOA which made one transit each in 2022, one of which just intersected the eastern edge on route into Carlingford Lough from the southeast and the other was observed crossing through the proposed OWF Area while loitering for four hours before also transiting into Carlingford Lough.

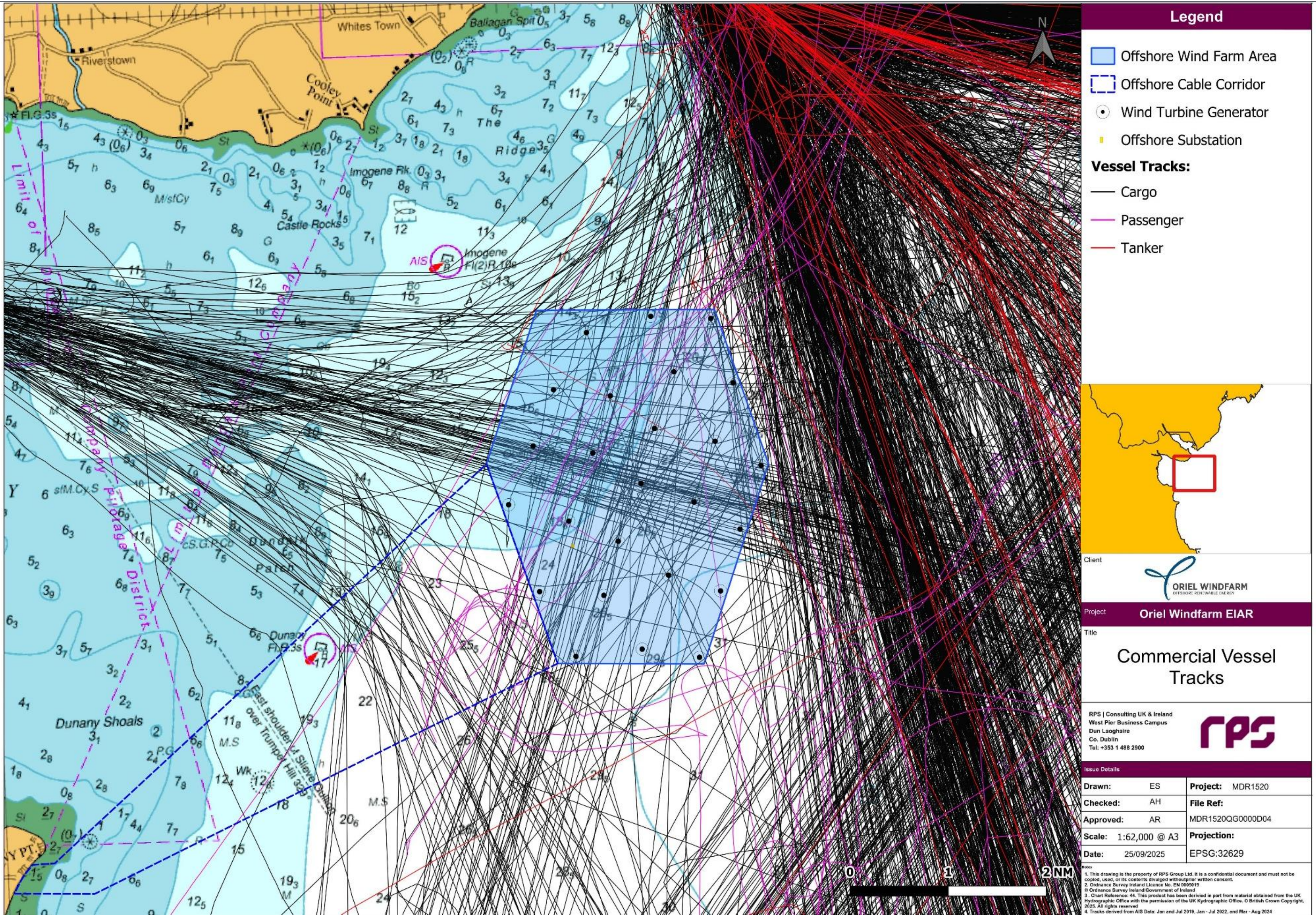


Figure 3-1: All AIS commercial vessel tracks around the OWF Area.

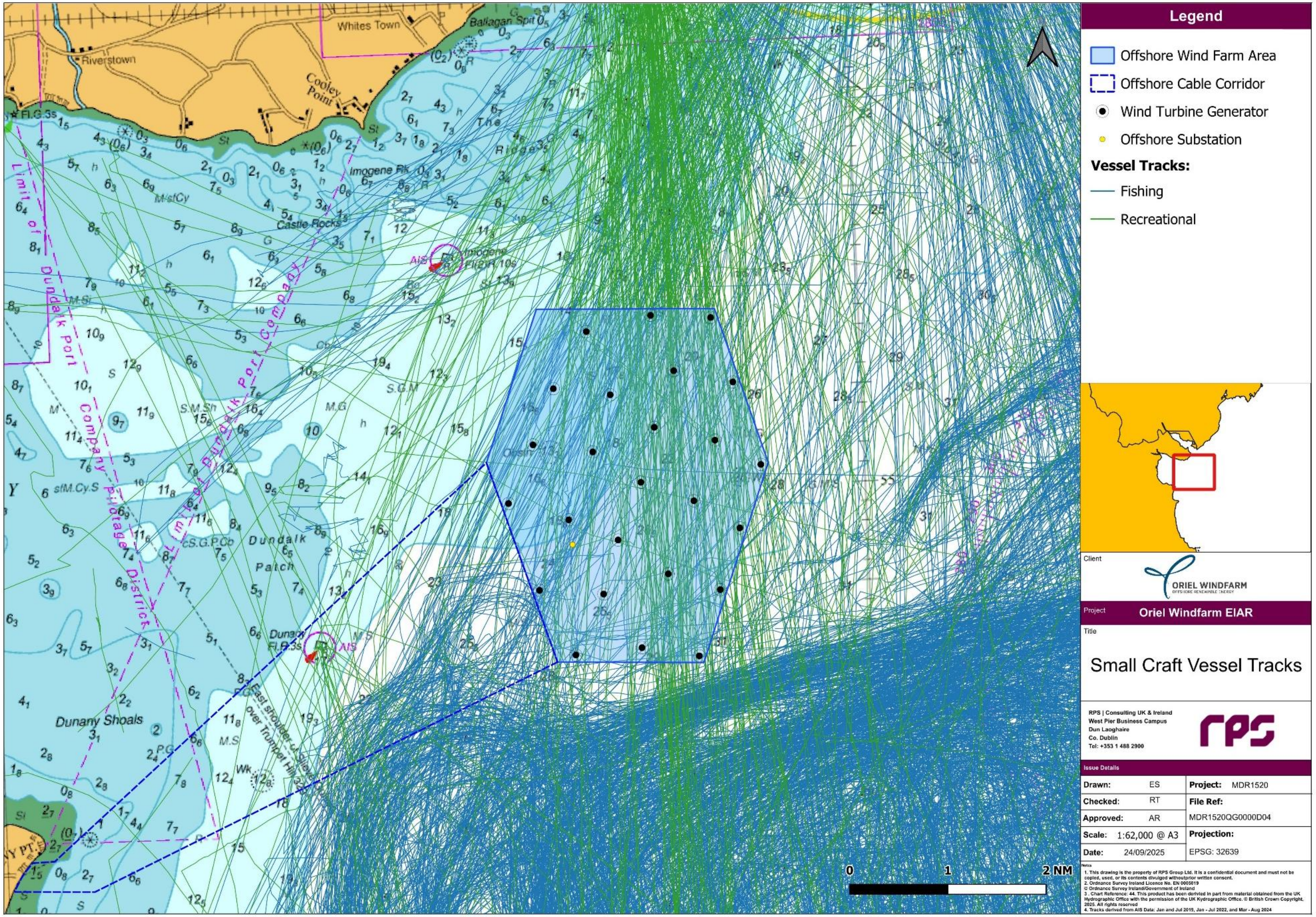


Figure 3-2: All AIS small craft tracks around the OWF Area.

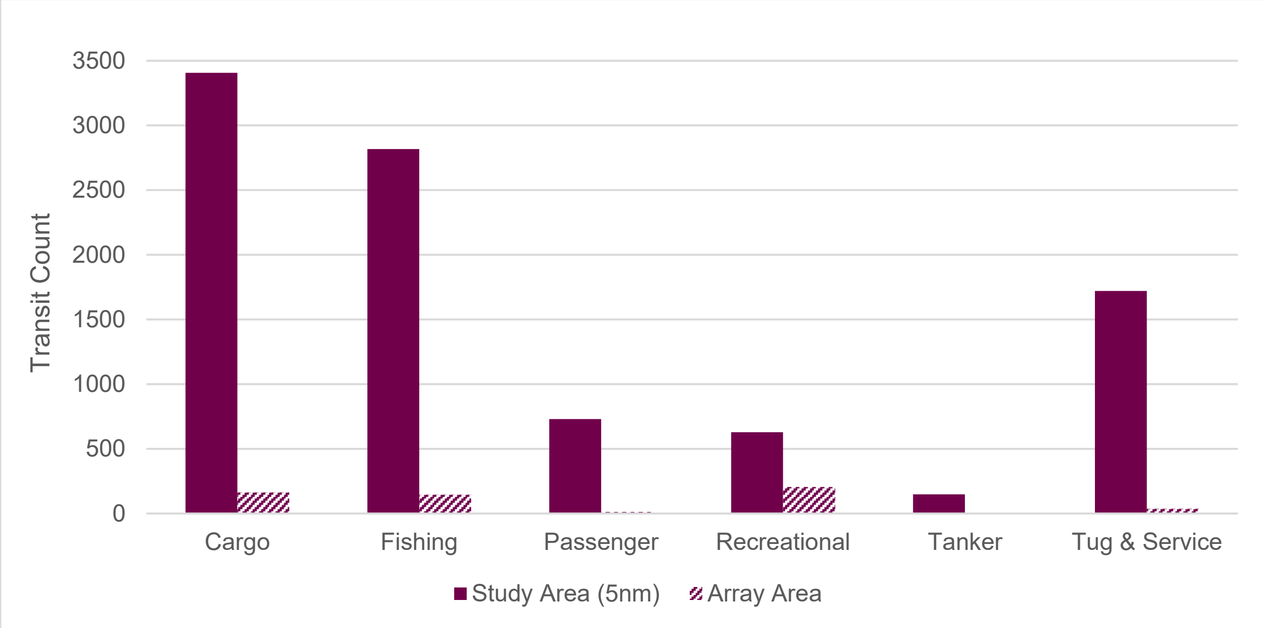


Figure 3-3: Number of transits by type and area during the 15-months (Jan & Jul 2019, Jan- Jul 2022, Mar – Aug 2024).

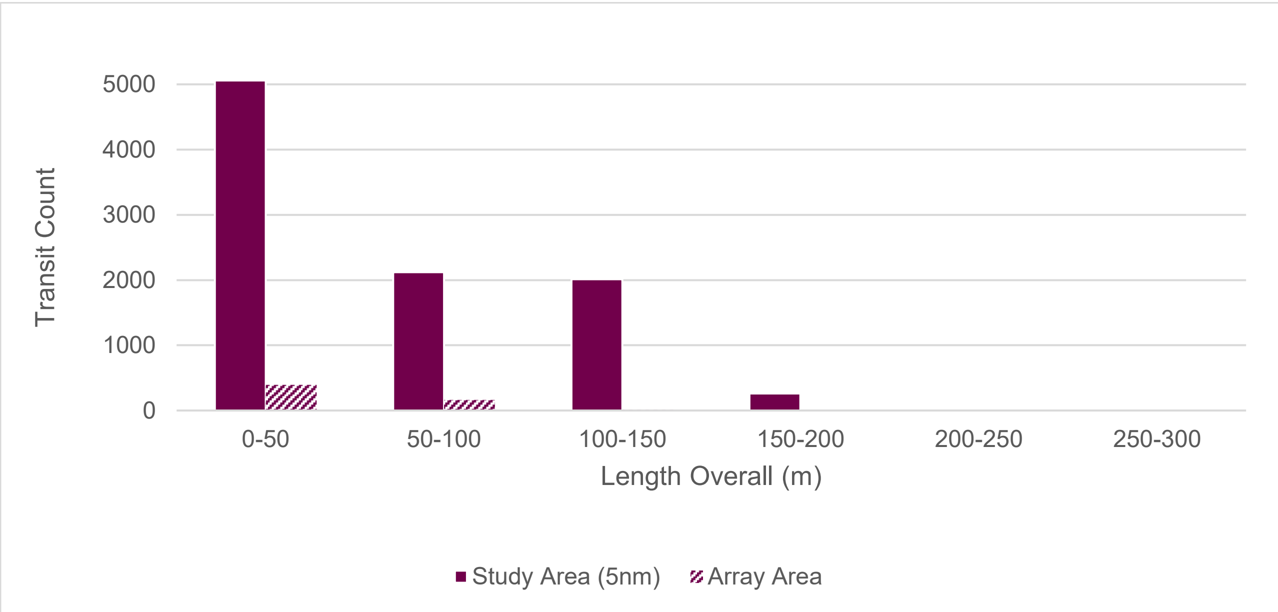


Figure 3-4: Vessel transits by LOA (m).

3.2 Consultation Responses

Consultation responses received throughout the EIAR process, regarding the safety of navigation are noted in Table 3-1. More detailed consultation notes are provided within the NRA (Appendix 13-1 of the EIAR [vol. 2B]). Overall, during this process, no consultees raised concerns regarding the safety of navigating through the OWF area.

Table 3-1: Consultation responses regarding navigation safety.

Date	Consultee and type of response	Issues raised
September 2019	Irish Sailing Association (Email)	Advised that Irish Sailing supports the European Boating Association position statement on wind farms.
September 2019	Warrenpoint Harbour (Meeting)	Considered that the Project would not have any navigation safety implications to Warrenpoint harbour; potential diversion of vessels around the OWF Area was not considered significant; the OWF Area was thought to have minimal if any effect on collision risk and grounding risk for commercial vessels; considered that commercial vessel contact with the Project would be minimal.
September 2019	Dundalk Pilot (Meeting)	Considered that the AIS vessel track plots are a fair representation of vessel traffic activity in Dundalk Bay. Raised no concerns on the impact on navigational safety.
September 2019	Dublin Port Company (Meeting)	Dundalk handles on average one vessel per week, however trade was currently declining. No navigational safety issues were raised regarding vessels entering and leaving Dundalk with the Project in place.
September 2019	Drogheda Port (Meeting)	The OWF Area is outside of the port jurisdiction and as such no navigational concerns were raised. Accepted that the potential diversion of vessels around the OWF Area and associated possible delays would be minor, as were the absolute number of vessels.

3.3 Navigation within the OWF Area

The Internation Convention for the Safety of Life at Sea (SOLAS) Chapter V (IMO, 1974) requires that all vessels that proceed to sea must undertake a voyage (passage) plan. In particular, Regulation 34 of SOLAS states that "*Prior to proceeding to sea, the master shall ensure that the intended voyage has been planned using the appropriate nautical charts and nautical publications for the area concerned, taking into account the guidelines and recommendations developed by the Organization*". It states that the voyage plan shall identify a route which "*ensures sufficient sea room for the safe passage of the ship throughout the voyage…anticipates all known navigational hazards and adverse weather conditions*". Key passage planning principles are also given in the IMO's 1999 Resolution A.893(21) note the four stages of passage planning are Appraisal, Planning, Execution and Monitoring. The Planning stage includes "*safe speed, having regard to the proximity of navigational hazards along the intended route or track, the manoeuvring characteristics of the vessel and its draught in relation to the available water depth*".

Restrictions on navigating within 500 m of WTGs would be in place during construction and major maintenance where Safety Zones will be established.

3.3.1 Commercial Vessels

Based on these principles are the practice of good seamanship, it is considered highly unlikely that a commercial vessel would choose to navigate through an OWF. A review of historical vessel traffic within the UK confirms that this is not common practice and masters are planning courses to pass clear of OWFs. This assumption was included within the NRA (Appendix 13-01 of the EIAR [vol. 2B]), which notes that up to three commercial vessels per month that transit to and from Drogheda and Greenore Port will be required to adjust their passage plan to pass either to the west or east of the OWF Area, as well as ~2 east/west vessel transits (leaving/entering Dundalk Harbour) per week that will also need to be adjusted accordingly.

In summary, the layout of the Project will have no impact on navigational safety for commercial shipping.

3.3.2 Recreational Vessels

Detailed analysis undertaken as part of the Hornsea Four OWF Environmental Statement (Orsted, 2021) and a review of UK vessel traffic demonstrated that recreational vessels were routinely choosing to navigate through an OWF (including London Array, Beatrice, Thanet, Rampion and Irish Sea developments).

The Royal Yachting Association (RYA) in the UK have recognised that navigation through an OWF is frequently undertaken by recreational craft. The European Boating Association (EBA, 2019) have also issued a position statement that provides similar advice. Guidance and advice is provided to recreational users including proper passage planning, ensuring they are aware of the structure locations and any ongoing operations through Notices to Mariners

Recreational vessels in the Study Area are typically navigating North-South between Carlingford Lough and Drogheda (section 3.1) such that they could transit in line with the primary LoO with a negligible change to current routes and greatest predictability and regularity in WTG positions. The small size of the Project, with an east-west width of 2.3 nm, also offers much greater opportunity for recreational craft on coastal passage to navigate around the OWF should they choose to do so.

However, the aforementioned analysis of UK OWFs noted that small craft often did not solely navigate parallel to the LoOs and may choose to tack or utilise waypoints within the OWF. While multiple LoO could allow for improved access and predictability for small craft to undertake straight transits that follow the rows and columns of the WTGs, existing vessel activity within operational OWFs demonstrates that this is not essential. It is also recognised that the Project will have a much greater spacing (>944 m) between WTGs in comparison to pre-existing sites, like Rampion (600 m) and London Array (650 m), and this offers substantial sea room for recreational transits. This would allow vessels that choose to deploy waypoints within the OWF Area to have more sea room available to safely place these waypoints between WTGs. Furthermore, very few incidents involving recreational craft have occurred within operational OWFs in the UK (see section 4.2) suggesting the risk is generally low. In addition, as shown in section 3.2, no concerns were raised by recreational stakeholders on the layout.

In summary, recreational vessels may choose to navigate through the Project, but the use of a single LoO would not compromise navigational safety.

3.3.3 Fishing Vessels

Fishing activity within the Project is shown to be low, with most fishing vessels observed south of the Project OWF Area (section 3.1; Figure 3-2), and those which are observed in the OWF Area transit predominantly in a NE-SW orientation, parallel to the primary LoO.

The National Federation of Fishermen's Organisations (NFFO) and Scottish Fishermen's Federation have published a report (NFFO, 2020) regarding 'Spatial Squeeze', a term used to describe the displacement of fishing vessel activities into adjacent corridors as a result of the presence of OWF Arrays. This is considered more generally as a result of the presence of an OWF and subsea cabling and therefore the number of LoO would not have a substantial effect on this impact.

However, significant analysis undertaken of UK OWFs by NASH Maritime and reported in the Hornsea Four OWF Environmental Statement (Orsted, 2021) has shown that fishing does routinely occur within operational OWFs, including both mobile and static gear. As the fishing is likely to occur mostly in favourable weather conditions, the spacing of >944 m would facilitate small craft fishing practices within the Project site. The Applicant will implement a Fisheries Management and Mitigation Strategy to promote co-existence between the Project and commercial fisheries. Furthermore, local fishermen will have excellent local knowledge and good situational awareness of the Project.

In summary, the majority of fishing in the Study Area is clear of the Project and therefore the impacts on fishing vessels that choose to navigate through the OWF area would be similar to those of recreational craft mentioned above and tolerable with a single LoO.

3.4 NRA Results

The NRA (section 7 of appendix 13-1 of the EIAR [vol. 2B]) considered any impact on navigation safety potentially caused by the construction, O&M and decommissioning phases of the Project. In total, 30 individual navigation hazards were assessed for the construction and decommissioning phases of the Project and 18 hazards were identified for the O&M phase. Each hazard was scored using a risk matrix for a "Most Likely" and "Worst Credible" consequence criteria ("People", "Property", "Environment" and "Business/Stakeholders"), taking into account the Project's embedded risk controls and were then combined into a single hazard 'inherent' risk score. A list of 15 additional risk control measures were then identified and were applied to hazards as relevant and appropriate to generate residual risk scores.

The risk assessment concluded that:

- A consensus was reached at the hazard workshops amongst stakeholders that during the construction phase, in the absence of any additional risk controls, seven hazards were Moderate Risk, 18 hazards were Minor Risk, and five hazards were Negligible Risk;
- A consensus was reached at the hazard workshops amongst stakeholders that, in the absence of any additional risk controls, two hazards were Moderate Risk, 15 hazards were Minor Risk, and one hazard was Negligible Risk.
- 14 of the additional risk control measures were identified for the construction phase and 13 for the operational phase;
- A consensus was reached at the hazard workshops amongst stakeholders that, with the additional risk controls, no hazards were Moderate Risk, 17 hazards were Minor Risk, and 13 hazards were Negligible Risk; and
- The highest-risk hazards related to the risk of collision (construction vessels, commercial vessels, workboats, and fishing/recreational), contact of a fishing vessel or construction vessel with the partially constructed OWF, and snagging of fishing gear.

In summary, the NRA concluded that the navigational risk and impact on navigation through the Project with a single LoO was minor with the adopted risk controls.

3.5 Surface SAR and Pollution Response

The NRA has demonstrated that the navigational risks surrounding the Project would be managed to Tolerable levels with mitigation. It may however be the case that were an incident to occur, there would be a requirement for a surface lifeboat/IRCG vessel to undertake SAR or pollution response within the OWF Area.

As detailed within the NRA (appendix 13-1 of the EIAR [vol. 2B]), consultation with the RNLI Station at Clogher Head in September 2019 reached consensus that the Project, with a single LoO, would not hamper existing lifesaving duties. This position is supported through the following key factors:

- **Spacing between structures**: The minimum spacing between structures within the Project OWF Area (944 m) is significantly greater than at most existing arrays and will provide safe flexibility for any SAR or pollution response vessel required to navigate internally within the OWF area;
- **Time to manoeuvre**: The minimum spacing between WTGs is 944m, even at full speed of 25 knots, it would take 73 seconds to pass from one WTG to another. At a more realistic search speed of ten knots, this would be three minutes. This gives significant time for the vessel to manoeuvre, ensure spatial awareness and make decisions to ensure the safety of the vessel and its crew;
- **Equipment**: RNLI lifeboats are fitted with various communications and navigation equipment including hand-held VHF (very high frequency) radio, onboard global positioning system (GPS), radar, VHF direction-finding (VDF) equipment and electronic charts. The impact on this technology has been shown to be negligible across numerous studies. For example, wind farm trials were carried out at North Hoyle OWF in 2004 and off the Kentish Flats wind farm in 2006. Marine Guidance Note (MGN) 372 Amendment 1 (M+F) Guidance to mariners operating in vicinity of UK OREIs (MCA, 2022) notes that '*the trials indicated that there is minimal impact on VHF radio, Global Positioning Systems (GPS) receivers, cellular telephones and AIS. UHF and other microwave systems suffered from the normal masking effect when turbines were in the line of the transmissions. The turbines produced strong radar echoes giving early warning of their presence. At close range, however, the trials showed that they may produce multiple reflected and side lobe echoes that can mask real targets… Similar effects were found during the British Wind Energy Association funded trials undertaken off the Kentish Flats wind farm in 2006.'* As part of the North Hoyle 2004

assessment by the MCA and QinetiQ (2004), tests were made on the quality of VHF transmissions when made near WTGs. This assessment concluded that the VHF Direction Finding equipment carried in the trial boats operated satisfactorily within the wind farm, except when very close to the WTGs (within approximately 50 m). This conclusion was supported by further tests by the MCA on SAR capabilities in wind farms in 2005. There is no evidence that a single LoO would materially affect these conclusions;

- **Project Mitigations**: As set out in section 6, the Project has numerous mitigation measures embedded within the design, many of which include requirements to assist and enable surface SAR to, within, and in the vicinity of the OWF Area. For example, an ERCoP will be drafted in collaboration with SAR authorities and a Lighting and Marking Plan (LMP) which will include clear and unique identification markings visible to surface craft and aircraft; and

- **Collaboration**: It is also recognised that there has been a long history of collaboration between the RNLI and OWF developers to facilitate knowledge sharing and exercising.

3.6 Summary

Based on a review of the existing vessel traffic in and around the Project OWF Area, prior consultation responses, and the results of the NRA, this section has demonstrated that:

- Commercial vessels would not navigate through the Project and therefore the single LoO would have no effect on navigational safety of larger vessels;

- Recreational vessels routinely navigate through OWFs elsewhere in the UK. The primary direction of travel is north-south, and therefore in line with the primary LoO. No concerns were raised by recreational stakeholders as regards to the layout on navigational safety;

- Whilst some fishing does occur within the OWF area, the majority of fishing activity is located south of the Project, and those vessels within the OWF area predominantly transit in a NE-SW orientation, parallel to the primary LoO. Co-existence between commercial fisheries and the Project is also anticipated to occur and it is demonstrated that certain types of fishing continue within operational OWFs elsewhere in the UK;

- For both recreational and fishing boats, their behaviour observed within OWFs do not necessarily follow the LoO, suggesting these are less critical for navigation given their small size and low speed;

- The NRA, for which consensus was reached with stakeholders on the results, noted that with mitigation all hazards were scored as either “Minor” or “Negligible”;

- The RNLI have stated that they do not believe the Project would affect their ability to respond to incidents within the Study Area and therefore the impact of a single LoO on surface SAR and on the IRCG’s pollution response capability is considered to be minor; and

- Several of the Project risk controls, including an ERCoP (see appendix 5-7 (EIAR vol. 2A) and LMP see appendix 5-8 (EIAR vol. 2A), will directly assist and enable surface SAR transits to, within, and in the vicinity of the OWF Area.

4 RISK PROFILE OF PROJECT

4.1 MetOcean Conditions

Metocean conditions in the area are considered when determining the likelihood of occurrence of a hazard or impact and what the weather conditions may be during the time of any SAR operation.

The Irish Coast Pilot (NP40) ADMIRALTY Sailing Directions (UKHO, 2023), summarises the climate on the east coast of Ireland as rather mild, equable, and humid. The summers are usually cloudy and wet, and the winters are windy with frequent rain. Snow is quite rare. The annual rainfall is generally heavy and well-distributed.

Although winds from any direction may be expected in any month, the winds are usually from the south-west and west, and occasionally from the north-west. From March to May however, north-east winds become frequent and north winds are not uncommon. Gales may occur in any month and are common from October to March.

Mist and fog often occur with coastal fog most frequent on autumn and winter mornings, but is generally not long lasting, however in winter it can be slow to clear. Generally, fog is more common inland and at higher altitudes, mainly during winter and during the mornings at times of high pressure. Poor visibility is infrequent, with about 12% of observations of the East coast recording poor visibility. Climate information from Dublin Airport Station (the nearest Climate Station to the Project) over the period 1974 – 2016 indicates an average of 39 days of fog per year, noting this may improve further offshore (UKHO, 2023).

There is little, if any, current in the Irish Sea, however, there is the possibility of a west-going surface current which is believed to set across the Irish Sea from Liverpool Bay during strong and persistent east winds. Tidal streams off the coast are generally weak and there is an area of permanently slack water between the latitudes of Drogheda (53˚ 43'.00N) and Carlingford Lough (54˚ 00'.00N). Tidal rates during spring tides for Killard Point (54°18.51'N 5°27.37W) show rates of less than 1.0 knot and therefore tidal rates are not considered significant.

4.2 Historical Incidents

Analysis of what has happened in the local area and within the industry is valuable in characterising the risk of the Project and the likelihood of the requirements for SAR activities within the Project. Historical incident data was collated for the Irish Sea and the industry more widely from a variety of sources as documented in the NRA (Volume 2B, Appendix 13-01). This included from the Marine Accident Investigation Branch (MAIB), RNLI and Irish Marine Casualty Investigation Board which is summarised in section 4.2.1. NASH Maritime have also collated decades of historical incident data for the offshore wind industry and reviewed industry resources, such as G+, which are summarised in section 4.2.2.

4.2.1 Local Incidents

Historical incident data from the MAIB (1992 – 2024) and RNLI (2008 – 2024) are presented spatially in Figure 4-1, and by incident type and vessel type in Table 4-1. The analysis shows that most of the incidents occurred close to the ports, with reducing incident frequency further offshore. The majority (~85%) of the incidents reported within the Study Area, were fishing vessels and recreational craft, largely related to incidents that would not be exacerbated by the Project (e.g. "*ill crewman on vessel*", "*adverse conditions*", "*leaks / swamping*", "*out of fuel*", etc.). Two incidents have been recorded within the proposed OWF Area, both of which were fishing vessels. One involved the vessel being towed to port for repair due to a broken propellor shaft and resultant loss of control in 1997, while the other rendered assistance in 2009 due to an ill crewman onboard.

This analysis suggests that the most likely incidents at the Oriel site from third party traffic would involve fishing vessels or recreational craft experiencing mechanical failure or health related events. However, the frequency is low, with approximately one incident every ten years, and responded to by the RNLI.

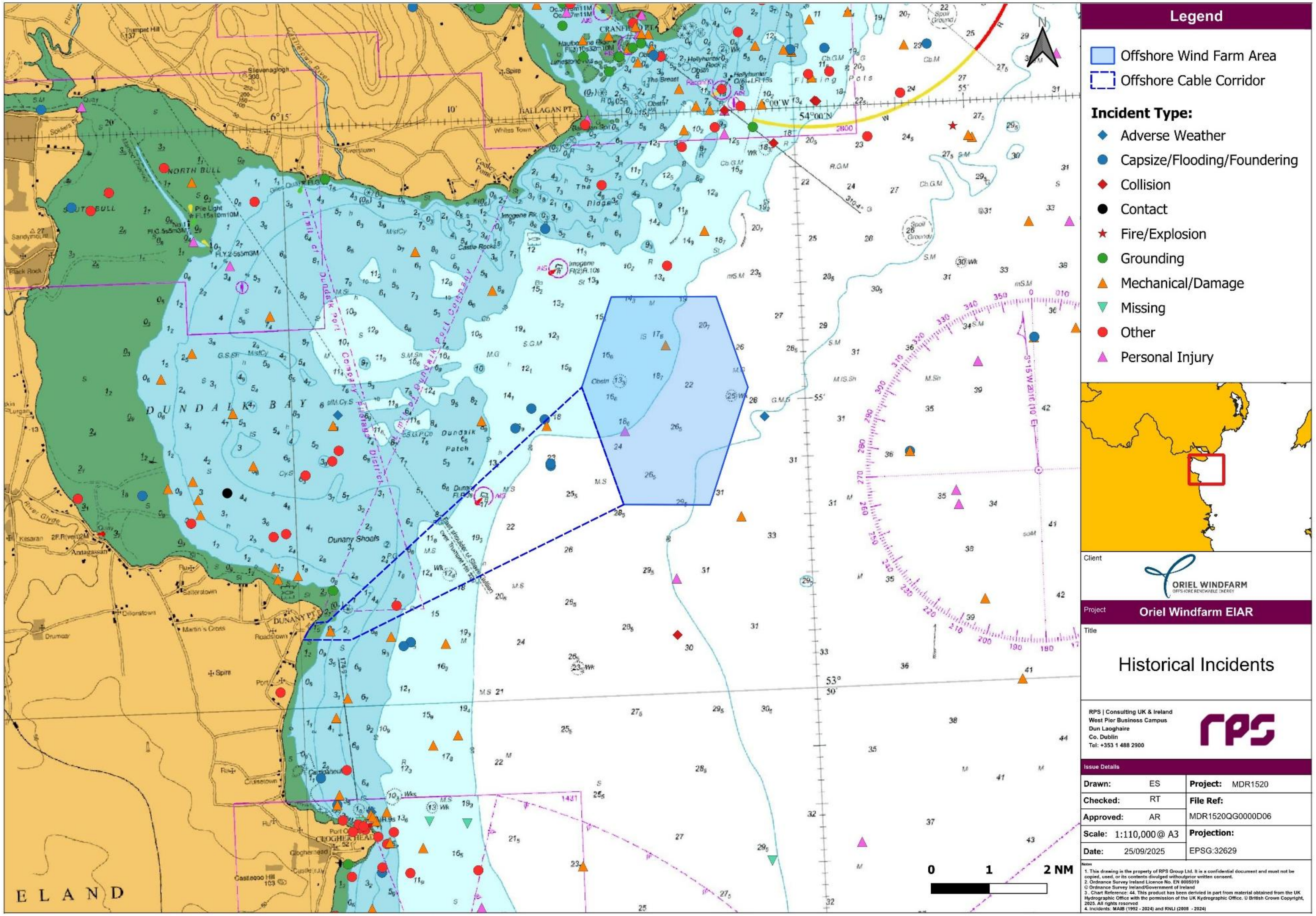


Figure 4-1: Historical incidents in and around the OWF Area.

Table 4-1: Historical incidents within 5 nm of the OWF Area by incident type and vessel type.

Incident Category	Vessel Type				Total
	Cargo	Fishing	Passenger	Recreational	
Adverse Weather	0	0	0	4	**4**
Capsize/Flooding/Foundering	0	13	0	3	**16**
Collision	1	3	1	1	**6**
Contact	0	1	0	0	**1**
Grounding	3	1	0	6	**10**
Mechanical/ Damage	2	28	0	27	**57**
Missing	0	2	0	2	**4**
Personal Injury	1	6	0	4	**11**
Other	0	11	14	11	**36**
Total	**7**	**65**	**15**	**58**	**145**

4.2.2 Industry Incidents

UK and global analyses were conducted on historical maritime incidents that occurred within/adjacent to an OWF or involved an OWF-supporting vessel.

4.2.2.1 Global Industry Incidents

Analysis of worldwide industry incidents has been undertaken using the G+ Global Offshore Wind Health and Safety Organisation (G+) annual incident data between 2014 to 2024. In total, 12,273 OWF-related incidents (1,115 incidents per year, on average) occurred worldwide. The annual number of incidents per 1 million work hours are presented in Figure 4-2, which shows that the proportion of incidents with respect to the number of work hours has generally declined over the last decade, reflecting improved industry safety.

Analysis was also conducted on the consequences of the incidents reported between 2014 and 2024 (presented in Figure 4-3). The most common OWF-related incident consequences are considered relatively minor (hazards, near hits and first aid). While more serious consequences were reported, such as fatalities and lost workdays, these had much a lower frequency of occurrence of 0.02% and 4.4% respectively.

Across the entire industry, in 2024:

- There were a total of 673 reported injuries and a single fatality;
- 66% of injuries required only first aid;
- There were a total of 48 incidents requiring emergency response and medical evacuation. These were mostly the result of working with hand/power tools, working at heights, walking and routine maintenance. Almost half of these took place aboard a vessel (jack-up/barge/Service Operations Vessel (SOV)/Crew Transfer Vessel (CTV)); and
- More generally, the G+ IOER notes that 58% of incidents were recorded on a vessel and 40% were recorded on a turbine.

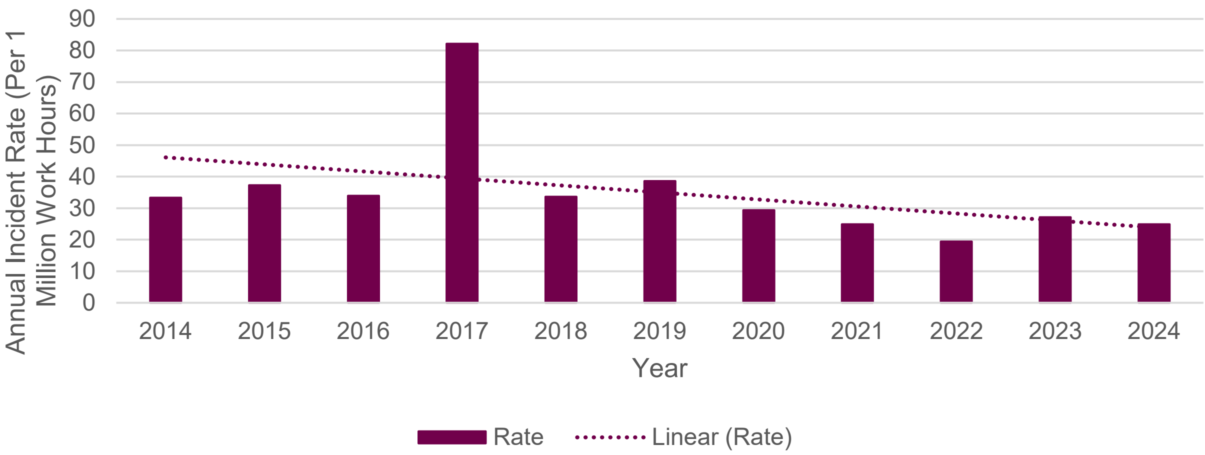


Figure 4-2: Global number of OWF-related incidents per 1 million work hours.

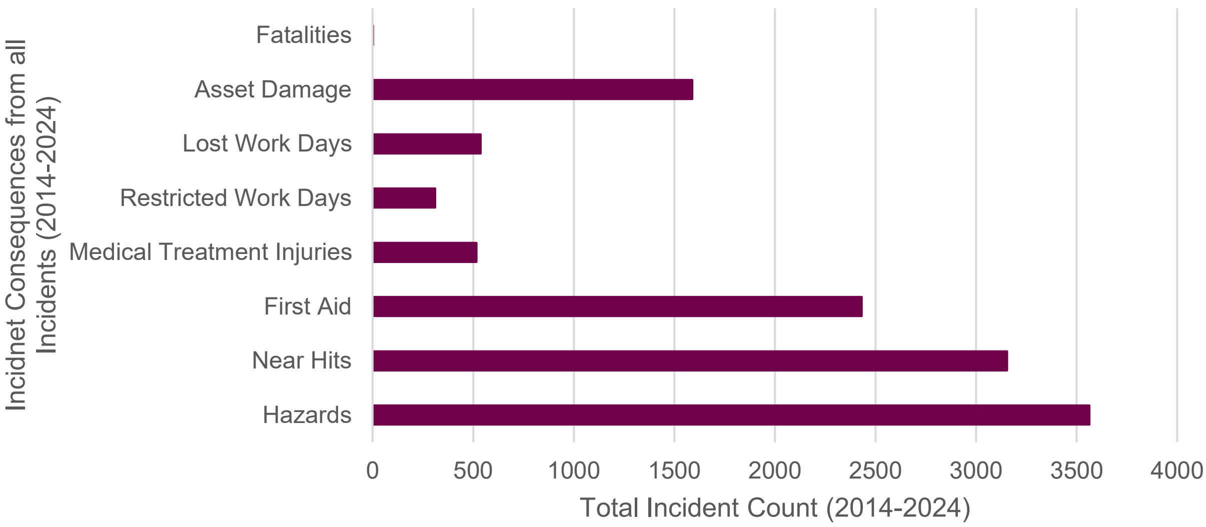


Figure 4-3: Consequences of global OWF-related incidents.

4.2.2.2 UK Industry Incidents

NASH Maritime have undertaken a thorough collation of navigational incidents occurring within the UK offshore wind industry. The UK analysis primarily draws from the MAIB (1992 to 2023) and RNLI (2008 to 2023) databases and is supplemented by MAIB investigation reports and news sources. 327 incidents were identified in the UK, from 2004, when the first OWF-related incident was recorded, to 2024 from all the data sources, summarised in Table 4-2 - of which detailed information was obtained for 256 (78%).

Where the information is available, 45% of OWF-related incidents occurred within the array boundary of OWFs, summarised in Table 4-3, 13% occurred within ports and harbours, and 42% occurred on-transit between the two. Project vessels (such as CTVs, SOVs, or construction vessels), account for 92% of OWF-related incidents. Within a wind farm array specifically, 82% of incidents also involved a project vessel, due to their frequency of operations and proximity to infrastructure.

The most frequent OWF-related incident types are personal injuries (25%), mechanical failures (22%), fire/explosions (17%), and allisions (15%). Very few allisions are recorded by a third-party vessel (5), however, anecdotally there have been more allisions involving fishing and recreational vessels which are unreported. Within a wind farm array, however, allisions are the most prominent incident type (31%), again with few attributed to third-party vessels (4).

There have been no recorded collisions or allisions involving large commercial shipping and OWFs in the UK.

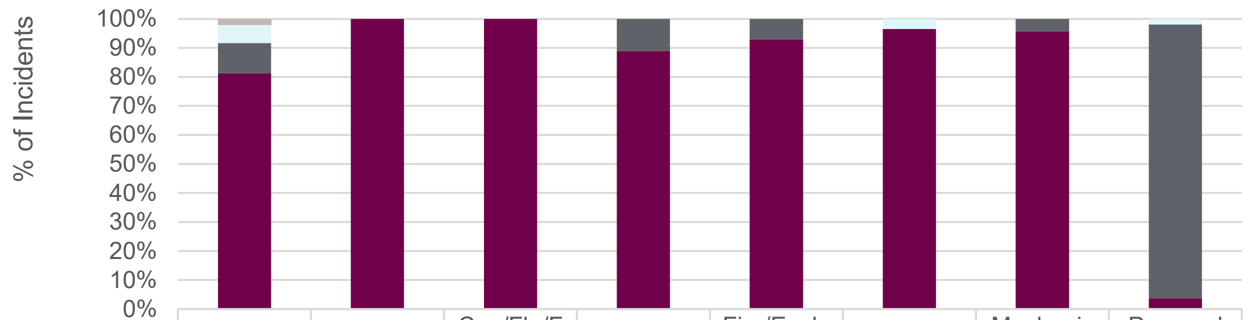
Figure 4-4 illustrates the types of injuries resulting from the OWF-related incidents. Most incidents did not result in significant injury to passengers or crew. However, 26% of the identified incidents for which consequences were known, involved 1+ injuries, with only six incidents resulting in more than two injuries.

Table 4-2: Frequency of UK wind farm-related incidents by incident and vessel type.

Incident Type	Project Vessel	Project / Third-Party Vessel	Third-Party Vessel	Non-Vessel	Total
Allision	41	2	5	0	**48**
Breakout	1	0	0	0	**1**
Capsize/Flooding/Foundering	10	0	0	0	**10**
Collision	1	8	0	0	**9**
Fire/Explosion	54	0	1	0	**54**
Grounding	31	0	0	0	**31**
Mechanical/Damage	67	1	4	0	**72**
Near Miss	3	12	2	0	**17**
Personal Injury	81	1	0	0	**82**
Other	1	0	0	2	**3**
Total	**290**	**24**	**11**	**2**	**327**

Table 4-3: Frequency of incidents that occurred within a UK wind farm array by incident and vessel type.

Incident Type	Project Vessel	Project / Third-Party Vessel	Third-Party Vessel	Non-Vessel	Total
Allision	32	1	4	0	**37**
Breakout	1	0	0	0	**1**
Capsize/Flooding/Foundering	2	0	0	0	**2**
Collision	0	5	0	0	**5**
Fire/Explosion	16	0	1	0	**17**
Grounding	1	0	0	0	**1**
Mechanical/Damage	18	0	5	0	**23**
Near Miss	0	1	2	0	**3**
Personal Injury	27	0	0	0	**27**
Other	0	0	0	2	**2**
Total	**97**	**7**	**12**	**2**	**118**



	Allision	Breakout	Cap/Flo/Fou	Collision	Fire/Explosion	Grounding	Mechanical	Personal Injury
5 Injuries	0.42%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
2 Injuries	1.27%	0.00%	0.00%	0.00%	0.00%	0.42%	0.00%	0.42%
1 Injury	2.12%	0.00%	0.00%	0.42%	1.27%	0.00%	0.85%	21.19%
No Injuries	16.53%	0.42%	2.54%	3.39%	16.95%	11.86%	19.07%	0.85%

Figure 4-4: Number of injuries by type resulting from OWF-related incidents.

4.3 Availability of SAR Assets in Region

This section presents an overview of the available SAR assets, including RNLI lifeboats, SAR helicopters, and medical facilities in the Project region.

4.3.1 RNLI Lifeboat Stations

The nearest RNLI lifeboat stations and the approximate lifeboat passage plans to and from these stations are presented spatially in Figure 4-5. Assuming a maximum lifeboat speed during calm weather and a lifeboat speed of approximately 66% of its maximum speed during rough weather, approximate times for a RNLI lifeboat to reach the OWF Area from its station during calm weather are provided in Table 4-4.

Table 4-4: RNLI lifeboat transit times during calm weather.

RNLI Station	Passage Plan Distance (nm)	Lifeboat Speed (kts)	Approximate Time (minutes)			
			Raise Alarm	Prepare for Launch	In Transit	Total to Casualty
Kilkeel	7.79	35	15	15	13.4	**43.4**
Clogher Head	8.19	25	15	15	19.7	**49.7**
Skerries	18.18	35	15	15	31.2	**61.2**
Newcastle (Co Down)	19.00	25	15	15	45.6	**75.6**

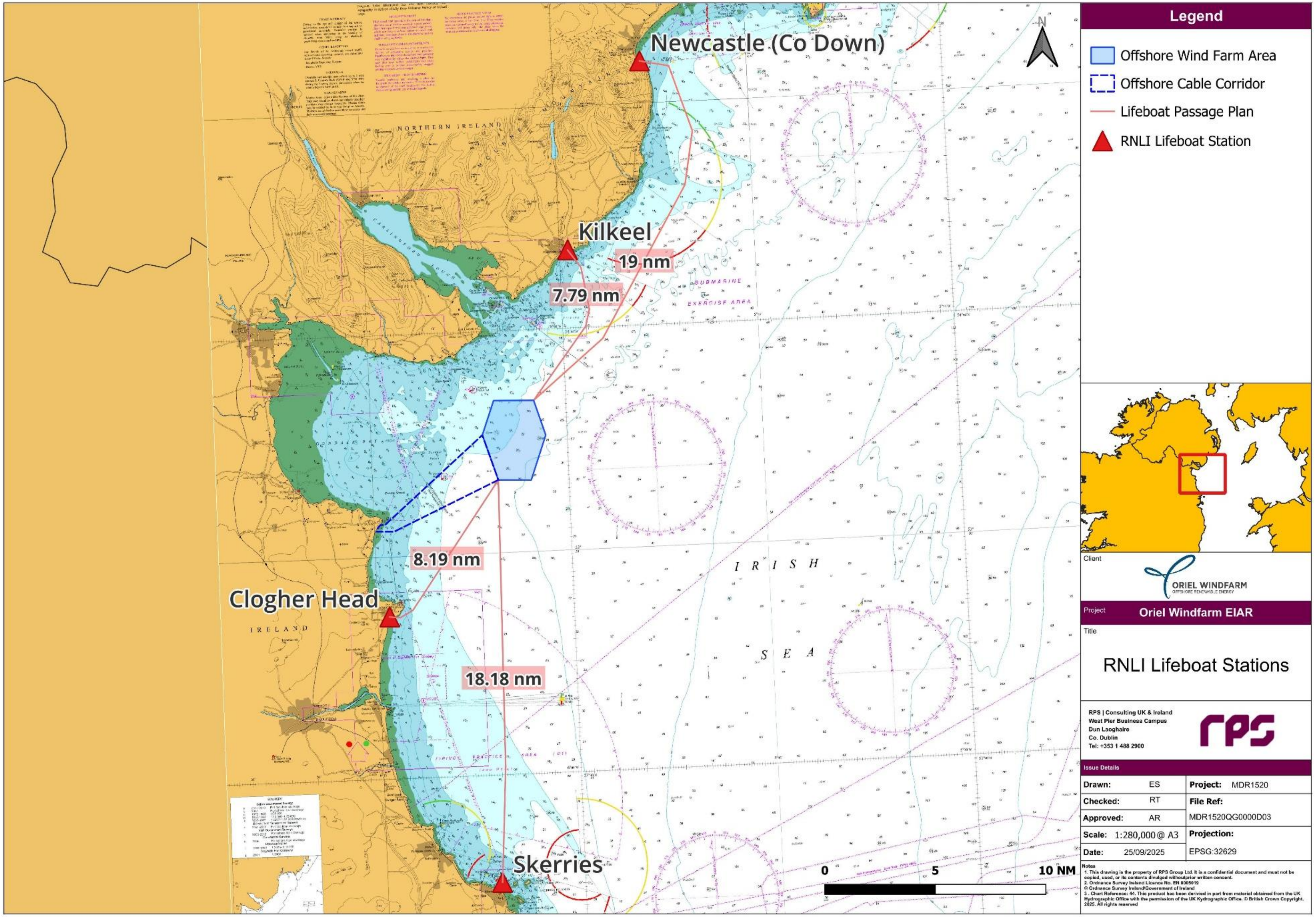


Figure 4-5: Nearest RNLI lifeboat stations.

4.3.2 SAR Helicopter Bases

There may be an emergency requiring SAR helicopter assistance. The nearest IRCG and UK SAR helicopter bases and the distances to and from these stations are presented spatially in Figure 4-6. Assuming a maximum helicopter speed of 165kts during calm weather and a cruising helicopter speed of approximately 151kts, approximate times for a SAR helicopter to reach the OWF Area from its base at cruising speed are provided in Table 4-5.

Table 4-5: SAR helicopter transit times at cruising speed.

Helicopter Base	Passage Plan Distance (nm)	Helicopter Speed (kts)	Approximate Time (minutes)					
			Raise Alarm	Scramble		During Transit	Total to Casualty	
				Day	Night		Day	Night
Dublin	28.30	151	15	15	45	11.2	**41.2**	**71.2**
Caernarfon	78.49	151	15	15	45	31.2	**61.2**	**91.2**
Sligo	90.48	151	15	15	45	36.0	**66.0**	**96.0**
Waterford	108.35	151	15	15	45	43.1	**73.1**	**103.1**
Shannon	124.4	151	15	15	45	49.4	**79.4**	**109.4**

4.3.3 Medical Facilities

Following the location and rescue of a casualty by either a lifeboat or SAR helicopter, the casualty will need to be transported to a nearby medical facility. All hospitals, with and without a helipad, located within 100nm of the OWF Area are presented spatially in Figure 4-7. Assuming a SAR helicopter cruising speed of 151 kts, the approximate times for a SAR helicopter to transit from the OWF Area to the hospitals with an existing helipad facility have been calculated and are presented in Table 4-6.

Table 4-6: Cruising SAR helicopter transit times from OWF Area to hospitals.

Hospital Name	Distance from OWF Area (nm)	SAR Helicopter Transit Time (assuming 151kts cruising speed) (minutes)
Beaumont Hospital	30.19	12.0
Tallaght University Hospital	37.35	14.8
Royal Victoria Hospital	40.43	16.1
Tyrone & Fermanagh Hospital	56.84	22.6
Altnagelvin Area Hospital	75.80	30.1
Letterkenny University Hospital	83.70	33.3
Sligo University Hospital	85.81	34.1

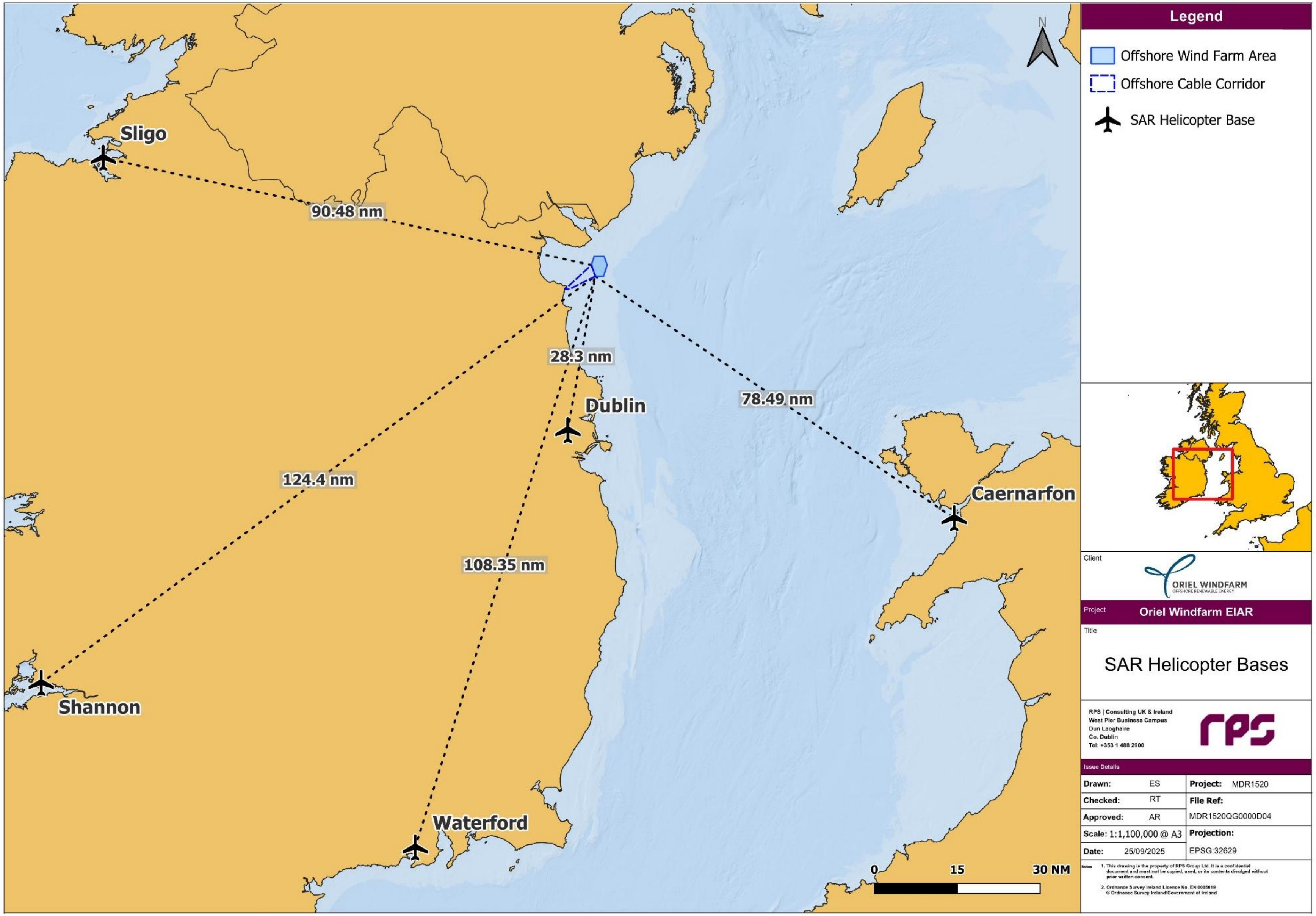


Figure 4-6: Closest IRCG and UK SAR helicopter bases.

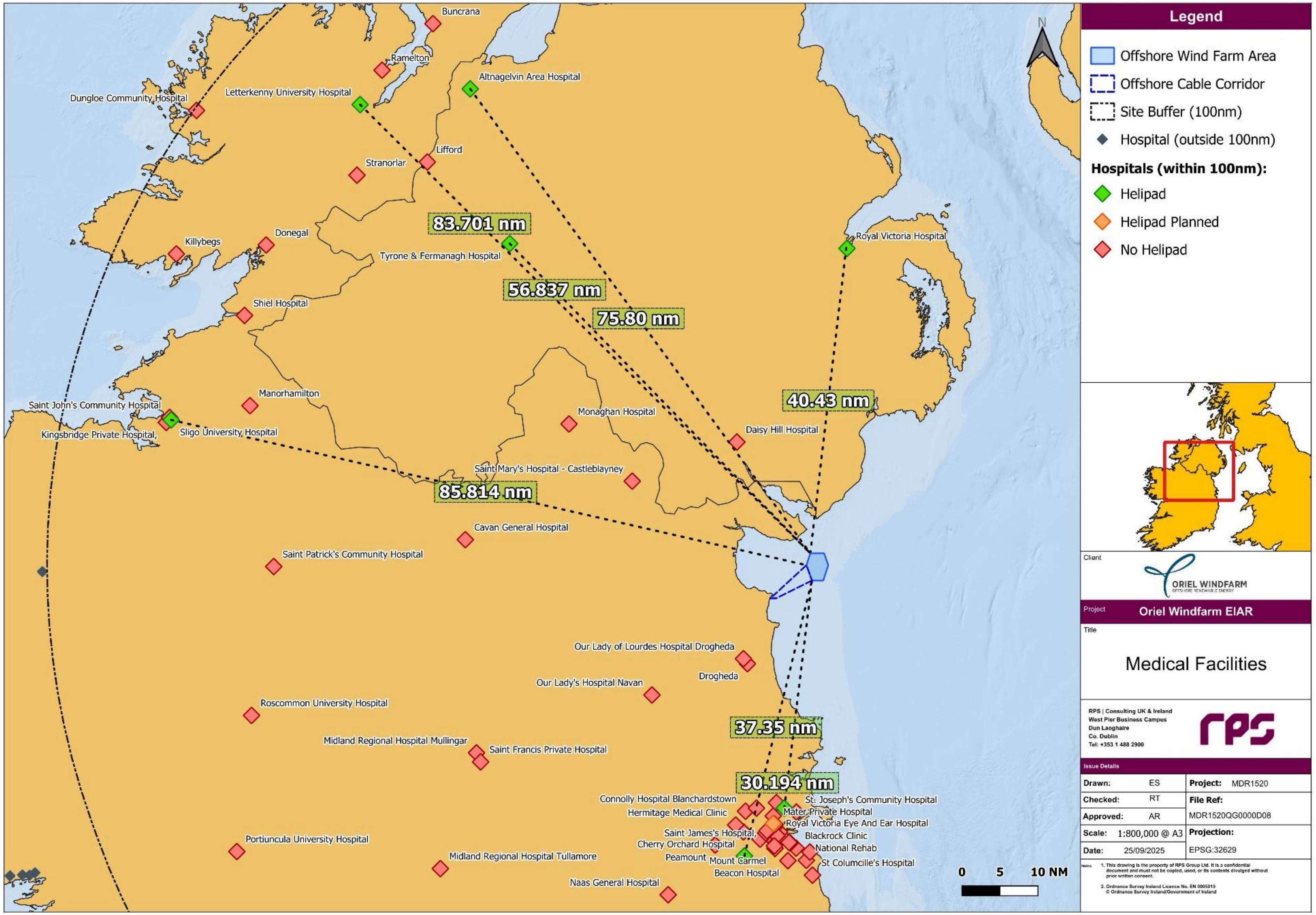


Figure 4-7: Medical facilities within 100 nm of the OWF Area.

4.4 Realistic Events

Analysis of historical incidents within section 4.2 has demonstrated that within the local area of the Project, very few incidents have occurred and therefore it would be expected, as demonstrated within the NRA, that incidents involving third party traffic in the immediate proximity of the OWF area would continue to be low. Analysis of incidents across the wider industry shows that the overwhelming majority of incidents occurring on existing OWFs are minor health and safety related incidents, involving a single casualty and often occurring aboard a Project vessel.

Based on this incident analysis, a long list of 35 possible incident types was collated, taking into account possible incident types, their location, project phase and number of people at risk. Figure 4-8 describes the various parameters used in creating this long list with the scenarios graded by their credibility in occurrence, with vessel mechanical failure and minor injuries having a high credibility of occurring whereas fire being possible but highly unlikely.

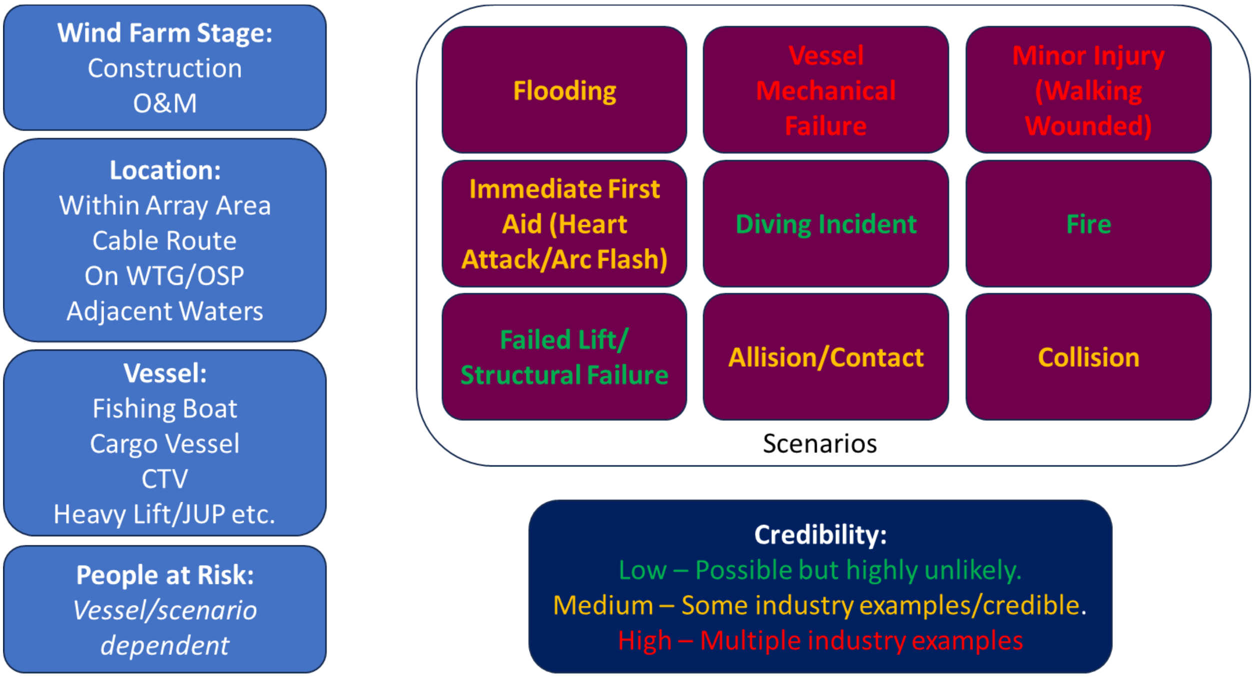


Figure 4-8: Characterisation of possible incidents at Project.

Following a review of these incident scenarios, it was recognised that they broadly conformed to two groups as described in Figure 4-9:

- **Organic incidents**: incidents occurring as a result of the Project's construction and O&M activities, likely to be minor health and safety incidents involving Project personnel and vessels with a singular casualty:
    - Alarm will be raised quickly through multiple means;
    - In the majority of cases, the Project will have sufficient first aid resources to provide initial response to such incidents, all personnel have as a minimum Standards of Training, Certification and Watchkeeping (STCW)/ Global Wind Organisation (GWO) basic first aid and solo working is not permitted;
- Should national SAR assets be required, the presence of Project assets on scene would enable casualties to be extracted from the WTGs/OSS (if required) and transported to outside the wind farm perimeter before national SAR assets arrive on scene;

  - There is highly unlikely to be the requirement for search activities with organic incidents. Casualties will be aboard vessels or structures and personnel will be monitored and tracked; and
  - Casualty will be transferred to an onshore place of safety or to an agreed transfer location for marine or helicopter transfer to a place of safety, most likely the nearest hospital as national SAR assets are only likely to be tasked where life or quality of life is at risk.

- **External incidents**: incidents that might occur involving non-Project vessels, particularly occurring when construction/O&M activities are not occurring. Analysis of vessel traffic within the vicinity of the Project suggests that small recreational or fishing vessels are those most likely to encounter difficulties (see section 3.1 and section 4.2):
  - Reliance on alarm being raised by casualty vessel (VHF/DSC);
  - National SAR assets being tasked to site;
  - The Project infrastructure being prepared (cease generation/orientation of WTGs);
  - National SAR asset arrives on scene and, if required, commence search;
  - Casualty identified and rescue undertaken; and
  - Casualty transferred to a place of safety.

It is possible that in extreme weather, the layout of the Project, with a single LoO, may affect the probability of a successful search for both organic and external incidents. However, as noted above, it is considered very unlikely that the organic incidents, which are the most likely to occur, would require a search. External incidents are more likely to occur in weather conditions where the wind farm is likely to be active in O&M activity. The significant Project assets and capabilities that would assist with a search and/or rescue should an organic or external incident occur are set out in section 6.

It is recognised that some challenges may be encountered when trying to extract casualties from in the immediate vicinity of a WTG due to the hazardous nature of WTGs, but this is inherent across all OWFs, irrespective of layout. Given the spacing between WTGs of more than 944m, it is considered that the layout of the Project would have a limited impact on the probability of a successful rescue once the casualty is identified.

Therefore, the Safety Justification principally considers worst credible event to be a serious external incident, principally the flooding/capsize of a small fishing vessel operating within or immediately adjacent to the Project, with no Project assets on scene. A review of the types of fishing boats operating in the region suggests that a realistic number of persons on board would be between one and three.

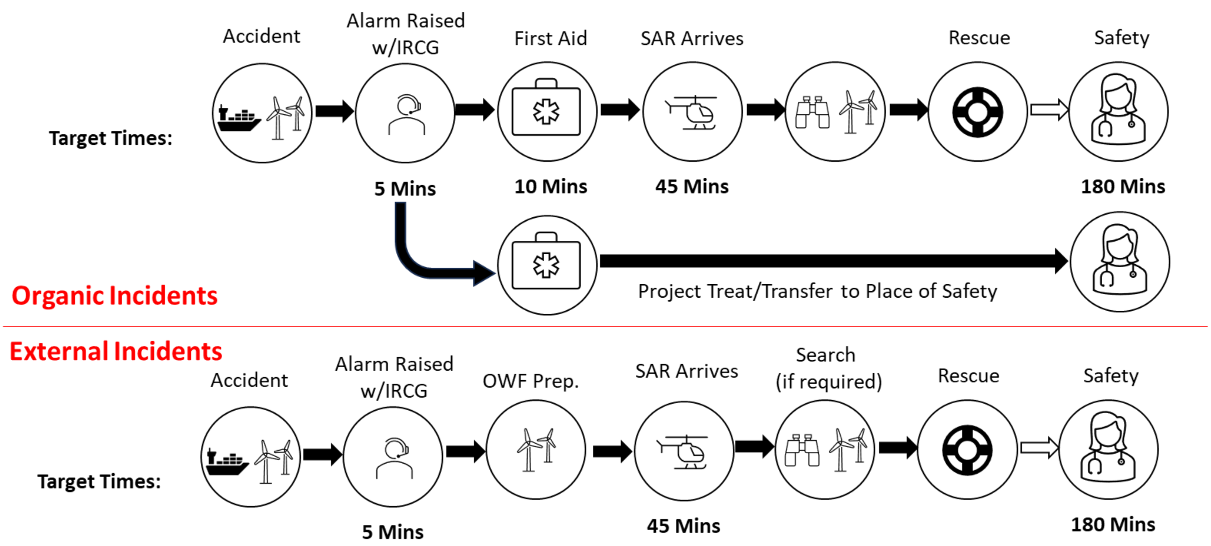


Figure 4-9: Organic and External incident flow diagrams.

4.5 Summary

Based on a comprehensive analysis of historical incidents occurring within the local area and for offshore wind projects more generally, it is demonstrated that:

- Few incidents are currently occurring within the Project site at present and as demonstrated within the NRA, the background risk profile is low;
- Within the wider industry, the overwhelming majority of incidents involve Project personnel/vessels involved in minor incidents which are responded to without the need for national SAR assets;
- If required, national SAR assets would not be on scene for approximately 45 minutes, and therefore, Project assets would be the first responders, offering immediate means of raising the alarm, initial first aid capability, search and/or rescue;
- The most likely incidents to occur, generated organically by the Project, would most likely be minor and responded to by the Project in accordance with the ERCoP and ERP. As there is a low likelihood of the necessity for search in such a scenario, the layout of the Project is not considered to have a material impact on the likelihood of success in these scenarios; and
- The realistic worst credible scenario is determined to be a small fishing boat experiencing flooding/capsize with between a single or three persons on board. With project assets on scene SAR is likely to be prompt and quicker than awaiting on shore National assets to arrive. Without Project assets on scene a National asset search may be required and the presence of the wind farm in poor weather conditions may impact on the probability of detection and in extreme weather condition, the single LoO may reduce the probability of detection further. The likelihood of this event occurring is assessed to be low.

5 HELICOPTER ACCESS AND SAR IN AND AROUND PROJECT

5.1 Introduction

As shown in the preceding sections the impact of the single LoO on surface navigation is negligible and no concerns were raised by local stakeholders on the proposed layout during NRA. It is recognised in the guidance that "*Turbine layouts of every offshore renewable energy project with floating and/or surface piercing devices and structures should be designed to allow safe transit through OREIs by SAR helicopters operating at low altitude in bad weather*". "*Regarding SAR access to windfarms, a SAR helicopter should be able to fly from one side of a windfarm to the other ... to either conduct searches amongst turbines or to access a location or turbine within the field*" (DoT, 2025). Therefore, the principal potential impact of the single LoO is considered to be on aerial helicopter access to perform SAR in and around the Project area.

Furthermore, "*If SAR resources are required to conduct a search and/or rescue inside non-linear windfarm layouts, there is a likelihood that these layouts will also significantly reduce the overall Probability of Detection (POD) of a search because resources may not be able to conduct a search at the optimum Sweep Width and Track Spacing for a particular SAR object. The presence of turbines may also reduce the searchable space and may expand or otherwise vary the distances between 'sweeps' through a wind farm and so may affect the desired sweep width and increase the likelihood of not sighting a SAR object*" (DoT, 2025).

Therefore, this section seeks to demonstrate how safe helicopter access can be maintained through the Project and that a high probability of detection is maintained. As set out in section 4, the realistic worst credible example of a small fishing boat in distress within the OWF area is used and it is assumed that there are no Project assets on scene at the time of the occurrence.

5.2 Initial Response and Search

As shown in section 4.3, once the incident occurs, the alarm would be raised. This principally could be through a Mayday VHF call by the casualty vessel, a DSC alert or the release of an Emergency Position-Indicating Radio Beacon (EPIRB) which would notify the Maritime Rescue Coordination Centre (MRCC) of a vessel in distress within the Project. Furthermore, it is likely that the Marine Coordination Centre (MCC), providing 24/7 monitoring of the Project would also receive the distress, noting the monitoring and communications equipment installed on the Project and may relay the Mayday to the MRCC if required (see section 6).

A national SAR asset may then be tasked to the site to conduct SAR operations. As described in section 4.3, the closest helicopter is based at Dublin, and if available, it is anticipated that it would take between 41 and 71 minutes to mobilise and transit to the Project site. During this time the MCC would prepare the Project in line with the requirements of the SAR coordinator and the ERCoP.

Given the Project's small size (section 5.5.1), an initial response may be for the SAR helicopter to perform an orbit of the Project. As shown in Figure 5-1, assuming a flight path of 12.21 nm (around the windfarm, maintaining 500 m from the WTGs), and a typical helicopter search speed of 60 kts, an initial helicopter search around the outside of Oriel OWF Area would take approximately 12.5 minutes. During this initial search, good visibility of the OWF area would be obtained:

- **Self-identification of the casualty**: The casualty vessel is likely to have numerous means of identifying its position to the SAR helicopter, including EPIRB, personal beacons and flares. Once on station, this would enable the helicopter to identify the casualty without having to enter the OWF;

- **Equipment ranges**: Whilst full operational specifications of national SAR helicopter equipment is not known, modern Forward-Looking Infrared (FLIR) cameras have effective ranges of up to 16.2 nm (30 km). Furthermore, other detection equipment including radar and AIS would offer enhanced detection capability within the Project;

- **Visibility**: As described in IAMSAR (ICAO, 2016), a helicopter in good visibility (5 nm) and benign weather conditions (<15 kts and <1 m wave height) might reasonably detect a small boat (c.6 m) at a range of 2.5 nm, or a four person life raft at 1.3 nm, both of which would therefore have a good likelihood of detection from outside the OWF. As set out in section 4.1, whilst poor visibility is possible, the majority of the year visibility of >5 nm would be maintained;

- **Search strategy**: The SAR helicopter will also use its equipment, particularly FLIR, to look down each SAR Access Lane; and

- **Blocking of WTGs**: A possible concern raised regarding search around an OWF is that the WTGs have the potential to block the line of sight to casualties behind the observer. It is acknowledged that the nature of mobile search by vessels or helicopters and the narrow widths of c.10m per WTG does mean that casualties are obscured temporarily. However, the primary SAR access lanes (see section 5.3.1) provide excellent search coverage of the site. A full line of sight of any obscured area would be achieved in less than a minute when transiting at 60 kts.

Figure 5-1 shows the search radius of a hypothetical initial orbit of the Project. Based on the IAMSAR reference tables (ICAO, 2016), with the exception of persons in the water or limited visibility, realistic search radius of more than one nautical mile provides excellent penetration into the Project, and two nautical mile range, which is achievable, provides full coverage. It is therefore realistic that this initial search would identify the casualty, leading to the planning for a rescue operation, without the need to enter and search the Project. Therefore, the single LoO would have no impact on the success of this initial search.

5.3 Access and Search within the OWF Area

In the event that the initial search is unsuccessful, the following section describes how the single LoO does not compromise the access and search potential within the OWF area.

5.3.1 Regularity of WTG Positions

Figure 5-2 shows the alignment of the WTGs with the LoO. The WTGs along the primary NE-SW axis have good linearity and regularity, with the deviation from the LoO typically less than 50 m in almost all cases. Approximately seven WTGs deviate by over 100 m, and only two deviate by more than 150 m. Several key points are noted:

- The majority of WTGs internal to the Projects have negligible deviations (approximately a nacelle length) and therefore be imperceptibly non-linear when viewed from an SAR asset approaching midpoint of an SAR Access Lane (see Figure 5-3 which has been extracted from the computer generated Fly Through videos presented to the IRCG on 24-June-2025);

- Seven of the WTGs deviated by more than 50 m are on the perimeter of the Project. As set out in the guidance "*perimeter turbines with smaller spacing than internal turbines*" (DoT, 2025) can be acceptable as the risks to the flight crew are limited as they are present on the entry-exit of the OWF;

- With a 118 m blade length, the orientation of the nacelle and blades could result in a variation in spacing between WTGs of up to 206 m, even with multiple LoOs. This is well in excess of the variation in alignment due to ground conditions and other constraints; and

- 500 m SAR Access Lanes when measured blade tip to blade tip are maintained even with the Application layout

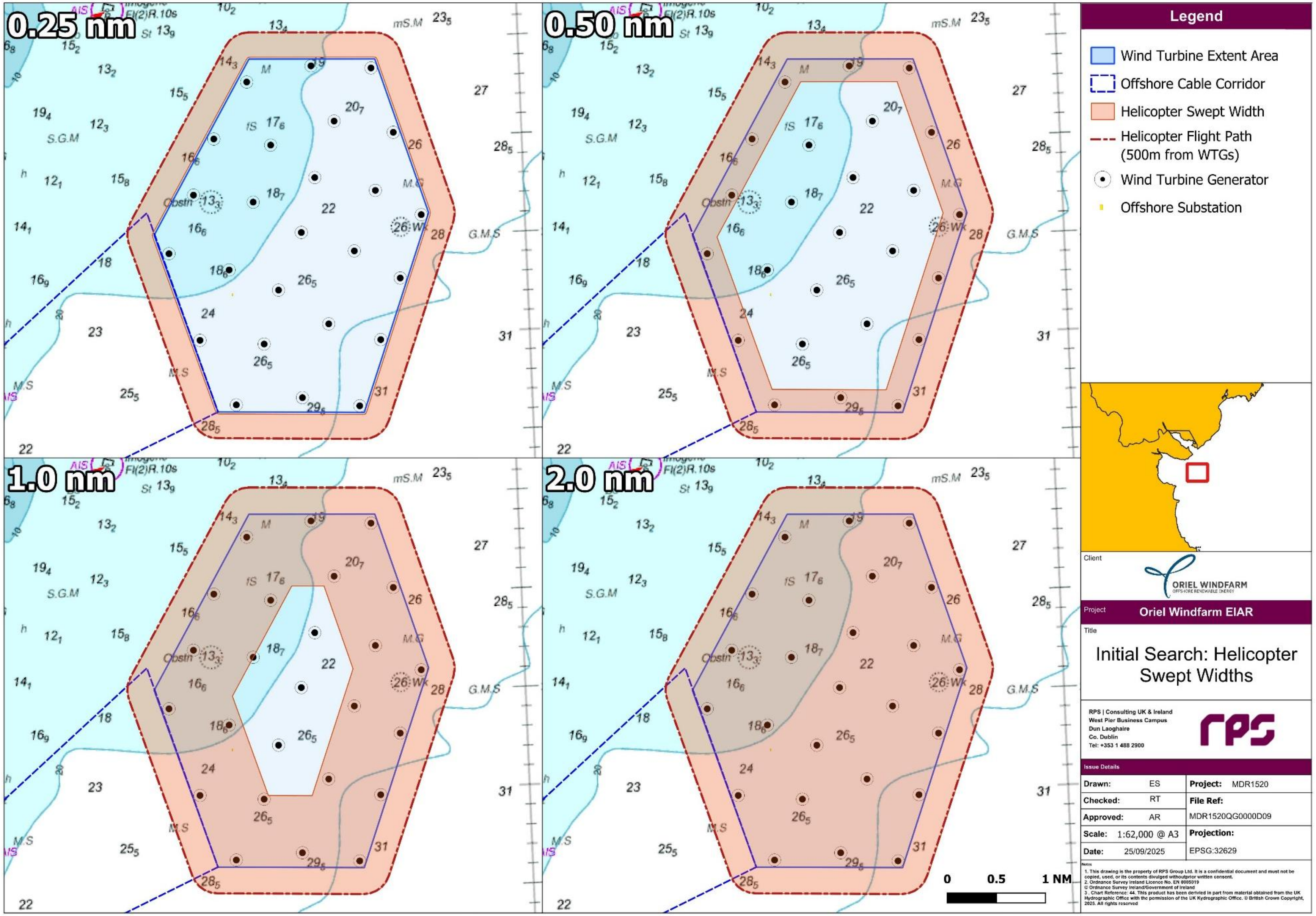


Figure 5-1: SAR Helicopter flight path and swept widths during initial orbital search.

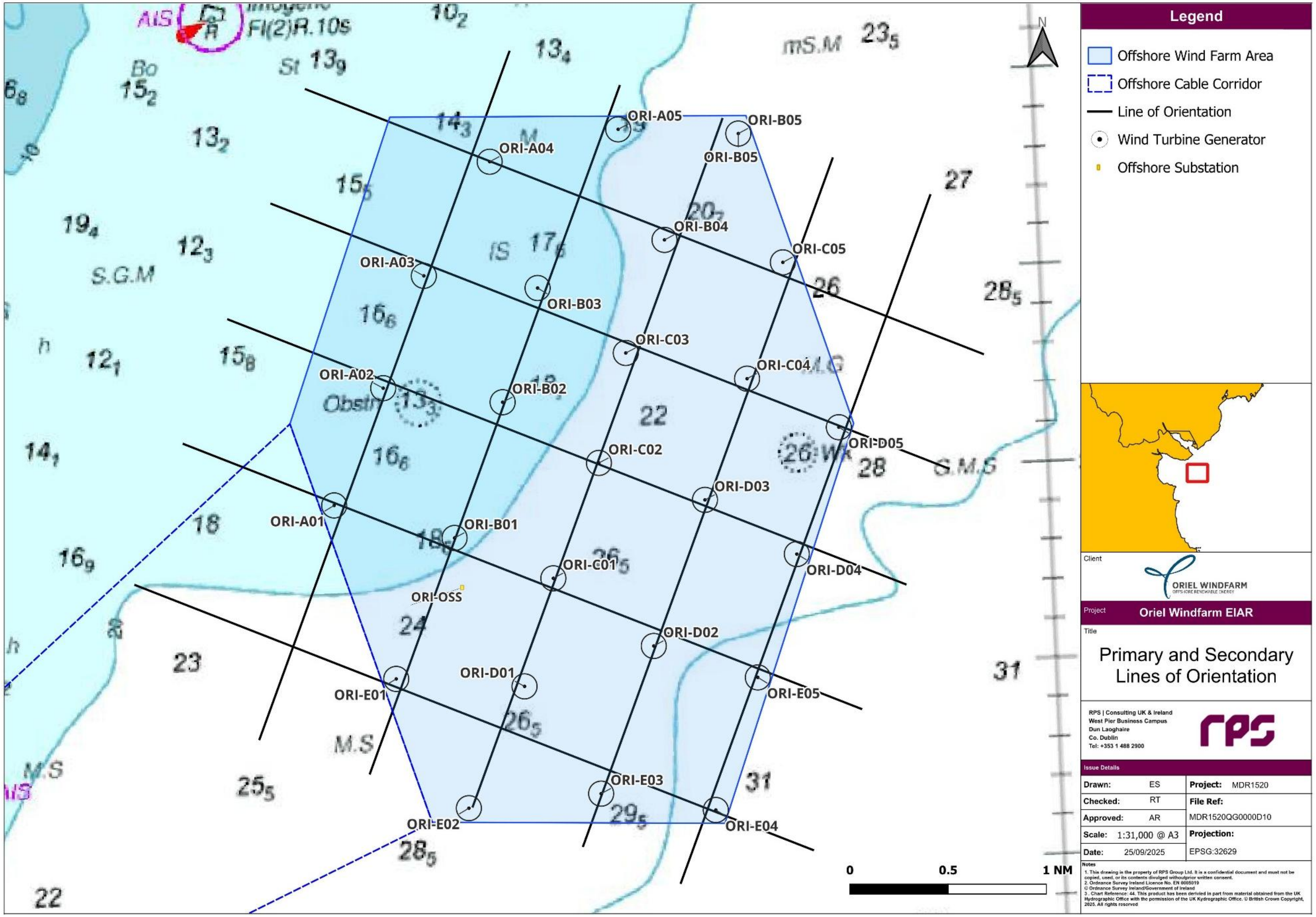
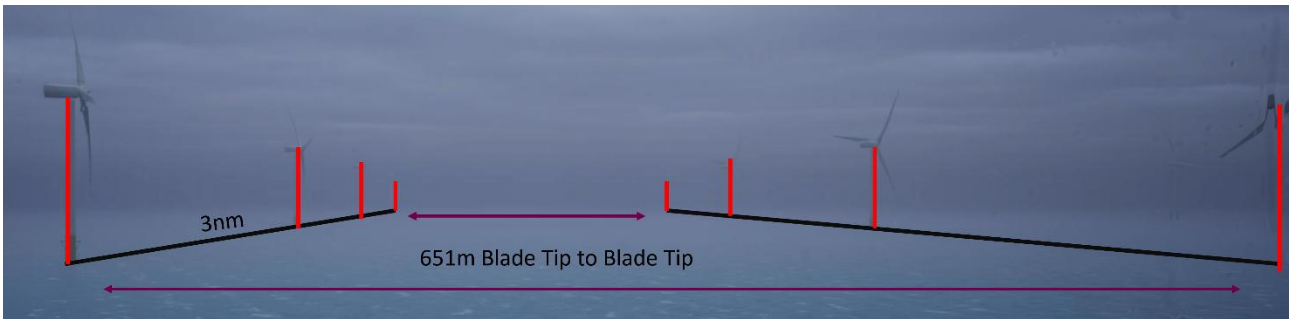


Figure 5-2: Alignment of structures along LoO.



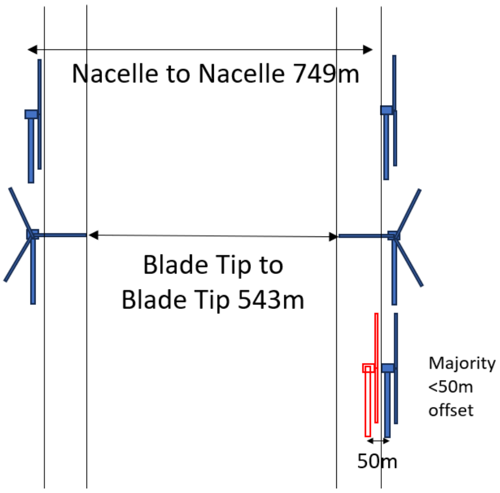


Figure 5-3: Perspective difference between SAR Access Lane and down the NE-SW LoO.

5.3.2 SAR Access Routes

As demonstrated in Figure 2-3, the layout offers a clear LoO (NE-SW), as was recognised within the IRCG submission (30-July-2024). The SAR access lanes are parallel, more than 500 m from blade tip to blade tip and exhibit regularity in WTG positions and therefore comply with the relevant guidance.

Figure 5-4 sets out a potential search pattern utilising the primary SAR access lanes:

- The transits are down the centre of each SAR Access Lane (as well as to the periphery on the eastern and western boundaries of the Project);
- Each transit is on a consistent heading of 021/201 degrees, improving predictability and situational awareness of the aircrew. This is also orientated to the prevailing southwesterly conditions, reducing the impact of crosswind on navigation;
- At least 250 m would be maintained in either direction from blade tips in their most constrained position, re-orientation of the blades would increase this to 360 m. As set out in Table 2-2, this meets the requirements of guidance and offers significantly more space than many existing operational OWFs;
- The separation between each transit is 0.55 nm, this is not dissimilar to search patterns used by SAR helicopters in open sea and likely to offer good overlapping coverage between passes and enhance the probability of detection; in addition, as set out in SOP-07, "*if weather is good, helicopter may be able to conduct more than one sweep within the available spacing"* and
- Recognising the small size of the Project, the maximum likely transit distance down a SAR Access Lane would be approximately 4.8 nm and would take approximately five minutes, assuming a helicopter speed of 60 kts. This means that the SAR helicopter spends only a short duration within the Project for each pass, reducing the risk.

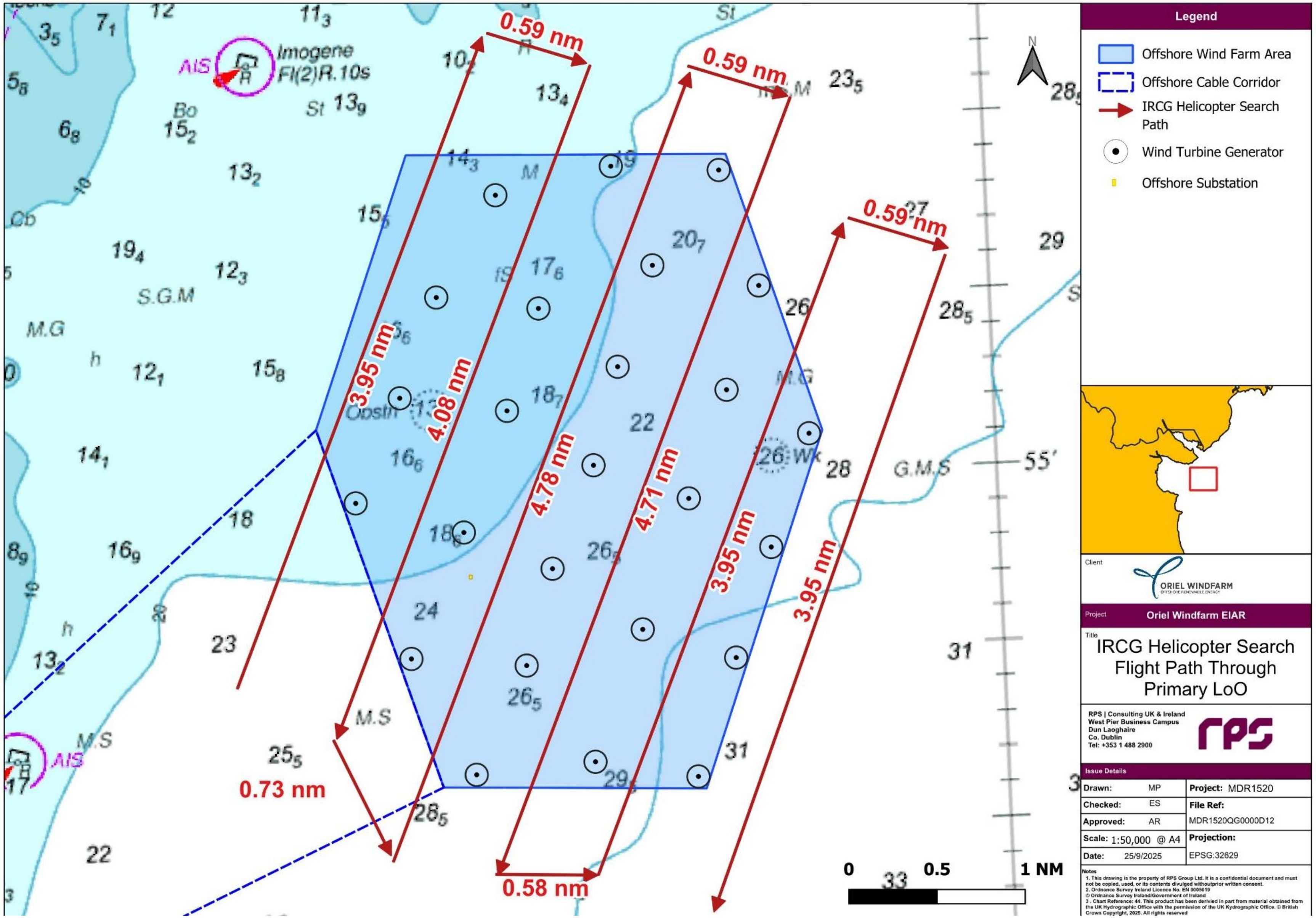


Figure 5-4: Hypothetical NE-SW parallel search pattern.

Figure 5-5 and Figure 5-6 shows the search coverage with swept widths of 0.25 nm and 1 nm respectively from the parallel search pattern shown in Figure 5-4. Even in the most constrained conditions with a 0.25 nm swept width, searching for a person in the water in poor weather, almost complete coverage of the Project is obtained with only a minor area in the immediate vicinity of the WTGs not covered. In practice, the actual swept widths will vary and so coverage of a vessel in distress in these areas may still be obtained.

It should be recognised that for modern large scale OWFs, the spacing between the turbines may exceed 0.75nm and therefore assuming a similar search pattern in the centre of the SAR Access Lanes, coverage would also not be complete. Therefore, the distance between WTGs to a large extent dictates the search coverage under such conditions rather than the alignment of the WTGs.

With the swept width increased to 1.0 nm, comprehensive coverage of the entire Project is obtained. The 0.55 nm distance between parallel tracks ensures significant overlap in each search pass, enabling redundancy and contingency.

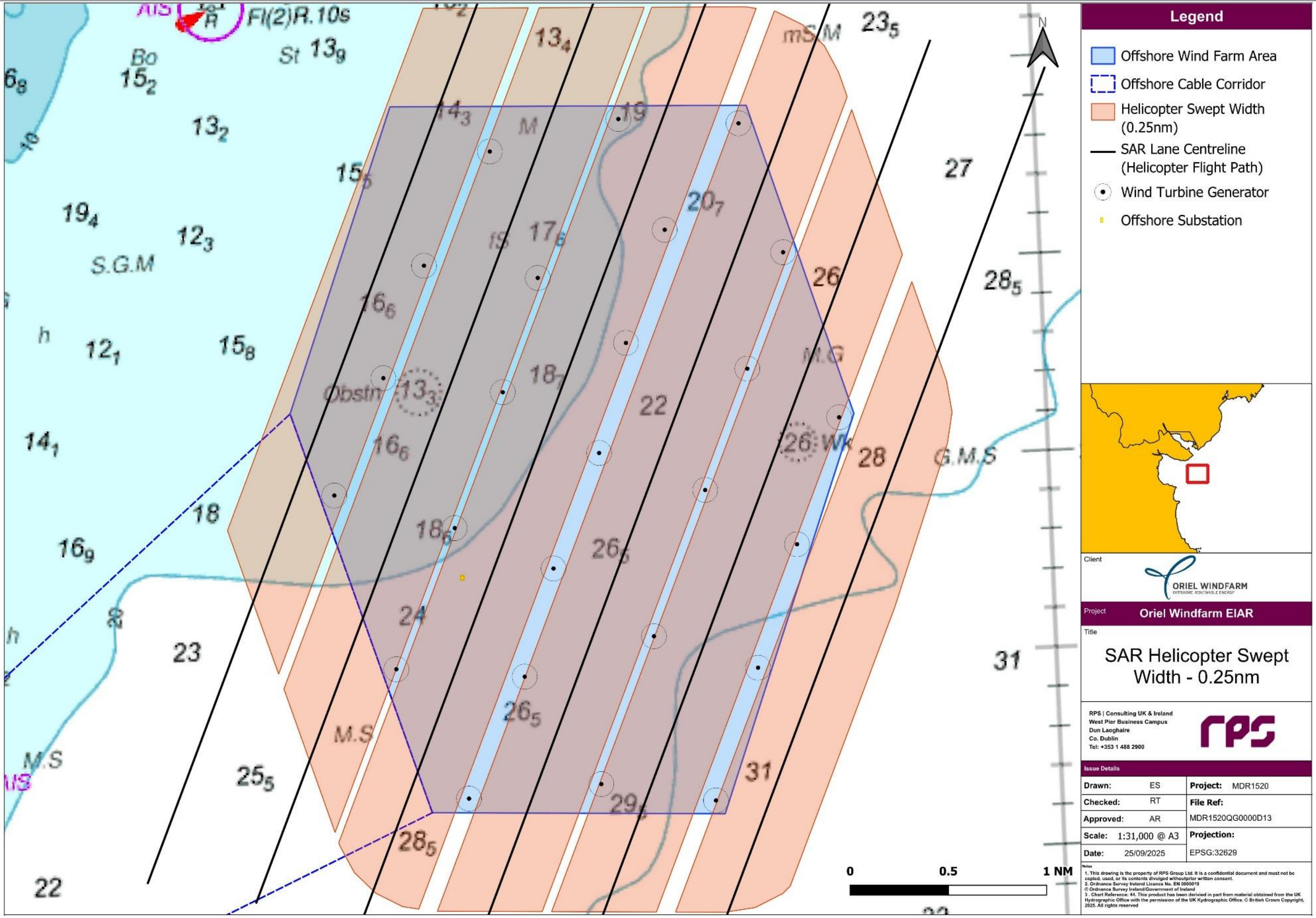


Figure 5-5: Search coverage (NE-SW) with 0.25 nm swept widths.

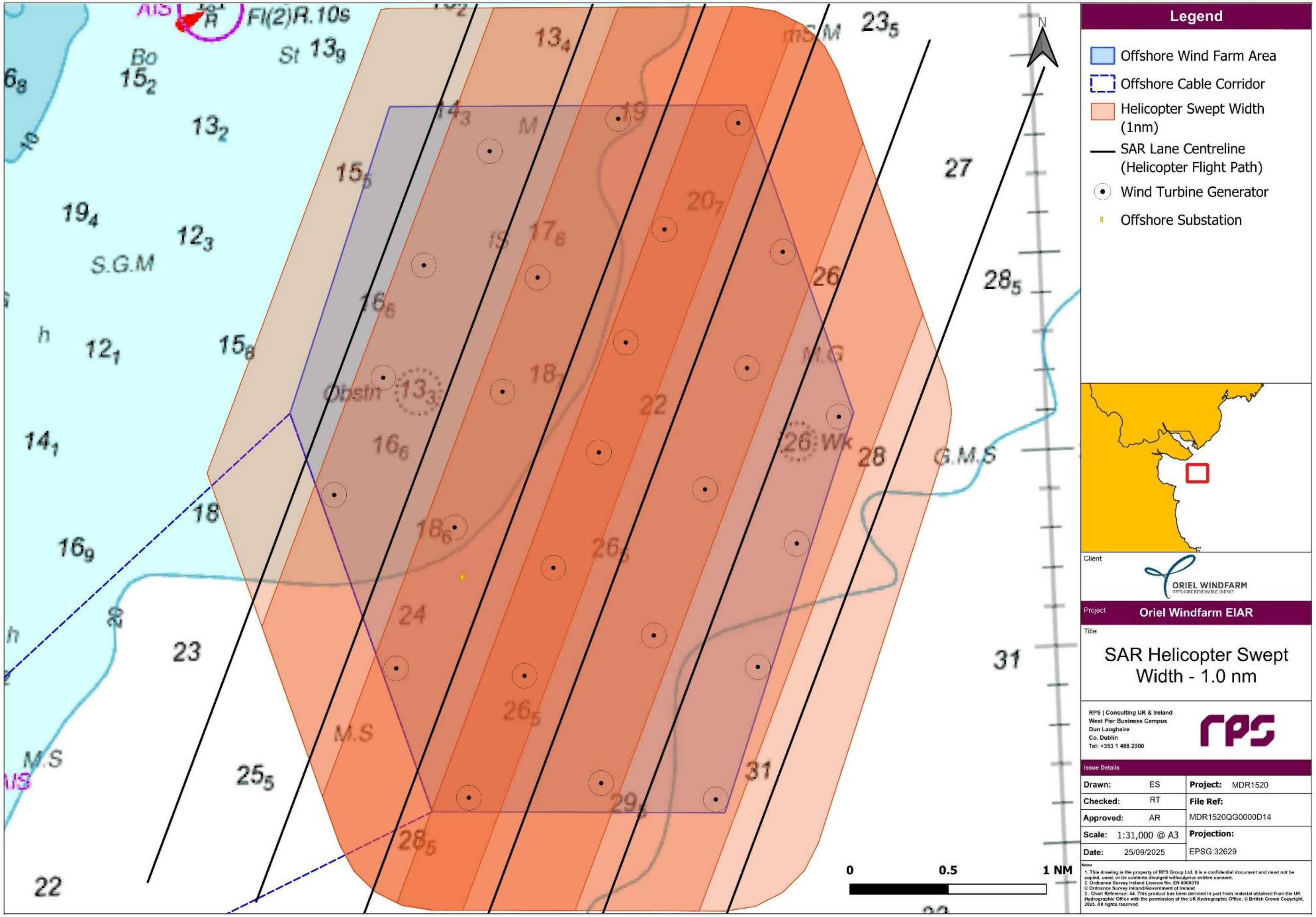


Figure 5-6: Search coverage (NE-SW) with 1 nm swept widths.

In addition to the primary NE-SW LoO, an alternative northwest to southeast (NW-SE) SAR Access Lanes are also available through the centre of the Project, which could be used by SAR assets if required (Figure 5-7). There is good alignment of WTGs along this second LoO within the centre, with most structures deviating less than 100 m from the identified LoO, and still offering four SAR access lanes > 500 m when measured blade tip to blade tip. Whilst navigation along this axis is not expected to be the primary means of search due to the reduced regularity of structures and the additional demands on the aircrew for safe navigation, it provides a viable alternative means of access to a rescue location utilising the prevailing winds if required.

Figure 5-8 shows how the search coverage increases with the inclusion of different search patterns and varying swept widths, due to overlapping search coverage. Utilising the perimeter search and all the SAR Access Lanes provide coverage of the entire area even in the most constrained conditions. It is, however, recognised that the least coverage and contingency is exhibited in the most northerly and southerly portions of the OWF where access in the E-W direction is not possible.

It is acknowledged that SAR provision in these regions could be enhanced through improvements to search capabilities. Possible mitigation measures to improve search capabilities, such as camera coverage, are detailed in section 6.

5.3.3 Access in the Immediate Area around WTGs

As shown in Figure 5-7, the 500 m SAR Access Lanes provide excellent coverage of the site except in the immediate vicinity of the nine central WTGs, due to some of the WTGs not being perfectly aligned and the oversail area of the blades. The overall impact to coverage is less than 0.2 nm by 0.3 nm.

Even with two LoOs with perfect linearity, SAR helicopters would avoid transiting in the immediate vicinity of WTGs, to reduce risk to the aircrew. Therefore, a small loss of coverage in these areas is inevitable. The Project layout and single LoO therefore does not inherently compromise the probability of detection of a casualty within the OWF area.

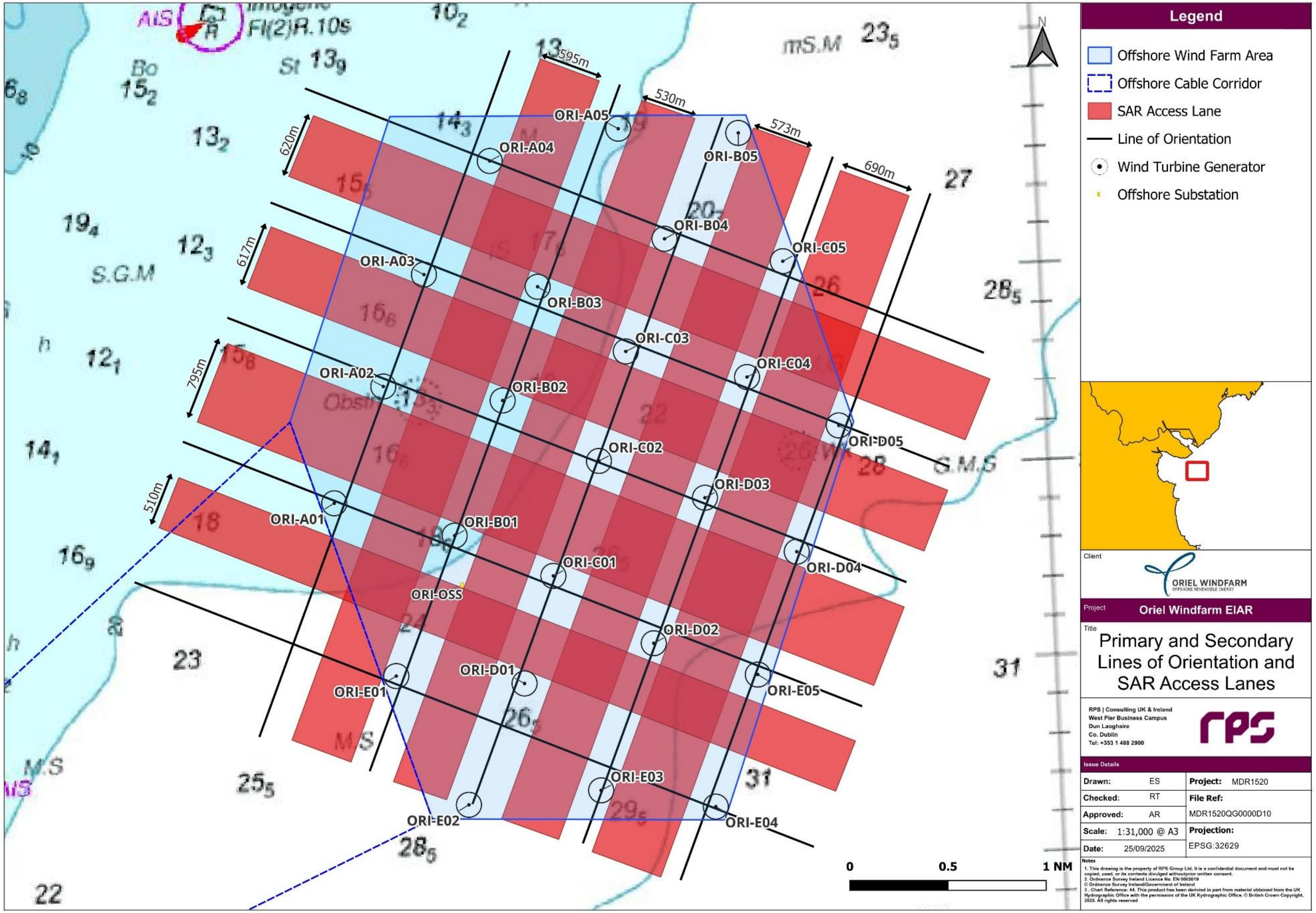


Figure 5-7: Primary (NE-SW) and secondary (NW-SE) LoOs and SAR access lanes.

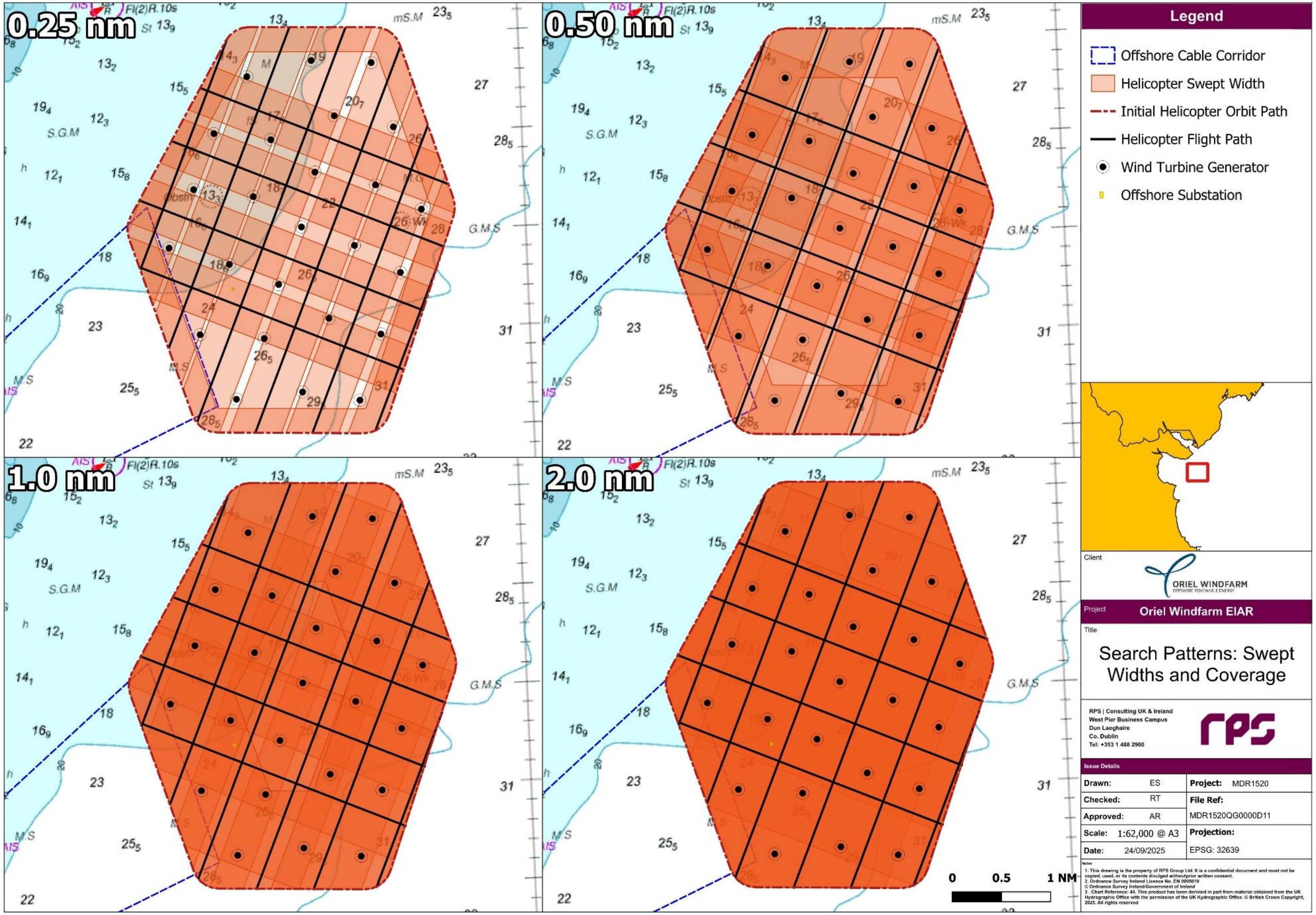


Figure 5-8: SAR coverage obtained with different search patterns and swept widths.

5.4 Alignment of OSS

The OSS location (presented on Figure 2-2) has been determined taking account of various constraints and considerations. Extensive engagement between the Applicant and EirGrid has been (and will continue to be) undertaken regarding the design of the OSS and its associated transmission infrastructure. The IRCG submission on the 30-July-2024 noted that the OSS is not aligned with the WTGs. Noting the site constraints detailed in section 2.4.1, it is not considered that this compromises safety of SAR within the Project, and could enhance it:

- The OSS is small in size, with the height of the main structure being 40 m above LAT (56 m above LAT, including cranes and telecommunications masts), and the footprint dimensions being 40 m by 30 m. This would be compared to 270 m tall WTGs;
- As shown in Figure 5-7**,** SAR access lanes of 500 m are achieved on both LoOs (NE-SW or NW-SE), whilst avoiding the OSS;
- The OSS is a single, unique structure and therefore could not be confused with the WTGs when visually identifying the LoOs;
- Figure 5-9 demonstrates that there is vertical and horizontal separation between the WTG towers, the OSS, and a SAR helicopter, assuming a SAR helicopter search height of 200 ft and viewing straight down the NE-SW SAR Access Lane between ORI-B01 and ORI-C01. Accounting for the maximum height of the OSS, including the telecommunications mast and antennas, a search height of 200 ft would enable the SAR helicopter to vertically clear the OSS if required, while transiting between the WTGs, with minimal change in altitude; and
- There is significant precedent within the UK for misalignment of OSSs from WTGs presented in section 5.5.3, as agreed with His Majesty's Coastguard and national SAR operators.

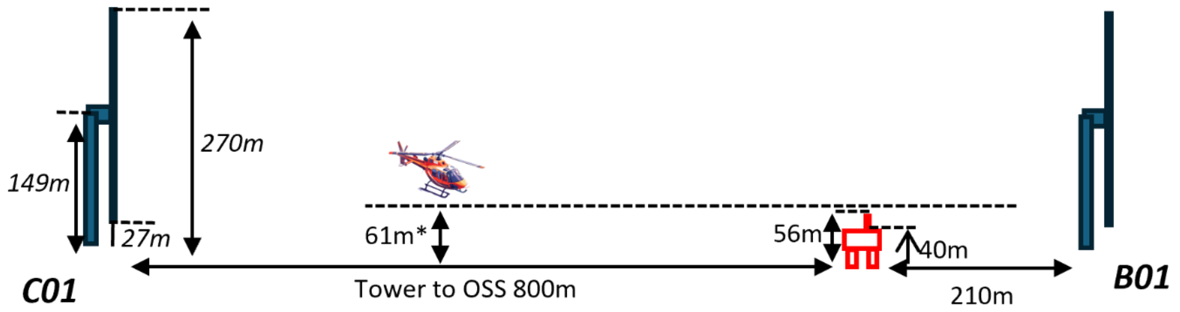


Figure 5-9: Scale illustration of the OSS and WTGs as seen from NE-SW SAR access lane between ORI-B01 and ORI-C01.

The OSS is a key structure within an OWF and contains the greatest number of electrical connections, sensors and maintenance requirements. As such it is the single structure where most activity is conducted during construction and O&M and therefore where the most people are concentrated. The OSS also contains a number of high voltage components which pose a hazard to personnel. As such, it is also perhaps where the most number of health and safety related incidents are likely to occur and the greatest requirement for extracting of a casualty by helicopter.

The Project Description (chapter 5 of the EIAR (vol. 2A) notes that, while the OSS will not be equipped with a helideck, it will include a hoisting area on the roof deck for emergency access by helicopter. Misalignment of the OSS from the WTGs greatly improves access to the OSS for Oriel helicopters, were they required, or for SAR helicopters. Figure 5-10 demonstrates the effect of embedding the OSS within the LoOs on access, requiring the helicopter to manoeuvre clear of WTGs for access arrangements.

This is most significant in circumstances where a go-around is required following a loss of engine power where a straight line climb is desired, free of obstructions. The Project would afford a maximum of 944 m horizontally for the go-around from the OSS at around 56m above sea level and to climb to safe height above the turbines at around 322m (500ft safety margin) were the OSS to be embedded, potentially affecting the safety of helicopter operations to the OSS. Noting full details of the IRCG helicopter capabilities are not available, for illustrative purposes it is noted that an S92 has a single engine Rate of Climb of 150 ft per minute and would therefore take 7 minutes to get 322 m and at 60 kts airspeed would cover up to 7 nm, far in excess of the available airspace between WTGs.

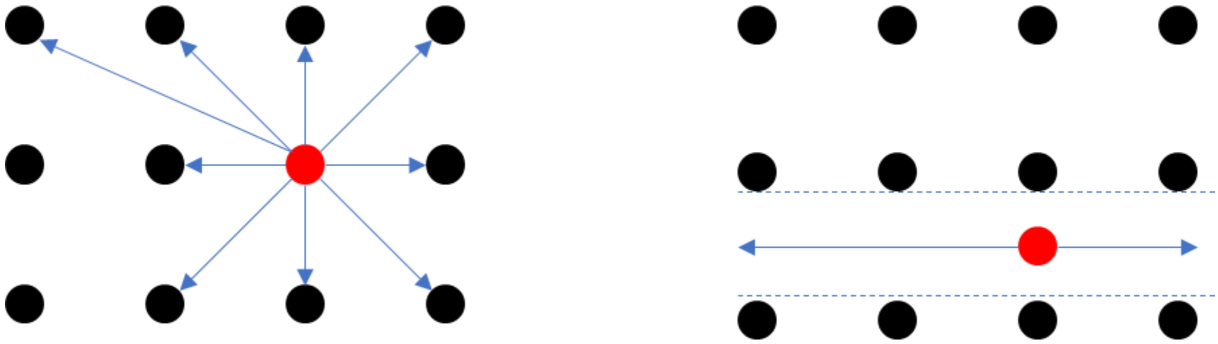


Figure 5-10: Effect of misalignment of OSS on access.

5.5 Precedent

This section provides examples of precedent from fully commissioned UK OWFs exhibiting comparable, characteristics, including single LoOs, turbine and OSS misalignment, alongside dense borders. It is highlighted that SAR has been demonstrated to be conducted safely and successfully in these more onerous precedents.

5.5.1 Size of Oriel OWF

It is noted within the recent IRCG Standard Operating Procedure 07-2025 (IRCG, 2025) that "*the early generation of wind farms were small in both overall size, number of installed turbines and geographical coverage, and so SAR resources had little apparent difficulty in responding to incidents within or around them*". A significant proportion of the SOP guidance, and the UK MGN654 Annex 5 guidance from which it originates, was developed for large scale OWFs (>10 nm in dimensions). Oriel is a small-scale development at 27.7 km^2, at 3.7 nm by 2.3 nm in dimensions, and therefore different SAR strategies can be employed and the suitability of a single LoO is more practicable, and in line with other small-scale OWF developments. Figure 5-11 demonstrates that, Oriel would have been the third smallest UK Round 2 development (26.5-150 km^2) and the smallest of Round 3 (78-560 km^2), Round 4 (125-500 km^2) or Round 5 (330-370 km^2).

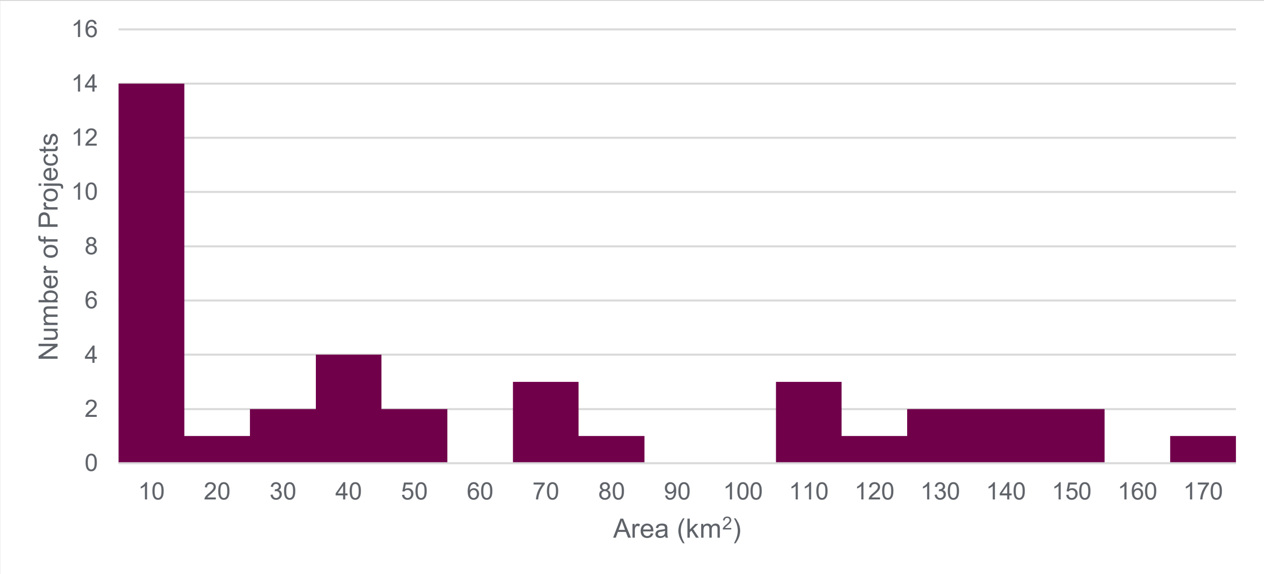


Figure 5-11: Number of UK OWF projects by area (Oriel is 27.7 km^2).

Some early UK OWFs, such as Rhyl Flats, had as little as 460 m in-row WTG spacing, and 1000 m between rows, therefore only providing SAR Access Lanes in one direction. The Project layout offers significantly greater spacing and therefore greater opportunity for SAR access than several previous projects, with selected examples summarised in Table 5-1. Furthermore, this enables 500 m SAR Access Lanes to exist even without re-orientating the blades to be parallel to the flight path.

Table 5-1: WTG spacing precedent.

Project	Minimum WTG Spacing (metres)
Rhyl Flats	460
Rampion	600
London Array	650
East Anglia One/Three	675
Gwynt-y-Mor	718
Hornsea Project One	878
Hornsea Project Two	924
Oriel OWF	**944**

5.5.2 Single-Line Turbine Orientation

Hornsea Projects One and Two are fully operational OWFs located approximately 55 nm offshore in the North Sea. Both feature single-line turbine orientation and dense borders (see Figure 5-12); however, sufficient mitigation was shown to be in place to justify that safe and effective SAR access was maintained (Dong Energy, 2017 & The Planning Inspectorate, 2016). In several respects, Hornsea is more challenging for SAR than Oriel:

- The SAR Access Lanes for Hornsea One/Two are approximately 10.7 nm in length compared to the 3.7 nm of Oriel and therefore each pass of the OWF area takes a third of the time;
- The width of the OWF is substantially greater, requiring significantly more transits to fully search the site;
- Although the wind farm has a single LoO the width of SAR Access Lanes varies markedly, by as much as approximately +/- 243 m, introducing an unwelcome variability, Oriels vary by +/- 80 m (NE-SW orientation) and +/- 142.5 m NW-SE orientation);
- The internal arrangement of Hornsea includes gaps between WTGs which further reduces predictability;
- The perimeter WTGs for Hornsea are dense, with reduced spacing, whilst Oriel exhibits only a staggered perimeter; and
- The distance from shore of Hornsea (55 nm) suggests helicopter assets would reach the site before lifeboat assets, relying on SAR helicopter entry into the wind farm for initial searches.

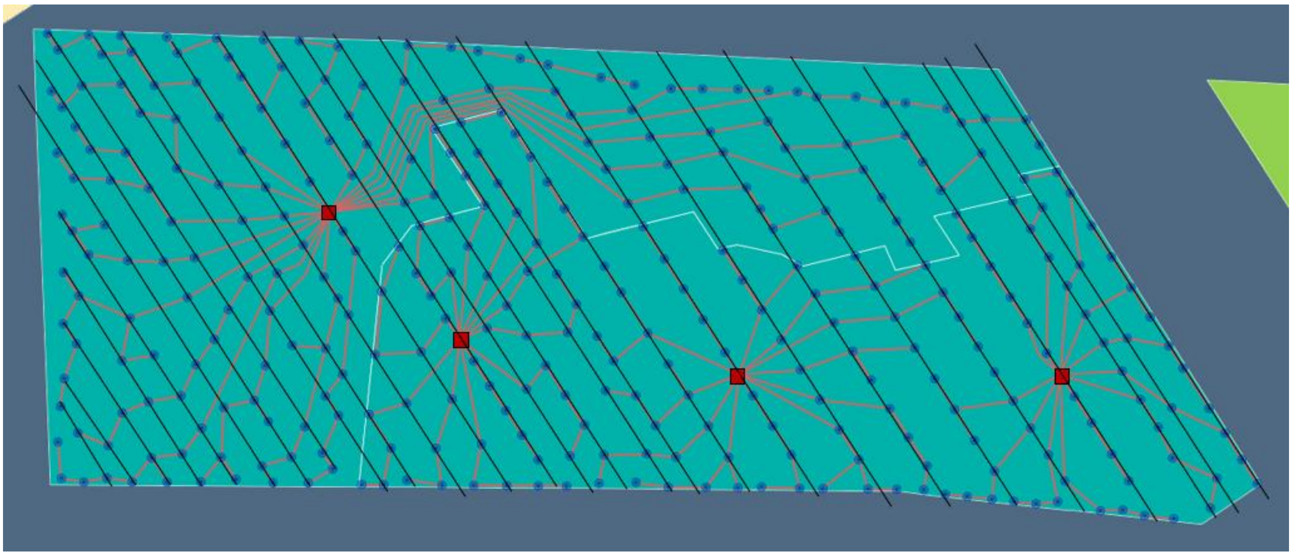


Figure 5-12: Hornsea Project OWFs One and Two demonstrating single-line turbine orientation precedent (adapted figure from 4C Offshore 2025).

5.5.3 OSS Misalignment

As noted in section 5.4, there is significant precedent for OSSs to not be aligned with the LoO. Figure 5-13 highlights a number of examples including Gwynt y Môr (operational since 2015) and West of Duddon Sands (operational since 2014), both in the Irish Sea, in addition to, Sheringham Shoal (operational since 2012) and Westermost Rough (operational since 2015), both in the North Sea. It is also noted that multiple European operational windfarms, including two Parkwind projects (Northwester 2 and Arcadis Ost), that have their OSS misaligned from the WTGs.

Despite OSS misalignment, these projects have been successfully constructed and operated with appropriate SAR mitigation (RWE, 2025; ScottishPower Renewables, 2025; Scira Offshore Energy, 2025; Lindy Energy, 2022), demonstrating that SAR can be, and is being, effectively managed with an offset OSS.

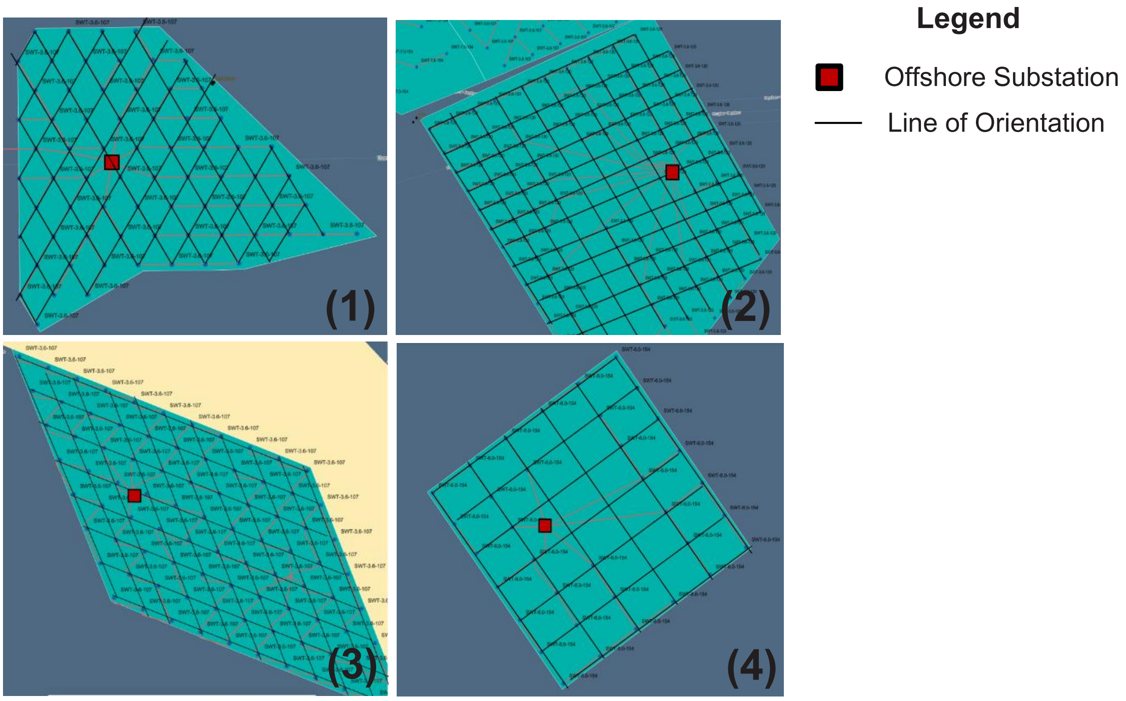


Figure 5-13: OWFs Gwynt y Môr (1), West of Duddon Sands (2), Sheringham Shoal (3), and Westermost Rough (4) demonstrating OSS misalignment precedent (adapted figure from 4C Offshore, 2025).

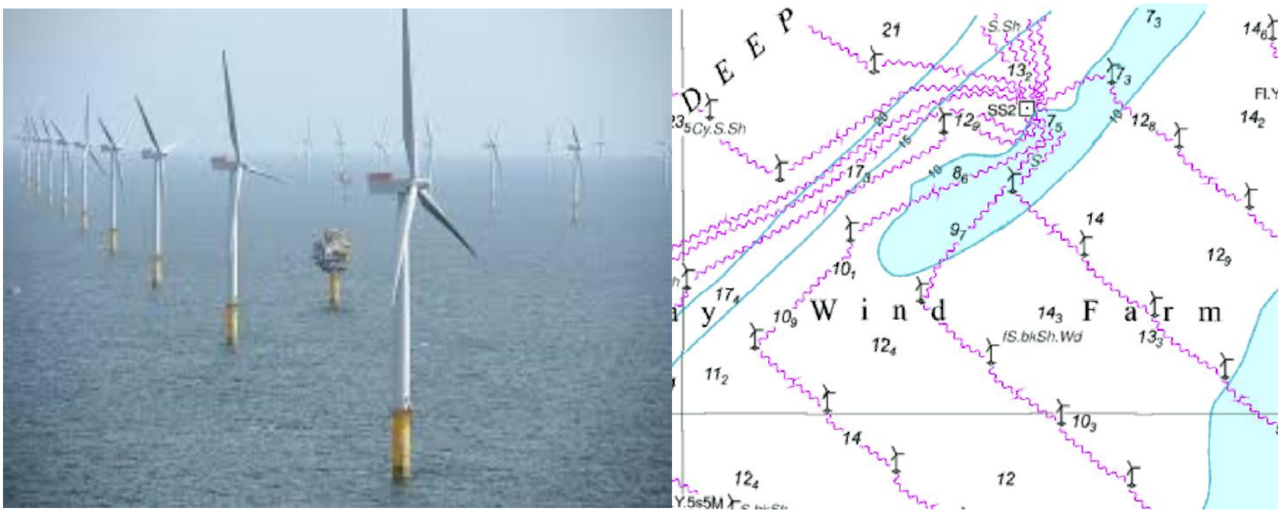


Figure 5-14: Offset substation within London Array OWF shown as aerial view (right) and on Admiralty chart (left).

5.6 Summary

In summary, this section has shown how both search and access could still be undertaken safely in and around the Oriel OWF Area, in the case of a SAR emergency. Firstly, Oriel is a small-scale development (3.7 nm by 2.3 nm) and therefore a higher PoD could be achieved without helicopters or lifeboats entering the OWF Area, compared to larger OWFs (> 10 nm).

Nevertheless, the proposed layout does seek to integrate as far as practically possible the underlying elements of best practice highlighted in the guidance documents to ensure the safety and effectiveness of SAR operations. The primary LoO from a NE-SW orientation has strong linearity (with the exception of the northeastern and southwestern boundaries, which form a dense border) and ensures that the OWF can be fully searched by a helicopter during SAR. Furthermore, an additional secondary LoO does exist from a west-east orientation which could be used by SAR assets given it also retains 500 m SAR access lanes. It is also highlighted that, given that the OSS is a small, single, unique structure that could not be confused with the WTGs when visually identifying the LoOs, not does it interfere with 500 m SAR Access Lanes, the location of the OSS does not present an obstacle for SAR. Overall, the SAR Access Lanes available offer potential coverage of almost the entire area with a Swept Width of <0.5 nm, although it is acknowledged that this could be enhanced through improvements to search capabilities. As a result, the next section (section 6) presents improvements to search capabilities as a result of the Project that would help to enhance SAR provision.

While single-line turbine orientation, dense boarders, and OSS misalignment raises SAR concerns, the safe operation of comparable operational UK OWFs provides clear precedent that the Project can be operated with equal assurance of safety.

6 MITIGATION

6.1 Project Mitigations

A number of key mitigation measures are embedded within the Project design which would reduce the risk (likelihood or consequence) of an incident occurring, and thereby the likelihood of SAR assets being required, or improve the effectiveness of SAR activities within the OWF. It is recognised that the Applicant currently operates a number of OWFs in Europe and it is proposed that key, proven design and management mitigations will be adopted for the Project, which are summarised in Table 6-1. This demonstrates that:

- Significant emergency plans and procedures will be developed to facilitate immediate and effective response to emergency situations;
- Suitable personal protective equipment (PPE) will be worn to reduce the likelihood of serious incidents;
- Numerous means of distress will be available, this includes enhanced monitoring of the area of sea around the Project through additional sensors and 24/7 monitoring from a marine control centre; and
- Medically trained personnel (such as STCW 95, GWO Basic Safety Training First Aid Module and GWO Enhanced First Aid) will be situated at the Project and able to provide immediate response to any first aid incidents.

These provisions are not currently available at this location for responding to incidents involving third party vessels and this therefore serves as a considerable improvement in maritime surveillance, SAR provision in the region. This additional capability is recognised in the relevant guidance (DoT, 2025). The nearest RNLI lifeboat, based in Kilkeel, at 7.8 nm distance will require between 13 and 20 minutes to transit to the site (depending on conditions) plus approximately 15 minutes for the alarm to be raised and 15 minutes to launch. Similarly, the nearest SAR helicopter, based at Dublin at 28.3 nm would take approximately 11 minutes to reach the site but could have a scramble time between 15 and 45 minutes depending on time of day, as well as still having 15 minutes for the alarm to be raised. Therefore, in all cases it would take at least 41 minutes for a helicopter and 43 minutes for a lifeboat to reach the site. This is compared to a CTV, on station, within a small OWF which could respond almost immediately to a casualty in line with SOLAS.

Further details of where OWF project vessels have responded to incidents is summarised in section 6.4.

Table 6-1: Project mitigation measures.

ID	Mitigation	Summary/Description	Objective/Benefit for SAR	Stage in Project Timeline	Responsible Party
Emergency Planning					
1	Risk and Emergency Preparedness Assessment / ERP	Identifies and evaluates potential hazards and vulnerabilities to establish what emergencies might occur and their potential impact. Details actions to ensure safety during an OWF incident, minimise damage, and coordinate the appropriate responses with relevant authorities	Ensures appropriate plans are in place to respond to any emergency in a timely and effective manner.	Post Consent/Prior to Construction	The Applicant
2	ERCoP	Details the emergency response planning requirements for the Project.	Ensures good liaison and coordination between the Project and other national SAR providers.	Post Consent/Prior to Construction	The Applicant (with agreement from IRCG/MSO)
3	Escape, Evacuation and Rescue Plans	Details the escape, evacuation and rescue requirements for the Project.	Minimises risk to personnel should an incident occur.	Post Consent/Prior to Construction	The Applicant (with agreement from IRCG)
4	Contractor/ Vessel ERPs	Details actions to ensure safety during on on-board incident, minimize damage, and coordinate the appropriate responses with relevant authorities.	Ensures appropriate plans are in place to respond to any emergency in a timely and effective manner.	Post Consent/Prior to Construction	The Applicant
5	Emergency Response Cards	Provides essential information to first responders if casualty is unable to communicate.	Ensures appropriate plans are in place to respond to any emergency in a timely and effective manner.	Prior to Construction	The Applicant (with agreement from IRCG)
6	Induction – general, location specific and task specific	Familiarizes workers with site-specific hazards, health and safety rules, emergency procedures, and their roles and responsibilities.	Reduces risk of an incident occurring.	Prior to Construction	The Applicant
7	Drills/Exercises (e.g. tabletop, man overboard etc.)	Enable workers to test plans, identify weaknesses, and improve skills in a risk-free environment	Ensures appropriate plans are in place to respond to any emergency in a timely and effective manner.	Prior to and During Construction	The Applicant (with agreement from IRCG)
8	Equipment (Life Jackets, personal protective equipment etc.)	Protects workers from health and safety risks if other control measures are insufficient.	Reduces risk of an incident occurring.	During Construction	The Applicant

ORIEL WIND FARM PROJECT – SAFETY JUSTIFICATION FOR SINGLE LINE OF ORIENTATION

ID	Mitigation	Summary/Description	Objective/Benefit for SAR	Stage in Project Timeline	Responsible Party
9	Inspections	Ensures required health and safety standards are maintained	Reduces risk of an incident occurring.	All Phases	The Applicant
Distress					
10	VHF (Oriel Private Channel / Ch16)	Enables a vessel in difficulty to be more quickly identified and the appropriate SAR response initiated.	Improved communication and means of distress.	All Phases	The Applicant
11	MCC monitoring	Provides the ability to respond to a request for assistance.	Improved communication, means of distress and coordination of incident response.	All Phases	The Applicant
12	EPIRB/Personal Locator Beacons if carried	Enables incidents to be more quickly located.	Improved search capability.	All Phases	The Applicant
13	In-situ VHF equipment	Enables a vessel in difficulty to be more quickly identified and the appropriate SAR response initiated.	Improved communication and means of distress.	All Phases	The Applicant
14	Wind farm emergency frequency	Provision of emergency frequency rebroadcasting.	Improved communication and means of distress.	All Phases	The Applicant
15	Hand Signals	Enables incidents to be identified/located in the event of equipment failure.	Improved communication and means of distress.	All Phases	The Applicant
First Aid and SAR					
16	STCW Basic Safety Training	Provides workers with essential survival and emergency response skills to help prevent and handle emergencies appropriately.	Reduces risk of an incident occurring and promotes health wellbeing and welfare.	All Phases	The Applicant
17	GWO Basic Training and Enhanced First Aid/Advance Rescue together with telemedicine	Enables participants to recognise signs and symptoms of life threating situations and administer safe and effective first aid in the wind turbine industry/WTG environment in order to save lives and prevent further injury, until the casualty can be handed over to the next level of care.	Improves immediate first aid provision following an incident.	All Phases	The Applicant
18	First Aid kit on all WTGs, OSS (inc. Automated External Defibrillator (AED)), onboard all vessels (inc. AED) and O&M Offices	Enables workers that are first-aid trained to carry out potentially life-saving first aid.	Improves immediate first aid provision following an incident.	All Phases	The Applicant

ORIEL WIND FARM PROJECT – SAFETY JUSTIFICATION FOR SINGLE LINE OF ORIENTATION

ID	Mitigation	Summary/Description	Objective/Benefit for SAR	Stage in Project Timeline	Responsible Party
19	2nd CTV Support	Having a CTV in-field with a second vessel on standby provides greater redundancy and self-rescue capability were a Project asset to require assistance, reducing the burden on national SAR provision.	Improves contingency should first CTV fail and provides improved SAR capability.	All Phases	The Applicant
20	Appropriately Equipped CTVs	All CTVs equipped with first aid kits, AED, VHF, Radar, means of recovery, multiple crew with binoculars, crew with appropriate training.	Improves immediate first aid provision following an incident and means of SAR.	All Phases	The Applicant

6.2 Camera Coverage

Based on the assessment within section 5, it was demonstrated that whilst there is very good access and probability of detection across the Project, in periods of reduced visibility, the weakest probability of detection in poor visibility of a small target is located in the most northerly and southerly regions of the site.

To address this, an additional mitigation that will be provided by the Project is the provision of a Pan Tilt Zoom camera on OR-B05 / OR-E02, facing internally to the OWF area. These cameras will be connected to the Project's MCC and monitored 24/7 alongside other sensors (AIS/VHF etc.). In the event that the vessel signals its distress, the MCC operator would be able to utilise the cameras to identify the location of the casualty and relay the information to the MRCC. This will offer significant improvements to casualty identification in the area, beyond what is currently in place, crucially aiding search capabilities and helping enhance maritime surveillance, security and SAR provision.

Figure 6-1 demonstrates how cameras located on these WTGs would improve vessel and casualty identification, at different visibility ranges. Most modern PTZ systems have the potential to offer high resolution coverage of the entire length of the Project in good visibility.

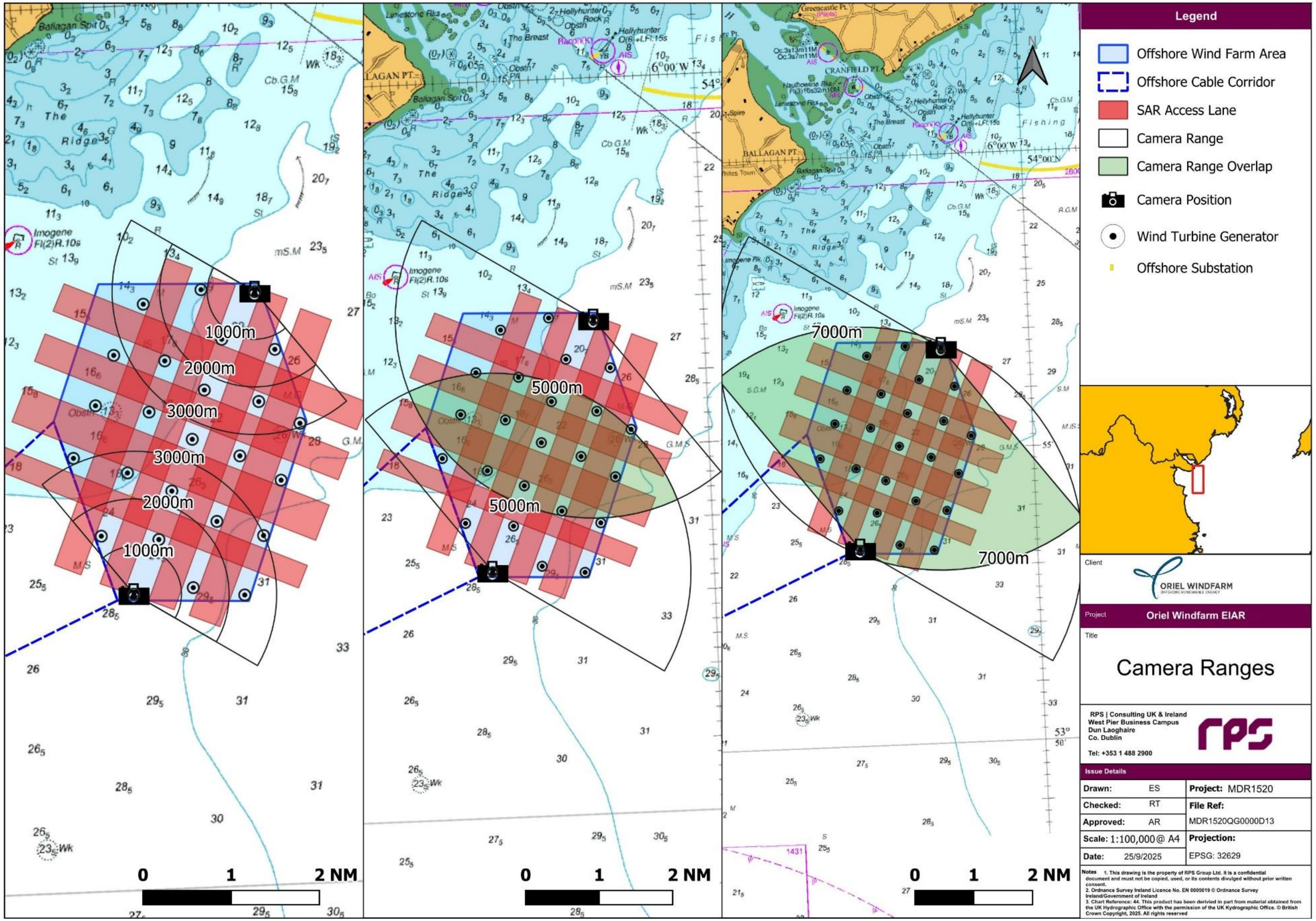


Figure 6-1: Wind farm monitoring with different camera ranges.

6.3 Optimised Micrositing

The construction of an OWF inevitably results in unforeseen constraints and ground conditions being discovered at the time of installation. As such, on occasion, it is necessary to move turbines or substations from the proposed layout and therefore a provision for micrositing of 50 m has been incorporated into the Project designs. Experience on previous OWFs has shown that this is rare and that such micrositing is often very small due to the detailed ground investigation work which has and will be undertaken.

The IRCG response noted that "*The minimum distance of 500 metres between turbines should not be compromised during micro sighting of turbines. Linear layout should not be compromised during micro sighting*". The Project has proposed a radius of potential lateral deviation of 50 m which is consistent with the conditions of many UK offshore wind project Marine Licences. This is the maximum radius of lateral deviation that is proposed and it is likely that where micrositing is required, it would be at much smaller distances and therefore will ensure that 500 m SAR access lanes are achieved. More generally, given the low likelihood of micrositing and the small margins that WTGs are anticipated to be moved, it is unlikely that this would have a meaningful impact on SAR operations.

Following discussions with the IRCG, it was agreed that there is the potential that optimised micrositing of selected WTGs could reposition the WTGs such that the deviation of these turbines from the primary LoO could be reduced. This would increase the alignment of the WTGs and improve access for SAR helicopters. Table 6-2 provide an initial indication of potential deviation reductions that could be achieved with optimised micrositing. The Applicant is committed to using micrositing to reduce the layout deviation where possible, subject to site ground constraints.

Table 6-2: Optimised micrositing.

WTG ID	Layout Deviation (m)	Potential Deviation with Optimised Micrositing (m)	Notes
ORI-A01	44	0	
ORI-A02	0	0	
ORI-A03	14	0	
ORI-A04	189	139	Peripheral WTG to NW
ORI-A05	115	65	Peripheral WTG to N
ORI-B01	26	0	
ORI-B02	0	0	
ORI-B03	70	20	Distance less than nacelle size
ORI-B04	163	113	
ORI-B05	138	88	Peripheral WTG to NE
ORI-C01	20	0	
ORI-C02	0	0	
ORI-C03	127	77	
ORI-C04	30	0	
ORI-C05	100	50	Peripheral WTG to NE
ORI-D01	85	35	Distance equivalent to nacelle size
ORI-D02	33	0	
ORI-D03	0	0	
ORI-D04	0	0	
ORI-D05	50	0	
ORI-E01	21	0	
ORI-E02	3	0	
ORI-E03	58	8	Peripheral WTG to S
ORI-E04	134	84	Peripheral WTG to SE

WTG ID	Layout Deviation (m)	Potential Deviation with Optimised Micrositing (m)	Notes
ORI-E05	65	15	Peripheral WTG to SE

6.4 Incidents Responded to by Vessels Associated with OWF

Historically, vessels supporting the OWF industry have been observed assisting with SAR at other projects, demonstrating that the Project can improve SAR within the region. NASH Maritime have collated records obtained from the RNLI, MAIB and web searches of where OWF vessels have provided assistance to casualties within the UK offshore wind industry. 40 incidents were identified including medical transfers, towing the affected vessel to safety or standing by until emergency services arrive. Key examples include:

- September 2014: A 7 m fishing vessel off Clacton-on-Sea sought assistance from the coastguard and RNLI when flooding occurred and her pumps failed to cope. The skipper's call for assistance was heard by a wind farm support vessel, which went to assist and pumped the flooding vessel dry with a portable pump.

- January 2015: A passenger on a cruise liner fell seriously ill after departing Liverpool, enroute to the Canary Islands. Authorities called for an immediate evacuation, and a CTV responded rapidly. The vessel reached the cruise liner, safely evacuated the casualty. Paramedics confirmed that the quick response was crucial to saving the casualties life.

- May 2015: A yacht suffered flooding and engine failure approximately 9 nm east of Mablethorpe while en route from the Norfolk coast to Grimsby. Two wind farm support vessels, diverted from transit to the Skegness OWFs to provide immediate assistance, initiating a tow towards Grimsby. The tow was subsequently transferred to the Skegness RNLI lifeboat, while the yacht’s crew were evacuated by the Humber lifeboat and airlifted to Humberside Airport.

- June 2018: A trimaran began taking on water before capsizing, forcing its two crew to abandon the vessel. Their Mayday broadcast and 999 call were received by HM Coastguard Holyhead and Belfast, who issued a Mayday relay requesting nearby assistance. A wind farm support vessel responded promptly, recovering the two men from the water and providing care until the arrival of a Coastguard helicopter.

- September 2019: A yacht experienced steering failure 17 nm southeast of Wick, close to the Beatrice OWF. The wind farm guard vessel responded to the yacht’s pan-pan call, securing a tow line and holding the vessel until the Wick RNLI lifeboat arrived. The lifeboat subsequently assumed the tow and brought the yacht safely into Wick Harbour.

- December 2020: A fishing vessel detonated a World War 2 mine whose explosion caused severe flooding, structural damage and life-threatening injuries, forcing its seven crew to abandon ship in a life-raft. A wind farm support vessel, operating at the Dudgeon OWF, recovered all seven crew within 22 minutes, providing immediate lifesaving medical care, until transferred by SAR Helicopter to hospital.

- In 2025, following the collision between a cargo vessel and a tanker off the Humber, CTVs operating at the nearby wind farms were first on scene, towed life rafts away from burning fuel and rescued the occupants having abandoned ship.

These examples demonstrate that OWF-associated assets play an increasingly important role in SAR, supplementing conventional assets and reducing response times, in line with their SOLAS obligations.

7 SUMMARY AND CONCLUSIONS

Recognising that the Project does not contain multiple LoOs, this technical note presents a Safety Justification to demonstrate that the proposed layout integrates as far as practically possible the underlying elements of best practice to ensure the safety and effectiveness of SAR operations. This safety justification has identified several key conclusions:

Project Overview (section 2):

- There is a significant and pressing need for increased offshore renewables in Ireland, which the Project will help meet;
- The area surrounding the Project site is constrained by environmental designations, seabed geology, commercial fisheries and other constraints which has resulted in a highly concentrated site boundary;
- Significant constraints on layout exist within the site boundary, including technical requirements of the WTG spacing, archaeological features and geotechnical consistency of the seabed;
- As such, it is not possible to install the appropriate number of WTGs within the site boundary whilst maintaining two LoO; and
- The proposed layout meets numerous aspects of the relevant guidance including maintaining one primary LoO (NE-SW), offering an alternative secondary LoO through the centre of the OWF Area and establishing clear SAR Access Lanes >500 m across the site.

Surface Navigation (section 3):

- Analysis of vessel traffic in the Study Area has demonstrated that vessels likely to navigate through the Project are likely to be small recreational craft and fishing vessels;
- It is not anticipated that any commercial shipping would transit through the Project and therefore the effects of a single LoO are negligible;
- Recreational craft do routinely navigate through OWFs in the UK and, where appropriate passage planning is undertaken in line with guidance, this has been achieved safely. Evidence suggests that recreational craft do not necessarily use the LoO for navigation, but the orientation of the primary LoO NE-SW approximately aligns with most of the observed coastal cruising;
- Fishing may also continue within the Project, noting that fishing transits observed within the OWF Area are predominantly in a NE-SW orientation, parallel to the primary LoO. The familiarity of local fishermen will also offer excellent spatial awareness and reduce the risks of an incident;
- No concerns on internal navigation by recreational or fishing stakeholders was raised during the NRA and a consensus was reached that all navigational risks were Minor or Negligible with adopted mitigation; and
- The single LoO is not anticipated to have any adverse effect on surface SAR by lifeboats and other vessels. This is due to the substantial spacing between the WTGs, the available time to manoeuvre and the effectiveness of equipment carried by lifeboats. No concerns were raised by the RNLI on the proposed layout.

Risk Profile of the Project (section 4):

- Few incidents are currently occurring within the Project site at present and as demonstrated within the NRA, the background risk profile is low;

- Within the wider industry, the overwhelming majority of incidents involve Project personnel/vessels involved in minor incidents which are responded to without the need for national SAR assets;
- If required, national SAR assets would not be on scene for approximately 45 minutes, and therefore, Project assets would be the first responders, offering immediate means of raising the alarm, initial first aid capability, search and/or rescue;
- The most likely incidents to occur, generated organically by the Project, would be most likely be minor and responded to by the Project in accordance with the ERCoP and ERP. As there is a low likelihood of the necessity for search in such a scenario, the layout of the Project is not considered to have a material impact on the likelihood of success in these scenarios; and
- The realistic worst credible scenario is determined to be a small fishing boat experiencing flooding/capsize with between a single or three persons on board, without Project assets on scene. The likelihood of this event occurring is assessed to be low. In very poor weather conditions, the single LoO may reduce the probability of a successful search in this scenario.

Helicopter Access and SAR (section 5):

- Where a national SAR helicopter is required, Oriel's small size (3.7 nm by 2.3 nm), means that a credible initial response to an incident would be for the first response to orbit the OWF to conduct an initial search. This could be achieved in most conditions with an excellent probability of detection across the Project with the use of SAR equipment such as FLIR, without having to enter the Project to perform search;
- The majority of WTGs are highly regular along the primary LoO, and where deviations occur they would be imperceptible from the perspective of a SAR helicopter. The greatest deviations are located on the perimeter of the Project, and are less than a blade length;
- The layout clearly offers one clear LoO (NE-SW), at a bearing of 021/201°, as was recognised within the IRCG submission during statutory consultation, that would enable SAR assets to safely enter from the NE into the prevailing SW conditions, which would be the likely means of access for SAR helicopters;
- The layout also offers alternative northwest to southeast (NW-SE) access through centre of the OWF Area, which could be used by SAR assets to reach a rescue location if required;
- Both orientations offer SAR Access Lanes > 500 m between blade tips, with a consistent heading and linearity of structures, which would enable good access and search potential of site;
- Excellent probability of detection can be maintained using the primary NE-SW SAR Access Lanes event in the most limited weather conditions and for small targets. In the majority of good weather conditions, overlapping coverage given the 0.55 nm parallel tracks through the Project would ensure comprehensive coverage;
- Many of the challenges around SAR within the Project, such as access close to WTGs, are not unique to the Project and unaffected by the single LoO;
- The OSS is a single, small (56 m height, and 40 m x 30 m footprint), unique structure, with good vertical and horizontal separation from the SAR Access Lanes;
- There is also substantial helicopter safety benefit to having the OSS misaligned from the LoO to improve access and egress to a structure where a high probability of need for support may arise; and
- There is substantial precedent across operational OWFs to demonstrate that SAR is being effectively managed in larger and more constrained OWFs.

Mitigation (section 6):

- The Project has proposed a substantial range of mitigations which would manage and improve SAR provision in the area. This includes development of emergency plans, 24/7 monitoring from an MCC and immediate provision of first aid capability;

- The Project will install PTZ cameras on the most northerly and southerly WTGs to bolster surveillance of the areas most constrained by access;

- The Project is also reviewing how micrositing can be used to further align the WTGs with the LoO, subject to geotechnical constraints; and

- It is recognised that the OWF industry has a duty to offer substantial rescue and lifesaving to other marine users in line with SOLAS obligations.

Summary:

In summary, site constraints prevent the establishment of two LoO. However, the proposed layout provides a single LoO aligned with the prevailing wind, with multiple, predictable SAR Access Lanes, all of which exceed the minimum requirement of 500 m separation between blade tips. A further partial LoO at right angles to the primary provides a secondary search option and another into-wind access route to the core of the wind farm, should prevailing conditions dictate. The relatively small and compact wind farm layout permits an initial orbital search, which in most conditions would allow a likely casualty to be sighted. If required, the proposed consistent SAR Access Lanes provide ample opportunity to prosecute a safe infield search by air or marine, which can also be augmented by turbine mounted optical search. The offset OSS does not impact its adjoining SAR Access Lane, and its location enhances the safety of any helicopter operations to it.

Accordingly, although the Project does not meet the full aspiration of SOP 07-2025; the unique location, size, proposed layout and enhanced organic optical search provides a high probability of detecting any likely casualty within its boundary contributing to any rescue and therefore the safety of the site is justified with a single LoO as set out in SOP 07-2025. As such the risk, with proposed mitigation, is judged to be As Low As Reasonably Practicable.

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An Roinn Iompair
Department of Transport

Garda Cósta na hÉireann
IRISH COAST GUARD

Mr. Micheál O'Toole
Director,
Irish Coast Guard,
Department of Transport,
2 Lesson Lane,
Dublin 2

1st December 2025

Richard Church,
Environmental and Consents Manager,
Oriel Wind Farm Ltd,
Digital Office Centre,
Balheary Road,
Swords, Co Dublin,
Ireland.

RE: REQUEST FOR FURTHER INFORMATION PROCESS IN THE APPLICATION TO AN BORD PLEANÁLA, UNDER SECTION 291 OF THE PLANNING AND DEVELOPMENT ACT 2000 (AS AMENDED) FOR PERMISSION FOR ORIEL WIND FARM – ABP CASE NUMBER: ABP-319799-24

Oriel Wind Farm

Dear Richard,

The Irish Coast Guard is a division within the Department of Transport and is not a separate legal entity to the Department. The Irish Coast Guard is a prescribed body under S.I. 100/2023 – Planning and Development (Maritime Development) Regulations 2023, however it remains a division of the Department of Transport.

On the 25th July 2024, Irish Coast Guard made a submission (attached) on the above planning application, raising concerns in relation to Search & Rescue (SAR).

By way of letter from An Coimisiún Pleanála dated 10th April 2025 addressed to the applicant, the applicant was requested to consult with the Irish Coast Guard, to address concerns raised with respect to search and rescue access and provided further information and clarity on such matters. The applicant met with Irish Coast Guard on 24th June 2025 and on 2nd September 2025. The applicant must respond with the further information to An Coimisiún Pleanála by the 19th January 2026.

The following documents/files (attached) were submitted to Irish Coast Guard on the 26th September 2025 for review:

1. A Safety Justification (MDR1520C Safety Justification A1 C01) dated September 2025
2. Shape File – WTGs_Points_WGS84.shp dated 22nd September 2025
3. Shape File – WTG_BladeOversails_118mBuffer_WGS84.shp dated 22nd September 2025
4. Shape File – OSS_30x40m_WGS84.shp dated 22nd September 2025
5. Shape File – MaxWidth_SAR_Access_Lane_WGS84.shp dated 22nd September 2025
6. Shape File – LinesofORientation_WGS84.shp dated 22nd September 2025

7. Shape File – 500m_SAR_Acess_Lane_WGS84.shp dated 22nd September 2025
8. A link to SAR fly-through – NASH-0530 Oriel FlyThrough R01-00.mp4.

The safety justification and associated documents provide mitigating measures in relation to one line of orientation when searching for a casualty within a wind farm for the proposed layout.

With regards to the eight documents/files submitted by the applicant on the 26th September 2025, the Irish Coast Guard has the following observations:

a. The safety justification (Safety Justification (MDR1520C Safety Justification A1 C01) dated September 2025) describes risk and mitigation measures. The justification would be enhanced by the addition of an appendix reiterating those risk assessment and mitigation measures and feature of as a constituent element of the ERCoP post the RFI process.

b. With regards to the potential misalignment of turbines, the applicant's commitment to using micro-siting to align the turbines in straight lines in the array is noted. The Irish Coast Guard notes the turbine misalignment will be reduced to a minimum as per Table 6.2: Optimised micro sighting on page 60 of the safety justification.

c. Irish Coast Guard makes observations regarding the misalignment of the Offshore Sub-station (OSS) raised in the submission to An Bord Pleanála on the 25th July 2024. Where micro-siting is possible, the OSS should be aligned to the extent practicable with turbines to avoid obstacles in SAR Lanes.

d. The applicant has committed to camera coverage in the array. For periods of reduced visibility, access to the camera would greatly assist with the detection of a casualty. The applicant has committed to relaying the camera information from the applicants Marine Coordination Centre (MCC) to the Irish Coast Guard's Marine Rescue Coordination Centre (MRCC). Where technology is available, the applicant should consider the provision of direct data feeds via a suitable mechanism to the Irish Coast Guard. Such systems will be of operational benefit to the IRCG for SAR, maritime casualties and pollution monitoring.

Subject to the implementation of the above observations (a-d), we are content the provisions and mitigations outlined have met the requirements as set out in the National Maritime Oil/HNS Spill Contingency Plan - Standard Operating Procedure 07-2025 Offshore Renewable Energy Installations (OREI): Guidance and Operational Considerations for SAR and Emergency Response and have no further comment at this time.

The applicant will need to submit a detailed Emergency Response Cooperation Plan (ERCoP) to the Irish Coast Guard for review for all phases of the development, subject to granting of planning permission.

We would also ask An Coimisiún Pleanála to consider the four observations (a-d) above and the provisions and mitigations as set out in the above mentioned (and attached) documents (1-8) are mandated as a condition of any planning decision to grant approval to the development. It is requested that this letter, inclusive of attachments, be forwarded to An Coimisiún Pleanála.

For and on behalf of the Irish Coast Guard

DocuSigned by:
Michael O'Toole
BC6A04EAC22C40E...

Micheal O'Toole

Director
Irish Coast Guard
Department of Transport