An Roinn Iompair
Department of Transport

Guidance on Safety of Navigation & Emergency Response: Offshore Renewable Energy Installations (OREI)

June 2025

Contents

Glossary **5**

1. Introduction **7**

1.1. Overview and Status of Guidance Document 7
1.2. Current Government Policy in support of OREI 8
1.3. Role of the Department of Transport's Marine Survey Office (MSO) and Irish Coast Guard (IRCG) 9
1.4. How and When the Guidance Should be Used 10

2. Planning Stage – Navigational Risk Assessment **12**

2.1 Prior to Consent 12
2.2 Maritime Traffic Survey 13
2.3 Minimum Clearance Distances of Wind Farm Boundaries from Shipping Routes 14
2.4 Wind Farm Shipping Route Template 16
2.5 Predicted Effect of OREI on Shipping Traffic and Interactive Boundaries 17
2.6 OREI Structures 21
2.7 Tides, Tidal Streams and Weather 22
2.8 Access to and Navigation Within, or Close to an OREI 22
2.9 SAR, Maritime Casualty, Counter Pollution and Salvage Incident Response 23
2.10 Hydrography 23
2.11 Communications, Radar and Positioning Systems 24
2.12 Assessment of Risk 25
2.13 Risk Mitigation 25

3. Development Consent **27**

4. Post-consent – construction and operation phases **28**

4.1 Layout Design 28
4.2 Marine Navigational Marking 29
4.3 Identification Marking 30
4.4 Mooring Arrangements 31
4.5 Post-consent (construction and operation phase) Maritime Traffic Monitoring 31
4.6 Cable Burial and Protection 31
4.7 Hydrography 32
4.8 SAR & Emergency Response Planning 32

5. Decommissioning **33**

ANNEX I – Navigational Risk Assessment - Methodology **34**

1. Introduction **36**

1.1 Risk Control 36
1.2 Guidance 36
1.3 Key terminology 36

2. Use and Coverage of the Methodology **39**

2.1 Use by Developers 39
2.2 Coverage of the Methodology – Physical Areas 39
2.3 Cumulative Impacts 39

2.4 Relationship with the EIA Report 40

3. Scope and Depth of the Assessment 41

3.1 Proportionality 41
3.2 Preliminary Search and Rescue Operations Assessment or Overview 41
3.3 Preliminary Assessment or Overview of the Required Emergency Response to the spills of Hazardous and Polluting Substances 42
3.4 Requirements for more detailed Emergency Response Assessments 42

4. Navigational Safety Goal 44

4.1 Proposed Navigation Safety Principles 44
4.2 Implications of the Proposed Navigation Approach 44

5. Overview of the Methodology 45

5.1 Key Features of the Methodology to achieve the Marine Navigational Safety Objectives 45
5.2 Integrity of Risk Assessment 45
5.3 Progressive Development of the Submission 46

6. Mechanism for Assessing Tolerability of Marine Navigational Safety and Emergency Response Risk 47

6.1 Tolerability of Individual Risks 47
6.2 Risk 47
6.3 Evidence 47
6.4 Risk Controls 47
6.5 Tolerability of Societal Concerns 47

7. Standard Format of a Submission 49

7.1 Contents of a Marine Navigational Safety and Emergency Response Risk Assessment Submission 49
7.2 Electronic Distribution 52

8. Indicative Process in Assessing a Developer's Submission 53

8.1 Introduction 53
8.2 Principle of the Process 53
8.3 Assessment of Information Supplied in the Submission 53
8.4 Assessment of the Limitations of the Information Supplied in the Submission 54

Section A - Background Information 55

A.1 Overview of Formal Safety Assessment 55

Section B - Setting the Scene 56

B.1 Understanding the Base Case Traffic Densities and Types 56
B.1.1 Survey Areas 56
B.1.2 Traffic Data Requirements 56
B.1.3 Extracting Information from the Data 56
B.1.4 Design Traffic Densities and Types 56
B.2 Predicting Future Densities and Types of Traffic 57
B.2.1 Traffic Forecasting 57
B.2.2 Description of a Technical and Operational Analysis 57

Section C - Setting the Scene 59

C.1 Hazard Identification in the Marine Environment 59

C.1.1 Causal Claims 59
C.1.2 Human Element 59
C.2 Tolerability of Risk 59
C.3 Risk Matrix 59
C.3.1 IMO Example of Likelihood/Frequency Index 60
C.3.2 IMO Example of Severity/Consequence Index 60
C.3.3 IMO Example of Risk Matrix 60

Section D - Appropriate Assessment Techniques & Tools 61

D.1 Overview of Appropriate Risk Assessment 61
D.1.1 Introduction 61
D.1.2 Types of Appropriate Assessment 61
D.2 Navigational Risk Assessment – Area Traffic Assessment Techniques 64
D.2.1 Types of Appropriate Assessment 64
D.2.2 Selection of Situations Requiring Area Traffic Assessment 64
D.2.3 Definition of Scenarios for Assessment 65
D.2.4 Requirements for Assessing a Scenario 66
D.2.5 Analysis and Presentation of Results 68
D.2.6 Analysis and Presentation of Results 68
D.3 Navigation Risk Assessment – Specific Traffic Assessment Techniques 69
D.3.1 Use of Specific Navigation Assessment Techniques 69
D.3.2 Defining Scenarios for Assessment 69

Section E - Deciding on the Risk Controls 71

E.1 Creating a Risk Control Log 71
E.2 Risk Control and Mitigation 71

ANNEX II – Offshore Renewable Energy – Installation Checklist 72

ANNEX III - Hydrography Guidelines for Offshore Developers 84

When to Survey 84
What to deliver 84

ANNEX IV - Search & Rescue, Maritime Casualty, Counter Pollution & Salvage 86

ANNEX V – Document Links 87

Glossary

AIS	Automatic Identification System
ALARP	As Low as Reasonably Practicable
ARPA	Automatic radar plotting aid
AtoN	Aids to Navigation
CAP	Climate Action Plan
CCTV	Closed Circuit Television
COLREG	IMO Convention on the International Regulations for Preventing Collisions at Sea 1972, as amended
COMREG	The Commission for Communications Regulation
DECC	Department of the Environment, Climate & Communications
DoT	Department of Transport
DSC	Digital Selective Calling
EEZ	Exclusive Economic Zone
EIAR	Environmental Impact Assessment Report
ENC	Electronic Navigational Chart
ERCoP	Emergency Response Co-Operation Plan
FSA	Formal Safety Assessment
GIS	Geographical Information System
GMDSS	Global Maritime Distress and Safety System
GSF	Generic Sensor Format
GSI	Geological Survey Ireland
HNS	Hazardous and Noxious Substances
IAA	Irish Aviation Authority
IALA	International Association of Marine Aid to Navigation and Lighthouse Authorities.
IL	Commissioners of Irish Lights (also known as Irish Lights)
IMA	Irish Maritime Administration
IMO	International Maritime Organisation
IRCG	Irish Coast Guard (Division of the Department of Transport)
LMP	Lighting & Marking Plan
MCA	United Kingdom's Maritime & Coastguard Agency
MHWS	Mean High Water Springs

MMSI	Maritime Mobile Service Identity
MSI	Maritime Safety Information
MSO	Marine Survey Office (Division of the Department of Transport)
NCP	National Contingency Plan
nm	Nautical Mile
NMOC	National Maritime Operations Centres
NRA	Navigational Risk Assessment
ORED	Offshore Renewable Energy Development
OREI	Offshore Renewable Energy Installation
OSCP	Oil/HNS Spill Contingency Plan
PIANC	World Association for Waterborne Transport Infrastructure
PNT	Positioning, Navigation, and Timing
RNLI	Royal National Lifeboat Institution
SAC	Special Area of Conservation
SAR	Search and Rescue
SFAIRP	So Far As Is Reasonably Practicable
SOLAS	IMO International Convention for the Safety of Life at Sea
SOP	Standard Operating Procedure
SPA	Special Protected Area
SRR	Search and Rescue Region
STS	Ship-to Ship Transfer
TSS	Traffic Separation Scheme (adopted by the IMO)
UK	United Kingdom
UKHO	United Kingdom Hydrographic Office
VHF	Very High Frequency
VTS	Vessel Traffic Services
WGS 84	World Geodetic System 1984

1. Introduction

1.1. Overview and Status of Guidance Document

1.1.1 This Guidance for Navigational Practice, Safety & Emergency Response for the development of offshore renewable energy installations (OREI) has been developed by the Department of Transport (DoT) in consultation with Department of Environment, Climate & Communication (DECC) and the Commissioners of Irish Lights (IL) in response to the proposed development of Offshore Renewable Energy Installations (OREI) in Irish waters, particularly large scale proposals for fixed bottom offshore wind farms.

1.1.2 The considerations and criteria contained in this guidance document are intended to address the navigational and emergency response impacts of OREI's proposed for Irish waters. This guidance has taken account of national requirements and international standards, particularly the UK Maritime & Coastguard Agency's (MCA's) Marine Guidance Notice MGN 654 (M+F), related to the establishment of OREI.

1.1.3 It is noted in the past few years that the MCA's navigation guidance has been taken into account by proposed developers of OREI in Irish waters. This is evidenced by the Department of the Environment, Climate and Communications' 2017 "*Guidance on EIS and NIS Preparation for Offshore Renewable Energy Projects*" which refers in Appendix II ('*Relevant guidance documents*') to the UK Department of Trade and Industry's 2005 "*Methodology for Assessing the Marine Navigational Safety Risks of Offshore Wind Farms*", which in turn references the UK Maritime and Coastguard Agency's (MCA's) 2004 Marine Guidance Note MGN 275(M) "*Proposed UK Offshore Renewable Energy Installations (OREI) – Guidance on Navigational Safety Issues*". The present iteration of the MCA's Guidance on Navigational Safety Issues is '*Marine Guidance Note MGN 654 (M+F)(2021)*', the successor to MGN 275(M), which is the reference document upon which this Irish navigation guidance is primarily based. The Department would therefore like to thank the UK's Maritime & Coastguard Agency for sharing their 2021 navigation guidance (MGN 654 (M+F), 2021) and for giving permission for its use in compiling this guidance document.

1.1.4 The Minister for Transport, the Irish Coast Guard (a Division of the Department of Transport), and the Commissioners for Irish Lights all have a remit in maritime navigational safety and are included in the list of prescribed bodies set out in Schedule 1 of Statutory Instrument No. 100 of 2023 – '*The Planning and Development (Maritime Development) Regulations 2023*'. These are prescribed bodies that may make submissions or observations to An Bord Pleanála with respect to applications for permission for development under section 291 of the Planning and Development Act 2000, as amended by the Maritime Area Planning Act 2021, which can include planning applications for large scale OREI projects.

1.1.5 Therefore, this guidance document should be taken into account by OREI developers seeking planning consent for offshore wind farm developments, as the above-mentioned prescribed bodies may rely on this guidance document in their submissions or observations to An Bord Pleanála. Furthermore, An Bord Pleanála may require compliance with the recommendations of this guidance document as a condition or conditions of development consent, in which case the Marine Area Regulatory Authority (MARA) would have the responsibility to enforce any such conditions.

1.1.6 This guidance should also be read in conjunction with the separate '*Guidance for Search and Rescue Guidance for OREI - Standard Operating Procedure 07-2025*', or its successor if updated, as published by the Irish Coastguard.

1.2. Current Government Policy in support of OREI

1.2.1 The Climate Action and Low Carbon Development (Amendment) Act 2021 commits Ireland to a 51% reduction in emissions by 2030 and Zero emissions by 2050. The Programme for Government 2025 sets a target of at least 5GW electricity to be generated from offshore wind by 2030. The Government's Climate Action Plan 2023 (CAP 23) sets out how Ireland will take advantage of the potential of at least 30GW of floating offshore wind power in our deeper waters in the Atlantic. The Government's Future Framework for Offshore Renewable Energy Policy Statement 2024 also outlines Ireland's long-term ambitions of 20GW of offshore renewable energy generation by 2040 and 37GW by 2050.

1.2.2 The Maritime Area Planning Act 2021 provides the legal underpinning to an entirely new plan-led marine planning system, enabling the development of Ireland's substantial offshore wind potential. This Act provides for Designated Maritime Area Plan (DMAPs) which will determine the broad area where offshore renewable energy projects can be developed, which will act as a management plan for a specific area of Ireland's marine waters, and which can be used to develop multi-activity area plans to promote the use of specific activities, including offshore renewables. This first DMAP has been located off the South Coast of Ireland and it puts forward an initial 'proposed' geographical area within which future offshore renewable energy development may take place.

1.2.3 There is now increased activity by offshore wind developers in preparation for the development of OREI around the Irish coast, particularly for fixed bottom wind farms. This document aims to provide guidance on navigational practice, safety, pollution control and emergency response issues (planning) for this development sector. As the development of OREI technology is recognised in future DMAPs, for example for floating wind farms and for wave, tidal and floating solar projects, this guidance document will also likely require revisions and updates in the future.

1.2.4 This guidance document, and any future amendments or revisions will be published by the Department by way of Marine Notice. Marine Notices are

information notices issued by the Department of Transport to publicise important safety, regulatory and other information relating to the maritime sector in Ireland. If you would like to be included on the mailing list to receive Marine Notices by email, please send a request to marinenotices@transport.gov.ie.

1.3. Role of the Department of Transport's Marine Survey Office (MSO) and Irish Coast Guard (IRCG) Divisions

1.3.1 The Marine Survey Office (MSO) and the Irish Coast Guard (IRCG) are both divisions of the Department of Transport.

The Marine Survey Office

1.3.2 The MSO is responsible for the implementation of national and international legislation on behalf of the Minister for Transport in relation to safety of shipping and the prevention of pollution of the marine environment from ship-based sources. The MSO carries out initial approval of designs and drawings for new vessels or modifications to existing vessels and then carries out the surveys necessary for the certification of those vessels. In addition, it provides both a host of ancillary and back-up services to the shipping industry, to other divisions in the Department of Transport, and to different Government Departments as well as providing technical representation for the Department at relevant international meetings. As part of this technical role, the MSO is responsible for reviewing Navigational Risk Assessments (NRAs) submitted by ORE developers to An Bord Pleanála as part of the Environmental Impact Assessment Reports for the developers' proposed developments.

The Irish Coast Guard

1.3.3 The main functions of the Irish Coast Guard (IRCG) are to co-ordinate search and rescue (SAR) in the Irish Search and Rescue Region (SRR), intervene as necessary in marine casualties to prevent or minimise damage from pollution to the coastline and related interests, respond to vessels requesting a Place of Refuge, implement the Oil Preparedness, Response and Co-operation Convention regime in Ireland and provide a Maritime Assistance Service.

1.3.4 Under the Sea Pollution (Amendment) Act 1999, an offshore unit or oil handling facility is required to submit to the Minister of Transport a plan for the prevention and minimisation of damage arising from an oil pollution incident and to have in place an oil pollution emergency plan. This Act was amended by the Sea Pollution (Miscellaneous Provisions) Act 2006 to include hazardous and noxious substances and hazard and noxious handling facilities.

1.3.5 The Minister for Transport, as advised by the IRCG, may also give a direction in writing to make modifications or changes to these plans as required. The Minister may also give a direction in writing or otherwise to refrain for carrying out an activity, which in the opinion of the Minister is necessary or expedient to respond to an oil or pollution incident on an offshore unit of handling facility.

1.3.6 IRCG, in collaboration with other Government Departments, reviews and approves the Oil/HNS Spill Contingency Plans (OSCPs) and the wider Emergency Response Co-Operation Plans (ERCoPs) for offshore units and for oil handling facilities. In addition, IRCG requires the operators of these facilities to prove their plans – this may take the form of training, certifications and exercise(s) validation processes.

1.3.7 The verification and approval of these plans by the IRCG is prescribed with the National Maritime Oil/HNS Spill Contingency Plan 2024, Standard Operating Procedure 05-2024 “Content and Implementation of an Oil/HNS Contingency Plan”.

1.3.8 Under the Sea Pollution (Amendment) Act 1999, transfer of ship’s stores, cargo or oil to or from a ship in a place in the State (not being a harbour), including within the State’s Exclusive Economic Zone (EEZ), can only be carried out in accordance with a permit granted by the Minister. The Minister may, upon an application being made by the owner, charterer, hirer or master of a ship, grant a permit to the applicant allowing the transfer to or from the ship concerned of ships stores, cargo or oil outside a harbour. This function is carried out by Authorised officers of IRCG. A ship to ship (STS) permit will be considered subject to environmental and habitat assessments and adequate contingency plans being in place.

1.4. How and When the Guidance Should be Used

1.4.1 This document is intended as guidance for developers of OREI in Irish waters. The guidance outlined in the document should be considered by OREI developers in the preparation of Navigational Risk Assessments (NRAs) and Emergency Response Co-Operation Plans (ERCoPs) which are included in the EIA Reports enclosed with the developers’ planning applications, and in any required post-consent documents.

1.4.2 The guidance should be used to evaluate all navigational risks, which could be reasonably foreseeable, by which the siting, construction, extension, operation and de-commissioning of an OREI could cause or contribute to an obstruction of, or danger to, the safety of navigation or emergency response. The guidance should also be used to assess potential changes to traffic patterns.

1.4.3 It is recognised that all OREI projects are at varying stages of planning and development, both pre-consent and post-consent, therefore proposals on meeting the principles of this guidance for undertaking marine works will be assessed on a ‘case by case’ basis. Albeit, it is noted that OREI developments predating the publication of this guidance will have already been designed with reference to the UK MCA’s Marine Guidance Notice MGN 654 (M+F) (the successor to the UK’s Marine Guidance Notice MGN 275(M)), upon which this Department of Transport guidance is based.

1.4.4 The guidance contained herein apply to all sites in Irish waters, whether within the jurisdiction of port/harbour limits or in open sea areas. However, port/harbour authorities may additionally require developers to comply with their own specific criteria and/or local regulations and directions. Evaluating the impact of proposed

OREI developments on existing port/harbour activities should be carried out in consultation with the relevant port/harbour authority and the wider port community.

1.4.5 OREI developers should evaluate the impacts of their projects and comply with the guidance during all phases of:

- planning;
- construction;
- operation; and,
- decommissioning.

1.4.6 The attention of OREI developers is also drawn to the Irish Coast Guard's 2025 guidance "*Standard Operating Procedure 07-2025: Offshore Renewable Energy Installations (OREI): Guidance and Operational Considerations for SAR and Emergency Response*", which is available on the Department of Transport's website.

2. Planning Stage – Navigational Risk Assessment

2.1 Prior to Consent

2.1.1 Early engagement with the DoT and relevant navigational stakeholders during the scoping stage of project development, is key for early identification of potential areas of concern that may require close attention. Developers are required to produce a Navigational Risk Assessments (NRA) in the planning stage as part of their environmental impact assessment report (EIAR) and application for development consent. The production of an NRA should be based on the International Maritime Organization's (IMO's) '*Formal Safety Assessment*', the latest version of which is available on the IMO's website. Any substantial changes to the project that impacts on shipping and navigation may require relevant updates to the NRA also, including at post-consent construction and operation phases.

2.1.2 Potential navigational or communications impacts, or hazards caused to mariners or emergency response services, using the site area and its environs, should be assessed. Assessments should be made of the consequences of ships deviating from normal routes to avoid proposed sites, including smaller vessels e.g., domestic vessels, coasters, recreational or fishing vessels entering shipping routes with larger vessels. Special regard should be given to evaluating situations which could lead to safety of navigation being compromised e.g., an increase in 'end-on' or 'crossing' encounters, or reduction in sea-room or water depth for manoeuvring, leading to choke points, etc.

2.1.3 Issues that could contribute to a maritime casualty or leading to emergency operations at sea or along the coast, or damage to the marine environment, should be highlighted in assessments. Further guidance on this can be found in the Irish Coastguard's Standard Operating Procedure 07-2025 "*Offshore Renewable Energy Installations: Guidance and Operational Considerations for SAR and Emergency Response*" which can be found here: www.gov.ie/en/publication/79e5d-national-maritime-oilhns-spill-contingency-plan-nmoscp/

2.1.4 Developers are responsible for ensuring that formally agreed co-ordinates and subsequent variations of site perimeters and individual OREI structures are made available, on request, to interested parties at relevant project stages, including application for consent, development, array variation, operation and decommissioning. This should be supplied as authoritative Geographical Information System (GIS) data. Metadata should facilitate the identification of the data creator, its date and purpose, and the geodetic datum used. For mariners' use, appropriate data should also be provided with latitude and longitude coordinates in WGS84 (ETRS89) datum.

2.2 Maritime Traffic Survey

2.2.1 An up-to-date traffic survey of the proposed development area concerned should be undertaken within 12 months prior to submission of a Navigational Risk Assessment as part of the Maritime Area Consent process (as is also recommended in the UK MCA's MGN 654). This survey should include all the vessel and craft types found in the area and total at least 28 days duration but also take account of seasonal variations and peak times in traffic patterns and fishing operations. Automatic Identification Systems (AIS) data alone will not constitute an appropriate traffic survey; radar, manual observations, other data sources (e.g., for fishing and recreation, seasonal cruise traffic) and stakeholder consultation will ensure those vessels that are not required to carry and operate AIS are included, and it provides an appropriate representation of the base line marine traffic.

2.2.2 However, to cover seasonal variations, peak times or perceived future traffic trends, the survey period may be extended to a maximum of 24 months. Should there be a break in the continuation surveys, a new full traffic survey may be required, and the time period starts from the completion of the initial 28-day survey period.

2.2.3 In the event of location specific issues being identified by the existing traffic survey and/or through consultation, additional surveys beyond the minimum outlined above may be required in order to support assessment of such issues. Developers must demonstrate that all localised conditions / existing / projected traffic patterns are considered.

2.2.4 Where relevant these variations should be justified in consultation with Irish Lights, ship operators, fishing vessel organisations and where appropriate, port/harbour and navigation authorities, and other recreational craft users. While recognising that site-specific factors need to be taken into consideration any such survey should include but may not be limited to an assessment of the cumulative and individual effects of the following:

i. Proposed OREI site relative to areas used by any type of marine craft,

ii. Numbers, types and sizes of vessels presently using such areas,

iii. Non-transit uses of the areas, e.g., fishing (including aquaculture activities), day cruising by recreational craft, racing, dredging, personal watercraft etc,

iv. Whether these areas contain shipping routes used by coastal, deep-draught or international scheduled vessels on passage,

v. Alignment and proximity of the site relative to adjacent shipping routes,

vi. Whether the nearby area contains prescribed routeing schemes or precautionary areas,

vii. Proximity of the site to areas used for anchorage (charted or uncharted), safe haven, port approaches and pilot boarding or landing areas,

viii. Whether the site lies within the limits of jurisdiction of a port and/or navigation authority,

ix. Proximity of the site to existing fishing grounds, or to routes used by fishing vessels to such grounds,

x. Proximity of the site to offshore firing practice ranges or ordnance dumping grounds, and areas used for any marine military purposes either presently or in the past,

xi. Proximity of the site to existing or proposed submarine cables and pipelines, offshore oil/gas platforms, marine dredging, marine archaeological sites or wrecks, other exploration/exploitation sites. This should include projects in the planning process, in addition to those consented,

xii. Proximity of the site to existing or proposed OREI developments, in co-operation with other relevant developers,

xiii. Proximity of the site relative to any designated areas for the disposal of dredging spoil,

xiv. Proximity of the site to any types of aids to navigation and/or Vessel Traffic Service (VTS) in or adjacent to the area and any impact thereon,

xv. Researched opinion using appropriate computer simulation techniques with respect to the displacement of traffic and, in particular, the creation of 'choke points' in areas of high traffic density and nearby planned or consented OREI sites not yet constructed,

xvi. With reference to item 'xv' above, the number and type of incidents to vessels which have taken place in or near to the proposed site of the OREI to assess the likelihood of such events in the future and the potential impact of such a situation,

xvii. Proximity of the site to areas used for recreation which depend on specific features of the area.

2.2.5 A review of the Navigational Risk Assessment should be carried out by the developer post-consent and prior to construction. This may include additional traffic survey data or if there are any changes to plans that could impact navigation e.g., construction methodology, and must be promptly communicated to the DoT and Irish Lights where lighting and marking schemes may be impacted.

2.3 Minimum Clearance Distances of Wind Farm Boundaries from Shipping Routes

2.3.1 The minimum clearance of wind farm boundaries from shipping routes shall ensure a distance of 5 nautical miles (nm) from the IMO's designated Traffic Separation Scheme (TSS) terminations and 2 nm from TSS boundaries. A minimum clearance of 2 nm shall be provided to traffic routes in the approaches to port/harbour

entrances. Consideration must be given to expansion of existing ports and where known, the planned development of new ports or facilities.

2.3.2 Where appropriate, OREI developments shall avoid known areas occupied by recreational craft or established fishing grounds. Developers must consider minimum distances that are appropriate, through stakeholder engagement with the National Parks and Wildlife Service and any other relevant statutory bodies, where a proposed development is located close to a Special Areas of Conservation (SAC) or Special Protected Area (SPA).

2.3.3 The below templates can be used for assessing distances between wind farm boundaries and shipping routes. Precisely where an interactive boundary should lie requires similarly flexible definition and agreement. See diagram below where[1]:

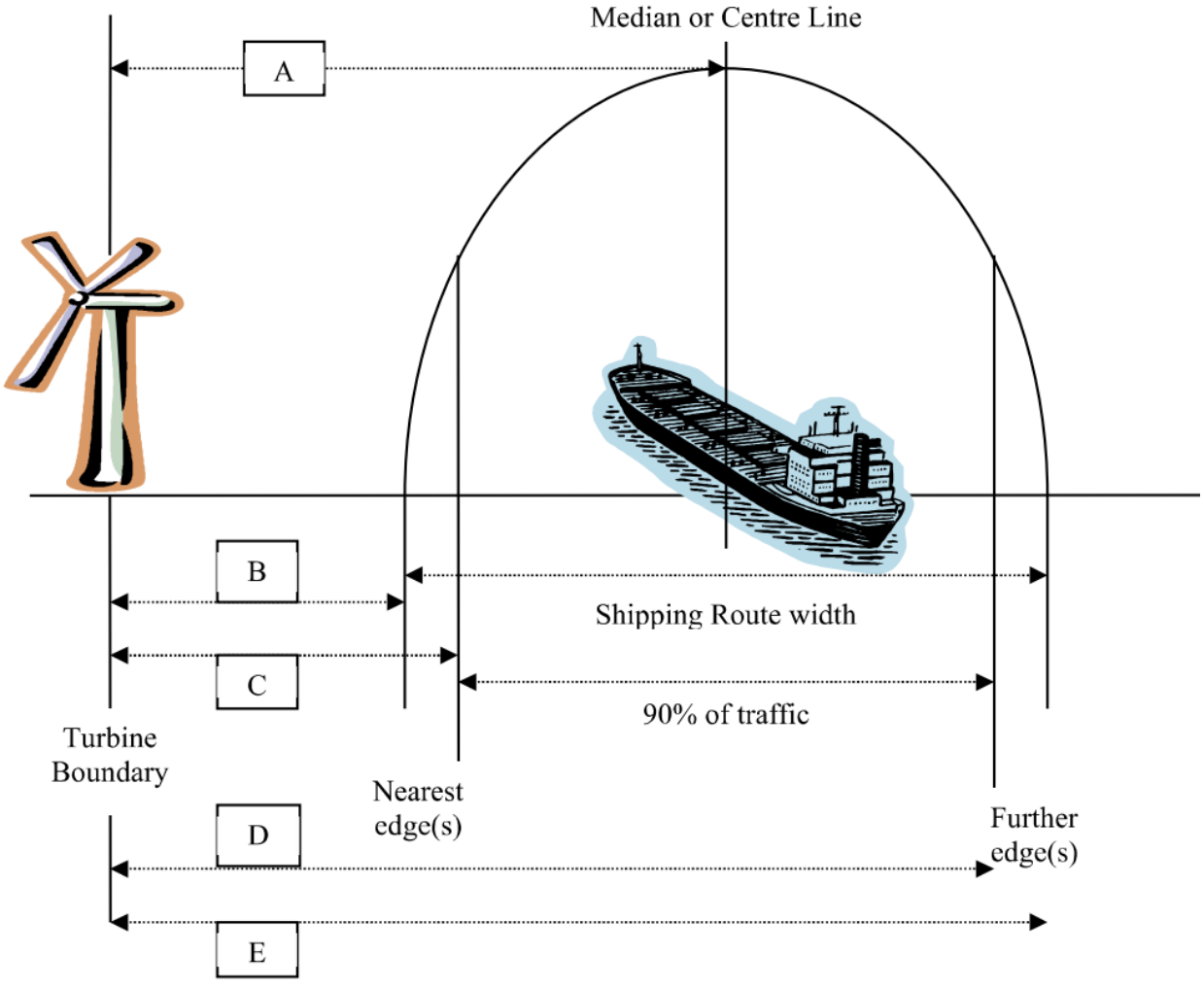


Figure 1: Interactive Boundaries

A = Turbine boundary to the shipping route median or centre line

[1] The Nautical Institute and World Ocean Council guidance document titled The Shipping Industry and Marine Spatial Planning may be useful to read in conjunction with this guidance: https://www.nautinst.org/uploads/assets/uploaded/299f934f-ee69-492e-8ada51abf26e8b19.pdf

B = Turbine boundary to nearest shipping route edge or IMO routeing measure boundary

C = Turbine boundary to nearest shipping 90% traffic level*

D = Turbine boundary to further shipping 90% traffic level*

E = Turbine boundary to further shipping route edge

(* = or another % to be determined)

2.4 Wind Farm Shipping Route Template

2.4.1 The wind farm "Shipping route" guidance template below is to be used as guidance and approval of distances between wind farm boundaries and shipping routes is on a case-by-case basis with the DoT and relevant navigation stakeholders. It is important to recognise that the template is not a prescriptive tool but needs intelligent application and advice will be provided on a case-by-case basis.

Distance of turbine boundary from shipping route **(90% of traffic, as per Distance C)**	**Factors for consideration**	**Risk**	**Tolerability**
<0.5nm (<926 metres)	X-Band radar interference Vessels may generate multiple echoes on shore- based radars	**VERY HIGH**	**INTOLERABLE**
0.5nm to <1nm (926m to <1,852m)	Mariners' Ship Domain (vessel size and manoeuvrability)	**HIGH**	**TOLERABLE IF as low as reasonably practicable (ALARP)**
1nm to <2nm (1,852m to <3,704m)	Minimum distance to parallel an IMO routeing measure, as per Distance B S-Band radar interference Automatic radar plotting aid (ARPA) affected (or other means)	**MEDIUM**	**Additional risk assessment and proposed mitigation measures required** Description of ALARP can be found in: a) IMO (2018) MSC-MEPC.2/Circ.12/Rev.2 dated 9 April 2018, 'Revised Guidelines for FSA in the IMO Rule Making Process'

2nm to 3.5nm (3,704m to 6,482m)	Compliance with COLREG becomes less challenging	**LOW**	
>3.5nm (>6,482m)	Minimum separation distance between turbines on opposite sides of a route	**LOW**	**BROADLY ACCEPTABLE**
5nm (>9,260m)	Adjacent wind farm introduces cumulative effect Minimum distance from TSS entry/exit	**VERY LOW**	**ACCEPTABLE**

Table 1 – Windfarm Shipping Route Template

2.5 Predicted Effect of OREI on Shipping Traffic and Interactive Boundaries

2.5.1 With regard to the inter-relationship of wind farms to shipping routes, OREI developers need to take early recognition of the factors involved when planning a turbine layout within their allocated water space. The template in Navigational Risk Assessment – Methodology (see ANNEX I) should be used.

2.5.2 The Merchant Shipping (Safety Convention) Act, 1952, as amended, implements the IMO's Safety of Life at Sea (SOLAS) Convention Chapter V (Safety of Navigation). This legislation applies to all vessels on all voyages. In some cases, areas of sea may be considered an essential area for navigation and of strategic importance for vessel operation and in accessing ports and harbours. While not an IMO designated routeing measure, these might be an area of sea that is actively used by all vessel types, including large commercial and internationally trading vessels, supply routes, and ferry routes. Therefore, for the purposes of this guidance document 'sea lanes' are considered to be IMO-adopted routeing measures and potentially other sea/shipping routes transited by all vessel types.

2.5.3 The template is based on a simulated scenario. There may be opportunities for the interactive boundaries to be flexible where, again, for example, vessels may be able to distance themselves from turbines to provide an increased margin of safety without significant penalty, or where turbines could be distanced from shipping nodal points. It is recognised that ship domains may vary and that larger, high speed, hazardous cargo and passenger carrying vessels may have larger domains.

2.5.4 Traffic surveys would also establish any route traffic bias where mariners may naturally turn to starboard to facilitate passing encounters in accordance with the IMO's International Regulations for Preventing Collisions at Sea, 1972 (COLREG). Additionally, marine traffic surveys would identify vessel type or category which

may consequently require larger domains to ensure that the following factors can be taken into consideration in determining corridor widths:

i. Compliance with the best practices of seamanship and principles to be observed in keeping a navigational watch including the composition of the watch,

ii. The manoeuvrability of vessels with special reference to stopping distance and turning ability in the prevailing conditions,

iii. Provisions that may be required with mechanical failure of vessels involved and level of support services,

iv. The state of visibility, wind, sea and tidal stream, and the proximity of navigational hazards,

v. The traffic density including concentrations of fishing vessels or any other vessels,

vi. The draught in relation to the available depth of water and the existence of submarine cables and obstructions,

vii. The effect on radar detection of the sea state, weather and other OREI sources of interference.

2.5.5 In the approaches to ports and harbours this is particularly relevant. This additional information would influence where boundaries may need to be established.

2.5.6 When larger developments provide corridors between sites to allow safe passage of shipping a detailed assessment will be required to establish the minimum width of the corridor. The assessment of the required sea room (corridor width) will be undertaken on a case-by-case basis and should take into account not only the requirements of the traffic survey but also the general location, sea area involved and nearby structures and installations. It will not always be possible to make a course that is planned, and experience shows that in heavy sea conditions it is much harder to stop or turn the vessel around. Deviations from track by as much as 20-degrees, or more, are common and must be considered. This deviation is used as the baseline for calculating corridor widths contained in the windfarm shipping route template.

2.5.7 Where turbines appear along both sides of a shipping corridor, the width requirement will be proportional to corridor length, based on a 20-degree course deviation.

2.5.8 The following factors should be applied when considering the width of a shipping corridor through an Offshore Renewable Energy Development (ORED):

- The distance between two OREDs.
- The distance between an ORED and the shore.
- The distance turbines should be from an established shipping route.

2.5.9 The assessment of the required sea room must take into account the general location and sea area involved. The level of preparedness of vessels operating near OREI, bridge manning, availability of engines for immediate manoeuvre and readiness to use anchors will all vary when the vessel is on a general sea passage, as opposed to in areas of recognised constrained operation, for example port approaches and rivers.

i. Size, manoeuvring characteristics and volume of the vessels expected to transit the proposed lanes.

a. Turning circles for vessels are typically calculated on six times the ship's length. This is a particularly good assumption when vessels on ocean or deep-sea passage will not have the same manoeuvrability as when engines and systems are prepared for port approach.

b. Requirements for stopping in an emergency must be considered.

c. The Netherlands made an assessment of sea room requirements using data supported by the PIANC assessment for channel design and the PIANC "*Interaction Between Offshore Wind Farms and Maritime Navigation*" (2018) report. In general, they strive for an obstacle free, or buffer, zone of 2nm between wind farms and shipping routes.

d. The possibility of ships overtaking cannot be excluded and should be taken into consideration.

ii. Provisions for possible mechanical failure of transiting vessels, bearing in mind the availability of support services.

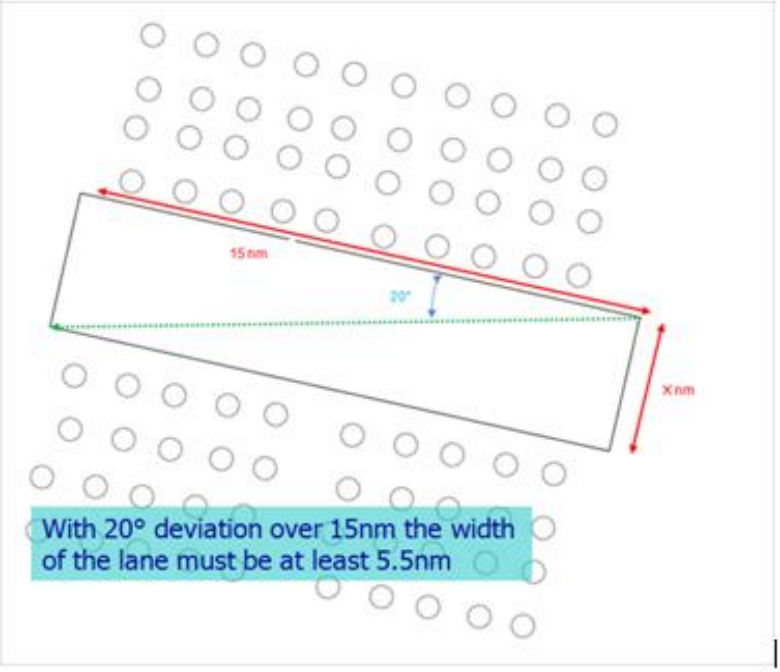
a. Engine failure while using a transit lane might necessitate emergency or unplanned anchoring, restricting available sea room for other vessels.

b. Dependant on depth of water the swinging circle of very large vessels, when anchored, must be calculated to assess the sea room required.

iii. Constraints of weather, sea and tidal conditions that may be expected in the location.

a. Unlike inshore and estuary areas, when on passage in exposed sea areas it will not always be possible to make good a planned course. Experience also shows that in heavy sea conditions it is much harder to turn the vessel around and may not be possible to achieve a dead stop and deviations from track are common. Therefore 20° or more, are common (as determined from the traffic assessment of the NRA) and must be considered in developing corridors through OREIs.

b. For example:



c. In tidal areas, the navigable width of a channel or route, for example, between an OREI and the shore, may be significantly reduced at low water.

iv. Other traffic, for example concentrations of fishing vessels, that will affect available sea-room to manoeuvre.

a. Concentrations of fishing vessels, or recreational traffic, will create requirements for manoeuvre and course alteration by other through traffic and also restrict sea-room in the shipping lane. The risk of further vessel to vessel conflict will be consequently increased.

b. The risk of displacing a group of traffic into space utilised by other users where available sea room is already confined, must be considered. For example, where recreational traffic is forced to use the same sea space as much larger and faster commercial vessels.

c. Existence of submarine cables and obstructions. The existence of submarine cables or other seabed obstructions may affect the ability of a vessel to anchor safely away from other traffic and this may be another consideration when assessing sea room requirements.

d. Radar interference. Dependant on the proximity to wind turbine towers, and the location of radar scanners aboard the vessel, some vessels may experience degradation of the radar display by false echoes. It may be possible that this will reduce the ability of

the bridge team to identify the presence of other vessels, including crossing vessels at the extremities of the lanes, which may require avoiding action.

2.5.10 *IMO Routeing Measures.* Any developments that may encroach on a traffic separation scheme or routing measure shall be avoided. It should be noted that any changes to IMO Routeing Measures will require approval by the Member States of the IMO.

2.6 OREI Structures

2.6.1 It should be determined whether any features of the OREI, including auxiliary platforms outside the main generator site, mooring and anchoring systems, inter-device and export cabling, could pose any hazards to safety of navigation of vessels underway, performing normal operations, including fishing, anchoring and emergency response. Such dangers would include air clearances of wind turbine blades above the sea surface, changes to charted depth due to tidal turbines, the burial depth of cabling, lateral movement of floating wind or tidal turbines etc.

2.6.2 Recommended minimum safe (air) clearances between sea level conditions at mean high water springs (MHWS) and rotor blades on fixed foundation wind turbines, or auxiliary platforms, stipulate that they should be suitable for the vessels types identified in the traffic survey but not less than 22 metres, unless developers are able to offer evidence that risks to any vessel type with air drafts greater than the requested minimum air drafts being provided are minimised. Depths, clearances and similar features of other OREI types which might affect marine safety should be determined on a case-by-case basis, for example, floating foundation wind turbines must allow for the degrees of motion (pitch, roll, yaw, heave, surge and sway), as appropriate.

2.6.3 There is no standard clearance figure that can be used to establish the safe clearance over underwater turbine devices. Rather, developers will need to demonstrate an evidence based, case-by-case approach which will include dynamic draught modelling in relation to charted water depth to ascertain the safe clearance over a device.

2.6.4 It should also be determined whether:

a) The structures could obscure or hinder the view of other vessels under way on any route.

b) The structures could obscure or hinder the view of the coastline or of any other navigational feature such as aids to navigation, landmarks, promontories, etc.

In both cases, the impact must form part of the risk assessment.

2.7 Tides, Tidal Streams and Weather

2.7.1 It should be determined whether:

i. Current maritime traffic flows and operations in the general area are affected by the depth of water in which the proposed installation is situated at various states of the tide i.e. whether the installation could pose problems at high water which do not exist at low water conditions, and vice versa.

ii. The set and rate of the tidal stream, at any state of the tide, has a significant effect on the handling of vessels in the area of the OREI site.

iii. The maximum rate tidal stream runs parallel to the major axis of the proposed OREI site layout, and if so, its effect on vessel handling and manoeuvring.

iv. The set is across the major axis of the OREI layout at any time, and, if so, at what rate.

v. Engine and/or steering failure, or other circumstance could cause vessels to be set into danger by the tidal stream. This should include unpowered vessels and small low speed craft.

vi. The structures themselves could cause changes in the set and rate of the tidal stream.

vii. The structures in the tidal stream could be such as to produce siltation, deposition of sediment or scouring, affecting navigable water depths in the OREI area or adjacent to the area.

viii. The site, in normal, bad weather, or restricted visibility conditions, could present difficulties or dangers to all vessels that might pass through or in close proximity to it.

ix. The structures could create problems in the area for vessels under sail, such as wind masking, turbulence or sheer.

x. Taking into account the prevailing winds for the area, whether engine failure or other circumstances could cause vessels to drift into danger, particularly if in conjunction with a tidal set such as referred to above.

2.8 Access to and Navigation Within, or Close to an OREI

2.8.1 It should be determined to what extent navigation would be feasible within or near to the OREI site itself by assessing whether:

a) Navigation within and/or near the site would be safe:

i. for all vessels, or

ii. for specified vessel types, operations and/or sizes,

iii. in all directions or areas, or

iv. in specified directions or areas,

v. in specified tidal, weather or other conditions.

b) Navigation in and/or near the site should be prohibited or restricted:

i. for specified vessel types, operations and/or sizes,

ii. in respect of specific activities,

iii. in all areas or directions, or

iv. in specified areas or directions, or

v. in specified tidal or weather conditions, or simply

vi. recommended to be avoided.

c) Where it is not feasible for vessels to access or navigate through the site, it could cause navigational safety, emergency response or routeing problems for vessels operating in the area, e.g., by causing a vessel or vessels to follow a less than optimum route or preventing vessels from responding to calls for assistance from persons in distress (as per SOLAS obligations).

2.9 SAR, Maritime Casualty, Counter Pollution and Salvage Incident Response

2.9.1 The Irish Coastguard (IRCG) is required to provide a search and rescue and emergency response service within the sea area occupied by all OREI in Irish waters. To ensure that such operations can be safely and effectively conducted, developers should consult the latest version of the IRCG's National Maritime Oil/HNS Spill Contingency Plan Standard Operating Procedure 07-2025.

2.9.2 A preliminary assessment on the potential impacts to search and rescue (SAR) and emergency response with the introduction of the OREI must be carried out and included as a chapter in the Navigational Risk Assessments (NRA).

2.10 Hydrography

2.10.1 In order to establish a baseline, confirm the safe navigable depth, monitor seabed mobility and to identify underwater hazards, detailed and accurate hydrographic surveys are required of the development at the pre-consent stage for the following:

a) The actual site of the proposed OREI shall be undertaken as part of the licence and/or consent application.

b) All proposed cable route(s).

2.10.2 The development may result in an alteration to maritime traffic patterns as vessels seek alternative passage around the proposed OREI. Where this is the case, it may be considered necessary that a hydrographic survey of these alternate passages and their immediate environs.

2.10.3 All hydrographic surveys listed above should fulfil the requirements of the Hydrography Guidelines for Offshore Developers in ANNEX II.

2.10.4 Further hydrographic surveys are required during the post-consent and decommissioning stages (see ANNEX II below).

2.11 Communications, Radar and Positioning Systems

2.11.1 To provide evidence of due diligence of a generic and, where appropriate, site-specific nature concerning whether:

a) The structures could produce radio frequency interference such as shadowing, reflections or phase changes, and emissions with respect to any frequencies used for marine positioning, navigation, and timing (PNT) or communications including the Global Maritime Distress and Safety System (GMDSS) and Automatic Identification System (AIS), whether ship borne, ashore or fitted to adjacent aids to navigation or any of the proposed structures. Consideration should be given to three scenarios:

   i. Vessels operating at a safe navigational distance.

   ii. Vessels by the nature of their work necessarily operating at less than the safe navigational distance to the OREI, e.g., support vessels, survey vessels, SAR assets.

   iii. Vessels by the nature of their work necessarily operating within the OREI.

Note: *GMDSS frequencies may not be subject to harmful interference, but for other frequencies, cases (ii) and (iii) may rely on agreed special measures where necessary.*

b) The structures could produce radar reflections, blind spots, shadow areas or other adverse effects, amongst others:

   i. Vessel to/from shore,

   ii. Vessel to vessel,

   iii. VTS radar to/from vessel,

   iv. Anomalous radar beacon (Racon) reception by vessel; and,

   v. Search and Rescue and maritime surveillance aircraft to/from vessels and/or OREI structures.

c) The structures and generators may produce sonar interference to shipping, fishing and recreational craft as well as marine wildlife.

d) The site might produce acoustic noise which could mask prescribed sound signals.

e) The generators and the seabed cabling within the site and onshore might produce electromagnetic fields affecting compasses and other navigation systems.

2.12 Assessment of Risk

2.12.1 The above NRA data and evidence gathering will feed into understanding the base case densities and types of traffic and estimating the level of baseline risks without the OREI in place and inherent risks associated with the introduction of the OREI. The Methodology document (see ANNEX I) requires a hazard log to be developed listing the hazards caused or changed by the OREI and the predicted baseline and inherent risks associated with each hazard. The hazard log must also include residual risks to show the tolerability level of risk after risk mitigation measures have been implemented to reduce them to '*As Low as Reasonably Practicable*' (ALARP).

2.13 Risk Mitigation

2.13.1 During the consenting process a developer should submit the mitigation and safety measures that will be applied to the ORE development for assessment by the DoT. These will be consistent with international maritime safety standards contained in, for example, the Safety of Life at Sea Convention, 1974. (SOLAS) - Chapter V, IMO Resolutions A.572 (14) and Resolution A.671 (16) and could include any or all of the following:

i. Promulgation of information and warnings through notices to mariners and other appropriate maritime safety information (MSI) dissemination methods,

ii. Continuous watch by multi-channel Very High Frequency (VHF), including DSC,

iii. Provision of Aids to Navigation as determined by Irish Lights at all stages of the development in the form of a Lighting and Marking Plan,

iv. Implementation of routeing measures within or near to the development where required,

v. Monitoring by radar, AIS, CCTV or other agreed means,

vi. Appropriate means for OREI operators to notify and provide evidence of and report incidents relating to safety of navigation in proximity to development sites,

vii. Submission of an Emergency Response Co-Operation Plan (ERCoP) and an Oil/HNS Spill Contingency Plan (OSCP) to the Irish Coastguard (IRCG) for all phases of the operation,

viii. Use of safety vessels where appropriate,

ix. Update Navigational Risk Assessments (NRAs) every two years e.g., at testing sites,

x. Device-specific or array-specific NRAs as appropriate,

xi. Design of OREI structures to minimise risk to contacting vessels or craft,

xii. Any other measures and procedures considered appropriate in consultation with other stakeholders.

3. Development Consent

3.1 The DoT expects all appropriate aspects of the Methodology in this guidance document (see ANNEX I) to be considered and adequately addressed through the checklist and submitted as part of the consent application to An Bord Pleanála. Any elements missing or inadequately addressed to the satisfaction of the DoT may result in delays or the submission by the DoT of an observation on an application.

3.2 Prior to submission of an application for development consent to An Bord Pleanála, developers should aim to get agreement from all relevant stakeholders for ensuring risks are assessed ‘As Low as Reasonably Practicable’ (ALARP) and that risk mitigation measures are agreed.

4. Post-consent – construction and operation phases

4.1 Layout Design

4.1.1 The DoT's IRCG will provide search and rescue (SAR) services in and around OREIs in Irish waters, using both SAR helicopters and emergency response vessels. The DoT also has responsibilities to ensure the safety of navigation is maintained and to address the risks to mariners who may wish to transit an offshore renewable development or find themselves in the vicinity of a development in an emerging situation or in adverse weather conditions.

4.1.2 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, and those vessels (including rescue craft) that decide to, or must, transit through them. Multiple lines of orientation provide alternative options for passage planning and for vessels and aircraft to counter the environmental effects on manoeuvring i.e. sea state, tides, currents, weather, and visibility. OREI 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. Developers should therefore carry out a further site-specific assessment, which builds on previous assessments, to identify the proposed locations of individual structures.

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

4.1.4 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. The assessment should consider the potential impacts the proposed locations may have on navigation and SAR activities. 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.

4.1.5 The safety justification should build on work conducted as part of the Navigation Risk Assessment and the mitigations identified as part of that process.

4.1.6 Engagement with the DoT's MSO and IRCG in advance of the lodgement of an OREI planning application with An Bord Pleanála is encouraged as early as

possible following the outcome of the site-specific layout assessment, and to discuss any potential improvements which can be made to the proposed layout, where considered necessary. 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.

4.1.7 Where multiple OREI sites have adjacent boundaries less than 1nm apart, including extensions to existing sites, due consideration must be given to the requirement for lines of orientation that allow a continuous passage for vessels and/or SAR helicopters through both sites, while still maintaining plans for at least two lines of orientation as appropriate to the site-specific nature of that site. Adjacent sites, as used in this section, will be assessed on a case-by-case basis.

4.1.8 Each layout design will be assessed on a case-by-case basis and the observations of the DoT (MSO and IRCG) will be submitted to An Bord Pleanála.

4.1.9 In respect to layouts SAR and Emergency Response, further information can be found in the IRCG's National Maritime Oil/HNS Spill Contingency Plan Standard Operating Procedure 07-2025.

4.2 Marine Navigational Marking

4.2.1 The Developer must, as soon as reasonably practicable prior to commencement of the on-site works, notify the Department's MSO, as well as Geological Survey Ireland (GSI) and the UK Hydrographic Office (UKHO) of the proposed works to facilitate the promulgation of maritime safety information and updating of nautical charts and publications through the Irish Marine Notices system administered by the Department.

4.2.2 In advance of the application for a Development Consent from An Bord Pleanála, a Lighting and Marking Plan (LMP), conforming with the guidelines set out by IALA - G1162 "*The Marking of Offshore Man-Made Structures*"[2] for the proposed site should be discussed and agreed with the Commissioners of Irish Lights. Early engagement is recommended for all applications. In determining the correct lighting and marking arrangements, authorities will have cognisance of the traffic surveys and Navigation Risk Assessment documentation prepared by the Developer. It should be determined:

i. How the overall site shall be marked by day and by night throughout construction, operation and decommissioning phases, taking into account that there may be an ongoing requirement for marking on completion of decommissioning, depending on individual circumstances. Aids to Navigation (AtoN) will be determined by Irish Lights.

[2] https://www.iala-aism.org/product/g1162/

ii. How individual structures and fittings on the perimeter of and within the site, both above and below the sea surface, would be marked by day and by night.

iii. If the specific OREI structure would be inherently radar conspicuous from all seaward directions (for SAR, maritime and aviation surveillance purposes) that may require special radar reflectors or target enhancers.

iv. If the site would be marked by additional electronic means e.g., Racons.

v. If the site would be marked by an AIS transceiver, and if so, the data it would transmit. Note – ComReg require sight of a consent from Irish Lights in the form of a Statutory Sanction under the Merchant Shipping Act, prior to their issuing a Maritime Mobile Service Identity (MMSI) for an AIS aid to navigation.

vi. If the site would be fitted with hazard warning arrangements in accordance with IALA recommendations.

vii. If the structure(s) would be fitted with aviation obstacle lighting, and, if so, how these would be screened from mariners or guarded against potential confusion with other surface navigational marks and lights.

viii. The proposed site and/or its individual generators must comply in general with markings for such structures, as required by Irish Lights in consideration of IALA guidelines and recommendations. There is an expectation that working lights and the identification (ID) lighting will not interfere with Aids to Navigation or create confusion for the Mariner navigating in or near the OREI.

ix. The Aids to Navigation specified by the Irish Lights are being maintained such that the 'availability criteria', as laid down conforming with the guidelines set out by IALA - G1162 "*The Marking of Offshore Man-Made Structures*" and applied by Irish Lights.

x. Procedures are established in responding to aids to navigation going off-station, as required by Irish Lights.

4.3 Identification Marking

4.3.1 Individual ID markings should conform to a "spreadsheet" format, e.g. lettered on the horizontal axis, and numbered on the vertical axis. The ID marking should be sequential, aligned with 'SAR lanes' (line of orientation for search and rescue purposes) and begin with the OREI name designator code, then the row/column numbering starting with the letter 'A' and then the turbine number. To avoid confusion, the letters 'O' and 'I' should not be used with the numbers 0 and 1. The detail of this will depend on the shape, geographical orientation and potential future expansion of each OREI development. The ID marking must be discussed with the

IRCG who will advise on any specific requirements for each development, taking into account any difference between internal and periphery turbine alignment.

4.3.2 The ID marking of substations should be considered in line with the above and there should be a clear differentiation between the substation and the turbine.

4.3.3 ID numbers must be clearly readable by an observer stationed three metres above sea level at a distance of at least 150 metres from the turbine. Each ID number plate shall be illuminated by a low intensity light visible from a vessel thus enabling the structure to be detected at a suitable distance to avoid a collision. Lighting for this purpose must be hooded or baffled so as to avoid unnecessary light pollution or confusion with navigation marks.

4.4 Mooring Arrangements

4.4.1 Floating devices, including those suspended in the water column, must have suitable mooring arrangements for the environmental conditions to ensure the device(s) remains on station and does not become a navigation hazard through failure of its moorings.

4.5 Post-consent (construction and operation phase) Maritime Traffic Monitoring

4.5.1 These guidelines recommend that conditions of development consent shall require OREI operators to monitor and review the impact their activities have on the safety of navigation during the construction and operation phases.

4.5.2 The main purpose of vessel traffic monitoring is to ensure the NRA for the project is accurate for the construction and operation phase; that the predictions made in the NRA (submitted with the planning application) with regards to the traffic patterns are accurate, and to ensure the mitigation measures are effective and remain fit for purpose.

4.5.3 The maritime traffic assessment should incorporate the use of AIS data and where practical, feedback should also be sought from shipping companies, ship Masters, fishing vessel skippers, and recreational sailors/users who regularly operate in and around different OREI sites to get realistic information on their experiences in different conditions.

4.5.4 The DoT expects the opportunity to discuss with the developer any changes identified as part of this monitoring process, after the initial submission of the NRA.

4.6 Cable Burial and Protection

4.6.1 Under no circumstances should depth reductions compromise safe navigation. Therefore, consideration should be given to areas of critical depths in relation to under keel clearance where any reduction in depth will increase risk to safe navigation, such as in IMO routeing measures, mobile seabed, approaches to ports

etc, and developers must discuss the tolerability of any changes to depths with the Department's MSO.

4.6.2 It should be determined at what depth below the seafloor export cables are buried to ensure there are no changes to charted depths. If burial is not possible, for example due to underwater features and/or seabed ground conditions, export cables should be suitably protected (e.g., by rocks or other such suitable mattress placements) to mitigate the risks to vessels as a condition of development consent. Any consented cable protection works must ensure existing and future safe navigation is not compromised. Consequently, the Department's MSO may accept up to 5% reduction in surrounding charted depths referenced to Chart Datum, unless developers are able to demonstrate that any identified risks to any vessel type are satisfactorily mitigated.

4.7 Hydrography

4.7.1 In order to confirm the seabed has been returned as close to its original profile and to identify underwater hazards, namely exposed cables and any protection measures, detailed and accurate hydrographic surveys are required of the cable route(s) in the post-construction phase. This should be carried out in accordance with the guidelines in ANNEX II.

4.8 SAR & Emergency Response Planning

4.8.1 As part of the post consent requirements, developers must address the requirements and guidance of the IRCG's Standard Operating Procedure 07-2025 '*Offshore Renewable Energy Installations: Guidance and Operational Considerations for SAR and Emergency Response*'.

4.8.2 An agreed Emergency Response Co-Operation Plans (ERCoP) should be in place prior to construction commencing as a condition of development consent. The ERCoP should be updated or replaced with a new version for the operational phase of the OREI.

4.8.3 An agreed Oil/HNS Spill Contingency Plan (OSCP) must be in place prior to construction commencing as a condition of development consent. The OSCP should be updated or replaced with a new version for the operational phase of the OREI.

5. Decommissioning

5.1 To minimise risks to mariners and SAR Operations there is an expectation that all infrastructure above the seabed and the sea surface will be rehabilitated as a condition of development consent. In the time between when the installation ceases to be operational and its removal, appropriate mitigation measures must be applied.

5.2 An agreed and updated ERCoP and OSCP must be in place prior to the removal of any offshore infrastructure.

5.3 Under the Sea Pollution (Amendment) Act 1999, a ship-to-ship (STS) transfer permit is required from IRCG for the transfer of ship's stores, cargo or oil to or from a ship in a place in the State (not being a harbour), including the State's Exclusive Economic Zone (EEZ). For further information please see the IRCG's Standard Operating Procedure 07-2025 '*Offshore Renewable Energy Installations: Guidance and Operational Considerations for SAR and Emergency Response'*, available on the Department's website.

5.4 In order to confirm the seabed has been returned as close to its original profile once all, or some, of the infrastructure has been removed as required, a hydrographic survey shall be required of the cable route(s) and the installed OREI area in accordance with the guidelines in ANNEX II as a condition of development consent.

ANNEX I – Navigational Risk Assessment - Methodology

The purpose of this Annex to the Department of Transport's Guidance on Safety of Navigation and Emergency Response for OREI is to provide guidance for developers in preparing their navigation risk and emergency response assessments and includes a suggested template in which they may produce their submission. Submissions shall demonstrate that suitable and appropriate risk controls are, or will be, in place for the assessed risk to be judged as broadly 'acceptable' or 'tolerable'. Although the specifics of this guidance are not mandatory, its use in carrying out navigational safety and emergency response risk assessments is strongly recommended. The key features of the Methodology recommend that developers:

1. Produce a submission that is proportionate to the scale of the development and the magnitude of the risks.
2. Produce a submission based on assessing risk by Formal Safety Assessment (FSA) using numerical modelling and/or other techniques and tools of assessment acceptable to the DoT and capable of producing results that are also acceptable to the DoT.
3. Estimate the "Base Case" level of risk based on existing densities and types of traffic and the existing marine environment.
4. Predict the "Future Case" level of risk based on the predicted growth in future densities and types of traffic and reasonably foreseeable future changes in the marine environment.
5. Produce a "Hazard Log" listing the hazards caused or changed by the introduction of the OREI, the risk associated with the hazard, the controls put in place and the tolerability of the residual risk.
6. Define the risk controls that will be put in place and create a Risk Control Log.
7. Predict the "Base Case with OREI" level of risk based on existing densities and types of traffic, the existing marine environment and with the OREI in place.
8. Predict the "Future Case with OREI" based on future traffic densities and types, the future marine environment and with the OREI in place.
9. Process this information into a submission including supporting evidence that the risks associated with the OREI are Tolerable on the basis of 'As Low As Reasonably Practicable' (ALARP) declarations.

It advises that the DoT will base their decision on assessing:

1. Whether the tools and techniques used in the assessments are acceptable.
2. Whether the claim in the submission shows that the OREI will meet the sought-after level of navigational safety and emergency response.

3. Whether there is sufficient information with the submission to have confidence in the claim.
4. Whether there is sufficient information with the submission to have confidence that appropriate risks controls are, or will be, in place.

1. Introduction to Navigational Risk Assessment - Methodology

1.1 Risk Control

The Methodology is based on the International Maritime Organisation's (IMO) 'Formal Safety Assessment' (FSA) guidance, which implements risk controls used in preparing a submission, which controls show that sufficient risk controls are in place for the assessed risk to be judged as 'tolerable'. The fact that a risk falls into a 'tolerable' or 'broadly acceptable' band in a Risk Matrix or is below some numerical limit, does not prove that it has been reduced to '*so far as is reasonably practicable*' (SFAIRP) or to '*as low as reasonably practicable*' (ALARP). Further reduction may still be reasonably practicable, however small the risk.

1.2 Guidance

Guidance to developers in applying the methodology is provided, as sections illustrating staged methods. Although the specific aspects of this guidance are not mandatory, it is strongly recommended that developers carry out risk assessments in the spirit of the detail indicated.

1.3 Key terminology

The key terminology used in this document is:

Acceptable Techniques	Techniques that are acceptable to the DoT in assessing the marine navigational safety and emergency response risks of offshore wind farms and other OREI types.
Acceptable Results	Results from applying the acceptable techniques that are themselves acceptable to the DoT. ***Note:*** *An 'Acceptable Result' is a result where the risk has been accurately assessed. It does not necessarily mean that the risk is acceptable.*
Accident	An unintended event involving fatality or injury, property loss or damage or environmental damage.
Accident Category	A designation of accident reported according to their nature.
Area Traffic Assessment	The part of navigation risk assessment that assesses the wider sea area, its marine environment, traffic and the OREI development to enable the prediction of the risk of collision, contact, grounding, and stranding.

Consequence	The outcome of an accident.
FN Curve	The cumulative frequency (F) of an accident versus the number (N) of fatalities.
Formal Safety Assessment	A rational and systematic process for assessing the risk associated with an activity and for evaluating the costs and benefits of options for reducing these risks. FSA is recommended by the IMO in its rule-making process.
Frequency	The number of occurrences per unit time (e.g. per year).
Navigation Safety Risk Assessment	The part of the navigation risk assessment relating to collision, contact, grounding and stranding of vessels. This assessment will be based on a Hazard Log and other assessment techniques and appropriate tools, which may include numerical modelling and simulation.
Guidance	Guidance on techniques and tools that may be used in applying the Methodology.
Hazard	A potential to threaten human life, health, property of the environment.
Individual Risk	A direct measure of the frequency of injury and fatalities for individuals at a given location.
Initiating Event	The first in a sequence of events leading to a hazardous situation or accident.
Navigational Safety and Emergency Response Risk Assessment	The body of information produced that is used as the basis of the navigational safety and emergency response risk assessment carried out for inclusion in the developer's submission comprising: • Formal Safety Assessment supported by: Navigation risk assessment comprising: • Navigation Safety Risk Assessment and • Other Navigation Safety Risk Assessment Details of Search and Rescue implications

Methodology	The recommended process, as described in this document, for undertaking and presenting a navigational safety and emergency response risk assessment to the DoT as part of the developer's EIA Report.
Other Navigation Safety Risk Assessment	The part of the navigation risk assessment relating to the wider range of marine safety risks but excluding initial collision, contact, grounding, and stranding. This assessment may be based on a Hazard Log.
Risk	The combination of the frequency of occurrence and the severity of the consequence.
Risk Control Measure	A means of controlling a single element of risk. Usually expressed as either: a. embedded – standard or good practice measures already utilised or in place, or b. additional – in addition to embedded controls for reducing risk to ALARP
Risk Control Option	A grouping of risk control measures into a practical regulatory option.
Societal Risk	An indirect measure of the magnitude of the event taking into account public aversion to large accidents. It is average risk experienced by a group of people exposed to an accident scenario.
Specific Traffic Assessment	The part of the navigation risk assessment that may be used, where required, to assess in detail the risk of more specific navigation issues and/or the proposed risk controls.

Table 2 - Key Terminology

2. Use and Coverage of the Methodology

2.1 Use by Developers

Developers are recommended to carry out a navigational safety and emergency response risk assessments in accordance with the IMO's Formal Safety Assessment[3] methodology and to submit the results in accordance with the standard format for a submission.

2.2 Coverage of the Methodology – Physical Areas

The key risk areas to be covered by the methodology are:

- Risks associated with a development.
- Cumulative risks associated with the development and the other offshore renewable energy installation (OREI) developments in the strategic OREI area.
- In-combination impacts on the risk of the development with other economic developments over the operational life of the OREI.

2.3 Cumulative Impacts

Consideration of cumulative and in combination impacts need to be undertaken, adopting a zonal approach for large developments, which will require a detailed consideration of the 'worst case' scenario. The National Marine Planning Framework 2021 outlines the DoT approach to cumulative impacts.[4]

To ensure sustainable development, it is important that the development opportunity should be managed efficiently and effectively and in a co-ordinated fashion through the marine planning process. Any proposed OREI developments should demonstrate that they will in order of preference:

a) avoid,

b) minimise,

c) mitigate adverse impacts, or

d) if it is not possible to mitigate significant adverse impacts, proposals should set out the reasons for proceeding.

Developers submitting applications for OREI projects should engage the relevant OREI developers in close proximity to a planned development site during consultation in the pre-application processes as appropriate.

[3] IMO, IMO Formal Risk Assessment
[4] gov.ie - National Marine Planning Framework (www.gov.ie)

2.4 Relationship with the EIA Report

The Navigational Risk Assessment (NRA), produced by applying this Methodology, informs the Shipping and Navigation chapter of the Environmental Impact Assessment (EIA) Report that is required for a development consent decision for a large scale OREI project. The EIA Report shall confirm which NRA recommendations are proposed with justification for acceptance or rejection of each.

3. Scope and Depth of the Assessment

3.1 Proportionality

The scope and depth of the developer's assessment, together with the tools and techniques necessary, should be proportionate to the scale of the development and magnitude of the risks. Developers are advised, prior to developing a submission to:

- Inform the DoT of their proposals and seek guidance.
- Carry out a preliminary hazard analysis.
- Define an appropriate programme of work.
- Define the tools and techniques to be used.
- Be prepared to change scope, depth, tools, and techniques resulting from assessed risk as the full assessment progresses.

The DoT will consider each assessment on a case-by-case basis and will be prepared in principle to accept a change in scope, depth, tools, and techniques resulting from the assessed risk as the full assessment progresses.

The elements of a Navigational Risk Assessment should consider the following:

- Comprehensive Hazard Log
- Detailed and quantified Navigation Risk Assessment
- Preliminary search and rescue assessment or overview to agreed DoT requirements
- Comprehensive Risk control log.

3.2 Preliminary Search and Rescue Operations Assessment or Overview

The OREI may present risks to marine safety that generate the need for search and rescue operations or may hinder search and rescue operations not associated to the development itself.

Therefore, the preliminary assessment should firstly consider all those features of the proposal which could present problems for the emergency services.

These considerations will include, but not be limited to, the detection, location and rescue of casualties and safe operation of rescue assets within and near to the OREI by other vessels, Irish Coast Guard (IRCG) National Maritime Operations Centres (NMOC), IRCG Search and Rescue (SAR) helicopters and Royal National Lifeboat Institution (RNLI) lifeboats or other rescue assets. They will subsequently feed into the details of the proposed turbine compliance with respect of an Emergency Response Co-Operation Plan (ERCoP) addressing individual turbine marking, lighting, rotor and nacelle control, emergency refuge

and communications links. These should link to the developer's own contingency plans and safety management system. It is recommended that any marine safety aspects of these be discussed and agreed with the DoT.

Due to the differences in designs and layouts, the physiological demands and safety risks of OREI structures, the rescue of personnel from OREI structures is not part of the training or mission of search and rescue helicopter or lifeboat personnel. To ensure rapid and effective rescue of injured or ill persons from within OREIs, it is recommended that developers and operators create in-field Technical Rescue teams or capabilities. Such teams could be comprised of technicians or other employees who have received relevant training and qualification in technical rescue and immediate medical aid techniques and procedures. These teams would form the primary response to extract an injured or ill person from within an OREI and deliver them to an accessible area for onward evacuation by SAR unit.

Surface vessels, in most circumstances, will be the most appropriate means of rescue from within wind farms or close to other OREI, the assessment should give details of the nearest RNLI, or other lifeboat service stations near to the site.

A full assessment may, include:

- Resource planning assessment
- Response planning assessment

3.3 Preliminary Assessment or Overview of the Required Emergency Response to the spills of Hazardous and Polluting Substances

Developers should become familiar with the 'National Maritime Oil/HNS Spill Contingency Plan (NCP)' and associated operating procedures. Such pollution, which includes oil and a variety of hazardous substances, may result from incidents occurring within or close to an OREI.

The preliminary assessment should determine the likelihood of any such incident occurring, such assessment to be based on the general navigation risk assessment and the type of vessels expected to be found in the vicinity. The potential consequences of such an incident, with respect to seafarers, the environment, and the shore population should be considered.

Any circumstance created by the OREI development which may adversely affect counter pollution operations undertaken by the appropriate authorities should be specified. These circumstances should include counter pollution operations relating to incidents not caused by the development itself, but into whose area the resulting pollution may drift.

3.4 Requirements for more detailed Emergency Response Assessments

Depending on the above assessment the DoT may require a more detailed emergency response assessment to be undertaken later as a condition of a granted consent. However,

where the frequency or the consequences of such incidents gives rise for even greater concern, a full assessment shall be required before consent is granted. Developers of specified OREIs shall be required to develop individual Oil/HNS Spill Contingency Plans broadly following the structures set out in the NCP. Please see Standard Operating Procedure (SOP) 07-2025 ‘Offshore Renewable Energy Installations (OREI): Guidance and Operational Considerations for SAR and Emergency Response’.

4. Navigational Safety Goal

4.1 Proposed Navigation Safety Principles

Due to the lack of specified goals for navigational safety in national or international waters, it is prudent to consider the overarching principle of reducing risk to that which is ALARP and that relevant good practice risk controls are in place.

4.2 Implications of the Proposed Navigation Approach

The implication of the proposed navigational safety approach is that safety will have to be managed through the lifetime of an OREI. Through-life safety management will include:

- Maintaining an up-to-date navigational safety and emergency response risk assessment
- Developing and implementing a safety policy
- Meeting the requirements for lighting and marking in accordance with IALA
- Maintaining an effective ERCoP & Oil/HNS Spill Contingency Plan (OSCP)
- Maintaining a current and updated safety and operations plan

As much of this will involve work after the consent period is granted, at the consent application stage the developer's navigational safety and emergency response risk assessment must make a commitment to:

- Implement the risk mitigations and controls (including the provision of assets) listed in the submission.
- Undertake any required post consent search and rescue and emergency response assessments.
- Define a safety policy.
- Develop and exercise the ERCoP & OSCP
- Operate in accordance with a safety and operations plan.
- Take positive action to create a safety culture with feedback on the level of compliance.
- Undertake periodic risk reviews and implement the findings to keep the risk levels within the goals for the navigation safety aspects of the OREI as part of their overall approach to safety.

5. Overview of the Methodology

5.1 Key Features of the Methodology to achieve the Marine Navigational Safety Objectives

The key features of the Navigational Risk Assessment methodology are:

- risk assessment (supported by appropriate techniques and tools),
- creating a hazard log,
- defining the risk controls in a Risk Control Log required to achieve a level of risk that is tolerable,
- preparing a submission that includes a claim, based on a reasoned argument, for a positive consent decision.

To produce a submission based on Formal Safety Assessment:	
1	**Define a Scope & Depth of the submission proportionate to the scale of the development & the magnitude of the risks**
2	**Estimate the "base case" level of risk**
3	**Predict the "future case" level of risk**
4	**Create a hazard log**
5	**Define risk controls and create a risk control log**
6	**Predict "base case with OREI" level of risk**
7	**Predict "future case with OREI" level of risk**
8	**Submission**

Table 3 - Key Features of the Methodology

5.2 Integrity of Risk Assessment

It is important that risk assessment should be of high integrity and not just a quoted risk number. Risk assessments should be used to:

- Demonstrate that the activities (i.e. navigation, search and rescue and emergency response) will remain feasible during construction operation and decommissioning of the development.
- Produce an intelligent comparative value of the change in risk associated with the activity caused by the development.
- Assess the sensitivity of the risk to changes.
- Identify, evaluate, and implement appropriate risk controls.

In addition, the discipline of risk assessment is to be used to identify issues that need to be considered in the:

- Hazard log
- Selection of Risk Control Options.

5.3 Progressive Development of the Submission

It is recommended that the submission is developed in stages as the scope and depth of each stage is dependent on the findings of the previous stage. The suggested stages are:

Stage 1: Obtain DoT approval for approach to be taken.

- Preliminary Hazard Analysis
- Define an appropriate Programme of Work
- Specify the tools and techniques to be used.

Stage 2: Maritime Traffic Survey

- Understanding the Base Case densities and types of traffic
- Understanding the future densities and types of traffic

Stage 3: Navigation risk assessment

- Area traffic assessment
- Specific traffic assessment (where appropriate)

Stage 4: Formal Safety Assessment comprising

- Hazard identification
- Risk assessment.
- Hazard log
- Risk control log.

Stage 5: Other Assessments

- Appropriate search and rescue assessment or overview
- Appropriate emergency response assessment or overview

Stage 6: Final Assessments and Submission Preparation.

6. Mechanism for Assessing Tolerability of Marine Navigational Safety and Emergency Response Risk

6.1 Tolerability of Individual Risks

Developers should aim to achieve agreement with stakeholders that risks in the hazard log are reduced to a level that is ALARP. Failure to reach agreement may result in delays or objections from stakeholders within the licensing and consenting process.

6.2 Risk

For each entry in the hazard log the risk shall be assessed against a risk matrix. Section C, below, provides examples of risk scoring from the IMO. Other risk scoring systems may be used by developers.

There shall be no unacceptable risks.

*(**Note:** The rating of risk may, with suitable justification, be determined by those undertaking the assessment)*

Further risk control options must be considered to the point where further risk control is grossly disproportionate (i.e. the ALARP principle) and an ALARP justification and declaration made.

6.3 Evidence

For each entry in the hazard log the sources of evidence shall be listed e.g. expert judgement, quantitative calculations.

6.4 Risk Controls

For each entry in the hazard log the risk controls shall be listed.

6.5 Tolerability of Societal Concerns

It is unlikely that reducing all risks in the hazard log to a level that is ALARP will be sufficient to give confidence that societal concerns are broadly acceptable. This is because many of the risks are interrelated in both cause and consequence and also the affected stakeholders may have different perspectives of perceived risks. Therefore, as a minimum, an overall assessment of societal risk will need to be made as:

An aggregate of all entries in the risk register; and for major risks such as collision, contact, grounding, and stranding.

The level of risk can, if appropriate, be determined in the form of an FN curve and:

Base Case

- With the current traffic, existing marine environment without the OREI

- Is assumed to be tolerable.

Base Case with OREI

- With the current traffic, existing marine environment and with the OREI
- The change against the base case needs to be assessed and judged against
- ALARP criteria

Future Case

- With the future traffic, future marine environment without the OREI
- Is assumed to be tolerable.

Future Case with OREI

- With the future traffic, future marine environment and with the OREI
- The change against the future case needs to be assessed and judged against
- ALARP criteria

Note: *These values of change and their tolerability are likely to be dependent on a number of variables used in the assessment of an OREI. These will include the size of the water space, its bathymetry and hence the sea room available for manoeuvring, and the variations in the marine operations taking place in the water space. The larger the space the lower the ratio of the OREI to base case risk.*

7. Standard Format of a Submission

7.1 Contents of a Marine Navigational Safety and Emergency Response Risk Assessment Submission

Developers are invited to submit their assessments in the following format:

Section	Contents	Commentary on the Contents
1	**Summary**	
2	**Risk Claim Supported by a Reasoned Argument and Evidence**	This should be written in such a way so that, if read separately from the rest of the document, the reader can understand: If the developer is claiming that the OREI will achieve the sought for level of marine navigational safety the reasoning and evidence on which that claim is made It should include: a) Navigational Safety Claim b) Supporting Reasoned Argument c) Overview of the Evidence obtained. Detailed description of the tools and techniques used, describing in detail, and demonstrating where necessary, the tools and techniques used and their rationale.
3	**Description of the Marine Environment**	This description should include the: a) Current marine environment b) Future marine environment
4	**Description of the OREI Development and how it Changes the Marine Environment**	This description should include: a) The proposed OREI b) Any options c) The future environment
5	**Analysis of the**	This analysis should include:

	Marine Traffic	a) Current traffic densities and types b) Predicted future traffic densities and types c) The effect of the OREI on current traffic densities and types d) The effect of the OREI on future traffic densities and types
6	**Status of the Hazard Log**	This should include: a) Summary of Tolerable, ALARP and Intolerable Risks b) Graphical representation of all risks on a matrix
7	**Navigation Risk Assessment**	The risk assessment should include: a) Base Case b) Future Case c) Base Case with OREI d) Future Case with OREI e) Future Options f) A summary of the other navigation safety risks from the hazard log and the risk controls put in place to manage them
8	**Search and Rescue Overview and Assessment**	Assessment dependent on level agreed with the DoT. In high-risk developments this may include, where appropriate, prior to or post consent: a) Resource Planning b) Prevention Strategy c) Response Plan Assessment
9	**Emergency Response Overview and Assessment**	Assessment dependent on level agreed with the DoT.
10	**Status of Risk Control Log**	An overview of the risk controls in the Risk Control Log

11	**Major Hazards Summary**	A summary of the major hazards, how they have been assessed, how they will be controlled and what trials have been undertaken to develop the assessment or controls. Likely “Major Hazards” to be summarised are: a) Collision and contact with other vessels and with OREI structures b) Grounding c) Contact with cables and snagging d) Contact with oil and gas pipelines e) Interference with communications, radar, etc.
12	**Statement of Limitations**	
13	**Through Life Safety Management**	An indication of, or a commitment to, the planned through life safety management including: a) Updating risk assessments b) Filling gaps in assessment c) Safety Policy d) Safety Management System e) Safety and Operations Plan f) Emergency Plan g) Through Life Review h) Emergency Response Co-Operation Plan

Table 2 - Contents of a marine navigational safety and emergency response risk assessment submission

	Section	Commentary on the Contents
A	**Background Information**	
B	**Setting the Scene**	This should include: a) Base Case densities and types of traffic b) Predicted Future Level of Traffic c) The Marine Environment – development of a Specific Technical and Operational Analysis

C	**Hazard Identification and Risk Assessment**	This should include: a) Development of Specific Influences on the Level of Risk b) Hazard log Worksheets or Database
D	**Appropriate Assessment Techniques and Tools**	This should include: a) Navigational safety risk assessment b) Appropriate search & rescue overview & assessment c) Appropriate emergency response overview & assessment d) Selection of techniques that are acceptable to the DoT e) Demonstration that results from the techniques are acceptable to the DoT.
E	**Deciding on the Risk Controls**	This should include: a) Risk Control Log Worksheets or Database

Table 4 - Sections to a navigational safety and emergency response risk assessment submission

7.2 Electronic Distribution

The submission and its sections must be capable of electronic circulation e.g., PDF, similar open standard file types from file download sites, over email, etc. or by other means in agreement with the DoT e.g., digital submissions.

8. Indicative Process in Assessing a Developer's Submission

8.1 Introduction

This section gives an indication of the process that will be followed by the DoT in assessing submissions.

8.2 Principle of the Process

The principle behind the process of assessing submissions by a developer is:

- All hazards to the safety of navigation have been identified.
- All identified hazards have been appropriately risk assessed rated.
- The proposed risk controls are appropriate and can be implemented/maintained.
- A declaration that the risk controls will be implemented.

8.3 Assessment of Information Supplied in the Submission

The DoT will assess if the submission includes information showing that:

1. The marine navigational safety requirements have been correctly identified based on Formal Safety Assessment
2. The submission declares that:
    a. The criteria have been complied with
    b. As a minimum standard or relevant good practice, risk controls will be put in place.
    c. The risks are broadly acceptable; or
        i. Tolerable with modifications; or
        ii. Tolerable with additional controls; or
        iii. Tolerable with monitoring
    d. That further risk control is grossly disproportionate.
3. The submission is supported by a reasoned argument.
4. The reasoned argument is built on the use of evidence and appropriate risk assessment tools and techniques.
5. The evidence is quality checked.
6. Techniques selected are acceptable.
7. Marine Notice checklist has been completed.

8.4 Assessment of the Limitations of the Information Supplied in the Submission

All assessment techniques will have limitations, the extent to which these affect the results will be dependent upon the scenario and the data used. It will be necessary to discuss the limitations of the specific assessment techniques to be used with the DoT in the case of developments within port limits, other competent port authority, before assessment work is completed.

The DoT will assess if the submission includes information showing that:

1. The nature, assumptions and limitations of the submission are set out and are understood.
2. The “absence of evidence of risk” is not taken as ‘evidence of absence of risk’.

Section A - Background Information

A.1 Overview of Formal Safety Assessment

Developers are expected to base their submissions on a Formal Safety Assessment[5] and addressing the safety of navigation issues arising from operations in the Marine Environment.

The IMO methodology was developed for use in the IMO rule making process for ships involved in international trade but since its development it has proved successful in more general marine applications, including the navigation risk assessment of ports. Formal Safety Assessment is a five-step process aimed at producing decision-making recommendations:

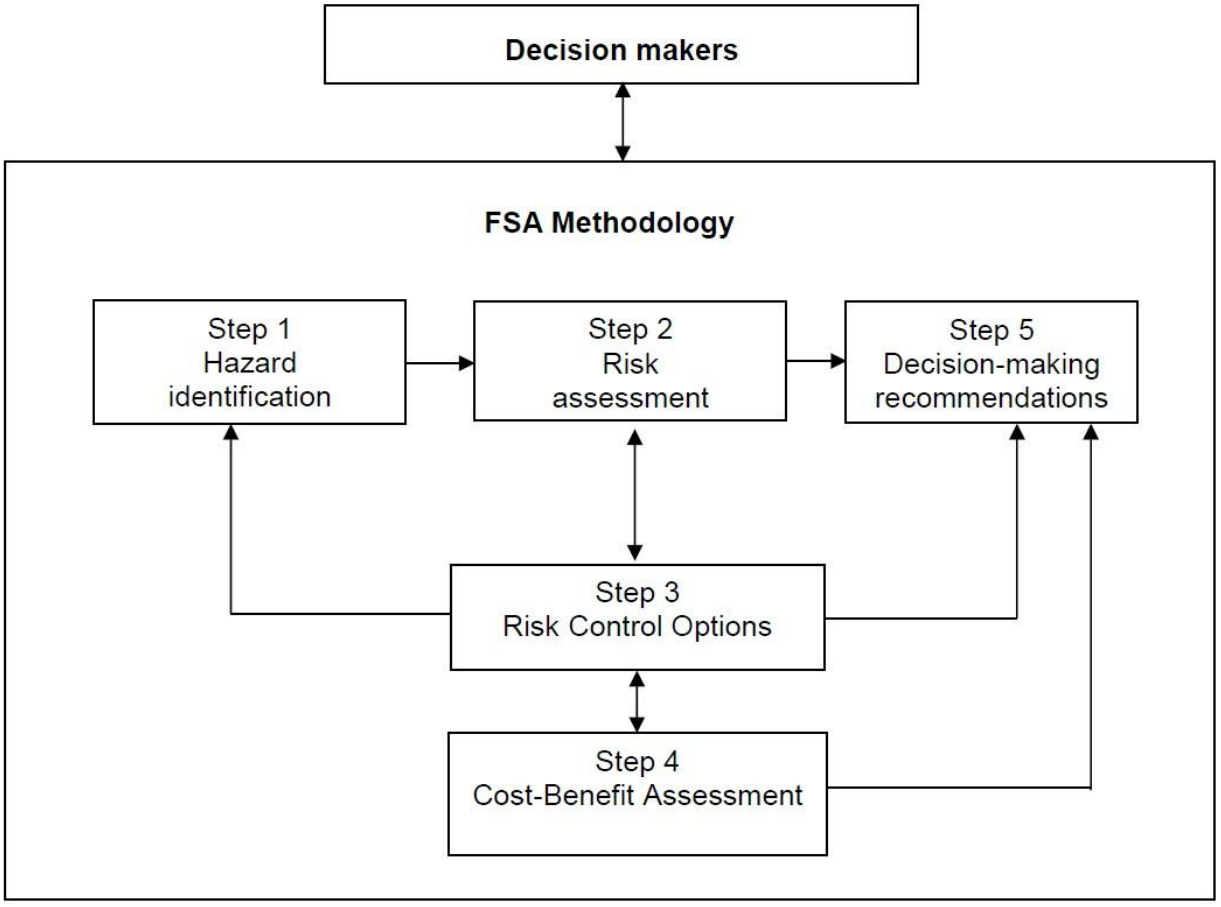


Figure 2: Flow Chart of the FSA Methodology

[5] See International Maritime Organization guidelines for FSA for use in the IMO-rule making process (MSC-MEPC.2/Circ.12/Rev.2)

Section B - Setting the Scene

B.1 Understanding the Base Case Traffic Densities and Types

The risk assessment needs to be based on a sound knowledge of the traffic densities and types. This is one of the key inputs to assessing proportionality.

B.1.1 Survey Areas

The boundary of the Survey Area should be constituted at a position so that further extension of the boundary would not appreciably impact the results of the assessment, i.e., boundary effects are minimised. A general guideline could be applied that the area of direct interest adjacent to the OREI or OREI groups, should lie within the centre 1/4 to 1/3 of the Survey Area. However, it is the responsibility of the analyst to demonstrate that the Survey Area is appropriate.

B.1.2 Traffic Data Requirements

Safety of navigation issues within and close to offshore OREI exist in many situations, and particularly where there is a combination of high traffic levels, different vessel operations and constrained water spaces, cumulative impacts and weather routing being key considerations. These aspects are inter-related with respect to offshore OREI. The risk is also dependent upon the type, size and nature of the vessels and their operations within the survey area. As such the classification of the traffic density, types, operations, sizes, drafts, speeds, and routes, is key to the accurate representation of the present safety regime, and future impacts.

B.1.3 Extracting Information from the Data

The results of the traffic survey should provide traffic information for the traffic as a whole and for each class of vessel with the data available. AIS data alone will not capture all vessel sizes therefore data from appropriate additional sources such as radar should be considered.

B.1.4 Design Traffic Densities and Types

It is appropriate to identify an average of the daily traffic densities and types for these routes or operations and for the survey area as a whole.

Routes and operational areas associated with and used by leisure craft, fishing vessels (which include aquaculture vessels or operations), dredging and other marine activities, should be identified. The seasonal variation of such traffic should be closely examined, and the data used to assess the specific risks relevant to these vessel types together with their interaction with larger vessels which might be navigating on through routes.

Developers should be aware that the traffic survey and assessment requirements cover all vessel and craft types and sizes. Many smaller vessels will not be equipped with the AIS and

therefore will not be detected using that system alone. Similarly, if radar surveys are made from shore locations, account should be taken of the operational range of such radars based on antenna height and target vessel size. Where small vessels cannot be detected visually or by either of these two methods, alternative arrangements should be made to fairly assess traffic types, routes, and operations within the whole of the area under survey. Consultation with organisations representing such vessels or craft may be useful in establishing how data can be obtained and establishing confidence level information on detection of non-AIS vessels and craft.

B.2 Predicting Future Densities and Types of Traffic

The methodology requires 'Future Case' levels of Risk with and without the OREI to be assessed. Therefore, a prediction needs to be made of the future densities and types of traffic.

B.2.1 Traffic Forecasting

A forecast of future traffic activity at 10-year intervals over the expected life of the OREI should be made, dependent on:

- national/regional marine growth predictions and local conditions - reasonably foreseeable developments, i.e. port & marine growth plans, etc)
- changes in vessel size anticipated over the forecast period.
- future change in all marine activities, such as fishing, recreational craft, offshore exploitation, other OREIs etc.

B.2.2 Description of a Technical and Operational Analysis

The developer's analysis will be expected to cover navigational risks which will include appropriate search and rescue and emergency response overviews and how these will be assessed and managed over all phases of the OREI development.

The developer's analysis will be expected to include a systematic identification of:

1. Potential accidents resulting from navigation activities.
2. Navigation activities affected by their proposed offshore OREI.
3. OREI structures that could affect navigation activities.
4. OREI development phases that could affect navigation activities.
5. Other structures and features that could affect navigation activities.
6. Vessel types involved in navigation activities.
7. Conditions affecting navigation activities.
8. Human actions related to navigation activities for use in hazard identification.

Note: *In this context 'Navigation' includes the marine operations undertaken by vessels of all types and sizes. Examples of such operations include fishing, dredging, recreational activities, etc. Where military vessel activity takes place on a regular basis in a particular area, such activity should be taken into account.*

The following sections describe a generic technical and operational analysis. In producing a site-specific analysis, developers should use this as a guide and add or remove site specific items, as appropriate and with justifications.

Section C - Setting the Scene

C.1 Hazard Identification in the Marine Environment

Accidents in the marine environment tend to be the result of a chain of events rather than a single cause and often involve human error, either in the cause of the accident or in the response to it.

The Hazard Log construction and population largely depends on the geospatial and other complexities of a particular OREI with regard to the navigational risks and any consequential emergency responses. It should include a suitable set of incident scenarios with potential causes and outcomes, to formulate objective evidence which is reproducible where possible.

The Hazard Log should, therefore, contain constructs which could:

- produce quantitively and qualitatively verifiable hazard scenarios; and
- provide data detailed enough for the next step of evaluation of risk factors.

C.1.1 Causal Claims

The IMO FSA encourages the use of causal chains in risk assessment as it recognises that many risks will be the result of complex chains of events, with a diversity of causes and a range of consequences.

C.1.2 Human Element

FSA stresses the importance of the human element. It states “The human element is one of the most contributory aspects to the causation and avoidance of accidents. Human element issues should be systematically treated within the FSA framework”.

C.2 Tolerability of Risk

Determining whether the predicted level of risk from an OREI development is tolerable or not is, in the first instance, a matter of asking the following questions:

a. is the risk below any unacceptable limit that has been established?

b. if so, has it also been reduced to as low as reasonably practicable (ALARP)?

The risk is only tolerable if the answer to both these questions can be demonstrated to be ‘Yes’.

C.3 Risk Matrix

The below IMO examples are based on ship-board scenarios and will require intelligent application for navigational risk posed by Offshore Renewable Energy Installations. It is suggested the assessment is based on a matrix that developers believe is appropriate for the needs of their development.

C.3.1 IMO Example of Likelihood/Frequency Index

Frequency Index			
Frequency	7	Frequent	Once per month on one ship
	5	Reasonably Probable	Once a year in a fleet of 10 ships
	3	Remote	Once a year in a fleet of 1000 ships
	1	Extremely Remote	Once in 20 years of a fleet of 5000 ships

C.3.2 IMO Example of Severity/Consequence Index

(**Note:** this example does not consider severity/consequence to property)

Severity Index			
Severity	4	Catastrophic	Multiple fatalities
	3	Severe	Single fatality of multiple severe injuries
	2	Significant	Multiple of severe injuries
	1	Minor	Single of minor injuries

C.3.3 IMO Example of Risk Matrix

RISK MATRIX				
FREQUENCY				
Frequent				**HIGH RISK**
Reasonably Probable				
Remote				
Extremely Remote	**LOW RISK**			
	Minor	Significant	Severe	Catastrophic
CONSEQUENCE				

Section D - Appropriate Assessment Techniques & Tools

D.1 Overview of Appropriate Risk Assessment

D.1.1 Introduction

Developers will be expected to undertake appropriate assessment in support of their navigation risk assessment.

This Section gives an overview of:

- the purpose of the appropriate assessment.
- the types of appropriate assessment.
- the hierarchy of appropriate assessment techniques.
- the concept of a scenario to control the scope and depth of the appropriate assessment.

This includes:

- Guidance on Navigation Risk Assessment
- Area Traffic Assessment
- Specific Traffic Assessment

Note: *Guidance on appropriate search and rescue overview and appropriate emergency response overview can be found in Section 3.2.*

D.1.2 Types of Appropriate Assessment

Depending on the scope and depth of the submission the following types of other appropriate assessments, for example numerical modelling, may be needed:

- In support of navigation risk assessment
- Area traffic assessment
- Specific traffic assessment

For search and rescue and emergency responses assessments see Section 3.2.

Definition 1 – Area Traffic Assessment

Area Traffic Assessment assesses the marine environment, the traffic and the OREI development to predict the risk of collision, contact, grounding, stranding and the cumulative effect of other developments now and in the future. If appropriate it may need to be statistical in nature, in any case based on assessing the vessel traffic and the behaviour of vessels with relation to steering rules, speed changes, the route they wish to follow, etc., and the multiple interrelationships with a large number of vessels, of different types, navigating in the

same environment over a long time and involved in a variety of operations which will each interact.

Definition 2 – Site Specific Assessment

Any numerical modelling, navigation simulator systems or other assessment techniques used in the risk assessment of a specific development will, singly or in combination with other tools and techniques, be required to fully:

a. include bathymetric and other site features data for the area using an Electronic Navigational Chart (ENC) base map or as determined by a site-specific survey. In particular, depth contours and navigation channels relevant to various vessel types, sizes and operations should be taken into account with respect to the potential for colliding with other vessels or OREI structures and for grounding due to the limitations of water space or whilst avoiding a collision.

b. model or assess the effects of tide and tidal streams in the OREI area, plus any local currents so as to determine their effects on manoeuvring, operations and on vessels not under command, SAR, pollution control, etc. Where tidal streams may be significantly affected by an OREI, the effects should be modelled or assessed, covering the OREI itself and, as necessary, the surrounding area.

c. model or assess the effects on navigation and marine operations of various weather conditions such as wind, sea state and visibility.

d. use the survey traffic data supplied by the developers and other sources from a combination of radar surveys, AIS data, observational and historical records.

e. model or assess typical fishing and recreational activities within and close to the OREI area, as in (d) above and their interaction with other vessel types navigating near and within that area. Such requisite background data to be supplied from the developers and other sources.

f. model or assess each vessel type with suitable draughts, dynamics, and domains or equivalent parameters.

g. establish a baseline of marine activity without an OREI.

h. examine the effects of the OREI on this marine activity and traffic if no re-routeing is recommended.

i. model or assess the chain of navigational events as vessels pass within or close to the OREI (i.e. where an alteration of course or speed made in an encounter with a turbine or other vessel produces a further encounter or encounters, including the avoidance of grounding in confined channels and shallow water effects).

j. model or assess the effect of the OREI on the necessary compliance of various vessel types to all of the International Regulations for the Prevention of Collisions at Sea 1972, as amended, (The Collision Regulations or ‘COLREG’) (e.g. power to sail, sail to fishing vessel, overtaking vessels, etc.) and to any local rules if the site lies within the area of an appropriate entity.

k. examine the cumulative effects of all wind farms and other OREI, aggregate dredging, other offshore installations etc., within the proximity of the given site, given the traffic data by developers.

l. recommend optimum routes based on the foregoing assessments if these are seen to be required.

m. determine, on request, the increased passage distances produced by re-routeing of specific vessels.

n. consider power and steering failures within and close to the OREI together with suitable researched allowances for human error and the effects of metocean conditions.

o. Include the effects of the OREI on the detection of other vessels within or on the far side of it, such effects to include visual blind areas and radar effects such as shadow and blind sectors, spurious echoes, and other effects, etc., using the typical beam widths, pulse lengths and powers of the vessel type radars involved.

p. model all vessel types' in compliance with Collision Regulations Rule 19 in relation to sub para (o) above.

q. apply such effects to relevant port and Vessel Traffic Services (VTS) radar sites.

r. If required by IRCG, investigate the effects of the OREI on helicopter SAR and fixed wing aircraft dispersal operations, etc., particularly any radar or thermal imaging effects.

s. examine the hazards and the consequences of major incidents within or close to the OREI.

t. include data and an overview of the consequences and control of oil and other pollutant spills.

u. recommend minimum separation distances of the specific wind farm or other OREI boundaries from established navigational routes, from port approaches, from routeing schemes, from existing recreational areas, from other OREI and from other offshore operations.

v. make navigational risk recommendations with respect to the construction and operation phases of the development.

w. include an overview of potential search and rescue activities and difficulties within and close to the OREI.

Note: *In the post-construction phase there is a requirement for OREI operators to monitor & review the impact which their activities are having on the safety of navigation. Where practical, feedback should also be obtained from Masters, fishing vessel skippers, recreational sailors and SAR stakeholders who regularly operate in and around different wind farm sites to get realistic information on their experiences in different conditions.*

D.2 Navigational Risk Assessment – Area Traffic Assessment Techniques

D.2.1 Types of Appropriate Assessment

Area Traffic Assessment will be required when there is uncertainty over the effect of the OREI on the ability of vessels to navigate and operate in the waters adjacent to and through the wind farm or other OREI area without suffering an increase in risk. Such risk will include amongst others the risks of contact, collision, grounding, and stranding.

Fundamental Requirements of Area Traffic Assessment

The fundamental requirements of Area Traffic Assessment include:

- that it assesses all traffic in both the strategic OREI area (if appropriate for the particular development) and the OREI area itself that it assesses the movement of vessels through the water in a way that is representative of vessel navigation and activity
- that it assesses the behaviour of the vessels to the Collision Regulations including:
    - the effect of reduced visibility on compliance with the Collision Regulations coupled with the expected effects on vessel and shore-based radars.
    - a representative rate of human error in applying the Collision Regulations
    - a representative rate of deliberate non-compliance with the Collision Regulations
- that it assesses the effect of manoeuvring in restricted waterways (defined from bathymetric data developed from Electronic Navigation Charts or from site specific surveys) including action by vessels to avoid shallow water
- that it is used to calculate:
    - as a minimum the frequency and density of interaction between vessels, vessels and shallow water, and vessels and OREI structures, to gain statistically significant information to assess the effect of the fundamental Risk Control Options of location, alignment, size and layout.
    - the probability of collision, contact, and grounding
    - for specific vessel types the risk and tolerability of the risk.

D.2.2 Selection of Situations Requiring Area Traffic Assessment

Source of the Situation

The situations requiring assessment will be determined by:

- the need to evaluate the general effect of the OREI on the marine traffic and the navigational risks associated with a development.

- the cumulative navigation risks associated with the development and the other OREI developments and other types of marine activity in the Strategic OREI Area
- the in-combination effects on the navigation risk of the development with other economic developments over the operational life of the OREI the need to evaluate the specific impact of the OREI due to the presence of specific marine traffic activity that may be present, or is planned, in close proximity to the OREI.
- the hazard log.
- the risk control log.

D.2.3 Definition of Scenarios for Assessment

The assessment should include, as a minimum, the following scenarios which have been proposed to assess the cumulative impact but ensure the key drivers of increased marine traffic levels and navigation constraints can be isolated and identified.

Item	Scenario	Objective
1	Present day Base Case	Provide assessment of present risk level for validation with historic data
2	Future Case based on: Traffic types and densities mid- way through the consent period (e.g. 10 yrs) Traffic types and densities at end of the consent period (e.g. 20 yrs)	Future assessment of study area risks with no OREI present
3	Base Case with OREI	Provide analysis of OREI(s) impacts only, unrelated to traffic increases or reductions
4	Future Case with OREI based on: Traffic types and densities mid- way through the consent period (e.g. 10 yrs) Traffic types and densities at end of the consent period (e.g. 25 yrs)	

Table 5 - Scenarios Requiring Area Traffic Assessment

D.2.4 Requirements for Assessing a Scenario

Each of the Scenarios should be assessed to determine:

- Feasibility
- Risk
- Sensitivity
- Controls.

Feasibility

The feasibility of shipping operations through a particular water space or channel, adjacent or close to OREI developments is best developed with respect to the meteorological and oceanographic data collated above, and guidance on vessel navigation requirements.

Risk

The risk associated with navigation within or close to wind farms and other OREI should be related to frequency and consequence. The analysis results should inform the key changes in risk of collision, contact and grounding/stranding as a result of the OREI development, with consequences being fed into SAR and counter pollution assessment. The assessment output should be tailored to identify:

- the quantitative risk level.

if the 'Future Case with OREI' scenario develops broadly acceptable risk when judged against the present traffic environment, the 'Future Case' (no OREI(s)), or are:

- tolerable with modifications
- tolerable with additional controls
- tolerable with monitoring

that further risk control is grossly disproportionate.

The output must provide specific data on collision potential between all vessel type routes and operations within the Study Area. The output should be in a format that the following key questions can be posed and answered:

- where are the areas of increased risk?
- determine impact on the frequency of collision, contact, grounding, and other hazard increases?
- which vessel type's routes and operations are most impacted, and where do these incidents occur?
- does the traffic assessment consider all the elements of navigational and other marine activities associated with key incidents?
- what SAR and counter pollution overview data may be generated from the key incidents?

The selection and identification of key incidents will be site specific, however the following threshold is recommended:

Sensitivity

Each of the principal scenarios defined above may be subject to sensitivity tests to examine the impact of key drivers. The sensitivities to be examined should be determined from the Influence Analysis.

Effectiveness of Controls

Where feasible the quantitative impact of modifications, controls, and monitoring should be identified. These may, but not necessarily, include:

- realignment of development boundaries and/or turbine/platform or other structure configurations
- recommended minimum separation distances of the specific OREI boundaries, and
- established navigational routes.
- mandatory routeing schemes

D.2.5 Analysis and Presentation of Results

Presentation of results should be clear and concise and in a form that can be understood by both experts and non-experts alike. This could take the form of graphical presentation supported by text and numerical data. Where large datasets are used and required for presentation these are best referenced in a Section from the main text. The presentation should include:

- the assessment technique used e.g. background, validation, references and methodology.
- data inputs
- the results
- any assumptions and deviations to mainstream methodology used in the calculations.
- conclusions on the impact of the assessment results with regards to OREI development.

The output should inform the operator and reviewer of the quantitative and/or qualitative changes in marine risk as a result of the OREI, and future activity. This should be set against the marine environment that has been mapped for the Study Area. The assessment should, as a minimum:

- predict the vessel to vessel and vessel to structure encounters and grounding potential.
- predict the contact/collision/grounding frequency distribution.
- link to vessel types to predict contact and collision risk.
- assist in the evaluation of the effectiveness of controls.

D.2.6 Analysis and Presentation of Results

The following are identified as critical parameters within area traffic assessment.

Critical Parameter	Explanation
Traffic Distribution	Positioning and width of vessel routes and operations
Traffic Density & Type	Total densities and types of traffic in the assessment and potential for vessel interaction.
OREI Location	Positioning and size of OREI, also orientation with respect to traffic streams and other vessel operations
Route Relocation	Assumptions adopted in impacting the original traffic distribution
Visibility	Assumptions adopted with respect to visibility through and close to the OREI and other means of vessel detection and tracking

Table 6 – Area Traffic Assessment – Critical Parameters

D.3 Navigation Risk Assessment – Specific Traffic Assessment Techniques

D.3.1 Use of Specific Navigation Assessment Techniques

Specific Traffic Assessment may be required to answer detailed questions about the feasibility and risk associated with specific navigation activities in or around an OREI. Typically, such assessment could be performed in response to:

- areas of 'High Risk' identified by the Area Traffic Assessment
- the need for an "ALARP declaration" in the hazard log
- the need to evaluate the effectiveness of a Risk Control in the risk control log.
- and for emergency response vessels (e.g. emergency towing vessels) to render assistance to vessels, in and around an OREI.

Need for Assessment

An evaluation of all navigational possibilities which could be reasonably foreseeable, by which the siting, construction, establishment, and de-commissioning of an OREI could cause or contribute to an obstruction of or danger to navigation or marine emergency services is required.

Specific traffic assessment may therefore be required to assess the risk of more specific navigational issues where the actual manoeuvring capabilities of the specific vessels involved in relationship to:

- the bathymetry
- the environmental conditions
- other traffic
- human action, inaction, and error
- the OREI development structures

are, or may be, critical to comply with the Collision Regulations and avoid incident.

D.3.2 Defining Scenarios for Assessment

Once a situation has been selected, a scenario or numbers of scenarios may need to be defined to fully explore the situation. It is important that the scenario definition is robust, i.e. that it is capable of broad interpretation and not narrowly focused on a unique situation.

Each scenario requires a core or base starting point which will include:

- the ENC charts of the OREI location or site-specific bathymetric surveys
- modifications to the ENC chart with details of the OREI configurations

- the characteristics of the subject vessel or vessels.

The details of the OREI that need to be added to the ENC chart include:

Shape and configuration.

- size (number and type of structure, spacing)
- location
- orientation

Associated structures

- ancillary platforms
- floating structures
- transformers
- meteorological towers

Development Status

- proposed
- part constructed.
- completed and operational

Marking

- navigation lights
- aviation lights
- AIS marks

Section E - Deciding on the Risk Controls

E.1 Creating a Risk Control Log

The concept of offshore renewable installations (OREI) and potential risk is accepted and therefore developers will be expected to manage risk by the identification and application of risk controls.

E.2 Risk Control and Mitigation

To meet the Safety of Navigation Objectives:

- applicable rules must be identified, consultations with appropriate stakeholder bodies held, agreement with the competent authority reached, and the rules have to be implemented by the OREI developer.
- risk controls must be identified, consultations with appropriate stakeholder bodies held, agreement with the competent authority reached, and the risk controls have to be implemented.
- risk control options have to be identified, consultations with appropriate stakeholder bodies held, agreement with a competent authority reached, on the risk controls that are capable of reducing identified risks to that which are As Low As Reasonably Practical
- emergency and contingency plans must be put in place and exercised.

The suggested process for creating a risk control log is:

Risk Control Description

- identify all the relevant risk controls.
- define the type of control (asset, rule, good practice and/or option)
- define what effect of control (prevention, mitigation and/or emergency response).

Consultation, Approval & Implementation

- identify appropriate stakeholder bodies for consultation.
- identify the competent authority for approval.
- identify the responsible action party for implementation.

ANNEX II – Offshore Renewable Energy – Installation Checklist

This checklist has been produced as an aid for developers to confirm that the Department of Transport's 'Guidance on Safety of Navigation & Emergency Response: Offshore Renewable Energy Installations' (OREI) has been addressed within an Environmental Impact Assessment Report and/or Navigation Risk Assessment as submitted to An Bord Pleanála when seeking formal consent for planning applications for OREI, particularly with respect to offshore wind farm developments.

Section	Yes/No	Comments
2. Planning Stage – Prior to Consent		
2.1.4 Site and Installation Co-ordinates: Developers are responsible for ensuring that formally agreed co-ordinates and subsequent variations of site perimeters and individual OREI structures are made available, on request, to interested parties at relevant project stages, including application for consent, development, array variation, operation and decommissioning. This should be supplied as authoritative Geographical Information System (GIS) data, preferably in Environmental Systems Research Institute (ESRI) format. Metadata should facilitate the identification of the data creator, its date and purpose, and the geodetic datum used. For mariners' use, appropriate data should also be provided with latitude and longitude coordinates in WGS84 (ETRS89) datum.		

2.2 Traffic Survey – includes:		
All vessel types	✓	
At least 28 days duration, within either 12 or 24 months prior to submission of the Environmental Impact Assessment Report	✓	
Multiple data sources	✓	
Seasonal variations	✓	
Department (MSO) consultation	✓	

Section	Yes/No	Comments
Department (Irish Coast Guard) consultation	✓	
Irish Lights consultation	✓	
Chamber of Shipping and shipping company consultation	✓	
Recreational and fishing vessel organisations consultation	✓	
Port and navigation authorities' consultation, as appropriate	✓	
2.3 Assessment of the cumulative and individual impacts (as appropriate):		
i. Proposed OREI site relative to areas used by any type of marine craft.	✓	
ii. Numbers, types and sizes of vessels presently using such areas.	✓	
iii. Non-transit uses of the areas, e.g. fishing, day cruising of leisure craft, racing, aggregate dredging, personal watercraft etc.	✓	
iv. Whether these areas contain transit routes used by coastal, deep-draught or international scheduled vessels on passage.	✓	
v. Alignment and proximity of the site relative to adjacent shipping routes.	✓	
vi. Whether the nearby area contains prescribed routeing schemes or precautionary areas.	✓	
vii. Proximity of the site to areas used for anchorage (charted or uncharted), safe haven, port approaches and pilot boarding or landing areas.	✓	

Section	Yes/No	Comments
viii. Whether the site lies within the jurisdiction of a port and/or navigation authority.	✓	
ix. Proximity of the site to existing fishing grounds, or to routes used by fishing vessels to such grounds.	✓	
x. Proximity of the site to offshore firing/bombing ranges and areas used for any marine military purposes.	✓	
xi. Proximity of the site to existing or proposed submarine cables or pipelines, offshore oil / gas platform, marine aggregate dredging, marine archaeological sites or wrecks, Special Area of Conservation, Special Protected Area, Marine Protected Area or other exploration / exploitation sites.	✓	
xii. Proximity of the site to existing or proposed OREI developments, in co-operation with other relevant developers, within each round of lease awards.	✓	
xiii. Proximity of the site relative to any designated areas for the disposal of dredging spoil or other dumping ground	✓	
xiv. Proximity of the site to aids to navigation and/or Vessel Traffic Services (VTS) in or adjacent to the area and any impact thereon.	✓	
xv. Researched opinion using computer simulation techniques with respect to the displacement of traffic and, in particular, the creation of 'choke points' in areas of high traffic density and nearby or consented OREI sites not yet constructed.	✓	

Section	Yes/No	Comments
xvi. With reference to xv. above, the number and type of incidents to vessels which have taken place in or near to the proposed site of the OREI to assess the likelihood of such events in the future and the potential impact of such a situation.	✓	
xvii. Proximity of the site to areas used for recreation which depend on specific features of the area.	✓	
2.5 Predicted Effect of OREI on traffic and Interactive Boundaries – where appropriate, the following should be determined:		
a. The safe distance between a shipping route and OREI boundaries.	✓	
b. The width of a corridor between sites or OREIs to allow safe passage of shipping.	✓	

2.6 OREI Structures: the following should be determined		
a. Whether any feature of the OREI, including auxiliary platforms outside the main generator site, mooring and anchoring systems, inter-device and export cabling could pose any type of difficulty or danger to vessels underway, performing normal operations, including fishing, anchoring and emergency response.	✓	
b. Clearances of fixed or floating wind turbine blades above the sea surface are *not less than 22 metres (*above MHWS for fixed). Floating turbines allow for degrees of motion.	✓	

Section	Yes/No	Comments
c. Underwater devices i. changes to charted depth ii. maximum height above seabed iii. Under Keel Clearance	 ✓ ✓ ✓	
d. Whether structure block or hinder the view of other vessels or other navigational features.	✓	
2.7 The Effect of Tides, Tidal Streams and Weather: It should be determined whether:		
a. Current maritime traffic flows and operations in the general area are affected by the depth of water in which the proposed installation is situated at various states of the tide i.e. whether the installation could pose problems at high water which do not exist at low water conditions, and vice versa.	✓	
b. The set and rate of the tidal stream, at any state of the tide, has a significant effect on vessels in the area of the OREI site.	✓	
c. The maximum rate tidal stream runs parallel to the major axis of the proposed site layout, and, if so, its effect.	✓	
d. The set is across the major axis of the layout at any time, and, if so, at what rate.	✓	
e. In general, whether engine failure or other circumstance could cause vessels to be set into danger by the tidal stream, including unpowered vessels and small, low speed craft.	✓	
f. The structures themselves could cause changes in the set and rate of the tidal stream.	✓	

Section	Yes/No	Comments
g. The structures in the tidal stream could be such as to produce siltation, deposition of sediment or scouring, affecting navigable water depths in the wind farm area or adjacent to the area.	✓	
h. The site, in normal, bad weather, or restricted visibility conditions, could present difficulties or dangers to craft, including sailing vessels, which might pass in close proximity to it.	✓	
i. The structures could create problems in the area for vessels under sail, such as wind masking, turbulence or sheer.	✓	
j. In general, taking into account the prevailing winds for the area, whether engine failure or other circumstances could cause vessels to drift into danger, particularly if in conjunction with a tidal set such as referred to above.	✓	

2.8 Assessment of Access to and Navigation Within, or Close to, an OREI: To determine the extent to which navigation would be feasible within the OREI site itself by assessing whether:		
a. Navigation within or close to the site would be safe:		
i. for all vessels, or	✓	
ii. for specified vessel types, operations and/or sizes.	✓	
iii. in all directions or areas, or	✓	
iv. in specified directions or areas.	✓	

Section	Yes/No	Comments
v. in specified tidal, weather or other conditions	✓	
b. Navigation in and/or near the site should be prohibited or restricted:		
i. for specified vessels types, operations and/or sizes. ii. in respect of specific activities, iii. in all areas or directions, or iv. in specified areas or directions, or v. in specified tidal or weather conditions,	✓ ✓ ✓ ✓ ✓	
c. Where it is not feasible for vessels to access or navigate through the site it could cause navigational, safety or routeing problems for vessels operating in the area e.g. by preventing vessels from responding to calls for assistance from persons in distress.	✓	
d. Guidance on the calculation of safe distance of OREI boundaries from shipping routes has been considered.	✓	

2.9 Search and rescue, maritime assistance service, counter pollution and salvage incident response.		
The DOT, through Irish Coast Guard, is required to provide Search and Rescue and emergency response within the sea area occupied by all offshore renewable energy installations in Irish waters. To ensure that such operations can be safely and effectively conducted, certain requirements must be met by developers and operators.		
a. An ERCoP will be developed for the construction, operation, and decommissioning phases of the OREI.	✓	

Section	Yes/No	Comments
b. The Irish Coast Guard guidance document Offshore Renewable Energy Installation: Requirements, Advice and Guidance for Search and Rescue and Emergency Response for the design, equipment and operation requirements will be followed.	✓	
c. A SAR checklist will be completed to record discussions regarding the requirements, recommendations and considerations outlined in the above document.	✓	

2.10 Hydrography - In order to establish a baseline, confirm the safe navigable depth, monitor seabed mobility and to identify underwater hazards, detailed and accurate hydrographic surveys are included or acknowledged for the following stages and to the DOT specifications:		
i. Pre-construction: The proposed generating assets area and proposed cable route.	✓	
ii. On a pre-established periodicity during the life of the development.	✓	
ii. Post-construction: Cable route(s).	✓	
iii. Post-decommissioning of all or part of the development: the installed generating assets area and cable route.	✓	

2.11 Communications, Radar and Positioning Systems - To provide researched opinion of a generic and, where appropriate, site-specific nature concerning whether:		
a. The structures could produce radio interference such as shadowing, reflections or phase changes, and emissions with respect to any	✓	

Section	Yes/No	Comments
frequencies used for marine positioning, navigation and timing (PNT) or communications, including GMDSS and AIS, whether ship borne, ashore or fitted to any of the proposed structures, to:		
i. Vessels operating at a safe navigational distance.	✓	
ii. Vessels by the nature of their work necessarily operating at less than the safe navigational distance to the OREI, e.g. support vessels, survey vessels, SAR assets.	✓	
iii. Vessels by the nature of their work necessarily operating within the OREI.	✓	
b. The structures could produce radar reflections, blind spots, shadow areas or other adverse effects: i. Vessel to vessel; ii. Vessel to shore; iii. VTS radar to vessel iv. Racon to/from vessel	 ✓ ✓ ✓ ✓	
c. The structures and generators might produce sonar interference affecting fishing, industrial or military systems used in the area.	✓	
d. The site might produce acoustic noise which could mask prescribed sound signals.	✓	
e. Generators and the seabed cabling within the site and onshore might produce electro-magnetic fields affecting compasses and other navigation systems.	✓	

Section	Yes/No	Comments
2.13 Risk mitigation measures recommended for OREI during construction, operation and decommissioning.		
Mitigation and safety measures will be applied to the OREI development appropriate to the level and type of risk determined during the Environmental Impact Assessment (EIA). The specific measures to be employed will be selected in consultation with the Irish Coast Guard and will be listed in the developer's Environmental Statement (ES). These will be consistent with international standards contained in, for example, the Safety of Life at Sea (SOLAS) Convention - Chapter V, IMO Resolution A.572 (14)3 and Resolution A.671(16)4 and could include any or all of the following:	✓	
i. Promulgation of information and warnings through notices to mariners and other appropriate maritime safety information (MSI) dissemination methods.	✓	
ii. Continuous watch by multi-channel VHF, including Digital Selective Calling (DSC).	✓	
iii. Provision of AtoN as determined by the MSO ICG or IL.	✓	
iv. Implementation of routeing measures within or near to the development.	✓	
v. Monitoring by radar, AIS, CCTV or other agreed means	✓	
vi. Creation of an Emergency Response Cooperation Plan with the Irish Coast Guard for the construction phase onwards.	✓	

Section	Yes/No	Comments
vii. Update NRAs every two years e.g. at testing sites.	✓	
viii. Device-specific or array-specific NRAs.	✓	
ix. Design of OREI structures to minimise risk to contacting vessels or craft.	✓	
x. Any other measures and procedures considered appropriate in consultation with other stakeholders.	✓	

Annex 1 Methodology for Assessing the Marine Navigational Safety & Emergency Response Risks of Offshore Renewable Energy Installations

The following content is included:	Section	Compliant Yes/No	Comments
A risk claim is included that is supported by a reasoned argument and evidence	**C.1.1**	✓	
Description of the marine environment	B3	✓	
Search and Rescue overview and assessment	3.3	✓	
Description of the OREI development and how it changes the marine environment	B3	✓	
Analysis of the marine traffic, including base case and future traffic densities and types.	B1 B2	✓	
Status of the hazard log • Hazard Identification • Risk Assessment • Influences on level of risk • Tolerability of risk • Risk matrix	C1 & E1 C2 C3	✓	
Navigation Risk Assessment • Appropriate risk assessment • DOT acceptance for assessment techniques and tools • Demonstration of results • Limitations	D1 D2 D3	✓	
Risk control log	E1	✓	

ANNEX III - Hydrography Guidelines for Offshore Developers

All hydrographic surveys should provide full seafloor coverage that meets the requirements of the current edition of the International Hydrographic Organization's (IHO's) S44 Order 1a. Particular attention should be given to horizontal and vertical sounding accuracy, together with target detection requirements and, all relevant data and reports related to safety of navigation are shared with the UKHO for the update of nautical charts and publications.

When to Survey

In order to establish a baseline, confirm safe navigable depth, monitor seabed mobility and to identify underwater hazards, detailed and accurate hydrographic surveys are required of the development at the following stages:

- Pre-construction: the proposed generating assets area and proposed cable route(s).
- On a pre-established periodicity during the life of the development as outlined in any marine licence condition.
- Post-construction: the cable route(s).
- Post-decommissioning of all or part of the development: the installed generating assets area and the cable route(s).

The development may result in an alteration of maritime traffic patterns as vessels seek alternative passage around the installed generating assets area. Where this is the case, the DoT may consider it necessary that a hydrographic survey of these alternate passages and their immediate environs be undertaken. The DoT will provide guidance here if required. Where shipping corridors are formed within or adjacent to the consented generating assets area, the requirement for hydrographic surveys shall be referred to the DoT and undertaken on a case-by-case basis.

What to deliver

It is requested that the hydrographic data be delivered in the following formats:

- All data should be rendered in digital form, in one of the following formats: CARIS Project Directory or GSF (Generic Sensor Format) or a format acceptable to GSI.
- Spurious data should be cleaned from the final, delivered dataset. Digital data should have rejected soundings included but flagged as deleted. The method used in any data cleaning (e.g. Shoal or Median Biased) should be clearly stated.
- Digital data should be full density i.e. prior to any gridding, binning or tinning being applied.

- If gridded datasets have been created, then these should also be included.
- The soundings should be reduced using observed tides, not predicted tides from tide tables.
- Depths should be referenced to Irish Chart Datum (Poolbeg Lighthouse) for the area.

A Report of Survey should be submitted with the survey data that describes how the data was gathered and processed and should include:

- A list of the equipment and software use and the personnel used.
- How the echosounder transducer and positioning equipment were set up, calibrated and used, together with all sensor offsets.
- Details of the horizontal datum to which the positions are referenced (or the grid, if appropriate).
- How the tides were measured, tide gauge was levelled, and how the depths were reduced to Chart Datum.

The hydrographic data and Report of Survey shall be delivered to the DoT within three months after completion of the survey. Upon completion of the review of these deliverables, the developer shall collate and supply the provided data to the UKHO in order that nautical charts and publications can be updated for the purposes of navigation safety.

Developers are reminded of the requirement to report significant changes in depths from charted depths that become a navigation hazard to the DoT and UKHO in order that Navigational Warnings and Notice to Mariners can be issued, if necessary.

ANNEX IV - Search & Rescue, Maritime Casualty, Counter Pollution & Salvage

OREI developers must fulfil the requirements of the IRCG guidance document **Standard Operating Procedure 07-2025 'Offshore Renewable Energy Installations: Guidance and Operational Considerations for SAR and Emergency Response'** which includes design, equipment and operational considerations.

A completed ERCoP, OSCP and a SAR Checklist are expected to be in place for the construction, operation and decommissioning phases of any OREI. The SAR checklist is a record of discussions regarding the requirements, recommendations and considerations outlined in the above document and should be agreed by the developer and the DoT on a case-by-case basis. The content of the SAR checklist will apply throughout the life of the OREI and will be used by IRCG to ensure actions agreed pre-construction and are correctly implemented.

For further information please see Standard Operating Procedure 07-2025 'Offshore Renewable Energy Installations: Guidance and Operational Considerations for SAR and Emergency Response' which can be found on the DoT website.

ANNEX V – Document Links

Reference	Web Link
Irish Coast Guard (A Division of the Department of Transport)	gov.ie - The Irish Coast Guard (www.gov.ie)
Marine Survey Office (A Division of the Department of Transport)	https://www.gov.ie/en/organisation-information/111f0e-marine-survey-office-mso/
Irish National Search and Rescue Plan	https://www.gov.ie/en/publication/856af1-the-national-search-and-rescue-plan/
National Maritime Oil/HNS Spill Contingency Plan	https://www.gov.ie/en/publication/79e5d-national-maritime-oilhns-spill-contingency-plan-nmoscp/
Sea Pollution Act, 1991	https://www.irishstatutebook.ie/eli/1991/act/27/enacted/en/html
Sea Pollution (Amended) Act, 1999	https://www.irishstatutebook.ie/eli/1999/act/18/enacted/en/html
Internation Maritime Organisation	https://www.imo.org/
Climate Action Plan 2023	gov - Climate Action Plan 2023 (www.gov.ie)
Commissioners of Irish Lights	https://www.irishlights.ie/
Irish Aviation Authority	https://www.iaa.ie/
S.I. No. 215/2005 Irish Aviation Authority (Obstacles To Aircraft in Flight) Order, 2005	https://www.irishstatutebook.ie/eli/2005/si/215/made/en/print
Aeronautical Services Advisory Memorandum (ASAM) Guidance Material on Off-Shore Wind Farms (IAA/IL)	https://www.iaa.ie/publications/docs/default-source/publications/advisory-memoranda/aeronautical-services-advisory-memoranda-(asam)/guidance-material-on-off-shore-wind-farms
G1162 The marking of Offshore Structures	https://www.iala-aism.org/product/g1162/

Controlled Document:	This is a controlled document prepared by the Department of Transport and published in June 2025.
Feedback:	If you have feedback about this document, send it to oreitechnicalguidance@transport.gov.ie so it can be considered at the next review of this document.
Disclaimer:	While all care and diligence have been used in extracting, analysing, and compiling this information, the Department of Transport gives no warranty that information provided is without error.