Environmental Impact Assessment Report

NISA

North Irish Sea Array

Volume 3: Offshore Chapters

Chapter 16
Commercial Fisheries

Statkraft

CIP
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16. Commercial Fisheries

16.1 Introduction

This chapter of the Environmental Impact Assessment Report (EIAR) presents an assessment of likely significant effects from the North Irish Sea Array (NISA) Offshore Wind Farm (hereafter referred to as the 'proposed development') in relation to commercial fisheries during the construction, operation and decommissioning phases.

This chapter sets out the methodology followed (Section 16.2), describes the baseline environment (Section 16.3) and summarises the main characteristics of the proposed development which are of relevance to commercial fisheries (Section 16.4), including any embedded mitigation. Potential impacts and relevant receptors are identified, and an assessment of likely significant effects on commercial fisheries is undertaken, details of which are provided (Section 16.5).

Additional mitigation measures are proposed to mitigate and monitor these effects if required (Section 16.6) and any residual likely significant effects are then described (Section 16.7). Transboundary effects are considered (Section 16.8) and cumulative effects are assessed in Section 16.9 and summarised in Chapter 38 Cumulative and Inter-Related Effects (hereafter referred to as the 'Cumulative and Inter-Related Effects Chapter'). The chapter then provides a reference section (Section 16.10).

The EIAR also includes the following:

- Detail on the competent experts that have prepared this chapter is provided in Appendix 1.1 in Volume 8; and
- Detail on the extensive consultation that has been undertaken with a range of stakeholders during the development of the EIAR is set out in Appendix 1.2.

A glossary of terminology, abbreviations and acronyms is provided at the beginning of Volume 2 of the EIAR; andA detailed description of the proposed development including construction, operation and decommissioning is provided in Volume 2, Chapter 6: Description of the Proposed Development – Offshore (hereafter referred to as the 'Offshore Description Chapter'), and Volume 2, Chapter 8: Construction Strategy – Offshore (hereafter referred to as the 'Offshore Construction Chapter').

The assessment should be read in conjunction with the following linked EIAR chapters within Volume 3:

- Chapter 13: Fish and Shellfish Ecology (hereafter referred to as the 'Fish and Shellfish Ecology Chapter'): where impacts on the ecology of fish and shellfish, including species of commercial interest, are assessed.
- Chapter 17: Shipping and Navigation (hereafter referred to as the 'Shipping and Navigation Chapter'): where impacts on the navigational safety aspects of fishing activity are assessed; and
- Chapter 20: Infrastructure and Other Users (hereafter referred to as the 'Infrastructure and Other Users Chapter'): where impacts on charter angling businesses are assessed.

Additional information on the baseline environment to support the commercial fisheries assessment includes:

- Volume 9, Appendix 16.1: Commercial Fisheries Technical Report.

All figures within this chapter are provided in Volume 7A.

For the purpose of this chapter, 'commercial fishing' is defined as any form of fishing activity legally undertaken with catch sold for taxable profit. Charter angling, defined as fishing for marine species where the purpose is recreation and not sale or trade, is assessed in the Infrastructure and Other Users Chapter. Navigational aspects related to fishing vessels while in transit are assessed in the Shipping and Navigation Chapter. The ecology of fish and shellfish, including species of commercial interest, are assessed in the Fish and Shellfish Ecology Chapter.

16.2 Methodology

16.2.1 Introduction

The assessments of commercial fisheries are consistent with the EIA methodology presented in Volume 2, Chapter 2: EIA and Methodology for the preparation of an EIAR (hereafter referred to as the EIAR Methodology Chapter).

This section provides the detailed methodology for undertaking the assessment of likely significant effects of relevance to commercial fisheries, including the study areas assessed, relevant guidance and policy, data collection and consultation.

16.2.2 Study Area

The commercial fisheries study areas were initially identified at the EIAR scoping stage, in line with Department of Communications, Climate Action and Environment (DCCAE) (now the Department of the Environment, Climate and Communications; DECC) Guidance (DCCAE, 2017) (See Appendix 2.1: Scoping Report).

The extent of the study area for the purposes of this assessment has been reviewed and updated to include a local and regional study area in consideration of the proposed development as presented in Figure 16.1.

The offshore elements of the proposed development consist of the array area and the offshore export cable corridor (ECC), referred to collectively as the 'offshore development area' hereafter. The offshore development area is fully located inside of 12 nautical mile (nm) territorial seas limit and within Ireland's Exclusive Economic Zone (EEZ) waters.

Fishing stocks are managed by stock at the scale of International Council for the Exploration of the Sea (ICES) divisions, and quotas for specific species are allocated per stock and ICES division, i.e. at a scale of ICES division 7a: Irish Sea. The offshore development area is located within the central portion of the ICES Division 7a (Irish Sea) statistical area.

ICES statistical rectangles are the smallest spatial unit used to collate commercial fisheries data; and it is considered appropriate to define the study areas using these. ICES statistical rectangles are consistent across all ICES member countries operating in the Irish Sea.

The array area is located within ICES statistical rectangle 36E4 and the ECC is located within ICES statistical rectangles 36E4 and 36E3, which together represent the commercial fisheries local study area, as shown in Figure 16.1. Note that the array area and the ECC occupy only a portion of these ICES statistical rectangles.

In order to understand fishing activity in waters adjacent to the offshore development area, a regional commercial fisheries study area has been defined to include 36E4 and 36E3, together with ICES statistical rectangles 37E4, 37E3, 35E4 and 35E3. Baseline data have been gathered and analysed for the regional study area. In summary, the study areas for commercial fisheries are:

- Local commercial fisheries study area: 36E4 and 36E3; and
- Regional commercial fisheries study area: 37E4, 37E3, 36E4, 36E3, 35E4 and 35E3.

The cumulative effects assessment considers a wider study area, at the scale of the Irish Sea, to ensure appropriate consideration of the range of fishing grounds targeted by the fishing fleets under assessment.

16.2.3 Relevant Guidance and Policy

This section outlines guidance and policy specific to commercial fisheries, including best practice guidelines. Overarching guidance on EIAR is presented in the EIAR Methodology Chapter. Furthermore, policy applicable to the proposed development is detailed in Volume 2, Chapter 3: Legal and Policy Framework.

The assessment of likely significant effects upon commercial fisheries has been made with specific reference to the following identified relevant guidelines and guidance:

- Seafood / Offshore renewable Energy Engagement in Ireland: A summary guide (Seafood / ORE Working Group, 2023).
- Guidelines on the information to be contained in Environmental Impact Assessment Reports (EPA, 2022).
- European Communities (Marine Strategy Framework) Regulations 2011 (S.I. No. 249 of 2011).
- National Marine Planning Framework (NMPF) - Project Ireland 2040 (Department of Housing, Local Government and Heritage, 2021) (hereafter referred to as the NMPF).
- Guidance on Environmental Impact Statement (EIS) and Natura Impact Statement (NIS) Preparation for Offshore Renewable Energy Projects (Environmental Working Group of the Offshore Renewable Energy Steering Group and the Department of Communications, Climate Action and Environment, 2017) (hereafter referred to as the DCCAE Guidance, 2017).
- Guidance on Marine Baseline Ecological Assessments and Monitoring Activities for Offshore Renewable Energy Projects Part 1 April 2018 (Department of Communications, Climate Action and Environment, 2018) (hereafter referred to as the DCCAE Guidance Part 1, 2018); and
- Guidance on Marine Baseline Ecological Assessments & Monitoring Activities for Offshore Renewable Energy Projects Part 2 April 2018 (Department of Communications, Climate Action and Environment, 2018) (hereafter referred to as the DCCAE Guidance Part 2, 2018).

The relevance of the above with regards to commercial fisheries and how these have been addressed within this assessment are presented in Appendix 16.1 of Volume 9.

The key National Marine Planning Framework (NMPF) policy that is applicable to the assessment of commercial fisheries is summarised in Table 16.1. NMPF policies are addressed in their entirety in Appendix 3.1: NMPF Compliance Report.

Table 16.1 Key NMPF policies relevant to the assessment

Policy Name	Policy Description	Where addressed
National Marine Planning Framework (2021)	**Fisheries Policy 1** Proposals that may have significant adverse impacts on access for existing fishing activities, must demonstrate that they will, in order of preference: a. avoid, b. minimise, or c. cmitigate such impacts. If it is not possible to mitigate significant adverse impacts on fishing activity, the public benefits for proceeding with the proposal that outweigh the significant adverse impacts on existing fishing activity must be demonstrated.	The embedded mitigation measures are defined in Section 16.4; these are considered as part of the designed in measures of the proposed development. The assessment of likely significant effects is described in Section 16.5. Where additional mitigation and monitoring measures are required, they are detailed in Section 16.6.
	Fisheries Policy 2 Where significant impact upon fishing activity arising from any proposal is identified, a Fisheries Management and Mitigation Strategy (FMMS) should be prepared by the proposer of development or other maritime area use, in consultation with local fishing interests and other interests as appropriate. All efforts should be made to agree the FMMS with those interests. Those interests should also undertake to engage with the proposer and provide best available, transparent and accurate information and data in a timely manner to help complete the FMMS.	The developer has committed to the preparation and adherence to a FMMS which follows the key principle of 'Collaboration and proactive fisheries impact mitigation including mechanisms at an individual vessel owner level and at a port level for a wider benefit to local fishers and fisheries.' Upon implementation of a FMMS (developed in consultation with the fishing industry), all residual significant effects are slight adverse or lower which are not significant in EIA terms. This ensures compliance of the proposed development with Fisheries Policy 3.

Policy Name	Policy Description	Where addressed
	The FMMS should be drawn up as part of readying a proposal prior to submission, with measures identified to be considered in finalising conditions of any authorisations granted. Development of the strategy should be coordinated with other relevant assessments such as EIA where possible. The content of the Fisheries Management and Mitigation Strategy (FMMS) should be relevant to the particular circumstances and could include: • An assessment of the potential impact of all stages of the development or other suggested use on the affected fishery or fisheries, both in socio-economic terms and in relation to environmental sustainability. This assessment should include consideration of any impact upon cultural identity within fishing communities, as well as identifying indirect / in-combination matters. • A recognition that the disruption to existing fishing opportunities / activity should be minimised as far as possible. • Demonstration of the public benefit(s) that outweigh the significant impacts identified. • Reasonable measures to mitigate any constraints which the proposed development or use may place on existing or proposed fishing activity. • Reasonable measures to mitigate any potential impacts on sustainability of fish stocks (e.g. impacts on spawning grounds or areas of fish or shellfish abundance) and any socio-economic impacts. • Where it does not prove possible to agree the FMMS with all interests: • Divergent views and the reasons for any divergence of views between the parties should be fully explained in the FMMS, and dissenting views should be given a platform within the said FMMS to make their case. • Where divergent views are identified, relevant public authorities should be engaged to identify informal and formal steps designed to enable proposal(s) to progress.	A FMMS has been developed and provided in Appendix 16.2.

The recently published guidance on Seafood/ORE Engagement in Ireland provides key principles for engagement with the fisheries sector. These principles include:

- Finding a balance between protecting seafood interests, responding to the global climate emergency, and meeting the State's legal obligations for reductions in carbon emissions as set out in the Climate Action Plan 2024.
- Encouraging the principle of co-existence, where the seafood and offshore renewable energy industries can work side-by-side in a manner that respectfully shares the marine space.
- Cooperating to determine the impact, effect, and opportunities that ORE proposals may have on seafood activity and working together to avoid, minimise, or mitigate any adverse impacts.
- Early and ongoing engagement between the sectors, including open sharing of information, honest and transparent communication, and cooperation to achieve sustainable outcomes that benefit both industries and Ireland's economy, society, and coastal communities.

- Mutual respect, best endeavours to reach agreement, and recognition of the importance of both sectors, which is critical to effective engagement.
- Overall encouragement for mutual respect, cooperation, and proactive engagement between the sectors.

The Developer is committed to working with the fishers to deliver these key principles.

In addition, a number of other guidance documents specific to the consideration of commercial fisheries are available from jurisdictions/countries with established offshore renewable energy sectors where comprehensive guidance has been developed. This guidance will be used to inform the assessment of the likely significant effects and specifically includes:

- Sea Fish Industry Authority and United Kingdom (UK) Fisheries Economic Network (UKFEN) (2012) Best practice guidance for fishing industry financial and economic impact assessments.
- Fishing Liaison with Offshore Wind and Wet Renewables Group (FLOWW) Best Practice Guidance for Offshore Renewables Developments. Recommendations for Fisheries Liaison. FLOWW (2014).
- FLOWW Best Practice Guidance for Offshore Renewables Developments: Recommendations for Fisheries Disruption Settlements and Community Funds. FLOWW (2015).
- Blyth-Skyrme, R.E. (2010) Options and opportunities for marine fisheries mitigation associated with wind farms. Final report for Collaborative Offshore Wind Research into the Environment contract FISHMITIG09. COWRIE Ltd, London; and
- Blyth-Skyrme, R.E. (2010) Developing guidance on fisheries Cumulative Impact Assessment for wind farm developers.

16.2.4 Data Collection and Collation

A range of data sources have informed this assessment, which are listed in Table 16.2. Data has been sourced from the Irish Sea Fisheries Protection Agency (SFPA), Bord Iascaigh Mhara (BIM; Ireland's Seafood Development Agency), the Irish Marine Institute, the Scientific, Technical and Economic Committee for Fisheries (STECF), ICES, the European Union (EU) Data Collection Framework (DCF), the UK Marine Management Organisation (MMO) and the European Maritime Safety Agency (EMSA).

Relevant literature from a number of sources has also been reviewed in the preparation of this report including Marine Institute (2017) Shellfish Atlas, the Marine Institute and BIM (2019) Shellfish Stocks and Fisheries Review and the Marine Institute (2020) Stock Book. A full catalogue of references and a description of the associated data limitations for each source are provided in Appendix 16.1.

Table 16.2 Data sources

Country	Data	Time period	Source
Landing statistics			
Ireland	Landings statistics data for Irish-registered vessels, with data query attributes for: species, weight of landing (kg) and first sales value (€) at the following geographic scales: • All ICES divisions • Irish Sea (7a) indicating port of landing • Irish Sea (7a) indicating ICES rectangle of catches.	2015 to 2022	Sea Fisheries Protection Agency (SFPA)
All Europe	Landings statistics for EU registered vessels with data query attributes for: landing year; landing quarter; ICES rectangle; vessel length; gear type; species; and, landed weight (tonnes).	2012 to 2016	EU Data Collection Framework (DCF) database
Ireland	Estimates of annual landings (tonnes) and value (€) of crustacean and bivalve shellfish (excl. prawns and mussels) into Ireland 2004-2019 (source: Logbook declarations and sales notes for vessels under 10 m, gatherer dockets, co-op data).	2004 to 2019	Marine Institute and BIM

Country	Data	Time period	Source
UK	Landings statistics data for UK-registered vessels, with data query attributes for: landing year; landing month; vessel length category; ICES rectangle; vessel/gear type; port of landing; species; live weight (tonnes); and value. These landings statistics are published annually by the MMO and include vessels registered to the following UK administrations and British crown dependencies: England, Wales, Scotland, Northern Ireland, Isle of Man (IOM), Guernsey and Jersey. Commercial fishing vessels that are registered to the IOM are required to hold both IOM and UK fishing licences.	2016 to 2021	Marine Management Organisation (MMO)
Spatial data and Vessel Monitoring System (VMS) data			
All Europe	VMS data for EU registered vessels ≥12m length. VMS data sourced from ICES displays the surface Swept Area Ratio (SAR) of catches by different gear types and covers EU (including UK) registered vessels 12m and over in length. Surface SAR indicates the number of times in an annual period that a demersal fishing gear makes contact with (or sweeps) the seabed surface. Surface SAR provides a proxy for fishing intensity.	2017 to 2020	ICES
All Europe	Fishing vessel route density, based on vessel Automatic Information System (AIS) positional data. AIS is required to be fitted on fishing vessels ≥15m length.	2019 to 2022	European Maritime Safety Agency (EMSA)
Ireland	Fishing vessel effort data indicating high and low fishing effort. The data are available for all EU vessels of 12m and larger, operating inside the Irish EEZ; outside this zone only Irish VMS data are routinely available within the data sets.	2014 to 2018	Marine Institute
Ireland	Polygon data indicating fishing grounds for Irish vessels operating inshore.	Undefined	Marine Institute
UK	VMS data for UK registered vessels ≥15m length. Note that UK vessels ≥12m in length have VMS on board, however, to date, the MMO provide amalgamated VMS datasets for ≥15m vessels only. VMS data sourced from MMO displays the first sales value (£) of catches.	2016 to 2020	MMO

16.2.5 Consultation

Information on fishing activity across the offshore development area has also been provided by the project Fisheries Liaison Officer (FLO) following consultation with Producer Organisations and fishers, summarised in Appendix 1.2: Consultation.

16.2.6 Methodology for Assessment of Effects

EIA significance criteria for commercial fisheries follows Environmental Protection Agency (EPA) guidance:

- EPA (2022) Guidelines on the information to be contained in Environmental Impact Assessment Reports.

The criteria for determining the sensitivity of the receiving environment and the magnitude of impacts for the commercial fisheries assessment are detailed in Table 16.3 and Table 16.4 respectively. A matrix was used for the determination of significance in EIA terms (Table 16.5). The combination of the magnitude of the predicted impact with the sensitivity of the receptor determines the significance of effect.

A summary of consultation with Commercial Fisheries stakeholders is provided in Appendix 1.2.

16.2.6.1 Sensitivity criteria

The definitions employed in assigning receptor sensitivity are provided in Table 16.3 and consider the following:

- Context – The degree to which the receptor will conform or contrast with the established (baseline) conditions. To define the context the following sub-factors will be considered:
  - Adaptability – The degree to which a receptor can avoid or adapt to an impact;
  - Tolerance – The ability of a receptor to accommodate temporary or permanent change without a significant adverse impact.
  - Recoverability – The temporal scale over and extent to which a receptor will recover following an impact; and
  - Value – A measure of the receptor's importance, rarity and worth.

Table 16.3 Sensitivity of the receiving environment

Receptor sensitivity	Definition
High	**Adaptability**: No alternative fishing grounds are available and/or the fishing fleet has very low operational range outside the proposed development boundary. **Tolerance**: Receptor is highly vulnerable to impacts that may arise from the project. **Recoverability**: Recoverability is long term or not possible. **Value**: The receptor is of very high socio-economic value.
Medium	**Adaptability**: Low levels of alternative fishing grounds are available and/or the fishing fleet has low operational range. **Tolerance**: Receptor is generally vulnerable to impacts that may arise from the project. **Recoverability**: Recoverability is slow and/or costly. **Value**: The receptor is of high socio-economic value.
Low	**Adaptability**: Moderate levels of alternative fishing grounds are available and/or fishing fleet has moderate operational range. **Tolerance**: Receptor is somewhat vulnerable to impacts that may arise from the project. **Recoverability**: Moderate to high levels of recoverability. **Value**: The receptor is of medium socio-economic value.
Negligible	**Adaptability**: High levels of alternative fishing grounds are available and/or fishing fleet has large to extensive operational range. **Tolerance**: Receptor is not generally vulnerable to impacts that may arise from the project and the fishing fleet is resilient to change. **Recoverability**: High or very high levels of recoverability. **Value**: The receptor is of low socio-economic value.

16.2.6.2 Magnitude of impact criteria

The definitions for magnitude consider the following:

- Extent - The area, the number of sites and/ or the proportion of a population affected over which an impact occurs.
- Duration - The time for which the impact occurs. The EPA (2022) guidelines defines long-term as between 15 to 60 years; medium-term 7 to 15 years and short-term as 1 to 7 years. The definitions of duration below are more precautionary (e.g. long-term is greater than 12 years) and aligns with EIA methodology established for UK assessments in the Irish Sea.
- Frequency - How often the impact occurs
- Probability - How likely the impact is to occur; and
- Consequences - The degree of change relative to the baseline level and the change in character.

Due to the range in scale, value (in terms of both landings and income/profit) and operational practises within the commercial fishing fleets assessed, specific economic criteria were not set for defining the level of consequence within the categories of high, medium, or low.

Instead, these classifications were based on judgement informed by the receiving environment characterisation and consultation with the industry. The definitions for each category of magnitude are defined in Table 16.4.

Table 16.4 Magnitude of the impact

Magnitude	Definition
High	• **Extent:** Impact is of considerable physical extent. • **Duration:** Impact is of long-term duration (i.e. greater than 12 years). • **Frequency:** The impact will occur continuously and constantly throughout the relevant project phase. • **Probability:** The impact is highly likely to occur. • **Consequences:** Impact is expected to result in one or more of the following: – Substantial loss of target fish or shellfish biological resource (e.g., loss of substantial proportion of resource within project area); and – Substantial loss of ability to carry on fishing activities (e.g., substantial proportion of effort within project area).
Medium	• **Extent:** Impact is of moderate physical extent. • **Duration:** Impact is of medium-term duration (i.e. less than 12 years). • **Frequency:** The impact will occur regularly throughout the relevant project phase. • **Probability:** The impact is likely to occur. • **Consequences:** Impact is expected to result in one or more of the following: – Partial loss of target fish or shellfish biological resource (e.g., moderate loss of resource within project area); and – Partial loss of ability to carry on fishing activities (e.g., moderate reduction of fishing effort within project area).
Low	• **Extent:** Impact is of limited physical extent. • **Duration:** Impact is of short-term duration (e.g., less than 5 years). • **Frequency:** The impact will occur intermittently throughout the relevant project phase. • **Probability:** The impact may occur. • **Consequences:** Impact is expected to result in one or more of the following: – Minor loss of target fish or shellfish biological resource (e.g., minor loss of resource within project area); and – Minor loss of ability to carry on fishing activities (e.g., minor reduction of fishing effort within project area).
Negligible	• **Extent:** Impact is of negligible physical extent. • **Duration:** Impact is very short-term duration (i.e. less than 2 years). • **Frequency:** The impact will occur infrequently throughout the relevant project phase. • **Probability:** The impact is unlikely to occur. • **Consequences:** Impact is expected to result in one or more of the following: – Slight loss of target fish or shellfish biological resource (e.g., slight loss of resource within project area); and – Slight loss of ability to carry on fishing activities (e.g., slight loss of fishing effort within project area).

16.2.6.3 Defining the significance of effect

The significance of the effect associated with an impact will be dependent upon the sensitivity of the receptor and magnitude of the impact. The assessment methodology for determining the significance of likely significant effects is described in Table 16.5. Effects defined as significant, very significant or profound are considered significant in EIA terms. An effect that has a significance of moderate, slight, not significant or imperceptible is not considered to be significant in EIA terms.

Table 16.5 Significance of likely significant effects upon commercial fisheries

			Existing Environment - Sensitivity			
			High	**Medium**	**Low**	**Negligible**
Description of Impact Magnitude	**Adverse impact**	**High**	Profound	Very significant	Moderate	Imperceptible
		Medium	Very significant	Significant	Moderate	Imperceptible
		Low	Moderate	Moderate	Slight	Imperceptible
		Negligible	Not significant	Not significant	Not significant	Imperceptible

Where relevant, mitigation measures that are incorporated as part of the proposed development design process and/ or can be considered to be industry standard practice (referred to as 'embedded mitigation') are considered throughout the chapter and are reflected in the outcome of the assessment of effects, described in Section 16.4.5. Additional mitigation measures that are not embedded and are considered as part of the residual effects assessment are described separately (Section 16.6).

16.3 Baseline Environment

16.3.1 Introduction

This section presents the existing receiving environment for commercial fisheries, using the most recent datasets available at the time of writing (2015-2021 for SFPA data; 2004-2019 for Marine Institute and BIM data; 2012-2016 for EU DCF data; 2016-2021 for MMO data; and 2016-2020 for ICES VMS data).

This section provides a summary of commercial fisheries activity that occurs within and around the proposed development.

A Commercial Fisheries Technical Report has been prepared (Appendix 16.1 of Volume 9) to provide a detailed characterisation of the baseline for commercial fisheries. A summary of the key findings from that study is provided in this section for the commercial fisheries local study area (i.e. ICES rectangles 36E3 and 36E4). Appendix 16.1 provides further details on target species and fishing vessel and gear characteristics, as well as comprehensively profiling the fisheries activity in the local and regional study areas, as well as the wider region of the Irish Sea. Full details of the data sources analysed, including data limitations, are provided in Appendix 16.1. The commercial fisheries regional study area informs the assessment of displacement effects, as well as the wider availability of alternative fishing grounds; the characterisation at an Irish Sea level informs the Cumulative Effects Assessment.

16.3.2 Receiving Environment

16.3.2.1 Commercial fisheries local study area

Landings by Irish registered vessels

Landings by Irish vessels from the commercial fisheries local study area (ICES rectangles 36E3 and 36E4) are presented by landed weight in Figure 4.18 of Appendix 16.1 for the time period 2016 to 2020.

The statistics indicate that on average 1,410 tonnes of *Nephrops norvegicus* (also known as Dublin Bay prawn, prawn, langoustine or Norway lobster, hereon referred to as nephrops) are landed annually, worth an estimated €10.2 million in first sales value per annum for landings by Irish vessels from 36E3 and 36E4 (based on a first sales value of €7,800 per tonne). The large majority of nephrops are landed from 36E4 which overlaps the array area.

Notable landings are recorded for sword razorshell (*Ensis* spp) from the inshore ICES rectangle 36E3, with an average of 330 tonnes landed annually, worth an estimated € 1.9 million in first sales value (based on a first sales value of €5,700 per tonne).

Other species of note landed from 36E3 include cockle (*Cardiidae*) (320 tonnes) and whelk (*Buccinidae*) (80 tonnes, €120,000 value per annum). Based on industry consultation, the landings data are understood to underestimate true levels of whelk, crab and lobster landings by potting vessels.

Landings by UK and other EU Member State vessels

Landings data for vessels registered in the UK and other EU Member States from the commercial fisheries local study area (36E3 and 36E4) is presented in Appendix 16.1.

The data indicates significant landings by UK (Northern Irish vessels) targeting the nephrops fishery in ICES rectangle 36E4; however, the majority of this effort is located outside the Irish territorial waters 12nm boundary and therefore outside the offshore development area.

A small level of landings by Belgian beam trawlers is noted to be caught in the local study area, but understood not to occur across the offshore development area.

16.4 Characteristics of the Proposed Development

This section outlines the characteristics of the proposed development that are relevant to the identification and assessment of likely significant effects on commercial fisheries during each phase of the proposed development. In this chapter this is limited to activities and infrastructure occurring in the offshore development area and it considers both Project Option 1 and Project Option 2 (the key characteristics of which are provided in Table 16.6, and are detailed in full in Section 6.2 of the Offshore Description Chapter).

Table 16.6 Key characteristics of Project Option 1 and Project Option 2

Key Offshore Characteristics	Project Option 1	Project Option 2
Array area	88.5km^2	88.5km^2
ECC	36.45km^2	36.45km^2
Landfall	One landfall site, immediately south of Bremore Point, which includes two subtidal exit pits within the ECC	One landfall site, immediately south of Bremore Point, which includes two subtidal exit pits within the ECC
Wind Turbine Generator (WTG)	49 WTGs with 250m rotor diameter	35 WTGs with 276m rotor diameter
WTG Foundations	49 monopiles of 12.5m diameter requiring seabed preparation	35 monopiles of 12.5m diameter or jacket foundations (three or four leg configurations, with 6m diameter pin piles) requiring seabed preparation
Offshore Substation Platform (OSP) Foundations (array area)	One OSP, with either a four-legged jacket foundation with pin piles, or one monopile; or two monopiles	One OSP, with either a four-legged jacket foundation with pin piles, or one monopile; or two monopiles
Cables	Installation of 111km of array cables within the array area and installation of two 18km export cables within the ECC	Installation of 91km of array cables within the array area and installation of two 18km export cables within the ECC

A presentation of the potential impacts in relation to Project Option 1 and Project Option 2 is provided, and the magnitude of those impacts in relation to the size and scale of the proposed development parameters. This enables the identification of the project option that will result in the greatest magnitude of impact on receptors and will therefore present the greatest potential for a likely significant effect (Table 16.8).

To determine the magnitude of the impact level analysis, calculations and mapping have been undertaken for the project option with the greatest magnitude of impact, including spatial mapping of key fishing grounds, for all impacts for the relevant receptor/s.

The significance of effect assessment has been undertaken for both project options, which considers both receptor sensitivity and the magnitude of the impact and is detailed in Section 16.5. Given the similarity of the project options in most instances the conclusions are the same. In some instances, the difference in magnitude of impact between project options results in a different categorisation of significance.

16.4.1 Parameters for assessment

The below activities and infrastructure and key design parameters have been considered within this chapter when determining the potential impacts. Further detail on the offshore elements of the proposed development is provided in Offshore Description Chapter and Offshore Construction Chapter. These parameters apply to both project options and any differences in values that may require consideration have been identified in Table 16.8.

16.4.2 Construction

During construction the following activities and infrastructure have the potential to impact on commercial fisheries:

- Pre-construction surveys within the ECC and array area
- Construction of the export cable, including cable pre-sweeping and the installation of cable and cable protection.
- Construction of the WTG and Offshore Substation Platform (OSP) foundations, including deployment of jack up vessels, anchor placement, cable pre-sweeping and the installation of inter-array cables; and
- Restricted access to offshore areas within the offshore development area including areas undergoing construction works and vessels undertaking construction activities.

16.4.3 Operational Phase

During operation, the following activities and infrastructure have the potential to impact on commercial fisheries:

- Physical presence of WTGs, OSP, inter-array cables and cable protection leading to disturbance to operations.
- Physical presence of export cable and cable protection
- Presence of maintenance vessel use during maintenance activities in the array area and ECC including safe passing distances.
- Cable repair, reburial, and maintenance activities; and
- Restricted access to the offshore development area.

16.4.4 Decommissioning

The infrastructure that will be decommissioned and methodology for doing so is not currently known but will be agreed prior to the commencement of decommissioning works and will be based upon current best regulations/practices and available technology, as described in the Offshore Description Chapter.

For the purposes of this assessment, the following activities and infrastructure have the potential to impact on commercial fisheries:

- Removal of WTG infrastructure including foundations (cut at 1m to 2m below seabed level);
- Removal of cables and associated cable protection; and
- Restricted access to the offshore development area.

As outlined in the Offshore Description Chapter, it is envisaged that, where appropriate, cables will be left in-situ when the proposed development is decommissioned, though discussions with stakeholders and regulators may identify the need for cables to be wholly or partially removed. Removal of cables would be of a similar magnitude of impact to construction and leaving cables in-situ would be of a similar magnitude of impact to the operational phase.

16.4.5 Embedded Mitigation Measures

The following embedded mitigation measures in Table 16.7 have been identified through the design and consultation process and are incorporated as part of the proposed development. The embedded mitigation measures will not be considered again at the residual effect stage.

Where additional mitigation is identified as being required to reduce the significance of the likely effect in EIA terms, this is presented in Section 16.6.

Table 16.7 Embedded mitigation relevant to commercial fisheries

Embedded mitigation	Justification
Construction	
Fisheries liaison	The Developer is committed to ongoing liaison with fishers throughout all stages of the project, including: • Continuation of the appointment of a company FLO to continue to maintain effective communications between the project and fishers, in compliance with the Seafood/ORE Engagement in Ireland guidance (Seafood/ORE Working Group, 2023); • Appropriate liaison with relevant fishing interests to ensure that they are fully informed of development planning and any offshore activities and works; • Timely issue of notifications including Notice to Mariners (NtMs), Kingfisher Bulletin notifications and other navigational warnings to the fishing community to provide advance warning of project activities and associated advisory safe passing distances; and • Development of an FMMS (Appendix 16.2) setting out in detail the approach to fisheries liaison and means of delivering co-existence and disruption payments.
Agreement of lighting and marking with Commissioners of Irish Lights during construction.	Implementation of a buoyed construction area around the site (assumed to be 12 construction buoys) during the appropriate phases, in consultation with Commissioners of Irish Lights.
Dropped objects	The approach for dealing with dropped objects, including reporting and recovery of dropped objects where they pose a potential hazard to other marine users, is included in the offshore environmental management plan (EMP). Measures to prevent dropped objects include: • Good housekeeping practices, with all wastes correctly stored. • Storage of hazardous chemicals as per material safety data sheet (MSDS); • Lift planning for over-the-side lifting (including appropriate crane rigging and load ratings, crane operator and rigger training and competency requirements) all lifting equipment will be tested and certified. • A ship-to-ship transfer permit will be in place • All deck items will be securely stowed • Transfers of objects will use specialist equipment and consider environmental conditions • Ongoing personnel awareness and training, and dropped object prevention programs (e.g., lanyards on hardhats, hand tools) • Safe working procedures to prevent dropped objects • Procedures will be put in place to ensure that the location of any lost material is recorded and that significant objects are recovered – including ROV and boat recovery where practicable

Embedded mitigation	Justification
	• Ongoing personnel awareness and training, and dropped object prevention programs; and • Waste Management Plan.
Cable Burial Risk Assessment (CBRA)	CBRA undertaken pre-construction following detailed site investigation surveys including consideration of under keel clearance and appropriate cable protection applied based upon the outcomes. To include consideration of requirements for monitoring of the protection.
Guard vessels	Use of temporary guard vessel during construction phase will be employed if deemed necessary during detailed design stage and following consultation with the relevant statutory authorities, e.g. to protect unlit structures and/or unprotected cable prior to burial.
Advisory safety zones	During construction the proposed development will deploy advisory safety zones around individual structures undergoing installation. Due to a lack of Irish guidance, it is proposed to establish zones based on the relevant UK guidance, UK guidance MGN 654 (Maritime and Coastguard Agency, 2021). Advisory safety zones of up to 500m in radius around individual structures undergoing installation will be established. Advisory safety zones of 50m will be sought for incomplete structures where construction activity may be temporarily paused (and therefore the 500m safety zone has lapsed) such as installed foundations or where construction works are completed but the WTGs have not yet been commissioned.
Advisory safe passing distances	Use of advisory safe passing distances including surrounding vessels that are undertaking sensitive construction, installation, or maintenance works. These vessels are likely to display Restricted in Ability to Manoeuvre (RAM) status.
Operation	
Fisheries liaison	The Developer is committed to ongoing liaison with fishers throughout all stages of the project, including: • Continuation of the appointment of a company FLO to continue to maintain effective communications between the project and fishers, in compliance with the Seafood/ORE Engagement in Ireland guidance (Seafood/ORE Working Group, 2023); • Appropriate liaison with relevant fishing interests to ensure that they are fully informed of development planning and any offshore activities and works; • Timely issue of notifications including Notice to Mariners (NtMs), Kingfisher Bulletin notifications and other navigational warnings to the fishing community to provide advance warning of project activities and associated advisory safe passing distances; and Development of a FMMS (Appendix 16.2) setting out in detail the approach to fisheries liaison and means of delivering co-existence and disruption payments.
Snagging	In the instance that snagging does occur, the Developer will work to the protocols laid out within the guidance produced by the UK FLOWW group and 'Recommendations for Fisheries Liaison: Best Practice' guidance for offshore renewable developers, in particular Section 11: Dealing with claims for loss or damage of gear as confirmed in the FMMS (Appendix 16.2).
Agreement of lighting and marking with Commissioners of Irish Lights during the operational phase.	The Developer is committed to marking and lighting the project in accordance with relevant industry guidance and as advised by relevant stakeholders including in accordance with IALA Recommendation O-139 (IALA, 2013) and Irish Lights requirements. In particular, the use of marine lighting to mark selected peripheral structures. The Developer will also ensure all structures associated with the proposed development are adequately marked on nautical and electronic charts.
Advisory safety zones	During the operational phase, the proposed development will deploy advisory safety zones around any WTG or OSP to protect technicians, crew and vessels on-site during any maintenance works. Safety zones are not a statutory requirement in Ireland meaning they are advisory only, however following UK guidance MGN 654 (Maritime and Coastguard Agency, 2021) the safety zones will be 50m during the operational phase.
Advisory safe passing distances	The proposed development will recommend that advisory clearance distances of up to 500m in radius are observed around cable installation vessels and cable repair vessels during the operational phase.

Embedded mitigation	Justification
Decommissioning	
Fisheries liaison	The Developer is committed to ongoing liaison with fishers throughout all stages of the project, including: • Continuation of the appointment of a company FLO to continue to maintain effective communications between the project and fishers, in compliance with the Seafood/ORE Engagement in Ireland guidance (Seafood/ORE Working Group, 2023); • Appropriate liaison with relevant fishing interests to ensure that they are fully informed of development planning and any offshore activities and works; • Timely issue of notifications including Notice to Mariners (NtMs), Kingfisher Bulletin notifications and other navigational warnings to the fishing community to provide advance warning of project activities and associated advisory safe passing distances; and Development of a FMMS (Appendix 16.2) setting out in detail the approach to fisheries liaison and means of delivering co-existence and disruption payments.
Agreement of lighting and marking with Commissioners of Irish Lights during decommissioning.	Implementation of a buoyed decommissioning area around the site (assumed to be 12 decommissioning buoys during the appropriate phases, in consultation with Commissioners of Irish Lights.
Advisory safety zones	During decommissioning the proposed development will deploy advisory safety zones around individual structures undergoing installation. Due to a lack of Irish guidance, it is proposed to establish zones based on the relevant UK guidance, UK guidance MGN 654 (Maritime and Coastguard Agency, 2021). Advisory safety zones of up to 500m in radius around individual structures undergoing installation will be established.
Advisory safe passing distances	Use of advisory safe passing distances including surrounding vessels that are undertaking sensitive decommissioning works. These vessels are likely to display Restricted in Ability to Manoeuvre (RAM) status.
Decommissioning strategy	A decommissioning strategy will be developed to cover the decommissioning phase and included as part of the Offshore EMP. The decommissioning strategy is anticipated to cover the removal of all structures above the seabed; cutting of piled foundations at approximately 1m to 2m below the seabed, with remaining sections fully buried; decision to leave or remove scour protection and buried assets; and secure burial of export cables in the intertidal area. As the decommissioning phase will be a similar process to the construction phase but in reverse (i.e., increased project vessels on-site, partially deconstructed structures) the embedded mitigation measure and post-effect mitigation measures will be similar to those for the construction phase.

Potential Impacts

The identification of potential impacts has been undertaken by considering the relevant characteristics from both project options (refer to Section 16.4.1) and the potential for a pathway for direct and indirect effects on known receptors (as identified in Section 16.3). Each identified impact relevant to commercial fisheries is presented in Table 16.8.

For each impact, the relevant project characteristics of Project Option 1 and Project Option 2 are presented to determine the magnitude (size or extent) of the potential impact, defined by the project parameters in the Offshore Description Chapter and in consideration of the WTG Limits of Deviation (LoD[1]), in line with the approach detailed in the EIAR Methodology Chapter. A comparison of the project options has then been undertaken to determine which project option has the greatest magnitude of impact.

[1] Both Project Option 1 and Project Option 2 layouts have a 500m Limit of Deviation (Lod)

Table 16.8 Potential impacts and magnitude of impact per project option. The project option that has the greatest magnitude of impact is identified in blue

Potential impact	Project Option 1	Project Option 2	Rationale for the project option with the greatest magnitude of impact
Construction phase			
2. 1. Array area construction activities and physical presence of offshore infrastructure during the construction period leading to reduction in access to, or exclusion from established fishing grounds	**Construction period:** • Up to 2 years (array area only) plus 12 months pre-construction preparation. **Advisory Safety Zones** • 500m advisory safety zones around construction activities • 50m advisory safety zones around partially complete infrastructure or complete project structures • 500m advisory clearance distances around installation vessels Seabed disturbance array area: • Seabed preparation at one OSP = 1,304m2. • Jack up vessel spud can footprint, anchoring operations, construction buoys (assumed 12) = 374,271m2. • Cable seabed preparation and installation in the array trench area affected: 111km length, 40m width (including preparatory seabed measures) = 4,440,000m2. Boulders required to be cleared across array area (IAC routes, WTG & OSP locations) & ECC = 4,909m2. **Total area of seabed affected (foundations, scour and inter-array cables) = 4,820,484m2** **Presence of infrastructure array area:** WTG footprint with scour protection, based on 49 WTG =121,767m2. One Offshore Substation Platform (OSP) foundations footprint = 4,788m2.	**Construction period**: Up to 2 years (array area only) plus 12 months pre-construction preparation. **Advisory Safety Zones** • 500m advisory safety zones around construction activities • 50m advisory safety zones around partially complete infrastructure or complete project structures • 500m advisory clearance distances around installation vessels Seabed disturbance array area: Seabed disturbance array area: • Seabed preparation at one OSP = 1,304m2. • Jack up vessel spud can footprint, anchoring operations, construction buoys (assumed 12) = 275,303m2. • Cable seabed preparation and installation in the array trench area affected: 91km length, 40m width (including preparatory seabed measures) = 3,640,000m2. Boulders required to be cleared across array area (IAC routes, WTG & OSP locations) & ECC = 3,534m2. **Total area of seabed affected (foundations, scour and inter-array cables) = 3,940,141m2** **Presence of infrastructure array area:** WTG footprint with scour protection, based on 35 WTG =162,982m2. One Offshore Substation Platform (OSP) foundations footprint = 4,788m2.	Both Project options have the same overall construction programme, although elements of the construction phase for Project Option 2 will be reduced due to a smaller number of WTGs the overall durations are the same due to the same suite of construction activities required for both. The construction footprint comprises the seabed area undergoing seabed preparation and exclusion zones around major activities. This includes the establishment of advisory safety zones of up to 500m in radius around individual structures. This may be bigger, depending on the nature of the works. It is important to note that the temporal aspect of temporary works will not apply in full throughout the 3 year construction phase. Project Option 1 is the project option with the greatest magnitude of impact for seabed preparation for WTGs/OSP and is based on 49 monopile WTGs and one monopile OSP. It should be noted that, incrementally, there will be a reduction in access due to the presence of WTGs/OSP and scour protection, cable crossings and cable protection, plus the temporary footprint of preparatory works. The permanent footprints are presented in the operational impact and are not repeated here. Project Option 1 is the project option with the greatest magnitude of impact for seabed preparation for cables and is based on a length of 111km of inter-array cables with a 40m wide installation corridor in which cable preparation activities may take place (this encompasses pre-lay activities (e.g. boulder removal), trenching and spoil width).

Potential impact	Project Option 1	Project Option 2	Rationale for the project option with the greatest magnitude of impact
	Pre- and post-lay rock berm area within array area (5 cable crossings) = 2750 m2. Inter array cable protection assuming (20% cable will require additional cable protection) = 111,000m2. **Total area of infrastructure (foundations, scour, cable protection) = 240,296m2.**	Pre- and post-lay rock berm area within array area (5 cable crossings) = 2750 m2. Inter array cable protection assuming (20% cable will require additional cable protection) = 91,000m2. **Total area of infrastructure (foundations, scour, cable protection) = 261,510m2.**	The OSP footprint is the same for both jackets or monopiles, the footprint is considered with scour as if jackets were used the scour protection would encompass the entire footprint of the jacket foundation in-between the jacket legs.
3. ECC construction activities and physical presence of constructed infrastructure leading to reduction in access to, or exclusion from established fishing grounds.	**Construction period:** • Up to 18 months (ECC only) including 12 months pre-construction preparation. **Advisory Safety Zones** 500m advisory safety zones around construction activities 50m advisory safety zones around partially complete infrastructure or complete project structures 500m advisory clearance distances around installation vessels **Seabed disturbance ECC:** Cable seabed preparation and installation in the ECC trench area affected: 18km length, 40m width (including preparatory seabed measures) = 1,440,000m2. Boulders required to be cleared across array area (IAC routes, WTG & OSP locations) & ECC = 9,817m2 **Subtidal HDD:** Total footprint of disturbance (exit pits, transition zone, temporary sidecast/ deposited material & JUV footprint) = 4,156m2. **Total area of seabed affected (ECC and HDD exit pit) = 1,449,065m2**	**Construction period:** • Up to 18 months (ECC only) including 12 months pre-construction preparation. **Advisory Safety Zones** 500m advisory safety zones around construction activities 50m advisory safety zones around partially complete infrastructure or complete project structures 500m advisory clearance distances around installation vessels **Seabed disturbance ECC:** Cable seabed preparation and installation in the ECC trench area affected: 18km length, 40m width (including preparatory seabed measures) = 1,440,000m2. Boulders required to be cleared across array area (IAC routes, WTG & OSP locations) & ECC = 7,069m2 **Subtidal HDD:** Total footprint of disturbance (exit pits, transition zone, temporary sidecast/ deposited material & JUV footprint) = 4,156m2. **Total area of seabed affected (ECC and HDD exit pit) = 1,451,225m2**	The ECC and export cable is the same for both project options therefore they have the same magnitude of impact.

Potential impact	Project Option 1	Project Option 2	Rationale for the project option with the greatest magnitude of impact
	Presence of infrastructure ECC: Cable protection assuming (20% cable will require additional cable protection) = 36,000m2 **Total area of infrastructure (foundations, scour, cable protection) = 36,0006m2**	**Presence of infrastructure ECC:** Cable protection assuming (20% cable will require additional cable protection) = 36,000m2 **Total area of infrastructure (foundations, scour, cable protection) = 36,0006m2**	
4. Displacement from within the offshore development area leading to gear conflict and increased fishing pressure on adjacent grounds.	**Construction period:** • Up to 3 years (for the entire offshore development area) including 12 months pre-construction preparation. Characteristics of the offshore development area are as considered in Impact 1 and Impact 2	**Construction period:** • Up to 3 years (for the entire offshore development area) including 12 months pre-construction preparation. Characteristics of the offshore development area are as considered in Impact 1 and Impact 2	Project option 1 represents the greatest duration and extent of fishing exclusion throughout the construction phase and hence the greatest potential for displacement.
5. Construction activities leading to disturbance of commercially important fish and shellfish resources leading to displacement or disruption of fishing activity.	The project option with the greatest magnitude of impact is presented in the Fish and Shellfish Ecology Chapter.	The project option with the greatest magnitude of impact is presented in the Fish and Shellfish Ecology Chapter.	Project Option 1 and Project Option 2 have the same magnitude of impact in relation to this impact.
6. Increased vessel traffic associated with the construction of the proposed development within fishing grounds leading to interference with fishing activity.	Maximum number of return trips for the delivery of main components and installation over the construction period: 3,008 Maximum number of vessels on site at any time: 49	Maximum number of return trips for the delivery of main components and installation over the construction period: 2,530 Maximum number of vessels on site at any time: 47	Project Option 1 is the project option with the greatest magnitude of impact and will lead to the highest level of construction activities and therefore highest level of construction vessel round trips. Project Option 1 is the project option with the greatest magnitude of impact and would result in the greatest potential for interference.
Operation			
7. Physical presence of array area infrastructure leading to reduction in access to, or exclusion from established fishing grounds.	Operational design life of 35 years. **WTG foundations and scour protection** • 49 x WTG foundations = 6,013m2 • Scour protection (total) = 115,754m2 **OSP foundation with scour protection** • Scour protection = 4,778m2	Operational design life of 35 years. **WTGs and OSP and scour protection** • 35 x WTG foundations = 4,295m2 • Scour protection (total) = 158,687m2 **OSP foundation with scour protection** • Scour protection = 4,778m2	Project option 1 represents the greatest duration and extent of fishing exclusion throughout the operational phase and hence the greatest potential to restrict access to fishing grounds.

Potential impact	Project Option 1	Project Option 2	Rationale for the project option with the greatest magnitude of impact
	Total WTG and OSP = 126,546m2 **Inter-array cable protection:** • 20% of 111km = 22km • Width of cable protection: 5m • Total footprint of cable protection = 111,000m2 **Total area of infrastructure (foundations, scour, cable protection) = 240,296m2.** **Advisory Safety Zones:** • Temporary 500m advisory safety zones around WTGs and OSP undergoing major maintenance. • Advisory clearance distances of up to 500m in radius are observed around cable installation vessels and cable repair vessels	**Total WTG and OSP = 167,760m2** **Inter-array cable protection:** • 20% of 91km = 18.2km • Width of cable protection: 5m • Total footprint of cable protection = 91,000m2 **Total area of infrastructure (foundations, scour, cable protection) = 261,510m2.** **Advisory Safety Zones:** • Temporary 500m advisory safety zones around WTGs and OSP undergoing major maintenance. • Advisory clearance distances of up to 500m in radius are observed around cable installation vessels and cable repair vessels	It comprises the greatest footprint of infrastructure (WTGs/OSPs, scour protection, cable crossings and cable protection for cables and entry to WTGs/OSPs) on the seabed, plus maintenance activities throughout the operational phase and associated temporary advisory safety zones. Project option 1 is the project option with the greatest magnitude of impact and is based on 49 x WTGs plus one OSP, each with 65m diameter GBS foundations and scour protection extending 15m from foundations in all directions. The smaller the spacing between WTGs the greater the potential for vessels to have restricted access to the site. Project option 1 is the project option with the greatest magnitude of impact and is based on 111km of inter-array cables. Assumes 20% of cable length is unburied due to ground conditions with 5m cable protection width. The assessment assumes that fishing will resume around and between infrastructure within the windfarm where possible, with the exception of an assumed 50m operating distance from infrastructure, areas of cable protection that cannot be fished, and advisory safety zones around infrastructure undergoing major maintenance or replacement. Furthermore, the individual decisions made by skippers with their own perception of risk will determine the likelihood of whether their fishing will resume within the proposed development. Inclement weather will be a significant contributor to this risk perception.
8. Physical presence of the export cable leading to reduction in access to, or exclusion from established fishing grounds.	Operational design life of 35 years. **Export cable:** • Two offshore export cable circuits; • 18km length of offshore export cable;	Operational design life of 35 years. **Export cable:** • Two offshore export cable circuits; • 18km length of offshore export cable;	The ECC and export cable is the same for both project options therefore they have the same magnitude of impact.

Potential impact	Project Option 1	Project Option 2	Rationale for the project option with the greatest magnitude of impact
	• 20% of offshore export cable requiring remedial protection of height 2m and width 5m; • Total footprint of cable protection = 36,000m2 • Zero cable crossings. **Total area of infrastructure (foundations, scour, cable protection) = 36,0006m2** **Advisory safe passing distances:** • Advisory safe passing distances of 500m around all active maintenance works • Advisory clearance distances of up to 500m in radius are observed around cable installation vessels and cable repair vessels	• 20% of offshore export cable requiring remedial protection of height 2m and width 5m; and • Zero cable crossings. **Total area of infrastructure (foundations, scour, cable protection) = 36,0006m2** **Advisory safe passing distances:** • Advisory safe passing distances of 500m around all active maintenance works • Advisory clearance distances of up to 500m in radius are observed around cable installation vessels and cable repair vessels	
9. Displacement from the offshore development area leading to gear conflict and increased fishing pressure on adjacent grounds.	Operational design life of 35 years. Characteristics of the offshore development area are as considered in Impact 6 and Impact 7	Operational design life of 35 years. Characteristics of the offshore development area are as considered in Impact 6 and Impact 7	Option 1 represents the greatest magnitude of impact in relation to this impact. Project option 1 represents the greatest duration and extent of fishing exclusion throughout the operational phase and hence the greatest potential to cause displacement. It comprises the surface piercing infrastructure and the greatest footprint of infrastructure (WTGs/OSPs, scour protection, cable crossings and cable protection for cables and entry to WTGs/OSPs) on the seabed, plus maintenance activities throughout the operational phase and associated temporary advisory safety zones.
10. Operational activities leading to displacement or disruption of commercially important fish and shellfish resources.	The project option with the greatest magnitude of impact is presented in the Fish and Shellfish Ecology Chapter.	The project option with the greatest magnitude of impact is presented in the Fish and Shellfish Ecology Chapter.	Project Option 1 and Project Option 2 have the same magnitude of impact in relation to this impact. The magnitude of the impact is defined by the area of seabed temporarily disturbed or damaged during maintenance activities. It includes areas affected by cable maintenance activities and jack-up vessel operations during the maintenance of WTG and OSP foundations.

Potential impact	Project Option 1	Project Option 2	Rationale for the project option with the greatest magnitude of impact
			The scenarios presented in the Fish and Shellfish Ecology chapter provide for the greatest disturbance to fish and shellfish species and therefore, the greatest knock-on effect to commercial fisheries. Importantly, this considers the impacts as a whole on commercially important species, rather than any one impact in particular.
11. Increased vessel traffic within fishing grounds as a result of changes to shipping routes and maintenance vessel traffic from the proposed development leading to interference with fishing activity.	• Maximum number of vessel return trips per year: 1,261 • Maximum number of vessels on site at any time: 12	• Maximum number of vessel return trips per year: 1,070 • Maximum number of vessels on site at any time: 12	Project Option 1 is the project option with the greatest magnitude of impact and will lead to the highest level of operational activities and therefore highest level of operational vessel round trips.
12. Physical presence of infrastructure leading to gear snagging.	Characteristics of the offshore development area are as considered in Impact 6 and Impact 7	Characteristics of the offshore development area are as considered in Impact 6 and Impact 7	Project Option 1 is the project option with the greatest magnitude of impact and represents the greatest potential for interactions between infrastructure and fishing gear.
Decommissioning phase			
13. Array area decommissioning activities leading to reduction in access to, or exclusion from, potential and/or established fishing grounds.	The decommissioning policy for the proposed development infrastructure is not yet defined however it is anticipated that structures above the seabed would be removed. The following infrastructure is likely be removed reused, or recycled where practicable: • WTGs and foundations (cut at 1m to 2m below the seabed); and • OSP including topsides and foundations (above or up to just under the seabed). The following infrastructure is likely to be decommissioned and could be left in situ depending on available information at the time of decommissioning:	The decommissioning policy for the proposed development infrastructure is not yet defined however it is anticipated that structures above the seabed would be removed. The following infrastructure is likely be removed reused, or recycled where practicable: • WTGs and foundations (above or up to just under the seabed); and • OSP including topsides and foundations (above or up to just under the seabed). The following infrastructure is likely to be decommissioned and could be left in situ depending on available information at the time of decommissioning:	The detail and scope of the decommissioning works will be determined by the relevant legislation and guidance at the time. Decommissioning arrangements will be detailed in a Decommissioning Plan, which will be subject to consultation with the Maritime Area Regulatory Authority (MARA) prior to decommissioning. Project Option 1 is the project option with the greatest magnitude of impact and it is anticipated that the impacts will be comparable to those identified for the construction phase.
14. ECC decommissioning activities leading to reduction in access to, or exclusion from established fishing grounds.			
15. Displacement from the offshore development area due to decommissioning activities leading to gear conflict and increased fishing pressure on adjacent grounds.			

Potential impact	Project Option 1	Project Option 2	Rationale for the project option with the greatest magnitude of impact
16. Decommissioning activities leading to displacement or disruption of commercially important fish and shellfish resources.	• Inter-array cables • Scour protection • Cable protection; and • Part of the foundations (e.g. some foundation material below the seabed may be left in situ). In the absence of detailed methodologies and schedules, decommissioning works and associated implications for commercial fisheries are considered analogous with those assessed for the construction phase.	• Inter-array cables • Scour protection • Cable protection; and • Part of the foundations (e.g. some foundation material below the seabed may be left in situ). In the absence of detailed methodologies and schedules, decommissioning works and associated implications for commercial fisheries are considered analogous with those assessed for the construction phase.	
17. Increased vessel traffic within fishing grounds as a result of changes to shipping routes and transiting decommissioning vessel traffic from the proposed development leading to interference with fishing activity.			
18. Physical presence of any infrastructure left in situ leading to gear snagging			

16.5 Potential Effects

The likely significant effects on commercial fisheries for each stage of the proposed development are considered, specifically, the likely significant effects of the proposed development during its construction, operational, and decommissioning phases associated with the offshore development area. The environment in the vicinity of the proposed development is naturally dynamic, and as such will exhibit some level of natural variation and change over time whether the proposed development proceeds or not.

Consequently, the identification and assessment of likely significant effects must be done in the context of natural change, both spatial and temporal.

16.5.1 Do-Nothing Scenario

In the do-nothing scenario, the proposed development would not be constructed and the commercial fisheries active across the offshore development area would continue in accordance with the characterised baseline.

The baseline assessment has demonstrated that commercial fisheries landings and activity varies from year-to-year, and that changing trends are normal and expected in future fisheries baseline environment. Patterns in commercial fisheries change and fluctuate based on a range of natural and management-controlled factors. This includes the following:

- Brexit: there have been two schemes to support the Irish fishing industry due to the reduction in the Total Allowable catches (TACs) and quotas as a result of Brexit:
  - Tie up scheme: for 1 month in 2021 and for 2 months in 2022; and
  - Decommissioning scheme: in 2023 which saw approximately 42 vessels enter decommissioning, equating to 20% of the offshore fleet. This included some vessels that fished across the offshore development area.
- Market demand: commercial fishing fleets respond to market demand, which is impacted by a range of factors, including the COVID pandemic affecting landings in 2020 and 2021.
- Market prices: commercial fishing fleets respond to market prices by focusing effort on higher value target species when prices are high, and markets are in demand.
- Stock abundance: fluctuation in the biomass of individual species stocks in response to status of the stock, recruitment, natural disturbances (e.g. due to storms, sea temperature etc.), climate change and changes in fishing pressure etc.
- Fisheries management: including new management for specific species where overexploitation has been identified, or changes in TACs leading to the relocation of effort, and/or an overall increase/decrease of effort and catches from specific areas.
- Environmental management: including the potential restriction of certain fisheries within protected areas.
- Improved efficiency and gear technology: with fishing fleets constantly evolving to reduce operational costs e.g. by moving from beam trawl to demersal seine; and
- Sustainability: with seafood buyers more frequently requesting certification of the sustainably of fish and shellfish products, such as the Marine Stewardship Council certification, industry is adapting to improve fisheries management and wider environmental impacts.

The variations and trends in commercial fisheries activity are an important aspect of the baseline assessment and forms the principal reason for considering up to five years of key baseline data. Given the time periods assessed, the future baseline scenario would typically be reflected within the current baseline assessment undertaken. However, in this case, existing baseline data do not capture any potential changes in commercial fisheries activity resulting from the withdrawal of the UK from the EU.

Following withdrawal, the UK and the EU have agreed to a Trade and Cooperation Agreement (TCA), from 1 January 2021. The TCA sets out fisheries rights and confirms that from 1 January 2021 and during a transition period until 30 June 2026, UK and EU vessels will continue to access respective Excusive Economic Zones (EEZs, 12 to 200nm) to fish. In this period, UK vessels will not have reciprocal access to the Irish territorial waters, between 0 to 12nm.

Twenty five percent of the EU's fisheries quota in UK waters will be transferred to the UK over the five-year transition period; most of this quota has already been transferred. After the five-year transition there will be annual discussions on fisheries opportunities. Across the local and regional study area, Irish fisheries have been impacted by quota transfers and this has led to a tie-up scheme and decommissioning vessel scheme to support the Irish catching sector.

Market changes have the potential to impact fishing activity in the regional study area; including prices of key species. Notably, the whelk fishery has grown and expanded in recent years which has pushed grounds further north.

16.5.2 Construction Phase

The impacts of the offshore construction of the proposed development have been assessed on commercial fisheries. The potential impacts arising from the construction of the proposed development are listed in Section 16.4.6. A description of the effects on commercial fisheries receptors caused by each identified impact is given below.

16.5.2.1 Impact 1 – Array area construction activities and physical presence of offshore infrastructure during the construction period leading to reduction in access to, or exclusion from established fishing grounds

During construction of the array area, associated infrastructure and inter-array cabling, commercial fisheries will be prevented from fishing where construction activities are taking place (plus roaming 500m safe passing distance for mobile installation vessels) across the construction period. The total construction duration for the array area will be over the course of 2 years, with a range of construction activities being undertaken simultaneously. In addition, pre-construction activities of up to 12 months will precede the offshore construction period and include pre-construction surveys and seabed preparations.

Sensitivity of the receptor

Irish demersal otter trawlers: the nephrops fishing grounds extend across much of ICES rectangle 36E4, within a fishery footprint area of approximately 1,500km^2. The array area overlaps with approximately 6% of the nephrops grounds that are routinely fished by Irish vessels both inside and outside territorial waters (based on the VMS data from the Marine Institute shown in Figure 3.4 of Appendix 16.1). Given that the nephrops fishery is targeted both inside and outside the array area, and the overall extent of nephrops fishing grounds in the local study area and within the array area, together with the gear configuration (which is normally twin-rigged or quad-rigged trawl nets), the sensitivity is assessed to be medium for Irish demersal otter trawlers. This aligns with the sensitivity definition provided in Table 16.3, in that low levels of alternative fishing grounds are available to the Irish demersal otter trawl fleet targeting nephrops, that this fleet is generally vulnerable to impacts and has a high socio-economic value.

UK demersal otter trawlers: access to the 12nm territorial waters is currently prohibited, meaning that UK vessels do not currently target fishing grounds within the array area. However, this reciprocal access may be restored in the future, and within the timeframe of the construction phase. Given the potential resumption of fishing within Irish territorial waters, the sensitivity is assessed to be medium for UK demersal otter trawlers.

Irish potters: potting gear is not routinely deployed within the array area, noting that nephrops are not targeted with pots in this area. Potting for whelk, brown crab and lobster occurs in areas inshore from the array area. Given the level of alternative grounds, the sensitivity is assessed to be low for Irish potters.

All other fleets: due to the availability and range of alternative fishing grounds for all other fleets assessed, the sensitivity is considered to be low.

Magnitude of impact

This impact will lead to a localised loss of access to fishing grounds and the fish resources within these grounds for a range of fishing opportunities during the 3-year construction period.

In terms of the area impacted by construction activities, in total up to 4.8km^2 of seabed will be disturbed during construction, which equates to 5% of the total array area.

During construction, the proposed development will deploy advisory safety zones around individual structures undergoing installation. Due to a lack of Irish guidance, it is proposed to establish zones based on the relevant UK guidance, UK guidance MGN 654 (Maritime and Coastguard Agency, 2016). Advisory safety zones of up to 500m in radius around individual structures undergoing installation will be established (equating to 0.79km^2 per structure). Advisory safety zones of 50m will be sought for incomplete structures where construction activity may be temporarily paused (and therefore the 500m advisory safety zone has lapsed) such as installed foundations or where construction works are completed but the WTGs have not yet been commissioned. Where deemed appropriate and in consultation with the relevant statutory authorities, guard vessels may be deployed.

In addition, there will be 500m advisory safety zones around infrastructure under construction (equating to 0.79km^2 per structure) and 500m advisory distance around construction vessels (equating to 3.14km^2 per vessel). While fishing within the array area during the construction process will not be legally prohibited, it is expected that fishers will avoid the construction area. As per the embedded mitigation, liaison with the fishing industry will ensure timely provision of details of the construction works, timing and location to allow fishers to plan their activities appropriately.

The impact is described below on a fleet-by-fleet basis. Irish demersal otter trawlers targeting nephrops and haddock and mixed demersal species: Nephrops is the main species landed within the Irish Sea mixed fisheries targeted using demersal otter trawls. Other species in the nephrops fishery constitute a low proportion of the overall landings and include cod *Gadus morhua*, haddock *Melanogrammus aeglefinus*, and anglerfish *Lophius* spp. A highly significant nephrops fishery is located within ICES rectangle 36E4. This nephrops fishery within the Irish Sea West Functional Unit 15, is targeted by vessels registered in Ireland and Northern Ireland, and other international fleets.

On average, Irish vessels land 1,410 tonnes of nephrops from the commercial fisheries local study area. To put this in context, within the Irish EEZ, Irish vessels land a total of 4,579 tonnes of nephrops (from all sea areas inside Irish EEZ); the commercial fisheries local study area therefore equates to 31% of Irish vessels landings of nephrops from the Irish EEZ. Spatial mapping data is available to evidence the location of the nephrops fishery, as presented in Appendix 16.1 (specifically Figures 3.2, 3.3 and 3.4). Analysis of surface swept area ratio data, as presented in Figure 3.2 (of Appendix 16.1), indicates that approximately 12% of the nephrops fishing intensity within 36E4 occurs within the array area. This proportional analysis is based on five years (2016 to 2020) of VMS fishing intensity (surface swept area ratio) data (see Figure 3.2 of Appendix 16.1 Commercial Fisheries Technical Report). Cross-referencing with landings data provides an average first sales value of approximately €1.55 million of nephrops caught by Irish trawlers from inside the array area during an annual period. Nephrops are largely sedentary creatures inhabiting burrows created in fine muddy sediments; fishing grounds are highly correlated to specific muddy habitats. The offshore development area overlaps with nationally significant and highly important nephrops fishing grounds that form part of the Irish Sea West Nephrops Functional Unit (FU15). Due to the high commercial value of the fishery operating specifically within the array area, coupled with the dependence on specific distinct muddy habitat types and the national significance of the nephrops fishery within the Irish territorial waters, the magnitude is assessed to be high for Irish demersal otter trawlers for both Project Option 1 and Project Option 2.

UK demersal otter trawlers also target nephrops within FU15, particularly vessels registered in Northern Ireland. However, the majority of UK effort is focused east of the Irish 12nm boundary and outside of the array area (see Figure 3.5 of Appendix 16.1). The magnitude is assessed to be low for UK demersal otter trawlers for both Project Option 1 and Project Option 2.

Irish potters targeting crab and lobster with creels and whelk with plastic pots: potting vessels are understood to operate south of the array area, and also along the edge of the grounds targeted by the nephrops trawl directed fishery, which is supported by scouting surveys, stakeholder consultation, VMS data, inshore fishery mapping and by virtue of the mobile effort across the array area (which makes co-existence of these gear types challenging). Nephrops are not targeted by creels or pots in this area. The magnitude is assessed to be low for Irish potters for both Project Option 1 and Project Option 2.

Beam trawl fishery: A beam trawl directed fishery targets flatfish (sole *Solea solea*, plaice *Pleuronectes platessa*, brill *Scophthalmus rhombus* and turbot *Psetta maxima*) and ray species (thornback ray *Raja clavata* and blonde ray *R. brachyura*). Very low activity is recorded within the local study area. Vessel Monitoring System (VMS) data indicates a beam trawl fishery approximately 40km south-east of the array area (outside of the local study area and within the regional study area). The magnitude is assessed to be low for the beam trawl fishery for both Project Option 1 and Project Option 2.

Scallop dredge fishery: A scallop directed fishery targets king scallop *Pectan maximus* within Irish territorial waters. The majority of grounds targeted are located outside and south of the array area, although a small patch overlaps with the very north-west tip of the array area. The statistics indicate that negligible quantities of king scallop are landed by Irish vessels from 36E4 (based on five-year data 2016-2020; data source SFPA, 2022). Therefore, it is assumed that negligible landings of scallop are taken from the array area. The magnitude is assessed to be low for the scallop dredge fishery for both Project Option 1 and Project Option 2.

Pelagic trawl fishery: Pelagic fisheries typically operate across wide geographic area to catch shoaling fish as they migrate to spawning grounds. The catches of pelagic species varies both spatially and temporally. Typically, in the wider Celtic Seas ecoregion, pelagic fisheries are targeted predominately along the shelf edge, to the west of Ireland. Some pelagic fisheries do occur within the Irish Sea (Division 7a), including herring *Clupea harengus* and sprat *Sprattus sprattus*. Landing statistics for the 36E4 indicate small quantities of landings of herring from 2018-2020. The magnitude is assessed to be low for the pelagic trawl fishery for both Project Option 1 and Project Option 2.

Significance of the effect

Irish demersal otter trawlers: overall, the sensitivity of the receptor is considered to be medium and the magnitude is deemed to be high for both Project Option 1 and Project Option 2. The significance of effect will, therefore, be very significant for both Project Option 1 and Project Option 2, which is significant in EIA terms (refer to Table 16.5 on defining the significance of effects).

UK demersal otter trawlers: overall, the sensitivity of the receptor is considered to be medium and the magnitude is deemed to be low for both Project Option 1 and Project Option 2. The significance of effect will, therefore, be moderate for both Project Option 1 and Project Option 2, which is not significant in EIA terms.

All other fleets: overall, the sensitivity of the receptors is considered to be low and the magnitude is deemed to be low for both Project Option 1 and Project Option 2. The significance of effect will, therefore, be slight for both Project Option 1 and Project Option 2, which is not significant in EIA terms.

16.5.2.2 Impact 2 – ECC construction activities and physical presence of constructed infrastructure leading to reduction in access to, or exclusion from established fishing grounds

Fishing activity will be locally and temporarily excluded at the location of construction owing to the presence of construction vessels, construction operations and the need to observe The Convention on the International Regulations for Preventing Collisions at Sea, 1972 (COLREGS). Specifically: Rule 18 Responsibilities between vessels I. A vessel engaged in fishing when underway shall, so far as possible, keep out of the way of: (i) a vessel not under command; (ii) a vessel restricted in her ability to manoeuvre. It is considered that construction vessels would be restricted in the ability to manoeuvre when engaged in active construction activities and therefore will be avoided by fishing vessels actively engaged in fishing.

The construction scenario assumes a construction period of up to 3 years. The ECC is 18km in length for both project options and it is assumed that 20% of the cable (i.e. 3.6km or 2nm length of cable) will require additional cable protection techniques such as concrete mattressing and/or loose rock placement.

In addition, advisory safe passing distances up to 500m radius around cable installation vessels active along the ECC is recommended i.e. a roaming 0.79km^2 area along the 18km ECC.

Sensitivity of the receptor

Irish demersal otter trawlers given the higher dependence of Irish vessels targeting nephrops grounds within territorial waters, the sensitivity is assessed to be medium.

UK demersal otter trawlers given the potential for reciprocal access to be restored within the timeframe of the construction phase, the sensitivity is assessed to be medium.

Irish potters: are typically < 15m in length and operate across more distinct areas of ground, typically 0 to 6nm from shore, but also extending from 6nm. The sensitivity of the Irish potting fleet is therefore, considered to be medium.

Irish razor dredgers: operate in very discrete specific grounds running parallel to the coastline within a channel that is 1-2nm wide. While alternative grounds are available both north and south of the ECC, it is clear that fishing grounds are highly specific and therefore the sensitivity is assessed to be medium for both Project Option 1 and Project Option 2.

All other fleets: due to the availability and range of alternative fishing grounds for all other fleets assessed, the sensitivity is considered to be low.

Magnitude of impact

Irish demersal otter trawlers: The nephrops fishing grounds that overlap with the array area extend into the east portion of the ECC, within a channel of approximately 1-2nm wide. This is located within ICES rectangle 36E4, and is immediately adjacent to the array area. This area forms part of a fishing trawl route running from south-east (inside the array area) to north-west (into the ECC). Small levels of activity by demersal otter trawling vessels are recorded across the remainder of the ECC. The Irish demersal otter trawlers would be required to fish elsewhere during the short-term construction period due to the roaming advisory safe passing distances from cable installation vessels. Given the high value of the nephrops grounds, even a short-term exclusion could impact a number of trawling vessels and therefore the magnitude is assessed to be medium for both Project Option 1 and Project Option 2.

UK demersal otter trawlers: there are low levels of activity by this UK fleet across the ECC (see Figure 3.5 of Appendix 16.1). The magnitude is assessed to be low for both Project Option 1 and Project Option 2.

Irish potters: Potting for whelk, crab and lobster is understood to occur across the ECC. Potting vessels are typically 12m and under in length and operate from a range of home ports along the central east coast of Ireland. Whelk are typically fished in water depths between 0 and 30m and areas where trawlers are active are generally avoided. Mapping for inshore potting grounds (see Figure 3.16 of Appendix 16.1) indicate that whelk grounds are located approximately 20km from the ECC. However, consultation with the local fleet indicates that whelk ground have extended north to areas across the ECC. Similarly for crab and lobster grounds, these are also mapped in inshore locations just south of the offshore development area, but are understood to have also extended north across the ECC. The available data corroborates that fishing by pots occurs across the ECC, specifically scouting surveys undertaken to assess that activity across the proposed development, together with landing statistics for local ports (see Section 4.1.1 of Appendix 16.1). During the construction phase, vessels with pots set along the ECC will be required to move these pots and cease fishing activities at particular construction locations. Sufficient notice, together with the support of a guard vessel where appropriate, will be provided to facilitate this process. Overall, given the activity across the ECC, together with the requirement for vessels to relocate their potting gear, the magnitude is assessed to be medium for both Project Option 1 and Project Option 2.

Irish razor dredgers: Activity is well understood for this fleet because razor clam vessels are required to use GPS tracker (inshore Vessel Monitoring Systems, iVMS) to demonstrate that their catch is from classified shellfish waters for food hygiene purposes. Mapping is presented in Figures 3.7, 3.8 and 3.9 of Appendix 16.1 which clearly demonstrate the presence of the fishery across the inshore section of the ECC. Data sources include inshore fishing ground mapping; iVMS for vessels of all lengths and VMS for vessels 12m and over.

All data sources corroborate the location of the hydraulic suction dredge fishery targeting razor shell across grounds running parallel to the coastline from 0 to 2nm (see Figure 3.9 of Appendix 16.1 Commercial Fisheries Technical Report). This is supported with landings statistics, which indicate considerable value of razor shell landed by Irish vessels from the Irish Sea, including from ICES rectangle 36E3, with an average of 330 tonnes landed annually, worth an estimated €1.9 million in first sales value per annum. These grounds overlap the inshore portion of the ECC and fishing vessels would be required to fish elsewhere during the construction period. Overall, given the activity across the ECC, together with the requirement to fish elsewhere during the short-term construction period due to the roaming advisory safety distances from cable installation vessels, the magnitude is assessed to be medium for both Project Option 1 and Project Option 2.

Scallop dredge fishery: Inshore scallop dredge grounds are indicated to overlap the ECC (see Figure 3.8 of Appendix 16.1). However, negligible landings of scallop are evident within landing statistics for ICES rectangle 36E3. The magnitude for the scallop dredge fishery is assessed to be low for both Project Option 1 and Project Option 2.

Mussel seed dredge fishery: The mussel fishery targets seed, which are re-laid for on-growing of bottom cultured mussel in aquaculture licence areas. The mussel beds targeted by Irish vessels are considered ephemeral, and therefore harvest rates can be up to 100% of a mussel bed, as seed is not required to be maintained for reproductive capacity (Marine Institute, 2017). Mussel seed may be found in small patches at the edge of sand banks and on coarse sediments and rock which are scoured by strong currents. VMS data for mussel seed dredge activity shows no activity across the offshore development area from 2015 to 2017 (Marine Institute, 2018). The magnitude for the mussel seed dredge fishery is assessed to be low for both Project Option 1 and Project Option 2.

Beam trawl fishery: No activity is recorded for the beam trawl fleet within the ECC (as evidenced in Figure 3.12 of Appendix 16.1). The magnitude for the beam trawl fishery is assessed to be low for both Project Option 1 and Project Option 2.

Pelagic trawl fishery: No activity is recorded for the pelagic trawl fleet within the ECC (as evidenced in Figure 3.15 of Appendix 16.1). The magnitude for the pelagic trawl fishery is assessed to be low for both Project Option 1 and Project Option 2.

Significance of the effect

Irish demersal otter trawlers: overall, the sensitivity of the receptor is considered to be medium and the magnitude is deemed to be medium for both Project Option 1 and Project Option 2. The significance of effect will, therefore, be significant for both Project Option 1 and Project Option 2, which is significant in EIA terms (refer to Table 16.5 on defining the significance of effects).

UK demersal otter trawlers: overall, the sensitivity of the receptor is considered to be medium and the magnitude is deemed to be low for both Project Option 1 and Project Option 2. The significance of effect will, therefore, be moderate for both Project Option 1 and Project Option 2, which is not significant in EIA terms.

Irish potting vessels: overall, the sensitivity of the receptor is considered to be medium and the magnitude is deemed to be medium for both Project Option 1 and Project Option 2. The significance of effect will, therefore, be significant for both Project Option 1 and Project Option 2, which is significant in EIA terms.

Irish razor dredgers: overall, the sensitivity of the receptor is considered to be medium and the magnitude is deemed to be medium for both Project Option 1 and Project Option 2. The significance of effect will, therefore, be significant for both Project Option 1 and Project Option 2, which is significant in EIA terms.

All other fleets: overall, the sensitivity of the receptors is considered to be low and the magnitude is deemed to be low for both Project Option 1 and Project Option 2. The significance of effect will, therefore, be slight for both Project Option 1 and Project Option 2, which is not significant in EIA terms.

16.5.2.3 Impact–3 - Displacement from within the offshore development area leading to gear conflict and increased fishing pressure on adjacent grounds

Sensitivity of the receptor

Irish demersal otter trawlers: given the higher dependence of Irish vessels targeting nephrops grounds within territorial waters, the sensitivity is assessed to be medium.

UK demersal otter trawlers: given the potential for increased pressure from Irish vessels moving from the proposed development area to areas outside territorial waters, the sensitivity is assessed to be medium.

Irish potters: are typically smaller in size with lower operational range and therefore the sensitivity is considered to be medium.

Irish razor dredgers: operate in very discrete specific grounds and therefore the sensitivity is assessed to be medium.

All other fleets: due to the availability and range of alternative fishing grounds for all other fleets assessed, the sensitivity is considered to be low.

Magnitude of impact

Irish demersal otter trawlers: localised exclusion from fishing grounds during the construction phase may lead to increased fishing pressure on adjacent nephrops grounds. Specifically, displacement is likely to result in increased effort by Irish vessels outside of the 12nm boundary and into the Irish EEZ where Northern Irish vessels also target (as described in Appendix 16.1). The magnitude of displacement is assessed to be medium for both Project Option 1 and Project Option 2.

UK demersal otter trawlers: while these vessels will not be displaced from the offshore development area, they may experience increased competition within the grounds they routinely fish due to displacement of Irish vessels. The magnitude of displacement is assessed to be medium for both Project Option 1 and Project Option 2.

Irish potters: conflict over diminished grounds is also likely to be of concern to the Irish potting vessels, if displaced vessels operating mobile gear explore grounds traditionally fished by potters. Displacement of mobile gear may therefore increase the risk of interaction with potting grounds and gear.

However, the seabed targeted by nephrops trawlers (soft, muddy sediment) is distinct from that targeted for lobster and crab (hard, rockier ground), which lowers the likelihood for increased gear conflict. When considering the impact of potters being displaced into grounds already targeted by potters two scenarios are feasible:

- Alternative fishing grounds are available to relocate gear, in which case gear conflict and displacement effects will be low; or
- Alternative fishing grounds are not available as adjacent areas are already being fished by potters, in which case the gear already on the ground limits the level of displacement. While there remains potential for gear conflicts and increased fishing pressure to arise, appropriately mitigated exclusion impacts will limit this.

On balance, the displacement effect to Irish potters targeting the offshore development area is considered to have a lower magnitude of impact than the exclusion impact; this is assuming that any exclusion impact is mitigated and that a portion of the effort excluded would be accommodated by alternative grounds available for re-located gear. Taking all of these aspects into consideration, the magnitude of the displacement impact is assessed to be low for both Project Option 1 and Project Option 2.

Irish razor dredgers: there is potential for displaced razor dredgers to increase pressure on grounds to the north and south of the ECC, however appropriately mitigated exclusion impacts will limit this. The displacement effect to Irish razor dredgers targeting the offshore development area is considered to have a lower magnitude of impact than the exclusion impact causing the displacement. The magnitude of the displacement impact is assessed to be low for both Project Option 1 and Project Option 2.

All other fleets: limited displacement is expected to occur for all other fleets given the low level of activity across the proposed development. The magnitude for all other fleets is assessed to be low for both Project Option 1 and Project Option 2.

Significance of the effect

Irish demersal otter trawlers: overall, the sensitivity of the receptor is considered to be medium and the magnitude is deemed to be medium for both Project Option 1 and Project Option 2. The significance of effect will, therefore, be significant for both Project Option 1 and Project Option 2, which is significant in EIA terms (refer to Table 16.5 on defining the significance of effects).

UK demersal otter trawlers: overall, the sensitivity of the receptor is considered to be medium and the magnitude is deemed to be medium for both Project Option 1 and Project Option 2. The significance of effect will, therefore, be significant for both Project Option 1 and Project Option 2, which is significant in EIA terms.

Irish potting vessels: overall, the sensitivity of the receptor is considered to be medium and the magnitude is deemed to be low for both Project Option 1 and Project Option 2. The significance of effect will, therefore, be moderate for both Project Option 1 and Project Option 2, which is not significant in EIA terms.

Irish razor dredgers: overall, the sensitivity of the receptor is considered to be medium and the magnitude is deemed to be low for both Project Option 1 and Project Option 2. The significance of effect will, therefore, be moderate for both Project Option 1 and Project Option 2, which is not significant in EIA terms.

All other fleets: overall, the sensitivity of the receptors is considered to be low and the magnitude is deemed to be low for both Project Option 1 and Project Option 2. The significance of effect will, therefore, be slight for both Project Option 1 and Project Option 2, which is not significant in EIA terms.

16.5.2.4 Impact 4- Construction activities leading to disturbance of commercially important fish and shellfish resources leading to displacement or disruption of fishing activity

Sensitivity of the receptor

Exposure to the impact is likely and commercial fleets targeting key species will be affected, including nephrops, brown crab, lobster, whelk and razor shell.

Due to the importance of the nephrops grounds located within the array area and ECC, the sensitivity of Irish demersal otter trawlers targeting nephrops is considered to be medium.

Due to the locality of the impact on razor shell, brown crab and lobster, the sensitivity of the Irish potting fleet and Irish razor dredge fleet is considered to be medium. This is based on the potential for grounds beyond the immediate construction activities to be affected by increased suspended sediment and sediment deposition, impacting the wider fished areas.

Due to the range of alternative areas targeted and the distribution of key commercial species throughout the Irish Sea the sensitivity of all other fleets is considered to be low.

Magnitude of impact

Detailed assessments of the following potential construction impacts have been undertaken in the Fish and Shellfish Ecology Chapter for key commercial shellfish species (including nephrops, brown crab, lobster, razor shell and whelk) and finfish species such as haddock, cod, whiting etc):

- Temporary habitat loss/disturbance from construction operations including foundation installation and cable laying operations.
- Increased suspended sediment concentrations as a result of foundation installation, cable installation and seabed preparation.
- Sediment deposition as a result of foundation installation, cable installation and seabed preparation; and

- Underwater noise as a result of foundation installation (i.e. piling) and other construction activities (e.g., cable installation).

With respect to the magnitude of this impact on commercial fisheries, the overall significance of the effect on fish and shellfish species is considered (i.e. both the magnitude and sensitivity of fish and shellfish species are considered to assess the magnitude on commercial fishing fleets). For instance, where an effect of negligible significance is assessed for a species, a negligible magnitude is assessed for commercial fishing; where an effect of slight significance is assessed for a species, a low magnitude is assessed for commercial fishing, and so on.

Details of the fish and shellfish ecology assessment are summarised in Table 16.9; with evidence, modelling and justifications for these assessments provided in the Fish and Shellfish Ecology Chapter.

The magnitude is therefore considered to be medium for nephrops within the array area and low for all other species for both Project Option 1 and Project Option 2.

Table 16.9 Significance of effects of construction impacts on fish and shellfish species relevant to commercial fisheries receptors

Potential impact	Species	Significance of effect
Habitat loss/ disturbance	Nephrops	Moderate
	Brown crab and lobster	Slight
	Razor shell	Slight
	All other fish and shellfish species	Slight
Increased suspended sediment concentrations	Nephrops	Moderate
	Brown crab and lobster	Slight
	Razor shell	Slight
	All other fish and shellfish species	Slight
Sediment deposition	Nephrops	Slight
	Brown crab and lobster	Slight
	Razor shell	Slight
	All other fish and shellfish species	Slight
Underwater noise	Shellfish	Slight
	Demersal finfish	Slight
	Pelagic finfish	Slight

Significance of the effect

Irish demersal otter trawlers: overall, the sensitivity of the receptor is considered to be medium and the magnitude is deemed to be medium for both Project Option 1 and Project Option 2. The significance of effect will, therefore, be significant for both Project Option 1 and Project Option 2, which is significant in EIA terms (refer to Table 16.5 on defining the significance of effects).

Irish potting vessels: overall, the sensitivity of the receptor is considered to be medium and the magnitude is deemed to be low for both Project Option 1 and Project Option 2. The significance of effect will, therefore, be moderate for both Project Option 1 and Project Option 2, which is not significant in EIA terms.

Irish razor dredgers: overall, the sensitivity of the receptor is considered to be medium and the magnitude is deemed to be low for both Project Option 1 and Project Option 2. The significance of effect will, therefore, be moderate for both Project Option 1 and Project Option 2, which is not significant in EIA terms.

All other fleets: overall, the sensitivity of the receptors is considered to be low and the magnitude is deemed to be low for both Project Option 1 and Project Option 2. The significance of effect will, therefore, be slight for both Project Option 1 and Project Option 2, which is not significant in EIA terms.

16.5.2.5 Impact 5- Increased vessel traffic associated with the construction of the proposed development within fishing grounds leading to interference with fishing activity

Sensitivity of the receptor

Irish potters: Construction traffic is likely to constrain most potting activity across established construction supply routes due to the vulnerability of the marker buoys to the propellers of passing construction vessels. It is noted that shipping routes do currently exist in the vicinity of the offshore development area, and that the construction vessels are likely to follow these existing routes where possible. Overall, the sensitivity of the Irish potting fleet is considered to be medium.

All other fleets are expected to be in a position to avoid the construction traffic and therefore the sensitivity is considered to be low.

Magnitude of impact

This potential impact focuses on vessel traffic related to the proposed development and changes to shipping patterns as a result of navigational routes leading to interference with fishing activity (i.e. reduced access) during construction.

Vessel movements (i.e. construction vessels transiting to and from areas undergoing construction works) related to the construction phase will add to the existing level of shipping activity in the regional study area (see the Shipping and Navigation Chapter for a full assessment of additional vessel movements).

As part of the embedded mitigation measures, continuous liaison with the fishing industry, including regular NtMs, will be undertaken including location and duration of construction activities.

Overall, the magnitude is therefore considered to be low for all fisheries for both Project Option 1 and Project Option 2.

Significance of the effect

Irish potting vessels: overall, the sensitivity of the receptor is considered to be medium and the magnitude is deemed to be low. The significance of effect will, therefore, be moderate for both Project Option 1 and Project Option 2, which is not significant in EIA terms (refer to Table 16.5 on defining the significance of effects).

All other fleets: overall, the sensitivity of the receptors is considered to be low and the magnitude is deemed to be low for both Project Option 1 and Project Option 2. The significance of effect will, therefore, be slight for both Project Option 1 and Project Option 2, which is not significant in EIA terms.

16.5.3 Operational Phase

The impacts of the operational phase of the proposed development have been assessed on commercial fisheries. The potential impacts arising from the operation of the proposed development are listed in Section 16.4.6. A description of the effects on commercial fisheries receptors caused by each identified impact is given below.

16.5.3.1 Impact–6 - Physical presence of array area infrastructure leading to reduction in access to, or exclusion from established fishing grounds

Sensitivity of the receptor

The sensitivity of the commercial fisheries fleets is the same as that presented for construction in Section 16.5.2.1, summarised as medium for Irish and UK demersal otter trawlers and low for all other fleets.

Magnitude of impact

The assessment assumes that commercial fisheries will be prevented from actively fishing within the footprint of installed infrastructure within the array area, together with associated advisory safety zones and advisory clearance distances for maintenance activities and assumed safe operating distances during operation, as set out in Table 16.7. The layout of the WTGs and OSP has aimed to align with the direction of the trawling lanes where practicable to aid passage through the array area.

Outside of this footprint area, the assessment assumes that fishing will be possible within the array area where WTG spacing and WTG layout allow productive grounds to be targeted, with the exception of an assumed 50m safe operating distance from infrastructure at the surface, the locations where areas of cable protection prevent fishing, and implementation of advisory safety zones around infrastructure undergoing major maintenance or replacement.

Importantly, in addition to the spacing described above, the individual decisions made by the skippers of fishing vessels with their own perception of risk will determine the likelihood of whether their fishing will resume within the array area. Inclement weather will be a significant contributor to this risk perception. The type and dimension of fishing gear also influences the potential opportunities within the array area. For example, twin-rigged trawl gears typically require a greater distance for safe operation and therefore may be less likely to target grounds in the vicinity of infrastructure.

Within the array area, the project option with the greatest magnitude of impact (Project option 1) for permanent reduction in access equates to of loss of 4.5km^2, including infrastructure footprint, scour protection and cable protection. The array area is 89km^2; the permanent reduction of 4.5km^2 equates to 5% of the array area that cannot be fished due to presence of infrastructure and cable protection.

Irish demersal otter trawlers: due to the nature of the gear, which is typically deployed as twin or quad-rigged trawl nets, it is expected that nephrops trawling activity will be affected within the array area during the operational phase. Vessels may choose to deploy single rigged nets to allow better manoeuvrability and access into the site. Overall magnitude is assessed as medium for both Project Option 1 and Project Option 2.

UK demersal otter trawlers: while the justification above for Irish trawlers is also applicable to UK trawlers, the majority of UK effort is focused east of the Irish 12nm boundary and outside of the array area (see Figure 3.5 of Appendix 16.1 Commercial Fisheries Technical Report). The magnitude is assessed to be low for UK demersal otter trawlers for both Project Option 1 and Project Option 2.

All other fleets: given the low levels of baseline activity in the local study area and within the array area compared to higher intensity fishing grounds elsewhere in the regional study area, the magnitude is assessed as low for both Project Option 1 and Project Option 2.

Significance of the effect

Irish demersal otter trawlers: overall, the sensitivity of the receptor is considered to be medium and the magnitude is deemed to be medium for both Project Option 1 and Project Option 2. The significance of effect will, therefore, be significant, which is significant in EIA terms for both Project Option 1 and Project Option 2 (refer to Table 16.5 on defining the significance of effects).

UK demersal otter trawlers: overall, the sensitivity of the receptor is considered to be medium and the magnitude is deemed to be low for both Project Option 1 and Project Option 2. The significance of effect will, therefore, be moderate for both Project Option 1 and Project Option 2, which is not significant in EIA terms.

All other fleets: overall, the sensitivity of the receptors is considered to be low and the magnitude is deemed to be low for both Project Option 1 and Project Option 2. The significance of effect will, therefore, be slight for both Project Option 1 and Project Option 2, which is not significant in EIA terms.

16.5.3.2 Impact 7 – Physical presence of the export cable leading to reduction in access to, or exclusion from established fishing grounds

Sensitivity of the receptor

The sensitivity of the commercial fisheries fleets is the same as that presented for construction in Section 16.5.2.2, summarised as medium for Irish and UK demersal otter trawlers, Irish potters and Irish razor dredgers; and low or all other fleets.

Magnitude of impact

The assessment assumes that fishing will resume within the vicinity of the export cables. Minimum burial depth of the export cable is unknown and subject to a CBRA, however, the typical burial depth is 1m – 3m. It is assumed that where areas of cable protection are not necessary, the cable will be buried to a depth that allows all fishing gears to operate, including demersal otter trawls, hydraulic dredge, scallop dredge and potting.

Temporary advisory safety distances will be requested around vessels engaged in export cable repair works, which could temporarily limit fishing opportunities within localised areas. NtMs will be issued in advance of any maintenance works. Potting vessels may be required to temporarily relocate pots during maintenance works, although such works are likely to be infrequent.

Cable protection in the form of rock placement and/or concrete mattressing is assumed for 20% of the export cable length. It is assumed that potting gear will continue to operate in the vicinity of any cable protection.

Given the soft, muddy habitat type that correlates with nephrops ground it is considered likely that cable burial will be successful in these areas, and that cable protection will not be required in these muddy habitats. This assumption is dependent upon the outcomes of a CBRA.

Given that fishing can resume across the ECC, the magnitude is considered to be low for all fishing fleets for both Project Option 1 and Project Option 2.

Significance of the effect

Irish and UK demersal otter trawlers, Irish potters and Irish razor dredgers: overall, the sensitivity of the receptor is considered to be medium and the magnitude is deemed to be low for both Project Option 1 and Project Option 2. The significance of effect will, therefore, be moderate for both Project Option 1 and Project Option 2, which is not significant in EIA terms (refer to Table 16.5 on defining the significance of effects).

All other fleets: overall, the sensitivity of the receptors is considered to be low and the magnitude is deemed to be low for both Project Option 1 and Project Option 2. The significance of effect will, therefore, be slight for both Project Option 1 and Project Option 2, which is not significant in EIA terms.

16.5.3.3 Impact 8 – Displacement from the offshore development area leading to gear conflict and increased fishing pressure on adjacent grounds

Sensitivity of the receptor

The sensitivity of the commercial fisheries fleets is the same as that presented for construction in Section 16.5.2.3, summarised as medium for Irish and UK demersal otter trawlers, Irish potters, and Irish razor dredgers; and low for all other fleets.

Magnitude of impact

Exclusion from fishing grounds during operation of the proposed development may lead to increases in fishing effort in other areas that may already be exploited thereby leading to gear conflict.

Given that all fishing can resume across the ECC, the magnitude of impact across the ECC is considered to be low for Irish potters and Irish razor dredgers for both Project Option 1 and Project Option 2.

As discussed in Section 16.5.3.1, there may be some level of loss of access for Irish demersal otter trawlers from within the array area. However, given that some fishing may resume within the array area, the level of displacement is expected to be lower than that assessed during the construction period. Overall, the magnitude of impact is considered to be low for Irish demersal otter trawlers for both Project Option 1 and Project Option 2.

Given the low levels of activity by all other fleets, the magnitude of displacement is considered to be low for all other fishing fleets for both Project Option 1 and Project Option 2.

Significance of the effect

Irish & UK demersal otter trawlers, Irish potters, and Irish razor dredgers: overall, the sensitivity of the receptor is considered to be medium and the magnitude is deemed to be low for both Project Option 1 and Project Option 2. The significance of effect will, therefore, be moderate for both Project Option 1 and Project Option 2, which is not significant in EIA terms (refer to Table 16.5 on defining the significance of effects).

All other fleets: overall, the sensitivity of the receptors is considered to be low and the magnitude is deemed to be low for both Project Option 1 and Project Option 2. The significance of effect will, therefore, be slight for both Project Option 1 and Project Option 2, which is not significant in EIA terms.

16.5.3.4 Impact 9 – Operational activities leading to displacement or disruption of commercially important fish and shellfish resources

Sensitivity of the receptor

The sensitivity of the commercial fisheries fleets is the same as that presented for construction in Section 16.5.2.4, summarised as medium for Irish demersal otter trawlers, Irish potters, and Irish razor dredgers; and low for all other fleets.

Magnitude of impact

Permanent and temporary impacts from operational activities may displace commercially important fish and shellfish populations from the offshore development area. This section assesses the potential subsequent impact for the owners of fishing vessels, where commercially important stocks may be disturbed or displaced to a point where normal fishing practices would be affected.

Detailed assessments of the following potential operational impacts have been undertaken in the Fish and Shellfish Ecology Chapter:

- Temporary and permanent habitat loss
- Increased suspended sediment concentrations.
- Underwater noise and vibration
- Interactions of EMF
- Barrier effects; and
- Introduction of hard substrate.

The approach to this assessment follows that outlined for construction, i.e. with respect to the magnitude of this impact on commercial fisheries, the overall significance of the effect on fish and shellfish species is considered (i.e. both the magnitude and sensitivity of fish and shellfish species are considered to assess the magnitude on commercial fishing fleets).

This is because the overall effect on the fish and shellfish species relates directly to the availability and amount of exploitable resource.

For instance, where an effect of imperceptible significance is assessed for a species, an imperceptible magnitude is assessed for commercial fishing; where an effect of slight significance is assessed for a species, a low magnitude is assessed for commercial fishing, i.e. the overall significance for fish and shellfish ecology helps to determine the magnitude of the impact for commercial fishing fleets. Details of the fish and shellfish ecology assessment are summarised in Table 16.10. Overall, the magnitude is therefore considered to be low in relation to all potential impacts for both Project Option 1 and Project Option 2.

Table 16.10 Significance of effects of operational impacts on fish and shellfish species relevant to commercial fisheries receptors

Potential impact	Significance of effect
Temporary and permanent habitat loss	Slight adverse
Increased suspended sediments and sediment re-deposition	Not significant
Underwater noise and vibration	Slight adverse
Interactions of EMF	Slight adverse
Barrier effects	Slight adverse
Introduction of hard substrate	Slight adverse

Significance of the effect

Irish and UK demersal otter trawlers, Irish potters, and Irish razor dredgers: overall, the sensitivity of the receptor is considered to be medium, and the magnitude is deemed to be low for both Project Option 1 and Project Option 2. The significance of effect will, therefore, be moderate for both Project Option 1 and Project Option 2, which is not significant in EIA terms (refer to Table 16.5 on defining the significance of effects).

All other fleets: overall, the sensitivity of the receptors is considered to be low, and the magnitude is deemed to be low for both Project Option 1 and Project Option 2. The significance of effect will, therefore, be slight for both Project Option 1 and Project Option 2, which is not significant in EIA terms.

16.5.3.5 Impact 10 – Increased vessel traffic within fishing grounds as a result of changes to shipping routes and maintenance vessel traffic from the proposed development leading to interference with fishing activity

Sensitivity of the receptor

The sensitivity of the commercial fisheries fleets is the same as that presented for construction in Section 16.5.2.5, summarised as medium for Irish potters; and low for all other fleets.

Magnitude of impact

This potential impact focuses on vessel traffic related to the operation of the proposed development and changes to shipping patterns as a result of navigational routes leading to interference with fishing activity (i.e. reduced access) during operation.

Vessel movements (i.e. maintenance vessels transiting to and from areas undergoing maintenance works) related to the operational phase will add to the existing level of shipping activity in the regional study area (see the Shipping and Navigation Chapter for a full assessment of additional vessel movements).

As part of the embedded mitigation measures, continuous liaison with the fishing industry, including regular NtMs, will be undertaken including location and duration of maintenance activities.

The vessel movements are no greater than predicted for the construction phase. The magnitude of impact is expected to be in the same or similar range to impacts described during construction and is therefore considered to be low for all fisheries for both Project Option 1 and Project Option 2.

Significance of the effect

Irish potters: the sensitivity of the receptor is considered to be medium and the magnitude is deemed to be low for both Project Option 1 and Project Option 2. The significance of effect will, therefore, be moderate for both Project Option 1 and Project Option 2, which is not significant in EIA terms (refer to Table 16.5 on defining the significance of effects).

All other fleets: the sensitivity of the receptor is considered to be low and the magnitude is deemed to be low for both Project Option 1 and Project Option 2. The significance of effect will, therefore, be slight for both Project Option 1 and Project Option 2, which is not significant in EIA terms (refer to Table 16.5 on defining the significance of effects).

16.5.3.6 Impact 11 – Physical presence of infrastructure leading to gear snagging

Sensitivity of the receptor

Due to the nature and operation of mobile demersal gear (i.e. it is actively towed and directly penetrates the seabed with near continuous contact) there is increased vulnerability to this impact and the sensitivity is therefore considered to be medium for all mobile demersal fisheries.

Potting gear shows a lower vulnerability as the gear is placed, not towed and is less likely to penetrate the seabed. The sensitivity of Irish potters is considered to be low.

Pelagic gear does not come into contact with the seabed and therefore has low vulnerability to snagging seabed infrastructure. The sensitivity of Irish pelagic trawl is considered to be low.

Magnitude of impact

The presence of offshore export and inter-array cables (and associated cable protection), together with WTGs and OSP structures (and associated scour protection) on the seabed represent potential snagging points for fishing gear and could lead to damage to, or loss of, fishing gear. This chapter does not assess the safety aspects as a result of snagging risk, this is covered in the Shipping and Navigation Chapter.

The embedded mitigation measures described in Table 16.7 include advisory safety zones during maintenance, a commitment to cable burial as the preferred option for cable protection, appropriate marking and charting of infrastructure and adherence to relevant UK FLOWW guidance.

Snagging poses a risk to fishing equipment, as well as damage to subsea infrastructure. Three phases of interaction are possible: initial impact of gear and subsea infrastructure; pullover of gear across subsea infrastructure; and snagging or hooking of gear on the subsea infrastructure. The snagging or hooking of fishing gear with infrastructure/cables on the seabed is the most hazardous to the vessel and crew due to the possibility of foundering. Foundering is considered in the Shipping and Navigation Chapter.

It is considered likely that fishers will operate appropriately (i.e. avoiding the indicated infrastructure and cable protection at the defined location) given adequate notification of the locations of any snagging hazards; and are highly likely to avoid the infrastructure and cable protection within the array area.

The proposed development includes 111km and 91km of inter-array cables for Project Option 1 and Project Option 2 respectively and 18km of offshore export cable (for two cables) for both project options. Twenty percent of the cable length for both export cables and inter-array cables is assumed to not achieve the target burial depth due to ground conditions and therefore will require cable protection which is 5m width and 2m height. Embedded mitigation details the typical burial depth of cables to 3m, where possible and a detailed CBRA, the results of which will be communicated to fisheries stakeholders. Furthermore, the Developer commits to follow standard protocols should snagging occur, the details of which will be provided in the FMMS. Maintenance will include regular monitoring of cable burial integrity and condition of cable protection. Overall, given the relatively low area impacted by the proposed development, together with the embedded measures, the magnitude is considered to be low for all fleets for both Project Option 1 and Project Option 2.

Significance of the effect

Irish potters and pelagic trawl: overall, the sensitivity of the receptors is considered to be low and the magnitude is deemed to be low for both Project Option 1 and Project Option 2. The significance of effect will, therefore, be slight for both Project Option 1 and Project Option 2, which is not significant in EIA terms (refer to Table 16.5 on defining the significance of effects).

All other mobile fleets: the sensitivity of the receptor is considered to be medium and the magnitude is deemed to be low for both Project Option 1 and Project Option 2. The significance of effect will, therefore, be moderate for both Project Option 1 and Project Option 2, which is not significant in EIA terms.

16.5.4 Decommissioning

The impacts of the offshore decommissioning of the proposed development have been assessed on commercial fisheries. The potential impacts arising from the decommissioning of the proposed development are listed in Section 16.4.6. A description of the effects on commercial fisheries receptors caused by each identified impact is given below.

16.5.4.1 Impact 12 - Array area decommissioning activities leading to reduction in access to, or exclusion from, potential and/or established fishing grounds

Significance of the effect

The effects of decommissioning activities are expected to be the same or similar to the effects from construction (Section 16.5.2.1). The significance of effect is therefore very significant for the Irish demersal otter trawl fleet for both Project Option 1 and Project Option 2, which is significant in EIA terms; moderate for the UK demersal otter trawl fleet for both Project Option 1 and Project Option 2, which is not significant in EIA terms; and slight for all other fleets for both Project Option 1 and Project Option 2, which is not significant in EIA terms (refer to Table 16.5 on defining the significance of effects).

16.5.4.2 Impact 13 - ECC decommissioning activities leading to reduction in access to, or exclusion from established fishing grounds

Significance of the effect

The effects of decommissioning activities are expected to be the same or similar to the effects from construction (Section 16.5.2.2). The significance of effect is therefore significant for the Irish demersal otter trawl, Irish potting and Irish razor dredge fleets for both Project Option 1 and Project Option 2, which is significant in EIA terms; moderate for UK demersal otter fleet for both Project Option 1 and Project Option 2, which is not significant in EIA terms; and slight for all other fleets for both Project Option 1 and Project Option 2, which is not significant in EIA terms (refer to Table 16.5 on defining the significance of effects).

16.5.4.3 Impact 14 - Displacement from the offshore development area due to decommissioning activities leading to gear conflict and increased fishing pressure on adjacent grounds

Significance of the effect

The effects of decommissioning activities are expected to be the same or similar to the effects from construction (Section 16.5.2.3). The significance of effect is therefore significant for the Irish and UK demersal otter trawl fleets for both Project Option 1 and Project Option 2, which is significant in EIA terms; moderate for Irish potting and Irish razor dredge fleets for both Project Option 1 and Project Option 2, which is not significant in EIA terms; and slight for all other fleets for both Project Option 1 and Project Option 2, which is not significant in EIA terms (refer to Table 16.5 on defining the significance of effects).

16.5.4.4 Impact 15 - Decommissioning activities leading to displacement or disruption of commercially important fish and shellfish resources

Significance of the effect

The effects of decommissioning activities are expected to be the same or similar to the effects from construction (Section 16.5.2.4). The significance of effect is therefore significant for the Irish demersal otter trawl fleets for both Project Option 1 and Project Option 2, which is significant in EIA terms; moderate for Irish potting and Irish razor dredge fleets for both Project Option 1 and Project Option 2, which is not significant in EIA terms; and slight for all other fleets for both Project Option 1 and Project Option 2, which is not significant in EIA terms (refer to Table 16.5 on defining the significance of effects).

16.5.4.5 Impact 16 - Increased vessel traffic within fishing grounds as a result of changes to shipping routes and transiting decommissioning vessel traffic from the proposed development leading to interference with fishing activity

Significance of the effect

The effects of decommissioning activities are expected to be the same or similar to the effects from construction (Section 16.5.2.5). The significance of effect is therefore moderate for Irish potting fleet for both Project Option 1 and Project Option 2, which is not significant in EIA terms; and slight for all other fleets for both Project Option 1 and Project Option 2, which is not significant in EIA terms (refer to Table 16.5 on defining the significance of effects).

16.5.4.6 Impact 17 - Physical presence of any infrastructure left in situ leading to gear snagging

Significance of the effect

The effects of decommissioning activities are expected to be the same or similar to the effects from operation (Section 16.5.3.6). The significance of effect is therefore slight for Irish potting and Irish pelagic trawl for both Project Option 1 and Project Option 2, which is not significant in EIA terms; and moderate for all other mobile fleets for both Project Option 1 and Project Option 2, which is not significant in EIA terms (refer to Table 16.5 on defining the significance of effects).

16.6 Mitigation and Monitoring Measures

Mitigation measures that were identified and adopted as part of the evolution of the proposed development design (i.e., embedded into the proposed development design) and that are relevant to commercial fisheries are listed in Table 16.7 and not considered again here. Key mitigation measures relate to the implementation of a Sustainable Fisheries Community (SFC) and Fisheries Management and Mitigation Strategy (FMMS).

Table 16.11 below identifies additional mitigation measures that are not embedded into the proposed development design.

Table 16.11 Mitigation relating to commercial fisheries

Measure	Mitigation description
Construction	
Volume 9, Appendix 16.2: Fisheries Management and Mitigation Strategy (FMMS)	This chapter has concluded significant impacts requiring additional mitigation for Irish demersal otter trawlers targeting Nephrops (Nephrops norvegicus) within the array area during the construction phase of the proposed development. Under the NMPF, where significant impacts are identified, a FMMS should be prepared (Fisheries Policy 2). This is provided as Volume 9 Appendix 16.2. The mitigation measures provided within the FMMS have been developed in consultation with the industry and will continue to be delivered through the FMMS as it remains a live document. The FMMS includes the following key principles and measures relevant to construction:

Measure	Mitigation description
	• **The proposed development will provide a Fisheries Liaison Strategy** The implementation of appropriate communication and information transfer strategies is of key importance to assist in minimising interference and facilitating effective co-existence with the fishing industry. The principles of liaison are that: – The Developer will undertake regular and routine communications via NtM to provide reasonable time (accounting for adverse weather etc.) to enable operational fishing business decisions to be made; – Continued engagement, constructive two-way communication and proactive dialogue between the fishers, their representatives and other fisheries stakeholders and the Developer is desired and is advantageous to all parties; and – All maritime operations that may have an effect on the commercial fishing sector will be made on a factual and accurate basis, in order to prevent unnecessary escalation of issues. • **The proposed development will follow the Seafood / Offshore Renewable Energy (ORE) Working Group Summary guidance (Seafood/ORE Working Group, 2023)** The FMMS provides a schedule for liaison and information dissemination. Notice and information will aim to be provided not less than 14 days prior for individual construction vessels mobilisations (where feasible) and weekly construction status updates will be provided. • **The Developer will minimise the size and duration of advisory safety zones during surveys and other works where safe and practicable to do so.** • **The Developer will provide local fisheries stakeholders with procedures for registering disruption payment claims for loss of/damage to fishing gear in association with surveys and construction activities of the proposed development.** • **Vessels undertaking operations in relation to the proposed development will be working to appropriate safety management systems to ensure safe work practices.** • **Vessels undertaking operations in relation to the proposed development will only undertake activities prescribed in their line of work.** • **Vessels involved in the construction, operation and maintenance and decommissioning of the proposed development, including guard vessels and survey vessels, will be provided with the relevant lines of communication (as outlined within the FMMS) to minimise interaction with fishing vessels undertaking their normal activities.** • **The proposed development will provide a Co-existence Strategy** The Developer regards coexistence as the continuation of both the proposed development and fishing industry activities at the same time within and around the array area and along the ECC. Specifically, these commitments relate to: – Proposed development design, i.e. the location and coordination of all wind farm layout infrastructure and cable burial and protection; – The offshore development area represents only 36% of the full MAC boundary area and was reduced as a commitment by the Developer to ensure optimal seabed usage where possible, whilst ensuring the key other marine users are impacted as minimally as possible; – Design of the array area that maximised corridors between turbines for navigation and orientated the turbines in a NNW - SSE direction to facilitate the direction of trawling in this area; – Appropriate notification of survey and construction activities to other marine users and the retention of a FLO and OFLO; – Appropriate lighting and marking of the proposed development and construction vessels; – Appropriate charting of the proposed development and notification of any hazards; and – The adoption of advisory safety zones and a process for marine coordination of all vessel activity. – Code of good practice for all vessels sets out measures for safe navigation, communication, vessel scheduling and reporting of any disruption. – Procedures in relation to gear fastening or loss; set out protocols for securing gear, reporting losses, retrieving lost gear and communicating any entanglement hazards. • **In addition to the commitments above, vessels undertaking operations in relation to the proposed development will be required to follow the mitigation and management measures provided in other documents and management plans committed to by the proposed development. These are referenced within the FMMS and include:**

Measure	Mitigation description
	– The Lighting and Marking Plan (Volume 9, Appendix 17.3); sets out the types, placement and intensity of lights, identification systems and protocols to ensure visibility and safety. – The Vessel Management Plan (VMP) (Volume 9, Appendix 17.2); sets out navigational safety measures for the proposed development, including use of advisory safety zones and guard vessels (as appropriate) – The Offshore Environmental Management Plan (EMP) (Volume 8, Appendix 6.1); includes a Dropped object procedure which sets out measures for risk assessment, reporting and retrieval protocols for dropped objects.
Sustainable Fisheries Community (SFC) (Appendix B within the FMMS Appendix 16.2)	• **The proposed development will develop and deliver a Sustainable Fisheries Community (SFC)** The SFC is a mechanism to deliver long-term proactive fisheries impact mitigation through collaboration and mutual cooperation between the local fishing community and the Developer. It is a live document and will be updated to reflect the current fishing and construction schedule ahead of the construction commencing. The key aim is to establish a SFC focused on the protection and enhancement of a locally sustainable fisheries and marine environment in the waters around the proposed development. This ambition includes the following delivered throughout the lifetime of the proposed development: – Collaboration between the Developer and local fishing community. – Provide a definition of what is considered the local fishing community. – Deliver a proactive fisheries impact mitigation process. – Create a mechanism to deliver benefits, both to and from, the local fishing ports. – Work collaboratively to deliver enhancements to the local marine environment. – To, in a broad context, enhance the sustainability of the local fishing community. – Establish ways of collaboratively adding value to local seafood produce. The SFC will focus on the commercial fishing industry in the long term through such measures such as enhancing stocks, improvements to fishing vessels, improvements that enhance the profit margins of sustainable fishing activities, and the development of new fisheries or other activities. Where construction related impacts occur, and where there are claims to be considered, the developer will require a significant level of supporting evidence for any such claims. It is for this reason that the Developer has gathered extensive fishing activity information, so as to ensure that this lengthy process can be expedited, for known fishers in the area. The Developer will develop a fair, transparent and evidence based disturbance payment scheme for those fishers that can evidence disruption. Further information of the SFC is provided in the FMMS Volume 9 (Appendix 16.2).
Operation	
FMMS	This chapter has concluded significant impacts requiring additional mitigation for Irish demersal otter trawlers targeting Nephrops (Nephrops norvegicus) within the array area during operation. Under the NMPF, where significant impacts are identified, a FMMS should be prepared (Fisheries Policy 2). This is provided as Volume 9 Appendix 16.2. The mitigation measures provided within the FMMS have been developed in consultation with the industry and will continue to be delivered through the FMMS as it remains a live document. The key principles and mitigation details are presented earlier in this table and the measures that are relevant to operation are: • **The Developer will provide a Fisheries Liaison Strategy** • **The Developer will follow the Seafood / Offshore Renewable Energy (ORE) Working Group Summary guidance (Seafood/ORE Working Group, 2023)** • **The proposed development will minimise the size and duration of advisory safety zones during operation and maintenance and other activities where safe and practicable to do so.** • **Vessels undertaking operations in relation to the proposed development will be working to appropriate safety management systems to ensure safe work practices.** • **Vessels undertaking operations in relation to the proposed development will only undertake activities prescribed in their line of work.** • **Vessels involved in the operation and maintenance of the proposed development, including guard vessels and survey vessels, will be provided with the relevant lines of communication (as outlined within the FMMS) to minimise interaction with fishing vessels undertaking their normal activities.**

Measure	Mitigation description
	• **The proposed development will provide a Co-existence Strategy** • **In addition to the commitments above, vessels undertaking operations in relation to the proposed development will be required to follow the mitigation and management measures provided in other documents and management plans committed to by the proposed development. These are referenced within the FMMS and include the VMP, LMP and Offshore EMP.**
SFC	• **The proposed development will develop and deliver a Sustainable Fisheries Community (SFC)** The SFC is a mechanism to deliver long-term proactive fisheries impact mitigation through collaboration and mutual cooperation between the local fishing community and the Developer. It is a live document and will be updated to reflect the current fishing ahead of the operation commencing. The key aim is to establish a SFC focused on the protection and enhancement of a locally sustainable fisheries and marine environment in the waters around the proposed development. This ambition includes the following delivered throughout the lifetime of the proposed development, including the operational phase: – Collaboration between the Developer and local fishing community. – Provide a definition of what is considered the local fishing community. – Create a mechanism to deliver benefits, both to and from, the local fishing ports. – Work collaboratively to deliver enhancements to the local marine environment. – To, in a broad context, enhance the sustainability of the local fishing community. – Establish ways of collaboratively adding value to local seafood produce. The engagement with the local fisheries around the SFC will commence ahead of construction. Whist consideration of the potential deliverables of the SFC has already commenced, the full and final detail of the long term aspects to help create a sustainable fisheries in the area will be developed over time. Delivering these broad ranging benefits to the local fishing community as relevant to the proposed development will continue into the operational phase.
Decommissioning	
FMMS	This chapter has concluded significant impacts requiring additional mitigation for Irish demersal otter trawlers targeting Nephrops (Nephrops norvegicus) within the array area during decommissioning. Under the NMPF, where significant impacts are identified, a FMMS should be prepared (Fisheries Policy 2). This is provided as Volume 9 Appendix 16.2. The mitigation measures provided within the FMMS have been developed in consultation with the industry and will continue to be delivered through the FMMS as it remains a live document. The key principles and mitigation details are presented earlier in this table and the measures that are relevant to decommissioning are: • **The proposed development will provide a Fisheries Liaison Strategy** • **The proposed development will follow the Seafood / Offshore Renewable Energy (ORE) Working Group Summary guidance (Seafood/ORE Working Group, 2023)** • **The proposed development will minimise the size and duration of advisory safety zones during surveys and other works where safe and practicable to do so.** • **Vessels undertaking operations in relation to the proposed development will be working to appropriate safety management systems to ensure safe work practices.** • **Vessels undertaking operations in relation to the proposed development will only undertake activities prescribed in their line of work.** • **Vessels involved in the construction, operation and maintenance and decommissioning of the proposed development, including guard vessels and survey vessels, will be provided with the relevant lines of communication (as outlined within the FMMS) to minimise interaction with fishing vessels undertaking their normal activities.** • **The proposed development will provide a Co-existence Strategy** • **In addition to the commitments above, vessels undertaking operations in relation to the proposed development will be required to follow the mitigation and management measures provided in other documents and management plans committed to by the proposed development. These are referenced within the FMMS and include the VMP, LMP and Offshore EMP.**

Measure	Mitigation description
	The FMMS is a live document and will be updated to reflect current (at the time of decommissioning) fishing practices and liaisons to reflect best practice at that point in time.
SFC	• **The proposed development will develop and deliver a Sustainable Fisheries Community (SFC)** The SFC is a mechanism to deliver long-term proactive fisheries impact mitigation through collaboration and mutual cooperation between the local fishing community and NISA. It is a live document and will be updated to reflect the current fishing ahead of decommissioning commencing, to provide a mechanism for dealing with this transitional phase for the fisheries. The key aim is to establish a SFC focused on the protection and enhancement of a locally sustainable fisheries and marine environment in the waters around the proposed development.

16.7 Residual Effects

This section presents the residual effects of the proposed development once the mitigation outlined in Section 16.6 has been applied.

Where the mitigation presented in Section 16.6 has changed the effect level, this has been detailed.

The residual effects of the project options once mitigation has been applied are summarised in Table 16.12.

Table 16.12 Residual effects relating to commercial fisheries

Potential impact	Receptor	Likely significant effect (Pre-Mitigation) – Project Option 1	Likely significant effect (Pre-Mitigation) – Project Option 2	Residual effect – Project Option 1	Residual effect – Project Option 2
Construction					
1. Array area construction activities and physical presence of offshore infrastructure during the construction period leading to reduction in access to, or exclusion from established fishing grounds	Irish demersal otter trawlers	Very significant	Very significant	Moderate to slight	Moderate to slight
				Mitigation measures as outlined in Section 16.6, including the measures detailed in the FMMS (Appendix 16.2), have reduced the significance of effect on Irish demersal otter trawlers to a not significant level.	
	UK demersal otter trawlers	Moderate	Moderate	Moderate to slight	Moderate to slight
				While this impact was not significant, mitigation measures as outlined in Section 16.6, including the measures detailed in the FMMS (Appendix 16.2), have reduced the significance of effect on UK demersal otter trawlers to a lower level.	
	Irish potting vessels	Slight	Slight	Slight	Slight
	Irish razor dredgers	Slight	Slight	Slight	Slight
	Irish scallop dredgers	Slight	Slight	Slight	Slight
	UK scallop dredgers	Slight	Slight	Slight	Slight
	Irish mussel dredgers	Slight	Slight	Slight	Slight
	Irish beam trawlers & demersal seine	Slight	Slight	Slight	Slight
	Belgian beam trawlers	Slight	Slight	Slight	Slight
	Irish pelagic trawlers	Slight	Slight	Slight	Slight

Potential impact	Receptor	Likely significant effect (Pre-Mitigation) – Project Option 1	Likely significant effect (Pre-Mitigation) – Project Option 2	Residual effect – Project Option 1	Residual effect – Project Option 2
19.ECC construction activities and physical presence of constructed infrastructure leading to reduction in access to, or exclusion from established fishing grounds	Irish demersal otter trawlers	Significant	Significant	Moderate to slight	Moderate to slight
				Mitigation measures as outlined in Section 16.6, including the measures detailed in the FMMS (Appendix 16.2), have reduced the significance of effect on Irish demersal otter trawlers to a not significant level.	
	UK demersal otter trawlers	Moderate	Moderate	Moderate to slight	Moderate to slight
				While this impact was not significant, mitigation measures as outlined in Section 16.6, including the measures detailed in the FMMS (Appendix 16.2), have reduced the significance of effect on UK demersal otter trawlers to a lower level.	
	Irish potting vessels	Significant	Significant	Moderate to slight	Moderate to slight
				Mitigation measures as outlined in Section 16.6, including the measures detailed in the FMMS (Appendix 16.2), have reduced the significance of effect on Irish potting vessels to a not significant level.	
	Irish razor dredgers	Significant	Significant	Moderate to slight	Moderate to slight
				Mitigation measures as outlined in Section 16.6, including the measures detailed in the FMMS (Appendix 16.2), have reduced the significance of effect on Irish razor dredgers to a not significant level.	
	Irish scallop dredgers	Slight	Slight	Slight	Slight
	UK scallop dredgers	Slight	Slight	Slight	Slight
	Irish mussel dredgers	Slight	Slight	Slight	Slight
	Irish beam trawlers & demersal seine	Slight	Slight	Slight	Slight
	Belgian beam trawlers	Slight	Slight	Slight	Slight

Potential impact	Receptor	Likely significant effect (Pre-Mitigation) – Project Option 1	Likely significant effect (Pre-Mitigation) – Project Option 2	Residual effect – Project Option 1	Residual effect – Project Option 2
	Irish pelagic trawlers	Slight	Slight	Slight	Slight
20. Displacement from within the offshore development area leading to gear conflict and increased fishing pressure on adjacent grounds	Irish demersal otter trawlers	Significant	Significant	Moderate to slight	Moderate to slight
				Mitigation measures as outlined in Section 16.6, including the measures detailed in the FMMS (Appendix 16.2), have reduced the significance of effect on Irish demersal otter trawlers to a not significant level.	
	UK demersal otter trawlers	Significant	Significant	Moderate to slight	Moderate to slight
				Mitigation measures as outlined in Section 16.6, including the measures detailed in the FMMS (Appendix 16.2), have reduced the significance of effect on UK demersal otter trawlers to a not significant level.	
	Irish potting vessels	Moderate	Moderate	Moderate to slight	Moderate to slight
				While this impact was not significant, mitigation measures as outlined in Section 16.6, including the measures detailed in the FMMS (Appendix 16.2), have reduced the significance of effect on Irish potting vessels to a lower level.	
	Irish razor dredgers	Moderate	Moderate	Moderate to slight	Moderate to slight
				While this impact was not significant, mitigation measures as outlined in Section 16.6, including the measures detailed in the FMMS (Appendix 16.2), have reduced the significance of effect on Irish razor dredging vessels to a lower level.	
	Irish scallop dredgers	Slight	Slight	Slight	Slight
	UK scallop dredgers	Slight	Slight	Slight	Slight
	Irish mussel dredgers	Slight	Slight	Slight	Slight

Potential impact	Receptor	Likely significant effect (Pre-Mitigation) – Project Option 1	Likely significant effect (Pre-Mitigation) – Project Option 2	Residual effect – Project Option 1	Residual effect – Project Option 2
	Irish beam trawlers & demersal seine	Slight	Slight	Slight	Slight
	Belgian beam trawlers	Slight	Slight	Slight	Slight
	Irish pelagic trawlers	Slight	Slight	Slight	Slight
21. Construction activities leading to disturbance of commercially important fish and shellfish resources leading to displacement or disruption of fishing activity	Irish demersal otter trawlers	Significant	Significant	Moderate to slight	Moderate to slight
				Mitigation measures as outlined in Section 16.6, including the measures detailed in the FMMS (Appendix 16.2), have reduced the significance of effect on Irish demersal otter trawlers to a not significant level.	
	UK demersal otter trawlers	Slight	Slight	Slight	Slight
	Irish potting vessels	Moderate	Moderate	Moderate to slight	Moderate to slight
				While this impact was not significant, mitigation measures as outlined in Section 16.6, including the measures detailed in the FMMS (Appendix 16.2), have reduced the significance of effect on Irish potting vessels to a lower level.	
	Irish razor dredgers	Moderate	Moderate	Moderate to slight	Moderate to slight
				While this impact was not significant, mitigation measures as outlined in Section 16.6, including the measures detailed in the FMMS (Appendix 16.2), have reduced the significance of effect on Irish razor dredging vessels to a lower level.	
	Irish scallop dredgers	Slight	Slight	Slight	Slight
	UK scallop dredgers	Slight	Slight	Slight	Slight

Potential impact	Receptor	Likely significant effect (Pre-Mitigation) – Project Option 1	Likely significant effect (Pre-Mitigation) – Project Option 2	Residual effect – Project Option 1	Residual effect – Project Option 2
	Irish mussel dredgers	Slight	Slight	Slight	Slight
	Irish beam trawlers & demersal seine	Slight	Slight	Slight	Slight
	Belgian beam trawlers	Slight	Slight	Slight	Slight
	Irish pelagic trawlers	Slight	Slight	Slight	Slight
22. Increased vessel traffic associated with the construction of the proposed development within fishing grounds leading to interference with fishing activity	Irish demersal otter trawlers	Slight	Slight	Slight	Slight
	UK demersal otter trawlers	Slight	Slight	Slight	Slight
	Irish potting vessels	Moderate	Moderate	Moderate to slight	Moderate to slight
				While this impact was not significant, mitigation measures as outlined in Section 16.6, including the measures detailed in the FMMS (Appendix 16.2), have reduced the significance of effect on Irish potting vessels to a lower level.	
	Irish razor dredgers	Slight	Slight	Slight	Slight
	Irish scallop dredgers	Slight	Slight	Slight	Slight
	UK scallop dredgers	Slight	Slight	Slight	Slight
	Irish mussel dredgers	Slight	Slight	Slight	Slight

Potential impact	Receptor	Likely significant effect (Pre-Mitigation) – Project Option 1	Likely significant effect (Pre-Mitigation) – Project Option 2	Residual effect – Project Option 1	Residual effect – Project Option 2
	Irish beam trawlers & demersal seine	Slight	Slight	Slight	Slight
	Belgian beam trawlers	Slight	Slight	Slight	Slight
	Irish pelagic trawlers	Slight	Slight	Slight	Slight
Operation					
23. Physical presence of array area infrastructure leading to reduction in access to, or exclusion from established fishing grounds	Irish demersal otter trawlers	Significant	Significant	Moderate to slight	Moderate to slight
				Mitigation measures as outlined in Section 16.6, including the measures detailed in the FMMS (Appendix 16.2), have reduced the significance of effect on Irish demersal otter trawlers to a not significant level.	
	UK demersal otter trawlers	Moderate	Moderate	Moderate to slight	Moderate to slight
				While this impact was not significant, mitigation measures as outlined in Section 16.6, including the measures detailed in the FMMS (Appendix 16.2), have reduced the significance of effect on UK demersal otter trawlers to a lower level.	
	Irish potting vessels	Slight	Slight	Slight	Slight
	Irish razor dredgers	Slight	Slight	Slight	Slight
	Irish scallop dredgers	Slight	Slight	Slight	Slight
	UK scallop dredgers	Slight	Slight	Slight	Slight
	Irish mussel dredgers	Slight	Slight	Slight	Slight

Potential impact	Receptor	Likely significant effect (Pre-Mitigation) – Project Option 1	Likely significant effect (Pre-Mitigation) – Project Option 2	Residual effect – Project Option 1	Residual effect – Project Option 2
	Irish beam trawlers & demersal seine	Slight	Slight	Slight	Slight
	Belgian beam trawlers	Slight	Slight	Slight	Slight
	Irish pelagic trawlers	Slight	Slight	Slight	Slight
24. Physical presence of the export cable leading to reduction in access to, or exclusion from established fishing grounds	Irish demersal otter trawlers	Moderate	Moderate	Moderate to slight	Moderate to slight
				While this impact was not significant, mitigation measures as outlined in Section 16.6, including the measures detailed in the FMMS (Appendix 16.2), have reduced the significance of effect on Irish demersal otter trawling vessels to a lower level.	
	UK demersal otter trawlers	Moderate	Moderate	Moderate to slight	Moderate to slight
				While this impact was not significant, mitigation measures as outlined in Section 16.6, including the measures detailed in the FMMS (Appendix 16.2), have reduced the significance of effect on UK demersal otter trawling vessels to a lower level.	
	Irish potting vessels	Slight	Slight	Slight	Slight
	Irish razor dredgers	Slight	Slight	Slight	Slight
	Irish scallop dredgers	Slight	Slight	Slight	Slight
	UK scallop dredgers	Slight	Slight	Slight	Slight
	Irish mussel dredgers	Slight	Slight	Slight	Slight

Potential impact	Receptor	Likely significant effect (Pre-Mitigation) – Project Option 1	Likely significant effect (Pre-Mitigation) – Project Option 2	Residual effect – Project Option 1	Residual effect – Project Option 2
	Irish beam trawlers & demersal seine	Slight	Slight	Slight	Slight
	Belgian beam trawlers	Slight	Slight	Slight	Slight
	Irish pelagic trawlers	Slight	Slight	Slight	Slight
25. Displacement from the offshore development area leading to gear conflict and increased fishing pressure on adjacent grounds	Irish demersal otter trawlers	Moderate	Moderate	Moderate to slight	Moderate to slight
				While this impact was not significant, mitigation measures as outlined in Section 16.6, including the measures detailed in the FMMS (Appendix 16.2), have reduced the significance of effect on Irish demersal otter trawling vessels to a lower level.	
	UK demersal otter trawlers	Moderate	Moderate	Moderate to slight	Moderate to slight
				While this impact was not significant, mitigation measures as outlined in Section 16.6, including the measures detailed in the FMMS (Appendix 16.2), have reduced the significance of effect on UK demersal otter trawling vessels to a lower level.	
	Irish potting vessels	Moderate	Moderate	Moderate to slight	Moderate to slight
				While this impact was not significant, mitigation measures as outlined in Section 16.6, including the measures detailed in the FMMS (Appendix 16.2), have reduced the significance of effect on Irish potting vessels to a lower level.	
	Irish razor dredgers	Moderate	Moderate	Moderate to slight	Moderate to slight
				While this impact was not significant, mitigation measures as outlined in Section 16.6, including the measures detailed in the FMMS (Appendix 16.2), have reduced the significance of effect on Irish razor dredgers to a lower level.	
	Irish scallop dredgers	Slight	Slight	Slight	Slight

Potential impact	Receptor	Likely significant effect (Pre-Mitigation) – Project Option 1	Likely significant effect (Pre-Mitigation) – Project Option 2	Residual effect – Project Option 1	Residual effect – Project Option 2
	UK scallop dredgers	Slight	Slight	Slight	Slight
	Irish mussel dredgers	Slight	Slight	Slight	Slight
	Irish beam trawlers & demersal seine	Slight	Slight	Slight	Slight
	Belgian beam trawlers	Slight	Slight	Slight	Slight
	Irish pelagic trawlers	Slight	Slight	Slight	Slight
26.Operational activities leading to displacement or disruption of commercially important fish and shellfish resources	Irish demersal otter trawlers	Moderate	Moderate	Moderate to slight	Moderate to slight
				While this impact was not significant, mitigation measures as outlined in Section 16.6, including the measures detailed in the FMMS (Appendix 16.2), have reduced the significance of effect on Irish demersal otter trawling vessels to a lower level.	
	UK demersal otter trawlers	Moderate	Moderate	Moderate to slight	Moderate to slight
				While this impact was not significant, mitigation measures as outlined in Section 16.6, including the measures detailed in the FMMS (Appendix 16.2), have reduced the significance of effect on UK demersal otter trawling vessels to a lower level.	
	Irish potting vessels	Moderate	Moderate	Moderate to slight	Moderate to slight
				While this impact was not significant, mitigation measures as outlined in Section 16.6, including the measures detailed in the FMMS (Appendix 16.2), have reduced the significance of effect on Irish potting vessels to a lower level.	

Potential impact	Receptor	Likely significant effect (Pre-Mitigation) – Project Option 1	Likely significant effect (Pre-Mitigation) – Project Option 2	Residual effect – Project Option 1	Residual effect – Project Option 2
	Irish razor dredgers	Moderate	Moderate	Moderate to slight	Moderate to slight
				While this impact was not significant, mitigation measures as outlined in Section 16.6, including the measures detailed in the FMMS (Appendix 16.2), have reduced the significance of effect on Irish razor dredgers to a lower level.	
	Irish scallop dredgers	Slight	Slight	Slight	Slight
	UK scallop dredgers	Slight	Slight	Slight	Slight
	Irish mussel dredgers	Slight	Slight	Slight	Slight
	Irish beam trawlers & demersal seine	Slight	Slight	Slight	Slight
	Belgian beam trawlers	Slight	Slight	Slight	Slight
	Irish pelagic trawlers	Slight	Slight	Slight	Slight
27. Increased vessel traffic within fishing grounds as a result of changes to shipping routes and maintenance vessel traffic from the proposed development leading to interference with fishing activity	Irish demersal otter trawlers	Slight	Slight	Slight	Slight
	UK demersal otter trawlers	Slight	Slight	Slight	Slight
	Irish potting vessels	Moderate	Moderate.	Moderate to slight	Moderate to slight
				While this impact was not significant, mitigation measures as outlined in Section 16.6, including the measures detailed in the FMMS (Appendix 16.2), have reduced the significance of effect on Irish potting vessels to a lower level.	

Potential impact	Receptor	Likely significant effect (Pre-Mitigation) – Project Option 1	Likely significant effect (Pre-Mitigation) – Project Option 2	Residual effect – Project Option 1	Residual effect – Project Option 2
	Irish razor dredgers	Slight	Slight	Slight	Slight
	Irish scallop dredgers	Slight	Slight	Slight	Slight
	UK scallop dredgers	Slight	Slight	Slight	Slight
	Irish mussel dredgers	Slight	Slight	Slight	Slight
	Irish beam trawlers & demersal seine	Slight	Slight	Slight	Slight
	Belgian beam trawlers	Slight	Slight	Slight	Slight
	Irish pelagic trawlers	Slight	Slight	Slight	Slight
28.Physical presence of infrastructure leading to gear snagging	Irish demersal otter trawlers	Moderate	Moderate	Moderate to slight	Moderate to slight
				While this impact was not significant, mitigation measures as outlined in Section 16.6, including the measures detailed in the FMMS (Appendix 16.2), have reduced the significance of effect on Irish demersal otter trawling vessels to a lower level.	
	UK demersal otter trawlers	Moderate	Moderate	Moderate to slight	Moderate to slight
				While this impact was not significant, mitigation measures as outlined in Section 16.6, including the measures detailed in the FMMS (Appendix 16.2), have reduced the significance of effect on UK demersal otter trawling vessels to a lower level.	
	Irish potting vessels	Slight	Slight	Slight	Slight
		Moderate	Moderate	Moderate to slight	Moderate to slight

Potential impact	Receptor	Likely significant effect (Pre-Mitigation) – Project Option 1	Likely significant effect (Pre-Mitigation) – Project Option 2	Residual effect – Project Option 1	Residual effect – Project Option 2
	Irish razor dredgers			While this impact was not significant, mitigation measures as outlined in Section 16.6, including the measures detailed in the FMMS (Appendix 16.2), have reduced the significance of effect on Irish razor dredging vessels to a lower level.	
	Irish scallop dredgers	Moderate	Moderate	Moderate to slight	Moderate to slight
				While this impact was not significant, mitigation measures as outlined in Section 16.6, including the measures detailed in the FMMS (Appendix 16.2), have reduced the significance of effect on Irish scallop dredging vessels to a lower level.	
	UK scallop dredgers	Moderate	Moderate	Moderate to slight	Moderate to slight
				While this impact was not significant, mitigation measures as outlined in Section 16.6, including the measures detailed in the FMMS (Appendix 16.2), have reduced the significance of effect on UK scallop dredging vessels to a lower level.	
	Irish mussel dredgers	Moderate	Moderate	Moderate to slight	Moderate to slight
				While this impact was not significant, mitigation measures as outlined in Section 16.6, including the measures detailed in the FMMS (Appendix 16.2), have reduced the significance of effect on Irish mussel dredging vessels to a lower level.	
	Irish beam trawlers & demersal seine	Moderate	Moderate	Moderate to slight	Moderate to slight
				While this impact was not significant, mitigation measures as outlined in Section 16.6, including the measures detailed in the FMMS (Appendix 16.2), have reduced the significance of effect on Irish beam trawlers and demersal seining vessels to a lower level.	
	Belgian beam trawlers	Moderate	Moderate	Moderate to slight	Moderate to slight
				While this impact was not significant, mitigation measures as outlined in Section 16.6, including the measures detailed in the FMMS (Appendix 16.2), have reduced the significance of effect on Belgian beam trawling vessels to a lower level.	

Potential impact	Receptor	Likely significant effect (Pre-Mitigation) – Project Option 1	Likely significant effect (Pre-Mitigation) – Project Option 2	Residual effect – Project Option 1	Residual effect – Project Option 2
	Irish pelagic trawlers	Slight	Slight	Slight	Slight
Decommissioning					
29. Array area decommissioning activities leading to reduction in access to, or exclusion from, potential and/or established fishing grounds.	Irish demersal otter trawlers	Very significant	Very significant	Moderate to slight	Moderate to slight
				Mitigation measures as outlined in Section 16.6, including the measures detailed in the FMMS (Appendix 16.2), have reduced the significance of effect on Irish demersal otter trawlers to a not significant level.	
	UK demersal otter trawlers	Moderate	Moderate	Moderate to slight	Moderate to slight
				While this impact was not significant, mitigation measures as outlined in Section 16.6, including the measures detailed in the FMMS (Appendix 16.2), have reduced the significance of effect on UK demersal otter trawling vessels to a lower level.	
	Irish potting vessels	Slight	Slight	Slight	Slight
	Irish razor dredgers	Slight	Slight	Slight	Slight
	Irish scallop dredgers	Slight	Slight	Slight	Slight
	UK scallop dredgers	Slight	Slight	Slight	Slight
	Irish mussel dredgers	Slight	Slight	Slight	Slight
	Irish beam trawlers & demersal seine	Slight	Slight	Slight	Slight
	Belgian beam trawlers	Slight	Slight	Slight	Slight

Potential impact	Receptor	Likely significant effect (Pre-Mitigation) – Project Option 1	Likely significant effect (Pre-Mitigation) – Project Option 2	Residual effect – Project Option 1	Residual effect – Project Option 2
	Irish pelagic trawlers	Slight	Slight	Slight	Slight
30. ECC decommissioning activities leading to reduction in access to, or exclusion from established fishing grounds.	Irish demersal otter trawlers	Significant	Significant	Moderate to slight	Moderate to slight
				Mitigation measures as outlined in Section 16.6, including the measures detailed in the FMMS (Appendix 16.2), have reduced the significance of effect on Irish demersal otter trawlers to a not significant level.	
	UK demersal otter trawlers	Moderate	Moderate	Moderate to slight	Moderate to slight
				While this impact was not significant, mitigation measures as outlined in Section 16.6, including the measures detailed in the FMMS (Appendix 16.2), have reduced the significance of effect on UK demersal otter trawling vessels to a lower level.	
	Irish potting vessels	Significant	Significant	Moderate to slight	Moderate to slight
				Mitigation measures as outlined in Section 16.6, including the measures detailed in the FMMS (Appendix 16.2), have reduced the significance of effect on Irish potting vessels to a not significant level.	
	Irish razor dredgers	Significant	Significant	Moderate to slight	Moderate to slight
				Mitigation measures as outlined in Section 16.6, including the measures detailed in the FMMS (Appendix 16.2), have reduced the significance of effect on Irish razor dredgers to a not significant level.	
	Irish scallop dredgers	Slight	Slight	Slight	Slight
	UK scallop dredgers	Slight	Slight	Slight	Slight
	Irish mussel dredgers	Slight	Slight	Slight	Slight
	Irish beam trawlers & demersal seine	Slight	Slight	Slight	Slight

Potential impact	Receptor	Likely significant effect (Pre-Mitigation) – Project Option 1	Likely significant effect (Pre-Mitigation) – Project Option 2	Residual effect – Project Option 1	Residual effect – Project Option 2
	Belgian beam trawlers	Slight	Slight	Slight	Slight
	Irish pelagic trawlers	Slight	Slight	Slight	Slight
31. Displacement from the offshore development area due to decommissioning activities leading to gear conflict and increased fishing pressure on adjacent grounds.	Irish demersal otter trawlers	Significant	Significant	Moderate to slight	Moderate to slight
				Mitigation measures as outlined in Section 16.6, including the measures detailed in the FMMS (Appendix 16.2), have reduced the significance of effect on Irish demersal otter trawlers to a not significant level.	
	UK demersal otter trawlers	Significant	Significant	Moderate to slight	Moderate to slight
				Mitigation measures as outlined in Section 16.6, including the measures detailed in the FMMS (Appendix 16.2), have reduced the significance of effect on UK demersal otter trawlers to a not significant level.	
	Irish potting vessels	Moderate	Moderate	Moderate to slight	Moderate to slight
				Mitigation measures as outlined in Section 16.6, including the measures detailed in the FMMS (Appendix 16.2), have reduced the significance of effect on Irish potting vessels to a lower level.	
	Irish razor dredgers	Moderate	Moderate	Moderate to slight	Moderate to slight
				Mitigation measures as outlined in Section 16.6, including the measures detailed in the FMMS (Appendix 16.2), have reduced the significance of effect on Irish razor dredgers to a lower level.	
	Irish scallop dredgers	Slight	Slight	Slight	Slight
	UK scallop dredgers	Slight	Slight	Slight	Slight
	Irish mussel dredgers	Slight	Slight	Slight	Slight

Potential impact	Receptor	Likely significant effect (Pre-Mitigation) – Project Option 1	Likely significant effect (Pre-Mitigation) – Project Option 2	Residual effect – Project Option 1	Residual effect – Project Option 2
	Irish beam trawlers & demersal seine	Slight	Slight	Slight	Slight
	Belgian beam trawlers	Slight	Slight	Slight	Slight
	Irish pelagic trawlers	Slight	Slight	Slight	Slight
32. Decommissioning activities leading to displacement or disruption of commercially important fish and shellfish resources.	Irish demersal otter trawlers	Significant	Significant	Moderate to slight	Moderate to slight
				Mitigation measures as outlined in Section 16.6, including the measures detailed in the FMMS (Appendix 16.2), have reduced the significance of effect on Irish demersal otter trawlers to a not significant level.	
	UK demersal otter trawlers	Slight	Slight	Slight	Slight
	Irish potting vessels	Moderate	Moderate	Moderate to slight	Moderate to slight
				While this impact was not significant, mitigation measures as outlined in Section 16.6, including the measures detailed in the FMMS (Appendix 16.2), have reduced the significance of effect on Irish potting vessels to a lower level.	
	Irish razor dredgers	Moderate	Moderate	Moderate to slight	Moderate to slight
				While this impact was not significant, mitigation measures as outlined in Section 16.6, including the measures detailed in the FMMS (Appendix 16.2), have reduced the significance of effect on Irish razor dredgers to a lower level.	
	Irish scallop dredgers	Slight	Slight	Slight	Slight
	UK scallop dredgers	Slight	Slight	Slight	Slight

Potential impact	Receptor	Likely significant effect (Pre-Mitigation) – Project Option 1	Likely significant effect (Pre-Mitigation) – Project Option 2	Residual effect – Project Option 1	Residual effect – Project Option 2
	Irish mussel dredgers	Slight	Slight	Slight	Slight
	Irish beam trawlers & demersal seine	Slight	Slight	Slight	Slight
	Belgian beam trawlers	Slight	Slight	Slight	Slight
	Irish pelagic trawlers	Slight	Slight	Slight	Slight
33. Increased vessel traffic within fishing grounds as a result of changes to shipping routes and transiting decommissioning vessel traffic from the proposed development leading to interference with fishing activity	Irish demersal otter trawlers	Slight	Slight	Slight	Slight
	UK demersal otter trawlers	Slight	Slight	Slight	Slight
	Irish potting vessels	Moderate	Moderate	Moderate to slight	Moderate to slight
				While this impact was not significant, mitigation measures as outlined in Section 16.6, including the measures detailed in the FMMS (Appendix 16.2), have reduced the significance of effect on Irish potting vessels to a lower level.	
	Irish razor dredgers	Slight	Slight	Slight	Slight
	Irish scallop dredgers	Slight	Slight	Slight	Slight
	UK scallop dredgers	Slight	Slight	Slight	Slight
	Irish mussel dredgers	Slight	Slight	Slight	Slight

Potential impact	Receptor	Likely significant effect (Pre-Mitigation) – Project Option 1	Likely significant effect (Pre-Mitigation) – Project Option 2	Residual effect – Project Option 1	Residual effect – Project Option 2
	Irish beam trawlers & demersal seine	Slight	Slight	Slight	Slight
	Belgian beam trawlers	Slight	Slight	Slight	Slight
	Irish pelagic trawlers	Slight	Slight	Slight	Slight
34. Physical presence of any infrastructure left in situ leading to gear snagging	Irish demersal otter trawlers	Moderate	Moderate	Moderate to slight	Moderate to slight
				While this impact was not significant, mitigation measures as outlined in Section 16.6, including the measures detailed in the FMMS (Appendix 16.2), have reduced the significance of effect on Irish demersal otter trawling vessels to a lower level.	
	UK demersal otter trawlers	Moderate	Moderate	Moderate to slight	Moderate to slight
				While this impact was not significant, mitigation measures as outlined in Section 16.6, including the measures detailed in the FMMS (Appendix 16.2), have reduced the significance of effect on UK demersal otter trawling vessels to a lower level.	
	Irish potting vessels	Slight	Slight	Slight	Slight
	Irish razor dredgers	Moderate	Moderate	Moderate to slight	Moderate to slight
				While this impact was not significant, mitigation measures as outlined in Section 16.6, including the measures detailed in the FMMS (Appendix 16.2), have reduced the significance of effect on Irish razor dredging vessels to a lower level.	
	Irish scallop dredgers	Moderate	Moderate	Moderate to slight	Moderate to slight
				While this impact was not significant, mitigation measures as outlined in Section 16.6, including the measures detailed in the FMMS (Appendix 16.2), have reduced the significance of effect on Irish scallop dredging vessels to a lower level.	

Potential impact	Receptor	Likely significant effect (Pre-Mitigation) – Project Option 1	Likely significant effect (Pre-Mitigation) – Project Option 2	Residual effect – Project Option 1	Residual effect – Project Option 2
	UK scallop dredgers	Moderate	Moderate	Moderate to slight	Moderate to slight
				While this impact was not significant, mitigation measures as outlined in Section 16.6, including the measures detailed in the FMMS (Appendix 16.2), have reduced the significance of effect on UK scallop dredging vessels to a lower level.	
	Irish mussel dredgers	Moderate	Moderate	Moderate to slight	Moderate to slight
				While this impact was not significant, mitigation measures as outlined in Section 16.6, including the measures detailed in the FMMS (Appendix 16.2), have reduced the significance of effect on Irish mussel dredging vessels to a lower level.	
	Irish beam trawlers & demersal seine	Moderate	Moderate	Moderate to slight	Moderate to slight
				While this impact was not significant, mitigation measures as outlined in Section 16.6, including the measures detailed in the FMMS (Appendix 16.2), have reduced the significance of effect on Irish beam trawlers and demersal seining vessels to a lower level.	
	Belgian beam trawlers	Moderate	Moderate	Moderate to slight	Moderate to slight
				While this impact was not significant, mitigation measures as outlined in Section 16.6, including the measures detailed in the FMMS (Appendix 16.2), have reduced the significance of effect on Belgian beam trawling vessels to a lower level.	
	Irish pelagic trawlers	Slight	Slight	Slight	Slight

16.8 Transboundary Effects

Transboundary effects are defined as those effects upon the receiving environment of other states, whether occurring from the proposed development alone, or cumulatively with other projects in the wider area.

This assessment considers the potential for transboundary residual effects of the proposed development (i.e. after mitigation measures have been applied for the proposed development). Depending on the nature of the effects, a specific assessment methodology for addressing relevant OWF projects may need to be agreed in advance.

Table 16.13 Potential transboundary effects on commercial fisheries receptors

Likely significant effect	Effect description	Effect significance – Project Option 1	Effect significance – Project Option 2
Effects on commercial fishing fleets as a result of impacts from the proposed development on commercial fish stocks in the waters of other EEA and non-EEA States	Effects on biological resources could occur over a range of tens of kilometres from the offshore development area and could therefore interact with the following states: UK and Isle of Man.	Based on the slight significance effect of disruption to commercial species during all phases of the proposed development, it is expected that any slight impact on stocks within the Irish EEZ, would become negligible in the context of the UK and Isle of Man EEZ, due to the distance of the proposed development from these EEZs and the dissipation of any stock effect over this distance. Therefore, the potential transboundary impact of effects on commercial fish stocks in the waters of other states on commercial fisheries is concluded to be negligible and is therefore considered to be not significant in EIA terms.	Based on the slight significance effect of disruption to commercial species during all phases of the proposed development, it is expected that any slight impact on stocks within the Irish EEZ, would become negligible in the context of the UK and Isle of Man EEZ. Therefore, the potential transboundary impact of effects on commercial fish stocks in the waters of other states on commercial fisheries is concluded to be negligible and is therefore considered to be not significant in EIA terms.
Effects on commercial fishing fleets from all EEA countries as a result of constraints on foreign commercial fishing activities operating in the offshore development area, including demersal trawling, beam trawling, scallop dredging and other gears. These effects may include reduction in access to fishing grounds and potential displacement of fishing effort from the offshore development area to alternative fishing grounds in other EEA States, which will have direct implications to that fishing ground.	Effects on commercial fishing fleets could occur over a range of 100s of kilometres from the offshore development area (i.e. affecting fleets from other states that operate in the vicinity of the proposed development, including inside and outside of the territorial waters) and could therefore interact with non-Irish fishing fleets including: UK, Isle of Man and Belgium.	Effects on these foreign commercial fishing fleets, in terms of reduction in access to fishing grounds and displacement into alternative grounds including other EEZs, have therefore been intrinsically considered throughout the commercial fisheries impact assessment process and are consistent to those presented in Sections 16.4.6 and 16.7.	Effects on these foreign commercial fishing fleets, in terms of reduction in access to fishing grounds and displacement into alternative grounds including other EEZs, have therefore been intrinsically considered throughout the commercial fisheries impact assessment process and are consistent to those presented in Sections 16.4.6 and 16.7.

16.9 Cumulative Effects

Likely significant cumulative effects of the proposed development in-combination with existing and / or approved projects for commercial fisheries have been identified, considered and assessed. The methodology for this cumulative assessment is a three-stage approach which is presented in the Cumulative and Inter-Related Effects Chapter.

The Cumulative and Inter-Related Effects Chapter contains the outcome of Stage 1 Establishing the list of 'Other Existing and/or Approved Projects'; and Stage 2 'Screening of 'Other Existing and/or Approved Projects'. This section presents Stage 3, an assessment of whether the proposed development in combination with other projects, grouped in tiers, would be likely to have a significant cumulative effects.

The assessment specifically considers whether any of the approved developments in the local or wider have the potential to alter the significance of effects associated with the proposed development. Developments which are already built and operating, and which are not identified in this chapter, are included in the baseline environment or have been screened out as there is no potential to alter the significance of effects.

The assessment of cumulative effects has considered likely significant effects that may arise during construction, operation and decommissioning of the proposed development. Cumulative effects were assessed to a level of detail commensurate with the information that has either been directly shared with the team preparing the EIAR, or was publicly available at the time of the assessment.

Given the location and nature of the proposed development, a tiered approach to establishing the list of other existing and/or approved projects has been undertaken in Stage 1 of the cumulative effects assessment. The tiering of projects is based on project relevance to the proposed development and it is not a hierarchical approach nor based on weighting. Further information on the tiers is provided in Section 16.9.2 and in the Cumulative and Inter-Related Effects Chapter.

16.9.1 Commercial fisheries cumulative screening exercise

The existing and/or approved projects selected as relevant to the cumulative effects assessment of impacts to commercial fisheries are based on an initial screening exercise undertaken on a long list (see Cumulative and Inter-Related Effects Chapter) based on spatial distance to the proposed development. Consideration of effect-receptor pathways, data confidence and temporal and spatial scales has then allowed the selection of the relevant projects for the screened commercial fisheries cumulative list.

When assessing likely significant effects for commercial fisheries, projects were screened into the assessment based on their ability to impact receptors within the ICES division 7a: Irish Sea statistical area.

For the full list of projects considered, including those screened out, please see the Cumulative and Inter-Related Effects Chapter and Appendix 38.1.

16.9.2 Projects considered within the cumulative effect assessment

The planned, existing and/or approved projects selected through the screening exercise as relevant to the assessment of cumulative likely significant effects to commercial fisheries are presented in Table 16.14.

- Tier 1 is limited to the Operation and Maintenance Facility (OMF) for the proposed development. The OMF option being considered involves the adaption and leasing part of an existing port facility at Greenore. Further detail is provided in the Offshore Description Chapter.
- Tier 2 is the east coast Phase One Offshore Wind Farms.
- Tier 3 is all other projects that have been screened in for this topic.

The tiering structure is intended to provide an understanding of the potential for likely significant effects of the proposed development with the construction of its OMF (tier one); followed by a cumulative assessment of the likely significant effect of that scenario combined with the east coast Phase One Offshore Wind Farms (tier two); and lastly the combination of tier one and tier two with all other existing and/or approved projects that have been screened in (tier three).

Table 16.14 Projects and plans considered within the cumulative impact assessment

Development type	Project	Status	Data confidence	Distance to the proposed development		Justification for screening into the cumulative effects assessment
				Array area (km)	ECC (km)	
Tier 1	OMF	Planning submission in 2024, construction in 2025, operational in 2026	Low - no documentation available	33.9km	38.8km	Potential to cause disruption to fishing activities.
Tier 2						
Phase One Offshore wind farm	Oriel Wind Park	Pre-consent	Medium – scoping report available at time of writing. A foreshore licence has been granted for site investigations (2022-2027). Reference FS007383. EIAR in preparation.	16.9km	21.6km	Overlap in construction period, Oriel Wind Park due to construct during 2026-2028
	Dublin Array	Pre-consent	Medium – scoping report available at time of writing. A foreshore licence has been granted for site investigations (2022-2027). Reference FS007188. Site investigations have been undertaken and EIAR in preparation.	32.9km	37.6km	Overlap in construction period, Dublin Array due to construct during 2028-2032
	Codling Wind Park and Codling Wind Park Extension	Pre-consent	Medium – scoping report available at the time of writing. A foreshore licence has been granted for site investigations. Reference FS007045	50.9km	56.9km	Overlap in construction period, with Colding Wind Park due to construct during 2027-2028

Development type	Project	Status	Data confidence	Distance to the proposed development		Justification for screening into the cumulative effects assessment
				Array area (km)	ECC (km)	
	Arklow Bank Phase 2	Pre-consent	Medium – scoping report available at time of writing. A foreshore licence has been granted for site investigations (2022-2027). Reference FS007339. Site investigations have been undertaken and EIAR in prep.	76.4km	80.0km	Overlap in construction period with Arklow Bank Phase 2 due to construct during 2026-2030
Tier 3						
Offshore wind farms	Morgan	Lease awarded Concept/Early Planning (Submitting application Q2 2024)	High: Preliminary Environmental Information Report (PEIR) available	111.5	119.9	Potential to cause disruption to fishing activities.
	North Channel Wind 2	Concept/Early Planning	Low-Medium	112.9	120.0	
	Mona	Lease awarded Concept/Early Planning (Stage 2 Consultation)	High: PEIR available	117.3	124.8	
	Isle of Man (Mooir Vannin)	Concept/Early Planning	Medium: Scoping submitted	118.0	126.5	
	Awel y Môr	Lease awarded In Planning (DCO granted in 2023)	High: EIA available	131.6	139.5	
	North Channel Wind 1	Concept/Early Planning	Low-Medium	135.4	141.7	
	Morecambe	Lease awarded Concept/Early Planning (Submitting DCO application Q1 2024)	High: PEIR available	138.9	146.5	
Other offshore Energy	West Anglesey Demonstration Zone	Tidal	High: EIAR available	78.3	87.7	

Development type	Project	Status	Data confidence	Distance to the proposed development		Justification for screening into the cumulative effects assessment
				Array area (km)	ECC (km)	
Subsea cables	CeltixConnect - Sea Fibre Networks	Under construction until 2028.	High	11.3	20.1	
	Mares Connect	Consultation	Low	33.2	41.5	
	LirlC	Proposed	Low-Medium	112.0	118.2	
	Erebus/Valorous Potential Cable Route	Proposed	Low-Medium	218.0	225.8	
Surveys	Statkraft North Irish Sea Array (NISA) Site Investigations for Export Cable Route and array area (FS007358)	Approved	High	0.3	0.0	
	Rockabill Cable Systems Ltd (FS006842)	Approved	High	18.6	15.1	
	Oriel Windfarm Limited, Site Investigations for the proposed offshore Oriel Wind Farm. Foreshore Licence application for geophysical, geotechnical, ecological and metocean site investigation works. Dundalk (FS006840)	Approved	High	18.0	22.6	
	Braymore Point (now referred to as Setanta Wind Park) (FS006973)	Approved	High	20.7	23.1	
	Codling Wind Park Ltd. Site Investigations for proposed Offshore Wind Farm, off Counties Wicklow and Dublin (FS007546)	Approved	High	17.2	13.2	

Development type	Project	Status	Data confidence	Distance to the proposed development		Justification for screening into the cumulative effects assessment
				Array area (km)	ECC (km)	
	Sure Partners Arklow Bank Wind Park Phase 2 Site Investigations (FS007339)	Approved	High	76.3	80.4	
	Arklow Bank Wind Park off coast of County Wicklow	Application Submitted	Low-Medium	76.7	81.2	
	Energia Site Investigation off Wexford Coast (FS007048)	Approved	High	91.2	97.4	
Coastal assets and Infrastructure	Greenlink Interconnector	Under construction until 2025	High	183.1	196.1	
	Installation of the EirGrid Celtic Interconnector Electricity Cable	Under construction until 2024	High	216.4	228.6	
	Bord Gais Networks – Dublin (FS006104)	Approved	High	35.8	29.5	

16.9.3 Project impacts included in the assessment

The identification of potential impacts for the cumulative assessment has been undertaken by considering the relevant characteristics from both project options (refer to Section 16.4.1) and the potential for a pathway for them to have direct and indirect effects on known receptors (as identified in Section 16.3) when combined with other projects.

For each impact, the project option with the greatest potential for a likely significant effect has been determined based on the comparison and justification provided in Table 16.8. The impacts considered in the cumulative assessment are presented in Table 16.15. As the residual effects for Project Option 1 and Project Option 2 are the same (as identified in Section 16.7), the cumulative effects assessment presented in this section applies to both options.

There is potential for cumulative reduction in access to or exclusion from established fishing grounds as a result of construction activities associated with the proposed development and other projects. For the purposes of this EIAR, this additive impact has been assessed within the Irish Sea, which is considered to be representative of the fishing grounds exploited by the fleets active across the commercial fisheries regional study area.

Table 16.15 Potential cumulative impacts and tiers for assessment

Potential cumulative impact	Phase	Tiers and projects	Justification for inclusion in cumulative effects assessment
1. Reduction in access to, or exclusion from established fishing grounds	Construction/ Operation/ Decommissioning	Tier 1 – OMF Tier 2 – Phase One Projects (4) Tier 3 – Other offshore wind farms (7) and energy projects (1); Subsea cables (2); Surveys (10); Coastal assets and infrastructure (2)	The location and nature of activities involved in the construction, operation and/or decommissioning of the projects has the potential to cause disruption to fishing activities.
2. Displacement leading to gear conflict and increased fishing pressure on established fishing grounds			
3. Displacement or disruption of commercially important fish and shellfish resources			

16.9.3.1 Cumulative Impact 1 - Reduction in access to, or exclusion from established fishing grounds

Tier 1

The Greenore OMF will comprise an operation and maintenance building and associated storage facilities as well as a number of berths, for the vessels required to access the wind farm. The existing Greenore site covers an area of approx. 150,000m^2, it is proposed to be adapted to provide up to three OMFs of which it is anticipated the proposed development will lease just one.

The OMF will comprise of the following:

- OMF building including a control room, offices, welfare facilities such as mess hall, kitchen, bathrooms, technicians washing and drying facilities, plant & equipment room.
- Warehouse and workshop (approx. 1000m^2)
- External storage area (approx. 1000m^2)
- Berthing facilities to support 3-4 Crew Transfer Vessels (CTVs)
- Vessel bunkering services for fuel and potable water
- Storage tanks for marine fuel and waste oil; and
- Additional supporting infrastructure such as lighting, perimeter security fencing, access control gates & Close-circuit television (CCTV).

Currently, the operations at the existing Greenore port includes general cargo and transportation of a variety of commodities including bulk animal feed, rock and fertiliser.

Greenore is a privately owned port. Commercial fishing vessels do not land catches at Greenore, nor are there any active fisheries within the locality of the proposed OMF.

Overall, due to there being no active fisheries within the locality of Greenore OMF, the additional cumulative magnitude for the reduction of access is assessed to be negligible for all commercial fishing fleets for both Project Option 1 and Project Option 2, and the sensitivity is assessed to be negligible for all commercial fishing fleets for both Project Option 1 and Project Option 2.

The significance of the cumulative effect of the Tier 1 project with Project Option 1 and Project Option 2, will, therefore, be imperceptible, which is not significant in EIA terms.

Tier 1 and 2

The Tier 2 group includes four Phase One Offshore Wind Farms: Oriel, Dublin Array, Arklow and Codling Wind Park. Oriel is located north west of the proposed development and is at the north-western edge of the extent of nephrops grounds. Through the Phase One Offshore Wind Farm Collaboration (refer to Appendix 1.2) it was confirmed by Oriel Wind Park that the project's infrastructure is outside the nephrops area on hard ground and the closest spawning or nursey areas are 6km south and east from the Oriel offshore wind farm area boundary. Therefore, for the nephrop fisheries all potential impacts were assessed as not significant. Oriel has also prepared an FMMS which will be submitted with their planning application. It is, therefore, not expected that Oriel will cause impacts higher than those assessed for the proposed development alone reduction in access impacts for the nephrops demersal otter trawl fleets (Irish and UK), Irish potting fleet and all other commercial fishing fleets. This conclusion is valid for both Project Option 1 and Project Option 2.

The locations of the other Tier 2 projects do not support a nephrops trawl fishery and have no further cumulative impact to the Irish demersal otter trawl (nephrops) fleet. Dublin Array, Codling Wind Park and Arklow support an active Irish potting fleet targeting whelk across their wind farm and/or ECC boundaries. Given the low level of whelk potting within the proposed development, this is not expected to raise the cumulative effect beyond that assessed for proposed development alone impacts.

Overall, given the grounds targeted across the region, including within Tier 2 projects, the sensitivity of the Irish demersal otter trawl (nephrops), Irish potting fleet and all other fleets is judged to be low and the magnitude of impact for all commercial fishing fleets is assessed as low. This takes account of the discrete nephrops grounds which overlap the proposed development, but are not widespread across the cumulative study area and/or across Tier 2 projects.

Therefore, the significance of effect from the reduced access, or exclusion from established grounds from the installation of either Project Option 1 or Project Option 2 cumulatively with the Tier 1 and Tier 2 projects is expected to be moderate to slight for the Irish demersal otter trawl (nephrops) and Irish potting fleets and slight for all other fleets, which is not significant in EIA terms.

Tier 1, 2 and 3 (All tiers)

The Tier 3 projects include seven other offshore wind farms, one other energy project, two subsea cables, two coastal infrastructure projects and ten activities associated with surveys. Information in the form of published PEIRs are available for Morgan, Mona and Morecambe Offshore Wind Farms. While limited information is available for other Tier 3 projects, they are included in the assessment on the basis of reasonable assumptions and knowledge of the footprint and overlap of commercial fishing fleets. Morgan, Mona and Morecambe Offshore Wind Farms are understood to overlap and/or be in proximity to the following key fisheries: king scallop and queen scallop dredge; queen scallop demersal otter trawl and whelk potting. These offshore wind farms are understood not to overlap or interact with Irish and UK demersal otter trawl vessels targeting nephrops or Irish potters.

Overall, due to the lack of overlap with the fisheries active in the local study area and proposed development, it is considered unlikely that the Tier 3 projects will raise the cumulative magnitude of impact to any higher than the proposed development alone effects for the nephrops demersal otter trawl fleets (Irish and UK), Irish potting fleet and all other commercial fishing fleets, for either Project Option 1 or Project Option 2.

Therefore, the significance of effect from the reduced access, or exclusion from established grounds from the installation of either Project Option 1 or Project Option 2 cumulatively with the Tier 1, 2, and 3 projects is expected to be moderate to slight for the Irish demersal otter trawl (nephrops) and Irish potting fleets and slight for all other fleets, which is not significant in EIA terms.

16.9.3.2 Cumulative Impact 2 – Displacement leading to gear conflict and increased fishing pressure on established fishing grounds

Tier 1

The effect of displacement leading to gear conflict and increased fishing pressure is directly correlated to the previous impact of reduced access to fishing grounds (i.e. if there is no reduction in access, then there will be no displacement). The reduction in access was assessed above to be imperceptible.

Overall, for the potential displacement effect, the additional cumulative magnitude is assessed to be negligible for all commercial fishing fleets for both Project Option 1 and Project Option 2, and the sensitivity is assessed to be negligible for all commercial fishing fleets for both Project Option 1 and Project Option 2.

The significance of the cumulative effect of the Tier 1 project with Project Option 1 and Project Option 2, will, therefore, be imperceptible, which is not significant in EIA terms.

Tier 1 and 2

The effect of displacement leading to gear conflict and increased fishing pressure is directly correlated to the previous impact of reduced access to fishing grounds (i.e. if there is no reduction in access, then there will be no displacement). There is a low magnitude of impact for reduced access to fishing grounds from Tier 2 projects and therefore displacement is not expected. As such the magnitude of impact of displacement is assessed as low for all fleets.

The sensitivity of the receptors is consistent with the assessment of reduced access to fishing grounds, which is assessed as low for the Irish demersal otter trawl (nephrops), Irish potting fleets and all other commercial fishing fleets. Therefore, the significance of effect from displacement leading to gear conflict and increased fishing pressure from the installation of either Project Option 1 or Project Option 2 cumulatively with the Tier 2 projects is expected to be moderate to slight for the Irish demersal otter trawl (nephrops) and Irish potting fleets and slight effect for all other fleets, which is not significant in EIA terms.

Tier 1, 2 and 3 (All tiers)

As per the justification for Impact 1 above, the additional Tier 3 projects do not raise the magnitude of impact above that of Tier 1 & 2 projects in terms of reduced access. Therefore, the significance of effect from displacement leading to gear conflict and increased fishing pressure from the installation of either Project Option 1 or Project Option 2 cumulatively with the Tier 1, 2 and 3 projects is expected to be moderate to slight for the Irish demersal otter trawl (nephrops) and Irish potting fleets and slight effect for all other fleets, which is not significant in EIA terms.

16.9.3.3 Cumulative Impact 3 - Displacement or disruption of commercially important fish and shellfish resources

Tier 1

The very low footprint of the proposed OMF related to berthing facilities is not anticipated to interact or disrupt the commercial exploited species targeted by the fleets under assessment.

Overall, the additional cumulative magnitude is assessed to be negligible for all commercial fishing fleets for both Project Option 1 and Project Option 2, and the sensitivity is assessed to be negligible for all commercial fishing fleets for both Project Option 1 and Project Option 2.

The significance of the cumulative effect of the Tier 1 project with Project Option 1 and Project Option 2, will, therefore, be imperceptible for all fleets, which is not significant in EIA terms.

Tier 1 and 2

Cumulative effects for fish and shellfish ecology have been assessed in the Fish and Shellfish Ecology Chapter covering the following effects:

- Increased suspended sediments.
- Habitat loss and disturbance
- Noise (and associated barrier effects); and
- Barriers to movement through the presence of EMF from cables.

All of the above cumulative effects on the populations of fish and shellfish receptors were found to be indistinguishable from the proposed development alone effects, for either Project Option 1 or Project Option 2.

Two key aspects when considering this cumulative effect in relation to the proposed development are that:

- The array area overlaps with a highly important nephrops fishery, with which the other Tier 2 projects do not overlap, with the exception of Oriel Wind Park, which is located on the north-western edge of these nephrops fishing grounds.
- As outlined in Section 16.9.3.1, through the Phase One Offshore Wind Farm Collaboration (refer to Appendix 1.2) it was confirmed by Oriel Wind Park that the project's infrastructure is outside the nephrops area on hard ground and the closest spawning or nursey areas are 6km south and east from the Oriel offshore wind farm area boundary. Therefore, for the nephrop fisheries all potential impacts were assessed as not significant. Oriel has also prepared an FMMS which will be submitted with their planning application.

Overall, it is considered unlikely that the Tier 1 and 2 projects will raise the cumulative effect to any higher than the proposed development alone for either Project Option 1 or Project Option 2 in terms of displacement or disruption to commercial important resources based on the following key findings from the Fish and Shellfish Ecology Chapter:

- Cumulative effects of increased suspended sediments are not expected to be higher than project alone effects for fish and shellfish resources.
- Cumulative effects of underwater noise and vibration are concluded to result in at most barely discernible changes to baseline conditions and result in a slight (adverse) effect to resources.
- Cumulative effects of loss and disturbance to habitat are considered to result in at most barely discernible changes to fish and shellfish receptors.
- Cumulative behavioural effects of electro- and magneto-sensitive fish and shellfish receptors are concluded to result in at most barely discernible changes to baseline conditions.

Therefore, the significance of effect from displacement or disruption to commercial important resources from either Project Option 1 or Project Option 2 cumulatively with the Tier 2 projects is expected to be moderate to slight for the Irish demersal otter trawl (nephrops) and Irish potting fleets and slight effect for all other fleets, which is not significant in EIA terms.

Tier 1, 2 and 3 (All tiers)

The additional Tier 3 projects do not raise the magnitude of impact above that of Tier 1 & 2 projects, as outlined in the Tier 1 and 2 section above.

Overall, it is considered unlikely that the Tier 3 projects will raise the cumulative magnitude of impact to any higher than the proposed development alone effects, for either Project Option 1 or Project Option 2. This is because other Tier 3 projects are not considered to effect the commercial fisheries receptors under assessment.

Therefore, the significance of effect from displacement or disruption to commercial important resources from either Project Option 1 or Project Option 2 cumulatively with the Tier 1, 2 and 3 projects is expected to be moderate to slight for the Irish demersal otter trawl (nephrops) and Irish potting fleets and slight effect for all other fleets, which is not significant in EIA terms.

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