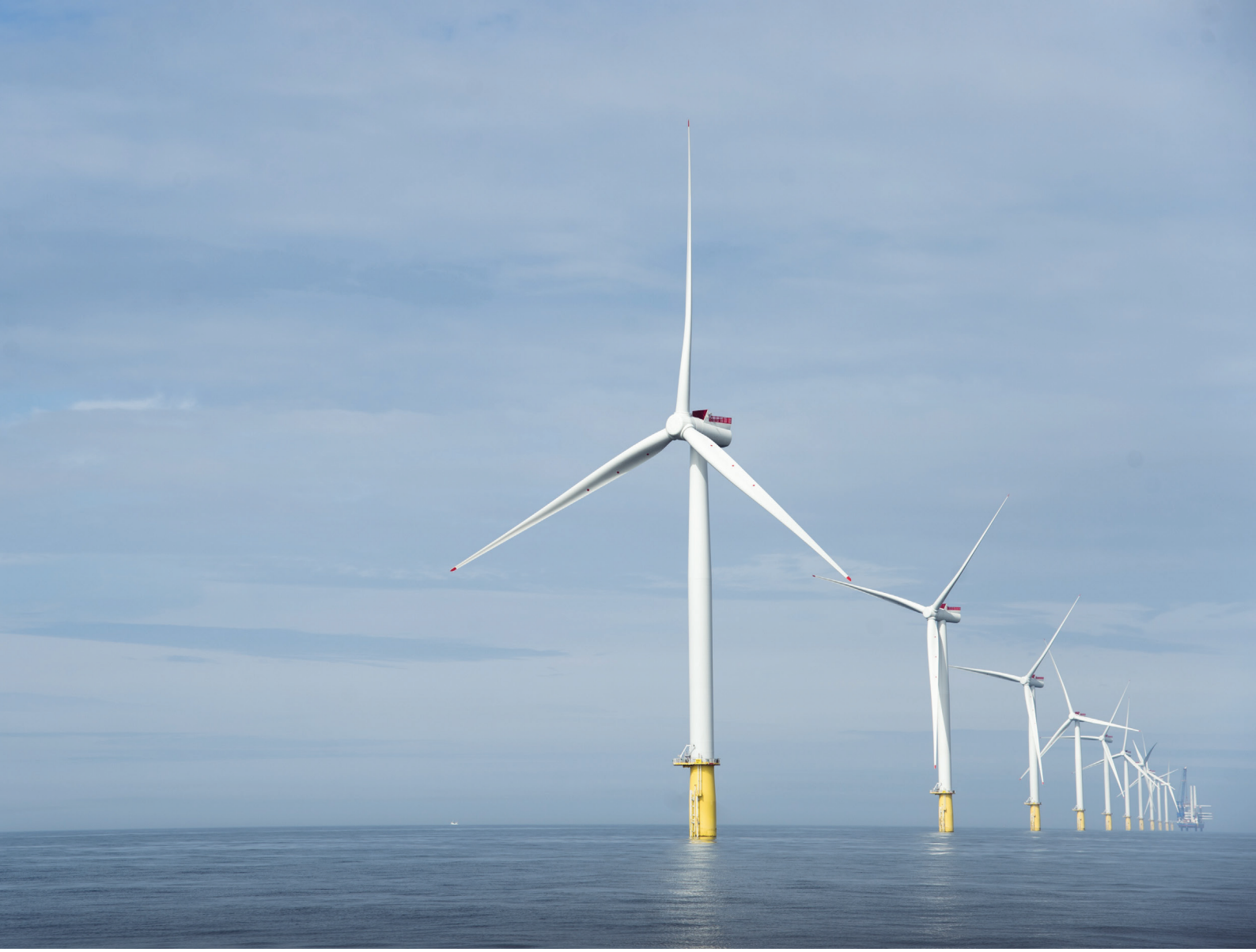

Sheringham Shoal and Dudgeon Offshore Wind Farm Extension Projects

Environmental Statement

Volume 1

Chapter 12 - Commercial Fisheries

August 2022
Document Reference: 6.1.12
APFP Regulation: 5(2)(a)

China Resources
Better Life Together

Masdar
A MUBADALA COMPANY

equinor

Title: **Sheringham Shoal and Dudgeon Offshore Wind Farm Extension Projects Environmental Statement** **Chapter 12: Commercial Fisheries**	
PINS Document no.: 6.1.12	
Document no.: C282-RH-Z-GA-00032	
Date:	Classification
August 2022	**Final**
Prepared by: **Royal HaskoningDHV**	
Approved by: **Sarah Chandler**	Date: August 2022

Table of Contents

Table of Tables

Volume 3

Appendix 12.1 Commercial Fisheries Technical Report

Glossary of Acronyms

BEIS	Department for Business Energy and Industrial Strategy
BERR	Department for Business, Enterprise and Regulatory Reform
BMF	Blue Marine Foundation
Cefas	Centre for Environment, Fisheries and Aquaculture Science
CAA	Civil Aviation Authority
CIA	Cumulative Impact Assessment
COLREGS	Convention on the International Regulations for Preventing Collisions at Sea
CPA	Coastal Protection Act
CPC	Cley-next-to-the-sea Parish Council
CPUE	Catch Per Unit Effort
CSCB	Cromer Shoal Chalk Beds
CTV	Crew Transfer Vessel
CSIMP	Cable Specification, Installation and Monitoring Plan
DCF	Data Collection Framework
DCO	Development Consent Order
DECC	Department for Energy and Climate Change
DEFRA	Department for the Environment and Rural Affairs
DEP	Dudgeon Offshore Wind Farm Extension Project
CFP	Common Fisheries Policy
DTI	Department of Trade and Industry
EC	European Commission
EEA	European Economic Area
EEZ	Exclusive Economic Zone
EIA	Environmental Impact Assessment
EIFCA	Eastern Inshore Fisheries Conservation Authority
EMF	Electromagnetic Field
ES	Environmental Statement
ESCA	European Subsea Cable Association
EU	European Union
EUMOFA	European Market Observatory for Fisheries and Aquaculture Products
FEPA	Food and Environment Protection Act
FLCP	Fisheries Liaison and Co-existence Plan

FLOWW	Fisheries Liaison with Offshore Wind and Wet Renewables Group
FLO	Fisheries Liaison Officer
GBS	Gravity Base Structure
GPS	Global Positioning System
HDD	Horizontal Directional Drilling
HRA	Habitats Regulations Assessment
HVAC	High Voltage Alternating Current
ICES	International Council for the Exploration of the Sea
IFCA	Inshore Fisheries Conservation Authority
IPMP	In-Principle Monitoring Plan
kg	kilogram
km	Kilometre
LPUE	Landings per unit effort
MCA	Maritime and Coastguard Agency
MCEU	Marine Consents and Environment Unit
MCZ	Marine Conservation Zone
MLS	Minimum Landing Size
MMO	Marine Management Organisation
MoD	Ministry of Defence
MPA	Marine Protected Area
MSY	Maximum sustainable yield
MW	Megawatts
NCC	Norfolk County Council
NFFO	National Federation of Fishermen's Organisations
NM	Nautical mile
NNDC	North Norfolk District Council
NNIFA	North Norfolk Independent Fishermen's Association
NPS	National Policy Statement
NRA	Navigation Risk Assessment
NSIP	Nationally Significant Infrastructure Project
O&M	Operation and Maintenance
OSP	Offshore Substation Platform
OWF	Offshore Wind Farm

PDE	Project Design Envelope
PEIR	Preliminary Environmental Information Report
PLGR	Pre-Lay Grapnel Run
SAC	Special Area of Conservation
SAGB	Shellfish Association of Great Britain
SEP	Sheringham Shoal Offshore Wind Farm Extension Project
SPA	Special Protection Area
SSB	Spawning stock biomass
TAC	Total allowable catch
TCA	Trade Cooperation Agreement
UK	United Kingdom
UKFEN	UK Fisheries Economic Network
VMS	Vessel Monitoring System
WCS	Worst-Case Scenario
WPC	Weybourne Parish Council

Glossary of Terms

DCO Boundary	The area subject to the application for development consent, including all permanent and temporary works for SEP and DEP.
Dudgeon Offshore Wind Farm Extension Project (DEP)	The Dudgeon Offshore Wind Farm Extension onshore and offshore sites including all onshore and offshore infrastructure.
The Dudgeon Offshore Wind Farm Extension Project (DEP) offshore site	The Dudgeon Offshore Wind Farm Extension consisting of the DEP wind farm site, interlink cable corridors and offshore export cable corridor (up to mean high water springs).
The Dudgeon Offshore Wind Farm Extension Project (DEP) onshore site	The Dudgeon Offshore Wind Farm Extension onshore area consisting of the DEP onshore substation site, onshore cable corridor, construction compounds, temporary working areas and onshore landfall area.
DEP North array area	The wind farm site area of the DEP offshore site located to the north of the existing Dudgeon Offshore Wind Farm
DEP South array area	The wind farm site area of the DEP offshore site located to the south of the existing Dudgeon Offshore Wind Farm
DEP wind farm site	The offshore area of DEP within which wind turbines, infield cables and offshore substation platform/s will be located and the adjacent Offshore Temporary Works Area. This is also the collective term for the DEP North and South array areas.
Grid option	Mechanism by which SEP and DEP will connect to the existing electricity network. This may either be an integrated grid option providing transmission infrastructure which serves both of the wind farms, or a separated grid option, which allows SEP and DEP to transmit electricity entirely separately.
Infield cables	Cables which link the wind turbines to the offshore substation platforms.
Interlink cables	Cables linking two separate project areas. This can be cables linking: 1) DEP South array area and DEP North array area 2) DEP South array area and SEP 3) DEP North array area and SEP

	1 is relevant if DEP is constructed in isolation or first in a phased development. 2 and 3 are relevant where both SEP and DEP are built..
Interlink cable corridor	This is the area which will contain the interlink cables between offshore substation platform/s and the adjacent Offshore Temporary Works Area.
Landfall	The point at the coastline at which the offshore export cables are brought onshore, connecting to the onshore cables at the transition joint bay above mean high water.
Offshore cable corridors	This is the area which will contain the offshore export cables or interlink cables, including the adjacent Offshore Temporary Works Area.
Offshore export cable corridor	This is the area which will contain the offshore export cables between offshore substation platform/s and landfall, including the adjacent Offshore Temporary Works Area.
Offshore export cables	The cables which would bring electricity from the offshore substation platform(s) to the landfall.
Offshore scoping area	An area presented at Scoping stage that encompassed all planned offshore infrastructure, including landfall options at both Weybourne and Bacton, allowing sufficient room for receptor identification and environmental surveys. This has been refined following further site selection and consultation for the PEIR and ES.
Offshore substation platform (OSP)	A fixed structure located within the wind farm site/s, containing electrical equipment to aggregate the power from the wind turbines and convert it into a more suitable form for export to shore.
Offshore Temporary Works Area	An Offshore Temporary Works Area within the DCO order limits in which vessels are permitted to carry out activities during construction, operation and decommissioning encompassing a 200m buffer around the wind farm sites and a 750m buffer around the offshore cable corridors. No permanent infrastructure would be installed within the Offshore Temporary Works Area.
Sheringham Shoal Offshore Wind Farm Extension Project (SEP)	The Sheringham Shoal Offshore Wind Farm Extension onshore and offshore sites including all onshore and offshore infrastructure.

Sheringham Shoal Offshore Wind Farm Extension Project (SEP) offshore site	Sheringham Shoal Offshore Wind Farm Extension consisting of the SEP wind farm site and offshore export cable corridor (up to mean high water springs).
Sheringham Shoal Offshore Wind Farm Extension Project (SEP) onshore site	The Sheringham Shoal Wind Farm Extension onshore area consisting of the SEP onshore substation site, onshore cable corridor, construction compounds, temporary working areas and onshore landfall area.
SEP wind farm site	The offshore area of SEP within which wind turbines, infield cables and offshore substation platform/s will be located and the adjacent Offshore Temporary Works Area.
Study area	Area where potential impacts from the project could occur, as defined for each individual EIA topic.
The Applicant	Equinor New Energy Limited.

12 COMMERCIAL FISHERIES

12.1 Introduction

1. This chapter of the Environmental Statement (ES) considers the potential impacts of the proposed Sheringham Shoal Offshore Wind Farm Extension Project (SEP) and Dudgeon Offshore Wind Farm Extension Project (DEP) on commercial fisheries. The chapter provides an overview of the existing environment for the proposed offshore sites, followed by an assessment of the potential impacts and associated mitigation for the construction, operation, and decommissioning phases of the projects.
2. This chapter has been written by Royal HaskoningDHV based on the associated Commercial Fisheries Technical Report (**Appendix 12.1 Commercial Fisheries Technical Report**) produced by Poseidon Aquatic Resource Management Ltd, with the assessment undertaken with specific reference to the relevant legislation and guidance, of which the primary sources are the National Policy Statements (NPS). Details of these and the methodology used for the Environmental Impact Assessment (EIA) and Cumulative Impact Assessment (CIA) are presented in **Section 12.4**.
3. The assessment should be read in conjunction with following linked chapters:
   - **Chapter 9 Fish and Shellfish Ecology**; and
   - **Chapter 13 Shipping and Navigation**.
4. Additional information to support the commercial fisheries assessment includes:
   - **Appendix 12.1 Commercial Fisheries Technical Report**.

12.2 Consultation

5. Consultation with regard to commercial fisheries has been undertaken in line with the general process described in **Chapter 5 EIA Methodology**. The key elements to date have included scoping and consultation with national and local fishing industry representatives and fishermen. The consultation undertaken has been considered in preparing the ES chapter. **Table 12-1** provides a summary of how the consultation responses received to date have influenced the approach that has been taken.
6. Consultation with national and local fishing industry representatives, fishermen and one local processor has been undertaken to ground truth the datasets analysed within this assessment (as detailed in **Section 12.4.2**) and inform the impact assessment. Details of the commercial fisheries consultees consulted in relation to SEP and DEP are provided in **Table 12-1**.
7. This chapter and the associated technical assessment have been produced with due consideration of the Section 42 consultation on the Preliminary Environmental Information Report (PEIR). Full details of the consultation process are presented in the **Consultation Report** (document reference 5.1) alongside the Development Consent Order (DCO) application.

Table 12-1: Consultation Responses

Consultee	Date	Comment	Project Response
Scoping Responses			
Planning inspectorate	19/11/19	The Inspectorate is content that the impact of increased collision risk can be scoped out from this aspect chapter on the basis that an assessment of collision risk will be included in the Shipping and Navigation aspect chapter.	The impact of collision risk in relation to commercial fisheries is assessed in **Chapter 13 Shipping and Navigation**.
Planning inspectorate	19/11/19	Exclusion of certain types of fishing may make an area more productive for other types of fishing. The ES should assess any likely significant effects on fish stocks of commercial interest that could result from the presence of the wind farm development and any safety or buffer zones.	Impacts on commercial fish stocks due to displacement of fishing activity due to SEP and DEP are assessed in **Sections 12.6.1.1-12.6.3**.
Planning Inspectorate	19/11/19	The ES should identify the size of safety zones to be implemented. Where the precise extents are unknown, a worst-case scenario should be assessed. This comment applies equally to Shipping and Navigation.	The size of safety zones are presented in **Section 12.3** and assessed in **Section 12.6.1.1-12.6.3**.
Planning Inspectorate	19/11/19	The Scoping Report does not define what will constitute the 'local fishing fleet'. The Applicant should ensure that the baseline covers a sufficiently broad spatial scope in order to identify any receptors that could be significantly affected by the Proposed Development	The local fishing fleet has been identified in **Appendix 12.1 Commercial Fisheries Technical Report** and in **Section 12.5**.
Appendix 12.1 Technical Report Consultation			
Eastern Inshore Fisheries Conservation Authority (EIFCA)	22/07/20	No major concerns at this point. No comments on impact assessment at this point.	Noted.

Consultee	Date	Comment	Project Response
EIFCA	22/07/20	Whelk fishing is increasing in intensity especially in the Wash and as a result, vessels are moving offshore into deeper water to fish.	Key fleets, fisheries and species are described in **Section 12.5**. Whelk, brown crab and lobster fisheries are noted as active in the wind farm site and export cable study areas. Vessel Monitoring System (VMS) data has been obtained and assessed to establish fishing intensity.
National Federation of Fishermen's Organisations (NFFO)	23/07/20	The NFFO will have an objection to unprotected surface lay of cable (which is proposed as an option within the Cromer Shoal Marine Conservation Zone (MCZ)). The NFFO have serious concern related to gear snagging with unprotected surface lay cable for vessels deploying/hauling potting gear and vessels operating mobile gear.	Unprotected surface laid cable has been scoped out. Cables will be buried as far as possible to avoid the need for external cable protection systems. The **Outline Cromer Shoal Chalk Beds (CSCB) MCZ Cable Specification, Installation and Monitoring Plan (CSIMP)** (document reference 9.7) provides further information on the anticipated cable installation and protection requirements within the MCZ.
NFFO	23/07/20	Sourcing UK VMS data for 12-14.99m vessels (which are not currently included in the publicly available data) was recommended.	Publicly available Marine Management Organisation (MMO) VMS data (2014 to 2018) which has been included in the assessment includes vessels that are ≥12m in length (**Section 12.4.2.1.2**).
NFFO	23/07/20	The potential for measures being proposed to mitigate project impacts on the MCZ was noted, specifically where such mitigation might include measures that lead to additional impacts on commercial fisheries e.g. extension to a Marine Protected Area (MPA), which could result in additional loss of fishing ground due to management measures within that extended area.	Extension of existing MPAs is not proposed (schedule of mitigation 6.5). It is noted that the extension of an MPA would be instigated by the relevant government department and would be outside of the control of the Applicant and the Project DCO process.
NFFO	23/07/20	The need to ensure clarity of where hazards to fishing vessels are assessed within the EIA was raised. E.g. gear snagging is assessed in commercial fisheries chapter and collision risk is assessed in shipping and navigation, clarity	Safety aspects including potential loss of life as a result of snagging risk are assessed within **Chapter 13 Shipping and Navigation**.

Consultee	Date	Comment	Project Response
		on where loss of life due to gear snagging hazard is assessed is required.	
Jonas Seafood Ltd	06/08/20	It was noted that with reference to the EIFCA mapping project from 2010 there is a 3 mile restriction on trawling from the shore therefore the shrimp vessels (beam trawlers) are unlikely to be close to the shore.	Noted.
Jonas Seafood Ltd	06/08/20	The landings data for the port of Wells in terms of value seems a little low since Jonas seafoods bought £1million of crab in 2019. This may be because under 35kg landings from one vessel are not required to be recorded.	Noted. Data limitations are described in **Section 12.4.6** and detailed further within **Appendix 12.1 Commercial Fisheries Technical Report**.
Jonas Seafood Ltd	06/08/20	Jonas seafood has considerable concerns about the lack of availability of supply of crab during construction of the extension projects which will negatively impact the business. The business would like to be compensated for the loss from the developer.	Impacts on the UK Potting fleet during the construction phase will be mitigated through justifiable disturbance payments (**Section 12.6.1**).
North Norfolk Independent Fishermen's Association (NNIFA)	07/08/20	Concern was raised about the impact of any pile driving on the fisheries resources especially the amount of sediment disturbance the effect on filter feeders and sea bed species such as crab and lobster.	Impacts on fish and shellfish associated with underwater noise from piling, temporary habitat loss and disturbance and sediment disturbance during the construction phase are assessed in **Chapter 9 Fish and Shellfish Ecology**.
NNIFA	07/08/20	The NNIFA will have an objection to unprotected surface lay of cable (which is proposed as an option within the Cromer Shoal MCZ). NNIFA have concerns related to gear snagging with unprotected surface lay cable for vessels deploying/hauling potting gear and vessels operating mobile gear.	Unprotected surface laid cable within the Cromer Shoal Chalk Beds MCZ has been scoped out of the Project Design Envelope (PDE). Cables will be buried as far as possible to avoid the need for external cable protection systems. The **Outline CSCB MCZ CSIMP** (document reference 9.7) provides further information on the anticipated cable installation and protection requirements within the MCZ.

Consultee	Date	Comment	Project Response
NNIFA	07/08/20	The NNIFA members noted that if both extension projects were going to be built they would prefer them to be constructed simultaneously over 4 year period because this would be less disruptive.	Sequential construction has been considered to represent the realistic worst-case construction scenario (**Section 12.3.2**). To clarify, offshore construction works would require up to two years per project (excluding pre-construction activities such as surveys), assuming SEP and DEP were built at different times. If built at the same time, offshore construction could be completed in two years. Accounting for the development scenarios described in **Section 4.1.1** of **Chapter 4 Project Description**, there could be a gap of up to one year between the completion of offshore construction works on the first Project and the start of offshore construction works on the second Project.
NNIFA	07/08/20	Any time a vessel has to detour round either infrastructure or the cable corridor this places extra cost in terms of fuel which then needs to be covered by extra effort on behalf of the vessels to catch more fish to maintain the profit margin.	Impacts on the UK Potting fleet during the construction phase will be mitigated through justifiable disturbance payments (**Section 12.6.1**).
NNIFA	07/08/20	DC also raised concerns that members of the NNIFA have with regard to the proposed construction time period. The compensation for displacement during this time period would be extensive and it has been observed that boats which do not usually fish for shellfish in this area are already appearing in the area.	Impacts on the UK Potting fleet during the construction phase will be mitigated through justifiable disturbance payments (**Section 12.6.1**).
NNIFA	07/08/20	It was noted that since smaller amount of catch i.e. 35kgs and under were not required to be recorded there may be a distortion of the true landings and value figures. The NNIFA consider that the data upon which the technical report is based may, therefore, not be a true record of the situation.	Noted. Data limitations are described in **Section 12.4.6** and detailed further within **Appendix 12.1 Commercial Fisheries Technical Report**.

Consultee	Date	Comment	Project Response
NNIFA	07/08/20	The need to ensure clarity of where hazards to fishing vessels are assessed within the EIA was raised. E.g. gear snagging is assessed in commercial fisheries chapter and collision risk is assessed in shipping and navigation, clarity on where loss of life due to gear snagging hazard is assessed is required.	The safety aspects including potential loss of life as a result of snagging risk are assessed within **Chapter 13 Shipping and Navigation**.
Local fisheries stakeholders	27/07/20 and 21/08/20	N/A	The following local stakeholders were approached but declined to comment: North Norfolk Fishermen's Society Wells and District Fishermen's Association Greater Wash Fishing Industry Group Independent fisherman Eastern England Fish Producers Organisation Ltd
Section 42 Responses			
Norfolk Country Council (NCC)	08/06/21	It is felt that where there is likely to be a demonstrable impact on commercial fishing affecting communities in Norfolk that Equinor should provide appropriate mitigation and compensation to those fishing communities affected.	The impact upon local commercial fishers has been assessed. Where justified, Fisheries Liaison with Offshore Wind and Wet Renewables Group (FLOWW) guidance will be followed with respect to the identification of appropriate mitigation / disturbance payments.
Weybourne Parish Council (WPC)	08/06/21	WPC has concerns about fishermen's livelihoods: the PEIR describes the impact as "minor adverse" for UK potters. However, on a local scale these impacts can be colossal.	The impact upon local commercial fishers has been assessed. Where justified, FLOWW guidance will be followed with respect to the identification of appropriate mitigation / disturbance payments.

Consultee	Date	Comment	Project Response
North Norfolk District Council (NNDC)	10/06/21	Commercial fishing in North Norfolk is a key part of the District's history, culture and economy. However, many commercial fisheries in the District operate on the margins of viability and existing and proposed wind farm related activities and associated restrictions/exclusion including surveying work can impact not only those fishing but those businesses that are dependent on local supplies from the fishing industry to process and sell to market including iconic produce such as Cromer crab. NNDC welcome the engagement already undertaken as set out in Table 14-2 of the PEIR chapter and would wish to see continued engagement with all relevant stakeholders as the project progresses.	Noted. Consultation undertaken to date is summarised within **Table 12-1** and **Appendix 12.1 Commercial Fisheries Technical Report**.
Cley-next-to-the-sea Parish Council (CPC)	09/06/21	CPC has concerns about fishermen's livelihoods.	The impact upon local commercial fishers has been assessed within the Commercial Fisheries Technical Report (**Appendix 12.1 Commercial Fisheries Technical Report**). Where justified, FLOWW guidance will be followed with respect to the identification of appropriate mitigation / disturbance payments.
NFFO	10/06/21	Reference is made to the application of a 500m safety zones for major maintenance. The introduction of service operation vehicles for use on some projects has led to applications for 500m safety zones applying to their activities. As these in practice are used for routine maintenance practices frequently docking to surface structures, they can under such provisions present a much more significant disruption to fishing activities within the vicinity of a site. It is requested that intentions with respect to such vessels and the use of safety zones are clarified and if it is considered an option, then the implications of such arrangements should be factored into the assessment."	Safety zones during the operational phase will not be applied to service operation vessel activities and will be for major maintenance only, with 10 jack-up vessel movements per site, per year anticipated requiring 500m safety zones during the operational phase (**Chapter 4 Project Description**).

Consultee	Date	Comment	Project Response
NFFO	10/06/21	It is noted that with the Cromer Shoal MCZ the intention is to surface lay the export cable. The assessment notes that it is expected that it is considered that fishermen would operate appropriately without defining what that means or defining assumptions for the purposes of the assessment. This is also complicated by the fact that a commitment has not been given over whether any surface laid, or shallow buried but exposed cable would be protected. Static fishing gears have the potential to snag an exposed unprotected cable and therefore this risk should be assessed.	Unprotected surface laid cable within the Cromer Shoal Chalk Beds MCZ has been scoped out of the PDE. Cables will be buried as far as possible to avoid the need for external cable protection systems. The **Outline CSCB MCZ CSIMP** (document reference 9.7) provides further information on the anticipated cable installation and protection requirements within the MCZ. The impact on snagging to static fishing gears has been considered in **Section 12.6.2.4**, **Appendix 12.1 Commercial Fisheries Technical Report** and **Chapter 13 Shipping and Navigation.**
NFFO	10/06/21	The cumulative assessment is predicated on the basis that fisheries will have access to the areas of all offshore wind farms project areas during the operational phase. However, there is as yet no firm evidence that in the case of trawling and beam trawling that fisheries are resuming within built out projects. In addition, Hornsea Project 3 appears to be missing from the cumulative assessment. Projects affecting some fleets in other North Sea state waters have not been included in the assessment.	Consultation and analysis conducted as part of the Commercial Fisheries Technical Report (**Appendix 12.1 Commercial Fisheries Technical Report**) has identified that levels of trawling and beam trawling are limited within SEP and DEP, with 99% of all landed weight in the wind farm sites study area caught using pots and traps. Hornsea Project 3 has been incorporated into **Table 12-12** of the updated Commercial Fisheries Technical Report (**Appendix 12.1 Commercial Fisheries Technical Report**).

Consultee	Date	Comment	Project Response
NFFO	10/06/21	It is not clear in the cumulative impact assessment what assumptions have been applied with respect to loss of access to fishing grounds and displacement from marine protected areas. It is noted that the government has signaled changes in approach following Brexit that imply more onerous exclusions of bottom contacting mobile fishing gears, as indicated in the recent MMO consultation on offshore marine sites, including the Dogger Bank where it is proposed to exclude these gears from the entirety of the site. In addition, it is not clear whether MPAs or other spatial management impediments in other North Sea states that will affects some fleets have been included.	Use of mobile gear is already spatially restricted within the Cromer Shoal Chalk Beds MCZ. More onerous restrictions are anticipated for mobile gear and this has been considered (i.e. the assumed position within the cumulative impact assessment is that mobile gear is restricted from MPAs with benthic features). However, due to current lack of mobile activity across SEP and DEP, it is not expected that displacement will occur.

Consultee	Date	Comment	Project Response
NFFO	10/06/21	It is difficult to draw a view on the validity of the cumulative impact assessment conclusions without a graphical representation of the projects against spatial fisheries data. The representation of VMS data in the report appears limited to 2017, although it is stated the assessment is based on, among other datasets, 2014-2017 UK VMS data. Nonetheless it is surprising that conclusions have been drawn of low sensitivity and magnitude of impact and minor adverse significance of effects on demersal trawl fisheries / none potting fisheries in terms of loss of access to fishing grounds and displacement effects resulting in gear conflict and increased pressures on alternative grounds. We anticipate that large scale displacement will result from the combined effects of multiple projects and other spatial management measures affecting fleets operating in the southern North Sea. Furthermore, these results are not consistent with, for example, the CIA for Norfolk Boreas that concluded moderate adverse impact significance for UK beam trawling (anglo-dutch and dutch seine netting and beam trawling to loss of access to fishing grounds and displacement effects and Hornsea 3 that concluded moderate impact significance for demersal trawls to loss of access to fishing grounds.	Existing demersal trawl fisheries / potting fishing activity in SEP and DEP is lower than in the Norfolk Boreas and Hornsea Project 3 areas, as shown in Figure 6.5 of Volume 2, Chapter 5 (Commercial Fisheries) of the Hornsea Project Three Offshore Wind Farm Environmental Statement (Orsted, 2018) and Figure 6.9 of Volume 3, **Appendix 12.1 Commercial Fisheries Technical Report** of the Norfolk Boreas Offshore Wind Farm Environmental Statement (Brown and May Marine Limited, 2019). The lower level of fishing activity is an important factor in the assessment and is one of the reasons that the impacts in relation to SEP and DEP are assessed as minor adverse. Additional VMS data for UK vessels for 2018 and 2019 has recently become available and has been incorporated into the assessment. VMS data from 2015 to 2017 has been retained to provide a 5-year timeline (**Section 12.4.2.1.2**).
NNIFA	15/06/21	The main pressure is outside vessels putting pressure on our grounds to get tract record.	The Commercial Fisheries Technical Report **Appendix 12.1 Commercial Fisheries Technical Report** has been updated with VMS data for UK vessels for 2018 and 2019. VMS data for non-UK vessels is available up to 2017. It is recognised that the future baseline for commercial fisheries may be affected by changing fisheries activity patterns driven by a range of factors, including fisheries management (e.g. Total Allowable Catches (TACs), policy changes (e.g. UK exit from EU) and natural biological variations in species biomass.

Consultee	Date	Comment	Project Response
EIFCA	18/06/21	Issues related to displacement of fishing activity: • What assessment of the possibility of displacement of fishing effort has been made? • Have fishermen been asked if there is place to displace to? This is especially important for small boat inshore fishers, who can't simply go further out. • In connection with the difficulty of finding alternative fishing grounds for some fishers, we suggest that the assessment "The potting fleets targeting whelk, crab and/or lobster within the DEP wind farm site are considered to be of medium vulnerability, medium recoverability and high value." (App. 14.1 Commercial Fisheries Technical Report, 5.7.1.1.1) may require re-appraisal – App. 14.1 Commercial Fisheries Table 5.1 identifies a sensitivity of "High" if condition "No alternative fishing grounds are available" is met, which may well be the case for inshore potters within the area affected by the proposed project. •The assumption that effort will be displaced, rather than removed, implies that it will be displaced to somewhere else. This will increase the effective fishing effort in that location. The impacts of that increased effort should be assessed as to effects on features of MPAs (if appropriate) and on fishers already operating in those areas. As this is a direct – and indeed seemingly intended – result of the required mitigation measure, it would seem to be the responsibility of the project developer to conduct this assessment.	It is agreed that the focus should be to mitigate the exclusion or reduced access in a way that does not lead to displacement i.e. mitigate so that fishing effort is removed, rather than displaced. This may be achieved through the requirement that gear moved due to construction activities is not subsequently used to fish elsewhere and instead goes into wet or dry storage. Further information is detailed within **Section 12.6.1.3** and **Section 12.6.2.3** and **Sections 5.7.1.3.1** and **Section 5.7.1.3.2** of **Appendix 12.1 Commercial Fisheries Technical Report**.

Consultee	Date	Comment	Project Response
		• We advise that similar payments of compensation in the past have resulted in fishers using the money to purchase more fishing gear. This has increased the effective fishing effort. The impacts of that increased effort should be assessed as to effects on features of MPAs (if appropriate) and on fishers already operating in those areas. As this is a direct and predictable result of the required mitigation measure, it would seem to be the responsibility of the project developer to conduct this assessment. • Noting these points above, should not financial compensation be paid to remove fishing activity from those areas where this is needed for project works, rather than displace it elsewhere? As the issues arising from such compensation are direct and predictable results of the required mitigation measure, it would seem to be the responsibility of the project developer to ensure that compensation results in local and temporary elimination of fishing pressure, rather than displacement.	
EIFCA	18/06/21	We note the comment "Consultation has been key throughout the EIA process to determine extent and distribution of activity by the < 12 m fleet." (App. 14.1 Commercial Fisheries Technical Report, 1.3.2) but were unable to find details of the consultation. Can you please direct us to the method and results of this consultation?	Consultation is presented within **Table 1.2** of the Commercial Fisheries Technical Report contained within **Appendix 12.1 Commercial Fisheries Technical Report**.
EIFCA	18/06/21	Issues relating to Cables & Electro- Magnetic Field (EMF) We think that the issue of potential effects from cables & EMF has been dismissed rather too lightly. This is especially the case for the cable corridor within the MCZ, where we note that "….. there is unprotected surface lay of cable (which is proposed as an option within the Cromer Shoal MCZ)….." (Chapter 12 Commercial Fisheries, section 327).	Unprotected surface laid cable within the Cromer Shoal Chalk Beds MCZ has been scoped out of the PDE. Cables will be buried as far as possible to avoid the need for external cable protection systems.

Consultee	Date	Comment	Project Response
		Our concerns arise from three main points – 1. The potential danger to fishers posed by the snagging risk of surface laid cables interacting with fishing gear. We do not necessarily accept that this is a risk only for mobile gear, and suggest that there needs to be full consideration of the potential impacts of snagging surface laid cables for potting gear. 2. The EMF effects experienced by organisms within the sea diminishes with distance from the cable source of such EMFs. This is recognised within the PEIR by the proposal of cable burial as a mitigation measure, with statements such as "The Applicant is committed to burying offshore export cables where possible, reducing the effects of EMFs .. Typical burial depth for DEP and SEP cables, .. is expected to be between 0.5m to 1.5m (or up to 1m for the export cables)" (Chapter 9 – Within Table 11-3: "Embedded Mitigation Measures"). When the cable is surface laid, the EMF effects have the potential to be much greater than would be the case for buried cables. 3. We think that there may well be more uncertainty over effects arising from EMF than presented in the PEIR.	The **Outline CSCB MCZ CSIMP** (document reference 9.7) provides further information on the anticipated cable installation and protection requirements within the MCZ. The commercial impacts as a result of snagging are assessed within **Section 12.6** and **Appendix 12.1 Commercial Fisheries Technical Report**. The safety aspects including potential loss of life as a result of snagging risk are assessed within **Chapter 13 Shipping and Navigation**. Potential EMF impacts are assessed within **Chapter 9 Fish and Shellfish Ecology**.

Consultee	Date	Comment	Project Response
EIFCA	18/06/21	The PEIR notes that there may be displacement of shipping traffic due to the installation and operation of the wind farm and associated infrastructure. We could not find an assessment of the impacts from this displacement on fishing activity, and request that this information be supplied please.	**Chapter 13 Shipping and Navigation** and the associated **Appendix 13.1 Navigation Risk Assessment (NRA)** assess the impact of vessel traffic displacement. Six of the main 14 commercial routes are expected to be deviated, and it is anticipated, given natural features in the projects vicinity deviations will largely occur along pre-established routing options. The impact of the displacements was, therefore, assessed to be tolerable. The impact of displacement of shipping routes on fishing activity is further assessed within **Section 12.6.1.6**, **Section 12.6.2.6**, **Table 12-16** and **Appendix 12.1 Commercial Fisheries Technical Report**.
EIFCA	18/06/21	We consider it very important that developers open and maintain effective dialogue with all fishing interests who may be affected by a project (commercial fishers, recreational fishers and charter boat operators). We continually seek to improve how we respond to consultations, both in terms of efficiency and content. Therefore, if any of the points raised in this response are reflected in the outcome we would appreciate being informed.	Noted and understood. It is noted that impacts to recreational fishers are considered within **Chapter 16 Petroleum Industry and Other Marine Users**.
Additional Consultation			
NFFO	13/09/21	Service operational vehicles used for routine maintenance may require 500m safety zones. This is informed by experience from other projects, including Race Bank.	Safety zones during the operational phase will not be applied to service operation vessel activities and will be for major maintenance only, with 10 jack-up vessel movements per site, per year anticipated requiring 500m Safety zones during the operational phase (**Chapter 4 Project Description**).

Consultee	Date	Comment	Project Response
NFFO	13/09/21	With regard to surface laid cables, local potting fleets would not avoid areas of cable protection or surface laid cable. It is not expected that static gear would be a threat to the cable, but there could be a risk to fishing operations, both in terms of loss of gear and possible capsize of vessel.	Unprotected surface laid cable has been scoped out of the PDE. Cables will be buried as far as possible to avoid the need for external cable protection systems. The **Outline CSCB MCZ CSIMP** (document reference 9.7) provides further information on the anticipated cable installation and protection requirements within the MCZ.
EIFCA	13/10/21	What length of protected cable is expected within the MCZ?	Horizontal directional drilling (HDD) construction method will be used to install the export cables (**Table 12-2**) which will avoid interaction with the intertidal area and nearshore outcropping chalk feature of the MCZ. Cables will be buried as far as possible to avoid the need for cable protection measures. It is noted that the existing Dudgeon and Sheringham export cables did not require external cable protection and were fully buried. Further information is provided within the **Outline CSCB MCZ CSIMP** (document 9.7).
EIFCA	13/10/21	Please provide HDD entry and exit locations when they are available.	Entry and exit points are not yet finalised, but will occur within the width of corridor. Exact locations will be communicated post consent.
EIFCA	13/10/21	With regard to displacement, it was noted that relatively small vessels cannot easily displace elsewhere due to limited operational range and limited availability of grounds.	Mitigation posed for displacement impacts focusses on removing rather than displacing effort. This will be delivered through the **Outline Fisheries Liaison and Co-existence Plan (FLCP)** (document reference 9.8), which sets out the principles of how this can be achieved.

Consultee	Date	Comment	Project Response
EIFCA	13/10/21	In addition, a number of MPAs exist in the region, which have been through Habitats Regulations Assessment (HRA) based on current levels of fishing. If displacement resulting from wind farms is to alter this level of effort, then HRAs may need revisiting.	The **HRA screening report** (document reference 5.4.1) screens for likely significant effects on Special Areas of Conservation (SAC) that have fish receptors as qualifying features. The screening exercise resulted in all sites with fish receptors as qualifying features being screened out of the assessment.
EIFCA	13/10/21	The relationships of vessel owners with buyers was highlighted, with potential disruption in supply leading to potential loss of relationships with buyers.	Seafood buyers have been included within consultation rounds (**Table 12-1**) and will be included in the **FLCP** (document reference 9.8).
EIFCA	13/10/21	With the unique features of the MCZ and current scale of fishing, fishermen are likely to consider it not possible to displace. There have been instances where insurance companies have declined to cover fishermen operating in The Wash if they fish over cables, which is preventing fishing in certain areas.	Mitigation posed for displacement impacts focusses on removing rather than displacing effort. This will be delivered through the **FLCP** (document reference 9.8), which sets out the principles of how this can be achieved.
EIFCA	13/10/21	This is specific to the shrimp trawl fishery in The Wash. There have been cases where cables in The Wash have become exposed, and are not behaving in a predictable manner.	Routine maintenance activities during the operational phase will check the integrity of the cable. Existing monitoring procedures for Dudgeon and Sheringham Shoal will be replicated for the extension projects.

Consultee	Date	Comment	Project Response
			The SEP and DEP export cable corridor runs parallel to the Dudgeon Offshore Wind Farm export cables. As detailed in the **Outline CSCB MCZ CSIMP** (document reference 9.7), 93% of the export cable length achieved a burial depth >1.0 m at Dudgeon. At one location 3km to 4km from shore, subcropping chalk was encountered at about 0.3m below sea bed, resulting in a reduced burial depth in this area of 0.3m. This was accepted due to the burial depth being in solid ground conditions, which from a cable burial risk assessment perspective offers greater protection from damage from anchoring and fishing activity. No remedial cable protection (either through burial or with external protection) was performed. Post-construction surveys do not show any exposed export cables, nor visibility of the trenched route on the sea bed. To date, no cable repair or remedial reburial works have been undertaken since the wind farm has been in operation.
EIFCA	28/02/22	Regarding upcoming surveys, EIFCA queried if conversations had been held with the fishing industry regarding gear entanglement.	A Fisheries Liaison Officer (FLO) has been appointed by the Project who is managing communications with local fishers. Communications regarding survey activities are contained within the communication log within the consultation report (document no 5.1).
EIFCA	10/03/22 (CSIMP)	The additional export cable corridor width will cause additional disruption to existing fisheries, because there is a higher intensity of fishing closer to shore. We request disruption is minimised, for example by establishing and maintaining frequent dialogue with local fishery stakeholders, and if possible timing works to avoid busier fishing periods.	Noted. A FLO has been appointed by the Project who is managing communications with local fishers. A **FLCP** (document reference 9.8) has been drafted in consultation with relevant stakeholders which sets out a plan for continued and ongoing consultation.

Consultee	Date	Comment	Project Response
EIFCA	10/03/22 (CSIMP)	EIFCA requests that the Applicants FLO liaise with the fishing industry to ascertain if they have or have had, any issues with the original cable installations and what lessons might be learnt to support successful coexistence with this project. We request notification of any fisheries reported issues both from current liaison and any issues previously reported since the original cables were installed.	Noted.
NFFO	29/06/22	An overview of the S42 comments raised by the previous Deputy Chief Executive was given. No further points were raised. Unprotected cable lay was the primary concern, which has been removed.	Noted.
NFFO	29/06/22	The NFFO is pleased to see an evidence-based approach being taken which is the fairest approach for everyone. Timely communication is key as its easier to not put gear out in an area in the first place than to have to move it.	Noted

12.3 Scope

12.3.1 Study Area

9. SEP and DEP are within the International Council for the Exploration of the Sea (ICES) Division Ivc (4c) within the UK Exclusive Economic Zone (EEZ) (**Figure 1-1**, **Appendix 12.1 Commercial Fisheries Technical Report**). Each ICES Division is divided into statistical rectangles within which fisheries landings are reported. SEP and DEP are located within ICES statistical rectangle 35F1, with the areal overlap being 2.49% and 2.79% respectively.

10. The DEP wind farm site consists of two array areas, the DEP North array area and the DEP South array area, which are both located outside the 12 nautical miles (NM) territorial waters limit in depths of between 11m and 23m. The DEP South array area is the closest to shore (26.5km at its nearest point). Combined, the DEP North array area and the DEP South array area cover 114.75km^2.

11. SEP is located partially outside the 12NM territorial limit and partially within the 6 to 12NM boundaries in water depths between 14m and 25m. It is approximately 15.8km from shore at its closest point and covers an area of 97km^2.

12. The proposed offshore cable corridors for SEP and DEP will route through both ICES rectangles 35F1 and 34F1 on approach to landfall and the areal overlap is calculated to be 1.91% for both rectangles, based on the construction option of building both SEP and DEP (see **Section 4.1.1** of **Chapter 4 Project Description**).

13. Since ICES statistical rectangles are the smallest area for which landings data are available these, along with the offshore DCO order limits, will be used to define the boundary for the study areas for describing commercial fisheries activity. Given the potential for displacement of vessels, the regional commercial fisheries study area also includes ICES rectangles 34F0 and 35F0 to the west. The commercial fisheries study areas are defined as follows and depicted in **Figure 1-4** (**Appendix 12.1 Commercial Fisheries Technical Report**).

    - SEP and DEP wind farm sites study area: 35F1;
    - Offshore cable corridor study area: 34F1 & 35F1; and
    - Regional study area: 34F0, 34F1, 35F0 and 35F1.

12.3.2 Realistic Worst Case Scenario

12.3.2.1 General Approach

14. The final design of SEP and DEP will be confirmed through detailed engineering design studies that will be undertaken post-consent to enable the commencement of construction. In order to provide a precautionary but robust impact assessment at this stage of the development process, realistic worst-case scenarios have been defined in terms of the potential effects that may arise. This approach to EIA, referred to as the Rochdale Envelope, is common practice for developments of this nature, as set out in Planning Inspectorate Advice Note Nine Rochdale Envelope (v3, 2018). The Rochdale Envelope for a project outlines the realistic worst-case scenario for each individual impact, so that it can be safely assumed that all lesser options will have less impact. Further details are provided in **Chapter 5 EIA Methodology**.

15. The realistic worst-case scenarios for the commercial fisheries assessment are summarised in **Table 12-2**. These are based on the project parameters described in **Chapter 4 Project Description**, which provides further details regarding specific activities and their durations.

16. In addition to the design parameters set out in **Table 12-2**, consideration is also given to:

- How SEP and DEP will be built out as described in **Section 12.3.2.2** Error! Reference source not found. to **Section 12.3.2.4**. This accounts for the fact that whilst SEP and DEP are the subject of one DCO application, it is possible that only one project could be built out (i.e. build SEP or DEP in isolation) or that both could be developed. If both are developed, construction may be undertaken either concurrently or sequentially.
- A number of further development options which either depend on pre-investment or anticipatory investment, or that relate to the final design of the wind farms.
- Whether one Offshore Substation Platform (OSP) or two OSPs are required (relevant only to the offshore assessments).
- The design option of whether to use all of the DEP North and DEP South array areas, or whether to use the DEP North array area only (relevant only to the offshore assessments).
- In order to ensure that a robust assessment has been undertaken, all development scenarios and options have been considered to ensure the realistic worst-case scenario for each topic has been assessed. Further details are provided in **Chapter 4 Project Description**.

12.3.2.2 Construction Scenarios

17. In the event that both SEP and DEP are built, the following principles set out the framework for how SEP and DEP may be constructed:

- SEP and DEP may be constructed at the same time, or at different times;

- If built at the same time both SEP and DEP could be constructed in four years;
- If built at different times, either Project could be built first;
- If built at different times, each Project would require a four year period of construction;
- If built at different times, the offset between the start of construction of the first Project, and the start of construction of the second Project may vary from two to four years;
- Taking the above into account, the total maximum period during which construction could take place is eight years for both Projects; and

The earliest construction start date is 2025.

18. The impact assessment for Commercial Fisheries considers the following development scenarios in determining the worst-case scenario for each topic:
    - Build SEP or build DEP in isolation – one OSP only; and
    - Build SEP and DEP concurrently or sequentially – with either two OSPs, one for SEP and one for DEP, or with one OSP only to serve both SEP and DEP.

19. For each of these scenarios it has been considered whether the build out of the DEP North and DEP South array areas, or the build out of the DEP North array area only, represents the worst-case for that topic. Any differences between SEP and DEP, or differences that could result from the manner in which the first and the second projects are built (concurrent or sequential and the length of any gap) are identified and discussed where relevant in the impact assessment section of this chapter (**Section 12.6**). For each potential impact, where necessary, only the worst-case construction scenario for two Projects is presented, i.e. either concurrent or sequential. The justification for what constitutes the worst-case is provided, where necessary, in **Section 12.6**.

20. The realistic worst-case build out scenario for commercial fisheries is considered to be sequential construction (i.e. one project is built before the other) because this represents the longest duration of offshore construction.

21. In relation to the different OSP scenarios where both SEP and DEP are built (i.e. whether there is one or two OSPs), each scenario has been presented, however only the worst-case for each individual component has been assessed in the impact assessment in **Section 12.6**. Where appropriate, the worst-case parameter for each component in the one or two OSP scenario has been denoted with an asterisk and underlined in **Table 12-2**. In addition, cells have been shaded grey to indicate which scenario represents the worst-case in relation to each of the impacts assessed.

12.3.2.3 Operation Scenarios

22. Operation scenarios are described in detail in **Chapter 4 Project Description**. Where necessary, the assessment considers the following three scenarios:
    - Only SEP in operation;
    - Only DEP in operation; and

- The two Projects operating at the same time, with a gap of two to four years between each Project commencing operation.

23. The operational lifetime of each Project is expected to be 40 years.

12.3.2.4 Decommissioning Scenarios

Decommissioning scenarios are described in detail in **Chapter 4 Project Description**. Decommissioning arrangements will be agreed through the submission of a Decommissioning Programme prior to construction, however for the purpose of this assessment it is assumed that decommissioning of SEP and DEP could be conducted separately, or at the same time

Table 12-2: Realistic Worst-Case Scenarios.

Impacts	SEP in Isolation	DEP in Isolation	SEP and DEP		Notes and Rationale
			Two OSPs (one in SEP wind farm site and one in DEP North array area)	One OSP (located in SEP wind farm site)	
Construction					
Impact 1: Construction activities and physical presence of constructed wind farm site infrastructure leading to reduction in access to, or exclusion from established fishing grounds.	**Sea bed preparation footprints** • Sand wave clearance: **0km²** • Worst case is for Gravity Base Structure (GBS) foundations: **0.057km²** (for up to 19 18MW wind turbines) • Route clearance: • Pre-lay grapnel run (PLGR): included in cable installation width area • Boulder clearance (up to 30): **1,178m²** **Total = 0.057km²**	**Sea bed preparation footprints** • Sand wave clearance: **0.93km²** • Worst case is for GBS foundations: **0.073km²** (for up to 24 18MW wind turbines) • Route clearance: • PLGR: included in cable installation width area • Boulder clearance (up to 20): **785m²** **Total = 1km²**	**Sea bed preparation footprints** • Sand wave clearance: **0.93km²*** • Worst case is for GBS foundations: **0.13km²** (for up to 43 18MW wind turbines) • Route clearance: • PLGR: included in cable installation width area. • Boulder clearance (up to 50): **1,963.5m²** **Total = 1.06km²***	**Sea bed preparation footprints** • Sand wave clearance: **0.76km²** • Worst case is for GBS foundations: **0.13km² (for up to 43 18MW wind turbines)** • Route clearance: • PLGR: included in cable installation width area • Boulder clearance (up to 50): 1,963.5m² **Total = 0.89km²**	This represents the maximum duration and extent of fishing exclusion throughout the construction phase and hence the greatest potential to restrict access to fishing grounds. Sand wave clearance (pre-sweeping) is confined to the DEP North and South array areas, the northern portion of the interlink cable corridor between the DEP North array area and SEP wind farm site and the interlink cable corridor between the DEP North and DEP South array areas (see **Figure 4.9** of **Chapter 4 Project Description**). Therefore, no sand wave clearance is required in the SEP wind farm site. The Worst-Case Scenario (WCS) is based on a two OSP scenario and is estimated based on analysis of existing geophysical data to determine where sand wave clearance is likely to be required. The width of sea bed disturbance along the PLGR is estimated to be up to 3m, which would be encompassed by the 15m cable installation disturbance width accounted for below. Calculations assume boulders of 5m diameter and an equivalent disturbance footprint at the origin boulder location and at the location to which it is moved. Individual permanent GBS footprints including scour protection are 14,314m² and
	Wind turbines physical presence: • Installation of up to **23 x 15 megawatt** (**MW**) **wind turbines** • Minimum separation distance between wind turbines: **1.05km** • Maximum permanent footprint of 19 GBS foundations (18MW) including foundation scour protection: **0.48km²**	**Wind turbines physical presence:** • Installation of up to **30** x **15MW wind turbines** • Minimum separation distance between wind turbines: **1.05km** • Maximum permanent footprint of 24 GBS foundations (18MW) including foundation scour protection: **0.61km²**	**Wind turbines physical presence:** • Installation of up to **43 18MW wind turbines** • Minimum separation distance between wind turbines: **1.05km** Maximum permanent footprint of 43 18MW GBS foundations including foundation scour protection: **1.09km²***		
	Offshore substation platforms	**Offshore substation platforms**	**Offshore substation platforms**	Same as SEP in Isolation	

Impacts	SEP in Isolation	DEP in Isolation	SEP and DEP		Notes and Rationale
			Two OSPs (one in SEP wind farm site and one in DEP North array area)	One OSP (located in SEP wind farm site)	
	• 1 OSP in SEP wind farm site • Maximum footprint of OSP foundations including scour protection (with suction cans): **4,761m²**.	• 1 OSP in DEP North array area • Maximum footprint of OSP foundations including scour protection (with suction cans): **4,761m²**.	• 2 OSPs, with an OSP in the SEP wind farm site and in the DEP North array area. • Maximum footprint of OSP foundations including scour protection (with suction cans): **9,522m²***.		25,447m² for a 15MW and 18MW wind turbine respectively and therefore the worst-case across the wind farm sites is associated with the 18MW wind turbines. The worst-case scenario assumes wind turbines utilise the entire SEP and DEP wind farm sites.
	Infield and interlink cables: Up to **90km** comprising**:** • **90km** of infield cables • No interlink cables • Burial depth: 0.5 to 1.5m (excluding burial in sand waves up to 20m; • Cable installation maximum width of temporary disturbance: 15m Maximum area disturbed: **1.35km²** for infield cables	**Infield and interlink cables:** Up to **201km:** • **135km** of infield cables (DEP North array area: 90km; DEP South array area: 45km) • Up to 3 parallel interlink cables between the DEP South array area and OSP in the DEP North array area: up to **66km** in length (combined) • Burial depth: same as SEP in isolation • Cable installation maximum width of temporary disturbance: Same as SEP in isolation Maximum area disturbed: **3.02km²** (Infield cables 2.025km², Interlink cables 1.05km²)	**Infield and interlink cables:** Up to **291km**: • Up to **225km** of infield cables (DEP North array area: 90km; DEP South array area 45km; SEP wind farm site 90km) • Up to 3 interlink cables from the DEP South array area to the OSP in the DEP North array area **66km** total length • Burial depth: Same as SEP or DEP in isolation • Cable installation maximum width of temporary disturbance: Same as SEP or DEP in isolation Maximum area disturbed: **4.37km²** (Infield 3.38km², interlink cables 1.05km²)	**Infield and interlink cables:** Up to **368km***: • Up to **225km** of infield cables (DEP North array area: 90km; DEP South array area 45km; SEP wind farm site 90km) • Up to 7 interlink cables from the DEP North array area (up to 5) and DEP South array area (up to 3) to OSP in SEP wind farm site, up to **143km** total length • Burial depth: Same as SEP or DEP in isolation • Cable installation maximum width of temporary disturbance: Same as SEP or DEP in isolation • Maximum area disturbed: **5.52km²*** (Infield 3.37km², interlink cables 2.15km²)	
	Infield and interlink subsea cable surface protection and pipeline crossings: Up to **1km** of surface protection for infield cables Width of surface protection: **4m** Total area of surface protection for infield cables: **4,000m²** 0 crossings for infield cables at SEP	**Infield and interlink subsea cable surface protection and pipeline crossings:** Up to **2.5km of surface protection: 13,000m²** (1.5km interlink cables, 1km infield cables) Up to **13 crossings** (over-trawlable) each with 2,100m² footprint (**Total = 27,300m²**) • Infield cables, up to seven crossings (three in DEP North array area at Durango-Waveney pipeline, up to four in the DEP South array area)	**Infield and interlink subsea cable surface protection and pipeline crossings:** Same as for DEP in isolation	**Infield and interlink subsea cable surface protection and pipeline crossings:** Same as for DEP in isolation	

Impacts	SEP in Isolation	DEP in Isolation	SEP and DEP		Notes and Rationale
			Two OSPs (one in SEP wind farm site and one in DEP North array area)	One OSP (located in SEP wind farm site)	
	0km of interlink cable for SEP in isolation	• Interlink cables, up to six crossings (three cables from the DEP South array area crossing two Dudgeon export cables) Total maximum footprint of cable protection (, interlink and infield) and cable crossing protection: **0.040km²***			
	Construction Duration • Up to **2** years of offshore construction	**Construction Duration** • Up to **2** years of offshore construction	**Construction Duration:** • Up to **4 years,** if built sequentially (2 years of offshore construction per project)		
	Exclusion zones: • 500m exclusion zones around construction activities = **0.79km²** per structure under construction at any one time; and • 50m exclusion zones around incomplete structures = **7,854m²** per partially constructed structure at any one time.	Same as SEP in Isolation	Same as SEP in Isolation	Same as SEP in Isolation	
Impact 2: Offshore export cable construction activities leading to reduction in access to, or exclusion from, established fishing areas	**Offshore export cables:** One High Voltage Alternating Current (HVAC) export cable up to **40km** in length • Burial depth: up to 1.0m for the export cables (excluding burial in sand waves up to 20m) • Cable installation maximum width of temporary disturbance: 15m Maximum area temporarily disturbed: **0.60km²**	**Offshore export cables:** One HVAC export cable up to **62km** in length • Burial depth: same as SEP in isolation • Cable installation maximum width of disturbance: Same as SEP in isolation Maximum area temporarily disturbed: **0.93km²**	**Offshore export cables: 2** HVAC export cables up to **102km*** in length • Burial depth: Same as SEP or DEP in isolation • Cable installation maximum width of disturbance: Same as SEP and DEP in isolation Maximum area temporarily disturbed: **1.53km²***	**Offshore export cables: 2** HVAC export cables from SEP up to **80km** in length • Burial depth: Same as SEP or DEP in isolation • Cable installation maximum width of disturbance: Same as SEP and DEP in isolation Maximum area temporarily disturbed: **1.20km²**	This represents the maximum duration and extent of fishing exclusion throughout the construction phase and hence the greatest potential to restrict access to fishing grounds. External cable protection systems (designed to be removable on decommissioning (see **Appendix 9.7.3 Cable Protection Decommissioning Feasibility** (document reference 9.7.3) of the **Outline CSCB MCZ CSIMP** (document reference 9.7)) may be placed in the HDD exit transition zone and as protection for the export cables. The impact assessment
	Subsea export cable surface protection and cable crossings:	**Subsea export cable surface protection and cable crossings:** Same as for SEP in isolation	**Subsea export cable surface protection and cable crossings:** Up to **0.5km of surface protection: 3,000m²** Up to **8 crossings** (over-trawlable) each with 2,100m² footprint (**Total = 16,800m²**)		

Impacts	SEP in Isolation	DEP in Isolation	SEP and DEP		Notes and Rationale
			Two OSPs (one in SEP wind farm site and one in DEP North array area)	One OSP (located in SEP wind farm site)	
	Up to **0.5km of surface protection: 3,000m²** Up to **four crossings** (over-trawlable) each with 2,100m² footprint (**Total = 8,400m²**) • Export cable, up to four crossings (two for Dudgeon export cables, 2 for Hornsea Three export cables). One disused subsea cable crosses the export cable, but no crossing required. Total maximum footprint of export cable protection and export cable crossing protection: **0.011km²**		• Export cables, up to eight crossings (four at Dudgeon export cables, four for Hornsea Project Three export cables). One disused subsea cable crosses the export cable, but no crossing required. Total maximum footprint of export cable protection and export cable crossing protection: **0.020km²***		is based on removal during decommissioning.
	HDD Exit Point temporary sea bed disturbance (978m²) • Initial trench: **600m²** • Transition zone: **50m²** • Jack up footprint: **128m²** • Deposited material on sea bed: **200m²** **Total = 978m²** **HDD exit permanent footprint of cable protection (900m²):** • HDD exit transition zone (100m x 3m): **300m²** • External cable protection (100m x 6m): **600m²**	Same as SEP in Isolation	**HDD Exit Point temporary sea bed disturbance (1,356m²)** • Initial trench: **600m²** • Transition zone: **100m²** • Jack up footprint: **256m²** • Deposited material on sea bed: **400m²** **Total = 1,356m²*** **HDD exit permanent footprint of cable protection (1,800m²):** • HDD exit transition zone (2 cables): **600m²** • External cable protection (2 cables): **1,200m²**		
	Offshore export cable construction Duration: • Total: 50 days	**Offshore export cable construction Duration:** • Total: 60 days	**Offshore export cable construction Duration:** • Total: **100 days**		
	Safe passing distance Roaming 500m safe passing distance for mobile installation vessels	Same as SEP in Isolation	Same as SEP in Isolation	Same as SEP in Isolation	

Impacts	SEP in Isolation	DEP in Isolation	SEP and DEP		Notes and Rationale
			Two OSPs (one in SEP wind farm site and one in DEP North array area)	One OSP (located in SEP wind farm site)	
Impact 3: Displacement from the wind farm site leading to gear conflict and increased pressure on adjacent grounds	As per the Realistic Worst Case Scenario for Construction phase Impact 1.				This represents the maximum duration and extent of fishing exclusion throughout the construction phase and hence the greatest potential for displacement.
Impact 4: Displacement from cable corridor leading to gear conflict and increased pressure on adjacent grounds	As per the Realistic Worst Case Scenario for Construction Phase Impact 2.				This represents the maximum duration and extent of fishing exclusion throughout the construction phase and hence the greatest potential for displacement.
Impact 5: Wind farm sites and offshore cable construction activities leading to displacement or disruption of commercially important fish and shellfish resources	See **Chapter 9 Fish and Shellfish Ecology** Realistic Worst Case Scenario.				The scenarios presented in Fish and Shellfish Ecology provide for the greatest disturbance to fish and shellfish species and therefore the greatest knock on effect to Commercial Fisheries
Impact 6: Increased vessel traffic within fishing grounds as a result of changes to shipping routes and transiting construction vessel traffic from wind farm sites and offshore export cable corridor infrastructure leading to interference with fishing activity.	**Vessel trips related to installation:** • Up to **16** construction vessels, including foundation installation, wind turbine installation, infield, interlink and export cable vessels, landfall cable installation, substation and accommodation vessels etc. • Construction vessel trips to port: **603** over 2 year construction periods	**Vessel trips related to installation:** • Up to **16** construction vessels, including foundation installation, wind turbine installation, infield, interlink and export cable vessels, landfall cable installation, substation and accommodation vessels etc. • Construction vessel trips to port: **603** over 2 year construction periods	**Vessel trips related to installation:** • Up to **25** construction vessels, including foundation installation, wind turbine installation, infield, interlink and export cable vessels, landfall cable installation, substation and accommodation vessels etc. • Construction vessel trips to port: **1,196** over 4 year construction periods (if constructed sequentially)	Same as two OSP scenario.	The maximum number of vessels transits and the maximum duration of the construction would result in the greatest potential for interference. Construction port/s will not be confirmed until nearer the start of construction
Operational Phase					
Impact 1: Physical presence of wind farm site infrastructure leading to reduction in access to, or exclusion from established fishing grounds	**Duration:** - Operational design life of 40 years.	**Duration:** - Operational design life of 40 years	**Duration:** - Operational design life of 40 years	**Duration:** - Operational design life of 40 years	This represents the maximum duration and extent of fishing exclusion throughout the operation phase and hence the greatest potential to restrict access to fishing grounds.
	Wind turbines: Permanent footprints as described for construction Impact 1	**Wind turbines:** Permanent footprints as described for construction Impact 1	**Wind turbines:** Permanent footprints as described for construction Impact 1	**Wind turbines:** Permanent footprints as described for construction Impact 1	

Impacts	SEP in Isolation	DEP in Isolation	SEP and DEP		Notes and Rationale
			Two OSPs (one in SEP wind farm site and one in DEP North array area)	One OSP (located in SEP wind farm site)	
					Assumption: Assessment assumes that fishing will resume around and between infrastructure within SEP/DEP where possible, with the exception of an assumed 50m operating distance from infrastructure, areas of cable protection, and 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 SEP/DEP. Inclement weather will be a significant contributor to this risk perception. In addition, certain gear types including pelagic trawl, twin rigged trawls and demersal seine / fly shooting will not be practically deployed within the operational wind farm sites. Assuming a jack-up vessel with a sea bed footprint of 1,200m^2 (up to four legs, each with a footprint of up to 300m^2). Disturbance is shown on average per year, however maintenance could vary across years during the operational stage.
	OSPs: As described for Impact 1	**OSPs:** As described for Impact 1	**OSPs:** As described for Impact 1	**OSPs:** As described for Impact 1	
	Cables: Lengths and protection footprints as described for Impacts 1 and 2	**Cables:** Lengths and protection footprints as described for Impacts 1 and 2	**Cables:** Lengths and protection footprints as described for Impacts 1 and 2	**Cables:** Lengths and protection footprints as described for Impacts 1 and 2	
	Cable Repairs and/or Remedial Cable Burial: • Up to 10 jack-up deployments per year. Legs / spudcans footprint up to **12,000m²** per year • Cable repair, replacement and reburial footprint: **1,170m²** per year	**Cable Repairs and/or Remedial Cable Burial:** • Up to 10 jack-up deployments per year. Legs / spudcans footprint up to **12,000m²** per year • Cable repair, replacement and reburial footprint: **1,743m²** per year	**Cable Repairs and/or Remedial Cable Burial:** • Up to 20 jack-up deployments per year. Legs / spudcans footprint up to **24,000m²** per year • Cable repair, replacement and reburial footprint: **4,473m²** per year.	**Cable Repairs and/or Remedial Cable Burial:** • Up to 20 jack-up deployments per year. Legs footprint up to **24,000m²** per year • Cable repair, replacement and reburial footprint: **4,704m²*** per year.	
	Safety zones: Up to 500m when major maintenance is in progress (use of jack-up vessel or similar).	Same as SEP in Isolation	Same as SEP in Isolation	Same as SEP in Isolation	
Impact 2: Physical presence of offshore export cable and infrastructure within the SEP/DEP offshore export cable corridor leading to reduction in access to, or exclusion from established fishing grounds	As per Realistic Worst Case Scenario for Operational Phase Impact 1.				This represents the maximum duration and extent of fishing exclusion throughout the operation phase and hence the greatest potential to restrict access to fishing grounds. **Assumption:** Assessment assumes that fishing will resume along the SEP/DEP offshore cable corridor, with the exception of an assumed 50m operating distance from infrastructure, areas of cable protection and safety zones

Impacts	SEP in Isolation	DEP in Isolation	SEP and DEP		Notes and Rationale
			Two OSPs (one in SEP wind farm site and one in DEP North array area)	One OSP (located in SEP wind farm site)	
					around infrastructure undergoing major maintenance. It is assumed that cable and pipeline crossings are over trawlable.
Impact 3: Displacement from the wind farm site and offshore export cable corridor leading to gear conflict and increased pressure on adjacent grounds	As per Realistic Worst Case Scenario for Operational Phase Impact 1.				This represents the maximum duration and extent of fishing exclusion throughout the operation and maintenance phase and hence the greatest potential for displacement.
Impact 4: Physical presence of the wind farm site and offshore export cable leading to gear snagging	As per Realistic Worst Case Scenario for Operational Phase Impact 1.				This represents the maximum scenario for project infrastructure present during operation and maintenance phase and hence the greatest potential for gear snagging.
Impact 5: Operation and maintenance activities leading to displacement or disruption of commercially important fish and shellfish resources	See **Chapter 9 Fish and Shellfish Ecology** Realistic Worst Case Scenario.				The scenarios presented in Fish and Shellfish Ecology provide for the greatest disturbance to fish and shellfish species and therefore the greatest knock-on effect to Commercial Fisheries
Impact 6: Increased vessel traffic within fishing grounds as a result of changes to shipping routes and maintenance vessel traffic leading to interference with fishing activity	**Duration** • Operational design life of 40 years.	**Duration:** • Operational design life of 40 years.	**Duration:** • Operational design life of 40 years.	**Duration:** • Operational design life of 40 years.	The maximum number of vessel transits and the maximum duration of the operation would result in the greatest potential for interference. Where possible, SEP and DEP will use existing O&M programme for Dudgeon and Sheringham Shoal Offshore Wind Farms respectively.
	Vessel trips related to operation and maintenance: • up to 6 operational and maintenance vessels per year, including lift, cable maintenance, auxiliary and accommodation vessels etc. Operation and maintenance vessel trips to port per year: approximately 604 per year (although majority (600 per year) will be (small Operation and Maintenance (O&M)	Same as SEP in Isolation	**Vessel trips related to operation and maintenance:** • up to 7 operational and maintenance vessels per year, including lift, cable maintenance, auxiliary and accommodation vessels etc. Operation and maintenance vessel trips to port per year: approximately 1,206 per year (although majority (1,20000) will be (small O&M vessels (CTV))	Same as two OSP scenario	

Impacts	SEP in Isolation	DEP in Isolation	SEP and DEP		Notes and Rationale
			Two OSPs (one in SEP wind farm site and one in DEP North array area)	One OSP (located in SEP wind farm site)	
	vessel (Crew Transfer Vessel (CTV))				
Decommissioning					
Impact 1: Wind farm site decommissioning activities leading to reduction in access to, or exclusion from, potential and/or established fishing grounds	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.				Decommissioning is likely to include removal of all of the wind turbine components and part of the foundations (those above sea bed level) and removal of all other surface infrastructure. Some or all of the infield cables, interconnector cables, and offshore export cables may be removed. Scour and cable protection would likely be left *in situ*.
Impact 2: Offshore export cable corridor decommissioning activities leading to reduction in access to, or exclusion from, potential and/or established fishing grounds					
Impact 3: Displacement from wind farm site and export cable corridor leading to gear conflict and increased fishing pressure on adjacent grounds					
Impact 4: Physical presence of any infrastructure left in situ leading to gear snagging					
Impact 5: Decommissioning activities leading to displacement or disruption of commercially important fish and shellfish resources					
Impact 6: Increased vessel traffic within fishing grounds as a result of changes to shipping routes and transiting decommissioning vessel traffic from SEP and DEP					

Impacts	SEP in Isolation	DEP in Isolation	SEP and DEP		Notes and Rationale
			Two OSPs (one in SEP wind farm site and one in DEP North array area)	One OSP (located in SEP wind farm site)	
leading to interference with fishing activity					

12.3.3 Summary of Mitigation Embedded in the Design

24. This section outlines the embedded mitigation relevant to the commercial fisheries assessment, which has been incorporated into the design of the projects. Where other mitigation measures are proposed, these are detailed in the impact assessment (**Section 12.6**).

Table 12-3: Embedded Mitigation Measures

Parameter	Mitigation Measures Embedded into the Design of SEP and DEP
Cable protection and maintenance	Where possible, cable burial will be the preferred option. External cable protection and cable maintenance as per the **Outline CSCB MCZ CSIMP** (document reference 9.7).
Communication	Advance warning and accurate location details of construction, maintenance and decommissioning operations, associated Safety zones and advisory passing distances will be given via Notices to Mariners and Kingfisher Bulletins.
Liaison	Ongoing liaison with fishing fleets will be maintained during construction, maintenance and decommissioning operations via an appointed Fisheries Liaison Officer and Fishing Industry Representative.
Navigation	Aids to navigation (marking and lighting) will be deployed in accordance with the latest relevant available standard industry guidance and as advised by Trinity House, Maritime and Coastguard Agency (MCA) and Civil Aviation Authority (CAA) and Ministry of Defence (MoD) as appropriate.
Navigation	The United Kingdom Hydrographic Office will be notified of both the commencement (within two weeks), progress and completion of offshore construction works (within two weeks) to allow marking of all installed infrastructure on nautical charts.
Co-existence	A FLCP will be developed pre-construction, in accordance with the Outline FLCP.
Liaison and best practice	Recommendations For Fisheries Liaison: Best Practice' guidance for offshore renewable developers (FLOWW 2014 and 2015; BERR, 2008) guidance will be followed where appropriate.
Safety zones	Safety zones of up to 500m will be applied during construction, major maintenance and decommissioning phases. Where defined by risk assessment, guard vessels will also be used to ensure adherence with Safety zones or advisory passing distances to mitigate impacts which pose a risk to surface navigation during construction, maintenance and decommissioning phases.
Dealing with claims for loss or damage of gear	In the instance that snagging does occur, the developer would work to the protocols laid out within the guidance by the FLOWW group and 'Recommendations For Fisheries Liaison: Best Practice' guidance for offshore renewable developers, in particular section 9: Dealing with claims for loss or damage of gear (FLOWW, 2014; BERR, 2008.

12.4 Impact Assessment Methodology

12.4.1 Policy, Legislation and Guidance

12.4.1.1 National Policy Statements

25. The assessment of potential impacts upon commercial fisheries has been made with specific reference to the relevant NPS. These are the principal decision making documents for Nationally Significant Infrastructure Projects (NSIPs). Those relevant to SEP and DEP are:
    - Overarching NPS for Energy (EN-1) (Department of Energy and Climate Change (DECC) 2011a);
    - NPS for Renewable Energy Infrastructure (EN-3) (DECC 2011b); and
    - NPS for Electricity Networks Infrastructure (EN-5) (DECC 2011c).
26. The specific assessment requirements for commercial fisheries, as detailed in the NPS, are summarised in **Table 12-4** together with an indication of the section of the ES chapter where each is addressed.
27. It is noted that the NPS for Energy (EN-1), the NPS for Renewable Energy Infrastructure (EN-3) and the NPS for Electricity Networks Infrastructure (EN-5) are in the process of being revised. Draft versions were published for consultation in September 2021 (Department for Business Energy and Industrial Strategy (BEIS), 2021). A review of the draft versions has been undertaken in the context of this ES chapter as detailed in **Table 12-4**.
28. **Table 12-4** includes a section for the draft version of NPS (EN-1, EN-3 and EN-5) in which relevant additional NPS requirements not presented within the current NPS (EN-1, EN-3 and EN5) have been included. A reference to the particular requirement's location within the draft NPS and to where within this ES chapter or wider ES has also been provided.
29. Minor wording changes within the draft versions which do not materially influence the NPS (EN-1, EN-3 and EN-5) requirements have not been reflected in **Table 12-4**.

Table 12-4: NPS Assessment Requirements

NPS Requirement	NPS Reference	Section Reference
NPS for Renewable Energy Infrastructure (EN-3)		
The construction and operation of offshore wind farms can have both positive and negative effects on fish and shellfish stocks.	EN-3 Section 2.6.122	A detailed assessment of the impacts to fish and shellfish stocks is provided in **Chapter 9 Fish Ecology**.

NPS Requirement	NPS Reference	Section Reference
Whilst the footprint of the offshore wind farm and any associated infrastructure may be a hindrance to certain types of commercial fishing activity such as trawling and longlining, other fishing activities may be able to take place within operational wind farms without unduly disrupting or compromising navigational safety. Consequently, the establishment of a wind farm can increase the potential for some fishing activities, such as potting, where this would not compromise any safety zone in place. The Planning Inspectorate should consider adverse or beneficial impacts on different types of commercial fishing on a case by case basis.	EN-3 Section 2.6.123	Pots and traps represent the major gear type across the wind farm sites. Impacts to commercial fishing grounds are assessed in **Section 12.6**.
In some circumstances, transboundary issues may be a consideration as fishermen from other countries may fish in waters within which offshore wind farms are sited	EN-3 Section 2.6.124	Assessment of potential transboundary impacts in relation to non-UK fishing fleet is provided in **Section 12.8.** Potential impacts incurred by non-UK registered vessels operating within UK waters, including Belgian, Danish, Dutch and French commercial fishing fleets, has been assessed across all impact categories.
Early consultation should be undertaken with statutory advisors and with representatives of the fishing industry which could include discussion of impact assessment methodologies. Where any part of a proposal involves a grid connection to shore, appropriate inshore fisheries groups should also be consulted.	EN-3 Section 2.6.127	Consultation undertaken to date is summarised in **Section 12.2** which includes consultation with local fisherman and commercial fisheries representatives. Consultation with key stakeholders will continue throughout the development process.

NPS Requirement	NPS Reference	Section Reference
Where a number of offshore wind farms have been proposed within an identified zone, it may be beneficial to undertake such consultation at a zonal, rather than a site specific, level.	EN-3 Section 2.6.128	Cumulative impacts with other offshore wind farm developments have been assessed in **Section 12.7.3**.
The assessment by the applicant should include surveys of the effects on fish stocks of commercial interest and any potential reduction in such stocks, as well as any likely constraints on fishing activity within the project boundaries. Robust baseline data should have been collected and studies conducted as part of the assessment.	EN-3 2.6.129	A detailed assessment of the impacts of the project on fish and shellfish receptors is provided in **Chapter 9 Fish and Shellfish Ecology**. The data used to form the baseline is provided in **Section 12.4.2**.
Where there is a possibility that safety zones will be sought around offshore infrastructure, potential effects should be included in the assessment on commercial fishing.	EN-3 Section 2.6.130	The impact of safety zones on commercial fishing is considered in **Section 12.6** and **Section 12.7**.
Mitigation should be designed to enhance where reasonably possible any potential medium and long-term positive benefits to the fishing industry, commercial fish stocks and the marine environment.	EN-3 Section 2.6.135	Mitigation measures proposed are described in **Section 12.6**. A detailed assessment of the impacts of the project on fish and shellfish receptors is provided in **Chapter 9 Fish and Shellfish Ecology**.
NPS for Renewable Energy Infrastructure (EN-3) Consultation (BEIS, 2021)		

NPS Requirement	NPS Reference	Section Reference
Where an offshore wind farm could affect a species of fish that is of commercial interest, but is also of ecological value, the Secretary of State should refer to Section 2.26 of this NPS with regard to the latter. The applicant should also speak to Department for Environment, Food and Rural Affairs (DEFRA) and representatives of the fishing industry to explore possible coordination of activities.	EN-3 Section 2.31.4	Commercial fisheries consultation is summarised in **Table 12-1** which includes consultation with local fishermen and commercial fisheries representatives. Ecological value is considered in **Chapter 9 Fish and Shellfish Ecology.** Consultation relating to fish ecology is contained within **Chapter 9 Fish and Shellfish Ecology.** Consultation with key stakeholders will continue throughout the development process.
Any mitigation proposals should result from the applicant having detailed consultation with relevant representatives of the fishing industry, the MMO and the relevant DEFRA policy team.	EN-3 Section 2.31.10	Mitigation measures proposed are described in **Section 12.6**. Consultation undertaken to date is summarised in **Table 12-1** which includes consultation with local fisherman and commercial fisheries representatives.

12.4.1.2 Guidance Relevant to Commercial Fisheries

30. In addition to the NPS, there are a number of pieces of legislation, policy and guidance applicable to the assessment of commercial fisheries. These include:

- Blyth-Skyrme (2010) Developing guidance on fisheries Cumulative Impact Assessment for wind farm developers;
- 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;
- BERR (Department for Business, Enterprise and Regulatory Reform) (2008) FLOWW Recommendations For Fisheries Liaison: Best Practice guidance for offshore renewable developers;

- Centre for Environment, Fisheries and Aquaculture Science (Cefas) (2012) Guidelines for data acquisition to support marine environmental assessments of offshore renewable energy projects. Contract report: ME5403, May 2012;
- Cefas, Marine Consents and Environment Unit (MCEU), Department for Environment, Food and Rural Affairs (DEFRA) and Department of Trade and Industry (DTI) (2004) Offshore Wind Farms – Guidance note for Environmental Impact Assessment In respect of Food and Environment Protection Act (FEPA) and Coastal Protection Act (CPA) requirements, Version 2;
- European Subsea Cable Association (ESCA) (2018) ESCA Statement on vessels operating in the vicinity of subsea cables;
- 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 (Fishing Liaison with Offshore Wind and Wet Renewables Group) (2015);
- International Cable Protection Committee (2009) Fishing and Submarine Cables – Working Together;
- RenewableUK (2013) Cumulative impact assessment guidelines, guiding principles for cumulative impacts assessments in offshore wind farms;
- Sea Fish Industry Authority and UK Fisheries Economic Network (UKFEN) (2012) Best practice guidance for fishing industry financial and economic impact assessments; and
- UK Oil and Gas (2015) Fisheries Liaison Guidelines – Issue 6.

12.4.1.3 Other

- HM Government (2011) UK Marine Policy Statement; and
- HM Government (2014) East Inshore and East Offshore Marine Plans.

31. Further detail is provided in **Chapter 2 Policy and Legislative Context**.

12.4.2 Data and Information Sources

32. To inform the assessment for commercial fisheries a number of data sources have been used, as shown in **Table 12-5**. Information on the commercial fisheries within the regional study area was collected through a detailed desktop review of existing studies and datasets which are summarised below.

33. In addition, in order to ground-truth the data collected and to understand temporal and spatial patterns of fishing activity, consultation has taken place with relevant inshore and offshore fisheries stakeholders (**Section 12.2**).

12.4.2.1.1 Landing statistics

34. Landings data has been collected from the following sources:
    - Landings statistics have been analysed for UK registered vessels operating within the study area between 2015 and 2019. Data collected includes landing year; landing month; vessel length category; ICES Division and rectangle; vessel/gear type; port of landing; species; live weight (tonnes); and, value. Source: MMO;
    - Landings statistics for EU vessels operating within the study area up to 2016 including Belgian, Dutch, French, Danish and UK registered vessels with data query attributes for: landing year; landing quarter; ICES rectangle; vessel length; gear type; species; and, landed weight (tonnes). Source: European Data Collection Framework (EU DCF);
    - Price data for non-UK Member States sourced from European Market Observatory for Fisheries and Aquaculture Products (EUMOFA) for 2012 to 2016; and
    - Shellfish monthly return data. Source: EIFCA, 2015 to 2019.
35. Data has also been sourced from a number of European fisheries bodies, including government, research bodies and directly from the fishing industry. Data limitations are described within the impact assessment in **Section 12.4.6**.

Table 12-5: Data Sources

Nationality	Data	Timeframe	Source
UK	Landing statistics data for UK registered vessels with data query attributes for: landing year; landing month; vessel length category; country code; ICES rectangle; vessel/gear type; port of landing; species; live weight (tonnes); and value.	2016 to 2020	MMO
	VMS data for UK registered vessels with attributes for time fishing and value of catch at a resolution of 200th of an ICES rectangle amalgamated for all mobile vessels and all static vessels.	2015 to 2019	
	Monthly Shellfish Activity Returns data for: UK vessels landing shellfish species caught within EIFCA jurisdiction.	2015 to 2019	EIFCA
Europe	Landings statistics for Belgian, Dutch, French and UK registered vessels for: landing year; quarter; ICES rectangle; vessel length; gear type; species and landed weight (tonnes).	2012 to 2016	EU DCF
	Price data for species landed by Belgian, Danish, Dutch, and French registered vessels for: landing year; species; price (€per kg)	2012 to 2016	EUMOFA

Nationality	Data	Timeframe	Source
	VMS data for Belgian, Dutch and French registered vessels with attributes for time fishing at a resolution of 1/200th of an ICES rectangle amalgamated for all mobile vessels. 2017 represents the latest data set available for this information	2017	ICES
	Maps of key sandeel grounds based on vessel tracking plots from Danish registered vessels	1985 to 2010	Danish Fishermen's Association and DTU Aqua
Netherlands	VMS data for Dutch registered vessels with data attributes presented graphically for: year; gear type; value of catch to a resolution of 1/200th ICES rectangle.	2011 to 2015	Wageningen Economic Research

12.4.2.1.2 Vessel Monitoring Systems data

36. All UK and EU fishing vessels (i.e. fishing vessels flying the flag of the UK or an EU Member State), and third party fishing vessels operating in UK and EU waters that are ≥12m in length are required to have a VMS on board that reports the vessels' position to fisheries management authorities every two hours. Publicly available MMO VMS data (2014 to 2018) included in the assessment includes vessels that are ≥12m in length.

37. A vessel's range varies due to weather conditions and skipper preferences as well as technical aspects such as power, but it is generally the case that vessels <12m in length fish within 20NM offshore. Vessels ≥12m in length can and do fish further afield, but in recent years many skippers have altered fishing patterns to favour fishing grounds closer to home ports due to increased fuel prices and time at sea restrictions (vessels being permitted a specific number of days at sea). This has particularly affected vessels operating mobile gears with high fuel demands, such as beam trawlers.

38. Although figures presenting maps using VMS data may appear to show inshore areas as having lower (or no) fishing activity compared within offshore areas, this may not represent the true situation since, as noted, VMS data does not include vessels typically operating in inshore area (i.e. typically vessels <12m in length). This is particularly important when assessing the activity across the offshore cable corridor.

39. The MMO collate VMS data for UK registered vessels by aggregating the number of position plots by general gear type (mobile or static) in a grid of sub-rectangles approximately 5.3NM^2 (i.e. at a resolution of 200th of an ICES rectangle). This has been integrated with landings values, thereby providing both effort (hours fished) and value (£) of each sub-rectangle for mobile and static gears. These data have been analysed across a five-year period from 2015 to 2019 for UK registered vessels. Note that at the time of writing 2019 represents the latest data set available for this information.

40. For fishing vessels registered under EU Member States, data has been collected through the EU DCF, which provides landings data for all vessel lengths by nationality, ICES rectangle, gear type, species and live weight (tonnes). The latest set of data that allows analysis to ICES statistical rectangle is 2016. Data available after 2016 onwards is amalgamated at ICES Division level e.g. Central North Sea, which does not allow analysis specific to the commercial fisheries study areas.

12.4.2.1.3 Surveillance data

41. In England the fishery protection squadron consists of two MMO fisheries patrol vessels, two MMO aircraft, contractual arrangements with two Royal Navy offshore patrol vessels and 22 patrol vessels from Inshore Fisheries Conservation Authority (IFCA). Consultation with EIFCA indicates that over recent years patrol vessel effort has focused on targeted inspections of vessels at sea, rather than randomised surveillance. As a result, surveillance data is less useful for constructing an unbiased on-going picture of fishing activity, and for this reason has not been included as a data source within this assessment.

12.4.2.1.4 Other sources

42. Surveys carried out across the SEP and DEP offshore sites that inform the commercial fisheries assessment based on fishing gear encountered during the surveys include benthic ecology surveys and geophysical surveys. The Sheringham Shoal and Dudgeon Extension Benthic Surveys Field Report (Survey Period: 10 to 19 August 2020) encountered the presence of fishing gear at four sample locations.

43. Other sources of data utilised in the assessment include published and grey literature which are cited in the text and included in the reference section at the end of this chapter and in **Appendix 12.1 Commercial Fisheries Technical Report**. They include outputs from the EIFCA fisheries mapping project published in 2010, which described the distribution of key fishing grounds off the North Norfolk coast.

12.4.3 Impact Assessment Methodology

44. **Chapter 5 EIA Methodology** provides a summary of the general impact assessment methodology applied to SEP and DEP. The following sections confirm the methodology used to assess the potential impacts on commercial fisheries.

45. The EIA draws on environmental baseline data and other information gathered and analysed in **Appendix 12.1 Commercial Fisheries Technical Report** and presents the potential effects on commercial fisheries of both SEP and DEP. Assumptions and limitations of the information compiled are identified within the EIA and any necessary monitoring and/or mitigation measures which could prevent, minimise, reduce or offset the possible environmental effects identified in the EIA process are highlighted.

46. The impact assessment methodology for commercial fisheries is consistent with that described in **Chapter 5 EIA Methodology**.

12.4.3.1 Definitions

47. For each effect, the assessment identifies receptors sensitive to that effect and implements a systematic approach to understanding the impact pathways and the level of impacts on given receptors. The definitions of sensitivity and magnitude for the purpose of the commercial fisheries assessment are provided in **Table 12-6** and **Table 12-7**.

Table 12-6: Definition of Sensitivity for a Fisheries Receptor

Sensitivity	Definition
High	Receptor is highly vulnerable to impacts that may arise from the project and recoverability is long term or not possible. And/or: No alternative fishing grounds are available.
Medium	Receptor is somewhat vulnerable to impacts that may arise from the project and has moderate levels of recoverability. And/or: Moderate levels of alternative fishing grounds are available and/or fishing fleet has moderate operational range.
Low	Receptor is not generally vulnerable to impacts that may arise from the project and/or has high recoverability. And/or: High levels of alternative fishing grounds are available and/or fishing fleet has large to extensive operational range; fishing fleet is adaptive and resilient to change.
Negligible	Receptor is not vulnerable to impacts that may arise from the project and/or has high recoverability. And/or: Extensive alternative fishing grounds available and/or fishing fleet is highly adaptive and resilient to change.

Table 12-7: Definition of Magnitude for a Commercial Fisheries Receptor

Magnitude	Definition
High	Impact is of long-term duration (e.g. greater than 12 years duration) and/or is of extended physical extent; And: 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 SEP and DEP offshore site); and • Substantial loss of ability to carry on fishing activities (e.g. substantial proportion of effort within SEP and DEP offshore site). (Negative)
	Impact is expected to result in one or more of the following:

Magnitude	Definition
	• Large scale or major improvement of resource quality, measurable against biomass reference points; and • Extensive restoration or enhancement of habitats supporting commercial fisheries resources. (Beneficial)
Medium	Impact is of medium term duration (e.g. less than 12 years) and/or is of moderate physical extent; And: 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 SEP and DEP offshore site); and • Partial loss of ability to carry on fishing activities (e.g. moderate reduction of fishing effort within SEP and DEP offshore site). (Negative)
	Impact is expected to result in one or more of the following: • Moderate improvement of resource quality; and • Moderate restoration or enhancement of habitats supporting commercial fisheries resources. (Beneficial)
Low	Impact is of short-term duration (e.g. less than 5 years) and/or is of limited physical extent; And: 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 SEP and DEP offshore site); and • Minor loss of ability to carry on fishing activities (e.g. minor reduction of fishing effort within SEP and DEP offshore site). (Negative)
	Impact is expected to result in one or more of the following: • Minor benefit to or minor improvement of resource quality; and • Minor restoration or enhancement of habitats supporting commercial fisheries resources. (Beneficial)
Negligible	Impact is of very short-term duration (e.g. less than 2 years) and/or physical extent of impact is negligible; And: 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 SEP and DEP offshore site); and

Magnitude	Definition
	• Slight loss of ability to carry on fishing activities (e.g. slight loss of fishing effort within SEP and DEP offshore site). (Negative)
	Impact is expected to result in one or more of the following: • Very minor benefit to or very minor improvement of resource quality; and • Very minor restoration or enhancement of habitats supporting commercial fisheries resources. (Beneficial)

48. In assessing the magnitude of the impact, the value and vulnerability of the receptor, i.e. the fishing fleet under assessment, together with the reversibility of the impact are also considered. 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 value within the categories of high, medium or low. Instead, these classifications were based on judgement informed by the baseline characterisation and consultation with the industry.

12.4.3.2 Impact Significance

49. In basic terms, the potential significance of an impact is a function of the sensitivity of the receptor and the magnitude of the effect (see **Chapter 5 EIA Methodology** for further details). The determination of significance is guided by the use of an impact significance matrix, as shown in **Table 12-8**. Definitions of each level of significance are provided in **Table 12-9**.

50. Potential impacts identified within the assessment as major or moderate are regarded as significant in terms of the EIA regulations. Appropriate mitigation has been identified, where possible, in consultation with the regulatory authorities and relevant stakeholders. The aim of mitigation measures is to avoid or reduce the overall impact in order to determine a residual impact upon a given receptor.

Table 12-8: Impact Significance Matrix

		Adverse Magnitude				Beneficial Magnitude			
		High	Medium	Low	Negligible	Negligible	Low	Medium	High
Sensitivity	High	*Major*	*Major*	*Moderate*	*Minor*	*Minor*	*Moderate*	*Major*	*Major*
	Medium	*Major*	*Moderate*	*Minor*	*Minor*	*Minor*	*Minor*	*Moderate*	*Major*
	Low	*Moderate*	*Minor*	*Minor*	*Negligible*	*Negligible*	*Minor*	*Minor*	*Moderate*
	Negligible	*Minor*	*Negligible*	*Negligible*	*Negligible*	*Negligible*	*Negligible*	*Negligible*	*Minor*

Table 12-9: Definition of Impact Significance

Significance	Definition
Major	Significant in EIA terms. Very large or large change in receptor condition, both adverse or beneficial, which are likely to be important considerations at a regional or district level because they contribute to achieving national, regional or local objectives, or could result in exceedance of statutory objectives and / or breaches of legislation.
Moderate	Significant in EIA terms. Intermediate change in receptor condition, which are likely to be important considerations at a local level.
Minor	Not-significant in EIA terms. Small change in receptor condition, which may be raised as local issues but are unlikely to be important in the decision making process.
Negligible	Not-significant in EIA terms. No discernible change in receptor condition.
No change	No impact, therefore, no change in receptor condition.

12.4.4 Cumulative Impact Assessment Methodology

51. The CIA considers other plans, projects and activities that may impact cumulatively with SEP and DEP. As part of this process, the assessment considers which of the residual impacts assessed for SEP and/or DEP on their own have the potential to contribute to a cumulative impact, the data and information available to inform the cumulative assessment and the resulting confidence in any assessment that is undertaken. **Chapter 5 EIA Methodology** provides further details of the general framework and approach to the CIA.

52. For commercial fisheries, these activities include planned projects within 100km of project elements to provide appropriate coverage of relevant fishing grounds, including other offshore wind farms, oil and gas developments, marine aggregate extraction areas, coastal maintenance works, fisheries management areas and MPA. Further detail on potential cumulative impacts is provided in **Section 12.7**.

12.4.5 Transboundary Impact Assessment Methodology

53. The transboundary assessment considers the potential for transboundary effects to occur on commercial fisheries receptors as a result of the Projects; either those that might arise within the EEZ of European Economic Area (EEA) states or arising on the interests of EEA states e.g. a non-UK fishing vessel. **Chapter 5 EIA Methodology** provides further details of the general framework and approach to the assessment of transboundary effects.

54. For commercial fisheries, the potential for transboundary effects has been identified in relation to Belgian, Danish, Dutch and French commercial fishing fleets operating in the study area.

12.4.6 Assumptions and Limitations

55. The most notable limitations of the assessment are associated with the data describing commercial fisheries in the study areas and within the SEP and DEP offshore DCO order limits. A full description of data limitations is provided in **Appendix 12.1 Commercial Fisheries Technical Report** (**Section 5.3**).

56. Limitations of landings data include the spatial size of ICES rectangles from which data is collected and the area overlapped by SEP and DEP. For example, the surface-area of SEP wind farm site is 2.49% and DEP wind farm site is 2.79% of the surface area of ICES rectangle 35F1. The proposed offshore export cable and interlink corridors overlap 1.91% of the surface area of ICES rectangle 35F1 and 34F1 (where both SEP and DEP are constructed). Care is therefore required when interpreting landings data for small areas of the overall ICES rectangles.

57. A further limitation of landings data is the potential under-reporting of landings associated with potting vessels, which may occur as a result of estimating catches (as opposed to accurate weighing) and not reporting catches that fall below the acceptable size limits.

58. Limitations of VMS data are primarily focused on the coverage being limited to vessels ≥12m. It is important to be aware that where mapped VMS data may appear to show inshore areas as having lower (or no) fishing activity compared within offshore areas, this is not the case because VMS data does not include vessels typically operating in inshore areas (i.e. which typically comprises of vessels <12m in length). Consultation has been key throughout the EIA process to determine extent and distribution of activity by the <12m fleet.

59. EIFCA noted that their 2010 fisheries mapping project outputs should not be used as the only source for which to ascertain the current or complete distribution of fishing activity for the species identified in the study because of the small number of participants involved (12).

60. However, as these data form only part of the evidence base, the limitations identified above are not considered to significantly affect the certainty or reliability of the impact assessment presented in **Section 12.6**.

61. The coronavirus (COVID-19) pandemic and associated government restrictions imposed on individuals and businesses during 2020 may have additionally impacted commercial fishing operators and, therefore, landings data for 2020 may not be as representative as previous years. It is however, noted that total first sales value for a number of ports (including Kings Lynn and Boston) increased during 2020, while for others a significant decline is noted (Wells and Lowestoft). Potential market and supply chain effects resulting from the UK-exit from the EU are not expected to be evident within the timeseries analysed, however, they may be present in the 2021 dataset.

12.5 Existing Environment

62. This section summarises the commercial fisheries baseline in the study areas. A more comprehensive description is included in **Appendix 12.1 Commercial Fisheries Technical Report**.

12.5.1 Key fleets and fisheries

12.5.1.1 Regional study area landings

63. Shellfish dominate the landings by all countries by both weight and value from the regional study area which includes ICES rectangles 34F0, 35F0, 34F1 and 35F1, encompassing The Wash to the southwest of the projects. Whelk *Buccinium undatum* are landed in highest quantity (approximately 1,500 tonnes per annum) with a first sales value of over €2 million. Brown shrimp *Crangon crangon* is the highest value species with just under €4 million per annum (based on five year average form 2012-2016), targeted primarily by beam trawlers in The Wash. Smaller quantities of finfish are landed including sole *Solea solea* and plaice *Pleuronectes platessa* by Dutch registered vessels and whiting *Merlangius merlangus* by French registered vessels with these fisheries concentrated to the east of SEP and DEP. The distribution of EU beam trawl activity from VMS data for 2017 is illustrated in **Figure 2-2** of **Appendix 12.1 Commercial Fisheries Technical Report**.

64. Dredgers targeting scallops and otter trawlers are active at low levels in the regional study area, but there is no significant activity close to SEP and DEP DCO order limits (**Figures 2-3 and 2-4**, **Appendix 12.1 Commercial Fisheries Technical Report)**.

65. The UK landings from the regional study area are dominated by shellfish species including, whelk, brown shrimp, brown crab *Cancer pagurus* and European lobster *Homarus gammarus* (hereafter named as lobster).

66. As described above, landing statistics indicate a significant beam trawl shrimp fishery within The Wash but outside of SEP and DEP. Similarly, cockles are caught using a suction dredge or harvested by hand primarily in The Wash. Whelk, brown crab and lobster fisheries are active in the wind farm site and export cable study areas and are discussed in the following section.

67. A full description of landings from all countries and UK vessels in the regional study area are presented in **Appendix 12.1 Commercial Fisheries Technical Report**.

12.5.1.2 SEP and DEP wind farm site and export cable study area landings

12.5.1.2.1 Landings by EU vessels

68. The annual average landings of the main species of fish by value by all EU countries fishing within the study area (ICES rectangles 34F1 and 35F1) are presented in **Figure 2-16** (**Appendix 12.1 Commercial Fisheries Technical Report**).

69. Dutch vessels dominate the landings by weight for sole, plaice, turbot *Scopthalmus maxima*, dab *Platichthys flesus*, and cod *Gadus morhua.* Whiting is predominantly landed by French vessels which are also responsible for the entire landings of mackerel *Scombrus scombrus.* Belgian vessels primarily target sole and plaice but to a much lesser extent than the Dutch fleet and all three countries land an equal weight of other species as shown in **Figure 2-16** (**Appendix 12.1 Commercial Fisheries Technical Report**)**.** Apart from sole, plaice and whiting all other species have a landed weight of less than 5 tonnes.

70. The individual annual average weight and value of landings by the three top species of fish landed by EU vessels, namely sole, plaice and whiting are 42 tonnes (€383,000), 38 tonnes (€55,000) and 32 tonnes (€52,000) respectively based on a five-year average from 2012 to 2016 (EU DCF, 2019). (**Figures 2-16 and 2-17 Appendix 12.1 Commercial Fisheries Technical Report**).

71. The commercial fisheries wind farm sites and export cable study areas are located within the sandeel management area for Dogger Bank , in the central and southern North Sea. There has also been historical fishery for sandeel (*Ammodytes*) species and sprat *Sprattus sprattus* by Danish vessels in the study area (**Figure 2-18**, **Appendix 12.1 Commercial Fisheries Technical Report**). There was a significant sandeel fishery targeted in this area between 2003-2004 with an approximate value of €1.4 million. The value of landings fell significantly from 2004 onwards and there have been no landings of sandeel recorded since 2011. Although the Total Allowable Catch (TAC) (defined in **Section 12.5.1.3**) for sandeel was reduced to zero initially in 2015 the fishery may resume in the future therefore there is potential for SEP and DEP to overlap key sandeel fishing areas. The main historical sandeel fishing areas are to the north and west of SEP and DEP (**Figure 2-19**, **Appendix 12.1 Commercial Fisheries Technical Report**). A proportion of these grounds are within ICES rectangle 35F1 and overlap with 2.04% of the offshore DCO area. Sandeel grounds within the commercial fisheries wind farm sites study area overlap with 13.07% of the DEP North array area and the DEP South array area combined. However, only the DEP North array area overlaps with these grounds and this overlap is calculated as being 20.87% of the wind farm site. SEP is located to the south and out with the key sandeel fishing grounds.

12.5.1.2.2 Landings by UK vessels

72. Data indicate that within the wind farm sites study area (ICES rectangle 35F1) there are only three species with an annual landed weight of over 5 tonnes. These are whelk, brown crab and lobster. The total landed weight and first sales value of these species from 2015 to 2019 is presented in **Figure 2-20** (**Appendix 12.1 Commercial Fisheries Technical Report**). Whelk dominate the landings from 35F1 and have grown significantly over the time period analysed, worth £1.9 million in first sales value landed from 35F1 in 2020. Ninety nine percent (99%) of all landed weight in the wind farm sites study area (35F1) is caught using pots and traps with a minimal amount landed by other gear types (**Figure 2-21**, **Appendix 12.1 Commercial Fisheries Technical Report**).

73. The proportion of the offshore cable study area (ICES rectangles 34F1 and 35F1) covered by the proposed offshore export cable corridor is 1.91% (where both SEP and DEP are constructed). Data from both ICES rectangles is used to describe the fisheries landings for the proposed offshore export cable corridor although it is noted that fishing is not proportional throughout ICES rectangles, therefore, figures are only indicative of fishing activity within the proposed offshore export cable corridor.

74. The key species landed in 2019 included whelk, brown crab and lobster with a combined first sales value of £2.9 million landed from ICES rectangles 34F1 and 35F1. Small amounts of brown shrimp, sole, bass and herring were also landed (**Figure 2-22**, **Appendix 12.1 Commercial Fisheries Technical Report**).

75. Pots and traps are used for 98% of the landed weight in the export cable corridor which highlights the importance of the shellfish fishery (**Figure 2-23**, **Appendix 12.1 Commercial Fisheries Technical Report**).

76. Monthly shellfish returns data indicate the importance of ICES rectangle 34F1 to the 10m and under potting fleet targeting crab and lobster (**Figure 2-24**, **Appendix 12.1 Commercial Fisheries Technical Report**).

77. EIFCA whelk catch return data illustrate the growth in the whelk fishery from 2015 to 2019, with 1,000 tonnes landed in 2019 from the EIFCA district (**Figure 2-25**, **Appendix 12.1 Commercial Fisheries Technical Report**).

12.5.1.3 Total Allowable Catch (TAC) and quotas

78. TACs and quotas are in place for many commercial fish species based on their stock distribution across ICES Divisions. TACs and quotas per country for key species are presented in **Appendix 12.1 Commercial Fisheries Technical Report**.

79. Within the UK EEZ, fishing activity from the shore to 6NM is only permissible for UK registered vessels. A number of restrictions are in place based on byelaws set by English IFCAs that control fisheries out to 6NM. From 6NM to 12NM, non-UK vessels may still be able to fish where they had historical rights to do so (under the London Fisheries Convention) following the UK's exit from the EU on 31st January 2020 and implementation of The Fisheries Act 2020.

80. On 1st January 2021, at the end of the transition period, the UK became an independent coastal state and in control of waters out to 200NM. Under the EU-UK Trade and Cooperation Agreement (TCA) international vessels are still permitted to fish outside 12NM under licence but subject to reduced quota allocation and other restrictions including technical gear measures and effort restrictions such as days at sea. Access rights of non-UK vessels to UK EEZ waters will remain until at least the end of 2026 with reducing quotas, after which rights will be subject to the conclusion of negotiated agreements.

12.5.2 Key species

12.5.2.1 Shellfish

81. Key shellfish species have been summarised here. For further detail see **Appendix 12.1 Commercial Fisheries Technical Report.**

12.5.2.1.1 Brown crab

82. Brown crab (also known as edible crab) is one of the most economically important crab species in UK waters. Along the coast of Lincolnshire and North Norfolk brown crab is primarily targeted by the UK potting fleet under the jurisdiction of the EIFCA within the 6NM limit and the MMO between 6 and 12NM. Traditionally this fishery is mixed with crab and lobster caught together. The combined landings in 2019 totalled 771 tonnes with a value of £1.75 million. This industry supports a considerable number of fishers and businesses in the EIFCA district (Bridges, 2019).

83. This decapod crustacean is benthic and is found in a wide range of habitats ranging from soft mud to rocky substrata. Activity tends to be higher at night when foraging occurs although smaller crabs are known to be equally active during both day and night (Scott *et al*., 2018).

84. The peak mating period is July to September usually at night after the female has moulted (Brown and Bennet, 1980). In the North Sea females tend to move offshore to release the planktonic larvae then move back inshore to feed. The period from hatching to recruitment into the fishery takes approximately 4 years. Post larval settlement is generally in inshore areas and juvenile crabs are more commonly associated with shallower inshore waters and the intertidal zone whereas the adults are commonly found in deeper water, usually between 6 and 40m.

85. Adult crabs are known to undertake extensive migrations, although previous studies have indicated that there were no migratory exchanges between the North Sea and English Channel. Adult females have shown a migratory movement northward along the east coast from Norfolk to Yorkshire and Humberside (Bannister, 2009).

86. The main fishing season for brown crab in the EIFCA district is from March/early April with a peak in May and June and steadily dropping to late September/early October (Bridges, 2019). The majority of vessels fishing for crab are under 10m although with the development of new markets for shellfish the number of over 10m offshore boats has increased to target crab in deeper waters.

87. Both crab and lobster are caught using pots and both species have no TACs or quotas in place. Management is principally through a minimum landing size, as well as limited regulations around effort, gear or catch controls. Compared to other areas, brown crab in the EIFCA district has a smaller average size and as a result there is a dispensation in the regulations on minimum landing size (MLS) allowed. Nationally this is set at 130mm carapace length (Council Regulation 850/98 ANNEX XII) but there is a derogation given for the EIFCA district (between 0 – 6NM) of 115mm carapace length (Undersized Edible Crabs Order 2000 (2000 No 2029)) (Bridges, 2019).

88. A stock assessment of crab and lobster undertaken by the EIFCA in 2018 identified that there was a decreasing trend in landings and effort across the EIFCA area from a peak in 2016 when the combined landed weight was over 1,000 tonnes. Landings per unit effort (LPUE) measured as pot hauls has also decreased although this has been somewhat offset by higher market prices.

89. In relation to the study area ICES rectangle 35F1 is considered to be an offshore area targeted by larger vessels. Landings from this area are influenced by the recruitment patterns seen in the inshore areas which is known to provide settlement substrate for larvae from the north.

12.5.2.1.2 Lobster

90. The crab and lobster fishery is one of the most economically important fisheries for the inshore potting fleet in the EIFCA district, with lobster being a high value shellfish species. Due to the inshore location of lobster they are predominantly targeted by the UK potting fleet located along the North Norfolk coast, under jurisdiction of the EIFCA from 0 to 6NM and the MMO from 6 to 12NM, in a mixed fishery with crab.

91. There are a range of vessels in the fleet with some staying close to shore, some remain within the inshore 6NM limits and some larger more powerful vessels travel offshore, including 10m catamarans. The majority of vessels within the EIFCA district are under 10m.

92. European lobster is a long-lived, large decapod crustacean that breeds once per year in the summer. Newly berried females begin to appear from September to December. Juveniles or adult lobsters do not undertake any significant migrations, inhabit rocky reef and rough ground areas. The availability of suitable habitat is considered to influence the carrying capacity and size structure of lobster populations (Seitz *et al.*, 2014; Welby, 2015). From hatching it takes approximately five years for a lobster to recruit to the fishery.

93. The North Norfolk lobster season begins in March/April, with landings peaking in July/August and falling through winter months. Within the EIFCA district the average annual combined crab and lobster landings of 771 tonnes with a value at first sale of £1.7 million supports many business and fishers within the area (EIFCA, 2020a).

94. Management measures for this fishery are seen as a priority and have been driven in part by the EIFCA Strategic Assessment of 2019 (EIFCA, 2020d) which noted the potential negative impact of fishing activities on the Cromer Chalk Beds MCZ which was designated as an MCZ in 2016. The Strategic Assessment also noted that the evidence base upon which management measures are based may be insufficient in relation to lobsters.

12.5.2.1.3 Whelk

95. The whelk fishery is currently the largest fishery both by landed weight and value in the commercial fisheries study area and targeted predominantly by the UK fleet. Overseas markets have expanded in the last five years which has boosted the increase in vessels targeting this species.

96. The common whelk is a slow growing, subtidal carnivorous mollusc which is distributed throughout most of the northern Atlantic between low water and 1,000m. Most are caught in depths of 40-60m.

97. There is limited dispersal of whelk juveniles because there is no pelagic larval stage, therefore, it is thought that there is limited connectivity between populations which could have implications for management and may make the species susceptible to local depletion and longer recovery rates (Blue Marine Foundation (BMF) 2018).

98. Stock status is relatively unknown in the UK, therefore, Catch per Unit Effort (CPUE) and LPUE are taken as a proxy for stock status. A reduced CPUE could be an indication that the fishery has exceeded the limits of sustainability. Whelk fisheries are, in general, unrestricted, lightly regulated and require little financial start-up resources.

12.5.2.2 Finfish

99. Key finfish species have been summarised here. For further detail see **Appendix 12.1 Commercial Fisheries Technical Report**. The majority of finfish from the commercial fisheries study area are landed by EU vessels as noted in **Section 12.5.1**.

12.5.2.2.1 Sole and Plaice

100. Plaice is commonly found just below the sediment surface on sandy, shingle and muddy bottoms at depths between 10 and 50m. It is predominantly caught in the central North Sea (Division 4b) but also across the regional fishery study area in the mixed fishery targeting sole.

101. Plaice is considered to be harvested sustainably. A multiannual plan has been proposed for this stock (EU 2016) but since this has not been adopted by Norway it is not used as a basis of advice for shared stocks.

102. Sole and plaice are typically targeted by vessels deploying beam trawl gear. Prior to its prohibition in July 2021 (EU 2019/1241), fishing with electric pulse trawl was also undertaken, including in the southern part of the southern North Sea. The prohibition of pulse trawl gear may result in vessels reverting to previous fishing grounds further north using towed demersal beam trawl gear (ICES 2020b).

12.5.2.2.2 Whiting

103. Whiting is a demersal species and an active predator feeding on commercial species such as Norway pout, sandeel, haddock and cod as well as juvenile fish. The species is widely distributed both inshore and offshore throughout the North Sea. Immature fish can be found in nursery areas close inshore and migrate to the open sea after the first year of life (Cohen *et al.*, 1990). This species is a broadcast spawner with a prolonged spawning season lasting from late January until June. Spawning distribution is widespread throughout the North Sea.

104. While ICES consider the North Sea stock to be harvested sustainably, with the stock at full reproductive capacity, and has been fluctuating around the ICES maximum sustainable yield reference point for biomass since 2008 (ICES, 2020c).

12.5.2.2.3 Mackerel

105. Mackerel are highly migratory pelagic species widely distributed in the continental shelf seas around the UK and Ireland, with distribution affected by temperature as well as the abundance and composition of its main diet of zooplankton. Mackerel can be found in large shoals feeding on small fish and prawns.

106. This species is known to shoal and migrate distances of up to 500 km along the continental shelf edge from mid-November to early March. The location of the relatively warm currents of the shelf edges are thought to influence the migratory pathways to the main spawning areas in the southern North Sea (Jansen *et al.*, 2012).

107. The Spawning Stock Biomass (SSB) for mackerel is estimated to have increased since 2008 but reached a maximum in 2014 and thereafter has declined. Although the fishing mortality has decreased since 2003, the stock has remained above Maximum Sustainable Yield (MSY). Despite this the advised catch is higher for 2020 than for 2019 because of the high recruitment for 2016 and 2017 year classes.

12.5.2.2.4 Dab

108. Dab is particularly abundant flatfish in the North Sea and can be found from the shore to depths of 500m on sandy habitats. Juveniles are found in shallow water but move offshore as adults. It is predominantly caught as bycatch in the plaice and sole fishery and this is sustainably exploited.

12.5.2.2.5 Cod

109. Cod in the North Sea have a wide distribution although there is evidence that there may be different subpopulations in different regions which may have a limited degree of mixing. This may have the effect of a slow recovery from a general low SSB and fishing mortality above MSY. The stock is currently considered to be fished unsustainably and has a reduced reproductive capacity (ICES 2019a).

12.5.2.2.6 Herring

110. Herring schools move between spawning and wintering grounds in coastal areas and feeding grounds in open water. Herring populations are known to use traditional gravelly spawning grounds, many of which are coastal waters or on offshore banks. Herring in the North Sea have several discrete spawning populations, including the nearby Downs herring population. For further information refer to **Chapter 9 Fish and Shellfish Ecology**.

111. Herring are predominantly caught in the southern North Sea in late autumn and winter. Despite below average recruitment from 2003 to 2013 and very low recruitment in 2015 and 2017, herring in the North Sea are at full reproductive capacity and considered to be harvested sustainably (ICES, 2020a). ICES recommend that, although the advice for 2020 is for an increased catch, the stock size is expected to reduce in the future due to the potential for reduced year class recruitment.

12.5.3 Key Gear

112. Key gear types have been summarised here. For further detail see **Appendix 12.1 Commercial Fisheries Technical Report.**

12.5.3.1 Pots and traps

113. Potting vessels predominantly target crab and lobster with parlour (two chambered) creels, but also standard (single chambered) creels, both of which are side opening. Whelks are targeted with top opening plastic pots. Some vessels will operate fleets of crab and lobster pots and whelk pots simultaneously with the level of whelk fishing activity driven by market prices. Whelk are predominantly targeted in muddy habitats, and not generally found on mobile sand or rocky ground.

114. When targeting whelk, vessels operating outside 6NM may deploy up to 1,500 to 2,000 pots, with 50 to 100 pots per string and 10 fathoms between pots. Commercial vessels within the EIFCA jurisdiction are limited to 500 pots with an internal volume of 30 litres per vessel, as per the Whelk Permit Byelaw. All whelk pots must have a minimum of two escape holes at least 24mm in diameter per pot and must be tagged with EIFCA supplied tags. There are no pot limits outside of 6NM.

115. When targeting brown crab and lobster, parlour pots are favoured for more offshore locations. Vessels may operate 1,000 to 3,500 pots in total, with 25 to 30 pots per string for a typical vessel, and up to 50 per string for larger vessels. Pots are spaced 15 fathoms (27.4m) apart and one string can cover up to 0.3NM. Vessels may operate three fleets of pots, so soak time is generally three days, weather permitting.

12.5.3.2 Beam Trawlers

116. Flatfish such as sole and plaice landed from the commercial fisheries study area using beam trawls with tickler chains which run along the sea bed and scare flatfish into the net. Since flatfish are not shoaling species fishing effort can be widespread across a number of grounds in the North Sea.

12.5.3.3 Pulse Trawlers

117. Prior to its prohibition in July 2021 (EU 2019/1241), fishing with electric pulse trawl was undertaken, including in the southern part of the southern North Sea. Pulse trawling had been used on an experimental basis since 2006 to target sole in the North Sea under a derogation from the EU. At present over 80 Dutch registered vessels are fishing for sole under the derogation in the southern North Sea outside the UK 12NM limit.

118. Pulse beam trawls replaced the heavy ground gear and tickler chain with drag wires through which electric impulses are sent. The electric pulse passes into the sea bed and stimulates the fish to rise up out of the substrate and into the trawl net. The prohibition of pulse trawl gear may result in vessels reverting to previous fishing grounds further north using towed demersal beam trawl gear (ICES 2020b).

12.5.3.4 Demersal Otter Trawling

119. Whiting is the main species caught with demersal trawling gear in the regional study area and this is predominantly targeted by French registered vessels, although cod and haddock are also targeted. Twin or multi-rig bottom trawl can be used, with two trawl doors approximately 1 tonne each which hold the net open horizontally. Various forms of ground gear are used depending on target species.

12.5.3.5 Pelagic trawling

120. Pelagic or mid-water trawls are towed at the appropriate level in the water column to intercept shoaling fish such as herring, sprat, mackerel or anchovy. The location of the shoals is determined by sonar or vertical sounder echoes. The majority of pelagic trawling activity in the regional study area is by French vessels.

12.5.4 Key Ports

12.5.4.1 Overview

121. The North Norfolk coast has a long history of potting for crab and lobster and Cromer crab are one of Norfolk's most well-known exports. There are approximately 50 active vessels operating along the coast, many of which are under 10m. Most operators are members of fisherman's associations, with few exceptions.

122. The two main types of potter include the beach boats which operate close inshore (within 3NM) for shorter periods of time compared to the larger mobile potters which have various ranges depending on size. The larger vessels operating out of harbours tend to be <10m although a few exceed this length and operate further offshore between 3 and 40NM. The fleet includes six catamarans, three of which operate out of Cromer and which are under 10m but can be landed and launched from the beach and have a larger outboard engine than the single hulls which means they can also fish further offshore and for longer.

123. The main landing ports along the North Norfolk coast include: Kings Lynn, Wells, Lowestoft, Boston, Southwold, Great Yarmouth, Sheringham, Cromer (including East and West Runton), Brancaster, Winterton and Blakeney. First sales value for the period 2016 to 2020 by port are presented in **Figure 3-1** and **Figure 3-2** of **Appendix 12.1 Commercial Fisheries Technical Report**).

124. The coronavirus (COVID-19) pandemic and associated government restrictions imposed on individuals and businesses during 2020 may have affected commercial fishing operators and, therefore, landings data for 2020 may not be as representative as previous years. It is however, noted that total first sales value for a number of ports (including Kings Lynn and Boston) increased during 2020, while for others a significant decline is noted (Wells and Lowestoft). Potential market and supply chain effects resulting from the UK-exit from the EU would be expected to be captured in 2021 landings data, and therefore, trends associated with Brexit are not expected to be evident within the timeseries analysed.

125. Until 2018 the main port by first sales value was Kings Lynn but in 2019 the value fell from approximately £2.7 million to £1.3 million and was overtaken by Wells (£2.4 million) and Lowestoft (£1.78 million), however, first sales value of landings into Kings Lynn increases in 2020, returning it to the key port in the region. Other ports in order of first sales value in 2020 are Boston (£0.78 million), Cromer (£0.36 million), Southwold (£0.32 million) and Great Yarmouth (£0.19 million).The ports of Brancaster, Sheringham, Winterton and Blakeney all have first sales values of under £0.1 million. Consultation with the NNIFA confirmed that the value of species landed into ports varies between years and that Kings Lynn is considered to be the main port in the area.

126. The values of species landed varies between ports over the period 2016 to 2020. Details of these changes are provided in **Appendix 12.1 Commercial Fisheries Technical Report**.

12.5.5 Fisheries Activity Assessment

12.5.5.1 Wind farm sites study area

12.5.5.1.1 UK Landing trends

127. Landing trends for UK vessels from the wind farm sites study area (ICES rectangle 35F1) by weight and value are presented in **Figure 4-1** and **Figure 4-2** of **Appendix 12.1 Commercial Fisheries Technical Report**. The surface area of the ICES rectangle covered by SEP is 2.49% and DEP is 2.79%, although this does not represent the proportion of landings from these areas since fishing grounds are not equally distributed throughout the rectangle.

128. Landings are dominated by whelk, brown crab and lobster with a value of £1.5 million, £249,000 and £224,000 respectively in 2019. As noted in **Section 12.5.1** the proportion of species landed by pots and traps is over 99% in the wind farm sites study area. For vessels over 15m potting activity is greater in the area overlapped by DEP where the value of landings from pots and traps in 2017 was in the region of £1,000-5,000 per quadrat (MMO, 2019) (**Figure 2-6** of **Appendix 12.1 Commercial Fisheries Technical Report**).

129. The total landed weight for all species from ICES rectangle 35F1 caught by the UK fleet increased significantly between 2016 (1,117 tonnes) and 2020 (1,840 tonnes) representing an increase in weight of 64%. This has been primarily led by a growing whelk fishery, with 2020 landings increased by 80% compared to 2016. With first sale value from 35F1 of just under £2 million, this highlights the growing importance of this species to locally based potting fleets.

130. Shellfish landings show a distinct seasonality as presented in **Figure 4-3** of **Appendix 12.1 Commercial Fisheries Technical Report**. Although crab and lobster tend to be targeted together, statistics indicate that brown crab landings primarily occur from March to November, peaking in May/June. A similar time period is seen for lobster, with peaks in July/August. The main whelk season is earlier and runs from January through to December although the peak landings are between April and June. The shellfish fishery is active throughout the year with a slight decrease in the winter months.

131. Although VMS data for the over 15m fishing vessels suggests there is little or no potting activity in the area overlapped by SEP (**Appendix 12.1 Commercial Fisheries Technical Report**, **Figure 2-6**), a 2010 EIFCA mapping project describing the spatial coverage of fishing for shellfish species (all UK vessel sizes) indicates that the 10m and under fleet are active in the wind farm sites study area (**Appendix 12.1 Commercial Fisheries Technical Report**, **Figure 4-4**). Port data also shows the predominance of under 10m vessels targeting shellfish from some of the local ports such as Cromer.

132. The 2010 EIFCA mapping project indicates that SEP wind farm site, the DEP South array area, and the southwestern part of the DEP North array area overlap crab and lobster fishing grounds. Only the DEP North array area is primarily located in a whelk fishing ground, although adjacent whelk fishing grounds may extend a short distance in to the SEP wind farm site. It should be noted that the shellfish grounds indicated on the EIFCA 2010 map are based on targeted interviews with a relatively small sample of fishermen (~12) at the time and are, therefore, unlikely to be representative of the entire fleet. Indeed, consultation directly with the industry indicates that currently all shellfish species are targeted across the district.

12.5.5.1.2 EU Landings trends

133. The commercial fisheries array study area is defined as ICES rectangle 35F1. Landings by EU Member States are predominantly from 35F1, with very low activity and landings from 34F1.

Dutch fishing activity

134. Landings by Dutch registered vessels in the commercial fisheries wind farm sites and export cable study areas (ICES rectangles 34F1 and 35F1) are described in **Section 12.5.1**. The two key species landed are sole and plaice.

135. **Figure 4-6** of **Appendix 12.1 Commercial Fisheries Technical Report** presents the annual landings of sole and plaice between 2012 and 2016 and **Figure 4-7** of **Appendix 12.1 Commercial Fisheries Technical Report** presents the main gear types used by the Dutch registered vessels. The latter shows that sole and plaice are targeted almost entirely by beam trawling.

136. Landings by Dutch registered vessels come from the western region of the wind farm sites to the east of SEP and DEP. The SEP wind farm site and the DEP South array area are not located within sole and plaice fishing grounds whereas the DEP North array area is located within an area of low value (€0-1000 per year) for this fishery (**Figure 4-8** of **Appendix 12.1 Commercial Fisheries Technical Report**).

137. In 2017 the Netherlands held 36% of the TAC for plaice with a quota of 46,471 tonnes. Landings of plaice at the end of 2016 from the commercial fisheries array study area (35F1) were recorded as 30 tonnes which represents 0.06% of the quota for 2017 in ICES Divisions 2a (Norwegian Sea) and 4 (North Sea).

138. Similarly, in 2017 the Netherlands held 75% of the TAC for sole (12,122 tonnes) in ICES Divisions 2a and 4. The landed weight recorded for sole at the end of 2016 in the commercial fisheries array study area (35F1) was 34 tonnes which represents 0.28% of the Dutch quota.

Belgian fishing activity

139. Landings data for ICES rectangle 34F1 and 35F1 for key species landed by Belgian registered vessels are presented in **Figure 4-9** of **Appendix 12.1 Commercial Fisheries Technical Report**. Only plaice and sole were landed in quantities over 2 tonnes during between 2012 and 2016.

140. Since a peak in 2013, landings for both plaice and sole has fallen to 1.08 and 0.21 tonnes respectively. In 2017 Belgium had a quota of 7,435 tonnes for plaice and a quota of 1,343 tonnes for sole in ICES Division 2a and 4. The landings data in for each species at the end of 2016 represents this to be 0.014% of the quota for plaice and 0.015% of the quota for sole. The commercial fisheries array study area (35F1) is therefore not considered to be an important fishing area for Belgian registered vessels.

French fishing activity

141. Prior to 2015 French registered demersal trawlers targeted whiting within the commercial fisheries array study area (35F1) but the landed weight has reduced significantly and in 2016 this was less than 0.5 tonnes. A similar trend was seen in the landings for mackerel targeted by the pelagic trawling fleet which has declined from approximately 7 tonnes in 2012 to less than 1 tonne in 2016 (**Figure 4-10** of **Appendix 12.1 Commercial Fisheries Technical Report**). The commercial fisheries study area is not considered to be an important fishing area for French registered vessels.

Danish fishing activity

142. Danish registered vessels principally target sandeel and sprat in a mixed fishery using demersal otter trawl gear. Landings of sandeel by Danish vessels reached a maximum of over 7,000 tonnes in 2003 (**Figure 2-11**, **Appendix 12.1 Commercial Fisheries Technical Report**) but have since declined and after 2011 no sandeel were caught in the commercial fisheries study area. Sandeel currently have a zero TAC in this area. However, as fishing for this species may resume in the future, it is included within the assessment.

143. Significant sandeel grounds are located across the northern part of ICES rectangle 35F1 as presented in **Figure 2-12** of **Appendix 12.1 Commercial Fisheries Technical Report**. The DEP North array area overlaps a small proportion (2.04%) of these sandeel grounds at their southernmost limit. It is calculated that sandeel grounds overlap with 20.87% of the DEP North array area.

12.5.5.2 Offshore cable corridor study area

144. The proposed offshore export cable corridor will be constructed between the DEP North array area and landfall at Weybourne in a DEP in isolation or two OSP scenario, or from the SEP wind farm site to landfall at Weybourne in a SEP in isolation or one OSP scenario (with interlink cables connecting the DEP North array area and DEP South array area to an OSP in the SEP wind farm site (see **Section 12.3.2**)). Offshore cables will traverse ICES rectangles 35F1 and 34F1 (the offshore cable corridor study area).

145. A similar trend in fishing activity is observed in the offshore export cable corridor study area and within the wind farm sites study area (35F1). In terms of landed weight, whelk predominate the landings and have increased significantly from 2016 to 2020 , demonstrating the importance of the whelk fishery for this area.

146. Ninety three percent (93%) of the whelk landings from 34F1 and 35F1 are taken from 35F1, highlighting that this fishery is focused in 35F1, which overlaps with both the wind farm sites and parts of the export cable corridor. A similar trend is observed for the other two key species namely, brown crab and lobster. The landed value of brown crab and lobster in the proposed offshore export cable corridor area between the SEP wind farm site and the landfall has remained relatively stable over the last five years, with an average combined first sales value of £1 million (**Appendix 12.1**). The figures suggest that the inshore areas are important grounds for the shellfish fisheries and consultation with a local fishermen's association confirm that the majority of boats are under 10m and fish relatively close to shore.

147. **Figure 4-13** of **Appendix 12.1 Commercial Fisheries Technical Report**) presents the proportion of landed weight by gear which demonstrates that pots and traps are the predominant gear used in the offshore cable corridor area.

12.6 Potential Impacts

12.6.1 Potential Impacts during Construction

12.6.1.1 Impact 1: Construction activities and physical presence of constructed wind farm site infrastructure leading to reduction in access to, or exclusion from established fishing grounds

12.6.1.1.1 DEP in Isolation

148. Construction of DEP will take place over a maximum period of up to 2 years. A range of construction activities will take place simultaneously with a maximum of 30 turbines constructed within the wind farm sites. The minimum space between turbines will be 1.05km.

Magnitude of effect

149. This effect will lead to a localised loss of access to fishing grounds. The effect is predicted to be of regional spatial extent, reversible, over a short-term period (maximum offshore construction period for DEP of up to 2 years) and will impact the receptors directly. Fishing may be prevented from <1% of the DEP wind farm site due to the footprint of infrastructure under construction. In addition, there will be a 500m safety distance around infrastructure under construction (equating to 0.79km^2 per structure).

150. The effect of construction on UK and EU fishing fleets is described below on a fleet-by-fleet basis.

151. UK Potters: DEP overlaps significant shellfish grounds routinely targeted by UK vessels. Key species targeted include whelk as well as brown crab and lobster caught in a mixed fishery. The proportion of species landed by pots and traps is over 99% in the array study area and DEP covers 2.79% of ICES rectangle 35F1. Higher resolution MMO VMS data for vessels over 15m in ICES rectangle 35F1 indicate that annual first sales value of landings for the larger potters which operate within DEP is in the region of £1000–5,000 per quadrat.

152. The under 10m fleet are also active within the ICES rectangle 35F1 as indicated from port landings. The EIFCA mapping project indicated that in 2010 DEP overlapped with whelk and crab and lobster fishing grounds. In 2018, first sales value of whelk, brown crab and lobster from ICES rectangle 35F1 were £1.4 million, £224,000 and £316,000 respectively.

153. The landings by the UK potting fleet are considered to be of high value for the key crustacean species landed from ICES rectangle 35F1 and within DEP. The fleet operates between shallower inshore areas to outside the 12NM limit with a range of vessel sizes. The opportunities for fishing in alternative areas are limited due to the depth limit for key crustacean species and the operational range limit for under 10m vessels. DEP covers only 2.79% of the ICES rectangle, but the whole of DEP is considered to be a key potting ground. The magnitude for the UK potting fleet is therefore considered to be medium.

154. Non-UK Vessels: Landings statistics and VMS data indicate that EU vessels fishing in the area include those registered to the Netherlands, France and Belgium. Landings from ICES rectangle 35F1 indicate these vessels are targeting four key finfish species identified as sole, plaice, whiting, and mackerel. However, activity within DEP wind farm site is low. The average annual landings by Dutch vessels within DEP are low at €0-1000 per year (based on spatial data from 2011 to 2015).

155. Landings data for ICES rectangle 35F1 for Dutch registered vessels indicate that sole and to a lesser extent plaice are targeted with a value of approximately €383,000 and €55,000 respectively based on a five-year average between 2012 to 2016. Based on 2016 figures landings of sole and plaice by Dutch vessels deploying demersal beam trawling gear represented 0.28% and 0.06% of the quota set for the Netherlands in 2017 respectively. While DEP is located within the area identified as fishing grounds for Dutch registered vessels, activity is limited in comparison to grounds located to the east of DEP.

156. Belgian registered demersal vessels target plaice and sole with beam trawling gear. In 2016 landed weight of these species was 1.08 tonnes and 0.21 tonnes for respectively, representing only 0.014% of the quota for plaice and 0.015% of the quota for sole.

157. Therefore, the value of EU beam trawling is considered to be very low within DEP.

158. French registered demersal trawlers within ICES rectangle 35F1 predominantly target whiting with an average annual first sale value of €52,000. Landed weight has reduced significantly and in 2016 this was less than 0.5 tonnes. The value of EU demersal trawling is considered to be very low within DEP wind farm area. French registered pelagic trawlers targeting mackerel landed less than 1 tonne from the wind farm sites study area in 2016.

159. Sandeel grounds previously fished by Danish sandeel industrial trawlers overlap with a small proportion of DEP (2.04%), representing 20.87% of the DEP North array area. The sandeel fishery is highly dependent on recruitment on a year to year basis and there is currently a zero TAC for sandeel due to low stock abundance (ICES 2019c). Sandeel grounds are well established and understood throughout the North Sea and it is reasonable to assume that the sandeel grounds overlapping the DEP North array area could be productive in the future including within the offshore construction period.

160. The landings from Dutch beam trawling for plaice and sole are considered to be of low value. The landings by Belgian beam trawlers and French demersal trawlers are considered to be very low. Should Danish industrial sandeel trawling resume in the future the overlap of DEP with the sandeel grounds is considered to be small (2%). The maximum area of loss will be small, the value of the area lost is low and the duration short-term. The magnitude is assessed to be negligible for the Dutch and Belgian beam trawlers and also for French and Danish demersal trawlers.

Sensitivity of the receptor

161. EU vessels targeting fish resources within the wind farm sites study area are over 15m in length and operate across large areas of the North Sea. These vessels can avoid construction areas if given sufficient notification. Mobile fleets over 15m in length are considered to have a large operational range.

162. The Dutch and Belgian beam trawl fleet and the French and Danish demersal trawl fleet are considered to have high levels of alternative fishing grounds based on their low dependence on the DEP wind farm sites. These fleets are considered to be of low vulnerability and high recoverability, and to have high levels of alternative fishing grounds. The sensitivity of the receptor is deemed to be low for the Dutch, Belgian, French and Danish fleet.

163. The UK potting fisheries operates across distinct areas of ground and although these areas can extend from close to the shore to outside the 12NM limit, they are considered to have lower levels of alternative fishing grounds. The under 10m fleet have a lower operational range compared to the over 10m fleet. The potting fleets targeting whelk, crab and/or lobster within DEP are considered to be of medium vulnerability and medium recoverability, and to have limited levels of alternative fishing grounds. The sensitivity of this receptor is therefore considered to be medium.

Significance of the impact

164. Dutch and Belgian beam trawl, French and Danish demersal trawl fleets: The sensitivity is considered to be low and the magnitude negligible. The impact will therefore be of **negligible adverse** significance.

165. UK Potting fleet: The sensitivity is considered to be medium and the magnitude medium. The significance of the impact, in the absence of any further mitigation (refer to **Section 12.6.1.1.4**), would therefore be **moderate adverse**, which is significant in EIA terms.

12.6.1.1.2 SEP in Isolation

166. Offshore construction of the SEP wind farm site will take place over a period of up to 2 years with a maximum of 23 turbines constructed within the wind farm site. There will be a range of construction activities taking place simultaneously. The minimum space between turbines will be 1.05km.

Magnitude of effect

167. This effect will lead to a localised loss of fishing grounds and fish and shellfish resources within these grounds for a range of fishing opportunities during the offshore construction period of up to 2 years.

168. The effect is predicted to be of regional spatial extent, reversible, over a short term period and will affect the receptors directly. Fishing may be prevented from up to <1% of the SEP wind farm site due to the footprint of infrastructure under construction. In addition, there will be a 500m safety distance around infrastructure under construction (equating to 0.79km^2 per structure).

169. The effect of construction on UK and EU fishing fleets is described below on a fleet by fleet basis.

170. UK Potters: VMS data for the over 12m vessels indicate that the SEP wind farm site does not overlap significant shellfish grounds routinely targeted by larger UK vessels. Landings data for ICES rectangle 35F1 show that species targeted by potters include whelk, brown crab and lobster.

171. The SEP wind farm site overlaps with 2.79% of the ICES rectangle 35F1 and the proportion of species landed by pots and traps in this area is over 99%. The under 10m fleet are known to be active within ICES Rectangle 35F1 as indicated from port landings. The EIFCA mapping project indicates that in 2010 the SEP wind farm site overlapped with the main crab and lobster fishing grounds and consultation with the NNIFA indicated that the whole area was fished for shellfish species including whelk. In 2018, first sales value of whelk, brown crab and lobster from ICES rectangle 35F1 were £1.4 million, £224,000 and £316,000 respectively.

172. Landings by UK potters targeting areas within the SEP wind farm site are considered to be of medium-high value. The fleet operates between inshore areas to outside the 12NM limit with a range of vessel sizes. The opportunities for fishing in alternative areas are limited due to fishing pressure on adjacent grounds and the operational range of the potting fleet. Although the SEP wind farm site covers only 2.49% of the ICES rectangle the whole of the SEP wind farm site is considered to be a routinely targeted potting ground. The magnitude for the UK potting fleet is therefore considered to be medium.

173. Non-UK Vessels: Landings statistics and VMS data indicate that EU vessels fishing in the area include those registered to the Netherlands, France and Belgium. Landings from the ICES rectangle 35F1 in which the SEP wind farm site is located indicate these vessels are targeting four key species identified as sole, plaice, whiting, and mackerel. However, the evidence indicates no activity within the SEP wind farm site.

174. Landings statistics indicate that Belgian registered demersal vessels target plaice and sole with beam trawling gear, landing weight 1.08 tonnes of plaice and 0.21 tonnes of sole in 2016 from ICES rectangle 35F1. This represents 0.014% of the quota for plaice and 0.015% of the quota for sole. The value of Belgian beam trawling is therefore considered to be very low within the SEP wind farm site.

175. French registered demersal trawlers predominantly target whiting in ICES rectangle 35F1 with an average annual first sale value of €52,000. Landed weight has reduced significantly in recent years and the SEP wind farm site does not overlap with the EU demersal trawling activity mapped within ICES rectangle 35F1. Mackerel landings taken by French mid-water/pelagic trawlers in 2016 were less than 1 tonne. The value of EU demersal trawling is considered to be very low within the SEP wind farm area.

176. The SEP wind farm site does not overlap with sandeel grounds previously fished by Danish sandeel industrial trawlers. These grounds are to the north of the site. If, in the future, there was a resumption of fishing for sandeel it is not considered that this activity will overlap with the SEP wind farm site.

177. The landings from Dutch beam trawling for plaice and sole are considered to be of moderate value although they represent a small proportion of the total quota caught by the Dutch fleet in Division 4c. Landings by Belgian beam trawlers and French demersal trawlers are considered to be very low. The SEP wind farm site does not overlap with sandeel grounds. The maximum area of loss will be small, the value of the area lost is low and the duration short term. The area will be fishable post construction. Therefore, the magnitude is assessed to be negligible for the Dutch and Belgian beam trawlers and French and Danish demersal trawlers.

Sensitivity of the receptor

178. EU vessels targeting fish resources within the commercial fisheries study area are over 12m in length and operate across large areas of the North Sea. These vessels can avoid construction areas if given sufficient notification. Mobile fleets over 12m in length are considered to have a large operational range.

179. The Dutch and Belgian beam trawl fleet and the French and Danish demersal trawl fleet are considered to have high levels of alternative fishing grounds based on their low dependence on the SEP wind farm site. These fleets are considered to be of low vulnerability and high recoverability, and to have high levels of alternative fishing grounds. The sensitivity of the receptor is deemed to be low for the Dutch, Belgian, French and Danish fleet.

180. The UK potting fisheries operates across distinct areas of ground and although these areas can extend from close to the shore to outside the 12NM limit, they are considered to have lower levels of alternative fishing grounds. The under 10m fleet have a lower operational range compared to the over 10m fleet. The potting fleets targeting whelk, crab and/or lobster within SEP are considered to be of medium vulnerability and medium recoverability, and to have limited levels of alternative fishing grounds. The sensitivity of this receptor is therefore considered to be medium.

Significance of the impact

181. Dutch and Belgian beam trawl, French and Danish demersal trawl fleets: The sensitivity is considered to be low and the magnitude negligible. The impact will therefore be of **negligible adverse** significance.

182. UK Potting fleet: The sensitivity is considered to be medium and the magnitude medium. The significance of the impact, in the absence of any further mitigation (refer to **Section 12.6.1.1.4**), would therefore be **moderate adverse**, which is significant in EIA terms.

12.6.1.1.3 SEP and DEP

183. The construction of SEP and DEP increases the maximum offshore construction period to 4 years over an approximate total 8 year period if SEP and DEP are constructed sequentially. This construction scenario includes a 2 year gap between offshore construction if offshore construction is in years 3 and 4 for the first project, then the second project offshore construction in years6,7 and 8. It is assumed that fishing would be possible to resume both during the construction period of each project, with the exception of safety zones around localised construction activities, and during the gap between construction phases.

Magnitude of effect

184. While the overall construction period may be longer, construction activities remain localised to specific construction events and short-term in nature. The magnitude of the effect on each receptor remains consistent with the assessment for SEP or DEP in isolation i.e. medium for UK potting, low for Dutch beam trawling and negligible for all other fleets.

Sensitivity of the receptor

185. The sensitivity of the receptor remains consistent with the assessment for SEP or DEP in isolation i.e. medium for UK potting, low for Dutch beam trawling and negligible for all other fleets.

Significance of the impact

186. The significance of the impact, in the absence of any further mitigation (refer to **Section 12.6.1.1.4**), would be: **moderate adverse** for UK potters, which is significant in EIA terms; **minor adverse** for Dutch beam trawlers; and **negligible adverse** for all other fleets (which are not significant in EIA terms).

12.6.1.1.4 Mitigation

187. UK potting fleet: with respect to any justifiable disturbance payment and cooperation agreements between SEP and/or DEP and commercial fishing vessel owners on an individual basis, the procedures as outlined in the FLOWW guidance documents (2014 and 2015), will be followed. The FLOWW guidance (2014 and 2015) provides guiding principles on how monetary settlements might be reached to reduce impacts, as well as promote mutual agreement and good relationships between developers and fishers. Example, FLOWW (2015) provides guidance on the evidence anticipated to support justifiable disturbance payments.

12.6.1.1.5 Residual Impact – SEP or DEP in Isolation

188. The residual impact of the physical presence of the wind farm during the construction phase potentially leading to exclusion or a reduction in access is **minor adverse** with mitigation, which is not significant in EIA terms.

12.6.1.1.6 Residual Impact - SEP and DEP

189. The residual impact of SEP and DEP is the same as that in isolation (**minor adverse**), which is not significant in EIA terms.

12.6.1.2 Impact 2: Offshore export cable construction activities leading to reduction in access to, or exclusion from, established fishing areas

12.6.1.2.1 SEP or DEP in Isolation

190. 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).

191. The construction scenario for offshore export cables associated with SEP or DEP built in isolation is based on an installation period of up to 110 days (50 days for SEP, 60 days for DEP), with an up to 2 year offshore construction period for each project. Outside the installation periods it is assumed that there will be fishing access. An advisory safety distance up to 1km radius around cable installation vessels active along the proposed offshore export cable corridor, is recommended i.e. a roaming 3.14km^2 area along the maximum offshore cable corridor between the DEP North array area and landfall, which overlaps with 35F1 and 34F1 by 0.26% for SEP in isolation and 1.24% for DEP in isolation.

Magnitude of effect

192. This effect will lead to a loss of access to fishing grounds and the fish resources within these grounds for a range of fishing opportunities during the construction activities for each project, which will directly affect fleets over a short-term duration. The effect is predicted to be intermittent and is of relevance to international fishing fleets outside the 6NM limit and for UK fishing fleets in all areas and is described below on a fleet-by-fleet basis.

193. UK Potters: Consultation with the EIFCA indicates that the offshore export cable corridor overlaps with fishing grounds routinely targeted by potting vessels targeting brown crab and lobster using creels and whelk using pots. Consultation with the NNIFA indicates that beach launched vessels tend to target areas from 0 to 3NM, while harbour based vessels predominantly target areas from 3NM to distances of 40NM offshore depending on the weight bearing capacity of the vessels. During the construction process vessels with pots set along the offshore cable corridors 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.

194. Dutch and Belgian beam trawlers, and French and Danish demersal trawlers: VMS and landings statistics indicate that there is a very low level of activity by vessels with mobile gear along the length of the offshore cable corridors.

195. UK Beam trawlers targeting shrimp: The Wash is a nationally significant area for the UK brown shrimp fishery; however, activity is predominantly within ICES rectangles 34F0 and 35F0 (which the offshore cable corridors do not overlap). The shrimp fishery also extends along the North Norfolk coast and within the Cromer Shoal Chalk Beds MCZ through which the offshore export cable corridor routes, within ICES rectangle 34F1. Brown shrimp landings from 34F1 have an average annual value of £21,500 (from 2014 to 2018), with minimal landings further offshore from 35F1. A notable reduction in landings was seen in 2015 which is linked to EIFCA management of closed areas to protect designated sites within their jurisdiction. Recent spatial restrictions of bottom towed gear have been put in place under the Marine Protected Areas Byelaw 2019 (EIFCA 2019) which came into force as from 4th May 2020. This byelaw prohibits bottom towed gears from operating in specified restricted areas within the MPA to mitigate the risk to the sensitive sub-features, including subtidal chalk bed, *Sabellaria spinulosa* (ross worm), sub-tidal mixed sediment and subtidal mud. The restrictions affect vessels using bottom towed gear.

196. The effect is predicted to be of regional spatial extent, intermittent, reversible and will affect the receptors directly. It is predicted that the offshore construction impact of each project will be short term (each will take up to 2 years for offshore construction) but the duration will be short-term (up to a 2 year period). Fishing may be prevented from roaming 500m radius from mobile installation vessels to allow safe passing distance (equating to a roaming 0.79km^2 exclusion from centre of installation vessels).

197. The magnitude is considered to be negligible for Dutch, Belgian beam trawlers, negligible for French and Danish demersal trawlers, low for UK shrimp beam trawlers and medium for UK potters.

Sensitivity of the receptor

198. The EU mobile vessels are over 15m in length and operate over large areas of the North Sea and have a large operational range. Adequate notification will allow all vessels to avoid construction areas.

199. Dutch, Belgian and French demersal trawlers have high alternative fishing grounds and a low dependency on the SEP and DEP offshore cable corridor areas. They are considered to have a low vulnerability and high recoverability, and to have high levels of alternative fishing grounds. The sensitivity of the receptor is considered to be negligible.

200. Sandeel grounds are not overlapped by the offshore cable corridors therefore the Danish sandeel fleet of industrial trawlers have little dependency on the offshore cable corridor. This fleet is considered to have substantial alternative fishing grounds and are adaptable to change (e.g. given large fluctuations in TACs). The Danish sandeel fleet are considered to be of low vulnerability and high recoverability, and to have high levels of alternative fishing grounds. The sensitivity of the receptor is deemed to be negligible.

201. The UK beam trawlers targeting shrimp are predominantly <18m in length and operate in distinct areas typically within 6NM of the shore and are concentrated within ICES rectangle 34F0 and 35F0, with a lower level of activity within 34F1. In the area overlapping the offshore export cable corridor, the UK beam trawl fleet targeting brown shrimp are deemed to be of low vulnerability and medium recoverability, and to have high levels of alternative fishing grounds. The sensitivity of the receptor is therefore, considered to be low.

202. The UK potting fleet in the inshore areas is typically <12m in length and operates across more distinct areas of ground, typically 0 to 6NM from shore but also extending beyond 6NM. The UK potting fleet is deemed to be of medium vulnerability and medium recoverability, and to have limited levels of alternative fishing grounds. The sensitivity of the receptor is therefore, considered to be medium.

Significance of the impact

203. Dutch, Belgian and French demersal trawlers: The overall sensitivity is considered to be low, and the magnitude negligible. The impact will, therefore, be **negligible adverse** and not significant in EIA terms.

204. Danish sandeel trawlers: The overall sensitivity is considered to be low, and the magnitude negligible. The impact will, therefore, be **negligible adverse** and not significant in EIA terms.

205. UK shrimp beam trawlers: The overall sensitivity is considered to be low and the magnitude low. The impact will, therefore, be **minor adverse** and not significant in EIA terms.

206. UK potting fleet: The overall sensitivity is considered to be medium and the magnitude medium. The impact, in the absence of any further mitigation, would therefore be **moderate adverse** and significant in EIA terms.

12.6.1.2.2 SEP and DEP

207. The construction of SEP and DEP increases the maximum offshore construction period to 4 years over a total 7-year period if SEP and DEP are constructed sequentially. This construction scenario includes a one-year gap between offshore construction if offshore construction is in years 3 and 4 for the first project, then the second project offshore construction in years 6 and 7. It is assumed that fishing would be possible to resume both during the construction period of each project, with the exception of safety zones around localised construction activities, and during the gap between construction phases.

Magnitude of effect

208. While the overall construction period is longer, the construction activities remain localised to specific construction events and short-time in nature. The magnitude of the effect on each receptor remains consistent with the assessment for SEP or DEP in isolation i.e. medium for UK potting, low for UK shrimp beam trawling and negligible for all other fleets.

Sensitivity of the receptor

209. The sensitivity of the receptor remains consistent with the assessment for SEP or DEP in isolation i.e. medium for UK potting, low UK shrimp beam trawling and negligible for all other fleets.

Significance of the impact

210. The significance of the impact, in the absence of any further mitigation, would be **moderate adverse** for UK potters, which is significant in EIA terms; **minor adverse** for UK beam trawlers; and **negligible adverse** for all other fleets, which are not significant in EIA terms.

12.6.1.2.3 Mitigation

211. UK potting fleet: through the application of justifiable disturbance payments (as described in **Section 12.6.1.1.4**).

12.6.1.2.4 Residual Impact - SEP or DEP in Isolation

212. UK potting fleet: The residual impact of cable construction activities potentially leading to exclusion or a reduction in access when only one project is built is **minor adverse** with mitigation, which is not significant in EIA terms.

213. UK beam trawlers: The residual impact of cable construction activities potentially leading to exclusion or a reduction in access when only one project is built is **minor adverse** for UK beam trawlers, which is not significant in EIA terms.

214. Other fleets: The residual impact of cable construction activities potentially leading to exclusion or a reduction in access when only one project is built is **negligible adverse** for UK beam trawlers, which is not significant in EIA terms.

12.6.1.2.5 Residual Impact - SEP and DEP

215. The residual impact of cable construction activities potentially leading to exclusion or a reduction in access when SEP and DEP are both constructed is the same as that in isolation (**minor** to **negligible adverse**), which is not significant in EIA terms.

12.6.1.3 Impact 3: Displacement from the wind farm site leading to gear conflict and increased pressure on adjacent grounds

12.6.1.3.1 DEP in Isolation

216. Localised exclusion from fishing grounds during phased construction of DEP may lead to temporary increases in fishing effort in other areas that may already be exploited, thereby leading to gear conflict and increased fishing pressure on adjacent grounds.

217. In terms of the area impacted by construction activities within DEP, in total the footprint of infrastructure under construction equates to 0.46 km^2 of sea bed will be disturbed during construction. In addition, there will be a 500m safety distance around infrastructure under construction (equating to 0.79km^2 per structure).

Magnitude of effect

218. The effect is predicted to be of regional spatial extent, short-term duration, intermittent and with medium reversibility. It is predicted that the effect will affect the receptor directly. The impact is of relevance to international and UK fishing fleets as described below.

219. VMS and landings statistics for the area surrounding DEP wind farm site indicate that there are numerous other areas where vessels (EU and UK) over 15m are using the same gear as those within ICES rectangle 35F1 in which DEP is located. Data on the value of landings for vessels over 12m using demersal gear (beam trawling and otter trawling) indicate that the value is much higher than in areas around DEP than within DEP.

220. VMS data show that UK, Dutch, French and Belgian beam trawlers targeting finfish, and Danish sandeel industrial trawlers, fish in large areas throughout the North Sea.

221. Gear conflict is likely to occur if vessels operating mobile gear explore areas traditionally fished by potters. Hutniczak (2018) built models of decision making by fishermen facing spatial choices and uncertain payoffs. The results suggest that when spatial restrictions on mobile gear fishing are implemented, fishermen will prioritise exploring areas known to them to be of greatest profit, rather than other grounds for which they have limited knowledge.

222. In the case of vessels operating beam trawls the most valuable areas are to the east of DEP wind farm sites. Sandeel grounds are well developed and concentrated to the north of DEP wind farm sites.

223. Historically, under the Common Fisheries Policy (CFP), certain EU vessels had historical agreements allowing rights to fish within the UK 12NM limit, including vessels from France, Belgium, Germany, Ireland and the Netherlands. Post UK exit from the EU, the agreement between the UK and EU permits non-UK vessels access to fish in UK waters under certain conditions, including between 6NM to 12NM. EU vessels may fish UK waters if they hold an appropriate licence from the UK Single Issuing Authority, which authorises access to UK waters to fish.

224. UK potting vessels operate throughout DEP from the shore to over 12NM. Displacement of potting vessels as a result of construction activities may place pressure on diminishing grounds and other shellfish fisheries.

225. The magnitude of potential increased conflict over alternative fishing grounds is considered to be low for all demersal trawlers and medium for UK potting vessels.

Sensitivity of the receptor

226. All commercial vessels operating outside the 12NM limit are considered to have a substantial availability of alternative grounds and a large operation range outside DEP wind farm areas. All mobile fleets are deemed to be of low vulnerability and high recoverability, and to have high levels of alternative fishing grounds. The sensitivity of all mobile fleets is therefore, considered to be low.

227. The UK potting fleet operates across large areas including both SEP and DEP and across the offshore cable corridors. This form of static fishing gear is considered to be of high vulnerability to gear conflict interactions since it is left unattended on the sea bed. It is expected that any displacement from mobile vessels may lead to exploring other fishing grounds outside DEP wind farm sites, which includes areas currently targeted by potters. The UK potting fleet are deemed to be of high vulnerability and medium recoverability, and to have limited levels of alternative fishing grounds. The sensitivity of the UK potting fleet is therefore considered to be medium.

Significance of the impact

228. All mobile fleets deploying demersal trawl gear: overall, the sensitivity of the receptor is considered to be low and the magnitude is deemed to be low. The impact will, therefore, be of **minor adverse** significance, which is not significant in EIA terms.

229. UK potting fleet: overall, the sensitivity of the receptor is considered to be medium and the magnitude is deemed to be medium. The impact of mobile gears being displaced into potting grounds will, therefore, be **moderate adverse** to UK potters in the absence of further mitigation (**Section 12.6.1.1.4**), which is significant in EIA terms.

12.6.1.3.2 SEP in Isolation

230. Localised exclusion from fishing grounds during phased construction of DEP may lead to temporary increases in fishing effort in other areas that may already be exploited thereby leading to gear conflict and increased fishing pressure on adjacent grounds.

231. In terms of the area impacted by construction activities within SEP, the footprint of infrastructure under construction equates to in total 0.34km^2 of sea bed will be disturbed during construction. In addition, there will be a 500m safety distance around infrastructure under construction (equating to 0.79km^2 per structure).

Magnitude of effect

232. The effect is predicted to be of regional spatial extent, short-term duration, intermittent and with medium reversibility. It is predicted that the effect will impact the receptor directly. The impact is of relevance to international and UK fishing fleets as described below.

233. VMS and landings statistics for the area surrounding the SEP wind farm site indicate that there are numerous other areas where vessels (EU and UK) over 15m are using the same gear as those within ICES rectangle 35F1 in which the SEP wind farm site is sited. Data on the value of landings for vessels over 12m using demersal gear (beam trawling and otter trawling) indicate that the value is much higher the in areas around the SEP wind farm site and little activity occurs within SEP. A similar situation exists for the over 15m potting fleet where VMS data indicates that there is a minimal amount of potting activity and the value within the SEP wind farm site is the lowest within the regional study area.

234. VMS data show that UK, Dutch, French and Belgian beam trawlers and Danish sandeel industrial trawlers fish in large areas throughout the North Sea.

235. In the case of vessels operating beam trawls the most valuable areas are to the east, and in The Wash to the southwest of the SEP wind farm site, and for the over 15m potting vessels the more valuable sites are to the west. Sandeel grounds are well developed and concentrated to the north of ICES rectangle 35F1 although the SEP wind farm site does not overlap the established fishing grounds.

236. Historically, under the CFP, certain EU vessels had historical agreements allowing rights to fish within the UK 12NM limit, including vessels from France, Belgium, Germany, Ireland and the Netherlands. Post UK exit from the EU, the agreement between the UK and EU permits non-UK vessels access to fish in UK waters under certain conditions, including between 6NM to 12NM. EU vessels may fish UK waters if they hold an appropriate licence from the UK Single Issuing Authority, which authorises access to UK waters to fish.

237. UK potting vessels operate throughout the SEP wind farm site from the shore to over 12NM. Displacement of potting vessels, as a result of construction activities, may place pressure on diminishing grounds and other shellfish fisheries.

238. The magnitude of potential increased conflict over alternative fishing grounds is considered to be low for all demersal trawlers and medium for UK potting vessels.

Sensitivity of the receptor

239. All commercial vessels operating outside the 12NM limit are considered to have a substantial availability of alternative grounds and a large operation range outside the SEP wind farm site. All mobile fleets are deemed to be of low vulnerability and high recoverability, and have high levels of alternative fishing grounds. The sensitivity of all mobile fleets is therefore, considered to be low.

240. The UK potting fleet operates across large areas including both SEP and DEP wind farm sites and across the offshore export cable corridor. This form of static fishing gear is considered to be of high vulnerability to gear conflict interactions since it is left unattended on the sea bed. It is expected that any displacement from mobile vessels may lead to exploring other fishing grounds outside the SEP wind farm site, which includes areas currently targeted by potters. The UK potting fleet are deemed to be of high vulnerability and medium recoverability, and to have limited levels of alternative fishing grounds. The sensitivity of the UK potting fleet is therefore, considered to be medium.

Significance of the impact

241. All mobile fleets deploying demersal trawl gear: overall, the sensitivity of the receptor is considered to be low and the magnitude is deemed to be low. The impact will, therefore, be of **minor adverse** significance, which is not significant in EIA terms.

242. UK potting fleet: overall, the sensitivity of the receptor is considered to be medium and the magnitude is deemed to be medium. The impact of mobile gears being displaced into potting ground will, therefore, be **moderate adverse** to UK potters in the absence of further mitigation (**Section 12.6.1.1.4**), which is significant in EIA terms.

12.6.1.3.3 SEP and DEP

Magnitude of effect

243. While the overall construction period is longer for this scenario, the construction activities remain localised to specific construction events and short-term in nature. The magnitude of the effect on each receptor remains consistent with the assessment for SEP or DEP in isolation i.e., medium for UK potting and low for all other fleets.

Sensitivity of the receptor

244. The sensitivity of the receptor remains consistent with the assessment for SEP or DEP in isolation i.e. medium for UK potting and low for all other fleets.

Significance of the impact

245. The significance of the impact is **moderate adverse** for UK potters in the absence of further mitigation (**Section 12.6.1.1.4**), which is significant in EIA terms, and **minor adverse** for all other fleets, which is not significant in EIA terms.

12.6.1.3.4 Mitigation

246. UK potting fleet: mitigation described in **Section 12.6.1.1.4** ‘Further mitigation’, details the approach to ascertain justifiable disruption and cooperation agreements between SEP and/or DEP and commercial fishing vessel owners on an individual basis. To mitigate this displacement effect, emphasis is focused on ensuring that the effect of reduced access is mitigated by removing that effort to ensure that it is not moved or displaced elsewhere. This can be delivered in a number of ways, such as the requirement for fishing gear that is subject to a cooperation agreement to be wet or dry stored (i.e. not actively fished), thereby minimising the displacement effect.

247. Through the application of cooperation agreements that appropriately mitigate reduced access by removing fishing effort to ensure displacement does not occur, the residual impacts will be of **minor adverse** significance, which is not significant in EIA terms.

12.6.1.3.5 Residual Impact - SEP or DEP in Isolation

248. UK potting fleet: The residual impact of displacement potentially leading to gear conflict and increased pressure on adjacent grounds when only one project is built is **minor adverse** with mitigation, which is not significant in EIA terms.

249. UK beam trawlers: The residual impact of displacement potentially leading to gear conflict and increased pressure on adjacent grounds when only one project is built is **minor adverse** for UK beam trawlers, which is not significant in EIA terms.

250. Other fleets: The residual impact of displacement potentially leading to gear conflict and increased pressure on adjacent grounds when only one project is built is **negligible adverse** for UK beam trawlers, which is not significant in EIA terms.

12.6.1.3.6 Residual Impact - SEP and DEP

251. The residual impact of displacement potentially leading to gear conflict and increased pressure on adjacent grounds when SEP and DEP are both constructed is the same as that in isolation (**minor** to **negligible adverse**), which is not significant in EIA terms.

12.6.1.4 Impact 4: Displacement from cable corridors leading to gear conflict and increased pressure on adjacent grounds

12.6.1.4.1 SEP or DEP in Isolation

252. Exclusion from fishing grounds during installation of cables in the offshore cable corridors may lead to temporary increases in fishing effort in other areas that may already be exploited, thereby leading to gear conflict.

253. For the projects in isolation, export cable installation will take up to 60 days (60 days for DEP, 50 days for SEP) during a two-year offshore construction period. It is assumed that outside this period there will be fishing access.

254. In terms of the area impacted by construction activities, there will be an advisory safety distance up to 500m radius around cable installation vessels active along the offshore cable corridors i.e. a roaming 0.79km^2 area along the offshore cable corridors.

Magnitude of effect

255. The effect is predicted to be of regional spatial extent, short-term duration, intermittent and with medium-high reversibility. It is predicted that the effect will impact the receptor directly.

256. UK potters: The vessels deploying pots across offshore cable corridors will be required to temporarily relocate gear to other grounds during the construction process. The density of pots varies significantly along the length of the export cable corridor. Within the EIFCA jurisdiction to 6NM a 500 pot limit is set for whelks. There are no pot limits outside 6NM. Vessels targeting crab and lobster deploy between approximately 300 and 3,500 pots.

257. However, it is not likely that all fleets (or pots from one vessel) will overlap the offshore export cable corridors or interlink cables (for DEP) given that a number of fleets of pots and a range of grounds are targeted at any given time. Vessels deploying pots in the North Norfolk area tend to leave their pots on the ground (i.e. do not bring pots back to shore in between fishing trips, with the exception of carrying out gear maintenance on specific pots/stings).

258. The restrictions on bottom towed gear under the Marine Protected Areas Byelaw 2019 will predominantly effect vessels targeting shrimp in the Wash.

259. Therefore, 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.

260. The displacement effect to UK potters targeting the offshore cable corridors is considered to have a lower magnitude of impact than the impact of safety zones causing the displacement. Taking all of these aspects into consideration, the magnitude of the displacement effect for the offshore cable corridor is assessed to be low for UK potters.

261. For all mobile fleets deploying demersal trawl gear, due to the lower level of activity across the offshore cable corridors, together with the range of alternative grounds, the magnitude is considered to be negligible.

Sensitivity of the receptor

262. All mobile commercial fisheries fleets operating within ICES rectangle 35F1 are considered to have high availability of alternative fishing grounds of higher value, and an operational range that is not limited to wind farm sites. All mobile fleets are deemed to be of low vulnerability and high recoverability, and to have high levels of alternative fishing grounds. The sensitivity of all mobile fleets is therefore, considered to be low.

263. The UK potting fleet operates across large areas including the wind farm sites and across the offshore export cable corridor. This form of static fishing gear is considered to be of high vulnerability to gear conflict interactions since it is left unattended on the sea bed. It is expected that any displacement of mobile vessels may lead to exploring other fishing grounds outside the offshore cable corridors, which includes areas currently targeted by potters. The UK potting fleet are deemed to be of high vulnerability and medium recoverability, and to have limited levels of alternative fishing grounds. The sensitivity of the UK potting fleet is therefore considered to be medium.

Significance of impact

264. UK potting fleet: overall, the sensitivity of the receptor is considered to be medium and the magnitude is deemed to be low. The impact of mobile gears being displaced into adjacent potting grounds will therefore be of **minor adverse** significance to UK potters, which is not significant in EIA terms.

265. All mobile fleets deploying demersal trawl gear: overall, the sensitivity of the receptor is considered to be low and the magnitude is deemed to be negligible. The impact will, therefore, be **negligible adverse**.

12.6.1.4.2 SEP and DEP

Magnitude of effect

266. While the overall construction period is longer for this scenario, the construction activities remain localised to specific construction events and short-term in nature. The magnitude of the effect on each receptor remains consistent with the assessment for SEP or DEP in isolation i.e., low for UK potting and negligible for all other fleets.

Sensitivity of the receptor

267. The sensitivity of the receptor remains consistent with the assessment for SEP or DEP in isolation i.e., medium for UK potting and low for all other fleets.

Significance of the impact

268. The significance of the impact is **minor adverse** for UK potters and **negligible adverse** for all other fleets, which are not significant in EIA terms.

12.6.1.4.3 Mitigation

269. No additional mitigation above that embedded (**Section 12.3.3**) is proposed.

12.6.1.4.4 Residual Impact - SEP or DEP in Isolation

270. UK potting fleet: The residual impact of displacement from the cable corridors potentially leading to gear conflict and increased pressure on adjacent grounds when only one project is built is **minor adverse**, which is not significant in EIA terms.

271. Mobile fleets: The residual impact of displacement from the cable corridors potentially leading to gear conflict and increased pressure on adjacent grounds when only one project is built is **negligible adverse** for UK beam trawlers, which is not significant in EIA terms.

12.6.1.4.5 Residual Impact - SEP and DEP

272. The residual impact of displacement from the cable corridor potentially leading to gear conflict and increased pressure on adjacent grounds when SEP and DEP are both constructed is the same as that in isolation (**minor adverse** to **negligible adverse**), which is not significant in EIA terms.

12.6.1.5 Impact 5: Construction activities leading to displacement or disruption of commercially important fish and shellfish resources

12.6.1.5.1 SEP or DEP in Isolation

273. Temporary displacement due to noise and disruption of habitats during construction activities may decrease or displace commercially important fish and shellfish populations from the area. This section assesses the potential temporary knock-on 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

Magnitude of effect

274. Assessments of the following potential construction impacts have been undertaken in **Chapter 9 Fish and Shellfish Ecology** for key commercial species:

- 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 sea bed preparation resulting in potential effects on fish and shellfish receptors;
- Sediment deposition as a result of foundation installation, cable installation and sea bed preparation resulting in potential effects on fish and shellfish receptors; and
- Underwater noise as a result of foundation installation (i.e. piling) and other construction activities (e.g. cable installation) resulting in potential effects on fish and shellfish receptors.

275. With respect to the magnitude of this effect on commercial fisheries, the overall significance of the impact 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 impact of negligible significance is assessed for a species, a negligible magnitude is assessed for commercial fishing; where an impact of **minor adverse** significance is assessed for a species, a low magnitude is assessed for commercial fishing, and so on.

276. Details of the fish and shellfish ecology assessment are summarised in **Table 12-10** with evidence, modelling and justifications for these assessments provided in **Chapter 9 Fish and Shellfish Ecology**.

277. The effect is predicted to be of regional spatial extent, of relevance to international fishing fleets, and of short-term duration. It is predicted that the effect will impact the receptor directly through loss of resources. The magnitude is therefore considered to be low for all species and all potential impacts.

Table 12-10: Significance of Effects of Construction Impacts on Fish and Shellfish Ecology

Potential impact	Species	Significance of impact
Habitat loss/ disturbance	Shellfish (including whelk, brown crab and lobster)	**Minor adverse**
	Sandeel and herring	**Minor adverse**
	All other fish and species	**Minor adverse**
Increased suspended sediment concentrations	Shellfish eggs and larvae	**Minor adverse**
	Sandeel and herring eggs and larvae	**Minor adverse**
	All other fish and shellfish species	**Minor adverse**
Sediment deposition	Shellfish eggs and larvae	**Minor adverse**
	Sandeel and herring eggs and larvae	**Minor adverse**
	All other fish and shellfish species	**Minor adverse**
Underwater noise	Shellfish	**Minor adverse**
	Demersal and pelagic finfish	**Minor adverse**
	Eggs and larvae	**Minor adverse**

Sensitivity of the receptor

278. Exposure to the impact is likely and commercial fleets targeting whelk, brown crab, lobster, brown shrimp and finfish species may be affected.

279. Due to the locality of the impact on whelk, brown crab and lobster, the sensitivity of the UK potting 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 potting fleet.

280. Brown shrimp are primarily targeted in the Wash, and also along the North Norfolk coast adjacent to the Wash. Brown shrimp fishing grounds are understood not to overlap with the offshore export cable corridor. Based on these fishing locations, and the rate of dispersion predicted by modelling, it is expected that elevated suspended sediment concentrations and sediment deposition will not impact brown shrimp grounds and therefore the sensitivity of UK beam trawlers targeting this species is considered to be low.

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

Significance of impact

282. UK potting fleet: overall, the sensitivity of the receptor is considered to be medium and the magnitude is deemed to be low. The impact will, therefore, be of **minor adverse** significance to UK potters, which is not significant in EIA terms.

283. All mobile fleets: overall, the sensitivity of the receptors is considered to be low and the magnitude is deemed to be low. The impact will, therefore, be of **minor adverse** significance to mobile fleets, which is not significant in EIA terms.

12.6.1.5.2 SEP and DEP

Magnitude of effect

284. The magnitude of the effect on each receptor remains consistent with the assessment for SEP or DEP in isolation i.e., low for UK potting and low for all other fleets.

Sensitivity of the receptor

285. The sensitivity of the receptor remains consistent with the assessment for SEP or DEP in isolation i.e., medium for UK potting and low for all other fleets.

Significance of the impact

286. The significance of the impact is **minor adverse** for all fleets, which is not significant in EIA terms.

12.6.1.5.3 Mitigation

287. No additional mitigation above that embedded (**Section 12.3.3**) is proposed.

12.6.1.5.4 Residual Impact - SEP or DEP in Isolation

288. All fleets: The residual impact of construction activities leading to disruption to commercially important fish resources when only one wind farm is built is **minor adverse**, which is not significant in EIA terms.

12.6.1.5.5 Residual Impact - SEP and DEP

289. The residual impact of construction activities leading to disruption to commercially important fish resources when SEP and DEP are both constructed is the same as that in isolation (**minor** to **negligible adverse**), which is not significant in EIA terms.

12.6.1.6 Impact 6: Increased vessel traffic within fishing grounds as a result of changes to shipping routes and transiting construction vessel traffic leading to interference with fishing activity

12.6.1.6.1 SEP or DEP in Isolation

Magnitude of effect

290. Vessel movements (i.e. construction vessels transiting to and from areas undergoing construction works) related to the construction of SEP or DEP, offshore cables and all associated infrastructure will add to the existing level of shipping activity in the area (see **Chapter 13 Shipping and Navigation**).

291. Concern regarding the potential for impact to fishing activities as a result of shipping traffic displacement was raised in consultation. Routeing deviations as a result of SEP and DEP were assessed within **Appendix 13.1 NRA**. Given natural features in the projects vicinity, the NRA established that deviations will largely occur along pre-established routeing options. As such, the impact of displacement was assessed to be tolerable and the significance of displacement to fishing vessels was assessed to be **minor adverse** for the UK potting fleet and negligible for all other fleets, which is not significant in EIA terms.

292. Based on the NRA assessment, together with the extent of fishing across the offshore DCO order limits and the level of construction vessel movement proposed, the magnitude of this effect is considered to be low for all fleets.

Sensitivity of the receptor

293. 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. The sensitivity of potting is therefore considered to be medium.

294. All other fleets are expected to be in a position to avoid the SEP and DEP offshore sites during construction and the sensitivity of all other fleets is considered to be negligible.

Significance of impact

295. UK potting fleet: overall, the sensitivity of the receptor is considered to be medium and the magnitude is deemed to be low. The impact will, therefore, be of **minor adverse** significance to UK potters, which is not significant in EIA terms.

296. All mobile fleets: overall, the sensitivity of the receptor is considered to be negligible and the magnitude is deemed to be low. The impact will, therefore, be **negligible adverse**, which is not significant in EIA terms.

12.6.1.6.2 SEP and DEP

Magnitude of effect

297. The magnitude of the effect on each receptor remains consistent with the assessment for SEP or DEP in isolation i.e. low for UK potting and low for all other fleets.

Sensitivity of the receptor

298. The sensitivity of the receptor remains consistent with the assessment for SEP or DEP in isolation i.e. medium for UK potting and negligible for all other fleets.

Significance of the impact

299. The significance of the impact is **minor adverse** for UK potters and **negligible adverse** for all mobile fleets, which are not significant in EIA terms.

12.6.1.6.3 Mitigation

300. No additional mitigation above that embedded (**Section 12.3.3**) is proposed.

12.6.1.6.4 Residual Impact - SEP or DEP in Isolation

301. UK potting fleet: The residual impact of increased vessel traffic potentially interfering with fishing activity when only one project is built is **minor adverse**, which is not significant in EIA terms.

302. Mobile fleets: The residual impact of increased vessel traffic potentially interfering with fishing activity when only one project is built is **negligible adverse**, which is not significant in EIA terms.

12.6.1.6.5 Residual Impact - SEP and DEP

303. The residual impact of increased vessel traffic potentially interfering with fishing activity when SEP and DEP are both constructed is the same as that in isolation (**minor adverse** to **negligible adverse**), which is not significant in EIA terms.

12.6.2 Potential Impacts during Operation

12.6.2.1 Impact 1: Physical presence of the wind farm site infrastructure leading to reduction in access to, or exclusion from established fishing grounds

12.6.2.1.1 DEP in Isolation

304. The potential impacts of the offshore operation and maintenance of DEP have been assessed on commercial fisheries receptors.

305. The assessment assumes that commercial fisheries will be prevented from actively fishing from an area of 0.46km^2 due to infrastructure within DEP, including up to 30 turbines with GBS foundations, together with associated safety zones for the OSP and maintenance activities and assumed operating distances (full details of the area breakdowns are provided in **Table 12-2**). Minimum turbine spacing is 1.05km, including between turbines and all other infrastructure.

306. Outwith the area of 0.46km^2, the assessment assumes that fishing will resume within DEP where fishing grounds can be targeted, with the exception of safety zones around infrastructure undergoing major maintenance and advisory safety distances around vessels undertaking major maintenance activities. In addition, the individual decisions made by skippers with their own perception of risk will determine the likelihood of whether their fishing will resume within DEP wind farm sites. Inclement weather will be a significant contributor to this risk perception.

Magnitude of effect

307. This effect will lead to localised loss of access to fishing grounds and the fish resources within these grounds for a range of fishing opportunities during the operational and maintenance phase, which will directly affect fleets over a long-term duration. The effect is predicted to be continuous with low reversibility and is of relevance to international fishing fleets.

308. The value and importance of DEP wind farm sites to commercial fishing fleets is presented for construction in **Section 12.6.1**. It is considered that this is the same for the operational and maintenance phase.

309. Localised loss of access to fishing grounds from within DEP wind farm sites amounts to an area of 0.46km^2 due to infrastructure, safety zones and assumed operational distances (equating to <1% of the total DEP wind farm sites' area), with additional safety zones for infrastructure undergoing major maintenance. Based on the assumption that fishing will resume within DEP wind farm sites, the magnitude of effect is considered negligible for Dutch beam trawlers, Belgian beam trawlers, French and Danish demersal trawlers and low for UK potters.

Sensitivity of the receptor

310. The sensitivity of the commercial fisheries receptors is the same as that presented for construction in **Section 12.6.1**. The sensitivity of the receptor is deemed to be low for the Dutch, Belgian, French and Danish fleet and medium for the UK potting fleet.

Significance of the impact

311. Dutch, Belgian, French ad Danish demersal trawlers: The sensitivity of the receptor is considered to be low and the magnitude negligible. The effect will, therefore, be **negligible adverse**.

312. UK potting fleet: The sensitivity of the receptor is considered to be medium and the magnitude low. The impact will, therefore, be of **minor adverse** significance, which is not considered to be significant in EIA terms.

12.6.2.1.2 SEP in Isolation

313. The impacts of the SEP wind farm site operation and maintenance are listed in **Table 12-10** along with the maximum design scenario against which each operation and maintenance phase impact has been assessed

314. The assessment assumes that commercial fisheries will be prevented from actively fishing within a total area of 0.34km^2 due to infrastructure within SEP, including 23 turbines with GBS foundations, together with associated safety zones for the OSP and maintenance activities and assumed operating distances (full details of the area breakdowns are provided in **Table 12-2**. Minimum turbine spacing is 1.05km, including between turbines and all other infrastructure.

315. Outwith the area of 0.34km^2, the assessment assumes that fishing will resume within the SEP wind farm site where fishing grounds can be targeted, with the exception of safety zones around infrastructure undergoing major maintenance and advisory safety distances around vessels undertaking major maintenance activities. In addition, the individual decisions made by skippers with their own perception of risk will determine the likelihood of whether their fishing will resume within the SEP wind farm site. Inclement weather will be a significant contributor to this risk perception.

Magnitude of effect

316. This effect will lead to localised loss of access to fishing grounds and the fish resources within these grounds for a range of fishing opportunities during the operational and maintenance phase, which will directly affect fleets over a long-term duration. The effect is predicted to be continuous with low reversibility and is of relevance to international fishing fleets.

317. The value and importance of the SEP wind farm site to commercial fishing fleets is presented for construction in **Section 12.6.1**. It is considered that this is the same for the operational and maintenance phase.

318. Localised loss of access to fishing grounds from within the SEP wind farm site amounts to an area of 0.34km^2 due to infrastructure, safety zones and assumed operational distances (equating to 0.37% of the total SEP wind farm site), with additional safety zones for infrastructure undergoing major maintenance. Based on the assumption that fishing will resume within the SEP wind farm site, the magnitude of effect is considered negligible for Dutch beam trawlers, Belgian beam trawlers, French and Danish demersal trawlers and low for UK potters.

Sensitivity of the receptor

319. The sensitivity of the commercial fisheries receptors is the same as that presented for construction in **Section 12.6.1**. The sensitivity of the receptor is deemed to be low for the Dutch, Belgian, French and Danish fleet and medium for the UK potting fleet.

Significance of the impact

320. Dutch, Belgian, French and Danish demersal trawlers: The sensitivity of the receptor is considered to be low and the magnitude negligible. The effect will, therefore, be **negligible adverse**.

321. UK potting fleet: The sensitivity of the receptor is considered to be medium and the magnitude low. The impact will, therefore, be **minor adverse** significance, which is not considered to be significant in EIA terms.

12.6.2.1.3 SEP and DEP Magnitude of effect

322. The magnitude of the effect on each receptor remains consistent with the assessment for SEP or DEP in isolation i.e. low for UK potting and negligible for all other fleets.

Sensitivity of the receptor

323. The sensitivity of the receptor remains consistent with the assessment for SEP or DEP in isolation i.e. medium for UK potting and low for all other fleets.

Significance of the impact

324. The significance of the impact is **minor adverse** for UK potters and **negligible adverse** for all mobile fleets, which are not significant in EIA terms.

12.6.2.1.4 Mitigation

325. No additional mitigation above that embedded (**Section 12.3.3**) is proposed.

12.6.2.1.5 Residual Impact - SEP or DEP in Isolation

326. All mobile fleets: The residual impact of the presence of wind farm infrastructure potentially leading to a reduction in access during the operation phase when only one wind farm is built is **negligible adverse**, which is not significant in EIA terms.

327. UK potters: The residual impact of the presence of wind farm infrastructure potentially leading to a reduction in access during the operation phase when only one wind farm is built is **minor adverse**, which is not significant in EIA terms.

12.6.2.1.6 Residual Impact - SEP and DEP

328. The residual impact of the presence of wind farm infrastructure potentially leading to a reduction in access during the operation phase when SEP and DEP are both constructed is the same as in isolation (**minor adverse** to **negligible adverse**), which is not significant in EIA terms.

12.6.2.2 Impact 2: Physical presence of the proposed offshore export cable and interlink cables leading to reduction in access to, or exclusion from established fishing grounds

12.6.2.2.1 SEP or DEP in Isolation

329. Temporary 500m advisory safety distances requested around vessels engaged in cable repair works, could limit fishing opportunities within localised areas.

Magnitude of effect

330. It is assumed in the assessment that fishing will resume within the vicinity of the offshore cable corridors during operation. The minimum burial depth of cables is 0.3m within Cromer Shoal Chalk Beds MCZ and 0.5m outside the MCZ. There will be no unprotected surface laid cable and it is assumed that where cable protection is not considered to be necessary this depth of burial will be sufficient for any trawling gear to operate and will not hinder the laying of pots.

331. Notices to Mariners 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 (see worst-case scenarios in **Table 12-2**).

332. The effect is predicted to be of local spatial extent and of short-term duration for maintenance works that may be required along the offshore export cable corridor and interlink cable corridors. It is predicted that the impact will affect the receptor directly. Given that fishing can resume across the majority of the offshore export cable corridor and interlink cable corridor, the magnitude is considered to be low for all fishing fleets.

Sensitivity of the receptor

333. All mobile commercial fishing fleets known to operate within the area of the export cable corridors are considered to have considerable alternative fishing grounds available which are of higher value. These vessels have a large operational range which is not limited to the offshore export cable corridor area. Commercial fishing fleets carrying mobile gear are considered to be of low vulnerability and high recoverability, and to have high levels of alternative fishing grounds. The sensitivity of the receptor is therefore deemed to be low.

334. The UK potting fleet are typically <12m in length and operate across more distinct areas of ground, typically 0 to 6NM from shore, but increasingly extending from beyond 6NM. The UK potting fleet are deemed to be of medium vulnerability and medium recoverability, and to have limited levels of alternative fishing grounds. The sensitivity of the receptor is therefore, considered to be medium.

Significance of the impact

335. All mobile fleets: overall, the sensitivity of the receptor is considered to be low and the magnitude is deemed to be low. The impact will, therefore, be of **minor adverse** significance, which is not significant in EIA terms.

336. UK potting fleet: overall, the sensitivity of the receptor is considered to be medium and the magnitude is deemed to be low. The impact will, therefore, be of **minor adverse** significance, which is not significant in EIA terms.

12.6.2.2.2 SEP and DEP

Magnitude of effect

337. The magnitude of the effect on each receptor remains consistent with the assessment for SEP or DEP in isolation i.e. low for UK potting and negligible for all other fleets.

Sensitivity of the receptor

338. The sensitivity of the receptor remains consistent with the assessment for SEP or DEP in isolation i.e., medium for UK potting and low for all other fleets.

Significance of the impact

339. The significance of the impact is **minor adverse** for UK potters and **minor adverse** or all mobile fleets, which is not significant in EIA terms.

12.6.2.2.3 Mitigation

340. No additional mitigation above that embedded (**Section 12.3.3**) is proposed.

12.6.2.2.4 Residual Impact - SEP or DEP in Isolation

341. All mobile fleets: The residual impact of the presence of the export and interlink cables potentially leading to a reduction in access during the operation phase when only one wind farm is built is **minor adverse**, which is not significant in EIA terms.

342. UK potters: The residual impact of the presence of the export and interlink cables potentially leading to a reduction in access during the operation phase when only one wind farm is built is **minor adverse**, which is not significant in EIA terms.

12.6.2.2.5 Residual Impact - SEP and DEP

343. All mobile fleets: The residual impact of the presence of the export and interlink cables potentially leading to a reduction in access during the operation phase when SEP and DEP are both constructed is **negligible adverse**, which is not significant in EIA terms.

344. UK potters: The residual impact of the presence of the export and interlink cables potentially leading to a reduction in access during the operation phase when SEP and DEP are both constructed is **minor adverse**, which is not significant in EIA terms.

12.6.2.3 Impact 3: Displacement from the wind farm site leading to gear conflict and increased pressure on adjacent grounds

12.6.2.3.1 SEP or DEP in Isolation

345. Exclusion from fishing grounds during operation and maintenance of SEP or DEP may lead to increases in fishing effort in other areas that may already be exploited thereby leading to gear conflict.

Magnitude of effect

346. The magnitude of effect of displacement during the operational and maintenance phase is expected to be the same or similar to that during the construction phase for all commercial fishing fleets deploying mobile demersal gear. The magnitude of potential increased conflict over alternative fishing grounds is considered to be low for all demersal trawlers.

347. In the construction phase it is considered that the displacement of potting vessels as a result of construction activities may place pressure on diminishing grounds and the presence of other shellfish fisheries as well as local ports. During operation, it is assumed that potting will resume within SEP or DEP, except around wind turbines and OSPs. Given this resumption of fishing, the magnitude of displacement is assessed as low for UK potting vessels.

Sensitivity of the receptor

348. The sensitivity of the commercial fisheries receptors is the same as that presented for construction summarised as low for all fleets deploying mobile gear and medium for UK potters.

Significance of impact

349. All mobile fleets deploying demersal trawl gear: overall, the sensitivity of the receptor is considered to be low and the magnitude is deemed to be low. The impact will, therefore, be of **minor adverse** significance, which is not significant in EIA terms.

350. UK potting fleet: overall, the sensitivity of the receptor is considered to be medium and the magnitude is deemed to be low. The impact will, therefore, be of **minor adverse** significance, which is not significant in EIA terms.

12.6.2.3.2 SEP and DEP

Magnitude of effect

351. The magnitude of the effect on each receptor remains consistent with the assessment for SEP or DEP in isolation i.e., low for all fleets.

Sensitivity of the receptor

352. The sensitivity of the receptor remains consistent with the assessment for SEP or DEP in isolation i.e., medium for UK potting and low for all other fleets.

Significance of the impact

353. The significance of the impact is **minor adverse** for UK potters and for all mobile fleets, which is not significant in EIA terms.

12.6.2.3.3 Mitigation

354. No additional mitigation above that embedded (**Section 12.3.3**) is proposed.

12.6.2.3.4 Residual Impact - SEP or DEP in Isolation

355. All mobile fleets: The residual impact of displacement potentially leading to gear conflict and increased pressure on adjacent grounds during the operation phase when only one wind farm is built is **minor adverse**, which is not significant in EIA terms.

356. UK potters: The residual impact of displacement potentially leading to gear conflict and increased pressure on adjacent grounds during the operation phase when only one wind farm is built is **minor adverse**, which is not significant in EIA terms.

12.6.2.3.5 Residual Impact - SEP and DEP

357. The residual impact of the presence of wind farm infrastructure potentially leading to a reduction in access during the operation phase when SEP and DEP are both constructed is the same as in isolation (**minor adverse** for all fleets), which is not significant in EIA terms.

12.6.2.4 Impact 4: Physical presence of the wind farm site, offshore export cable and interlink cables leading to gear snagging

12.6.2.4.1 SEP or DEP in Isolation

358. The array cables, interconnector cables, export cables and associated cable protection, together with any structures on the sea bed represent potential snagging points for fishing gear and could lead to damage to, or loss of, fishing gear. The safety aspects including potential loss of life as a result of snagging risk are assessed within **Chapter 13 Shipping and Navigation**.

Magnitude of effect

359. Snagging poses a risk to fishing equipment and in extreme cases may potentially lead to capsize of vessel and crew fatalities, 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 sea bed is the most hazardous to the vessel and crew due to the possibility of capsizing.

360. It is considered likely that fishermen would operate appropriately given adequate notification of the locations of any snagging hazards; and are highly likely to avoid SEP and DEP infrastructure and cable protection. Levels of fishing effort by the EU mobile fleet are low within SEP and DEP. For this reason, the magnitude of gear snagging is considered to be low.

361. The UK potting fleet has considerable effort within the SEP and DEP wind farm sites and cable corridors, therefore the magnitude of the effect of gear snagging to this fleet is considered medium.

Sensitivity of the receptor

362. Due to the nature and operation of mobile trawling gear (i.e., it is actively towed and demersal gear directly penetrates the sea bed with near continuous contact) there is increased vulnerability to this impact and the sensitivity is therefore considered to be medium for demersal and pelagic fleets.

363. UK potters show a low vulnerability as the gear is placed, not towed and is less likely to penetrate the sea bed. The sensitivity of UK potters is considered to be low.

Significance of the impact

364. All mobile fleets deploying demersal gear: overall, the sensitivity of the receptor is considered to be medium and the magnitude is deemed to be low. The impact will, therefore, be of **minor adverse** significance, which is not significant in EIA terms.

365. UK potting fleet: overall, the sensitivity of the receptor is considered to be low and the magnitude is deemed to be medium. The impact will, therefore, be of **minor adverse** significance, which is not significant in EIA terms.

12.6.2.4.2 SEP and DEP

Magnitude of effect

366. The magnitude of the effect on each receptor remains consistent with the assessment for SEP or DEP in isolation i.e., medium for UK potting and low for all other fleets.

Sensitivity of the receptor

367. The sensitivity of the receptor remains consistent with the assessment for SEP or DEP in isolation i.e., low for UK potting and medium for all other fleets.

Significance of the impact

368. The significance of the impact is **minor adverse** for UK potters and all mobile fleets, which is not significant in EIA terms.

12.6.2.4.3 Mitigation

369. No additional mitigation above that embedded (**Section 12.3.3**) is proposed.

12.6.2.4.4 Residual Impact - SEP or DEP in Isolation

370. All mobile fleets: The residual impact of the presence of the wind farm site and cables potentially leading to gear snagging during the operation phase when only one wind farm is built is **minor adverse**, which is not significant in EIA terms.

371. UK potters: The residual impact of the presence of the wind farm site and cables potentially leading to gear snagging during the operation phase when only one wind farm is built is **minor adverse**, which is not significant in EIA terms.

12.6.2.4.5 Residual Impact - SEP and DEP

372. The residual impact of the presence of the wind farm site and cables potentially leading to gear snagging during the operation phase when SEP and DEP are both constructed is the same as in isolation (**minor adverse** for all fleets), which is not significant in EIA terms.

12.6.2.5 Impact 5: Operation and maintenance activities leading to displacement or disruption of commercially important fish and shellfish resources

373. Displacement or disturbance of commercially important fish and shellfish resources may occur during the operational phase due to a range of impacts brought on by the physical presence and operation of the project, including long-term habitat alterations and potential Electromagnetic Field (EMF) effects.

374. Long-term changes to benthic habitat due to rock protection and other infrastructure at specific locations within the wind farm sites and offshore cable corridors may affect spawning and nursery grounds, most notably for demersal spawners.

375. Other ecological effects, such as the creation of artificial habitat and the potential for the wind farm sites to act as a refuge for commercially important fish and shellfish species, are considered within the assessment carried out in **Chapter 9 Fish and Shellfish Ecology**.

12.6.2.5.1 SEP or DEP in Isolation

Magnitude of effect

376. As described in **Chapter 9 Fish and Shellfish Ecology**, EMF during operation would be mitigated by use of armoured cable for offshore cables together with burial, with exception of possible surface laid export cable within the Cromer Shoal MCZ area.

377. With the exception of elasmobranchs, no experiments have highlighted significant concerns and the magnitude of impact of EMFs is generally considered to be low for most marine organisms (Switzer and Meggitt, 2010; Polagye et al., 2011). Evidence from post construction surveys of Round 1 wind farms (Kentish Flats, Lynn and Inner Dowsing, Burbo Bank and Barrow) show no significant effects to fish populations as a result of EMF.

378. Elasmobranchs do not form a targeted fishery in this area and are not taken in significant quantities as retained species by the fleets in operation across the SEP and DEP offshore sites.

379. The permanent habitat loss due to the installation of foundations, scour protection and cable protection will result in a reduction of potential spawning habitat available to a number of commercial species including, sole, plaice, sandeel, mackerel and cod. The breakdown of potential habitat lost per species is presented in **Chapter 9 Fish and Shellfish Ecology**, together with a full assessment of this impact.

380. Overall, the magnitude of disruption or displacement of commercially important species during operation is considered to be low for shellfish and negligible for finfish species.

Sensitivity of the receptor

381. For UK potters the sensitivity is considered to be medium, based on their reliance on grounds across the offshore export cable corridor. The sensitivity of all other fleets to the displacement of resources is considered low, based on the range of alternative areas available and the distribution of key commercial species throughout the southern North Sea.

Significance of the impact

382. All mobile fleets: overall, the sensitivity of the receptor is considered to be low and the magnitude is deemed to be negligible. The impact will, therefore, be of **negligible adverse** significance, which is not significant in EIA terms.

383. UK potting fleet: overall, the sensitivity of the receptor is considered to be medium and the magnitude is deemed to be low. The impact will, therefore, be of **minor adverse** significance, which is not significant in EIA terms.

12.6.2.5.2 SEP and DEP

Magnitude of effect

384. The magnitude of the effect on each receptor remains consistent with the assessment for SEP or DEP in isolation i.e., low for fleets targeting shellfish species and negligible for fleets targeting finfish.

Sensitivity of the receptor

385. The sensitivity of the receptor remains consistent with the assessment for SEP or DEP in isolation i.e., medium for UK potting and low for all other fleets.

Significance of the impact

386. The significance of the impact is **minor adverse** for UK potters and **negligible adverse** for all mobile fleets, which are not significant in EIA terms.

12.6.2.5.3 Mitigation

387. No additional mitigation above that embedded (**Section 12.3.3**) is proposed.

12.6.2.5.4 Residual Impact - SEP or DEP in Isolation

388. All mobile fleets: The residual impact of the operation and maintenance of the Project leading to the disruption of commercially important fish and shellfish species when only one wind farm is built is **negligible adverse**, which is not significant in EIA terms.

389. UK potters: The residual impact of the operation and maintenance of the Project leading to the disruption of commercially important fish and shellfish species when only one wind farm is built is **minor adverse**, which is not significant in EIA terms.

12.6.2.5.5 Residual Impact - SEP and DEP

390. The residual impact of the presence of the wind farm site and cables potentially leading to gear snagging during the operation phase when SEP and DEP are both constructed is the same as in isolation (**minor adverse** to **negligible adverse**), which is not significant in EIA terms.

12.6.2.6 Impact 6: Increased vessel traffic within fishing grounds as a result of changes to shipping routes and maintenance vessel traffic leading to interference with fishing activity

12.6.2.6.1 SEP or DEP in Isolation

391. The effects of the operational and maintenance phase are expected to be the same or similar to the effects from construction. The significance of impact is therefore **minor adverse** for the UK potting fleet and **negligible adverse** for all other fleets, which are not significant in EIA terms.

12.6.2.6.2 SEP and DEP

392. The significance of impact on each receptor remains consistent with the assessment for SEP or DEP in isolation.

12.6.2.6.3 Mitigation

393. No additional mitigation above that embedded (**Section 12.3.3**) is proposed.

12.6.2.6.4 Residual Impact - SEP or DEP in Isolation

394. All mobile fleets: The residual impact of increased vessel traffic during the operation phase when only one wind farm is built is **negligible adverse**, which is not significant in EIA terms.

395. UK potters: The residual impact of increased vessel traffic during the operation phase when only one wind farm is built is **minor adverse**, which is not significant in EIA terms.

12.6.2.6.5 Residual Impact - SEP and DEP

396. The residual impact of increased vessel traffic during the operation phase when SEP and DEP are both constructed is the same as in isolation (**minor adverse** to **negligible adverse**), which is not significant in EIA terms.

12.6.3 Potential Impacts during Decommissioning

397. The impacts of the offshore decommissioning of SEP and DEP have been assessed on commercial fisheries. The assessment below is relevant to in isolation and SEP and DEP scenarios.

12.6.3.1 Impact 1: Wind farm site decommissioning activities leading to reduction in access to, or exclusion from, potential and/or established fishing grounds

398. The effects of decommissioning activities are expected to be the same or similar to the effects from construction. The significance of impact, in the absence of any further mitigation, would be **moderate adverse** for the UK potting fleet, which is significant in EIA terms; **minor adverse** for Dutch beam trawl fleet and **negligible adverse** for all other fleets, which are not significant in EIA terms.

12.6.3.1.1 Mitigation

399. UK potting fleet: with respect to any justifiable disturbance payment, the procedures as outlined in the FLOWW guidance documents (2014 and 2015), will be followed as described in **Section** Error! Reference source not found..

400. All other fleets: No additional mitigation above that embedded (**Section 12.3.3**) is proposed.

12.6.3.1.2 Residual Impact - SEP or DEP in Isolation

401. Dutch beam trawl: The residual impact of decommissioning activities potentially leading to reduction in access to or exclusion from established fishing grounds when only one wind farm is built is **minor adverse**, which is not significant in EIA terms.

402. All other mobile fleets: The residual impact of decommissioning activities potentially leading to reduction in access to or exclusion from established fishing grounds when only one wind farm is built is **negligible adverse**, which is not significant in EIA terms.

403. UK potters: The residual impact of decommissioning activities potentially leading to reduction in access to or exclusion from established fishing grounds when only one wind farm is built is **minor adverse** with mitigation, which is not significant in EIA terms.

12.6.3.1.3 Residual Impact - SEP and DEP

404. The residual impact of decommissioning activities potentially leading to reduction in access to or exclusion from established fishing grounds when SEP and DEP are both constructed is the same as in isolation (**minor adverse** to **negligible adverse**), which is not significant in EIA terms.

12.6.3.2 Impact 2: Project offshore cable decommissioning activities leading to reduction in access to, or exclusion from, potential and/or established fishing grounds

405. The effects of decommissioning activities are expected to be the same or similar to the effects from construction. The significance of impact, in the absence of any further mitigation, would therefore be **moderate adverse** for the UK potting fleet, (which is significant in the absence of further mitigation (**Section 12.6.1.1.4**)), **minor adverse** for UK shrimp beam trawl fleet and **negligible adverse** for all other fleets, which are not significant in EIA terms.

12.6.3.2.1 Mitigation

406. UK potters: with respect to any justifiable disturbance payment, the procedures as outlined in the FLOWW guidance documents (2014 and 2015), will be followed as described in **Section 12.6.1.1.4**.

407. All other fleets: No additional mitigation above that embedded (**Section 12.3.3**) is proposed.

12.6.3.2.2 Residual Impact - SEP or DEP in Isolation

408. Dutch beam trawl: The residual impact of cable decommissioning activities potentially leading to reduction in access to or exclusion from established fishing grounds when only one wind farm is built is **minor adverse**, which is not significant in EIA terms.

409. All other mobile fleets: The residual impact of cable decommissioning activities potentially leading to reduction in access to or exclusion from established fishing grounds when only one wind farm is built is **negligible adverse**, which is not significant in EIA terms.

410. UK potters: The residual impact of decommissioning activities potentially leading to reduction in access to or exclusion from established fishing grounds when only one wind farm is built is **minor adverse** with mitigation, which is not significant in EIA terms.

12.6.3.2.3 Residual Impact - SEP and DEP

411. The residual impact of cable decommissioning activities potentially leading to reduction in access to or exclusion from established fishing grounds when SEP and DEP are both constructed is the same as in isolation (**minor adverse** to **negligible adverse**), which is not significant in EIA terms.

12.6.3.3 Impact 3: Displacement from wind farm sites and cable corridors leading to gear conflict and increased fishing pressure on adjacent grounds

412. The effects of decommissioning activities are expected to be the same or similar to the effects from construction. The significance of impact is therefore **minor adverse** for all fleets, which is not significant in EIA terms.

12.6.3.3.1 Mitigation

413. No additional mitigation above that embedded (**Section 12.3.3**) is proposed.

12.6.3.4 Impact 4: Physical presence of any infrastructure left in situ leading to gear snagging

414. The effects following decommissioning activities are expected to be the same or similar to the effects from operation. The significance of impact is therefore **minor adverse** for all fleets, which is not significant in EIA terms.

12.6.3.4.1 Mitigation

415. No additional mitigation above that embedded (**Section 12.3.3**) is proposed.

12.6.3.5 Impact 5: Decommissioning activities leading to displacement or disruption of commercially important fish and shellfish resources

416. The effects of decommissioning activities are expected to be the same or similar to the effects from construction. The significance of impact is therefore **minor adverse** for all fleets, which is not significant in EIA terms.

12.6.3.5.1 Mitigation

417. No additional mitigation above that embedded (**Section 12.3.3**) is proposed.

12.6.3.6 Impact 6: Increased vessel traffic within fishing grounds as a result of changes to shipping routes and transiting decommissioning vessel traffic leading to interference with fishing activity

418. The effects of decommissioning activities are expected to be the same or similar to the effects from construction. The significance of impact is therefore **minor adverse** for UK potting and **negligible adverse** for all other fleets, which are not significant in EIA terms.

12.6.3.6.1 Mitigation

419. No additional mitigation above that embedded (**Section 12.3.3**) is proposed.

12.7 Cumulative Impacts

12.7.1 Identification of Potential Cumulative Impacts

420. The first step in the cumulative assessment is the identification of which residual impacts assessed for SEP and/or DEP on their own have the potential for a cumulative impact with other plans, projects and activities (described as 'impact screening'). This information is set out in **Table 12-11**. Only potential impacts assessed in **Section 12.6** as negligible or above are included in the CIA (i.e. those assessed as 'no impact' are not taken forward as there is no potential for them to contribute to a cumulative impact).

421. **Table 12-11** identifies that in relation to commercial fisheries there is the potential for cumulative impacts in relation to reduction in access to, or exclusion from established fishing grounds, and gear conflict and increased pressure on adjacent grounds.

Table 12-11: Potential Cumulative Impacts (Impact Screening)

Impact	Potential for Cumulative Impact	Data Confidence	Rationale
Construction			
Construction Impact 1: Construction activities and physical presence of constructed wind farm site infrastructure leading to reduction in access to, or exclusion from established fishing grounds	Yes	High	There is potential for other developments to also lead to a reduction in access to or exclusion from established fishing grounds at the same time as SEP and DEP.
Construction Impact 2: Offshore cable construction activities leading to reduction in access to, or exclusion from, establish fishing areas	Yes	High	
Construction Impact 3: Displacement from the wind farm site leading to gear conflict and increased pressure on adjacent grounds	Yes	High	There is potential for other developments to also lead to gear conflict and increased pressure on adjacent grounds at the same time as SEP and DEP.
Construction Impact 4: Displacement from cable corridors leading to gear conflict and increased pressure on adjacent grounds	Yes	High	

Impact	Potential for Cumulative Impact	Data Confidence	Rationale
Construction Impact 5: Construction activities leading to displacement or disruption of commercially important fish and shellfish resources	No	High	• The highly localised nature of the impacts (i.e. they occur entirely within the SEP and DEP limits only); and/or • Management measures in place for SEP and DEP will also be in place on other projects reducing their risk of occurring.
Construction Impact 6: Increased vessel traffic within fishing grounds as a result of changes to shipping routes and transiting construction vessel traffic leading to interference with fishing activity	No	High	
Operation			
Operation Impact 1: Physical presence of the wind farm site infrastructure leading to reduction in access to, or exclusion from established fishing grounds	Yes	High	There is potential for other developments to also lead to a reduction in access to or exclusion from established fishing grounds at the same time as SEP and DEP.
Operation Impact 2: Physical presence of the proposed offshore export cable and interlink cables leading to reduction in access to, or exclusion from established fishing grounds	Yes	High	
Operation Impact 3: Displacement from the wind farm site leading to gear conflict and increased pressure on adjacent grounds	Yes	High	There is potential for other developments to also lead to gear conflict and increased pressure on adjacent grounds at the same time as SEP and DEP.
Operation Impact 4: Physical presence of the wind farm site and offshore export cable and interlink cables leading to gear snagging	No	High	The highly localised nature of the impacts (i.e. they occur entirely within the SEP and DEP limits only). • Management measures in place for SEP and DEP will also be in place on other projects reducing their risk of occurring.
Operation Impact 5: Operation and maintenance activities leading to displacement or disruption of commercially important fish and shellfish resources	No	High	

Impact	Potential for Cumulative Impact	Data Confidence	Rationale
Operation Impact 6: Increased vessel traffic within fishing grounds as a result of changes to shipping routes and maintenance vessel traffic leading to interference with fishing activity	No	High	
Decommissioning			
Decommissioning impact 1: Wind farm site decommissioning activities leading to reduction in access to, or exclusion from, potential and/or established fishing grounds	Yes	High	There is potential for other developments to also lead to a reduction in access to or exclusion from established fishing grounds at the same time as SEP and DEP.
Decommissioning impact 2: Project offshore cable decommissioning activities leading to reduction in access to, or exclusion from, potential and/or established fishing grounds	Yes	High	
Decommissioning impact 3: Displacement from wind farm site and cable corridors leading to gear conflict and increased fishing pressure on adjacent grounds	Yes	High	There is potential for other developments to also lead to gear conflict and increased pressure on adjacent grounds at the same time as SEP and DEP.
Decommissioning impact 4: Physical presence of any infrastructure left *in situ* leading to gear snagging	No	High	• The highly localised nature of the impacts (i.e. they occur entirely within the SEP and DEP limits only); and/or • Management measures in place for SEP and DEP will also be in place on other projects reducing their risk of occurring.
Decommissioning impact 5: Decommissioning activities leading to displacement or disruption of commercially important fish and shellfish resources	No	High	
Decommissioning impact 6: Increased vessel traffic within fishing grounds as a result of changes to shipping routes and transiting decommissioning vessel traffic leading to interference with fishing activity	No	High	

12.7.2 Other Plans, Projects and Activities

422. The second step in the cumulative assessment is the identification of the other plans, projects and activities that may result in cumulative impacts for inclusion in the CIA (described as 'project screening'). This information is set out below, together with a consideration of the relevant details of each, including current status (e.g. under construction), planned construction period, closest distance to SEP and DEP, status of available data and rationale for including or excluding from the assessment.

423. The project screening has been informed by the development of a CIA Project List which forms an exhaustive list of plans, projects and activities in a very large study area relevant to SEP and DEP. The list has been appraised, based on the confidence in being able to undertake an assessment from the information and data available, enabling individual plans, projects and activities to be screened in or out.

424. All projects and plans considered alongside SEP and DEP have been placed into 'tiers' to reflect their current status within the planning and development process. The tier approach is intended to ensure that there is a clear understanding of the level of confidence in the cumulative assessments provided in the ES. An explanation of each tier is included in **Chapter 5 EIA Methodology**.

425. For commercial fisheries, planned projects were screened into the assessment based on a study area of 100km from project elements, to provide appropriate coverage of relevant fishing grounds.

Table 12-12: Summary of Projects Considered for the CIA in Relation to SEP and DEP (Project Screening)

Project	Status	Construction Period	Closest Distance from the Project (km)	Confidence in Data	Included in the CIA (Y/N)	Rationale
MCZs within 100km of SEP and/or DEP	Designated	N/A	0.0 (Export cable corridor, Cromer Shoal Chalk Beds MCZ) 6 (array area)	High	Y	Including Cromer Shoal Chalk Beds, Markham's Triangle, Holderness Inshore and Holderness Offshore. Possible fishing restrictions to protect designated features
Special Protection Areas (SPAs) within 100km of SEP and/or DEP	Designated with management plans yet to be implemented	N/A	0.0 (Export cable corridor, North Norfolk Coast SPA) 7 (array area)	High	Y	Including: The Wash, North Norfolk Coast, Greater Wash and Humber Estuary. Possible fishing restrictions to protect designated features
SACs within 100km of SEP and/or DEP	Designated with management plans yet to be implemented	N/A	0.0 (Export cable corridor, The Wash	High	Y	Including: North Norfolk Coast, The Wash and North Norfolk Coast, Haisborough, Hammond and Winterton, Inner Dowsing, Race Bank and North Ridge, North

Project	Status	Construction Period	Closest Distance from the Project (km)	Confidence in Data	Included in the CIA (Y/N)	Rationale
			and North Norfolk Coast SAC) 15 (array area)			Norfolk Sandbanks and Saturn Reef, and Southern North Sea. Possible fishing restrictions to protect designated features
Sustainable Seaweed Ltd Seaweed Farm	Application submitted	N/A	1.5 (array area) 8 (cable corridor)	Low	Y	There is the potential for overlap in the operational phases.
Norfolk Seaweed Ltd Seaweed Farm	Application submitted	Unknown	12 (cable corridor) 17 (array area)	High	Y	There is the potential for overlap in the operational phases.
Outer Dowsing	Pre-PEIR	TBC	13 (array area) 16 (cable corridor)	High	Y	The operational phase of the Offshore Wind Farm (OWF) will overlap with SEP and DEP.
Viking Link Interconnector	In planning	2022 to 2023	43 (to SEP array)	High	Y	The operational phase will overlap with SEP and DEP.
Hornsea Project Two	In construction	2020-2022 (offshore construction)	34 (cable corridor) 52 (array area)	High	Y	The operational phase of the OWF will overlap with SEP and DEP.

Project	Status	Construction Period	Closest Distance from the Project (km)	Confidence in Data	Included in the CIA (Y/N)	Rationale
Hornsea Project Four	Application submitted	2024 to 2029	52 (array area) 70 (cable corridor)	Medium	Y	There is the potential for overlap in the construction and operational phases of the OWF and SEP and DEP.
Hornsea Project Three	Consented	2023 to 2025 (single phase) 2023 to 2031 (two phase)	0 (cable corridor) 83 (array area)	High	Y	There is the potential for overlap in the construction and operational phases of the OWF and SEP and DEP. The Hornsea 3 export cable corridor will cross the SEP and DEP export cable corridor.
Norfolk Vanguard Offshore Wind Farm	Consented	2025 to 2027 (offshore construction)	28 (cable corridor) 58 (array area)	High	Y	There is the potential for overlap in the construction and operational phases of the OWF and SEP and DEP.
Norfolk Boreas	Consented	2025 to 2029	22 (cable corridor) 82 (array area)	High	Y	There is the potential for overlap in the construction and operational phases of the OWF and SEP and DEP.
East Anglia THREE Offshore Wind Farm	Consented	2023 to 2026	94 (cable corridor) 95 (array area)	High	Y	There is the potential for overlap in the construction and operational phases of the OWF and SEP and DEP.

Project	Status	Construction Period	Closest Distance from the Project (km)	Confidence in Data	Included in the CIA (Y/N)	Rationale
East Anglia ONE North Offshore Wind Farm	Consented	2023 to 2026	97 (cable corridor) 98 (array area)	High	Y	There is the potential for overlap in the construction and operational phases of the OWF and SEP and DEP.

12.7.3 Assessment of Cumulative Impacts

426. Having established the residual impacts from SEP and/or DEP with the potential for a cumulative impact, along with the other relevant plans, projects and activities, the following sections provide an assessment of the level of cumulative impact that may arise.

12.7.3.1 Cumulative Impact 1: Cumulative effects of reduction in access to, or exclusion from, potential and/or established fishing grounds

Magnitude of effect

427. All assessed Tier 2 and Tier 3 wind farms are expected to have a negligible to low magnitude of effect on the North Norfolk potting fleet. . It is noted that the Hornsea Project Two Windfarm ES predicted **minor adverse** residual impacts for commercial fisheries, with additional mitigation proposed for the potting fleet during construction of the offshore export cable. However, it is considered that the key potting fleet operating within the Hornsea Project Two area is the Holderness Coast Fishing Industry Group, and that the Norfolk potting fleets do not routinely operate as far north as the Hornsea Project Two Wind Farm.

428. The nearby Sheringham Shoal, Dudgeon and Race Bank offshore wind farms are not included within the cumulative assessment as the timeline of activity falls within the baseline assessment. However, these projects provide useful context with confirmed activity by North Norfolk potting fleets across their array areas and offshore cable corridors. Furthermore, the impacts are assessed as minor during decommissioning of Race Bank and Dudgeon and negligible during operation on account of the opportunity for co-existence of potting fisheries.

429. Overall, for all operational wind farms included in Tier 1, the magnitude of the cumulative effect is assessed as being low to UK potters.

430. In relation to all other fleets (including UK, Dutch, Danish, French and Belgian otter trawlers, and/or beam trawlers) the following wind farms have the most potential to result in a cumulative impact due to the location of the wind farms and the grounds targeted and/or operational range of the fishing fleets: (from south to north) North Falls, Five Estuaries, East Anglia One, Triton Knoll, Race Bank, Dudgeon, Hornsea Project One and Hornsea Project Two. Based on the available evidence, including VMS data provided by the MMO, all other wind farms are expected to have a low to negligible magnitude of effect for these fleets.

431. Based on available ESs for Tier 2 and 3 wind farms (SMart Wind, 2015; Vattenfall, 2018; Ørsted, 2018; ScottishPower Renewables and Vattenfall, 2015; Scottish Power Renewable, 2019), it is understood that these offshore wind farms are considered to represent effects within a range of **negligible** to **minor adverse** significance to demersal trawl commercial fisheries. This is due to fishing not being excluded within the operational wind farms, together with commitment to follow FLOWW guidance (BERR, 2008 and FLOWW, 2014). As such a low magnitude is assessed for these fleets.

432. The magnitude of impact of harbour dredging activities and oil and gas production activities is considered to be low to all fishing fleets based on the time-frame of associated works and limited areal overlap with fishing activities.

433. A network of MCZs, SACs and SPAs are included as plans with potential to have cumulative impacts on commercial fisheries. Of specific note based on their proximity to SEP and DEP and the activity of the commercial fishing fleets under assessment are the:

- North Norfolk Sandbanks and Saturn Reef SAC;
- North Norfolk Coast SPA and SAC;
- Cromer Shoal Chalk Beds MCZ; and
- Dogger Bank SAC.

434. The objective for these designations is to maintain the integrity of the sites and identified features. There is uncertainty as to whether management measures will be implemented in relation to commercial fisheries operating within these sites. Where management measures are required, it is DEFRA's policy that:

- Both regulatory and non-regulatory mechanisms should be investigated (e.g. voluntary agreements);
- Management measures with the least social and economic impact should be implemented where effective in meeting conservation objectives (e.g. gear adaptations or seasonal closures rather than area closures); and
- Management measures should be proportionate to the conservation objectives of the feature (e.g. permit schemes rather than area closures).

435. The impact of the designated Cromer Shoal Chalk Beds MCZ on the UK potting fleet has been considered. Natural England has recently provided advice to the EIFCA on fisheries management in this MCZ and the significance of potential damage by the potting fleet (Natural England, 2020). Natural England's report (2020) finds that cumulative active potting across the MCZ significantly damages areas of complex, rugged chalk within the MCZ. Management is highly likely to be implemented (Natural England, 2020) to reduce the impact of potting on these specific areas of rugged chalk that exist within the MCZ. In addition, Natural England (2020) advises that management is implemented immediately to stop storing of pots within the MCZ area, as well as the introduction of a lost gear and recovery system.

436. Due to the introduction of existing fisheries management measures within the MCZ, together with the potential for further management in the future to protect the chalk features (e.g. if an adaptive approach to managing activity over the rugged chalk is not possible), the cumulative impact is assessed as having a medium magnitude for this fleet of UK potters.

437. Management restrictions have been implemented for UK mobile bottom contact gears, including otter trawl and beam trawl, within the Cromer Shoal Chalk Beds MCZ (EIFCA MPA Byelaw 2019). However, given the low level of mobile gear effort across SEP and DEP, the cumulative magnitude of impact to all demersal trawling fleets is considered to be low.

Sensitivity of receptor

438. Based on the operating range of the UK potting fleet under assessment, it is deemed to be of medium vulnerability and medium recoverability, and to have limited levels of alternative fishing grounds. The sensitivity of the receptor is therefore, considered to be medium.

439. Demersal fisheries fleets are deemed to be of low vulnerability and medium recoverability, and to have high levels of alternative fishing grounds. The sensitivity of the receptor is therefore, considered to be low.

Significance of impact

440. For UK potters, overall, the sensitivity of the receptor is considered to be medium and the magnitude is deemed to be medium. In the absence of any further mitigation, the cumulative impact would therefore be of **moderate adverse** significance, which is significant in EIA terms. This assessment takes account of a high degree of uncertainty.

441. The activity of UK potting fleets across SEP and DEP resulted in residual **minor adverse** effects to these receptors, including mitigation related to justifiable disturbance payments. The inclusion of MPAs with the cumulative assessment and associated potential management measures that could lead to restrictions to the UK potting fleet results in a **moderate adverse** assessment for the UK potting fleet. The cumulative effect of the MPAs is unmitigable by the Applicant. Even if the cumulative contribution from SEP and DEP to this impact is *de minimis* the assessment of significance would remain the same as a result of the inclusion of the MPAs.

442. For all other mobile fleets, overall the sensitivity of the receptor is considered to be low and the magnitude is deemed to be low. The cumulative impact will, therefore, be of **minor adverse** significance, which is not significant in EIA terms.

443. **Table 6.4** of **Appendix 12.1 Commercial Fisheries Technical Report** summarises the commercial fisheries impact assessment findings for key offshore wind farms included in the cumulative assessment.

12.7.3.2 Cumulative Impact 2: Cumulative effects of displacement leading to gear conflict and increased fishing pressure on alternative grounds

Magnitude of effect

444. 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 medium magnitude of effect for reduced access to fishing grounds for the UK potting fleet and therefore displacement is expected. As such the magnitude of effect of displacement is assessed as medium for the UK potting fleet; and low for all other mobile gear commercial fisheries fleets.

Sensitivity of receptor

445. The sensitivity of the receptors is consistent with the assessment of reduced access to fishing grounds. The sensitivity is therefore medium for potting fleets and low for all other commercial fishing fleets.

Significance of impact

446. For UK potting vessels, overall, the sensitivity of the receptor is considered to be medium and the magnitude is deemed to be medium. In the absence of any further mitigation, the cumulative impact would therefore be of **moderate adverse** significance, which is significant in EIA terms. This assessment takes account of a high degree of uncertainty.

447. The activity of UK potting fleets across SEP and DEP resulted in residual **minor adverse** effects to these receptors for SEP and DEP, including mitigation related to removing potential effort that may be displaced. The inclusion of MPAs with the cumulative assessment and associated potential management measures that could lead to restrictions to the UK potting fleet results in a **moderate adverse** assessment for the UK potting fleet. The cumulative effect of the MPAs is unmitigable by the Applicant. Even if the cumulative contribution from SEP and DEP to this impact is *de minimis* the assessment of significance would remain the same as a result of the inclusion of the MPAs.

448. For all other mobile gear fleets, overall the sensitivity of the receptor is considered to be low and the magnitude is deemed to be low. The cumulative effect will, therefore, be of **minor adverse** significance, which is not significant in EIA terms.

449. **Table 6.4** of **Appendix 12.1 Commercial Fisheries Technical Report** summarises the commercial fisheries impact assessment findings for key offshore wind farms included in the cumulative assessment.

12.8 Transboundary Impacts

450. This commercial fisheries chapter has assessed the potential impacts incurred by non-UK registered vessels operating within UK waters. This includes the potential effects on Belgian, Danish, Dutch and French commercial fishing fleets across all impact categories assessed, including exclusion from SEP and DEP and displacement effects. Transboundary impacts within UK waters have therefore been intrinsically considered throughout the commercial fisheries EIA process and are consistent with those presented in **Sections 12.6** and **12.7**.

451. Transboundary impacts outside UK waters are limited to potential displacement of fishing effort from SEP and DEP into non-UK EEZs, namely the Dutch EEZ. Based on the established fishing grounds targeted by the fleets under assessment it is not anticipated that displacement effects into the Dutch EEZ would be significant.

12.9 Inter-relationships

452. The assessment of the impacts arising from construction, operation and decommissioning of SEP and DEP indicates that impacts on receptors addressed in other chapters may potentially further contribute to the impacts assessed on commercial fisheries and vice versa. **Table 12-13** provides a summary of the principal inter-relationships and sign-posts to where those issues have been addressed in the relevant chapters.

Table 12-13: Commercial Fisheries Inter-Relationships

Topic and description	Related chapter	Where addressed in this chapter	Rationale
Construction			
Construction activities leading to displacement or disruption of commercially important fish and shellfish resources	**Chapter 9 Fish and Shellfish Ecology**	**Section 12.6.1.5**	The impact receptor is fish and shellfish resources. Fish and shellfish species are also assessed in **Chapter 9 Fish and Shellfish Ecology**
Increased vessel traffic within fishing grounds as a result of changes to shipping routes and transiting construction vessel traffic leading to interference with fishing activity	**Chapter 13 Shipping and Navigation**	**Section 12.6.1.6**	The impact relates to changes in changes in shipping routes. Changes to shipping routes are assessed in **Chapter 13 Shipping and Navigation**
Operation			
Operation and maintenance activities leading to displacement or disruption of commercially important fish and shellfish resources	**Chapter 9 Fish and Shellfish Ecology**	**Section 12.6.2.5**	The impact receptor is fish and shellfish resources. Fish and shellfish species are also assessed in **Chapter 9 Fish and Shellfish Ecology**
Increased vessel traffic within fishing grounds as a result of changes to shipping routes and maintenance vessel traffic leading to interference with fishing activity	**Chapter 13 Shipping and Navigation**	**Section 12.6.2.6**	The impact relates to changes in changes in shipping routes. Changes to shipping routes are assessed in **Chapter 13 Shipping and Navigation**
Decommissioning			
Decommissioning activities leading to displacement or disruption of commercially important fish and shellfish resources	**Chapter 9 Fish and Shellfish Ecology**	**Section 12.6.3.5**	The impact receptor is fish and shellfish resources. Fish and shellfish species are also assessed in **Chapter 9 Fish and Shellfish Ecology**

Topic and description	Related chapter	Where addressed in this chapter	Rationale
Increased vessel traffic within fishing grounds as a result of changes to shipping routes and transiting decommissioning vessel traffic leading to interference with fishing activity	**Chapter 13 Shipping and Navigation**	**Section 12.6.3.6**	The impact relates to changes in changes in shipping routes. Changes to shipping routes are assessed in **Chapter 13 Shipping and Navigation**

12.10 Interactions

453. The impacts identified and assessed in this chapter have the potential to interact with each other. The areas of potential interaction between impacts are presented in **Table 12-14**. This provides a screening tool for which impacts have the potential to interact.

454. **Table 12-15** provides an assessment for each receptor (or receptor group) as related to these impacts.

455. Within **Table 12-15** the impacts are assessed relative to each development phase (Phase assessment, i.e. construction, operation or decommissioning) to see if (for example) multiple construction impacts affecting the same receptor could increase the level of impact upon that receptor. Following this, a lifetime assessment is undertaken which considers the potential for impacts to affect receptors across all development phases.

Table 12-14: Interaction Between Impacts – Screening

Potential Interaction between Impacts						
Construction						
	Impact 1: Construction activities and physical presence of constructed wind farm site infrastructure leading to reduction in access to, or exclusion from established fishing grounds	Impact 2: Offshore export cable construction activities leading to reduction in access to, or exclusion from, established fishing areas	Impact 3: Displacement from the wind farm site leading to gear conflict and increased pressure on adjacent grounds	Impact 4: Displacement from cable corridor leading to gear conflict and increased pressure on adjacent grounds	Impact 5: Construction activities leading to displacement or disruption of commercially important fish and shellfish resources	Impact 6: Increased vessel traffic within fishing grounds as a result of changes to shipping routes and transiting construction vessel traffic leading to interference with fishing activity
Impact 1: Construction activities and physical presence of constructed wind farm site infrastructure leading to reduction in access to, or exclusion from established fishing grounds	-	Yes	Yes	Yes	No	No

Potential Interaction between Impacts						
Impact 2: Offshore export cable construction activities leading to reduction in access to, or exclusion from, established fishing areas	Yes	-	Yes	Yes	No	No
Impact 3: Displacement from the wind farm site leading to gear conflict and increased pressure on adjacent grounds	Yes	Yes	-	Yes	No	No
Impact 4: Displacement from cable corridor leading to gear conflict and increased pressure on adjacent grounds	Yes	Yes	Yes	-	No	No
Impact 5: Construction activities leading to displacement or disruption of commercially important fish and shellfish resources	No	No	No	No	-	No

Potential Interaction between Impacts						
Impact 6: Increased vessel traffic within fishing grounds as a result of changes to shipping routes and transiting construction vessel traffic leading to interference with fishing activity	No	No	No	No	No	-
Operation						
	Impact 1: Physical presence of the wind farm site infrastructure leading to reduction in access to, or exclusion from established fishing grounds	Impact 2: Physical presence of the proposed offshore export cable and interlink cables leading to reduction in access to, or exclusion from established fishing grounds	Impact 3: Displacement from the wind farm site leading to gear conflict and increased pressure on adjacent grounds	Impact 4: Physical presence of the wind farm site, offshore export cable and interlink cables leading to gear snagging	Impact 5: Operation and maintenance activities leading to displacement or disruption of commercially important fish and shellfish resources	Impact 6: Increased vessel traffic within fishing grounds as a result of changes to shipping routes and maintenance vessel traffic leading to interference with fishing activity
Impact 1: Physical presence of the wind farm site infrastructure leading to reduction in access to, or exclusion from established fishing grounds	-	Yes	Yes	No	No	No

Potential Interaction between Impacts						
Impact 2: Physical presence of the proposed offshore export cable and interlink cables leading to reduction in access to, or exclusion from established fishing grounds	Yes	-	Yes	No	No	No
Impact 3: Displacement from the wind farm site leading to gear conflict and increased pressure on adjacent grounds	Yes	Yes	-	No	No	No
Impact 4: Physical presence of the wind farm site, offshore export cable and interlink cables leading to gear snagging	No	No	No	-	No	No

Potential Interaction between Impacts						
Impact 5: Operation and maintenance activities leading to displacement or disruption of commercially important fish and shellfish resources	No	No	No	No	-	No
Impact 6: Increased vessel traffic within fishing grounds as a result of changes to shipping routes and maintenance vessel traffic leading to interference with fishing activity	No	No	No	No	No	-
Decommissioning						
	Impact 1: Wind farm site decommissioning activities leading to reduction in access to, or exclusion from, potential and/or established fishing grounds	Impact 2: Project offshore export cable corridor decommissioning activities leading to reduction in access to, or exclusion from, potential and/or established fishing grounds	Impact 3: Displacement from wind farm site and export cable corridor leading to gear conflict and increased fishing pressure on adjacent grounds	Impact 4: Physical presence of any infrastructure left *in situ* leading to gear snagging	Impact 5: Decommissioning activities leading to displacement or disruption of commercially important fish and shellfish resources	Impact 6: Increased vessel traffic within fishing grounds as a result of changes to shipping routes and transiting decommissioning vessel traffic leading to interference with fishing activity

Potential Interaction between Impacts						
Impact 1: Wind farm site decommissioning activities leading to reduction in access to, or exclusion from, potential and/or established fishing grounds	-	Yes	Yes	No	No	No
Impact 2: Project offshore export cable corridor decommissioning activities leading to reduction in access to, or exclusion from, potential and/or established fishing grounds	Yes	-	Yes	No	No	No
Impact 3: Displacement from wind farm site and export cable corridor leading to gear conflict and increased fishing pressure on adjacent grounds	Yes	Yes	-	No	No	No

Potential Interaction between Impacts						
Impact 4: Physical presence of any infrastructure left *in situ* leading to gear snagging	No	No	No	-	No	No
Impact 5: Decommissioning activities leading to displacement or disruption of commercially important fish and shellfish resources	No	No	No	No	-	No
Impact 6: Increased vessel traffic within fishing grounds as a result of changes to shipping routes and transiting decommissioning vessel traffic leading to interference with fishing activity	No	No	No	No	No	-

Table 12-15: Interaction Between Impacts – Phase and Lifetime Assessment

	Highest significance level				
Receptor	Construction	Operation	Decommissioning	Phase assessment	Lifetime assessment
UK potters targeting lobster, brown crab and whelk UK beam trawlers targeting brown shrimp French demersal and midwater trawlers targeting whiting and mackerel Dutch beam trawlers targeting sole and plaice Belgian beam trawlers targeting sole and plaice Danish demersal trawlers targeting sandeel	Minor adverse	Minor adverse	Minor adverse	**No greater than individually assessed impact** The impacts are considered to be of negligible to minor adverse significance on the individual receptors. Given that the impacts are minor and that each impact will be managed with standard and best practice methodologies it is considered that there would either be no interactions, or that these would not result in greater impact than assessed individually.	**No greater than individually assessed impact** The impacts are considered to be of negligible to minor adverse significance on the individual receptors. Given that the impacts are minor and that each impact will be managed with standard and best practice methodologies it is considered that there would either be no interactions, or that these would not result in greater impact than assessed individually.
Commercially important fish and shellfish resources	Minor adverse	Minor adverse	Minor adverse	**No greater than individually assessed impact**	**No greater than individually assessed impact**

	Highest significance level				
				The impacts are considered to be of negligible to minor adverse significance on the individual receptors. Given that the impacts are minor and that each impact will be managed with standard and best practice methodologies it is considered that there would either be no interactions, or that these would not result in greater impact than assessed individually.	The impacts are considered to be of minor adverse significance of effect on the individual receptors. Given that the magnitudes are minor and that each impact will be managed with standard and best practice methodologies it is considered that there would either be no interactions or that these would not result in greater impact during the lifetime of the project than assessed individually.

12.10.1 Potential Monitoring Requirements

456. Monitoring requirements for SEP and DEP are described in the **Offshore In-Principle Monitoring Plan (IPMP)** (document reference 9.5) submitted alongside the DCO application and further developed and agreed with stakeholders prior to construction based on the **Offshore IPMP** and taking account of the final detailed design of the projects. However, no monitoring in relation to commercial fisheries is considered necessary, other than the standard arrangements for fisheries liaison, which will be agreed in the FLCP prior to the start of construction. The FLCP will be produced in accordance with the **Outline FLCP** (document reference 9.8) submitted with the DCO application.

12.11 Assessment Summary

457. This chapter has provided a characterisation of the existing environment for commercial fisheries based on landings statistics, vessel monitoring and surveillance data, and initial consultation with the fishing industry.

458. Commercial fisheries baseline activity data has been assessed for the UK, Netherlands, France, Belgium and Denmark. Based on quota allocations and landing statistics for the commercial fisheries regional study area, it is understood that vessels registered to other countries have low levels of activity within the SEP and DEP DCO order limits.

459. The key fleets included in this assessment are (in no particular order):

- UK potters targeting lobster, brown crab and whelk;
- UK beam trawlers targeting brown shrimp;
- French demersal and midwater trawlers targeting whiting and mackerel;
- Dutch beam trawlers and fly shooting targeting sole, plaice and mixed demersal finfish species;
- Belgian beam trawlers targeting sole, plaice and mixed demersal finfish species; and
- Danish demersal trawlers targeting sandeel throughout the North Sea with occasional effort overlapping the SEP and DEP offshore site.

460. The assessment has established that there will be impacts of **negligible** to **minor adverse** significance on commercial fishing fleet receptors, and **moderate adverse** impacts (in the absence of further mitigation) on the UK potting fleet during construction, operation and decommissioning phases of SEP and DEP. However, the **moderate adverse** impacts on the UK potting fleet will be mitigated through justifiable disturbance payments to reduce the significance of residual impacts to **minor adverse**. **Table 12-16** presents a summary of the impacts assessed within this ES, the details of any necessary mitigation and the residual impacts.

461. Cumulative impacts were assessed to be **minor adverse** to all mobile fleets and **moderate adverse** to UK potters driven by the inclusion of potential management measures within MPAs that could lead to restrictions to the UK potting fleet. The cumulative effect of the MPAs is unmitigable by the Applicant. Even if the cumulative contribution from SEP and DEP to this impact is *de minimis* the assessment of significance would remain the same as a result of the inclusion of the MPAs.

Table 12-16: Summary of Potential Impacts on Commercial Fisheries

Potential impact	Receptor	Sensitivity	Magnitude	Pre-mitigation impact	Mitigation measures proposed	Residual impact
Construction phase						
Construction activities and physical presence of constructed wind farm site infrastructure leading to reduction in access to, or exclusion from established fishing grounds	UK potting	Medium	Medium	Moderate adverse	With respect to any justifiable disturbance payment, the procedures as outlined in the FLOWW guidance (2014 and 2015), will be followed.	**Minor adverse**
	Dutch beam trawl	Low	Low	Minor adverse	None beyond embedded mitigation	**Minor adverse**
	All other mobile fleets	Low	Negligible	Negligible adverse	N/A	**Negligible adverse**
Offshore cable construction activities leading to reduction in access to, or exclusion from, establish fishing areas	UK potting	Medium	Medium	Moderate adverse	With respect to any justifiable disturbance payment, the procedures as outlined in the FLOWW guidance (2014 and 2015), will be followed.	**Minor adverse**
	UK shrimp beam trawl	Medium	Low	Minor adverse	None beyond embedded mitigation	**Minor adverse**
	All other mobile fleets	Low	Negligible	Negligible adverse	N/A	**Negligible adverse**
Displacement from the wind farm site leading to gear conflict and increased pressure on adjacent grounds	UK potting	Medium	Medium	Moderate adverse	With respect to any justifiable disturbance payment, the procedures as outlined in the FLOWW guidance (2014 and 2015), will be followed.	**Minor adverse**

Potential impact	Receptor	Sensitivity	Magnitude	Pre-mitigation impact	Mitigation measures proposed	Residual impact
	All mobile fleets	Low	Low	Minor adverse	None beyond embedded mitigation	**Minor adverse**
Displacement from cable corridors leading to gear conflict and increased pressure on adjacent grounds	UK potting	Medium	Low	Minor adverse	None beyond embedded mitigation	**Minor adverse**
	All mobile fleets	Low	Negligible	Negligible adverse	N/A	**Negligible adverse**
Construction activities leading to displacement or disruption of commercially important fish and shellfish resources	UK potting	Medium	Low	Minor adverse	None beyond embedded mitigation	**Minor adverse**
	All mobile fleets	Low	Low	Minor adverse	None beyond embedded mitigation	**Minor adverse**
Increased vessel traffic within fishing grounds as a result of changes to shipping routes and transiting construction vessel traffic leading to interference with fishing activity	UK potting	Medium	Low	Minor adverse	None beyond embedded mitigation	**Minor adverse**
	All mobile fleets	Negligible	Low	Negligible adverse	N/A	**Negligible adverse**
Operation and maintenance phase						
Physical presence of the wind farm site infrastructure leading to reduction in access to, or exclusion from established fishing grounds	UK potting	Medium	Low	Minor adverse	None beyond embedded mitigation	**Minor adverse**
	All mobile fleets	Low	Negligible	Negligible adverse	N/A	**Negligible adverse**
Physical presence of the proposed offshore export cable and interlink cables leading to reduction in access to, or exclusion from established fishing grounds	UK potting	Medium	Low	Minor adverse	None beyond embedded mitigation	**Minor adverse**
	All mobile fleets	Low	Negligible	Negligible adverse	N/A	**Negligible adverse**

Potential impact	Receptor	Sensitivity	Magnitude	Pre-mitigation impact	Mitigation measures proposed	Residual impact
Displacement from the wind farm site leading to gear conflict and increased pressure on adjacent grounds	UK potting	Medium	Low	Minor adverse	None beyond embedded mitigation	**Minor adverse**
	All mobile fleets	Low	Low	Minor adverse	None beyond embedded mitigation	**Minor adverse**
Physical presence of the wind farm site, offshore export cable and interlink cables leading to gear snagging	UK potting	Low	Medium	Minor adverse	None beyond embedded mitigation	**Minor adverse**
	All mobile fleets	Medium	Low	Minor adverse	None beyond embedded mitigation	**Minor adverse**
Operation and maintenance activities leading to displacement or disruption of commercially important fish and shellfish resources	UK potting	Medium	Low	Minor adverse	None beyond embedded mitigation	**Minor adverse**
	All mobile fleets	Low	Negligible	Negligible adverse	N/A	**Negligible adverse**
Increased vessel traffic within fishing grounds as a result of changes to shipping routes and maintenance vessel traffic leading to interference with fishing activity	UK potting	Medium	Low	Minor adverse	None beyond embedded mitigation	**Minor adverse**
	All mobile fleets	Negligible	Low	Negligible adverse	N/A	**Negligible adverse**
Decommissioning phase						
Wind farm site decommissioning activities leading to reduction in access to, or exclusion from, potential and/or established fishing grounds	UK potting	Medium	Medium	Moderate adverse	With respect to any justifiable disturbance payment, the procedures as outlined in the FLOWW guidance (2014 and 2015), will be followed.	**Minor adverse**
	Dutch beam trawl	Low	Low	Minor adverse	None beyond embedded mitigation	**Minor adverse**

Potential impact	Receptor	Sensitivity	Magnitude	Pre-mitigation impact	Mitigation measures proposed	Residual impact
	All other mobile fleets	Low	Negligible	Negligible adverse	N/A	**Negligible adverse**
Project offshore export cable corridor decommissioning activities leading to reduction in access to, or exclusion from, potential and/or established fishing grounds	UK potting	Medium	Medium	Moderate adverse	With respect to any justifiable disturbance payment, the procedures as outlined in the FLOWW guidance (2014 and 2015), will be followed.	**Minor adverse**
	UK shrimp beam trawl	Medium	Low	Minor adverse	None beyond embedded mitigation	**Minor adverse**
	All other mobile fleets	Low	Negligible	Negligible adverse	N/A	**Negligible adverse**
Displacement from wind farm site and export cable corridor leading to gear conflict and increased fishing pressure on adjacent grounds	UK potting	Medium	Medium	Moderate adverse	With respect to any justifiable disturbance payment, the procedures as outlined in the FLOWW guidance (2014 and 2015), will be followed.	**Minor adverse**
	All mobile fleets	Low	Low	Minor adverse	None beyond embedded mitigation	**Minor adverse**
Physical presence of any infrastructure left in situ leading to gear snagging	UK potting	Low	Medium	Minor adverse	None beyond embedded mitigation	**Minor adverse**
	All mobile fleets	Medium	Low	Minor adverse	None beyond embedded mitigation	**Minor adverse**
Decommissioning activities leading to displacement or disruption of commercially important fish and shellfish resources	UK potting	Medium	Low	Minor adverse	None beyond embedded mitigation	**Minor adverse**
	All mobile fleets	Low	Low	Minor adverse	None beyond embedded mitigation	**Minor adverse**

Potential impact	Receptor	Sensitivity	Magnitude	Pre-mitigation impact	Mitigation measures proposed	Residual impact
Increased vessel traffic within fishing grounds as a result of changes to shipping routes and transiting decommissioning vessel traffic leading to interference with fishing activity	UK potting	Medium	Low	Minor adverse	None beyond embedded mitigation	**Minor adverse**
	All mobile fleets	Negligible	Low	Negligible adverse	N/A	**Negligible adverse**
Cumulative						
Cumulative effects of reduction in access to, or exclusion from, potential and /or established fishing grounds.	UK potting	Medium	Medium	Moderate adverse	N/A	**Moderate adverse***
	All mobile fleets	Low	Low	Minor adverse	N/A	**Minor adverse**
Cumulative effects of displacement leading to gear conflict and increased fishing pressure on alternative grounds.	UK potting	Medium	Medium	Moderate adverse	N/A	**Moderate adverse***
	All mobile fleets	Low	Low	Minor adverse	N/A	**Minor adverse**

* The cumulative effect of the MPAs on commercial fishing is unmitigable by the project and this impact would remain significant without the de minimis cumulative contribution from SEP and DEP (**Section 12.7.3**).

12.12 References

Bannister, R.C.A, 2009. On the management of brown crab fisheries. Shellfish Association of Great Britain (SAGB). Internal Report 2009

BEIS (2021) Draft National Policy Statement for Renewable Energy Infrastructure (EN-3) Available at: https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/1015236/en-3-draft-for-consultation.pdf

BERR (Department for Business, Enterprise and Regulatory Reform) (2008) Fisheries Liaison with Offshore Wind and Wet Renewables Group (FLOWW) Recommendations For Fisheries Liaison: Best Practice guidance for offshore renewable developers.

Blue Marine Foundation (2018) Management recommendations for English non-quota fisheries: Common whelk

Blyth-Skyrme (2010). Developing guidance on fisheries Cumulative Impact Assessment for wind farm developers.

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;

Bridges T.J. (2019). Research Report 2018. Crab and lobster assessment. Eastern IFCA 2018 https://www.eastern-ifca.gov.uk/wp-content/uploads/2019/09/2019_04_25_Crustacean_Stock_Assessment_report_2018.pdf

Brown, C. G. & Bennett, D. B. (1980). Population and Catch Structure of the Edible Crab (*Cancer pagurus*) in the English-Channel. *J Conseil* 39:88-100

Centre for Environment, Fisheries and Aquaculture Science (Cefas) (2012). Guidelines for data acquisition to support marine environmental assessments of offshore renewable energy projects. Contract report: ME5403, May 2012

Cefas, Marine Consents and Environment Unit (MCEU), Department for Environment, Food and Rural Affairs (DEFRA) and Department of Trade and Industry (DTI) (2004). Offshore Wind Farms - Guidance note for Environmental Impact Assessment In respect of FEPA and CPA requirements, Version 2

DECC (2011a) Overarching NPS for Energy (EN-1)

DECC (2011b) NPS for Renewable Energy Infrastructure (EN-3)

DECC (2011c) NPS for Electricity Networks Infrastructure (EN-5)

EIFCA 2020a. Eastern IFCA Monthly Shellfish Returns for brown crab, lobster and whelk.

EIFCA 2010b. Eastern IFCA Fisheries Mapping Project 2010. https://www.eastern-ifca.gov.uk/about/fisheries/fisheries-mapping-project/

EIFCA (2019) Eastern IFCA Marine Protected Areas Byelaw 2018. https://www.eastern-ifca.gov.uk/wp-content/uploads/2020/05/EIFCA-MPA-Byelaw-2018.pdf

EIFCA 2020c Eastern IFCA North Norfolk Coast Habitat Mapping Report 2018-2019. https://www.eastern-ifca.gov.uk/wp-content/uploads/2020/04/EIFCA_North-Norfolk-Coast_Habitat_Mapping_Survey_Report_2018-2019.pdf

EIFCA, 2020d Eastern IFCA Strategic Assessment 2020. https://www.eastern-ifca.gov.uk/wp-content/uploads/2020/03/2020-Strategic-Assessment-1.pdf

European Subsea Cable Association (ESCA) (2018). ESCA Statement on vessels operating in the vicinity of subsea cables;

European Union Data Collection Framework (EU DCF) (2019). Data by quarter-rectangle: Tables and maps of effort and landings by ICES statistical rectangles.

European Union Market Observatory for Fisheries and Aquaculture products (EUMOFA) (2019). Yearly comparison between member states.

EU 2016. REGULATION OF THE EUROPEAN PARLIAMENT AND OF THE COUNCIL on establishing a multi-annual plan for demersal stocks in the North Sea and the fisheries exploiting those stocks and repealing Council Regulation (EC) 676/2007 and Council Regulation (EC) 1342/2008. COM(2016) 493 final. 23 pp. [redacted]

EU 2020. COUNCIL REGULATION (EU) 2019/529 of 28 March 2019 amending Regulation (EU) 2019/124 as regards certain fishing opportunities [redacted]

Fisheries Liaison with Offshore Wind and Wet Renewables group FLOWW (2015) FLOWW Best Practice Guidance for Offshore Renewables Developments: Recommendations for Fisheries Disruption Settlements and Community Funds (FLOWW, 2015).

FLOWW (2014) FLOWW Best Practice Guidance for Offshore Renewables Developments: Recommendations for Fisheries Liaison. January 2014.

Forewind (2013a) Dogger Bank Creyke Beck A & B Offshore Wind Farms, Environmental Statement.

Forewind (2013b) Sofia Offshore Wind Farm, Environmental Statement.

Hutniczak, B., and A. Munch 2018. Fishermen's location choice under spatio-temporal update of expectations. Journal of Choice Modelling 28 pp 124-136.

ICES Advice 2019a – Cod (*Gadus morhua*) in Subarea 4, Division 7.d, and Subdivision 20 (North Sea, eastern English Channel, Skagerrak) [redacted]

ICES Advice 2019b – Turbot in Subarea 4 (North Sea). [redacted]

ICES, 2019c Sandeel (*Ammodytes* spp.) in divisions 4.b–c, Sandeel Area 1r (central and southern North Sea, Dogger Bank) [redacted]

ICES Advice 2020a - Herring (*Clupea harengus*) in Subarea 4 and divisions 3.a and 7.d, autumn spawners (North Sea, Skagerrak and Kattegat, eastern English Channel) [redacted]

ICES, 2020b. Request from the Netherlands regarding the impacts of pulse trawling on the ecosystem and environment from the sole (*Solea solea*) fishery in the North Sea. [redacted]

ICES, 2020c Whiting (*Merlangius merlangus*) in Subarea 4 and Division 7.d (North Sea and eastern English Channel) [redacted]

International Cable Protection Committee (2009). Fishing and Submarine Cables - Working Together.

Jansen T, Campbell A, Kelly C, Hátún H, Payne MR 2012. Migration and Fisheries of North East Atlantic Mackerel (*Scomber scombrus*) in Autumn and Winter. PLoS ONE 7(12): e51541. [redacted]

Lincs Wind Farm Limited (2010). LID6 Environmental Statement. [redacted]

Marine Management Organisation (MMO) (2020) IFISH database with landing statistics data for UK registered vessels for 2015 to 2019 with attributes for: landing year; landing month; vessel length category; country code; ICES rectangle; vessel/gear type; species; live weight (tonnes); and value; and landing year; landing month; vessel length category; country code; vessel/gear type; port of landing; species; live weight (tonnes); and value.

Marine Management Organisation (MMO) (2021) Vessel Monitoring System (VMS) data for UK vessels from 2015 to 2019.

Natural England (2020). Human impacts on Cromer Shoal Chalk Beds MCZ: Chalk complexity and population dynamics of commercial crustaceans. Natural England Research Report RR04412. [redacted]

PINS (2018). Planning Inspectorate Advice Note Nine: Rochdale Envelope.

Polagye, B., B. Van Cleve, A. Copping, and K. Kirkendall (editors) (2011) Environmental effects of tidal energy development. U.S. Dept. Commerce, NOAA Tech. Memo. F/SPO-116, 181 p.

RenewableUK (2013). Cumulative impact assessment guidelines, guiding principles for cumulative impacts assessments in offshore wind farms.

RWE npower renewables (2003) Triton Knoll Offshore Wind Farm Ltd Environmental Statement ES Volume 3 (Annex I) Commercial Fisheries.

Scira Offshore Energy (2006). Environmental Statement of the Sheringham Shoal wind farm.

[redacted]

Scott, K., Harsanyi, P. & Lyndon, A. R. 2018. Baseline measurements of physiological and behavioural stress markers in the commercially important decapod Cancer pagurus (L.). Journal of Experimental Marine Biology and Ecology 507:1-7

Scottish Power Renewables and Vattenfall (2015) East Anglia THREE Chapter 13 Commercial Fisheries Environmental Statement Volume 1 Document Reference – 6.1.14. Report prepared by Brown and May Limited.

Sea Fish Industry Authority and UK Fisheries Economic Network (UKFEN) (2012). Best practice guidance for fishing industry financial and economic impact assessments

Seitz, R. D., W Ennhage, H., Bergström, U., Lipcius, R. N., and Ysebaert, T. (2014). Ecological value of coastal habitats for commercially and ecologically important species. – ICES Journal of Marine Science, 71: 648-665.

SMart Wind (2013) Hornsea Offshore Wind Farm Project One – Environmental Statement Volume 2 Chapter 6 – Commercial Fisheries.

SMart Wind (2015) Hornsea Offshore Wind Farm Project Two – Environmental Statement Volume 2 Chapter 5 – Commercial Fisheries.

Switzer, T. & Meggitt, D. (2010). Review of Literature and studies on Electro Magnetic Fields (EMF) generated by undersea power cables and associated influence on Marine Organisms. Sound & Sea Technol. DOI: .1109/OCEANS.2010.5664611.

UKFEN (2013) Best Practice Guidance for Fishing Industry Financial and Economic Impact Assessments.

UK Oil and Gas (2015). Fisheries Liaison Guidelines - Issue 6.

Vattenfall (2018) Norfolk Vanguard Offshore Wind Farm Chapter 13 Commercial Fisheries Environmental Statement. https://infrastructure.planninginspectorate.gov.uk/wp-content/ipc/uploads/projects/EN010079/EN010079-001502-Chapter%2014%20Commerical%20Fisheries%20Norfolk%20Vanguard%20ES.pdf

Welby, P.R., (2015) Crab and Lobster Stock Assessment. Eastern Inshore Fisheries and Conservation Authority Annual Research Report.