Dudgeon and Sheringham Shoal Offshore Wind Farm Extensions

Preliminary Environmental Information Report

Volume 1

Chapter 14 - Commercial Fisheries

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China Resources
Better Life Together

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Table of Contents

List of Tables

Volume 3

Glossary of Acronyms

AfL	Agreement for Lease
$B_{trigger}$	Biomass trigger point
BMS	below minimum sized
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
CPUE	Catch Per Unit Effort
DCO	Development Consent Order
DCF	European Data Collection Framework
DECC	Department for Energy and Climate Change
DEFRA	Department for the Environment and Rural Affairs
DEP	Dudgeon Extension Project
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
EPP	Evidence Plan Process
ES	Environmental Statement
EU	European Union
EU DCF	European Union Data Collection Framework
EU MAP	EU Multiannual plan
EUMOFA	European Market Observatory for Fisheries and Aquaculture Products
FEPA	Food and Environment Protection Act
FLOWW	Fisheries Liaison with Offshore Wind and Wet Renewables Group
F_{lim}	Fishing mortality limit reference point
F_{msy}	Fishing mortality consistent with achieving Maximum Sustainable Yield

F_{pa}	Fishing mortality precautionary approach reference point
GBS	Gravity Base Structure
GIS	Geographical Information System
GPS	Global Positioning System
HVAC	High-Voltage Alternating Current
HVDC	High-Voltage Direct Current
ICES	International Council for the Exploration of the Sea
IFCA	Inshore Fisheries Conservation Authority
km	Kilometre
LCCC	Length Converted Catch Curve
LO	Landings Obligation
LPUE	Landings per unit effort
m	Metre
MCA	Maritime and Coastguard Agency
MCEU	Marine Consents and Environment Unit
MW	Megawatts
MAP	Multiannual plan
MCZ	Marine Conservation Zone
MLS	minimum landing size
MMO	Marine Management Organisation
MPA	Marine Protected Area
MSY	Maximum sustainable yield
MW	Megawatts
NM	Nautical mile
NFFO	National Federation of Fishermen's Organisations
NNIFA	North Norfolk Independent Fishermen's Association
NPPF	National Planning Policy Framework
NPS	National Policy Statement
NSIP	Nationally Significant Infrastructure Project
OSP	Offshore Substation Platform
OWF	Offshore Wind Farm
PEIR	Preliminary Environmental Information Report
RWCS	Realistic Worst Case Scenario

SAC	Special Area of Conservation
SCI	Site of Community Importance
SEP	Sheringham Shoal Extension Project
SNC	South Norfolk Council
SNS	Southern North Sea
SoS	Secretary of State
SPA	Special Protection Area
SSB	Spawning stock biomass
TAC	Total allowable catch
UK	United Kingdom
UKFEN	UK Fisheries Economic Network
UN	United Nations
VMS	Vessel Monitoring System
WTG	Wind Turbine Generator
ZAP	Zone Appraisal and Planning

Glossary of Terms

The Applicant	Equinor New Energy Limited
Dudgeon Offshore Wind Farm Extension site	The Dudgeon Offshore Wind Farm Extension offshore wind farm boundary.
The Dudgeon Offshore Wind Farm Extension Project (DEP)	The Dudgeon Offshore Wind Farm Extension site as well as all onshore and offshore infrastructure.
Grid option	Mechanism by which DEP and SEP 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 DEP and SEP to transmit electricity entirely separately.
Infield cables	Cables which link the wind turbine generators to the offshore substation platforms.
Interlink cables	Cables linking two separate project areas. This can be cables linking 1. DEP S and DEP N 2. DEP S and SEP 3. DEP N and SEP 1 is relevant if DEP is constructed alone or first in a phased development. 2 and 3 are relevant in a tandem construction.
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 corridor	An area that will contain cables outside of a wind farm site, either interlink cables or offshore export cables.
Offshore export cables	The cables which would bring electricity from the offshore substation platform(s) to the landfall.
Offshore substation platform (OSP)	A fixed structure located within the wind farm area, containing electrical equipment to aggregate the power from the wind turbine generators and convert it into a more suitable form for export to shore.
PEIR boundary	The area subject to survey and preliminary impact assessment to inform the PEIR, including all permanent and temporary works for DEP and SEP. The PEIR boundary will be refined down to the final DCO boundary ahead of the application for development consent.
Study area	Area where potential impacts from the project could occur, as defined for each individual EIA topic.

Sheringham Shoal Offshore Wind Farm Extension site	Sheringham Shoal Offshore Wind Farm Extension offshore wind farm boundary.
The Sheringham Shoal Offshore Wind Farm Extension Project (SEP)	The Sheringham Shoal Offshore Wind Farm Extension site as well as all onshore and offshore infrastructure.

14 COMMERCIAL FISHERIES

14.1 Introduction

1. This chapter of the Preliminary Environmental Information Report (PEIR) considers the potential impacts of the proposed Dudgeon Extension Offshore Wind Farm Project (DEP) and Sheringham Extension Offshore Wind Farm Project (SEP) on commercial fisheries. The chapter provides an overview of the existing environment for the proposed offshore development area, 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 14.1**) 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 14.4**.
3. The assessment should be read in conjunction with following linked chapters:
   - **Chapter 11 Fish and Shellfish Ecology**; and
   - **Chapter 15 Shipping and Navigation**.
4. Additional information to support the commercial fisheries assessment includes:
   - **Appendix 14.1 Commercial Fisheries Technical Report**.

14.2 Consultation

5. Consultation with regard to commercial fisheries has been undertaken in line with the general process described in **Chapter 6 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 PEIR. **Table 14-1** 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 and inform the impact assessment. Details of the commercial fisheries consultees consulted in relation to DEP and SEP are provided in **Table 14-2.**
7. This chapter will be updated following the consultation on the PEIR in order to produce the final assessment that will be submitted with the Development Consent Order (DCO) application. Full details of the consultation process will also be presented in the Consultation Report alongside the DCO application.

Table 14-1: Consultation responses.

Consultee	Date/ Document	Comment	Project Response
Scoping Responses			
Planning inspectorate	19/11/19 Scoping Response	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 14 Shipping and Navigation**.
Planning inspectorate	19/11/19 Scoping Response	Exclusion of certain types of fishing may make an area more productive for other types of fishing. The Environmental Statement (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 to commercial fish stocks due to displacement of fishing activity due to DEP and SEP is assessed in **Section 14.6.1-14.6.3**.
Planning Inspectorate	19/11/19 Scoping Response	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 14.3** and assessed in **Section 14.6.1-14.6.3**.
Planning Inspectorate	19/11/19 Scoping Response	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 14.1 Commercial Fisheries Technical Report** and in **Section 14.5**.

Table 14-2: Consultation record

Consultee	Date(s)	Forum of consultation
Eastern Inshore Fisheries Conservation Authority	22 July 2020; 21 August 2020	Email, Teams meeting and telephone
National Federation of Fishermen's Organisations	23 July 2020	Email and Teams meeting
North Norfolk Independent Fishermen's Association	07 August 2020, 25 August 2020	Email and telephone
North Norfolk Fishermen's Society	21 August 2020	Email
Wells and District Fishermen's Association	21 August 2020	Email
Greater Wash Fishing Industry Group	27 July 2020	Email
Independent fisherman	27 July 2020	Email
Jonas Seafood Ltd	27 July 2020, 06 August 2020	Email and telephone
Eastern England Fish Producers Organisation Ltd	27 July 2020	Email

14.3 Scope

14.3.1 Study Area

8. DEP and SEP 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 14.1 Commercial Fisheries Technical Report**). Each ICES Division is divided into statistical rectangles within which fisheries landings are reported. The DEP and SEP wind farm sites are located within ICES statistical rectangle 35F1, with the areal overlap being 2.79% and 2.49% respectively.

9. There are two DEP wind farm sites, DEP North and DEP South, which are both located outside the 12 nautical miles (NM) territorial waters limit in depths of between 11m and 23m. DEP South is the closest to shore (31km at its nearest point). Combined, the Agreement for Lease (AfL) area defining DEP North and DEP South covers an area of 103.5 km^2.

10. The SEP wind farm site 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 17.5km from shore at its closest point and covers an area of 92.6km^2.

11. The proposed offshore cable corridors for DEP and SEP 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 SEP and DEP simultaneously.

12. Since ICES statistical rectangles are the smallest area for which landings data are available these, along with the offshore PEIR boundary 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 14.1 Commercial Fisheries Technical Report**).

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

14.3.2 Realistic Worst Case Scenario

14.3.2.1 General Approach

13. The final design of DEP and SEP 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 (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 6 EIA Methodology**.

14. The realistic worst case scenarios for the commercial fisheries assessment are summarised in **Table 14-3**. These are based on the project parameters described in **Chapter 5 Project Description**, which provides further details regarding specific activities and their durations.

15. In addition to the design parameters set out in **Table 14-3**, consideration is also given to how DEP and SEP will be built out as described in **Section 14.3.2.2** to **Section 14.3.2.4** below. This accounts for the fact that whilst DEP and SEP are the subject of one DCO application, it is possible that either one or both of the projects will be developed, and if both are developed, that construction may be undertaken either concurrently or sequentially.

Table 14-3: Realistic Worst Case Scenarios.

Impacts	DEP in Isolation	SEP in Isolation	DEP & SEP Together	Notes and Rationale
Construction				
Construction activities and physical presence of constructed wind farm infrastructure leading to reduction in access to, or exclusion from established fishing grounds.	**Wind turbines:** • Installation of up to **32 turbines** 14MW WTG • Minimum separation distance between WTG: **0.99km** • Max foundation footprint area of gravity base structure (GBS) foundations including scour protection per WTG: **14,314m^2** • Total area of seabed disturbance from WTGs and scour protection: **0.46km^2** **Offshore substation platforms**	**Wind turbines:** • Installation of up to **24 turbines** 14MW WTG • Minimum separation distance between WTG: **0.99km** • Max foundation footprint area of gravity base structure (GBS) foundations including scour protection per WTG: **14,314m^2** • Total area of seabed disturbance from WTGs and scour protection: **0.34km^2** **Offshore substation platforms** • 1 OSP in SEP	**Wind turbines:** • Installation of up to **56 turbines** 14MW WTG • Minimum separation distance between WTG: **0.99km** • Max foundation footprint area of gravity base structure (GBS) foundations including scour protection per WTG: **14,314m^2** • Total area of seabed disturbance from WTGs and scour protection: **0.80km^2** **Offshore substation platforms** • 2 OSPs, assuming an integrated grid option	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. The worst case scenario assumes WTGs utilise the entire area of the DEP and SEP wind farm sites.

Impacts	DEP in Isolation	SEP in Isolation	DEP & SEP Together	Notes and Rationale
	• 1 offshore substation platform (OSP) in DEP North • Maximum scour protection area (per foundation, comprising all legs where relevant): **1,662m²**. **Cables** • Infield cables: 135km • Cable burial depth 0-1.5m (0.5-1.5m outside Cromer Shoal Chalk Beds MCZ); • Overtrawlable rock protection: 1km • 4m width of rock protection; and • Up to 7 pipeline crossings for DEP infield cables.	• Maximum scour protection area (per foundation, comprising all legs where relevant): **1,662m²**. **Cables** • Infield cables: 90km • Cable burial depth 0-1.5m (0.5-1.5m outside Cromer Shoal Chalk Beds MCZ); • Overtrawlable rock protection: 1km • 4m width of rock protection; and • No infield cable.	with an OSP in SEP and in DEP North. • Maximum scour protection area (per foundation, comprising all legs where relevant): **1,662m²**. **Cables** • Infield cables: 225km • Cable burial depth 0-1.5m (0.5-1.5m outside Cromer Shoal Chalk Beds MCZ); • Overtrawlable rock protection: 1km • 4m width of rock protection; and • Up to 7 pipeline crossings for DEP infield cables. No infield cable crossings in SEP	**DEP and SEP together worst case scenario per cable** **Infield:** Assumes SEP, DEP North and DEP South are all built.

Impacts	DEP in Isolation	SEP in Isolation	DEP & SEP Together	Notes and Rationale
	Construction Duration • Up to **2** years of offshore construction **Exclusion zones:** • 500m exclusion zones around construction activities = 0.79km^2 per structure under construction at any one time; and • 50m exclusion zones around incomplete structures = 7,854m^2 per partially constructed structure at any one time.	**Construction Duration** • Up to **2** years of offshore construction **Exclusion zones:** • 500m exclusion zones around construction activities = 0.79km^2 per structure under construction at any one time; and • 50m exclusion zones around incomplete structures = 7,854m^2 per partially constructed structure at any one time.	**Construction Duration:** - Up to **4 years,** if built sequentially (2 years of offshore construction per project). **Exclusion zones:** • 500m exclusion zones around construction activities = 0.79km^2 per structure under construction at any one time; and • 50m exclusion zones around incomplete structures = 7,854m^2 per partially constructed structure at any one time.	
Offshore cable corridor construction activities leading to reduction in access to, or exclusion	**Offshore cables (export and interlink)** Length of cables: • Export = 62km^2 • Interlink = 66km^2	**Offshore cables (export and interlink)** Length of cables: • Export = 40km^2 • No interlink	**Offshore cables (export and interlink** Length of cables: • Export = 102km^2 • Interlink = 154mk^2	This represents the maximum duration and extent of fishing exclusion throughout the construction phase and hence the greatest potential to restrict

Impacts	DEP in Isolation	SEP in Isolation	DEP & SEP Together	Notes and Rationale
from established fishing grounds	• Cable burial depth 0.5-1m (export), 1.5m (interlink) depending on area outside Marine Conservation Zone (MCZ) and 0-0.3m inside MCZ; • Indicative max area of disturbance from trenching = **0.384km²** Cable protection: • Export cable = 3,000m² (length: 0.5km) • Interlink = 9,000m² (length: 1.5km) • 6m width rock berm protection; • Up to 4 overtrawlable cable crossings for DEP	• Cable burial depth 0.5-1m (export), 1.5m (interlink) depending on area outside Marine Conservation Zone (MCZ) and 0-0.3m inside MCZ; • Indicative max area of disturbance from trenching = **0.12km²** Cable protection: • Export cable = 3,000m² (length:1.0km) • No interlink cable • 6m width rock berm protection; • Up to 4 overtrawlable cable crossings for	• Cable burial depth 0.5-1m (export), 1.5m (interlink) depending on area outside Marine Conservation Zone (MCZ) and 0-0.3m inside MCZ; • Indicative realistic[1] area of disturbance from trenching = **0.67km²** Cable protection: • Export cable = 3,000m² (length: 0.5km) • Interlink = 9,000m² (length: 1.5km) • 6m width rock berm protection; • Up to 8 overtrawlable cable crossings for	access to fishing grounds. **DEP and SEP together worst case scenario per cable** **Export:** DEP and SEP are developed with a separated grid option (each having their own substation and export cable). **Interlink:** Assumes DEP and SEP are developed with an integrated grid option but only DEP North is developed. **DEP and SEP together realistic case scenario per cable** DEP and SEP developed with an integrated grid option and both DEP

[1] The individual worst case scenarios presented for export and interlink would not represent a developable scenario if taken as a total, therefore a 'realistic' worst case scenario is presented for the max area of disturbance from trenching for the DEP and SEP together. The realistic worst case scenario for disturbance from export and infield trenching is where DEP and SEP are developed with an integrated grid option and both DEP North and DEP South are developed.

Impacts	DEP in Isolation	SEP in Isolation	DEP & SEP Together	Notes and Rationale
	export cable (2 for Dudgeon export cables, 2 for Hornsea Three export cables); • Up to 6 overtrawlable cable crossings for DEP interlink cable • Total rock berm protection area footprint **0.051km²** **HDD Exit Point (978m²)** • Initial trench: **600m²** • Transition zone: **50m²** • Jack up footprint: **128m²** • Deposited material on seabed: **200m²** HDD exit cable protection: • 100m of HDD exit point cable protection: **300m²**	SEP export cable (2 for Dudgeon export cables, 2 for Hornsea Three export cables); • Total rock berm protection area footprint **0.015km²** **HDD Exit Point (978m²)** • Initial trench: **600m²** • Transition zone: **50m²** • Jack up footprint: **128m²** • Deposited material on seabed: **200m²** HDD exit cable protection: • 100m of HDD exit point cable protection: **300m²**	DEP and SEP export cables (4 for Dudgeon export cables, 4 for Hornsea Three export cables); • Up to 6 overtrawlable cable crossings for DEP interlink cable • Total rock berm protection area footprint **0.059km²** **HDD Exit Point (1,356m²)** • Initial trench: **600m²** • Transition zone: **100m²** • Jack up footprint: **256m²** • Deposited material on seabed: **400m²** HDD exit cable protection: • 200m of HDD exit point cable protection: **600m²**	North and DEP South are developed.

Impacts	DEP in Isolation	SEP in Isolation	DEP & SEP Together	Notes and Rationale
	Construction Duration: • Total: 60 days **Safe passing distance** Roaming 500m safe passing distance for mobile installation vessels	**Construction Duration:** • Total: 50 days **Safe passing distance** Roaming 500m safe passing distance for mobile installation vessels	**Construction Duration:** • Total: 110 days if projects constructed in isolation and sequentially (SEP 50 days, DEP 60 days). 50 days in tandem construction scenario. **Safe passing distance** Roaming 500m safe passing distance for mobile installation vessels	
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 activities and physical presence of wind farm infrastructure leading to reduction in access to, or exclusion from established fishing grounds”.			This represents the maximum duration and extent of fishing exclusion throughout the construction phase and hence the greatest potential for displacement.
Displacement from cable corridor leading to gear conflict and	As per the Realistic Worst Case Scenario for “Offshore cable corridor construction activities and physical presence of wind farm infrastructure leading to reduction in access to, or exclusion from established fishing grounds”.			This represents the maximum duration and extent of fishing exclusion throughout the

Impacts	DEP in Isolation	SEP in Isolation	DEP & SEP Together	Notes and Rationale
increased pressure on adjacent grounds				construction phase and hence the greatest potential for displacement.
Wind farm sites and offshore cable construction activities leading to displacement or disruption of commercially important fish and shellfish resources	See **Chapter 11 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
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	**Vessel trips related to installation:** • Up to **16** construction vessels, including foundation installation, WTG installation, infield, interlink and export cable vessels, landfall cable installation, substation and accommodation vessels etc.	**Vessel trips related to installation:** • Up to **16** construction vessels, including foundation installation, WTG installation, infield, interlink and export cable vessels, landfall cable installation, substation and accommodation vessels etc.	**Vessel trips related to installation:** • Up to **25** construction vessels, including foundation installation, WTG installation, infield, interlink and export cable vessels, landfall cable installation, substation and accommodation vessels etc.	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

Impacts	DEP in Isolation	SEP in Isolation	DEP & SEP Together	Notes and Rationale
interference with fishing activity.	• Construction vessel trips to port: **603** over 2 year construction periods	• Construction vessel trips to port: **603** over 2 year construction periods	• Construction vessel trips to port: **1,196** over 4 year construction periods (if constructed sequentially)	
Operation				
Physical presence of wind farm site infrastructure leading to reduction in access to, or exclusion from established fishing grounds	**Duration:** Operational design life of 35 years. **Wind turbines:** As for construction above. **OSPs:** As for construction above. **Cables:** As for construction above. **Cable Repairs and/or Remedial Cable Burial:** • Up to 10 jack-up deployments per year. Legs / spudcans footprint up to **12,000m²** per year	**Duration:** - Operational design life of 35 years. **Wind turbines:** As for construction above. **OSPs:** As for construction above. **Cables:** As for construction above. **Cable Repairs and/or Remedial Cable Burial:** • Up to 10 jack-up deployments per year. Legs / spudcans footprint up to **12,000m²** per year	**Duration:** - Operational design life of 35 years. **Wind turbines:** As for construction above. **OSPs:** As for construction above. **Cables:** As for construction above. **Cable Repairs and/or Remedial Cable Burial:** • Up to 20 jack-up deployments per year. Legs / spudcans footprint up to **24,000m²** per year	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 around and between infrastructure within the DEP/SEP wind farm sites where possible, with the exception of an assumed 50m operating distance

Impacts	DEP in Isolation	SEP in Isolation	DEP & SEP Together	Notes and Rationale
	• Cable repair, replacement and reburial footprint: **1,743m²** per year **Safety Zones:** Up to 500m when major maintenance is in progress (use of jack-up vessel or similar).	• Cable repair, replacement and reburial footprint: **1,170m²** per year **Safety Zones:** Up to 500m when major maintenance is in progress (use of jack-up vessel or similar).	• Cable repair, replacement and reburial footprint: **4,737m²** per year. • Realistic cable repair, replacement and reburial footprint: **4,704m²** **Safety Zones:** Up to 500m when major maintenance is in progress (use of jack-up vessel or similar).	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 the DEP/SEP wind farm sites. 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.

Impacts	DEP in Isolation	SEP in Isolation	DEP & SEP Together	Notes and Rationale
Physical presence of offshore export cable and infrastructure within the DEP/SEP offshore export cable corridor leading to reduction in access to, or exclusion from established fishing grounds	As per Realistic Worst Case Scenario for “Physical presence of wind farm site infrastructure leading to reduction in access to, or exclusion from established fishing grounds”.			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 DEP/SEP offshore cable corridor, with the exception of an assumed 50m operating distance from infrastructure, areas of cable protection and safety zones around infrastructure undergoing major maintenance. It is assumed that cable and pipeline crossings are overtrawlable.

Impacts	DEP in Isolation	SEP in Isolation	DEP & SEP Together	Notes and Rationale
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 "Physical presence of wind farm site infrastructure leading to reduction in access to, or exclusion from established fishing grounds".			This represents the maximum duration and extent of fishing exclusion throughout the operation and maintenance phase and hence the greatest potential for displacement.
Physical presence of the wind farm site and offshore export cable leading to gear snagging	As per Realistic Worst Case Scenario for "Physical presence of wind farm site infrastructure leading to reduction in access to, or exclusion from established fishing grounds".			This represents the maximum scenario for project infrastructure present during operation and maintenance phase and hence the greatest potential for gear snagging.
Operation and maintenance activities leading to displacement or disruption of commercially important fish and shellfish resources	See **Chapter 11 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

Impacts	DEP in Isolation	SEP in Isolation	DEP & SEP Together	Notes and Rationale
Increased vessel traffic within fishing grounds as a result of changes to shipping routes and maintenance vessel traffic from DEP/SEP array area and offshore export cable corridor infrastructure leading to interference with fishing activity.	**Duration:** • Operational design life of 35 years. **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 690 (although majority (624) will be (small O&M vessel (CTV))	**Duration:** • Operational design life of 35 years. **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 690 (although majority (624) will be (small O&M vessel (CTV))	**Duration:** • Operational design life of 35 years. **Vessel trips related to operation and maintenance:** • up to 9 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 694 (although majority (624) will be (small O&M vessel (CTV))	The maximum number of vessels transits and the maximum duration of the operation would result in the greatest potential for interference. Where possible, DEP and SEP will use existing O&M programme for Dudgeon and Sheringham Shoal Offshore Wind Farms respectively.
Decommissioning				
Wind farm site decommissioning activities leading to				Decommissioning is likely to include removal of all of the wind turbine

Impacts	DEP in Isolation	SEP in Isolation	DEP & SEP Together	Notes and Rationale
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.			components and part of the foundations (those above seabed 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*.
Offshore export cable corridor decommissioning activities leading to reduction in access to, or exclusion from, potential and/or established fishing grounds				
Displacement from wind farm site and export cable corridor leading to gear conflict and increased fishing pressure on adjacent grounds				
Physical presence of any infrastructure left in				

Impacts	DEP in Isolation	SEP in Isolation	DEP & SEP Together	Notes and Rationale
situ leading to gear snagging				
Decommissioning activities leading to displacement or disruption of commercially important fish and shellfish resources				
Increased vessel traffic within fishing grounds as a result of changes to shipping routes and transiting decommissioning vessel traffic from DEP and SEP leading to interference with fishing activity				

14.3.2.2 Construction Scenarios

16. The following principles set out the framework for how DEP and SEP may be constructed:
    - DEP and SEP may be constructed at the same time, or at different times;
    - If built at the same time, both DEP and SEP could be constructed in four years, with offshore construction being undertaken over two years (likely years three and four) of the overall construction period;
    - If built at different times, either project could be built first;
    - If built at different times the first project would require a four-year period of overall construction and a two year offshore construction period, the second project a three-year period of construction including a two year offshore construction period;
    - If built at different times, the duration of the gap 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;
    - Assuming maximum construction periods, and taking the above into account, the maximum period over which the construction of both projects could take place is seven years; and
    - The earliest construction start date is 2024 and the latest is 2028.
17. In order to determine which construction scenario presents the realistic worst case for each receptor and impact, the assessment considers both maximum duration effects and maximum peak effects, in addition to each project being developed in isolation, drawing out any differences between DEP and SEP.
18. The three construction scenarios considered by the commercial fisheries assessment are therefore:
    - Build DEP or build SEP in isolation;
    - Build DEP and SEP concurrently – reflecting the maximum peak effects; and
    - Build DEP and SEP sequentially with a gap of up to four years between the start of construction of each Project – reflecting the maximum duration of effects.
19. Any differences between DEP and SEP, 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 14.6**). For each potential impact 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 14.6**.

14.3.2.3 Operation Scenarios

20. Operation scenarios are described in detail in **Chapter 5 Project Description**. The assessment considers the following three scenarios:
    - Only DEP in operation;

- Only SEP in operation; and
- The two projects operating at the same time, with a gap of up to three years between each project commencing operation.

21. The operational lifetime of each project is expected to be 35 years.

14.3.2.4 Decommissioning Scenarios

22. Decommissioning scenarios are described in detail in **Chapter 5 Project Description**. Decommissioning arrangements will be agreed through the submission of a Decommissioning Plan prior to construction, however for the purpose of this assessment it is assumed that decommissioning of DEP and SEP could be conducted separately, or at the same time.

14.3.3 Summary of Mitigation Embedded in the Design

23. 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 14.6**).

Table 14-4: Embedded Mitigation Measures

Parameter	Mitigation Measures Embedded into the Design of DEP and SEP'
Cable protection	Where possible, cable burial will be the preferred option for cable protection.
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 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 Fisheries Co-existence and Liaison Plan will be developed.

Parameter	Mitigation Measures Embedded into the Design of DEP and SEP'
Safety zones	Safety zones of up to 500m will be applied during construction, 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.

14.4 Impact Assessment Methodology

14.4.1 Policy, Legislation and Guidance

14.4.1.1 National Policy Statements

24. 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 DEP and SEP 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).

25. The specific assessment requirements for commercial fisheries, as detailed in the NPS, are summarised in **Table 14-5** together with an indication of the section of the PEIR chapter where each is addressed.

Table 14-5: NPS Assessment Requirements.

NPS Requirement	NPS Reference	Section Reference
En-1 NPS for Energy (EN-1)		
The construction and operation of offshore windfarms 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 11 Fish Ecology.**

NPS Requirement	NPS Reference	Section Reference
Whilst the footprint of the offshore windfarm 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 windfarms without unduly disrupting or compromising navigational safety. Consequently, the establishment of a windfarm 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	Impacts to commercial fishing grounds are assessed in **Section 14.6.1 – 14.5.3**
In some circumstances, transboundary issues may be a consideration as fishermen from other countries may fish in waters within which offshore windfarms are sited	EN-3 Section 2.6.124	Assessment of potential transboundary impacts in relation to non-UK fishing fleet is provided in **Section 14.8.**
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 14.2** which includes consultation with local fisherman and commercial fisheries representatives.
Where a number of offshore windfarms 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 14.7**.

NPS Requirement	NPS Reference	Section Reference
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 11 Fish and Shellfish Ecology**. The data used to form the baseline is provided in **Section 14.4.2**.
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	An assessment of safety zones on commercial fishing is presented in **Section 14.6** and **14.7**.
Where the precise extents of potential safety zones are unknown, a realistic worst case scenario should be assessed. Applicants should consult the MCA. Exclusion of certain types of fishing may make an area more productive for other types of fishing. The assessment by the applicant should include surveys of the effects on fish stocks of commercial interest and the potential reduction or increase in such stocks that will result from the presence of the windfarm development and of any safety zones.	EN-3 Section 2.6.131	Consideration has been given to the implementation of safety zones for definition of the worst case scenario (**Table 14-3**) and assessment of potential impacts on commercial fisheries is provided in **Section 14.6** and **14.7**.

14.4.1.2 Other

26. 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) Fisheries Liaison with Offshore Wind and Wet Renewables Group (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 FEPA and 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 (Fishing Liaison with Offshore Wind and Wet Renewables Group) (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.

27. Further detail is provided in **Chapter 3 Policy and Legislative Context**.

14.4.2 Data and Information Sources

28. To inform the assessment for commercial fisheries a number of data sources have been used, as shown in **Table 14-6**. 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.

29. In addition, in order to ground-truth the data collected and to understand patterns of fishing activity both temporal and spatial, consultation has taken place with relevant inshore and offshore fisheries stakeholders.

14.4.2.1.1 Landing statistics

30. 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: Marine Management Organisation (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 Union 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: Eastern Inshore Fisheries and Conservation Authority EIFCA (2015 to 2019).

31. 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 14.4.7**.

Table 14-6: 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.	2015 to 2019	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.	2014 - 2017	
	Monthly Shellfish Activity Returns data for: UK vessels landing shellfish species caught within EIFCA jurisdiction.	2015 to 2019	EIFCA

Nationality	Data	Timeframe	Source
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
	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. 2016 represents the latest data set available for this information	2016	MMO
	Maps of key sandeel grounds based on vessel tracking plots from Danish registered vessels	1985 - 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

14.4.2.1.2 Vessel Monitoring Systems data

32. 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.

33. 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.

34. 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.

35. 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 2014 to 2018 for UK registered vessels. Note that at the time of writing 2018 represents the latest data set available for this information.

36. For fishing vessels registered under European country flags, data has been collected through the European Data Collection Framework (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.

14.4.2.1.3 Surveillance data

37. 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 IFCA. Consultation with the 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.

14.4.2.1.4 Other sources

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

39. 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 14.1**. 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.

14.4.3 Impact Assessment Methodology

40. **Chapter 6 EIA Methodology** provides a summary of the general impact assessment methodology applied to DEP and SEP. The following sections confirm the methodology used to assess the potential impacts on commercial fisheries.

41. The EIA draws on environmental baseline data and other information gathered and analysed in **Appendix 14.1** and presents the potential effects on commercial fisheries of both DEP and SEP. 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.

42. The impact assessment methodology for commercial fisheries is consistent with that described in **Chapter 6 EIA Methodology**.

14.4.3.1 Definitions

43. 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 14-7** and **Table 14-8**.

Table 14-7: Definition of sensitivity for a commercial 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 14-8: 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 project area); and • Substantial loss of ability to carry on fishing activities (e.g. substantial proportion of effort within project area). (Negative)
	Impact is expected to result in one or more of the following: • 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 project area); and • Partial loss of ability to carry on fishing activities (e.g. moderate reduction of fishing effort within project area). (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:

Magnitude	Definition
	Impact is expected to result in one or more of the following: • Minor loss of target fish or shellfish biological resource (e.g. minor loss of resource within project area); and • Minor loss of ability to carry on fishing activities (e.g. minor reduction of fishing effort within project area). (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 project area); and • Slight loss of ability to carry on fishing activities (e.g. slight loss of fishing effort within project area). (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)

44. 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.

14.4.3.2 Impact Significance

45. 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 6 EIA Methodology** for further details). The determination of significance is guided by the use of an impact significance matrix, as shown in **Table 14-9**. Definitions of each level of significance are provided in **Table 14-10**.

46. 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 14-9 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 14-10 Definition of impact significance

Significance	Definition
Major	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	Intermediate change in receptor condition, which are likely to be important considerations at a local level.
Minor	Small change in receptor condition, which may be raised as local issues but are unlikely to be important in the decision making process.
Negligible	No discernible change in receptor condition.
No change	No impact, therefore, no change in receptor condition.

14.4.4 Cumulative Impact Assessment Methodology

47. The cumulative impact assessment (CIA) considers other plans, projects and activities that may impact cumulatively with DEP and SEP. As part of this process, the assessment considers which of the residual impacts assessed for DEP and/or SEP 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 6 EIA Methodology** provides further details of the general framework and approach to the CIA.

48. 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 marine protected areas. Further detail on potential cumulative impacts is provided in **Section 14.7**.

14.4.5 Transboundary Impact Assessment Methodology

49. 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 Exclusive Economic Zone (EEZ) of European Economic Area (EEA) states or arising on the interests of EEA states e.g. a non UK fishing vessel. **Chapter 6 EIA Methodology** provides further details of the general framework and approach to the assessment of transboundary effects.

50. 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.

14.4.6 Assumptions and Limitations

51. The most notable limitations of the assessment are associated with the data describing commercial fisheries in the study areas and within the DEP and SEP offshore PEIR boundary. A full description of data limitations is provided in **Appendix 14.1 Commercial fisheries Technical Report** (**Section 5.3**).

52. Limitations of landings data include the spatial size of ICES rectangles from which data is collected and the area overlapped by DEP and SEP. For example, the surface-area of DEP wind farm site is 2.79%, and SEP wind farm site is 2.49% of the surface area of ICES rectangle 35F1 respectively. The proposed offshore export cable and interlink corridors overlap 1.91% of the surface area of ICES rectangle 35F1 and 34F1 (for construction of SEP and DEP simultaneously). Care is therefore required interpreting landings for such small parts of statistical rectangles.

53. 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.

54. Limitations of VMS data are primarily focused on the coverage being limited to vessels ≥12 m. 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 do not include vessels typically operating in inshore area (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.

55. 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).

56. 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 assessments in **Section 14.6**.

14.5 Existing Environment

57. This section summarises the commercial fisheries baseline in the study areas. A more comprehensive description is included in **Appendix 14.1 Commercial Fisheries Technical Report**.

14.5.1 Key fleets and fisheries

14.5.1.1 Regional study area landings

58. 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 the east of the DEP and SEP wind farm sites. The distribution of EU beam trawl activity from VMS data for 2017 is illustrated in **Figure 2-2** of **Appendix 14.1 Commercial Fisheries Technical Report**.

59. Dredgers targeting scallops and otter trawlers are active at low levels in the regional study area, but there is no significant activity close to the DEP and SEP PEIR boundary (**Figures 2-3 and 2-4**, **Appendix 14.1 Commercial Fisheries Technical Report)**.

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

61. As described above, landing statistics indicate a significant beam trawl shrimp fishery within the Wash but outside of the DEP and SEP areas. 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.

62. A full description of landings from all countries and UK vessels in the regional study area are presented in **Appendix 14.1 Commercial Fisheries Technical Report**.

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

14.5.1.2.1 Landings by EU vessels

63. The annual average landings of the main species of fish by value by all EU countries fishing within the study areas (ICES rectangles 34F1 and 35F1) are presented in **Figure 2-9** (**Appendix 14.1 Commercial Fisheries Technical Report**).

64. 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 2-9** (**Appendix 14.1 Commercial Fisheries Technical Report**)**.** Apart from sole, plaice and whiting all other species have a landed weight of less than 5 tonnes.

65. The individual annual average weight and value of landings by the three top species of fish, 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 2-9 and 2-10 Appendix 14.1 Commercial Fisheries Technical Report**).

66. The commercial fisheries wind farm sites and export cable study areas are located within the sandeel management area for the 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 2-11**, **Appendix 14.1 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 TAC for sandeel was reduced to zero initially in 2015 the fishery may resume in the future therefore the potential for DEP and SEP to overlap key sandeel fishing areas. The main historical sandeel fishing areas are to the north and west of DEP and SEP (**Figure 2-12**, **Appendix 14.1 Commercial Fisheries Technical Report**). A proportion of these grounds are within ICES rectangle 35F1 and overlap with 2.04% of the offshore PEIR area. Sandeel grounds within the commercial fisheries wind farm sites study area overlap with 13.07% of DEP North and DEP South combined. However, only DEP North 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.

14.5.1.2.2 Landings by UK vessels

67. 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 2-13** (**Appendix 14.1 Commercial Fisheries Technical Report**) . Whelk dominate the landings from 35F1 and have grown significantly over the time period analysed, worth £1.5 million in first sales value landed from 35F1 in 2019. 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 2-14**, **Appendix 14.1 Commercial Fisheries Technical Report**).

68. The proportion of the offshore cable study area (ICES rectangles 34F1 and 35F1) covered by the proposed offshore export cable corridor is 1.91% (for construction of SEP and DEP simultaneously). 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.

69. 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 2-15**, **Appendix 14.1 Commercial Fisheries Technical Report**).

70. Pots and traps are used for 97% of the landed weight in the export cable corridor which highlights the importance of the shellfish fishery (**Figure 2-16**, **Appendix 14.1 Commercial Fisheries Technical Report**).

71. Monthly shellfish returns data indicate the importance of ICES rectangle 34F1 to the 10m and under potting fleet targeting crab and lobster (**Figure 2-17**, **Appendix 14.1 Commercial Fisheries Technical Report**).

72. 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 2-18**, **Appendix 14.1 Commercial Fisheries Technical Report**).

14.5.1.3 Total Allowable catch (TAC) and quotas

73. Total Allowable Catches (TACs) and quotas are in place for many commercial fish species based on their stock distribution across ICES Divisions. TACs and quotas per country are presented in **Appendix 14.1 Commercial Fisheries Technical Report** for key species.

74. Within the UK EEZ, fishing activity from the shore to 6 NM 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 6 NM. From 6 NM to 12 NM, 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.

75. 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 200 NM. Under the EU-UK Trade and Cooperation Agreement (TCA) international vessels are still permitted to fish outside 12 NM 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.

14.5.2 Key species

14.5.2.1 Shellfish

76. Key shellfish species have been summarised here. For further detail see **Appendix 14.1 Commercial Fisheries Technical Report.**

14.5.2.1.1 Brown crab

77. 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 6 NM limit and the MMO between 6 and 12 NM. 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).

78. 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).

79. 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.

80. 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).

81. 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.

82. 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 – 6 NM) of 115mm carapace length (Undersized Edible Crabs Order 2000 (2000 No 2029)) (Bridges, 2019).

83. 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.

84. 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.

14.5.2.1.2 Lobster

85. 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 6 NM and the MMO from 6 to 12 NM, in a mixed fishery with crab.

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

87. 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.

88. 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).

89. 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.

14.5.2.1.3 Whelk

90. 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.

91. The common whelk is a slow growing, subtidal carnivorous mollusc which is distributed throughout most of the northern Atlantic between low water and 1000m. Most are caught in depths of 40-60m.

92. 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).

93. Stock status is relatively unknown in the UK therefore Catch per Unit Effort (CPUE) and Landings per Unit Effort (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.

14.5.2.2 Finfish

94. Key finfish species have been summarised here. For further detail see **Appendix 14.1 Commercial Fisheries Technical Report**. The majority of finfish from the commercial fisheries study area are landed by EU vessels as noted in **Section 14.5.1**.

14.5.2.2.1 Sole and Plaice

95. 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.

96. 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.

97. A larger proportion of sole is now harvested from the southern part of the southern North Sea (Division 4c) as a result of the introduction of pulse fishing gear under technical measures which allows vessels to fish in softer grounds (compared to the traditional beam trawls used to catch both sole and plaice). However, current information indicates that such gear will be prohibited from June 2021. This may result in vessels reverting to previous fishing grounds further north using towed demersal gear (ICES 2020b).

14.5.2.2.2 Whiting

98. 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.

99. 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).

14.5.2.2.3 Mackerel

100. 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.

101. 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).

102. The 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 MSY. Despite this the advised catch is higher for 2020 than for 2019 because of the high recruitment for 2016 and 2017 year classes.

14.5.2.2.4 Dab

103. 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.

14.5.2.2.5 Cod

104. 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).

14.5.2.2.6 Herring

105. 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 11 Fish and Shellfish Ecology**.

106. 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.

14.5.3 Key Gear

107. Key gear types have been summarised here. For further detail see **Appendix 14.1 Commercial Fisheries Technical Report.**

14.5.3.1 Pots and traps

108. 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 is driven by market prices. Whelk are predominantly targeted in muddy habitats, and not generally found on mobile sand or rocky ground.

109. When targeting whelk, vessels operating outside 6 NM 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.

110. 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 (27.4 m) apart and one string can cover up to 0.3 NM. Vessels may operate three fleets of pots, so soak time is generally three days, weather permitting.

14.5.3.2 Beam Trawlers

111. Flatfish such as sole and plaice landed from the commercial fisheries study area using beam trawls with tickler chains which run along the seabed 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.

14.5.3.3 Pulse Trawlers

112. Pulse trawling has 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 12 NM limit.

113. Pulse beam trawls replace the heavy ground gear and tickler chain with drag wires through which electric impulses are sent. The electric pulse passes into the seabed and stimulates the fish to rise up out of the substrate and into the trawl net. The beam can be replaced by a more hydrodynamically shaped structure called the Sum wing beam which is designed to further reduce the impact on the seabed. Pulse beam trawls use less fuel and have less seabed disturbance as drag wires do not penetrate the seabed.

14.5.3.4 Demersal Otter Trawling

114. 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.

14.5.3.5 Pelagic trawling

115. 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.

14.5.4 Key Ports

14.5.4.1 Overview

116. 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.

117. The two main types of potter include the beach boats which operate close inshore (within 3 NM) 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 40 NM. 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.

118. 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 2014 to 2019 by port are presented in **Appendix 14.1 Commercial Fisheries Technical Report Figure 3-1**).

119. 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 Wells (£2.4 million) and Lowestoft (£1.78 million). Other ports in order of first sales value in 2019 are Southwold (£0.53 million), Cromer (£0.52 million), Great Yarmouth (£0.30 million) and Boston (£0.19 million). The ports of Brancaster, Sheringham, Winterton and Blakeney all have first sales values of under £0.1 million. Consultation with the North Norfolk Independent Fishermen's Association (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.

120. The values of species landed varies between ports over the period 2014 to 2019. Details of these changes are provided in **Appendix 14.1 Commercial Fisheries Technical Report**.

14.5.5 Fishing Activity Assessment

14.5.5.1 Wind farm sites study area

14.5.5.1.1 UK Landing trends

121. 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 14.1 Commercial Fisheries Technical Report**. The surface area of the ICES rectangle covered by the DEP wind farm sites is 2.79%, and 2.49% by the SEP wind farm site, although this does not represent the proportion of landings from these areas since fishing grounds are not equally distributed throughout the rectangle.

122. 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 14.5.1** 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 Appendix 14.1 Commercial Fisheries Technical Report**).

123. Although the total landed weight for all species from ICES rectangle 35F1 caught by the UK fleet did not increased significantly between 2015 (928 tonnes) and 2019 (1,317 tonnes) the notable exception is for whelk. Landings for whelk increased by 66% from just under 700 tonnes in 2015 to 1156 tonnes in 2019 with an even greater increase in value (155%) as a result of the increase in price per tonne.

124. Shellfish landings show a distinct seasonality as presented in **Figure 4-3** (**Appendix 14.1 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 therefore active throughout the year with a slight decrease in the winter months.

125. Although VMS data for the over 15m fishing vessels suggests there is little or no potting activity in the area overlapped by the SEP wind farm site (**Appendix 14.1 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 14.1 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.

126. The 2010 EIFCA mapping project indicates that the SEP wind farm site, DEP South, and the southwestern part of DEP North overlap crab and lobster fishing grounds. Only DEP North 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.

14.5.5.1.2 EU Landings trends

127. 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

128. 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 14.5.1**. The two key species landed are sole and plaice.

129. **Figure 4-6** of **Appendix 14.1 Commercial Fisheries Technical Report** presents the annual landings of sole and plaice between 2012 and 2016 and **Figure 4-7** of **Appendix 14.1 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.

130. Landings by Dutch registered vessels come from the western region of the wind farm sites area to the east of DEP and SEP. DEP South and SEP are not located within sole and plaice fishing grounds whereas DEP North is located within an area of low value (€0-1000 per year) for this fishery (**Figure 4-8** of **Appendix 14.1 Commercial Fisheries Technical Report**).

131. 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).

132. 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

133. Landings data for ICES rectangle 34F1 and 35F1 for key species landed by Belgian registered vessels are presented in **Figure 4-9** of **Appendix 14.1 Commercial Fisheries Technical Report**. Only plaice and sole were landed in quantities over 2 tonnes during between 2012 and 2016.

134. 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

135. 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 14.1 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

136. 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 14.1 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.

137. Significant sandeel grounds are located across the northern part of ICES rectangle 35F1 as presented in **Figure 2-12** of **Appendix 14.1 Commercial Fisheries Technical Report**. DEP North 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 DEP North.

14.5.5.2 Offshore cable corridor study area

138. The proposed offshore export cable corridor will be constructed between DEP North and landfall at Weybourne in a DEP in isolation scenario, or from SEP to landfall at Weybourne in a tandem scenario (with interlink cables connecting DEP North and DEP South to an OSP in SEP (see **Section 14.3.2**). Offshore cables will traverse ICES rectangles 35F1 and 34F1 (the offshore cable corridor study area).

139. 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 and despite there being a slight reduction in landed weight between 2017 and 2018 (**Figure 4-11**, **Appendix 14.1 Commercial Fisheries Technical Report**) the first sales value has increased from £1.3 million to £1.4 million. This growth is also seen from 2018 to 2019, with an increase in landed weight and first sales value to over £1.8 million from 34F1 and 35F1 in 2019 (MMO, 2020). This demonstrates the importance of the whelk fishery for this area.

140. The total landed weight for whelk in the wind farm sites area (35F1) in 2019 was approximately 1,156 tonnes compared with a weight of 1,374 tonnes from the wind farm sites and offshore export cable corridor areas combined (35F1 and 34F1) demonstrating that the main whelk fishing area is located within the wind farm sites area.

141. The landed value of brown crab and lobster in the offshore cable study area has remained relatively stable between 2015 and 2019, recorded at approximately £512,000 and £573,000 respectively in 2019 (**Figure 4-12**, **Appendix 14.1 Commercial Fisheries Technical Report**). Brown crab and lobster landed values from the wind farm sites study area from the same year were £249,000 and £224,000 respectively.

142. 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 10 m and fish relatively close to shore.

143. **Figure 4-13** of **Appendix 14.1 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.

14.6 Potential Impacts

14.6.1 Potential Impacts during Construction

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

14.6.1.1.1 DEP Wind Farm Sites in Isolation

144. 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 32 turbines constructed within the wind farm sites. The minimum space between turbines will be 0.99km.

Magnitude of effect

145. 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 array 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).

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

147. 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 the DEP wind farm area is in the region of £1000–5,000 per quadrat.

148. 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.

149. 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 the DEP wind farm sites. The fleet operates between shallower inshore areas to outside the 12 NM 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 the DEP wind farm sites area is considered to be a key potting ground. The magnitude for the UK potting fleet is therefore considered to be medium.

150. 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).

151. 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 the DEP wind farm sites are 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.

152. 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.

153. Therefore, the value of EU beam trawling is considered to be very low within the DEP wind farm site.

154. 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.

155. Sandeel grounds previously fished by Danish sandeel industrial trawlers overlap with a small proportion the DEP wind farm sites (2.04%), representing 20.87% of DEP North. 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 DEP North could be productive in the future including within the offshore construction period.

156. 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

157. 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.

158. 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, high recoverability and low value. The sensitivity of the receptor is deemed to be low for the Dutch, Belgian, French and Danish fleet.

159. 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 the DEP wind farm sites are considered to be of medium vulnerability, medium recoverability and high value. The sensitivity of this receptor is therefore considered to be medium.

Significance of the impact

160. 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.

161. 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, would therefore be of **moderate** adverse significance, which is significant in EIA terms.

Further mitigation

162. 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. Specifically, this will consist of the provision of evidence and data, examples of which include (FLOWW, 2015):

- Copy of certificate of registry for each vessel for which a claim is being made;
- Copy of a valid MCA certification or equivalent;
- Copy of the relevant vessel fishing licenses and entitlements for each vessel for which a claim is being made;
- Sight of vessels fishing charts and GPS plotter records to provide clear historic evidence of potential disruption in the area of the operations;
- Evidence of sales notes where available for an agreed time period;
- Fishing accounts of the vessels concerned for an agreed time period;
- Fishing vessel or and/or fisheries landings data held by fisheries authorities. Due to the requirements of the Data Protection Act, for access to individual records a declaration will need to be completed in order for records to be released; and
- It may be appropriate to validate sources of evidence not obtained directly from claimants in order to verify accuracy (for example, transcription errors may exist in official landings data). Similarly, corroboration/validation of evidence provided by claimants may be possible via independent sources such as fishery officers, for example.

163. Through the application of justifiable disturbance payments, the residual impact will, therefore, be of **minor adverse** significance, which is not significant in EIA terms.

14.6.1.1.2 SEP Wind Farm Site in Isolation

164. Offshore construction of SEP will take place over a period of up to 2 years with a maximum of 24 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 0.99km.

Magnitude of effect

165. 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.

166. 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 array 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).

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

168. UK Potters: VMS data for the over 12m vessels indicate that SEP 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.

169. SEP 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 SEP wind farm area 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.

170. 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.

171. 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 SEP is located indicate these vessels are targeting four key species identified as sole, plaice, whiting, and mackerel. However, the evidence indicates no activity within SEP wind farm site.

172. 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.

173. 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.

174. 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.

175. 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. SEP 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

176. 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.

177. 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 area. These fleets are considered to be of low vulnerability, high recoverability and low value. The sensitivity of the receptor is deemed to be low for the Dutch, Belgian, French and Danish fleet.

178. 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 the SEP wind farm site are considered to be of medium vulnerability, medium recoverability and high value. The sensitivity of this receptor is therefore considered to be medium.

Significance of the impact

179. 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.

180. 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, would therefore be of moderate adverse significance, which is significant in EIA terms.

Further mitigation

181. UK potting fleet: as described in **Section 14.6.1.1.1 Further mitigation**, through the application of justifiable disturbance payments, the residual impact will be of **minor adverse** significance, which is not significant in EIA terms.

14.6.1.1.3 DEP and SEP Wind Farm Sites Together

182. The construction of DEP and SEP together increases the maximum offshore construction period to 4 years over a total 7 year period if DEP and SEP 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

183. 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 DEP or SEP in isolation i.e., medium for UK potting, low for Dutch beam trawling and negligible for all other fleets.

Sensitivity of the receptor

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

Significance of the impact

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

Further mitigation

186. UK potting fleet: as described in **Section 14.6.1.1.1**, through the application of justifiable disturbance payments, the residual impact will be of **minor adverse** significance, which is not significant in EIA terms.

14.6.1.2 Impact 2: Offshore cable construction activities leading to reduction in access to, or exclusion from, establish fishing areas

14.6.1.2.1 DEP or SEP in Isolation

187. 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).

188. The construction scenario for offshore export cables associated with DEP or SEP built in isolation is based on an installation period of up to 110 days (60 days for DEP, 50 days for SEP), with a 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 DEP North and landfall, which overlaps with 35F1 and 34F1 by 1.24% for DEP in isolation and 0.26% for SEP in isolation.

Magnitude of effect

189. 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 6 NM limit and for UK fishing fleets in all areas and is described below on a fleet-by-fleet basis.

190. 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.

191. 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.

192. 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 (MPA) 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.

193. 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) but the duration will be short-term (up to 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).

194. 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

195. 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.

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

197. 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 route. 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, high recoverability and low value. The sensitivity of the receptor is deemed to be negligible.

198. The UK beam trawlers targeting shrimp are predominantly <18m in length and operate in distinct areas typically within 6 NM 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, medium recoverability and low value. The sensitivity of the receptor is therefore, considered to be low.

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

Significance of the impact

200. 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.

201. 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.

202. 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.

203. 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.

Further mitigation

204. UK potting fleet: as described in **Section 14.6.1.1.1** through the application of justifiable disturbance payments the residual impact will be of **minor adverse** significance, which is not significant in EIA terms.

14.6.1.2.2 DEP and SEP Together

205. The construction of DEP and SEP together increases the maximum offshore construction period to 4 years over a total 7 year period if DEP and SEP 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

206. 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 DEP or SEP in isolation i.e., medium for UK potting, low for UK shrimp beam trawling and negligible for all other fleets.

Sensitivity of the receptor

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

Significance of the impact

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

Further mitigation

209. UK potting fleet: as described in **Section 14.6.1.1.1.** Further mitigation, through the application of justifiable disturbance payments the residual impact will be of **minor adverse** significance, which is not significant in EIA terms.

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

14.6.1.3.1 DEP in Isolation

210. Localised exclusion from fishing grounds during phased construction of the DEP wind farm sites 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.

211. In terms of the area impacted by construction activities within the DEP wind farm sites, in total the footprint of infrastructure under construction equates to 0.46 km^2 of seabed 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

212. 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.

213. 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 the DEP wind farm sites are 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 the in areas around DEP wind farm sites than within the DEP wind farm sites.

214. 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.

215. 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.

216. 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.

217. Historically, under the CFP, certain EU vessels had historical agreements allowing rights to fish within the UK 12 NM 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.

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

219. 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

220. All commercial vessels operating outside the 12 NM 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, high recoverability and medium value. The sensitivity of all mobile fleets is therefore, considered to be low.

221. The UK potting fleet operates across large areas around and inshore of the DEP and SEP wind farm sites 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 seabed. 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, medium recoverability and medium value. The sensitivity of the UK potting fleet is therefore, considered to be medium.

Significance of the impact

222. 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.

223. 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 of moderate adverse significance to UK potters, which is not significant in EIA terms.

Further mitigation

224. UK potting fleet: as described in **Section 14.6.1.1.1** Further mitigation, through the application of justifiable disturbance payments the residual impact will be of **minor adverse** significance, which is not significant in EIA terms.

14.6.1.3.2 SEP in Isolation

225. Localised exclusion from fishing grounds during phased construction of the DEP wind farm site 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.

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

Magnitude of effect

227. 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.

228. VMS and landings statistics for the area surrounding 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 SEP 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 SEP wind farm site and little activity occurs within the SEP wind farm site. A similar situation exists for the over 12m potting fleet where VMS data indicates that there is a minimal amount of potting activity and the value within SEP wind farm site is the lowest within the regional study area.

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

230. In the case of vessels operating beam trawls the most valuable areas are to the east, and in the Wash to the southwest of SEP wind farm site, and for the over 12m 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 SEP wind farm site does not overlap the established fishing grounds.

231. Historically, under the CFP, certain EU vessels had historical agreements allowing rights to fish within the UK 12 NM 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.

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

233. 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

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

235. The UK potting fleet operates across large areas inshore from both DEP and SEP wind farm areas 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 seabed. It is expected that any displacement from mobile vessels may lead to exploring other fishing grounds outside SEP wind farm site, which includes areas currently targeted by potters. The UK potting fleet are deemed to be of high vulnerability, medium recoverability and medium value. The sensitivity of the UK potting fleet is therefore, considered to be medium.

Significance of the impact

236. 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.

237. 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 of moderate adverse significance to UK potters, which is not significant in EIA terms.

Further mitigation

238. UK potting fleet: as described in **Section 14.6.1.1.1** Further mitigation, through the application of justifiable disturbance payments the residual impact will be of **minor adverse** significance, which is not significant in EIA terms.

14.6.1.3.3 DEP and SEP Together

Magnitude of effect

239. 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 DEP or SEP in isolation i.e., medium for UK potting and low for all other fleets.

Sensitivity of the receptor

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

Significance of the impact

241. The significance of the impact is of moderate adverse significance for UK potters, which is significant in EIA terms, and minor adverse significance for all other fleets, which is not significant in EIA terms.

Further mitigation

242. UK potting fleet: as described in **Section 14.6.1.1.1** Further mitigation, through the application of justifiable disturbance payments the residual impact will be of **minor adverse** significance, which is not significant in EIA terms.

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

14.6.1.4.1 DEP or SEP in Isolation

243. 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.

244. 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.

245. 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

246. 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.

247. 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. Within the EIFCA jurisdiction to 6 NM a 500 pot limit is set for whelks. There are no pot limits outside 6 NM. Vessels targeting crab and lobster deploy between approximately 300 and 3,500 pots.

248. 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).

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

250. 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.

251. 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.

252. 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

253. 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 windfarm sites. All mobile fleets are deemed to be of low vulnerability, high recoverability and medium value. The sensitivity of all mobile fleets is therefore, considered to be low.

254. 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 seabed. 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, medium recoverability and medium value. The sensitivity of the UK potting fleet is therefore considered to be medium.

Significance of impact

255. 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.

256. 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.

14.6.1.4.2 DEP and SEP Together

Magnitude of effect

257. 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 DEP or SEP in isolation i.e., low for UK potting and negligible for all other fleets.

Sensitivity of the receptor

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

Significance of the impact

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

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

14.6.1.5.1 DEP or SEP in Isolation

260. 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

261. Assessments of the following potential construction impacts have been undertaken in **Chapter 11 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 seabed preparation resulting in potential effects on fish and shellfish receptors;
- Sediment deposition as a result of foundation installation, cable installation and seabed 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.

262. 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.

263. Details of the fish and shellfish ecology assessment are summarised in **Table 14-11** with evidence, modelling and justifications for these assessments provided in **Chapter 11 Fish and Shellfish Ecology**.

264. 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 14-11 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

Potential impact	Species	Significance of impact
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

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

266. 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.

267. 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.

268. 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

269. 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.

270. 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.

14.6.1.5.2 DEP and SEP Together

Magnitude of effect

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

Sensitivity of the receptor

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

Significance of the impact

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

14.6.1.6 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

14.6.1.6.1 DEP or SEP in Isolation

Magnitude of effect

274. Vessel movements (i.e. construction vessels transiting to and from areas undergoing construction works) related to the construction of DEP or SEP, offshore cables and all associated infrastructure will add to the existing level of shipping activity in the area (see **Chapter 15 Shipping and Navigation**).

275. Based on the extent of fishing across the offshore PEIR boundary 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

276. 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.

277. All other fleets are expected to be in a position to avoid the project areas during construction and the sensitivity of all other fleets is considered to be negligible.

Significance of impact

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

279. 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.

14.6.1.6.2 DEP and SEP Together

Magnitude of effect

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

Sensitivity of the receptor

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

Significance of the impact

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

14.6.2 Potential Impacts during Operation

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

14.6.2.1.1 DEP Wind Farm Sites in Isolation

283. The impacts of the offshore operation and maintenance of the DEP wind farm sites have been assessed on commercial fisheries. The environmental impacts arising from the operation and maintenance DEP wind farm sites are listed in **Table 14-11** along with the maximum design scenario against which each operation and maintenance phase impact has been assessed.

284. The assessment assumes that commercial fisheries will be prevented from actively fishing from an area of 0.46km^2 due to infrastructure within the DEP wind farm sites, including up to 32 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 14-3**). Minimum turbine spacing is 0.99km, including between turbines and all other infrastructure.

285. Outwith the area of 0.46km^2, the assessment assumes that fishing will resume within the DEP wind farm sites 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

286. 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.

287. The value and importance of DEP wind farm sites to commercial fishing fleets is presented for construction in **Section 14.6.1**. It is considered that this is the same for the operational and maintenance phase.

288. 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

289. The sensitivity of the commercial fisheries receptors is the same as that presented for construction in **Section 14.6.1**. 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 effect

290. 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**.

291. 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.

14.6.2.1.2 SEP Wind Farm Sites in Isolation

292. The impacts of the offshore operation and maintenance SEP wind farm site have been assessed on commercial fisheries. The environmental impacts arising from the operation and maintenance SEP wind farm site are listed in **Table 14-11** along with the maximum design scenario against which each operation and maintenance phase impact has been assessed

293. The assessment assumes that commercial fisheries will be prevented from actively fishing within a total area of 0.34km^2 due to infrastructure within the SEP wind farm site, including 24 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 14-3**. Minimum turbine spacing is 0.99km, including between turbines and all other infrastructure.

294. 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 SEP wind farm site. Inclement weather will be a significant contributor to this risk perception.

Magnitude of effect

295. 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.

296. The value and importance of SEP wind farm site to commercial fishing fleets is presented for construction in **Section 14.6.1**. It is considered that this is the same for the operational and maintenance phase.

297. Localised loss of access to fishing grounds from within 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 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

298. The sensitivity of the commercial fisheries receptors is the same as that presented for construction in **Section 14.6.1**. 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

299. 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**.

300. 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.

14.6.2.1.3 DEP and SEP Wind Farm Sites Together

Magnitude of effect

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

Sensitivity of the receptor

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

Significance of the impact

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

14.6.2.2 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

14.6.2.2.1 DEP or SEP in Isolation

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

Magnitude of effect

305. 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 0m within Cromer Shoal Chalk Beds MCZ and 0.5m outside the MCZ. Outside the MCZ, 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. A proposed option for the laying of the export cable located within the Cromer Shoal Chalk Beds MCZ is to surface lay the cable without protection.

306. 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.

307. 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 corridors, the magnitude is considered to be low for all fishing fleets.

Sensitivity of the receptor

308. All mobile commercial fishing fleets known to operate within the area of the export cable corridors are considered to have a considerable alternative fishing grounds available and 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, high recoverability and low value. The sensitivity of the receptor is therefore deemed to be low.

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

Significance of the impact

310. 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.

311. 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.

14.6.2.2.2 DEP and SEP Together

Magnitude of effect

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

Sensitivity of the receptor

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

Significance of the impact

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

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

14.6.2.3.1 DEP or SEP in Isolation

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

Magnitude of effect

316. 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.

317. 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 the DEP or SEP wind farm sites, 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

318. 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

319. 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.

320. 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.

14.6.2.3.2 DEP and SEP Together

Magnitude of effect

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

Sensitivity of the receptor

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

Significance of the impact

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

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

14.6.2.4.1 DEP or SEP in Isolation

324. The array cables, interconnector cables, export cables and associated cable protection, together with any structures on the seabed 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 15 Shipping and Navigation**.

Magnitude of effect

325. 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).

326. 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 seabed is the most hazardous to the vessel and crew due to the possibility of capsizing.

327. Consultation with the NFFO indicate that there are concerns relating to snagging for vessels deploying/hauling gear and vessels operating mobile gear in areas where there is unprotected surface lay of cable (which is proposed as an option within the Cromer Shoal MCZ). It is noted that the EIFCA MPA Byelaw 2019 prohibits mobile gear within the large majority of the Cromer Shoal MCZ and the entirety of the MCZ overlap with the offshore export cable. Implications of gear snagging with surface laid cable are therefore specific to non-mobile gear including potting.

328. 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 the DEP and SEP wind farm site infrastructure and cable protection. Levels of fishing effort by the EU mobile fleet are low within the DEP and SEP wind farm sites. For this reason, the magnitude of gear snagging is considered to be low.

329. The UK potting fleet has considerable effort within the DEP and SEP 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

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

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

Significance of the impact

332. 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.

333. 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.

14.6.2.4.2 DEP and SEP Together

Magnitude of effect

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

Sensitivity of the receptor

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

Significance of the impact

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

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

337. 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.

338. 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.

339. 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 11 Fish and Shellfish Ecology**.

14.6.2.5.1 DEP or SEP in Isolation

Magnitude of effect

340. As described in **Chapter 11 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.

341. 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.

342. 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 project areas.

343. 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 11 Fish and Shellfish Ecology**, together with a full assessment of this impact.

344. 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

345. 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

346. 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.

347. 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.

14.6.2.5.2 DEP and SEP Together

Magnitude of effect

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

Sensitivity of the receptor

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

Significance of the impact

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

14.6.2.6 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

14.6.2.6.1 DEP or SEP in Isolation

351. 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 is not significant in EIA terms.

14.6.2.6.2 DEP and SEP Together

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

14.6.3 Potential Impacts during Decommissioning

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

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

354. 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.

Further mitigation

355. 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 as described in **Section 14.6.1.1.1** Further mitigation.

356. The residual impact for the UK potting fleet will, therefore, be of **minor adverse** significance, which is not significant in EIA terms.

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

357. 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 EIA terms, minor adverse for UK shrimp beam trawl fleet and negligible adverse for all other fleets, which is not significant in EIA terms.

Further mitigation

358. 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 as described in **Section 14.6.1.1.1**. The residual impact for the UK potting fleet will, therefore, be of **minor** adverse significance, which is not significant in EIA terms.

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

359. 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.

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

360. 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.

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

361. 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.

14.6.3.6 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

362. 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 is not significant in EIA terms.

14.7 Cumulative Impacts

14.7.1 Identification of Potential Cumulative Impacts

363. The first step in the cumulative assessment is the identification of which residual impacts assessed for DEP and/or SEP 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 14-12** below, together with a consideration of the confidence in the data that is available to inform a detailed assessment and the associated rationale. Only potential impacts assessed in **Section 14.6** 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).

364. **Table 14-12** 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 14-12: 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 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 DEP and SEP.
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 DEP and SEP.
Construction Impact 4: Displacement from cable corridor leading to gear conflict and increased pressure on adjacent grounds	Yes	High	
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 DEP and SEP limits only); and/or

Impact	Potential for Cumulative Impact	Data Confidence	Rationale
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	• Management measures in place for DEP and SEP will also be in place on other projects reducing their risk of occurring.
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 DEP and SEP.
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 DEP and SEP.
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 DEP and SEP limits only); and/or

Impact	Potential for Cumulative Impact	Data Confidence	Rationale
Operation Impact 5: Operation and maintenance activities leading to displacement or disruption of commercially important fish and shellfish resources	No	High	• Management measures in place for DEP and SEP will also be in place on other projects reducing their risk of occurring.
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 DEP and SEP.
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 DEP and SEP.

Impact	Potential for Cumulative Impact	Data Confidence	Rationale
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 DEP and SEP limits only); and/or • Management measures in place for DEP and SEP 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	

14.7.2 Other Plans, Projects and Activities

365. 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 DEP & SEP, status of available data and rationale for including or excluding from the assessment.

366. 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 DEP and SEP. 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.

367. All projects and plans considered alongside DEP and SEP 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 6 EIA Methodology**.

Table 14-13: Summary of projects considered for the CIA in relation to DEP and SEP (project screening)

Project	Status	Distance from project (km)	Nearest project element	Confidence in Data (Tier)	Included in the CIA (Y/N)	Rationale
Dudgeon Offshore Wind Farm	Operational	0	Dudgeon Extension	High (1)	Y	
Sheringham Shoal Offshore Wind Farm	Operational	0	Sheringham Extension	High (1)	Y	
EIFCA Byelaw 12 Inshore trawling restriction and Byelaw 15 Towed gear restriction for bivalve molluscs	Active	0	Export cable	High (1)	Y	
MCZs within 100km of DEP and/or SEP	Designated	0 (Cromer Shoal Chalk Beds MCZ)	Export cable	1	Y	Including Cromer Shoal Chalk Beds, Markham's Triangle, Holderness Inshore and Holderness Offshore. Possible fishing restrictions to protect designated features

Project	Status	Distance from project (km)	Nearest project element	Confidence in Data (Tier)	Included in the CIA (Y/N)	Rationale
SPAs within 100km of DEP and/or SEP	Designated	0	Export cable	1	Y	Including: The Wash, North Norfolk Coast, Greater Wash and Humber Estuary. Possible fishing restrictions to protect designated features
SACs within 100km of DEP and/or SEP	Designated	The Wash and North Norfolk Coast SAC	Export cable	1	Y	Including: North Norfolk Coast, The Wash and North Norfolk Coast, Haisborough, Hammond and Winterton, Inner Dowsing, Race Bank and North Ridge, North Norfolk Sandbanks and Saturn Reef, Southern North Sea and Dogger Bank.

Project	Status	Distance from project (km)	Nearest project element	Confidence in Data (Tier)	Included in the CIA (Y/N)	Rationale
						Possible fishing restrictions to protect designated features
Race Bank Offshore Wind Farm Operation and Maintenance for non-cable activities - Generator assets	Operational	9.97	Sheringham Extension	High (1)	Y	Marine license (L/2018/00214) granted. Valid 24th October 2018-31st May 2043.
Lincs Offshore Wind Farm	Operational	34.37	Export cable	1		
Lincs Offshore Windfarm Maintenance of existing works	Operational	34.5	Sheringham Extension	1	Y	Marine license granted (L/2015/00094/1). Valid 13th March 2015-31st October 2038.
Lynn and Inner Dowsing Offshore Wind Farm	Operational	37.17	Export cable	1	Y	

Project	Status	Distance from project (km)	Nearest project element	Confidence in Data (Tier)	Included in the CIA (Y/N)	Rationale
Scroby Sands Offshore Wind Farm	Operational	51.43	Export cable	1	Y	
Great Yarmouth inner harbour dredge disposal. The works will be undertaken on an annual basis when required.	Operational	55.09	Dudgeon Extension	1	Y	Marine license (L/2016/00376) granted. Valid 12 December 2016-1st April 2026.
Humber Gateway Offshore Wind Farm	Operational	63.94	Export cable	1	Y	
Westermost Rough Offshore Wind Farm	Operational	80.6	Export cable	1	Y	
Triton Knoll Offshore Wind Farm	In construction	13.15	Dudgeon Extension	2	Y	

Project	Status	Distance from project (km)	Nearest project element	Confidence in Data (Tier)	Included in the CIA (Y/N)	Rationale
Hornsea Project Two Offshore Wind Farm	In construction	52.36	Dudgeon Extension	2		
Hornsea Project One Offshore Wind Farm	Commissioning	54.9	Dudgeon Extension	2	Y	
EIFCA Marine Protected Areas Byelaws Restricted area 35 (Weybourne to Happisburgh) closure to towed demersal gear to protect Cromer Shoal chalk beds	Implemented	0	Export cable	3	Y	
Independent Oil and Gas / Blythe Hub Development. Elgood well tied back via production pipeline to a new	Consented	1	Dudgeon Extension	3	Y	

Project	Status	Distance from project (km)	Nearest project element	Confidence in Data (Tier)	Included in the CIA (Y/N)	Rationale
production platform (Blythe)						
Norfolk Vanguard Offshore Wind Farm	Consented	58.44	Dudgeon Extension	3	Y	
Five Estuaries	Pre Scoping	72.7	3	Low (3)	Y	
North Falls	Pre Scoping	75.0	3	Low (3)	Y	
Dogger Bank A	Consented	80.5	3	High (3)	Y	
Dogger Bank B	Consented	93.6	3	High (3)	Y	
Sofia	Consented	93.6	3	High (3)	Y	
East Anglia THREE Offshore Wind Farm	Consented	94.83	Dudgeon Extension	High (3)	Y	

14.7.3 Assessment of Cumulative Impacts

368. Having established the residual impacts from DEP and/or SEP 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.

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

Magnitude of effect

369. The impacts of reduced access or exclusion from fishing grounds assessed within individual commercial fisheries assessments for key offshore wind farms are presented **Table 14-4**.

370. Due to the proximity of the operational Sheringham Shoal, Dudgeon and Race Bank offshore wind farms to DEP and SEP and to the grounds targeted by potters, they have the greatest potential to result in a cumulative impact for the North Norfolk potting fleet. All other wind farms are expected to have a negligible to low magnitude of effect on this fleet. It is noted that the Westermost Rough Offshore Windfarm ES predicted negligible to moderate adverse impacts for commercial fisheries. However, it is considered that the key potting fleet operating within the Westermost Rough is the Holderness Coast Fishing Industry Group, and that the Norfolk potting fleets do not routinely operate as far north as the Westermost Rough Offshore Wind Farm.

371. The ES for Sheringham Shoal, Dudgeon and Race Bank confirm activity by North Norfolk potting fleets across their array areas and offshore cable corridors. However, 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.

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

373. 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, Hornsea Project Two, Dogger Bank A, Dogger Bank B and Sofia. 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.

374. Based on available ESs (Forewind, 2013a; Forewind 2013b; Lincs Wind Farm Limited, 2010; RWE npower renewables, 2003; Scottish Power Renewables and Vattenfall, 2015; SMart Wind, 2013; SMart Wind, 2015; Vattenfall, 2018), 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.

375. 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.

376. 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 DEP and SEP 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.

377. 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).

378. The impact of the designated Cromer Shoal 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.

379. 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.

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

Sensitivity of receptor

381. Based on the operating range of the UK potting fleet under assessment, it is deemed to be of medium vulnerability, medium recoverability and medium value. The sensitivity of the receptor is therefore, considered to be medium.

382. Demersal fisheries fleets are deemed to be of low vulnerability, medium recoverability and low value. The sensitivity of the receptor is therefore, considered to be low.

Significance of impact

383. 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.

384. 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.

385. **Table 6.4** of **Appendix 14.1 Commercial Fisheries Technical Report** summarises the commercial fisheries impact assessment findings for key offshore wind farms included in the cumulative assessment.

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

Magnitude of effect

386. 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

387. 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

388. 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.

389. 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.

390. **Table 6.4** of **Appendix 14.1 Commercial Fisheries Technical Report** summarises the commercial fisheries impact assessment findings for key offshore wind farms included in the cumulative assessment.

14.8 Transboundary Impacts

391. 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 DEP and SEP 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 14.6** and **14.7**.

392. Transboundary impacts outside UK waters are limited to potential displacement of fishing effort from DEP and SEP 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.

14.9 Inter-relationships

393. The assessment of the impacts arising from construction, operation and decommissioning of DEP and SEP indicates that impacts on receptors addressed in other chapters may potentially further contribute to the impacts assessed on commercial fisheries and vice versa. **Table 14-14** provides a summary of the principal inter-relationships and sign-posts to where those issues have been addressed in the relevant chapters.

Table 14-14: 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 11 Fish and Shellfish Ecology**	**Section 14.6.1.5**	The impact receptor is fish and shellfish resources. Fish and shellfish species are also assessed in **Chapter 11 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 15 Shipping and Navigation**	**Section 14.6.1.6**	The impact relates to changes in changes in shipping routes. Changes to shipping routes are assessed in **Chapter 15 Shipping and Navigation**

Topic and description	Related chapter	Where addressed in this chapter	Rationale
Operation			
Operation and maintenance activities leading to displacement or disruption of commercially important fish and shellfish resources	**Chapter 11 Fish and Shellfish Ecology**	**Section 14.6.2.5**	The impact receptor is fish and shellfish resources. Fish and shellfish species are also assessed in **Chapter 11 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 15 Shipping and Navigation**	**Section 14.6.2.6**	The impact relates to changes in changes in shipping routes. Changes to shipping routes are assessed in **Chapter 15 Shipping and Navigation**
Decommissioning			
Decommissioning activities leading to displacement or disruption of commercially important fish and shellfish resources	**Chapter 11 Fish and Shellfish Ecology**	**Section14.6.3.5**	The impact receptor is fish and shellfish resources. Fish and shellfish species are also assessed in **Chapter 11 Fish and Shellfish Ecology**
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 15 Shipping and Navigation**	**Section 14.6.3.6**	The impact relates to changes in changes in shipping routes. Changes to shipping routes are assessed in **Chapter 15 Shipping and Navigation**

14.10 Interactions

394. 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 14-15**. This provides a screening tool for which impacts have the potential to interact.

Table 14-16 provides an assessment for each receptor (or receptor group) as related to these impacts.

395. Within **Table 14-16** 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 14-15: Interaction between impacts – screening

Potential Interaction between Impacts Construction						
	Impact 1: Construction activities and physical presence of constructed wind farm infrastructure leading to reduction in access to, or exclusion from established fishing grounds	Impact 2: Offshore cable construction activities leading to reduction in access to, or exclusion from, establish 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 infrastructure leading to reduction in access to, or exclusion from established fishing grounds	-	Yes	Yes	Yes	No	No
Impact 2: Offshore cable construction activities leading to reduction in access to, or exclusion from, establish fishing areas	Yes	-	Yes	Yes	No	No

Potential Interaction between Impacts						
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 14-16 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	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.

	Highest significance level				
Danish demersal trawlers targeting sandeel					
Commercially important fish and shellfish resources	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 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.

Potential Monitoring Requirements

396. Monitoring requirements for DEP and SEP will be described in the in-principle monitoring plan (IPMP) submitted alongside the DCO application and further developed and agreed with stakeholders prior to construction based on the 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 Fisheries Co-existence and Liaison Plan prior to the start of construction.

14.11 Assessment Summary

397. 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.

398. 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 DEP and SEP PEIR boundary.

399. 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;
- Danish demersal trawlers targeting sandeel throughout the North Sea with occasional effort overlapping the project area.

400. The assessment has established that there will be impacts of negligible to minor adverse significance on commercial fishing fleet receptors, and moderate adverse impacts on the UK potting fleet during construction, operation and decommissioning phases of DEP and SEP. Moderate impacts on the UK potting fleet, which are significant in EIA terms, will be mitigated through further mitigation in the form of justifiable disturbance payments to reduce the significance of residual impacts to minor adverse. **Table 14-17** presents a summary of the impacts assessed within this ES, the details of any necessary mitigation and the residual impacts.

Table 14-17: 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 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	N/A	**Negligible**
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**

Potential impact	Receptor	Sensitivity	Magnitude	Pre-mitigation impact	Mitigation measures proposed	Residual impact
	UK shrimp beam trawl	Medium	Low	Minor adverse	None beyond embedded mitigation	**Minor adverse**
	All other mobile fleets	Low	Negligible	Negligible	N/A	**Negligible**
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**
	All mobile fleets	Low	Low	Minor adverse	None beyond embedded mitigation	**Minor adverse**
Displacement from cable corridor 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	N/A	**Negligible**
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**

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 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	N/A	**Negligible**
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	N/A	**Negligible**
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	N/A	**Negligible**
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**

Potential impact	Receptor	Sensitivity	Magnitude	Pre-mitigation impact	Mitigation measures proposed	Residual impact
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	N/A	**Negligible**
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	N/A	**Negligible**
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**

Potential impact	Receptor	Sensitivity	Magnitude	Pre-mitigation impact	Mitigation measures proposed	Residual impact
	Dutch beam trawl	Low	Low	Minor adverse	None beyond embedded mitigation	**Minor adverse**
	All other mobile fleets	Low	Negligible	Negligible	N/A	**Negligible**
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	N/A	**Negligible**
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	**Minor adverse**

Potential impact	Receptor	Sensitivity	Magnitude	Pre-mitigation impact	Mitigation measures proposed	Residual impact
					(2014 and 2015), will be followed.	
	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**
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	N/A	**Negligible**

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