Dudgeon and Sheringham Shoal Offshore Wind Farm Extensions

Preliminary Environmental Information Report

Volume 1

Chapter 18 - Petroleum Industry and Other Marine Users

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Glossary of Acronyms

AfL	Agreement for Lease
BEIS	Department for Business, Energy and Industrial Strategy
CA	Cruising Association
CIA	Cumulative Impact Assessment
DCO	Development Consent Order
DEL	Dudgeon Extension Limited
DEP	Dudgeon Extension Project
EEA	European Economic Area
EEZ	Exclusive Economic Zone
EIA	Environmental Impact Assessment
ES	Environmental Statement
ESCA	European Subsea Cable UK Association
HSE	Health and Safety Executive
IOG	Independent Oil and Gas
IPC	Infrastructure Planning Commission
ICPC	The International Cable Protection Committee
IPMP	In-Principle Monitoring Plan
MCS	Marine Conservation Society
MCZ	Marine Conservation Zone
MoD	Ministry of Defence
MW	Megawatts
NRA	Navigational Risk Assessment
NPS	National Policy Statement
NSIP	Nationally Significant Infrastructure Project
OGA	Oil and Gas Authority
OSP	Offshore Substation Platform
PEIR	Preliminary Environmental Information Report
RYA	Royal Yachting Association
SEL	Scira Extension Limited
SEP	Sheringham Shoal Extension Project
UK	United Kingdom
UXO	Unexploded Ordinance

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 South and DEP North 2. DEP South and SEP 3. DEP North and SEP 1 is relevant if DEP is constructed alone or first in a phased development. 2 and 3 are relevant with an integrated grid option.
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 which will contain cables outside of a wind farm site(s), 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 (220 – 230kV).
Offshore substation platform	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.

18 PETROLEUM INDUSTRY AND OTHER MARINE USERS

18.1 Introduction

1. This chapter of the Preliminary Environmental Information Report (PEIR) considers the potential impacts of the proposed Dudgeon Offshore Wind Farm Extension Project (DEP) and Sheringham Shoal Offshore Wind Farm Extension Project (SEP) on the petroleum industry and other marine users including existing and planned offshore infrastructure. 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 DEP and SEP.
2. This chapter has been written by Royal HaskoningDHV, with the assessment undertaken with specific reference to the relevant legislation and guidance, of which the primary source 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 18.4**.
3. Activities and users considered include those associated with the petroleum industry (also defined as the offshore oil and gas industry in this chapter) including platforms, and subsea infrastructure including pipelines; other offshore wind infrastructure; telecommunications cables and interconnector cables; marine aggregate extraction; disposal sites; aquaculture, unexploded ordnance (UXO); and recreational activities.
4. The assessment should be read in conjunction with the following linked chapters:
   - **Chapter 14 Commercial Fisheries**;
   - **Chapter 15 Shipping and Navigation**; and
   - **Chapter 17 Aviation and MoD**.

18.2 Consultation

5. Consultation with regard to the petroleum industry and other marine users has been undertaken in line with the general process described in **Chapter 6 EIA Methodology**. The key elements to date have included scoping and targeted consultation with stakeholders with assets in proximity to DEP and SEP, including oil and gas operators. The feedback received has been considered in preparing the PEIR. **Table 18-1** provides a summary of how the consultation responses received to date have influenced the approach that has been taken.
6. 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 18-1: Consultation responses

Consultee	Date / Document	Comment Received	Project Response
Petroleum Industry including pipelines			
Oil and Gas operators	TBC	Consultation has commenced and responses will be reported in the final ES.	NA
Independent Oil and Gas (IOG)	TBC	Consultation has commenced and responses will be reported in the final ES.	NA
Other offshore wind farms			
The Planning Inspectorate	Scoping Opinion, 19/11/19	"The Scoping Report proposes to scope out **potential interference with other wind farms,** however, it explains that the proposed export cable corridor options are likely cross over the existing Dudgeon export cables and the Hornsea Project Three offshore wind farm (if consented). The Inspectorate welcomes that crossing agreements will be sought with cable owners and operators and appropriate installation and protection measures developed. The Inspectorate considers that any likely significant effects should be assessed in the ES."	The impact to subsea cables associated with other offshore wind farms is assessed in **Section 18.6**. See also **Section 18.5.4** for details of the other offshore wind farms considered.
Cables			
The Planning Inspectorate	Scoping Opinion, 19/11/19	"Further consultation is proposed to identify potential sensitive receptors; therefore, the Inspectorate considers that the ES should assess potential impacts to **telecommunication cables and interconnectors** where significant effects are likely."	The impact to subsea cables and pipelines has been scoped into this assessment and is addressed in **Section 18.6**.

Consultee	Date / Document	Comment Received	Project Response
Aggregate and disposal sites			
The Planning Inspectorate	Scoping Opinion, 19/11/19	"On the basis that there is no overlap of known **aggregate licence areas or disposal sites** with the extension areas or export cable corridors, the Scoping Report scopes out an assessment of effects. However, section 2.13.3 of the Scoping Report proposes that the ES will identify aggregate sites and disposal sites in the baseline environment. Should the desk based assessment identify any previously unknown disposal sites or aggregate sites, the ES should assess any likely significant effects to these receptors that could arise from the Proposed Development. The Inspectorate welcomes that any impacts from proposed dredger transit activities will be assessed as part the Shipping and Navigation aspect."	No additional disposal sites or aggregate sites have been identified since the publication of the Scoping Report. **Figure 18.5** shows that there are no disposal sites or aggregate sites within the wind farm sites or proposed offshore cable corridors. Impacts from proposed dredger transit are addressed in **Chapter 15 Shipping and Navigation**.
UXO			

Consultee	Date / Document	Comment Received	Project Response
The Planning Inspectorate	Scoping Opinion, 19/11/19	"The Scoping Report states that detailed geophysical survey and investigation would identify any **UXO** and measures would be taken to mitigate risks of detonation. The Scoping Report considers this is a health and safety risk rather than being an environmental issue and notes that potential impacts to other receptors will be assessed where relevant (e.g. fish and marine mammal ecology). The EIA Regulations 2017 require an assessment of the likely significant effects to population and health, and resulting from the vulnerability of the Proposed Development to risks of major accidents and/or disasters.	The impact to population and health from UXO is addressed in **Chapter 30 Health**.
Transboundary			
The Planning Inspectorate	Scoping Opinion, 19/11/19	"The Inspectorate considers that given the location of the Proposed Development, significant **transboundary effects** to other marine users are unlikely and that this matter can be scope out of the ES. This is on the basis that transboundary impacts on commercial fishing and shipping and navigation are assessed in their respective aspect chapters."	Transboundary effects have been assessed in **Chapter 14 Commercial Fisheries** and **Chapter 15 Shipping and Navigation** in line with the Planning Inspectorate's recommendations.

18.3 Scope

18.3.1 Study Area

7. The study area for this assessment has a wide geographic scope to ensure that all plans, projects and activities that have the potential to be influenced by DEP and SEP are identified and included in the assessment. In the majority of cases, this is the area encompassed by and within 5km of the boundaries of the wind farm sites and offshore cable corridors.

8. The assessment considers existing as well as planned projects and activities, where information is within the planning system, otherwise publicly available, or has been made available to Equinor through the consultation process.

18.3.2 Realistic Worst Case Scenario

18.3.2.1 General Approach

9. 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**.

10. The realistic worst case scenarios for the petroleum industry and other marine users assessment are summarised in **Table 18-2**. These are based on the project parameters described in **Chapter 5 Project Description**, which provides further details regarding specific activities and their durations.

11. In addition to the design parameters set out in **Table 18-2**, consideration is also given to how DEP and SEP will be built out as described in **Section 18.3.2.2** to **Section 18.3.2.4** 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 DEP and SEP will be developed, and if both are developed, that construction may be undertaken either concurrently or sequentially.

Table 18-2: Realistic Worst Case Scenarios

Impact	DEP in Isolation	SEP in Isolation	DEP & SEP Together	Notes and Rationale
Construction				
General disruption or damage to the activities or assets of the petroleum industry and other marine users (including other offshore wind farm export cables, oil & gas, and subsea cables)	**Wind farm sites:** Two wind farm sites totaling **103.5km²** (DEP North: 64.8km² DEP South: 38.7km²) Installation of up to **32 turbines** (between 17 and 32 ranging from 14MW to 26MW) and **1 offshore substation platform** (OSP) in DEP North Safety zones of 500m radius from any construction activity (to be applied for) **Offshore cables:** Up to **267km** of cables comprising:	**Wind farm site:** One wind farm site totaling **92.6km²** Installation of up to **24 turbines** (between 13 and 24 ranging from 14MW to 26MW) and **1 OSP** comprising in the SEP wind farm site Safety zones of 500m radius from any construction activity (to be applied for) **Offshore cables:** Up to **130km** of cables comprising:	**Wind farm sites:** Three farm sites totaling **196.1km²** (DEP North, DEP South and SEP). Installation of up to **56 turbines** (between 30 and 56 ranging from 14MW to 26MW) and **2 OSPs** in DEP North and SEP wind farm sites (if projects not integrated) Safety zones of 500m radius from any construction activity (to be applied for)	The worst case scenario represents the construction scenario which would create the maximum disruption for the longest period for the petroleum industry and other marine users. This includes activities which could adversely affect the activities of the petroleum industry and other marine users, through: • overlapping other projects (area covered by the export cable corridor and the wind farm site); • disruption to services (e.g. transit routes) affecting safety (navigation and buffer zones around structures); • potential adverse impact of structure construction (wind

Impact	DEP in Isolation	SEP in Isolation	DEP & SEP Together	Notes and Rationale
	• One HVAC export cable up to **62km** in length • **135km** of infield cables (DEP North: 90km; DEP South: 45km) • Up to 3 parallel interlink cables between DEP South and OSP in DEP North: up to **66km** in length (combined) • Burial depth: 0.5 to 1m (excluding burial in sand waves up to 20m; export cable	• One HVAC export cable up to **40km** in length • **90km** of infield cables • No interlink cables • Burial depth: Same as DEP in isolation	**Offshore cables (worst case scenario[1]):** Up to **481km** of cables: • 2 HVAC export cables up to **102km** in length (DEP 62km and SEP 40km) • Up to **225km** of infield cables • Up to 7 interlink cables up to **154km** total length (7 cables from DEP North to OSP in SEP and DEP South not developed) **Realistic worst case scenario** Up to 448km cables (80km export, 225km of infield, 143 interlink)	turbines and ancillary structures number and location and foundation type); • export and inter-array cable excavation, layout and properties; • cable and pipeline crossings; and • suspended sediments. **DEP and SEP together worst case scenario per cable** **Export:** DEP and SEP are developed in a separated grid option (each having their own substation and export cable).

[1] The individual worst case scenarios presented for export, interlink and infield cables would not represent a developable scenario if taken as a total, therefore a 'realistic' worst case scenario for all cables is presented for this and for all other activities that vary depending on the development scenario in question. This includes sandwave clearance, number of OSP and anchoring.

Impact	DEP in Isolation	SEP in Isolation	DEP & SEP Together	Notes and Rationale
	surface lay possible in Cromer Shoal Chalk Beds MCZ) • Cable trench maximum width of disturbance: 1.5 **Maximum area disturbed: 0.789km²** • (Export cable 0.186km², Infield cables 0.405km², Interlink cables 0.198km²) **Subsea cable surface protection and pipeline crossings:** 0.051km² Up to **3.0km of surface protection** (0.5km export cables, 1.5km interlink cables, 1.0km infield cables)	• Cable trench maximum width of disturbance: Same as DEP in isolation **Maximum area disturbed: 0.390km²** • (Export cable 0.120km², Infield cables 0.270km²) **Subsea cable surface protection and pipeline crossings:** 0.015km²	• Burial depth: Same as DEP and SEP in isolation • Cable trench maximum width of disturbance: Same as DEP and SEP in isolation **Maximum realistic disturbed area** (Integrated grid option, both DEP North and South developed): **1.34km²** • (Export cable 0.24km², Infield cables 0.68km², Interlink cables 0.43m²) **Subsea cable surface protection and pipeline crossings:** 0.059km²	**Infield:** Assumes SEP, DEP North and DEP South are all built. **Interlink:** Assumes DEP and SEP are developed in an integrated grid option but only DEP North is developed. **Realistic worst case scenario for cables** The realistic worst case scenario for cables is DEP and SEP are developed in an integrated grid option and both DEP North and DEP South are developed.

Impact	DEP in Isolation	SEP in Isolation	DEP & SEP Together	Notes and Rationale
	Up to **17 crossings** (overtrawlable) assuming unbundled installation • Infield cables, up to 7 crossings (3 in DEP North at Durango-Waveney pipeline, up to 4 in DEP South) • Interlink cables, up to 6 crossings (3 cables crossing 2 Dudgeon export cables) • Export cable, up to 4 crossings (2 at Dudgeon export cables, 2 for Hornsea Three export cables). One disused subsea cable crosses the export cable but no crossing required.	Up to **1.5km of surface protection** (0.5km export cables, 1.0km infield cables) Up to **four crossings** (overtrawlable) assuming unbundled installation • Infield cables, no crossings • Export cable, up to 4 crossings (2 for Dudgeon export cables, 2 for Hornsea Three export cables). One disused subsea cable crosses the export cable but no crossing required.	Up to **3km of surface protection** (0.5km export cables, 1.5km interlink cables, 1km infield cables) Up to **21 crossings** (overtrawlable) assuming unbundled installation • Infield cables, up to 5 crossings (3 in DEP North at Durango-Waveney pipeline, up to 4 in DEP South) • Interlink cables, up to 6 crossings (3 cables crossing 2 Dudgeon export cables) • Export cables, up to 8 crossings (4 at Dudgeon export cables, 4 for Hornsea Three export cables). One disused subsea cable crosses the export cable but no crossing required.	

Impact	DEP in Isolation	SEP in Isolation	DEP & SEP Together	Notes and Rationale
	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** **Maximum temporal footprint** • Duration of offshore construction: **2 years**	**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** **Maximum temporal footprint**	**HDD Exit Point (1356m²)** • 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** **Maximum temporal footprint**	Horizontal Directional Drilling (HDD) beneath intertidal zone with offshore exit point approximately 1,000m offshore. For the DEP and SEP together scenario, the initial trench assumes both export cables are within the same initial trench, meaning the area of disturbance is the same as DEP and SEP in isolation scenarios. However, for the transition zone it assumes two trenches therefore the area of disturbance is double DEP

Impact	DEP in Isolation	SEP in Isolation	DEP & SEP Together	Notes and Rationale
	Vessel movements: • Maximum number of construction vessels on site at any one time: 16 • Construction vessel trips to port: 603 over 2 years	• Duration of offshore construction: **2 years** **Vessel movements:** • Maximum number of construction vessels on site at any one time: 16 • Construction vessel trips to port: 603 over 2 years	• Duration of offshore construction: **4 years** if built sequentially with a maximum gap of 1 year. **Vessel movements:** • Maximum number of construction vessels on site at any one time: 25 in total if both DEP and SEP constructed concurrently) • Construction vessel trips to port: 1,196 over 2 years (concurrent) or 4 years (sequential)	and SEP in isolation scenarios. Jack up footprint for DEP and SEP together is includes total jack up legs footprint and jack up movements required.
Operation				
General disruption or damage to the activities or assets of the petroleum	**Maximum spatial footprint:** as for construction, excluding safety zones (not required	**Maximum spatial footprint:** as for construction, excluding safety zones (not required during routine operation)	**Maximum spatial footprint:** as for construction, excluding safety zones (not required during routine operation)	This scenario represents the greatest potential disruption to the petroleum industry and other marine users during operational activities including:

Impact	DEP in Isolation	SEP in Isolation	DEP & SEP Together	Notes and Rationale
industry and other marine users (including other renewable energy projects, oil & gas, aggregates and subsea cables)	during routine operation) **Wind farm sites (0.46km^2):** Operation of up to **32 turbines** with GBS foundations and scour protection, total footprint **0.458km^2** and **1 OSP** in DEP North with jacket foundations with suction cans and scour protection, total footprint **0.0017km^2** **Offshore cables and crossings:** As for construction **Maximum temporal footprint:** The operational lifetime is expected to be 35 years	**Wind farm sites (0.35km^2):** Operation of up to **24 turbines** with GBS foundations and scour protection, total footprint **0.344km^2** and **1 OSP** in DEP North with jacket foundations with suction cans, and scour protection, total footprint **0.0017km^2** **Offshore cables and crossings:** As for construction **Maximum temporal footprint:** The operational lifetime is expected to be 35 years	**Wind farm sites (0.805km^2):** Operation of up to **56 turbines** with GBS foundations and scour protection, total footprint **0.802km^2** and **2 OSPs** in DEP North and SEP (if projects not integrated) with jacket foundations with suction cans, and scour protection, total footprint **0.0033km^2** **Offshore cables and crossings:** As for construction **Maximum temporal footprint:** The operational lifetime is expected to be 35 years **Vessel movements:**	• Footprint of the actual project structures from DEP and SEP; • Maintenance and repair vessel activity and anchoring; • Use of port services; and • Crossings and proximity of cables and pipelines during operation and maintenance. **Proximity:** Separation distance of 500m from existing operational infrastructure and wind turbines proposed

Impact	DEP in Isolation	SEP in Isolation	DEP & SEP Together	Notes and Rationale
	Vessel movements: • Maximum number of vessels on site at any one time: 7 Operation and maintenance vessel trips to port per year: approximately 690 (although majority (624) will be (small O&M vessel (CTV))	**Vessel movements:** • Maximum number of vessels on site at any one time: 7 • Operation and maintenance vessel trips to port per year: approximately 690 (although majority (624) will be (small O&M vessel (CTV))	• Maximum number of vessels on site at any one time: 9 • Operation and maintenance vessel trips to port per year: approximately 694 (although majority (624) will be (small O&M vessel (CTV))	
Decommissioning				
General disruption or damage to the activities or assets of the petroleum industry and other marine users (including other renewable energy projects, oil & gas,	No final decision has yet been made regarding the final decommissioning policy for the offshore project infrastructure. It is also recognised that legislation and industry best practice change over time. However, the following infrastructure is likely be removed, reused or recycled where practicable: • Turbines including monopile, steel jacket and GBS foundations; • OSPs including topsides and steel jacket foundations; and • Offshore cables may be removed or left *in situ* depending on available information at the time of decommissioning. The following infrastructure is likely to be decommissioned *in situ* depending on available information at the time of decommissioning:			Decommissioning arrangements will be detailed in a Decommissioning Plan, which will be drawn up and agreed with the Department for Business, Energy and Industrial Strategy (BEIS) prior to construction.

Impact	DEP in Isolation	SEP in Isolation	DEP & SEP Together	Notes and Rationale
aggregates and subsea cables)	• Scour protection; • Offshore cables may be removed or left *in situ*; and • Crossings and cable protection The detail and scope of the decommissioning works will be determined by the relevant legislation and guidance at the time of decommissioning and will be agreed with the regulator. For the purposes of the worst case scenario, it is anticipated that the impacts will be no greater than those identified for the construction phase.			

18.3.2.2 Construction Scenarios

12. 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 projects 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 construction including 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 start of construction of the first project, and the start of construction of the second project may vary from two to four years;
        - If the gap between the projects is less than two years, the first project would wait for the second project in order to be constructed together.
    - 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.
13. 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.
14. The three construction scenarios considered in the petroleum industry and other marine users 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. This would result in a maximum gap in offshore construction of one year.
15. 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 18.6**). For each potential impact only the worst case construction scenario for the two projects is presented, i.e. either concurrent or sequential. The justification for what constitutes the worst case is provided, where necessary, in **Section 18.6**.

18.3.2.3 Operation Scenarios

16. 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.

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

18.3.2.4 Decommissioning Scenarios

18. 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.

18.3.3 Summary of Mitigation Embedded in the Design

19. The location of the wind farm sites and proposed offshore export corridor has been selected to minimise potential interactions with neighbouring infrastructure. This is the key embedded mitigation with regard to the petroleum industry and other marine users. **Chapter 4 Site Selection and Assessment of Alternatives** describes the process of development of the wind farm sites and the proposed offshore export cable corridor. As a result, DEP and SEP are:
    - Located away from offshore wind farm sites (excluding the parent Dudgeon and Sheringham Shoal offshore wind farm sites) and proposed offshore wind farms (the SEP wind farm site boundary was selected to be 5km from the proposed Race Bank extension);
    - Located a minimum of 500m away from oil and gas platforms and subsea wellheads;
        - Turbines and OSPs located a minimum of 500m away from oil and gas pipelines;
    - Located away from telecommunication and transmission cables;
    - Located outside any areas licenced for dredging and aggregate extraction;
    - Located outside of major shipping lanes and areas of high density shipping (considered further in **Chapter 15 Shipping and Navigation**).
    - Located outside any MoD danger areas; and
    - Located outside any MoD practice and exercise areas.

20. Owners and operators of infrastructure (including oil and gas operators, other wind farm developers, dredging companies and cable operators) have been and will continue to be, consulted by Equinor, and commercial and technical agreements will be put in place where required ahead of construction. Crossing and proximity agreements will be agreed post-consent with the relevant asset owners.

21. Construction, operation and maintenance, and decommissioning activity will be communicated using Notice to Mariners. Temporary 500m safety zones will be in place around vessels undertaking work.

18.4 Impact Assessment Methodology

18.4.1 Policy, Legislation and Guidance

18.4.1.1 National Policy Statements

22. The assessment of potential impacts upon the petroleum industry and other marine users has been made with specific reference to the relevant NPS. These are the principal decision making documents for Nationally Significant Infrastructure Projects (NSIPs). The NPS for Renewable Energy Infrastructure (EN-3) (DECC 2011) is the NPS of most relevance to the petroleum industry and other marine users.

23. The specific assessment requirements for the petroleum industry and other marine users, as detailed in the NPS, are summarised in **Table 18-3** together with an indication of the section of the PEIR chapter where each is addressed.

Table 18-3: NPS Assessment Requirements

NPS Requirement	NPS Reference	Section Reference
NPS for Renewable Energy Infrastructure (EN-3)		
There may be constraints imposed on the siting or design of offshore wind farms because of restrictions resulting from the presence of other offshore infrastructure and activities.	Section 2.6, paragraph 2.6.35	**Chapter 4 Site Selection and Alternatives** provides the rationale for the location of the wind farm areas, array cables and proposed offshore export cable corridor, which includes consideration of constraints associated with other offshore infrastructure.

NPS Requirement	NPS Reference	Section Reference
Where a potential offshore wind farm is proposed close to existing operational offshore infrastructure, or has the potential to affect activities for which a license has been issued by Government, the applicant should undertake an assessment of the potential effect of the proposed development on such existing or permitted infrastructure or activities. The assessment should be undertaken for all stages of the lifespan of the proposed wind farm in accordance with the appropriate policy for offshore wind farm EIAs.	Section 2.6, paragraph 2.6.179	The potential impacts are assessed in **Section 18.6**.
Applicants should engage with interested parties in the potentially affected offshore sectors early in the development phase of the proposed offshore wind farm, with an aim to resolve as many issues as possible prior to the submission of an application to the Infrastructure Planning Commission (IPC).	Section 2.6, paragraph 2.6.180	Consultation with owners and operators of offshore infrastructure is being undertaken by Equinor, consultation responses received to date are shown in **Table 18-1**.
Such stakeholder engagement should continue throughout the life of the proposed development including construction, operation and decommissioning phases where necessary. As many of these offshore industries are regulated by Government, the relevant Secretary of State should also be a consultee where necessary. Such engagement should be taken to ensure that solutions are sought that allow offshore wind farms and other uses of the sea to successfully co-exist.	Section 2.6, paragraph 2.6.181	Consultation with the secretary of state has been undertaken as part of the scoping phase. The scoping opinion from the Secretary of State in relation to the petroleum industry and other marine users are shown in **Table 18-1**.

18.4.1.2 Other

24. In addition to the NPS, there are a number of pieces of legislation, policy and guidance applicable to the assessment of the petroleum industry and other marine users. These include:

- European Subsea Cable UK Association (ESCA) Guideline No. 6 – The Proximity of Offshore Renewable Energy Installations and Submarine Cable Infrastructure in UK Waters (ESCA, 2016);
- The International Cable Protection Committee (ICPC) has issued a series of recommendations for marine cables, specifically:
  - Recommendations No. 2 – Recommended Routing and Reporting Criteria for Cables in Proximity to Others (ICPC, 2015);
  - Recommendations No. 3 – Criteria to be Applied to Proposed Crossings Submarine Cables and/or Pipelines (ICPC, 2014);
  - Recommendations No. 13 – The Proximity of Offshore Renewable Wind Energy Installations and Submarine Cable Infrastructure in National Waters (ICPC, 2013).
- Oil and Gas UK – Pipelines Crossing Agreement and Proximity Agreement Pack (Oil and Gas UK, 2015); and
- Oil and gas licencing rounds information (Oil and Gas Authority, 2018).

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

18.4.2 Data and Information Sources

26. The data sources that have been used to inform the assessment are listed in **Table 18-4**.

Table 18-4: Other available data and information sources.

Data set	Spatial coverage	Year	Notes
Petroleum Industry	UK	2021	Oil and Gas Authority: https://ogauthority.maps.arcgis.com/apps/webappviewer/index.html?id=adbe5a796f5c41c68fc762ea137a682e Oil and gas surface and subsurface infrastructure, wells, pipelines and licensing information.
Offshore wind farms	UK	2021	The Crown Estate: https://thecrownestate.maps.arcgis.com/apps/webappviewer/index.html?id=b7f375021ea845fcabd46f83f1d48f0b Planned, consented, under construction wind farm areas and export cable corridors. Proposed offshore wind extension projects.

Data set	Spatial coverage	Year	Notes
Offshore cables	UK	2021	Offshore Renewables and Cable Awareness (KIS-ORCA), publicly available data: https://kis-orca.eu/map/#
Aggregate sites	UK	2021	The Crown Estate: https://thecrownestate.maps.arcgis.com/apps/webappviewer/index.html?id=b7f375021ea845fcabd46f83f1d48f0b Marine aggregates production and exploration options areas.
Dredger transit routes	UK	2009	BMAPA: https://bmapa.org/issues/renewable_energy.php Aggregate dredger transit routes (all passage plans).
Disposal sites	UK	2021	Cefas: http://data.cefas.co.uk/#/View/407

18.4.3 Impact Assessment Methodology

27. **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 the petroleum industry and other marine users.

28. The assessment of impacts on the petroleum industry and other marine users has focused on establishing potential for overlaps, interactions and the consequential potential for conflict between activities in both a geographical and temporal context. This information has been obtained through statements made in publicly available literature (e.g. information in an EIA or Scoping Report) or through consultation with the relevant operator of the activity as discussed in **Section 18.2**.

18.4.3.1 Definitions

29. 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 Petroleum Industry and Other Marine Users assessment are provided in **Table 18-5** and **Table 18-6**.

Table 18-5: Definition of sensitivity.

Sensitivity	Definition
High	High value activity/activity fundamental to the operator or infrastructure that is of international or national economic importance. No redundancy available in the event of impact. Asset very sensitive to the impact. For example, gas pipeline, electrical infrastructure or telecommunication cable supporting UK or European activity or nationally important aggregates area where extraction company has no access to areas of equal quality aggregates.
Medium	Medium value activity. Impact to asset would significantly reduce operators' activities but not result in complete failure to continue operations. Limited redundancy available. Asset regionally important. Asset has limited tolerance of impact. For example, gas pipeline, electrical infrastructure or telecommunication cable, where asset owners have some potential for redundancy planning. Aggregates areas where extraction company has some, but limited access to equal quality aggregate.
Low	Low value activity. Impact to asset would have limited implications on operator/public either due to the availability of redundancy or limited pathway for impact. Asset has some tolerance of impact. For example, electrical or telecommunication cable with ability to undertake redundancy planning to limit impact. Aggregates area where extraction company has access to large area of equal quality aggregate.
Negligible	Low value activity, operators' activities would not be significantly reduced by impact. Asset generally tolerant of impact. Limited impact to asset owners or local community in case of damage or failure.

Table 18-6: Definition of magnitude.

Magnitude	Definition
High	Loss of resource and / or quality and integrity of receptor; severe damage to key characteristics, features or elements. For example, accidental damage to asset resulting in permanent or long term inoperability or complete loss of access to economically important asset.
Medium	Loss of resource, but not adversely affecting integrity of resource; partial loss of / damage to key characteristics, features or elements. For example, damage to an asset that results in either short term, complete inoperability or long term reduced functionality. Partial loss of access to economically important asset, or short term complete loss of access.

Magnitude	Definition
Low	Some measurable change in attributes, quality or vulnerability, minor loss or, or alteration to, one (maybe more) key characteristics, features or elements. For example, accidental damage to asset resulting in short term reduction of functionality but not complete loss of function. Short term disruption to access of asset.
Negligible	Very minor loss or detrimental alteration to one or more characteristics, features or elements, and / or slight alteration to activity.

18.4.3.2 Impact Significance

30. 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 18-7**. Definitions of each level of significance are provided in **Table 18-8**.

31. 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 18-7: 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 18-8: 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.

Significance	Definition
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.

18.4.4 Cumulative Impact Assessment Methodology

32. 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 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.

33. Further detail on potential cumulative impacts is provided in **Section 18.7**.

18.4.5 Transboundary Impact Assessment Methodology

34. The transboundary assessment considers the potential for transboundary effects to occur on other marine user receptors as a result of DEP and SEP; 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.

35. For the petroleum industry and other marine users, the potential for transboundary effects has been scoped out in line with the recommendation of the Planning Inspectorate in the Scoping Opinion (Planning Inspectorate, 2019) (see **Table 18-1**).

18.4.6 Assumptions and Limitations

36. Characterisation of the existing environment and the resulting impact assessment is based on publicly available information, purchased data or information gained directly from the relevant companies / organisations during consultation. There may be elements of uncertainty associated with the locations of some existing infrastructure and where this is the case, this will be discussed with the owners / operators and / or established during pre-construction surveys as necessary.

18.5 Existing Environment

18.5.1 Petroleum Industry Infrastructure

37. The southern North Sea is a mature area of oil and gas development with wells and production platforms producing from primarily gas reservoirs and exporting via pipelines to onshore terminals, such as the Bacton gas terminal, for further processing and transmission to the downstream gas distribution network. Some of this infrastructure is now undergoing decommissioning as hydrocarbon fields reach the end of the economic life.

38. The DEP and SEP project boundaries were chosen with the aim of avoiding direct interaction with oil and gas infrastructure as much as possible. The nearest oil and gas infrastructure is associated with the Anglia, Lancelot and Waveney gas fields. There is no surface oil and gas infrastructure within the DEP or SEP wind farm sites or the proposed offshore export cable corridor. However the normally unmanned Perenco-operated Waveney gas platform is located close to the northern boundary of the DEP North wind farm site such that the DEP North boundary has been routed around the Waveney 500m safety zone. The Lancelot A platform, also operated by Perenco and normally unmanned, is located to the north and within 5km of the DEP North wind farm site.

39. The planned Blythe Hub surface and subsurface infrastructure is located in close proximity to the DEP wind farm sites, and a connecting pipeline will route directly North of DEP South, stopping south of DEP North. The Blythe Hub project includes the development of two gas fields, Blythe and Elgood, located in blocks 48/23 and 48/22. Both fields are 100% owned and operated by Independent Oil and Gas (IOG). A normally unmanned offshore production platform will be constructed at Blythe with a single production well beneath the platform. A single subsea well will also be developed in the Elgood field to the north west of the Blythe platform and will be tied back to Blythe via a 6" subsea flowline and controlled from Blythe by an umbilical. As stated in the Blythe Hub Development Environmental Statement, the present project schedule is that offshore activities will commence in Q3 2020 with the laying of the pipeline infrastructure, to be followed in Q1 of 2021 with the installation of the Blythe platform and the drilling of the Elgood and Blythe wells. The production of 'first gas' is now planned for Q3 2021 (IOG, 2020).

40. A list of all surface and subsurface infrastructure within 5km of DEP and SEP is provided in **Table 18-9** and shown in **Figure 18.1.**

41. Further, in order to help achieve a safe operating environment, a consultation zone of 9NM radius (CAA, 2016) exists around offshore helicopter installations. This consultation zone is not considered a prohibition on wind turbine development within a 9NM radius of offshore operations, but is a trigger for consultation between platform operators, helicopter operators, and wind developers to maintain a safe coexistence between wind turbines and offshore helicopter operations. **Figure 18.2** shows the platforms within 9MN.

Table 18-9: Oil or gas infrastructure within 5km of DEP and SEP offshore wind farm area

Name	Status	Operator	Distance from DEP (km)	Distance from SEP (km)
Surface infrastructure				
Waveney	Active	Perenco	0.6	20
Lancelot A	Active	Perenco	5.3	25
Blythe platform	Pre-commission	IOG North Sea Ltd. and IOG U.K. Ltd.	1.3	17
Subsurface infrastructure				

Name	Status	Operator	Distance from DEP (km)	Distance from SEP (km)
Elgood wellhead	Pre-commission	IOG North Sea Ltd. and IOG U.K. Ltd.	0.5	19
Durango wellhead	Pre-commission	Perenco	7.2	5.1
Wells				
Elgood well	Pre-commission	IOG North Sea Ltd. and IOG U.K. Ltd.	0.5	19
48/17c-12Z	Completed - operating	Perenco UK Ltd	0.6	19
48/17c-W1	Completed - operating	Perenco UK Ltd	0.6	19
48/17c-12	Completed - operating	Perenco UK Ltd	0.6	19
48/17c-W2	Completed - operating	Perenco UK Ltd	0.6	19
48/16b-2	Decommissioned	Conoco Philips UK Ltd	3.4	12
48/16b-3	Decommissioned	Serica Energy UK Ltd	1.5	12
48/17-1	Decommissioned	Apache Beryl Ltd	1.8	16
48/17a-6	Decommissioned	Perenco	3.8	26
48/18c-8	Decommissioned	Unknown	2.7	23
48/21-1	Decommissioned	Unknown	6.7	4.7
48/21a- 3	Decommissioned	Unknown	6.3	5.2
48/22-1	Decommissioned	Unknown	3.7	14
48/22-2	Decommissioned	Unknown	4.2	14
48/22-3	Decommissioned	Unknown	2.5	12
48/22-4	Decommissioned	Unknown	0.8	17
48/22b-5	Decommissioned	Century Exploration UK Ltd	6.2	8.4
48/22b-6	Decommissioned	Perenco UK Ltd	0	15
48/23-2	Decommissioned	Unknown	4.8	22
48/23-1	Decommissioned	Unknown	3.9	20
48/23a-4	Decommissioned	Unknown	0	16
48/23-3	Decommissioned	Unknown	0.2	15

Name	Status	Operator	Distance from DEP (km)	Distance from SEP (km)
48/27a-1	Decommissioned	Fina Petroleum Development Limited	8.5	2.3

18.5.2 Petroleum Industry Pipelines

42. There is a concentration of pipelines to the east of DEP and SEP linking southern North Sea gas fields to the Bacton Gas Terminal on the Norfolk Coast. The most easterly of these traverse the DEP South wind farm site. They are the Perenco operated Lancelot to Bacton gas export pipeline (PL876) and the Bacton to Lancelot chemical pipeline (PL877); and the Shell operated Shearwater to Bacton gas pipeline (PL1570), all of which run parallel to each other (**Figure 18.1**). The Durango to Waveney gas production pipeline, operated by Perenco, also traverses the DEP North wind farm site. Gas pipeline PL27, linking the Viking gas field in the east and the Threddlethorpe Gas Terminal on the Lincolnshire coast to the west, routes parallel to, and approximately 500m north of the northern boundary of DEP North.

43. The Elgood to Blythe production pipeline will route close to the southern boundary of DEP North and the planned Blythe to Thames pipeline to export gas from the Blythe platform will route close to the north-eastern boundary of DEP South (**Figure 18.1**).

44. There are no pipelines within or in close proximity to the SEP wind farm site.

18.5.3 Oil and Gas Licence Areas

45. For the purpose of oil and gas licensing, the UK continental shelf is divided into quadrants, and within each quadrant, licence blocks. Different types of licence[2] for particular blocks, or part blocks, are issued by BEIS through competitive annual Seaward Licensing Rounds under the Petroleum Act 1998 (as amended).

46. The most recent licencing was through the 32nd Offshore Licensing Round which closed in November 2019. The Oil and Gas Authority (OGA) confirmed it was taking a temporary pause from annual licence round activity and would not run a licence round in what would have been the 2020/21 period. There is one 32nd round provisional award block (48/23d) which partially overlaps both DEP South and DEP North (**Figure 18.1**). A provisional licence requires further data is gathering on the licence block on the estimated oil or gas volumes ahead of making a drilling commitment which would then be subject to a final award.

47. **Table 18-10** shows current licenced blocks that overlap with DEP North and DEP South. No licence blocks overlap with SEP wind farm area.

[2] Such as production licences, exploration licences and innovation licences. More information on the types of licences is available from the Oil and Gas Authority: https://www.ogauthority.co.uk/licensing-consents/types-of-licence/

Table 18-10: Current licence blocks overlapping with DEP.

Quadrant Block	Operator	Licence type	Licence End	Distance from DEP North (km)	Distance from DEP South (km)
48/22c	IOG North Sea Limited	Production	2041	0	4.28
48/23a	IOG North Sea Limited	Production	2030	5.25	0
48/17d	OK Energy (North Sea) Limited	Production	2044	0	11
48/17c	Perenco UK Limited	Production	2027	0	13
48/16	OK Energy (North Sea) Limited	Production	2044	0	20
48/22b	IOG North Sea Limited	Production	2030	4.17	2.25

18.5.4 Offshore Wind Infrastructure

48. UK waters and the southern North Sea area in particular are a focus of significant offshore wind development activity, having been subject to several phases of offshore wind development under The Crown Estate's various leasing rounds (Round 1, Round 2, Round 1 and 2 extensions and Round 3 developments). In 2017 The Crown Estate launched an opportunity for existing wind farms to apply for project extensions. DEP and SEP are both part of this process.

49. Other nearby operational offshore wind farms in the Greater Wash area include the parent Dudgeon and Sheringham Shoal offshore wind farms and also Race Bank, Lincs, Inner Dowsing and Lynn offshore wind farms (**Figure 18.4**). A summary of all offshore wind farms in the vicinity of DEP and SEP is provided in **Table 18-11**.

50. The existing Dudgeon and Sheringham Shoal offshore wind farms are owned by different partners, however Equinor has ownership interests in both. The Dudgeon partners also own Dudgeon Extension Limited (DEL – being the named undertaker for DEP) whilst Equinor is the sole owner of Scira Extension Limited (SEL – being the named undertaker for SEP). Equinor acts as the operator of the projects on behalf of both DEL and SEL. Given the commonality of ownership interests, it is in the interests of DEP and SEP that Equinor will ensure that the development of DEP and SEP is undertaken in such a way to limit and, where possible, avoid any potential impacts on the existing Dudgeon and Sheringham Shoal offshore wind farms.

51. The next nearest operational wind farm to the projects is Race Bank, located 10.1km to the west of the SEP wind farm site, with export cables making landfall in Lincolnshire. Race Bank has been operational since 2018 (Ørsted, 2018a). The consented Triton Knoll offshore wind farm is 13.2km to the northwest of DEP North, with the export cables making landfall in Lincolnshire. Installation of the offshore array began in January 2020 (Triton Knoll website, 2020).

52. Export cables for the existing Dudgeon and Sheringham Shoal offshore wind farms make landfall on the North Norfolk coast to the west of Weybourne. The proposed DEP and SEP offshore export cables cross and then route to landfall immediately to the east of the Dudgeon export cables. The Dudgeon export cables will also be crossed further offshore by interlink cables, either those connecting DEP South to an OSP in the SEP wind farm site (with an integrated grid option), or interlink cables from DEP South to DEP North with a separated grid option (**Figure 18.3**).

53. The offshore export cable corridor for the Hornsea Three offshore wind farm crosses the DEP and SEP offshore export cable corridor approximately 14km from the coast, and makes landfall at Weybourne to the west of the DEP and SEP offshore export cable corridor landfall. As such, in the event that Hornsea Three is constructed the DEP and SEP offshore export cables would need to cross the Hornsea Three offshore export cables (**Figure 18.4**).

Table 18-11: Offshore wind farm projects in the southern North Sea and their approximate distance from the nearest DEP and SEP wind farm area

Offshore Wind Farm	Status	Developer/ Owner	Generating Capacity (MW)	Distance from DEP (km)	Distance from SEP (km)
Dudgeon	Operational	Dudgeon Offshore Wind Ltd	402	0	18
East Anglia ONE	Under construction	Scottish Power Renewables	714	100	105
East Anglia ONE North	Application submitted	Scottish Power Renewables	800	100	100
East Anglia TWO	Application submitted	Scottish Power Renewables	900	105	105
East Anglia THREE	Consented	Consented	1400	95	105
Hornsea Project One	Operational	Ørsted	1200	55	80
Hornsea Project Two	Under construction	Ørsted	1400	53	70
Hornsea Project Three	Consented	Ørsted	2400	83	105
Hornsea Project Four	Pre-planning application	Ørsted	1000	53	70
Humber Gateway	Operational	RWE	219	60	70

Offshore Wind Farm	Status	Developer/ Owner	Generating Capacity (MW)	Distance from DEP (km)	Distance from SEP (km)
Inner Dowsing	Operational	Execo	97.2	50	38.2
Lincs	Operational	Ørsted	270	46.0	34.4
Lynn	Operational	Execo	97.2	51	37
Norfolk Boreas	Application submitted	VWPL	1800	85	100
Norfolk Vanguard East	Consented	Vattenfall Wind Power Limited (VWPL)	900	90	100
Norfolk Vanguard West	Consented	VWPL	900	60	70
Race Bank	Operational	Ørsted	573	19.2	10.0
Scroby Sands	Operational	E.ON Climate and Renewables UK	60	60	60
Sheringham Shoal	Operational	SCIRA Offshore Energy Ltd	317	13	0
Triton Knoll	Under construction	RWE	857	13.2	19.2
Westermost Rough	Operational	Ørsted	210	80	85

18.5.5 Telecommunication Cables and Interconnectors

54. The southern North Sea is crossed by a large number of cables, and the majority of those not related to offshore wind (as described in **Section 18.5.1**) are telecommunication cables between the UK and mainland Europe (**Figure 18.3**). Several electrical interconnector cables also connect the power grids of the UK and mainland Europe. The majority in the North Sea connect to the UK on the coast of Kent to the south. However the planned Viking interconnector, being developed by NGI and Engerginet.dk, will connect Denmark to the UK making landfall on the Lincolnshire coast. The Viking interconnector is planned to be delivered by 2022 and is located approximately 40m to the north of DEP North at its nearest point (**Figure 18.3**). The disused Stratos telecommunications cable makes landfall near Weybourne and is inside the offshore export cable corridor as it approaches the coast. From here the cable routed in a north easterly direction, passing to the southeast of the onshore scoping area (KIS-ORCA, 2019) (**Figure 18.3**). There are no other telecommunications cables or interconnectors in the vicinity of DEP or SEP.

18.5.6 Marine aggregate extraction

55. There are no aggregate dredging licences or application areas within 5km of DEP or SEP. The nearest licenced areas for aggregate production are areas 515/1 and 515/2, licenced to Westminster Gravels Ltd and located to the north and west of the projects, approximately 8km and 10km away from DEP North respectively (**Figure 18.5**).

56. DEP and SEP overlap with an area identified as a High Potential Aggregate Resource (AGG3 zone). This area is covered by Policy AGG3 in the East Inshore and East Offshore Marine Plans (2014). The areas defined as high potential aggregate resource are based on mapping undertaken by British Geological Survey on behalf of The Crown Estate and identify the locations with the greatest potential for aggregate resource. The East Inshore and Offshore Marine Plan states that within defined areas of high potential aggregate resource, proposals should demonstrate that they will not prevent aggregate extraction or if they do how they will be minimised or mitigated. However, the site is not a licenced aggregate extraction area itself.

57. The East Inshore and Offshore Marine Plan WIND1 policy states licences should not be granted that are in, or could affect, sites held under a lease or an agreement for lease (AfL) that has been granted by The Crown Estate for development of an offshore wind farm, unless certain criteria are met. Therefore, as the AfLs are already in place for the DEP and SEP wind farm sites, they take precedence over any future potential aggregate extraction that may have occurred within the respective AfLs.

58. Some aggregate dredging vessels transit the DEP and SEP wind farm sites (BMAPA, 2009), although they are outside the main dredger transit routes. Impacts on shipping associated with marine aggregate extraction are assessed in **Chapter 15 Shipping and Navigation**.

18.5.7 Disposal sites

59. There are no marine disposal sites within 5km of DEP or SEP, the nearest is the historical Dudgeon disposal site (HU145) located approximately 9.5km away, which is now closed. The nearest open disposal site is associated with the Race Bank offshore wind farm export cable corridor (HU126) located 10km northwest of the SEP wind farm site (**Figure 18.5**). Offshore wind farm disposal sites are typically licenced for the disposal of sediment arisings from seabed levelling works, primarily during wind farm construction and cable installation. HU126 is only to be used to dispose of sediment arising from Race Bank offshore wind farm seabed levelling and will be closed on completion of the works.

60. There are no identified historical dumps for sewage sludge or radioactive wastes in the vicinity of the projects, activities that have been banned by OSPAR.

18.5.8 Aquaculture

61. Aquaculture off the North Norfolk coast (mariculture) is currently limited to a small number of shellfish farms which produce oysters in the shallow coastal waters of Blakeney Point and Wells-next-the-Sea (**Figure 18.6**).

18.5.9 Unexploded Ordnance (UXO)

62. The southern North Sea has been a major area of naval and airborne warfare, most notably during World War 1 and World War 2. Consequently, it is possible for UXO to be found in almost any area of the southern North Sea. There are no identified explosives dumping grounds in the vicinity of DEP and SEP, the nearest being approximately 110km southeast of the export cable corridor (**Figure 18.5**).

63. Pre-construction UXO surveys were completed for Dudgeon and Sheringham Shoal offshore wind farms. The Dudgeon UXO survey identified 20 UXOs and three UXO related/shaped debris for removal (MMT, 2015). The UXO and UXO debris identified were air dropped and projectile ordnance with charges ranging from 45kg to 1000lb, a MK 17 mine, and mine sinkers. The Sheringham Shoal UXO survey identified 10 potential UXOs (Gardline, 2010), however, all the potential UXO identified was nonexplosive ordinance except for one confirmed 250lb German air drop bomb.

64. Magnetometer surveys have been completed across the offshore export cable corridor in 2019, and the wind farm sites and interlink cable corridors in 2020. Detailed UXO surveys and if required a detonation programme will be carried out prior to construction of DEP and/or SEP.

18.5.10 Marine Recreation

65. This section provides an overview of marine recreational activity which has the potential to interact with DEP and SEP. Recreational activity includes recreational fishing, recreational vessel activity and SCUBA diving. It should be noted that impacts on recreational vessels from a navigation perspective are assessed in **Chapter 15 Shipping and Navigation**.

18.5.10.1 Recreational fishing

66. Sea angling is the capture of fish for leisure or personal consumption, by line only, and is the most common method of marine recreational fishing in the UK. There are no complete lists of marine recreational fishers nor licensing schemes in the UK, so an independent study would be required to accurately estimate participation, effort and catches (CEFAS, 2020). However, the 2012 Sea Angling survey estimated that there are 884,000 sea anglers in England. Shore fishing was the most common type of sea angling (almost 3 million angler-days) compared with private/rented boats (1 million angler-days) and charter boats (0.1 million angler-days) (Defra, 2013). It is generally considered that the most important area to anglers is within 1nm of the coast (Offshore Energy SEA, 2009). Since the Sea Angling 2012 survey in England, a revised monitoring programme with new methods was tested in 2015 and expanded in 2016 and 2017 to estimate numbers of UK sea anglers, how often they fish, what they catch (Defra, 2020). The latest data showed that an estimated 874,000 people in the UK went sea angling in 2016, and 902,000 in 2017, an increase from the 2012 survey.

67. The east coast, including the Eastern Inshore Fisheries and Conservation Authority (EIFCA) district incorporating the counties of Lincolnshire, Norfolk and Suffolk, is popular with recreational sea anglers, who practice the sport both at sea and from the beach. The recreational sector is increasingly recognised for its importance to the local economy, as well as for the amenity value of the activity itself (EIFCA, 2020). Shore fishing is undertaken from the Weybourne area. There are charter fishing trips from Well-next-the-sea to the west of landfall, and Brancaster Staithe further west, but no established charter fishing from Weybourne.

18.5.10.2 Recreational vessels

68. Recreational vessel usage is described in **Chapter 15 Shipping and Navigation** and the **Navigational Risk Assessment (NRA)** competed for the projects (**Annex 15.1**), including the results of 28-day summer (July-August 2020) and winter (Jan-Feb 2021) shipping surveys in the navigation study area. Recreational vessels, including yachts and motor cruisers, predominantly transit along the coast inshore of the SEP wind farm site in the summer months. Some transit in a northwesterly and southeasterly direction between the DEP and SEP wind farm sites, with a small number traversing along northeastern boundary of the SEP wind farm site (**Figure 18.7**).

69. The summer shipping survey recorded less than one recreational vessel per day on average in the study area (within 10nm of the DEP and SEP wind farm sites) (Jan-Feb 2021 for winter) The survey observations align with the Royal Yachting Association (RYA) coastal atlas, the majority of recreational vessels transiting close to the coastline inshore of DEP and SEP wind farm sites and a small proportion routeing between the DEP and SEP wind farm sites.

70. Additionally, there is a RYA identified boating area along the coast inshore of the DEP and SEP wind farm sites and across the export cable corridor (**Annex 15.1 NRA, Figure 14.18**).

18.5.10.3 Diving

71. There are a number of coastal dive sites along the North Norfolk coast inshore of the DEP and SEP wind farm sites. **Figure 18.7** shows the locations of recreational dive sites identified by the Finstrokes website (Finstrokes, 2020). Several dive sites off the coast are associated with shipwrecks, the nearest being the wreck of the SS Rosalie which is dived from the shore, located close to the western boundary of the offshore export corridor close to landfall. To the east of the offshore export corridor is an area of chalk gullies between Weybourne and Sheringham, and continuing east to Overstrand chalk cliffs (North Norfolk Divers website, 2020). This area is dived to enjoy the chalk reef and associated marine life, with shore dive locations identified as Sheringham Gullies and Overstrand to the east of the export cable corridor (Finstrokes, 2020; **Figure 18.7**).

18.5.11 Future Trends

72. The deployment of offshore wind in the UK is set to continue with an existing pipeline of projects in planning and further expansion expected to achieve a target of 40GW offshore wind capacity by 2030. Therefore offshore wind deployment in the southern North Sea and wider North Sea is likely to increase over the next 10–20 years.

73. There are plans to further integrate the UK electrical network and the European networks through the installation of interconnector cables. This is likely to lead to an increase in electricity transmission cables across the southern North Sea, such as the Viking interconnector.

74. The oil and gas industry, especially in the southern North Sea, is in a period of slow decline with existing gas fields reaching the end of their economic lives and the rate of new field development declining. It is likely that the baseline of steady decline in the oil and gas industry in the southern North Sea will continue. However, it is acknowledged that the OGA continues to award new licences, and that new projects such as the Blythe Hub will be developed.

75. The East Anglia coast (i.e. Norfolk and Suffolk) has been highlighted in the East Marine Plan (HM Government, 2014) as being an important area for aggregates for the UK, with a view to facilitating growth of the aggregates industry in this area of the UK seabed. It is expected that aggregate extraction activity will increase over the next 10–20 years (HM Government, 2014) as a strategic industry for this area.

18.6 Potential Impacts

18.6.1 Potential Impacts during Construction

76. The baseline presented in **Section 18.5** shows that there are no interactions between DEP and SEP and other offshore wind farms, aggregates or disposal sites and therefore there is no pathway for impact. Following the scoping response from the Planning Inspectorate (**Table 18-1**), impacts on these receptors have been scoped out of the EIA and are not considered further in this chapter. Potential impacts to other offshore wind farm export cables are considered in **Section 18.6.1.2** below.

77. Following the scoping response from the Planning Inspectorate (**Table 18-1**) impacts to human health from UXO are considered in **Chapter 30 Health**. UXO is not considered further in this chapter.

18.6.1.1 Impact 1: Potential interference with oil and gas operations

18.6.1.1.1 DEP in Isolation

78. As discussed in **Section 18.5**, and presented in **Table 18-9** and **Figure 18.1**, there is oil and gas infrastructure within and in close proximity to the DEP offshore area. Construction activities such as seabed preparation, installation of turbines, trenching and installation of cables, vessel anchoring and debris clearing have the potential to interfere with existing operations, however the areas being considered for the siting of turbines are a minimum of 500m from existing platforms, pipelines, active wells and other infrastructure. Impacts are only identified for the nearest platforms, Waveney and Blythe, where there is the potential for access restrictions as a result of DEP and SEP.

79. Impacts on oil and gas platform access (marine and helicopter) are assessed in **Section 18.6.2.1** whereby the operational assessment allows for the worst case during construction. Any impacts on the transit of oil and gas vessels are assessed in **Chapter 15 Shipping and Navigation** and potential impacts on pipelines are assessed in **Section 18.6.1.3**.

80. The oil and gas industry as a receptor is an industry of national importance. Damage to platforms or subsurface infrastructure, including active wells, caused by the construction of DEP has the potential to cause major disruption to oil and gas operations with associated environmental impacts; therefore, the sensitivity of the receptor is high.

81. As detailed in **Section 18.6.2.1** the magnitude of effects at this stage is low given the platforms are unmanned and access is infrequent, however a detailed study on both baseline marine and helicopter platform access (baseline analysis and assessment of disruption) is being undertaken and will be reported in the ES. Therefore, the impact on potential oil and gas exploration and development is provisionally considered to be of **moderate** adverse significance at this stage, but with the expectation that this can be reduced to minor adverse, or less, following the completion of the above study and further consultation.

82. In order to prevent impacts, Equinor has approached potentially affected oil and gas operators to understand any impacts from DEP on their operations. Discussions will continue with the intention of developing proximity agreements where relevant prior to construction as embedded mitigation (see **Section 18.3.3**). Proximity agreements will determine how close construction activities can be to the existing infrastructure. With these in place, along with existing site selection to avoid oil and gas infrastructure (excluding pipelines), significant impacts are anticipated to be avoidable.

18.6.1.1.2 SEP in Isolation

83. There is no active oil and gas infrastructure inside or within 5km of the SEP wind farm site or offshore export cable corridor. Therefore, there would be no pathway and **no impact** associated with the construction of SEP in isolation.

18.6.1.1.3 DEP and SEP Together

84. Should DEP and SEP be constructed together, either concurrently or sequentially, the potential impacts to oil and gas operations would be the same as for DEP or SEP in isolation (**Section 18.6.1.1.1 and Section 18.6.1.1.12**).

18.6.1.2 Impact 2: Potential impacts on oil and gas exploration and development

18.6.1.2.1 DEP in Isolation

85. The DEP wind farm site overlaps six licenced blocks (**Section 18.5.1**). It is not known whether these production licences include commitments to further development or exploration, however, there is the potential that during construction of DEP, seismic surveys within these licenced blocks would be restricted (due to the size of the seismic equipment), and any potential future drilling or installation of new infrastructure within the wind farm site would be limited by DEP offshore infrastructure or construction activities.

86. The oil and gas industry as a receptor is an industry of national importance. It is difficult to predict the level of impact that DEP would have on future oil and gas activity and there is no guarantee of future exploration or development activity, therefore the sensitivity is considered to be medium. Where development interests of oil or gas developers and offshore renewables developers come into conflict as they seek to develop the same or adjoining areas of the seabed, the Secretary of State expects that the parties will be able to come to a private, commercial agreement which will allow the parties to accommodate their respective development aims (DECC, 2014).

87. The magnitude of the impact depends on the level of oil and gas development that occurs within the DEP area. The oil and gas production licences that overlap spatially and could overlap temporally with the DEP construction phase (which would begin in 2024 at the earliest) are all of the blocks listed in **Table 18-10**. If future oil and gas exploration or development were planned in the DEP wind farm sites during the construction phase the magnitude of the impact could be medium due to short term loss of access, however if no further development occurs during the operation of DEP there would be no impact.

88. Consultation with the operators of the licensed blocks has aimed to address any future operational issues and establish a line of communication to ensure that coexistence between both activities can be achieved with minimal disruption. Therefore, following the consultation undertaken the worst case magnitude of the impact is considered to be low.

89. As a worst case the sensitivity of the licence operators is considered to be medium given the unknown likelihood of exploration or development activity in the DEP wind farm sites during with the construction phase, with a low magnitude of impact following consultation and agreements. Therefore, the impact on potential oil and gas exploration and development is considered to be of **minor** adverse significance.

18.6.1.2.2 SEP in Isolation

90. The SEP wind farm site and offshore export cable corridor do not overlap with any oil and gas licences. Therefore, there would be **no impact** associated with the construction of the SEP in isolation.

18.6.1.2.3 DEP and SEP in Together

91. Should DEP and SEP be constructed concurrently or sequentially the potential impacts to oil and gas exploration and development would be the same (**minor adverse**) as for DEP in isolation. This is because there would still be no impact associated with SEP, due to the lack of overlapping licenced blocks.

18.6.1.3 Impact 3: Potential impacts on subsea cables and pipelines

18.6.1.3.1 DEP in Isolation

92. Construction actives, such as cable and foundation installation, vessel anchoring and debris clearing operations, in proximity to existing cables and pipelines and at crossings has the potential to damage existing assets.

93. If constructed in isolation, the DEP offshore cable corridors will cross the Dudgeon export cables twice and the Hornsea Three export cable corridor once (if Hornsea Three is constructed) (**Figure 18.3**). This would require up to 4 cable crossings assuming unbundled installation (**Table 18-2**). The offshore export cable corridor would also cross the disused Stratos telecommunications cable, however no crossing would be required and there will be no impact on this receptor.

94. DEP North intersects one pipeline (Durango to Waveney) requiring up to three infield cable crossings, and DEP South intersects three pipelines (PL876, PL877 and PL1570) requiring up to four infield cable crossings. Turbines and OSPs will be located a minimum of 500m away from these pipelines.

95. Therefore DEP in isolation will cross up to 17 subsea cables and pipelines. The sensitivity of the receptors is high. Damage to cables would be expensive to repair and has the potential to cause disruption to power distribution and, as a worst case, total loss of function with limited or no ability to use redundancy (although Dudgeon has two export cables and therefore has redundancy should one be damaged). Damage to pipelines could cause major disruption to oil and gas operations and associated potential environmental impacts. Therefore the potential magnitude of such an impact is on cables and pipelines is high.

96. In order to prevent impacts, Equinor will enter into proximity and crossing agreements with the affected cable and pipeline owners and operators as part of embedded mitigation (see **Section 18.3.3**). Proximity agreements will determine how close construction activities can be to the existing infrastructure, and crossing agreements will determine how any crossings are made. Crossings are likely to require the installation of protective material (for example rock armouring or concrete mattresses) over the cables or pipelines, then laying the DEP cables over the protective material. Protective material would then be laid over the DEP cables. The resultant locations, design and construction methodologies will avoid physical impact upon cables and pipelines which may affect their operation.

97. Consequently the magnitude of the impact would be reduced to negligible, meaning that the impact of the construction of DEP in isolation on subsea cables and pipelines would be of **minor** adverse significance.

18.6.1.3.2 SEP in Isolation

98. If constructed in isolation, the SEP offshore export cable corridor will cross the Dudgeon export cables once and the Hornsea Three export cable corridor once (**Figure 18.3**). This would require up to four crossings assuming unbundled installation (**Table 18-2**). The offshore export cable corridor would also cross the disused Stratos telecommunications cable, however no crossing would be required and there will be no impact on this receptor.

99. As stated above for DEP in isolation, Equinor will enter into proximity and crossing agreements with the affected cable owners and operators to minimise the magnitude of impact. Given the high receptor sensitivity but negligible magnitude, the impact of the construction of SEP in isolation on subsea cables would be of **minor** adverse significance.

18.6.1.3.3 DEP and SEP Together

100. Should DEP and SEP be constructed together, concurrently or sequentially, up to 21 cable and pipeline crossings would be required. Although this is more than either DEP or SEP in isolation, the potential impacts would be at the same general locations on the same receptors, and with adherence to proximity and crossing agreements, the impacts would be the same (**minor** adverse).

18.6.1.4 Impact 4: Potential impacts on marine recreation

18.6.1.4.1 DEP in Isolation

101. During the construction phase of DEP there will be temporary 500m safety zones in operation around construction vessels and advisory safety distances as well as an incremental increase in the presence of wind farm infrastructure. This will result in a potential displacement of recreational activities during the construction phase. Any incremental increase in displacement or navigational safety impacts on recreational vessels traversing the wind farm sites as a result of construction vessels and the installation of surface infrastructure (turbines and OSPs) is addressed **Chapter 15 Shipping and Navigation**.

102. The spatial extent of DEP is small in comparison to the wider southern North Sea where recreational activities occur. Additionally, displacement of activities will be associated primarily with installation of the inshore part of the offshore export cable than construction of DEP infrastructure further offshore. Following completion of offshore export cable installation, including HDD exit pits, the impact of displacement will cease and is therefore temporary. Therefore, the magnitude of the impact is considered low.

103. The marine recreational vessels are able to alter their course when necessary and recreational angling and diving from boats are able to use alternative areas. Notices to Mariners will be provided when necessary throughout construction works. Therefore, marine recreational activities are considered to be adaptable and able to tolerate and recover following temporary displacement during the construction phase, and sensitivity is low.

104. Overall the impact on recreational activities due to the construction of DEP in isolation is considered to be of **minor** adverse significance.

18.6.1.4.2 SEP in Isolation

105. The sensitivity of recreational activities to temporary displacement during construction, and the potential magnitude of the impact for SEP in isolation is considered the same as for DEP. Therefore, the overall significance of the impact on recreational activities due to the construction of SEP in isolation is considered to be of **minor** adverse significance.

18.6.1.4.3 DEP and SEP Together

106. Should DEP and SEP be constructed together and at the same time, peak displacement effects would be greater and concentrated within a 2 year period. If constructed sequentially peak effects would be lower but the duration of impacts would be spread over up to 4 years. For both scenarios the potential impacts would still be considered as **minor** in the context of the area available for marine recreation and the duration of the impact, the magnitude of the impact is still considered low.

18.6.2 Potential Impacts during Operation

18.6.2.1 Impact 1: Potential interference with oil and gas operations

18.6.2.1.1 DEP in Isolation

107. There is potential for operation and maintenance activities associated with DEP to interfere with existing oil and gas operations. With safety zones around wind farm infrastructure and increased vessel traffic (transiting crew, monitoring surveys and maintenance vessels), access to oil and gas infrastructure such as the Waveney Gas Platform, Blythe Hub infrastructure and existing gas pipelines by vessels and helicopters may be compromised.

108. When flying in good visibility (VMC) a helicopter must maintain a 150m (500ft) separation distance from all obstacles. Access requirements to the platform helidecks in VMC are not considered to be affected at a distance of greater than 1NM from wind turbines. Within 1NM helicopter access impacts are considered possible when considering other factors such as wind conditions, approach direction and turbulence from platform structures. When flying low visibility (IMC) a pilot is required to maintain a 1,000ft vertical clearance from all obstacles and 1NM lateral separation from all onboard radar contacts until the pilot can transfer to VFR flight to make the final approach to the platform.

109. Helicopters which operate to and from offshore platforms are fitted with weather radar which can be used to conduct an instrument approach to the platform in poor visibility. Airborne Radar Approaches (ARA) are used as a low-visibility approach procedure to the platforms and rely upon the on-board weather radar for obstacle detection and navigation. The radar is designed to display weather phenomena, such as rain, as well as obstacles such as the oil and gas platforms, or wind turbines. When flying IMC certain wind conditions dictate the area of approach to the platform, a standard ARA procedure might not be available due to the proximity of wind turbines. Helicopter access to oil and gas platforms may be restricted under certain weather conditions (in poor visibility (IMC) coupled with strong winds). The extent of this effect can be defined spatially; however, the temporary nature of the effect will vary on a case by case basis. This is due to the fact that the length of time in which helicopters can operate Visual Flight Rules (VFR) will vary due to different weather conditions, and the fact there are inherent restrictions on other phases of flight in certain weather conditions not attributed to the presence of wind turbines near the destination platform.

110. In order to help achieve a safe operating environment, a consultation zone of 9NM radius (CAA, 2016) exists around offshore helicopter installations. This consultation zone is not considered a prohibition on wind turbine development within a 9NM radius of offshore operations, but is a trigger for consultation between platform operators, helicopter operators, and wind developers to maintain a safe coexistence between wind turbines and offshore helicopter operations. DEP North and DEP South are located within the consultation zones of several installations as illustrated in **Figure 18.2.**

111. Details of consultation undertaken so far with oil and gas operators is provided in **Table 18-1**. Consultation is still ongoing, which will further inform the final impact assessment to be presented in the Environmental Statement within the DCO application.

112. The oil and gas industry as a receptor is an industry of national importance. Helicopters are the primary method of access for offshore personnel completing maintenance activities and are also important for transporting small items of equipment. The restriction of helicopter and vessel access has the potential to cause major disruption to oil and gas operations; therefore, the sensitivity of the receptor (in this case the oil and gas industry) is assumed to be high.

113. At this stage potential impacts on the Perenco operated Waveney platform are considered most likely given its location approximately 500m from the DEP North boundary. The planned Blythe platform to be developed by Independent Oil and Gas is also less than 200m east of the boundary of the existing Dudgeon offshore wind farm and approximately 1.1km north of DEP South. Subject to further consultation and assessment, the magnitude of effect is considered low for all relevant platforms. This is based on low frequency access requirements and an assumption that helicopters approaching the nearest platform, Waveney, will only be able to approach from the north in low-visibility (ARA) conditions but that this situation should occur at a low frequency, particularly given the low level of helicopter activity at Waveney (typically one visit per month). Vessel track data shows usage of the waters beyond the 500m safety zone but at a lower density.

114. The assessment at this stage is therefore that the magnitude of effect on access to oil and gas platforms as a result of the operation of DEP will be low and the sensitivity of the receptors is considered to be high. Without further mitigation, the impact of DEP in isolation is provisionally considered to be of **moderate** adverse significance, which is significant in EIA terms.

115. As detailed in relation to construction (**Section 18.6.1.1**), a detailed study, alongside continued consultation with operators, including further detailed assessment of potential helicopter and vessel access impacts on oil and gas platforms is underway, with the expectation that impacts can be reduced. The results of the assessment, which will analyse vessel tracks, flight data (approach and departure) and met data will be included in the final ES.

18.6.2.1.2 SEP in Isolation

18.6.2.1.3 There is no active oil and gas infrastructure inside or within 5km of the SEP wind farm site or offshore export cable corridor. Therefore, there would be **no impact** associated with the operation of SEP in isolation.

18.6.2.1.4 DEP and SEP Together

116. SEP is not within the CAA 9NM consultation distance around oil and gas platforms, therefore the potential impact is restricted to DEP. Without further mitigation, the impact from the operation of DEP and SEP together will therefore be the same as for DEP in isolation, of **moderate** adverse significance, which is significant in EIA terms.

18.6.2.1.5 Mitigation and Residual Impacts

117. Once the magnitude of the impacts on oil and gas receptors is better understood and fully assessed (following further consultation and the outcome of the assessment of potential access impacts outlined above), mitigation measures will be considered to reduce the residual impacts to a level that is **not significant** in EIA terms. Mitigation options include positioning of turbines within DEP North and DEP South to minimise any restrictions to platform helicopter approaches.

18.6.2.2 Impact 2: Potential impacts on oil and gas exploration and development

18.6.2.2.1 DEP in Isolation

118. The DEP wind farm site overlaps six licenced blocks (**Section 18.5.1**). It is not known whether these production licences include commitments to further development or exploration, however, there is the potential that during operation of DEP, seismic surveys within these licenced blocks would be restricted (due to the size of the seismic equipment) and any potential future drilling or placement of new infrastructure within the wind farm site would be limited by DEP offshore infrastructure.

119. The oil and gas industry as a receptor is an industry of national importance, but in this case there is no guarantee of future exploration or development activity, therefore the sensitivity is considered to be medium.

120. The magnitude of the impact depends on the level of oil and gas development that occurs within the DEP area. The oil and gas production licences that overlap spatially and temporally with the DEP operational phase (which would begin in 2028 at the earliest) are blocks 48/23a and 48/23b (end date 2030), 48/22c (2041), 48/17d (2044) and 48/16 (2044) (**Table 18-10**). It is unlikely that significant exploration and development activity will take place towards the end of a licence period. However, the presence of DEP infrastructure would restrict future oil and gas exploration and development and therefore the magnitude of the impact could be medium based on the partial loss of access to economically important asset. However if no further development occurs during the operation of DEP there would be no impact.

121. Consultation with the operators of the licensed blocks has aimed to address any future operational issues and establish a line of communication to ensure that coexistence between both activities can be achieved with minimal disruption. Therefore, following the consultation undertaken the worst case magnitude of the impact is considered to be low.

122. As a worst case the sensitivity of the licence holders is considered to be medium given the unknown likelihood of exploration or development activity in the DEP wind farm sites during with the operation phase, with a low magnitude of impact following consultation and agreements. Therefore, the impact on potential oil and gas exploration and development is considered to be of **minor** adverse significance.

18.6.2.2.2 SEP in Isolation

123. The SEP wind farm site and the proposed offshore export cable corridor do not overlap with any oil and gas licences. Therefore, there would be **no impact** associated with the operation of SEP in isolation.

18.6.2.2.3 DEP and SEP in Together

124. Should DEP and SEP operate at the same time the potential impacts to oil and gas exploration and development would be the same (**minor** adverse) as for DEP in isolation. This is because there would be no impact associated with SEP, due to the lack of overlapping licence blocks.

18.6.2.3 Impact 3: Potential impacts on subsea cables and pipelines

125. During the operation phase, there is the potential for maintenance activities to cause damage to subsea cables and pipelines at crossings and where wind farm infrastructure is installed in close proximity to existing assets. Maintenance activities may include cable repair work which could entail the use of jack-up vessels, or the deployment of anchors. It is expected that any such activities would be subject to the same principles and agreements as established during the construction phase (see **Section 18.6.1.3**).

18.6.2.3.1 DEP in Isolation

126. If DEP is operated in isolation there will be up to ten cable crossings and seven pipeline crossings assuming unbundled installation (**Table 18-2**). As described in **Section 18.6.1.3** the sensitivity of the receptors is high. Damage to cables would be expensive to repair and has the potential to cause disruption to power distribution and total loss of wind farm asset function. Damage to pipelines could cause major disruption to oil and gas operations and associated potential environmental impacts. However, the likelihood of damage to existing cables and pipelines is low due to the implementation of crossing and proximity agreements, and the reduced likelihood that intervention will be required (compared to the construction phase), so the magnitude of the impact is deemed negligible. Therefore, any impacts would be of **minor** adverse significance.

18.6.2.3.2 SEP in Isolation

127. If SEP is operated in isolation there will be up to four cable crossings assuming unbundled installation (**Table 18-2**). The sensitivity of the receptors is high. However, the likelihood of damage to existing cables is small due to the implementation of crossing and proximity agreements and the reduced likelihood that intervention will be required (compared to the construction phase); therefore, the magnitude of the impact is deemed negligible and, as for DEP in isolation, any impacts would be of **minor** adverse significance.

18.6.2.3.3 DEP and SEP Together

128. Should DEP and SEP be operated together there would be up to 21 cable and pipeline crossings. Although this is more than for either DEP or SEP in isolation, the potential impacts are assessed as being of the same significance (**minor** adverse) because there is no significant change in the magnitude of effect.

18.6.2.4 Impact 4: Potential impacts on marine recreation

18.6.2.4.1 DEP in Isolation

129. During the operational phase of DEP recreational vessels will be excluded from the immediate vicinity of surface infrastructure due to the physical presence of turbines and OSPs in the DEP wind farm site. Furthermore there will be temporary 500m safety zones in operation around maintenance vessels when repairs are required. These will result in a potential displacement of recreational activities in these areas. Any displacement or navigational safety impacts on recreational vessels traversing the wind farm sites as a result of the presence of surface infrastructure (turbines and OSPs) is addressed **Chapter 15 Shipping and Navigation**.

130. The area from which recreational activities may be displaced during maintenance activities is likely to be smaller than during construction with potential to result in only a slight alteration to recreational activity. The frequency of maintenance activities is likely to be low and intermittent over a longer time period, and it is possible that cable repair and maintenance will not be required in the areas where recreational activities are concentrated (primarily around the inshore part of the offshore export cable corridor rather than DEP infrastructure further offshore). The magnitude of the impact is considered negligible. As for construction, the sensitivity of the receptor is assessed as low (**Section 18.6.1.4**).

131. Overall the impact on recreational activities due to the operation of DEP in isolation is considered to be of **negligible** adverse significance.

18.6.2.4.2 SEP in Isolation

132. The sensitivity of recreational activities to displacement during operation, and the potential magnitude of the impact for SEP in isolation is considered the same as for DEP. Therefore, the overall significance of the impact on recreational activities due to the operation of SEP in isolation is considered to be of **negligible** adverse significance.

18.6.2.4.3 DEP and SEP Together

133. Should DEP and SEP be operated at the same time, the potential impacts would still be considered as **negligible** adverse significance because although the potential area of displacement is higher, in the context of the area available for marine recreation and given the intermittent nature of maintenance activities, the magnitude of the impact is still considered negligible.

18.6.3 Potential Impacts during Decommissioning

134. Impacts upon the petroleum industry and other users during decommissioning are anticipated to be similar to those assessed during the construction phase of DEP and SEP, with an incremental reduction of impact as infrastructure is removed.

135. Decommissioning works would be determined by the relevant legislation and guidance at the time of decommissioning and would most likely involve the accessible installed components. Offshore, this is likely to include removal of all of the wind turbine and OSP components, including the foundations above seabed level but excluding scour protection. Offshore cables may be left *in situ* or removed depending on available information and technology at the time of decommissioning. The infield cables will be cut at each end towards the foundation structures. Cable protection and crossings would likely be left *in situ*.

18.6.3.1 Impact 1: Potential interference with oil and gas operations

18.6.3.1.1 DEP and SEP in Isolation

136. To minimise environmental impacts, buried offshore cables may be disconnected and left *in situ* along with associated cable protection measures and crossings. If this is not the case and they are removed, agreements will be reached with owners of existing (and potentially future) infrastructure prior to removal.

137. Wind turbine and OSP foundations will be removed to the level of the seabed. These structures will have been located to avoid any impact upon existing infrastructure and therefore decommissioning impacts are not anticipated.

138. The sensitivity, embedded mitigation and magnitude of effects would be comparable to those identified for the construction phase. Therefore, the impact significance would be **no impact** for both DEP in isolation and SEP in isolation.

18.6.3.1.2 DEP and SEP Together

139. Decommissioning of DEP and SEP, either concurrently or sequentially, would result in the same potential impacts to oil and gas operations (**no impact**) as for DEP or SEP in isolation (**Section 18.6.3.1.1**).

18.6.3.2 Impact 2: Potential impacts on oil and gas exploration and development

18.6.3.2.1 DEP and SEP in Isolation

140. The sensitivity and magnitude of effects on oil and gas exploration and development during decommissioning would be comparable to those identified for the construction phase. Therefore, the impact significance would be **minor** adverse for DEP in isolation and **no impact** for SEP in isolation.

141. It is worth noting that's there could be a beneficial impact from the removal of wind farm infrastructure and the freeing up of seabed for exploration and development. This is assessed as low magnitude given the expected long term decline of oil and gas activity in the southern North Sea. With a medium sensitivity, there may be an impact of minor beneficial significance on oil and gas exploration and development from the decommissioning of DEP.

18.6.3.2.2 DEP and SEP Together

142. Decommissioning of DEP and SEP, either concurrently or sequentially, would result in the same potential impacts to oil and gas exploration and development (**minor adverse** and **minor beneficial**) as for DEP in isolation (**Section 18.6.3.2.1**). This is because there would no impacts associated with SEP are anticipated.

18.6.3.3 Impact 3: Potential impacts on subsea cables and pipelines

18.6.3.3.1 DEP and SEP in Isolation

143. To minimise environmental impacts, the offshore cables may be disconnected and left *in situ* along with associated cable protection measures and subsea structures.

144. The sensitivity and magnitude of effects would be comparable to those identified for the construction phase, although it is worth noting that existing cables and pipelines at crossings are likely to be decommissioned before DEP and SEP, and therefore there may be no impact. However, as a worst case as for the construction phase, the impact on subsea cables and pipelines would be of **minor** adverse significance for both DEP and SEP in isolation due to decommissioning.

18.6.3.3.2 DEP and SEP Together

145. Decommissioning of DEP and SEP, either concurrently or sequentially, would result in the same worst case potential impacts to subsea cables and pipelines (**minor** adverse) as for the construction phase (and potentially lower if existing cables and pipelines at crossings have already been decommissioned).

18.6.3.4 Impact 4: Potential impacts on marine recreation

18.6.3.4.1 DEP and SEP in Isolation

146. To minimise environmental impacts, offshore cables may be disconnected and left *in situ* along with associated cable protection measures and subsea structures. Wind turbines and OSPs will be removed to the level of the seabed.

147. The sensitivity and magnitude of effects during the period of decommissioning activities would be comparable to those identified for the construction phase. Therefore, the impact significance would be **minor** adverse upon marine recreation for both DEP and SEP in isolation.

18.6.3.4.2 DEP and SEP Together

148. Decommissioning of DEP and SEP, either concurrently or sequentially, would result in the comparable potential impacts to marine recreation (**minor** adverse) as for the construction phase (**Section 18.6.1.4.3**). As for the construction phase, this is because of the area available for marine recreation and the duration of the impact, so the magnitude of the impact is still considered low.

18.7 Cumulative Impacts

18.7.1 Identification of Potential Cumulative Impacts

149. The first step in the cumulative assessment is the identification of which residual impacts have the potential for a cumulative impact with other plans, projects and activities (described as 'impact screening'). This information is set out in **Table 18-12** 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 1.6 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).

150. **Table 18-12** concludes that in relation to the petroleum industry and other marine users there are potential cumulative impacts on oil and gas exploration and development , subsea cables and pipelines and marine recreation.

Table 18-12: Potential Cumulative Impacts (impact screening)

Impact	Potential for Cumulative Impact	Data Confidence	Rationale
Construction			
Impact 1: Potential interference with oil and gas operations	No	Medium	Impacts have only been identified for the Blythe and Waveney platforms whereby given the location of other project there are no further access restrictions as a result of other plans and projects.
Impact 2: Potential impacts on oil and gas exploration and development	Yes	Low	Other projects may result in further restricted access to licensed areas. Limited information about future exploration and development.

Impact	Potential for Cumulative Impact	Data Confidence	Rationale
Impact 3: Potential impacts on subsea cables and pipelines	Yes	High	Cumulative impacts from other cable and pipeline crossings.
Impact 4: Potential impacts on marine recreation	Yes	Medium	Cumulative impacts from other projects restricting/displacing recreational activities.
Operation			
Impact 1: Potential interference with oil and gas operations	No	Medium	Impacts have only been identified for the Blythe and Waveney platforms whereby given the location of other project there are no further access restrictions as a result of pother plans and projects.
Impact 2: Potential impacts on oil and gas exploration and development	Yes	Low	Other projects may result in further restricted access to licensed areas. Limited information about future exploration and development.
Impact 3: Potential impacts on subsea cables and pipelines	Yes	High	Cumulative impacts from other cable and pipeline crossings.
Impact 4: Potential impacts on marine recreation	Yes	Medium	Cumulative impacts from other projects restricting/displacing recreational activities.
Decommissioning			
Impact 1: Potential interference with oil and gas operations	No	Medium	As for construction.

Impact	Potential for Cumulative Impact	Data Confidence	Rationale
Impact 1: Potential impacts on oil and gas exploration and development	Yes	Low	As for construction.
Impact 2: Potential impacts on subsea cables and pipelines	Yes	High	As for construction.
Impact 3: Potential impacts on marine recreation	Yes	Medium	As for construction.

18.7.2 Other Plans, Projects and Activities

151. 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 in **Table 18-13** 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. 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.

152. 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.

Table 18-13: Planned projects within 5m of DEP or SEP

Project	Status	Construction Period	Closest Distance from the Project (km)	Distance from the cable corridor (km)	Confidence in Data	Included in the CIA (Y/N)	Rationale
Dudgeon Offshore Wind Farm	Operational	N/A	0.0 (DEP North and South)	0.0	High	N	Commonality of ownership interests – Equinor will ensure that the development of DEP and SEP is undertaken in such a way to limit and, where possible, avoid any potential impacts on the existing Dudgeon and Sheringham Shoal offshore wind farms. See **Section 18.5.4** for further details.
Sheringham Shoal Offshore Wind Farm	Operational	N/A	0.0 (SEP wind farm site)	0.0	High	N	As above
EIFCA Restricted areas (closed to bottom towed gear)	Active	N/A	0.0 (Export cable corridor)	0.0	High	N	No adverse impact from the trawling restriction on the receptors.

Project	Status	Construction Period	Closest Distance from the Project (km)	Distance from the cable corridor (km)	Confidence in Data	Included in the CIA (Y/N)	Rationale
Weybourne Beck outfall to Walcott coastal frontage - Maintenance works	Active	Unknown (open licence until 3rd July 2028)	0.0 (Export cable corridor)	0.0	High	N	Maintenance works and project impacts will not interact because the nearest marine components of the projects are the HDD exit pits located offshore.
Hornsea Project Three Offshore Wind Farm	Consented	2021-2027 or 2021-2031 (offshore export cable construction 2023-2024, possibly also 2028-2029)	0.0 (Export cable corridor)	0.0	High	Y	Hornsea Project three export cables will also cross Perenco (PL876, PL877) and Shell (PL1570) pipelines; Dudgeon export cables; and potentially impact marine recreation near landfall. There is potential that this project could be constructed in two phases with offshore export cable construction in years 3 and 4, and possibly also years 8 and 9 in a two-phase development. Temporal overlap with DEP and SEP export cable construction is unlikely but possible.

Project	Status	Construction Period	Closest Distance from the Project (km)	Distance from the cable corridor (km)	Confidence in Data	Included in the CIA (Y/N)	Rationale
Blythe Hub Development	Under construction	2020 2021	0.5 (Elgood well to DEP wind farm site)	3.6	High	Y	Pipeline may cross Perenco (PL876, PL877) and Shell (PL1570) pipelines.
Sheringham lifeboat station - maintenance works	Active	Unknown (open licence until 31st May 2027)	2.1 (Export cable corridor)	2.1	High	N	Maintenance works and project impacts will not interact because the nearest marine components of the projects are the HDD exit pits located offshore.

18.7.3 Assessment of Cumulative Impacts

153. 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 impact that may arise. Two other projects are included in the CIA: Hornsea Project Three Offshore Wind Farm and the Blythe Hub development

18.7.3.1 Cumulative Impact 1: Potential impacts on oil and gas exploration and development

154. The Blythe Hub development overlaps areas licenced to the developer, IOG, and licence block 48/23d which has yet to be awarded. Hornsea Project Three does not overlap any of the same licenced areas as DEP and SEP, therefore there is no cumulative impact on oil and gas exploration and development.

18.7.3.2 Cumulative Impact 2: Potential impacts on subsea cables and pipelines

155. In addition to DEP South infield cables crossing Perenco (PL876, PL877) and Shell (PL1570) operated pipelines, Hornsea Project Three and the Blythe Hub development are also expected to cross these pipelines at different locations, with potential cumulative impacts. The residual impact from DEP and SEP on subsea cables and pipelines is assessed as minor adverse for the construction, operation and decommissioning phases. As with DEP and SEP, it is expected that Hornsea Project Three and the Blythe Hub development will reach agreements with the affected operators (including proximity and crossing agreements) such that cumulative impacts remain **minor** adverse significance during all stages of the projects.

18.7.3.3 Cumulative Impact 3: Potential impacts on marine recreation

156. The residual impact from DEP and SEP on marine recreation is assessed as minor adverse for the construction and decommissioning phases and negligible adverse for the operation phase. Recreational vessel activity in the vicinity of the Blythe Hub is very low (**Figure 18.7**) and marine recreational activities are concentrated in coastal areas. Therefore no cumulative impacts with the Blythe Hub development are anticipated.

157. Installation of the Hornsea Project Three offshore export cables has the potential to have cumulative impacts with DEP and SEP export cable activities on coastal marine recreation receptors. The Hornsea Project Three offshore export cable corridor is located approximately 325m to the west of the DEP and SEP offshore export cable corridor. Based on a Hornsea Project Three construction start in 2021 and offshore export cable corridor construction in years 3 and 4 (2023-2024), and possibly also years 8 and 9 in a two-phase development (2028-2029) (Ørsted, 2018), temporal overlap of export cable construction is not expected. Similarly, it is unlikely that cable maintenance activities would take place at the same time during operation of the wind farm export cables, and concurrent decommissioning is not expected. However, with DEP and SEP offshore cable construction commencing as early as 2026, it is possible that if Hornsea Project Three construction is delayed then offshore DEP/SEP cable construction activities could commence shortly after Hornsea Project Three (or shortly before a Hornsea Project Three second stage development.

158. Even in this worst case scenario, in the context of the area available for marine recreation the magnitude of any cumulative impact is still considered low for construction or decommissioning and negligible for operation. Cumulative impacts are therefore assessed as being of **minor** adverse significance (construction or decommissioning) and **negligible** adverse significance (operation).

18.8 Transboundary Impacts

159. Transboundary impacts for the petroleum industry and other marine users have been scoped out of the assessment in line with the recommendation of the Planning Inspectorate in the Scoping Opinion (Planning Inspectorate, 2019) (**Section 18.2**).

18.9 Inter-relationships

160. **Table 18-14** illustrates the inter-relationship between impacts discussed in this chapter and those discussed in other chapters.

Table 18-14: Petroleum industry and other marine users inter-relationships

Topic and description	Related chapter	Where addressed in this chapter	Rationale
Construction and operation			
Shipping traffic associated with the petroleum and other marine industries	**Chapter 15 Shipping and Navigation**	Direct impacts on oil and gas operations (including access of vessels to oil and gas infrastructure) are assessed in **Section 18.6.1.1** and **Section 18.6.2.1**.. The impact to subsea cables and pipelines is assessed in **Section 18.6.1.3**.	The presence of project construction and operational vessels and the installation of wind farm infrastructure has to potential to be a navigational hazard to oil and gas shipping, requiring diversion of vessels when in transit.
Helicopter traffic associated with the petroleum and other marine industries	**Chapter 17 Aviation and MoD**	Direct impacts on oil and gas operations (including access of helicopters to oil and gas infrastructure) are assessed in **Section 18.6.1.1**. and **Section 18.6.2.1**.	The presence of project construction and operational vessels and the installation of wind farm infrastructure (turbines and OSPs) has to potential to be a navigational hazard to oil and gas helicopter traffic and require diversion.

Topic and description	Related chapter	Where addressed in this chapter	Rationale
Decommissioning			
Shipping traffic associated with the petroleum and other marine industries	**Chapter 15 Shipping and Navigation**	Direct impacts on oil and gas operations are assessed in **Section 18.6.1.1**. The impact to subsea cables and pipelines is assessed in **Section 18.6.1.3**.	The presence of project decommissioning vessels has to potential to be a navigational hazard to oil and gas shipping, require diversion of vessels when in transit and to restrict access of vessels to oil and gas infrastructure.
Helicopter traffic associated with oil and gas platforms	**Chapter 17 Aviation and MoD**	Direct impacts on oil and gas operations are assessed in **Section 18.6.1.1**.	The presence of project decommissioning vessels has to potential to be a navigational hazard to oil and gas helicopter traffic, require diversion and to platforms.

18.10 Interactions

161. The impacts identified and assessed within each chapter may have the potential to interact with each other. However, in this case there are no potential interactions between impacts on the petroleum industry and other marine users described in this chapter as these are all separate, non-related receptors.

18.11Potential Monitoring Requirements

162. No monitoring relevant to this assessment is anticipated. However, any such requirements will be agreed with stakeholders prior to construction taking account of the final detailed design of DEP and SEP.

18.12Assessment Summary

163. This chapter has provided a characterisation of the existing environment for the petroleum industry and other marine users based on existing data, which has established that there will be some **minor** adverse residual impacts on oil and gas operations, subsea cables and pipelines, and recreational activities during construction, operation and decommissioning phases of DEP and SEP.

164. Although DEP and SEP may require works to take place in close proximity to existing oil and gas operations, and will require cable crossings of existing cables and pipelines, the potential for any major adverse impacts can be mitigated through site selection and the use of proximity and crossing agreements with other operators. Further work is also underway to fully assess the restriction to oil and gas platforms (notably the Blythe and Waveney platforms) in terms of both marine and helicopter access so that suitable mitigation can be established as required.

Table 18-15: Summary of potential impacts on the petroleum industry and other marine users topic

Potential impact	Receptor	Sensitivity	Magnitude	Pre-mitigation impact	Mitigation measures proposed	Residual impact
Construction						
Impact 1: Potential interference with oil and gas operations	Oil and gas operations	High	Medium (DEP) No impact (SEP)	**Moderate** adverse (DEP) **No impact** (SEP)	Equinor will reach agreements with operators as part of embedded mitigation	Level of residual impact to be confirmed following a detailed assessment of platform access (DEP) **No impact (SEP)**
Impact 2: Potential impacts on oil and gas exploration and development	Oil and gas operations	Medium	Low	**Minor** adverse	N/A	**Minor** adverse
Impact 3: Potential impacts on subsea cables and pipelines	Subsea cables and pipelines	High	Negligible	**Minor** adverse	Equinor will reach agreements with operators as part of embedded mitigation, including proximity and crossing agreements.	**Minor** adverse

Potential impact	Receptor	Sensitivity	Magnitude	Pre-mitigation impact	Mitigation measures proposed	Residual impact
Impact 4: Potential impacts on marine recreational activities	Recreational vessels, sea angling and scuba diving	Low	Low	**Minor** adverse	N/A	**Minor** adverse
Operation						
Impact 1: Potential interference with oil and gas operations	Oil and gas operations	High	Medium (DEP) No impact (SEP)	**Moderate** adverse (DEP) **No impact** (SEP)	Equinor will reach agreements with operators as part of embedded mitigation	Level of residual impact to be confirmed following a detailed assessment of platform access (DEP) **No impact (SEP)**
Impact 2: Potential impacts on oil and gas exploration and development	Oil and gas operations	Medium	Low	**Minor** adverse	N/A	**Minor** adverse

Potential impact	Receptor	Sensitivity	Magnitude	Pre-mitigation impact	Mitigation measures proposed	Residual impact
Impact 3: Potential impacts on subsea cables and pipelines	Subsea cables and pipelines	High	Negligible	**Minor** adverse	Equinor will reach agreements with operators as part of embedded mitigation, including proximity and crossing agreements.	**Minor** adverse
Impact 4: Potential impacts on marine recreational activities	Recreational vessels, sea angling and scuba diving	Low	Negligible	**Negligible** adverse	N/A	**Negligible** adverse
Decommissioning						
Impact 1: Potential interference with oil and gas operations	Oil and gas operations	High	No impact	**No impact**	Equinor will reach agreements with operators as part of embedded mitigation	**No impact**
Impact 2: Potential impacts on oil and gas exploration and development	Oil and gas operations	Medium	Low	**Minor** adverse	N/A	**Minor** adverse

Potential impact	Receptor	Sensitivity	Magnitude	Pre-mitigation impact	Mitigation measures proposed	Residual impact
Impact 3: Potential impacts on subsea cables and pipelines	Subsea cables and pipelines	High	Negligible	**Minor** adverse	Equinor will reach agreements with operators as part of embedded mitigation, including proximity and crossing agreements.	**Minor** adverse
Impact 4: Potential impacts on marine recreational activities	Recreational vessels, sea angling and scuba diving	Low	Low	**Minor** adverse	N/A	**Minor** adverse

18.13References

BMAPA (2009) Renewable Energy & Cables. Dredger transit routes (Online) Available from the British Marine Aggregate Producers Association (BMAPA) website: https://bmapa.org/issues/renewable_energy.php

Centre for Environment, Fisheries and Aquaculture Science (Cefas) (2020). Participation, catches and economic impact of sea anglers resident in the UK in 2016 & 2017. Available at: https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/896907/UK_Sea_Angling_2016-17_report_final.pdf

Department of Energy and Climate Change (DECC) (2014). Oil and gas clause in Crown Estate leases. Guidance on procedures for independent valuation where necessary. June 2014. Available at: https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/318704/Crown_Estate_Lease_Independent_Valuer_Guidance.pdf

Department for Environment, Food and Rural Affairs (Defra) (2009) UK Offshore Energy Strategic Environmental Assessment. Available at: https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/194348/OES_A3h_Other_Users.pdf

Department of Energy and Climate Change (DECC) (2011) National Policy Statement for Renewable Energy Infrastructure (EN-3). Available at: https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/37048/1940-nps-renewable-energy-en3.pdf

Eastern IFCA (2020) Recreational Sea Anglers. Available at: https://www.eastern-ifca.gov.uk/recreational-sea-anglers/

European Subsea Cables Association (ESCA) (2016). Guidelines. Available at: http://www.escaeu.org/guidelines/

Finstrokes website (2020). Dive map. Available at: https://www.finstrokes.com/dive-map

Fishing The Spot (2020) Fishing in Weybourne. Available at: https://fishingthespot.uk/fishing-near/50531-fishing-Weybourne

HM Government (2014). East Inshore and East Offshore Marine Plans. Available at: https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/312496/east-plan.pdf

Independent Oil and Gas (IOG) (2020). Blythe Hub Development Environmental Statement - Additional Information. Available at: https://www.independentoilandgas.com/media/1273/blythe-hub_es_additional-information_25feb2020.pdf

International Cable Protection Committee (ICPC) (2013). Recommendation No. 13. The Proximity of Offshore Renewable Wind Energy Installation and Submarine Cable infrastructure in National Waters. Issue 2B, 26 November 2013.

ICPC (2014). Recommendation No. 3. Criteria to eb Applied to Proposed Crossings of Submarine Cables and/or Pipelines. Issue 10B, 12 February 2014.

ICPC (2015). Recommendation No. 2. Recommended Routing and Reporting Criteria for Cables in Proximity to Others. Issue 11A, 3 November 2015.

KIS-ORCA (2019) Offshore map. Kingfisher Information Service - Offshore Renewable & Cable Awareness project (KIS-ORCA). (Online) Available from: http://www.kisorca.eu/map#.XVKiruhKiUk

Marine Management Organisation (MMO) (2013) Sea Angling 2012 – a survey of recreational sea angling activity and economic value in England. Available at: file:///C:/Users/304964/Downloads/12025_SeaAngling2012synthesisreportFINAL%20(2).pdf

Oil and Gas Authority (2018) Offshore Licensing Rounds. Available at: https://www.ogauthority.co.uk/licensing-consents/licensing-rounds/offshore-licensing-rounds/#tabs

Oil and Gas UK (2015) Pipeline Crossing Agreement and Proximity Agreement Pack.

Ørsted (2018a) Race Bank Offshore Wind Farm officially opens. Available at: https://orsted.co.uk/media/newsroom/news/2018/06/race-bank-offshore-wind-farm-officially-opens

Ørsted (2018b). Hornsea Project Three Environmental Statement – Chapter 3: Project Description. PINS Document Reference: A6.1.3 APFP Regulation 5(2)(a). May 2018. Available at: https://infrastructure.planninginspectorate.gov.uk/wp-content/ipc/uploads/projects/EN010080/EN010080-000528-HOW03_6.1.3_Volume%201%20-%20Ch%203%20-%20Project%20Description.pdf Accessed 19/01/2021

North Norfolk Divers website (2020). Chalk gullies. Available at: https://www.northnorfolkdivers.co.uk/chalk-gullies/

PINS (2019). Scoping Opinion: Proposed Dudgeon and Sheringham Shoal Offshore Wind Farm Extensions. Planning Inspectorate Reference EN010109. Available at: https://infrastructure.planninginspectorate.gov.uk/wp-content/ipc/uploads/projects/EN010109/EN010109-000006-EQNR_Scoping%20Opinion%202017%20EIA%20Regs.pdf

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

RWE (2020) Triton Knoll Latest News and Information. Available at: https://www.tritonknoll.co.uk/latest-news/

The Crown Estate (2019) Record of the Habitats Regulations Assessment Undertaken under Regulation 63 of The Conservation of Habitats and Species Regulations 2017

and Regulation 28 of The Conservation of Offshore Marine Habitats and Species Regulations 2017. 2017 Offshore Wind Extensions Plan. Dated 28 August 2019