



Sheringham Shoal and Dudgeon Offshore Wind Farm Extension Projects

ES Non-Technical Summary

August 2022

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APFP Regulation: 5(2)(a)

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Sheringham Shoal and Dudgeon Offshore Wind Farm Extension Projects Environmental Statement Non-Technical Summary	
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Approved by:	Date:
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Glossary of Acronyms

DCO	Development Consent Order
Defra	Department of Environment, Food and Rural Affairs
DEP	Dudgeon Offshore Wind Farm Extension Project
EIA	Environmental Impact Assessment
ES	Environmental Statement
LVIA	Landscape and Visual Impact Assessment
MW	Megawatts
NPS	National Policy Statement
PEIR	Preliminary Environmental Information Report
PINS	Planning Inspectorate
SEP	Sheringham Shoal Offshore Wind Farm Extension Project
SVIA	Seascape and Visual Impact Assessment
UK	United Kingdom

Glossary of Terms

Dudgeon Offshore Wind Farm Extension Project (DEP)	The Dudgeon Offshore Wind Farm Extension onshore and offshore sites including all onshore and offshore infrastructure.
DEP offshore site	The Dudgeon Offshore Wind Farm Extension consisting of the DEP wind farm site, interlink cable corridors and offshore export cable corridor (up to mean high water springs).
DEP onshore site	The Dudgeon Offshore Wind Farm Extension onshore area consisting of the DEP onshore substation site, onshore cable corridor, construction compounds, temporary working areas and onshore landfall area.
DEP North array area	The wind farm site area of the DEP offshore site located to the north of the existing Dudgeon Offshore Wind Farm
DEP South array area	The wind farm site area of the DEP offshore site located to the south of the existing Dudgeon Offshore Wind Farm
DEP wind farm site	The offshore area of DEP within which wind turbines, infield cables and offshore substation platform/s will be located and the adjacent Offshore

	Temporary Works Area. This is also the collective term for the DEP North and South array areas.
European site	Sites designated for nature conservation under the Habitats Directive and Birds Directive. This includes candidate Special Areas of Conservation, Sites of Community Importance, Special Areas of Conservation, potential Special Protection Areas, Special Protection Areas, Ramsar sites, proposed Ramsar sites and sites compensating for damage to a European site and is defined in regulation 8 of the Conservation of Habitats and Species Regulations 2017, although some of the sites listed here are afforded equivalent policy protection under the National Planning Policy Framework (2021) (paragraph 176) and joint Defra/Welsh Government/Natural England/NRW Guidance (February 2021).
Evidence Plan Process (EPP)	A voluntary consultation process with specialist stakeholders to agree the approach, and information to support, the EIA and HRA for certain topics.
Expert Topic Group (ETG)	A forum for targeted engagement with regulators and interested stakeholders through the EPP.
Grid option	Mechanism by which SEP and DEP will connect to the existing electricity network. This may either be an integrated grid option providing transmission infrastructure which serves both of the wind farms, or a separated grid option, which allows SEP and DEP to transmit electricity entirely separately.
Horizontal directional drilling	Trenchless technique used to install cables – in this case referring to the installation of the export cables at the landfall.
Horizontal directional drilling zones	The areas within the onshore cable route which will house horizontal directional drilling entry or exit points.
Infield cables	Cables which link the wind turbine generators to the offshore substation platform(s).
Interlink cables	Cables linking two separate project areas. This can be cables linking: <ol style="list-style-type: none"> 1) DEP South array area and DEP North array area 2) DEP South array area and SEP

	<p>3) DEP North array area and SEP</p> <p>1 is relevant if DEP is constructed in isolation or first in a phased development.</p> <p>2 and 3 are relevant where both SEP and DEP are built.</p>
Interlink cable corridor	This is the area which will contain the interlink cables between offshore substation platform/s and the adjacent Offshore Temporary Works Area.
Integrated Grid Option	Transmission infrastructure which serves both extension projects.
Jointing bays	Underground structures constructed at regular intervals along the onshore cable route to join sections of cable and facilitate installation of the cables into the buried ducts.
Landfall	The point at the coastline at which the offshore export cables are brought onshore, connecting to the onshore cables at the transition joint bay above mean high water.
Offshore cable corridors	This is the area which will contain the offshore export cables or interlink cables, including the adjacent Offshore Temporary Works Area.
Offshore export cable corridor	This is the area which will contain the offshore export cables between offshore substation platform/s and landfall, including the adjacent Offshore Temporary Works Area.
Offshore export cables	The cables which will bring electricity from the offshore substation platform(s) to the landfall. 220 – 230kV.
Offshore scoping area	An area presented at Scoping stage that encompassed all planned offshore infrastructure, including landfall options at both Weybourne and Bacton, allowing sufficient room for receptor identification and environmental surveys. This has been refined following further site selection and consultation for the PEIR and ES.
Offshore substation platform (OSP)	A fixed structure located within the wind farm site/s, containing electrical equipment to aggregate the power from the wind turbine generators and convert it into a more suitable form for export to shore.
Offshore Temporary Works Area	An Offshore Temporary Works Area within the offshore Order Limits in which vessels are

	permitted to carry out activities during construction, operation and decommissioning encompassing a 200m buffer around the wind farm sites and a 750m buffer around the offshore cable corridors. No permanent infrastructure will be installed within the Offshore Temporary Works Area.
Onshore cable corridor	The area between the landfall and the onshore substation sites, within which the onshore cable circuits will be installed along with other temporary works for construction.
Onshore export cables	The cables which will bring electricity from the landfall to the onshore substation. 220 – 230kV.
Onshore Substation	Compound containing electrical equipment to enable connection to the National Grid.
Order Limits	The area subject to the application for development consent, including all permanent and temporary works for SEP and DEP (application boundary).
Separated Grid Option	Transmission infrastructure which allows each project to transmit electricity entirely separately.
Sheringham Shoal Offshore Wind Farm Extension Project (SEP)	The Sheringham Shoal Offshore Wind Farm Extension onshore and offshore sites including all onshore and offshore infrastructure.
SEP offshore site	Sheringham Shoal Offshore Wind Farm Extension consisting of the SEP wind farm site and offshore export cable corridor (up to mean high water springs).
SEP onshore site	The Sheringham Shoal Wind Farm Extension onshore area consisting of the SEP onshore substation site, onshore cable corridor, construction compounds, temporary working areas and onshore landfall area.
SEP wind farm site	The offshore area of SEP within which wind turbines, infield cables and offshore substation platform/s will be located and the adjacent Offshore Temporary Works Area.
Study area	Area where potential impacts from the project could occur, as defined for each individual Environmental Impact Assessment (EIA) topic.
The Applicant	Equinor New Energy Limited

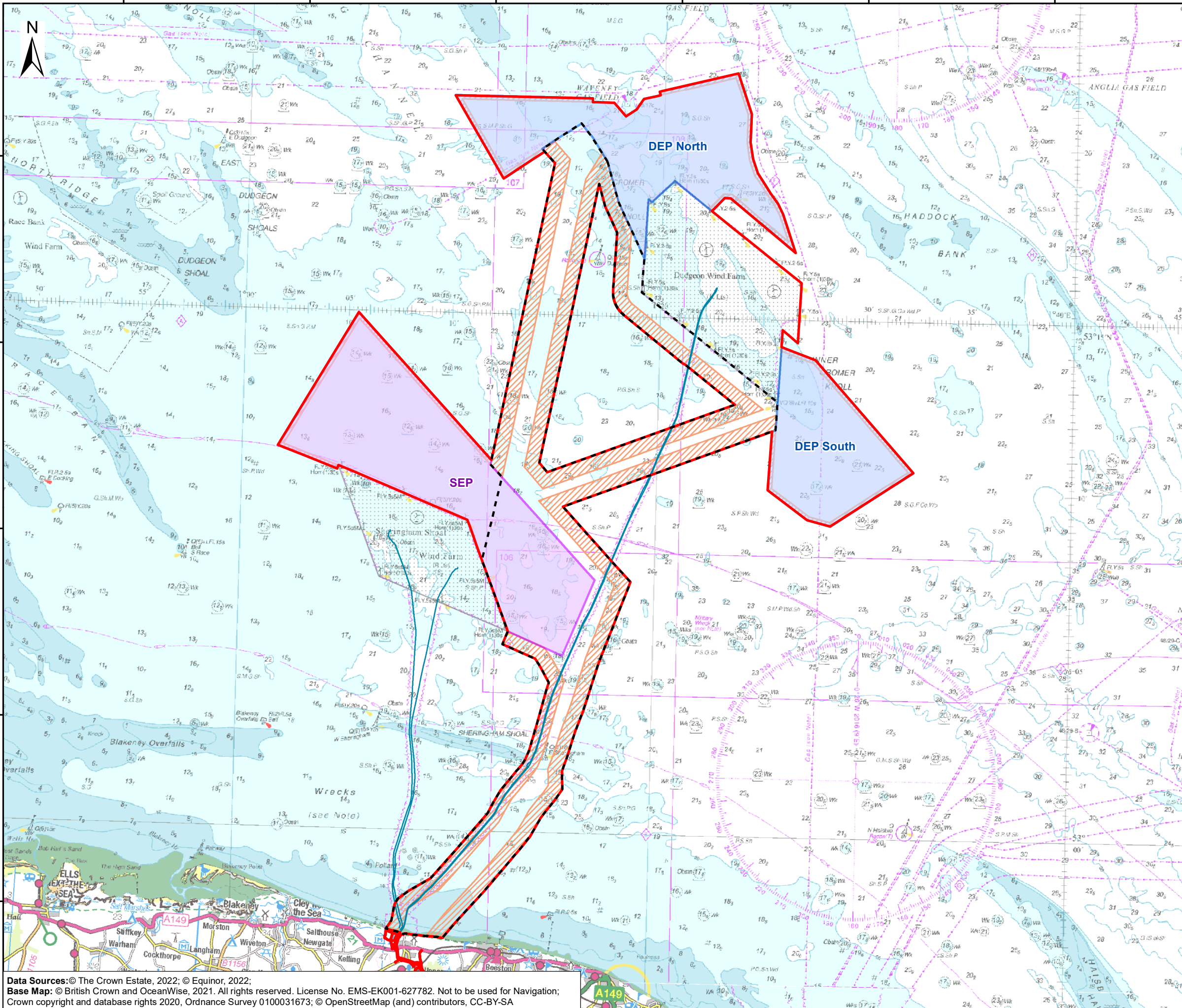
NON-TECHNICAL SUMMARY

1 Introduction

1.1 Purpose of the Document

1. This document is the Non-Technical Summary of the Environment Statement (ES) for Sheringham Shoal Offshore Wind Farm Extension Project (hereafter SEP) and Dudgeon Offshore Wind Farm Extension Project (hereafter DEP). It provides a summary of SEP and DEP, the key findings of the Environmental Impact Assessment (EIA) and of the site selection process that underpins it.
2. SEP and DEP are Nationally Significant Infrastructure Projects. Consent to construct, operate and decommission SEP and DEP is therefore being requested from the Secretary of State for Business, Energy and Industrial Strategy, under the Planning Act 2008. Consequently, an EIA is required to support a Development Consent Order (DCO) application. The purpose of the EIA is to assess the potential impacts of SEP and DEP on the environment, from construction through to decommissioning, and to allow stakeholders to develop an informed view of the impacts of the development, as required by The Infrastructure Planning (Environmental Impact Assessment) Regulations 2017 (the EIA Regulations).
3. In accordance with the EIA Regulations, an ES has been prepared which details the findings of the EIA process for SEP and DEP and accompanies the DCO application submitted to the Planning Inspectorate.
4. The existing operational Sheringham Shoal and Dudgeon Offshore Wind Farms are owned by different partners, with Equinor New Energy Limited being the only partner with ownership in both wind farms. In 2018, The Crown Estate invited developers to bid for extensions to operational offshore wind farms. Equinor New Energy Limited (hereafter the Applicant) applied, on behalf of the partners in the existing Sheringham Shoal and Dudgeon Offshore Wind Farms, for an Agreement for Lease for their extension. An acceptance letter from The Crown Estate was received in September 2019 and Agreements for Lease were signed in April 2020 for DEP and August 2020 for SEP. The Applicant is leading on the development work for both SEP and DEP.
5. When operational, SEP and DEP combined will have the potential to generate renewable power for 785,000 United Kingdom (UK) homes from up to 23 wind turbines at SEP and up to 30 wind turbines at DEP.
6. The main components of SEP and DEP comprise offshore wind turbines, offshore substation platform(s), offshore cables, onshore cables and an onshore substation. The offshore Order Limits are shown in [Figure 1-1](#). The onshore Order Limits are shown in [Figure 1-2](#). A more detailed set of plans showing the Order Limits is available in [Chapter 4 Project Description](#).
7. This Non-Technical Summary is a stand-alone document intended to provide a high-level overview of the potential environmental impacts of SEP and DEP in non-technical terms. For further information, the full ES should be referred to.

360000 370000 380000 390000 400000 410000



Sheringham Shoal and Dudgeon Offshore Wind Farm Extension Projects

Title:

Figure 1.1 Offshore Order Limits

Document:

Environmental Statement (ES)
6.1 Non-Technical Summary

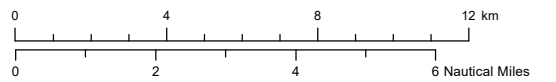
Application Doc. no.: 5(2)(a)

Legend:

- Order Limits
- Dudgeon Offshore Wind Farm Extension Project Wind Farm Site
- Sheringham Shoal Offshore Wind Farm Extension Project Wind Farm Site
- Offshore Cable Corridors
- Offshore Temporary Work Area
- Existing Offshore Wind Farm
- Existing Offshore Wind Farm Export Cable



Coordinate Reference System: WGS 1984 UTM Zone 31N
Transformation WGS84: OSGB_1936_To_WGS_1984_7



Scale: 1:200,000 Scale at size: A3

Equinor Doc. no.: C282-RH-Z-GA-00018
RHDHV Doc. no.: PB8164-RHD-ZZ-OF-DR-Z-0258

A	25/08/2022	First Issue	JT	AP	PM
REV	DATE	STATUS	DRW	CHK	APR

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Sheringham Shoal and Dudgeon Offshore Wind Farm Extension Projects

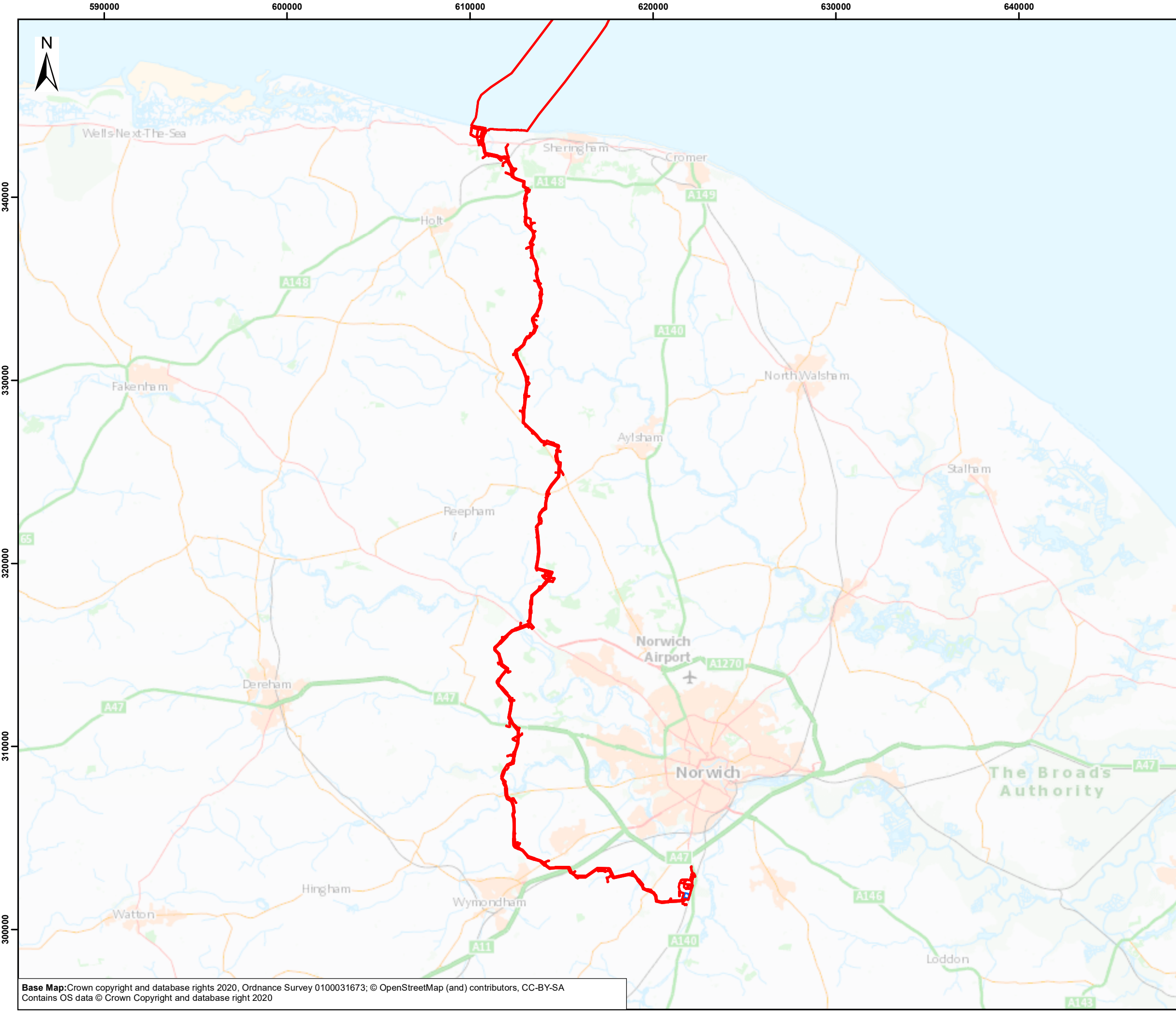
Title: Sheringham Shoal and Dudgeon Offshore Wind Farm Extension Projects

Figure 1.2
Onshore Order Limits

Document: Environmental Statement (ES)
6.1 Non-Technical Summary

Application Doc. no.: 5(2)(a)

- Legend:
- Order Limits
 - Onshore Substation Site



Coordinate Reference System: British National Grid
Transformation WGS84: OSGB_1936_To_WGS_1984_7

0 2,000 4,000 6,000 8,000 10,000 12,000 Metres
0 2,000 4,000 6,000 8,000 10,000 12,000 Yards

Scale: 1:200,000 Scale at size: A3

Equinor Doc. no.: C282-RH-Z-GA-00018
RHDHV Doc. no.: PB8164-RHD-ZZ-ON-DR-Z-0194

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1.2 The Applicant and the Project Team

8. Equinor New Energy Limited is part of Equinor ASA, which is an international energy company present in more than 30 countries. The company employs 22,000 people globally, and over 650 in the UK. As a broad energy company, Equinor is committed to long term value creation in a low carbon future and aims to reach net zero emissions globally by 2050.
9. Equinor has been operating in the UK for over 35 years. It is the UK's leading energy provider and supports the UK economy by investing billions in crucial energy infrastructure, working with over 700 suppliers across the country.
10. In the UK, Equinor currently powers around 750,000 homes through its three wind farms: Sheringham Shoal Offshore Wind Farm; Dudgeon Offshore Wind Farm; and the world's first floating offshore wind farm, Hywind Scotland which is partnered with Batwind, the world's first battery for offshore wind.
11. Royal HaskoningDHV is an environmental and engineering consultancy with considerable expertise in offshore renewable energy and has been commissioned as the consultant to lead the EIA for SEP and DEP. Royal HaskoningDHV has provided environmental, development and consenting support on over 14GW of renewable energy projects across 30 UK offshore wind farms. Royal HaskoningDHV's EIA activities and ESs are accredited by the Institute of Environmental Management and Assessment under the EIA Quality Mark Scheme. This demonstrates Royal HaskoningDHV's commitment to ensuring EIA is undertaken to a high quality and in accordance with best practice.

1.3 The Need for the Projects

12. Climate change is a global issue caused by the increase of carbon emissions into the atmosphere and is one of the main challenges of our time. SEP and DEP will make a contribution both to the achievement of UK decarbonisation targets and to global commitments in mitigating climate change. By generating low carbon, renewable electricity in the UK, SEP and DEP will also help to reduce the UK's reliance on imported energy and will increase energy supply security. Further detail is provided on this in **ES Chapter 1 Introduction**, **ES Chapter 2 Policy and Legislative Context**, the **Planning Statement** and the **Project Vision**.
13. SEP and DEP will make a substantial contribution to the achievement of national renewable energy targets towards net zero greenhouse gas emissions and to the UK's contribution to global efforts to reduce the effects of climate change.
14. SEP and DEP could contribute approximately 4% of the current shortfall towards meeting the UK's offshore wind cumulative deployment target for 2030.
15. The offshore wind farms will provide secure, reliable, affordable renewable energy supply in the UK. SEP and DEP will reduce carbon emissions and contribute to the economy by providing substantial investment locally and nationally, as well as employment opportunities and new infrastructure.
16. SEP and DEP will continue to drive technology and development costs down to provide low-cost energy to consumers and provide community benefits to help fight fuel poverty. SEP and DEP will also significantly contribute to the UK's commitment to meeting the legally binding target of net zero greenhouse gas emissions by 2050.

1.4 Site Selection and Assessment of Alternatives

17. The site selection and project design process involved early engagement with communities and stakeholders. This ensured that site selection decisions were communicated with people and allowed for feedback to influence and refine the project design.
18. The site selection process has been informed by specialists, comprising of engineers, planners, land advisors, legal and environmental consultants whose expertise was drawn upon throughout the process.
19. The location and design of the SEP and DEP infrastructure has taken into account a wide range of environmental, physical and social considerations. For example, the routing and design of the onshore cables to avoid populated areas and areas of ecological importance where possible. The aim was to establish an overall footprint and set of design parameters that were environmentally and socially acceptable, and feasible from an engineering and commercial perspective. This reflects a long-term consideration to ensure that the lowest possible energy cost is passed onto the consumer.
20. The Applicant has undertaken extensive pre-application engagement with stakeholders, communities and landowners in order to seek input for the ongoing refinement of the SEP and DEP project design, and to communicate the decisions that have been made.
21. Further consultation on the site selection was undertaken through a range of methods including public consultation, a consultation website and an information line. Phase 1 consultation on site selection for the onshore substation and cable corridor ran from 9th July 2020 to 20th August 2020 and Phase 2 public consultation for updates and feedback ran from 29th April 2021 to 10th June 2021. Engagement has also been undertaken with landowners and local authorities. Full details of the consultation process are presented in the **Consultation Report**, which forms part of the DCO application.
22. Equinor has also engaged with a number of stakeholders on site selection matters. Several Expert Topic Groups have been established to enable detailed discussions on particular EIA topics. Details of the technical consultation undertaken are presented in the **Consultation Report**.
23. More detail with regard to site selection can be found in **Chapter 3 Site Selection and Assessment of Alternatives**.

24. **Table 1-1** gives an overview of the key site selection decisions that have been made during the EIA process.

Table 1-1: Summary of Key Site Selection Decisions

Infrastructure Element	Options considered	Decision	Main environmental benefits
National Grid connection point	Following the completion of the Connection and Infrastructure Options Note, National Grid made a grid connection offer in April 2019 for connection at Norwich Main National Grid Substation that would accommodate both SEP and DEP. The Applicant accepted this offer in May 2019.		
Landfall	Weybourne; Bacton; and Happisburgh.	Weybourne (west)	<ul style="list-style-type: none"> • Lower elevation at the coastline and other technical advantages; • Shorter corridor, minimising footprint; • Avoids populated areas at the coast and those at risk of coastal erosion as far as possible; • Avoids the Wash and North Norfolk Coast Special Area of Conservation; • Less offshore cable and pipeline crossings; • Better access; and • High confidence in the feasibility of horizontal directional drilling (the method used to install the export cables under the beach at the landfall without the need for trenches) due to previous installations.
Offshore export cable corridor	Multiple	Export cable corridor to Weybourne (with landfall at Weybourne West)	<ul style="list-style-type: none"> • Shorter corridor, minimising footprint; • Avoids the Wash and North Norfolk Coast Special Area of Conservation; • Less offshore cable and pipeline crossings; • Avoids Bacton sandscaping scheme; and • Avoids area of outcropping chalk further offshore.

Infrastructure Element	Options considered	Decision	Main environmental benefits
Onshore substation	17 sites within 5 Zones	Option 1	<ul style="list-style-type: none"> • Avoids a potential settlement of high heritage importance; • Uses a natural low point within the landscape, reducing its visibility from views across the Tas Valley; • Final footprint avoids area of potential surface water flood risk; • Closer to the area most influenced by existing infrastructure; • At least 500m from nearest residential properties – reduce risk of noise and visual impacts; and • Slight preference from community feedback.
Onshore cable corridor	<ul style="list-style-type: none"> • The route of the onshore cable corridor was selected based upon guiding design principles, constraints mapping, surveys and landowner and stakeholder feedback. • The route was based on two fixed points – landfall and the onshore substation. The route between these fixed points was refined over time as more information was received. • An initial 1km wide corridor was identified in 2019 to inform the scope of surveys and to start consultation with stakeholders and landowners. Information from those surveys and consultation enabled the corridor to be refined down to 200m wide and was the basis of the assessment work presented in the Preliminary Environmental Information Report issued in 2021. The findings of that preliminary assessment and further consultation allowed a further refinement down to the final width of 60m for the DCO application, increasing to a width of 100m for trenchless crossing zones, such as main rivers and A roads. 		

1.5 The Environmental Impact Assessment Process

25. The EIA considers all relevant topics both onshore and offshore. The topics to be included in the EIA were agreed with the Planning Inspectorate and other stakeholders through the scoping process, with the Planning Inspectorate providing a Scoping Opinion in November 2019 which is available at:

https://infrastructure.planninginspectorate.gov.uk/wp-content/uploads/projects/EN010109/EN010109-000006-EQNR_Scoping%20Opinion%202017%20EIA%20Regs.pdf

26. The EIA findings for SEP and DEP are reported within the ES. As part of the process, the onshore and offshore existing environment has been characterised, through a combination of desk-based studies, consultation and site-specific surveys.

27. All potential impacts of the construction, operation and decommissioning of SEP and DEP have been identified and an assessment made of the significance of each potential impact using a standardised approach by EIA topic specialists.

28. Where the impact assessment identifies that an aspect of the development is likely to give rise to significant environmental impacts, mitigation measures are proposed to avoid impacts or reduce them to acceptable levels and, if possible, to provide an enhancement to the existing environment. Mitigation will be agreed through the ongoing process of consultation with the relevant authorities and other parties.

29. The process also considers:

- Cumulative impacts, where SEP and DEP are considered alongside the predicted impacts of other projects in the area (for example another offshore wind farm or road development);
- Transboundary impacts, where activities in other countries may be impacted (for example shipping routes and commercial fishing activities); and
- Inter-relationships, where impacts to one receptor can have a knock-on impact on another (for example noise impacts disturbing people in the nearest properties may also disturb species associated with nearby nature conservation sites).

1.6 Role of National Policy Statements in the Decision-Making Process

30. There are three National Policy Statements (NPS) which are relevant to SEP and DEP:

- EN-1 Overarching Energy, which highlights that there should be a presumption in favour of granting consent for projects which fall within relevant NPSs and recognises that offshore wind is a key factor in meeting UK policy objectives;
- EN-3 Renewable Energy Infrastructure, which covers nationally significant renewable energy infrastructure (including offshore wind farms in excess of 100MW); and

- EN-5 Electricity Networks, which covers the electrical infrastructure (including electricity cable systems and substations) in conjunction with EN-1.

31. EN-1, EN-3 and EN-5 are in the process of being revised. A draft version of each NPS was published for consultation in September 2021. Consultation closed in November 2021. Although the revised NPS are in draft form they are considered to be important and relevant for the purpose of decision-making and as such a review of the draft versions has also been undertaken and is described in the relevant ES chapters. As such, the ES outlines how the development of SEP and DEP will comply with the requirements of these NPS.

1.6.1 Other Planning Policies

32. Local authorities are required to prepare and maintain up-to-date Local Development Plans which set out their objectives for the use and development of land within their jurisdiction, and general policies for implementation.

33. The onshore project area falls under the jurisdiction of the following county council and local planning authorities:

- Norfolk County Council;
- North Norfolk District Council;
- Broadland District Council; and
- South Norfolk Council.

34. The Local Development Plans have been considered during the onshore site selection for SEP and DEP to avoid conflict with those planning objectives, wherever possible.

1.7 The ES Structure

35. The ES covers SEP and DEP including both the offshore and onshore development areas. The ES is comprised of:

- Volume 1: ES Chapters (chapter list shown in **Table 1-2**);
- Volume 2: Figures;
- Volume 3: Appendices; and
- Non-Technical Summary (this document).

Table 1-2: ES Volume 1 Chapter List

Section	Chapters	Title
Introductory	Chapter 1	Introduction
	Chapter 2	Policy and Legislative Context
	Chapter 3	Site Selection and Assessment of Alternatives
	Chapter 4	Project Description
	Chapter 5	EIA Methodology
Offshore	Chapter 6	Marine Geology, Oceanography and Physical Processes
	Chapter 7	Marine Water and Sediment Quality
	Chapter 8	Benthic Ecology
	Chapter 9	Fish and Shellfish Ecology

Section	Chapters	Title
	Chapter 10	Marine Mammal Ecology
	Chapter 11	Offshore Ornithology
	Chapter 12	Commercial Fisheries
	Chapter 13	Shipping and Navigation
	Chapter 14	Offshore Archaeology and Cultural Heritage
	Chapter 15	Aviation and Radar
	Chapter 16	Petroleum Industry and Other Marine Users
Onshore	Chapter 17	Ground Conditions and Contamination
	Chapter 18	Water Resources and Flood Risk
	Chapter 19	Land Use, Agriculture and Recreation
	Chapter 20	Onshore Ecology and Ornithology
	Chapter 21	Onshore Archaeology and Cultural Heritage
	Chapter 22	Air Quality
	Chapter 23	Noise and Vibration
Wider Scheme Aspects	Chapter 24	Traffic and Transport
	Chapter 25	Seascape and Visual Impact Assessment
	Chapter 26	Landscape and Visual Impact Assessment
	Chapter 27	Socio-Economics and Tourism
	Chapter 28	Health
	Chapter 29	Transboundary Impacts Summary

1.8 Consultation

36. Equinor has undertaken extensive community and stakeholder consultation, which has informed a number of key decisions in relation to the design and development of SEP and DEP in order to deliver an environmentally sustainable project.
37. Consultation was carried out in accordance with the Statement of Community Consultation, which outlines the approach to consultation with local communities on plans to develop SEP and DEP. Public consultation has included (but not been limited to):
- Community feedback reports shared with all registered participants, key local and community stakeholders, and on the Equinor project website;
 - Phase 1 consultation (2019/2020) with statutory consultees and the public;
 - Phase 2 consultation (2021) with statutory consultees and the public;
 - Parish Council briefings;
 - Direct discussions with landowners;
 - Newsletters distributed throughout the onshore substation(s) site selection study area;
 - Dedicated project e-mail address and freepost address to assist local communities in contacting the Applicant;
 - Provision of a dedicated project website; and

- Regular and targeted discussions with regulators and other stakeholder bodies through various means including Expert Topic Group meetings as part of the Evidence Plan Process, as detailed in the **Consultation Report**.

38. Full details of the SEP and DEP consultation process is presented in the **Consultation Report**.

2 SEP and DEP Project Description

39. SEP and DEP are located in the Greater Wash region of the southern North Sea. The closest point to the coast is 15.8km from SEP and 26.5km from DEP (**Figure 1-1**). The offshore area (**Figure 1-1**) includes the SEP and DEP wind farm sites where the wind turbines will be located, and the offshore cable corridors that connect the wind farm sites to the landfall.

40. The key offshore components are:

- 13 to 23 offshore wind turbines for SEP;
- 17 to 30 offshore wind turbines for DEP;
- Wind turbines with maximum tip height of 330m;
- Two offshore substation platforms (one for SEP and one for DEP) and their associated foundations; and
- Offshore cables.

41. SEP and DEP will also require onshore infrastructure in order to transmit and connect the offshore wind farms to the onshore substation (**Figure 1-2**), which in summary comprise:

- Landfall at Weybourne, where the offshore export cables are brought ashore and jointed to the onshore cables;
- 60km of underground cables between the landfall and the grid connection at the existing National Grid Norwich Main substation; and
- A new onshore substation for SEP and DEP next to the Norwich Main substation.
 - Substation would be 3.25ha in size for SEP or DEP alone, or 6ha for SEP and DEP together; and
 - Substation buildings and electrical equipment up to 15m tall.

42. **Figure 2-1** illustrates the main elements of SEP and DEP that will be installed. Further details of the key offshore and onshore components can be found in **Chapter 4 Project Description**.

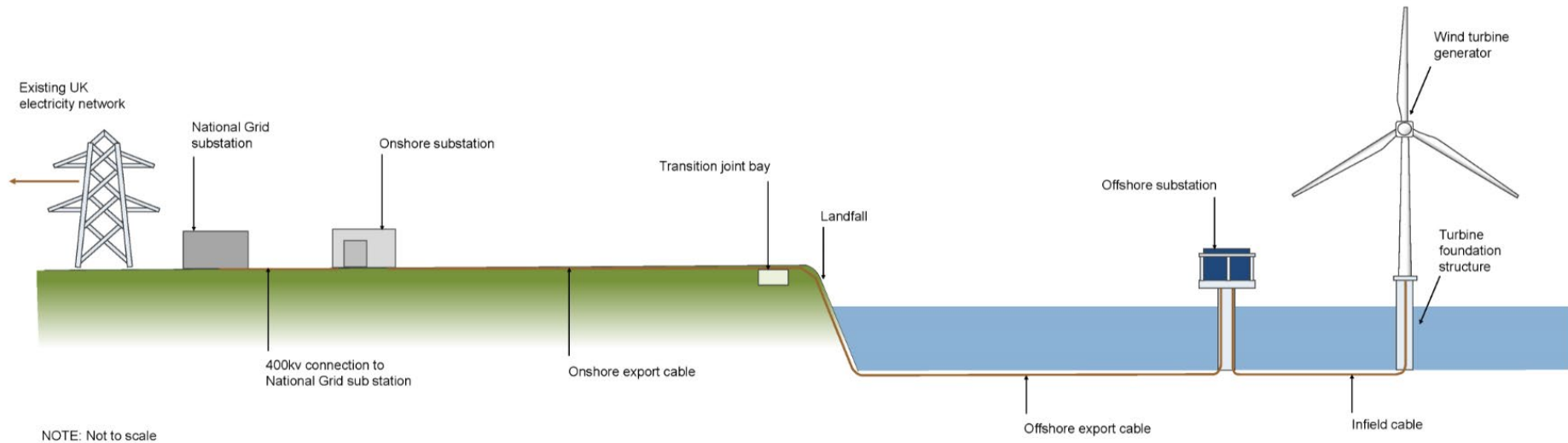
43. The earliest that construction could commence is 2025, with the onshore construction works likely to commence first.

2.1 Offshore Works

44. Up to 30 15MW wind turbines will be installed at DEP and up to 23 15MW wind turbines at SEP, although a range of different turbines sizes and associated foundations are under consideration. If larger capacity wind turbines are used (up to 26MW), fewer will be required in total.

45. Infield cables will link the wind turbines to the offshore substation platform(s). Depending on the development scenario (see [Section 2.3](#) below), the wind farm sites will be connected to one another via interlink cables, with up to two offshore substation platforms. An offshore export cable corridor will link the wind farm sites with the cable landfall at Weybourne.
46. Offshore construction works will require up to two years per Project (excluding pre-construction activities such as surveys), assuming SEP and DEP are built at different times. There could be a gap of up to three years between the completion of offshore construction works on the first Project and the start of offshore construction works on the second Project. However, if built at the same time, offshore construction could be completed in two years.

Figure 2-1: SEP and DEP Overview Schematic (N.B. Not to Scale).



2.2 Onshore Works

47. The offshore export cables will make landfall at Weybourne to the west of Weybourne beach car park at the Muckleburgh Military Collection. The cables will be installed under the beach using a horizontal directional drilling method, which will minimise the need for construction activity on the beach. This installation method avoids the need for excavating trenches to bury the cables and uses a drilling rig to install the cables beneath features.
48. During the landfall works a temporary onshore compound will be required to accommodate the drilling rigs, ducting and welfare facilities. The temporary landfall compound will be set back approximately 150m inland from the beach and will be up to 75m long by 75m wide. The onshore landfall area includes a narrow strip of land adjacent to the beach of approximately 1,000m to allow for onshore duct preparation. This area makes use of existing vehicle tracks within the Muckleburgh Estate.
49. From the landfall at Weybourne to the new substation near the existing Norwich Main substation, the main cable installation method will be open cut trenching. This method requires trenches to be excavated, cable ducts placed into the trenches, and soil backfilled to bury the ducts. Cables can be pulled through the buried ducts at joint locations. However, there are also a number of sensitive locations where trenchless techniques, such as horizontal directional drills, will be undertaken, for example when passing beneath some roads, rivers or blocks of woodland.
50. The cable corridor width of 45m (single project) or 60m (two projects) is required to excavate trenches within which the ducts will be buried and subsequently cables will be pulled. The cable corridor is wider than the trenches alone as it will also include space for a haul road to deliver equipment to the installation site from construction compounds, and space for storing materials and storing excavated soils when trenches are opened, and for installing construction drainage.
51. From the landfall the onshore cable corridor travels south, crossing the A149, and the North Norfolk Railway line between Holt and Sheringham and continuing south to cross Cromer Road (A148) to the east of High Kelling. South of North Norfolk Railway line the cable corridor crosses through a commercial woodland (Weybourne Wood), which will be crossed by two trenchless crossings to minimise tree losses in this location.
52. The cable corridor continues south passing the villages of Oulton and Cawston and crossing the River Wensum near Attlebridge and then crossing the A47 between Hockering and Easton. From this point the onshore cable corridor heads south east crossing the A11 near Ketteringham before reaching the preferred onshore substation site just south of the existing Norwich Main substation.
53. The installation of the onshore cables is expected to take up to 24 months in total if either SEP and DEP is constructed in isolation or up to 26 months if both SEP and DEP are constructed at the same time. If SEP and DEP are built one after the other, there will be two separate onshore construction periods of up to 24 months each.

54. The onshore substation will be constructed to accommodate both SEP and DEP. If only one project comes forward the substation will be up to 3.25ha in size. If both projects are taken forward a single substation will be constructed to accommodate both connections and will be up to 6ha. Landscape and tree planting schemes will be carefully designed to reduce visual impacts of the onshore substation.
55. Following completion of the onshore construction works the onshore area will be reinstated and can return to its previous uses, with the exception of the onshore substation which will remain in place throughout the 40 year operational life of SEP and DEP.

2.3 Project Development Scenarios

56. Whilst SEP and DEP are each Nationally Significant Infrastructure Projects in their own right, a single application for development consent will be made covering both wind farms, and the infrastructure required to connect SEP and DEP to the grid. A single planning process is intended to provide for consistency in the approach to the assessment, consultation and examination.
57. For the purpose of the EIA, the project development scenarios for SEP and DEP have been broadly categorised as:
- In isolation – where only SEP or DEP is constructed;
 - Sequential – where SEP and SEP are both constructed in a phased approach with either SEP or DEP being constructed first; or
 - Concurrent – where SEP and DEP are both constructed at the same time.
58. The ES has considered the appropriate realistic worst-case scenarios associated with the different development scenarios and presented the results accordingly. Further details of the project development scenarios can be found in **Chapter 4 Project Description**.

3 Topics Considered in the Environmental Impact Assessment

59. The ES covers a wide range of offshore and onshore environmental topics for which potential impacts have been assessed. Many of these assessments are related to each other and these links are highlighted within the ES chapters.
60. The SEP and DEP ES presents assessments for all of the topics and potential impacts that were specified within the Planning Inspectorate's Scoping Opinion (PINS, 2019). Each of these assessments is summarised in the sections that follow.

3.1 Offshore

3.1.1 Marine Geology, Oceanography and Physical Processes

61. The assessment considers the construction, operation, and decommissioning phases of SEP and DEP and the potential impacts on relevant receptors, including the Cromer Shoal Chalk Beds Marine Conservation Zone, sand banks (and associated sand waves), and the East Anglian coast. The Marine Conservation Zone is important for a range of subtidal habitats including outcropping chalk and the coast is important for gravel/sand beaches, dunes and cliffs. The assessment considers the effects on waves, currents and movement of sediment, both in the water column and along the sea bed.
62. Potential effects have been assessed mainly using an evidence-based approach, utilising the range of data available, and supported by numerical modelling of waves. The baseline conditions are described using data collected for the Project, a review of existing knowledge about this part of the southern North Sea, and numerical modelling and theoretical studies undertaken for the adjacent Dudgeon and Sheringham Shoal offshore wind farms.
63. Most of the sea bed comprises sediment with large particle sizes that cannot be suspended in the water column and will not form part of a sediment plume if disturbed during construction. In areas where construction activities may encounter finer sea bed sediments, these are likely to be suspended in the water column, but for a short time only (hours to days).
64. Changes to waves, currents and sediment movement due to the operational presence of the foundation structures will be small in magnitude and local in spatial extent. Importantly, a commitment has been made to bury, as far as possible, all offshore cables below the sea bed, to minimise the need for external cable protection.
65. Overall, construction and operational effects on waves, currents and movement of sediment are predicted to be small scale, localised and temporary. Hence, they are categorised as negligible adverse impact or no impact. This applies to SEP and/or DEP and cumulatively with other plans, projects and activities, including the operational Dudgeon and Sheringham Shoal offshore wind farms.
66. The Marine Geology, Oceanography and Physical Processes chapter was used as a basis for the assessments of other offshore topics, particularly marine water and sediment quality, benthic ecology, and fish and shellfish ecology.

3.1.2 Marine Water and Sediment Quality

67. The existing marine water and sediment quality environment within the proposed wind farm areas and cable corridors has been characterised using site-specific survey data and supplemented where available by information held on national databases.

68. The water quality within the area of the wind farms is reported to be improving, with concentrations of contaminants below levels which could harm marine life. Concentrations of sediment suspended in the water column vary substantially under natural conditions depending on the season and may increase significantly during storm events.
69. The offshore export cable corridor passes through two Water Framework Directive coastal water bodies and within 10km of two designated bathing waters. These designations indicate good water quality in relation to parameters monitored in the bathing waters but some contaminants exceed environmental quality standards in the coastal water bodies.
70. Site specific surveys took sediment samples at the wind farm sites and along the offshore cable corridors which were analysed for levels of contamination. The results showed that concentrations of contaminants within the sediments are below sediment guideline values and therefore are low risk with respect to marine water quality.
71. The subsequent impact assessment determined that during the construction, operation and decommissioning works for SEP and/or DEP, significant impacts on water quality will not occur, including cumulatively with other projects.

3.1.3 Benthic Ecology

72. Seabed surveys were undertaken across the offshore sites and cable corridors to provide a detailed understanding of the benthic ecology of the area. The survey results were used to produce habitat maps to inform the assessment. The export cables at the landfall will be installed under the beach using a drilling method (as was completed for the operational Dudgeon and Sheringham Shoal offshore wind farms), avoiding any direct impacts on the intertidal environment.
73. The sea bed across the offshore sites is dominated by sands and gravels, with the corresponding benthic communities typical of these sediments which are widely distributed across the southern North Sea. There is an area of outcropping chalk close to shore (which is a key feature of the Cromer Shoal Chalk Beds Marine Conservation Zone), however this area is completely avoided through the drilling method that will be used at the landfall.
74. Potential impacts include temporary disturbance and/or loss of habitats, increases in suspended sediments and sediment deposition, and impacts on the Cromer Shoal Chalk Beds Marine Conservation Zone. The majority of impacts are temporary in nature and localised to the project boundaries and immediate surrounding area. Impacts from SEP and/or DEP, including cumulative impacts, were assessed to be negligible or minor adverse, largely due to the small scale of the sea bed footprint of the SEP and DEP impacts relative to the extent of similar habitats in the wider area.

3.1.4 Fish Ecology

75. The fish and shellfish species and populations that may be impacted by SEP and DEP have been characterised using numerous literature and data sources, with the latter including extensive site surveys, habitat mapping, and historical surveys of the operational Dudgeon and Sheringham Shoal offshore wind farms. This work identified the presence of a number of species of interest due to their ecosystem, commercial and/or conservation value, for example sandeel, herring, edible crab, lobster and European eel.
76. A range of activities during the construction, operation and decommissioning phases of SEP and DEP have the potential to impact fish and shellfish. These include, for example, activities that cause disturbance to the sea bed, habitat loss and underwater noise. The assessment of effects of underwater noise was informed through an underwater noise modelling study.
77. In all cases the assessment established that there will be some negligible to minor adverse residual impacts resulting from SEP and/or DEP. The impacts are generally localised in nature, being restricted to the project boundaries and surrounding area. The same is true of the potential for cumulative impacts, which are limited by the temporary and/or localised nature of the effects in question.

3.1.5 Marine Mammal Ecology

78. Site characterisation using project specific surveys, existing data from other offshore wind farms and other available information for the region identified harbour porpoise, bottlenose dolphin, white-beaked dolphin, minke whale, grey seal and harbour seal as the key marine mammal species for assessment.
79. Activities during the construction, operation, maintenance and decommissioning phases have the potential to impact marine mammals. The impacts that have been assessed include the potential for underwater noise from the clearance of unexploded ordnance, piling (including use of acoustic deterrent devices), other construction activities, operation and maintenance works and vessels to result in auditory injury, disturbance, behavioural impacts, barrier effects (i.e. preventing movement of animals) and changes to food availability. Other potential impacts that were assessed include increased collision risk with vessels, changes to prey resource and changes in water quality.
80. The underwater noise modelling and results of the wider impact assessment concluded that only minor impacts to marine mammals will occur as a result of SEP and/or DEP, with the implementation of mitigation measures during unexploded ordnance clearance and piling, as outlined in the **Draft Marine Mammal Mitigation Protocol**. There is the potential for cumulative impacts when considering other activities and noise sources in the wider area, including with other offshore wind farms. These impacts have the potential to affect marine mammals, but with the implementation of appropriate mitigation measures, the cumulative impact on marine mammals was also assessed as minor.

3.1.6 Offshore Ornithology

81. An assessment of the potential impacts on offshore ornithology receptors that may arise from the construction, operation and decommissioning of the offshore components of SEP and DEP has been carried out. This was informed by extensive consultation with stakeholders (principally Natural England and the Royal Society for the Protection of Birds) through the ornithology Expert Topic Group.
82. Characterisation of the existing environment for offshore ornithology has been undertaken based on project-specific survey data and existing data and literature. The former consisted of two years of digital aerial surveys conducted at least monthly (29 surveys in total), covering an area containing DEP, SEP and surrounding waters. All offshore ornithology receptors recorded were assessed with regard to their nature conservation value and sensitivity to the potential effects of offshore wind farms.
83. The impacts that could potentially occur on offshore ornithology receptors during the construction and decommissioning of SEP and DEP are disturbance, displacement and barrier effects, and indirect impacts through effects on habitats and prey species. During the operational phase, the potential impacts include disturbance, displacement and barrier effects, collision risk and indirect impacts through effects on habitats and prey species.
84. There is connectivity between SEP and DEP and important populations of breeding seabirds (e.g. Sandwich tern breeding on the North Norfolk Coast and kittiwake breeding at the Flamborough and Filey Coast). It is considered that neither SEP, DEP or surrounding waters are of very high importance for foraging, commuting to foraging areas, or other activities for any species, though they are used regularly by a range of offshore ornithology receptors during the breeding season. Outside the breeding season, SEP, DEP and surrounding waters are of limited importance to offshore ornithology receptors that inhabit the wider Wash area and southern North Sea.
85. During the construction and decommissioning of SEP and DEP, no predicted impacts have been assessed to be greater than minor adverse significance for any offshore ornithology receptor. This includes the more sensitive receptors screened into detailed assessment for disturbance, displacement and barrier effects, namely guillemot, razorbill and red-throated diver.
86. During the operational phase of SEP and DEP, disturbance, displacement and barrier effects on the more sensitive receptors screened into detailed assessment (gannet, guillemot, razorbill, red-throated diver and Sandwich tern) may result in impacts of minor adverse significance, in both project alone or cumulative impact scenarios. Collision risk is assessed as no greater than minor adverse significance in project alone and cumulative impact scenarios for all species screened into the assessment (black-headed gull, common gull, common tern, gannet, herring gull, kittiwake, lesser black-backed gull, little gull and non-breeding waterbirds), with the exception of Sandwich tern and great black-backed gull. For these species, impacts in the project alone scenario are predicted to be of minor adverse significance, but moderate adverse significance in the cumulative impact scenario.

3.1.7 Commercial Fisheries

87. Commercial fishing activity has been characterised using landings statistics, vessel monitoring and surveillance data, and consultation with the fishing industry.
88. The key fleets considered in the assessment are: UK potters targeting lobster, brown crab and whelk; UK beam trawlers targeting brown shrimp; French demersal and midwater trawlers targeting whiting and mackerel; Dutch beam trawlers and fly shooting targeting sole, plaice and mixed demersal finfish species; Belgian beam trawlers targeting sole, plaice and mixed demersal finfish species; and Danish demersal trawlers targeting sandeel throughout the North Sea with occasional effort overlapping the project area.
89. Based on quota allocations and landing statistics, vessels registered to other countries including the Netherlands, France, Belgium and Denmark have low levels of activity within the SEP and DEP wind farm areas and cable corridors.
90. The assessment has established that impacts from SEP and/or DEP will be of negligible to minor adverse significance for all commercial fishing fleet receptors, with the exception of the UK potting fleet which was assessed as moderate adverse without further mitigation. These impacts may arise as a result of reduction in access to, or exclusion from established fishing grounds, and displacement from the wind farm site leading to gear conflict and increased pressure on adjacent grounds.
91. Cumulative impacts were assessed to be minor adverse to all mobile fleets and moderate adverse to UK potters, driven by the inclusion of potential management measures within marine protected areas that could lead to restrictions to the UK potting fleet. However the cumulative effect of the marine protected areas is unmitigable by the Applicant and does not affect the outcome of the assessment.
92. Impacts on the UK potting fleet will be mitigated through justifiable disturbance payments in line with the Fishing Liaison with Offshore Wind and Wet Renewables Group best practice guidance, reducing the significance of residual impacts to minor adverse.

3.1.8 Shipping and Navigation

93. Shipping and navigation consists of the transport of people or goods (both commercially or for recreational purposes) and vessels associated with extraction activities (fishing, aggregates and oil and gas) in the marine environment. In order to assess potential impacts on shipping and navigation, existing vessel traffic and navigational features in the vicinity of SEP and DEP have been analysed using vessel data sets, and targeted vessel surveys in addition to other publicly available data sources.
94. Analysis shows that tanker, cargo and passenger (commercial) vessels account for the majority of the traffic, with aggregate dredgers, oil and gas support vessels, wind farm support vessels, fishing vessels and recreational vessels present to a lesser degree. The highest traffic levels within the study area are from commercial vessels operating along established routeing between SEP and DEP.

95. Impacts are identified and assessed considering shipping and navigation features in vicinity of SEP and DEP and the activities associated with the construction, operation and decommissioning of SEP and/or DEP, as well as cumulatively with other plans and projects.
96. Identified impacts include an increase in vessel to vessel collision risk and the potential for a vessel to interact with surface structures. The reduced navigable space between the operational Dudgeon and Sheringham Shoal offshore wind farms was raised as a concern by commercial stakeholders, however, with the identified mitigation including implementation of a Navigation Management Plan, impacts were considered to be as low as reasonably practicable and within tolerable risk levels.
97. Minimal deviations to main shipping routes in terms of the change in journey distance were identified, and the impact of vessel displacement overall was considered to be within tolerable risk levels with mitigation. Consultation will continue with the Maritime and Coastguard Agency to agree emergency response and cooperation plans and the turbine layout, with consideration of emergency response requirements.

3.1.9 Offshore Archaeology and Cultural Heritage

98. A characterisation of the existing environment for offshore archaeology and cultural heritage has been undertaken based on both existing and site specific geophysical survey data. This has considered the potential for sea bed prehistory sites, paleogeographic features and sea bed features of archaeological interest, such as wrecks of either maritime or aviation origin.
99. There are no known sea bed prehistory sites within the study area, although a number of paleogeographic features, such as former river channels, have been interpreted from the geophysical survey data. These are of interest from an archaeological perspective because they may be associated with surviving terrestrial features and deposits corresponding to times when sea levels were lower and the study area may have been inhabited. This will be further investigated through geotechnical surveys, such as the collection of sediment samples or 'cores', prior to the start of construction.
100. Seabed features are categorised according to their level of archaeological interest, from A1 to A3. Features described as A1 include all those of anthropogenic origin or archaeological interest, of which 30 have been identified within the SEP and DEP study area, including 16 wrecks. The approach to mitigation is to avoid these features via Archaeological Exclusion Zones and micro-siting during detailed design to ensure that direct impacts will not occur. This will include further investigations prior to the start of construction, such as high resolution geophysical survey and sea bed imagery.

101. In order to account for unexpected archaeological finds such as wrecks or aircraft crash sites potentially concealed beneath the sea bed and not seen by the geophysical surveys, a formal protocol for archaeological discoveries will be agreed with regulators and implemented during construction. The approach to the implementation of mitigation measures will be agreed in consultation with Historic England in accordance with industry standards and guidance. An Outline Written Scheme of Investigation will be submitted as part of the consent application, setting out the methodology for all proposed mitigation.
102. With the application of recommended measures, significant impacts to offshore archaeology and cultural heritage from SEP and/or DEP (including cumulative and transboundary impacts) will not occur. There is the potential for beneficial effects through the contribution of data to academic and scientific objectives, and public outreach and engagement, both within the UK and wider European networks. In the case of SEP and DEP this will build on the already extensive body of literature that has been developed for the existing Dudgeon and Sheringham Shoal offshore wind farms.

3.1.10 Aviation and Radar

103. The airspace in the vicinity of SEP and DEP comprises military exercise areas, restrictive airspace, airways and offshore helicopter platforms and transit routes. Wind turbines can interfere with radar equipment and operations leading to safety implications.
104. The wind turbines will be detectable and have the potential to affect military low flying operations in addition to the National Air Traffic Services Primary Surveillance Radars located at Claxby and Cromer, the Ministry Of Defence Air Defence Radar at Trimingham and the Primary Surveillance Radar and air traffic control safe minimum altitude chart at Norwich Airport. The export cable corridor is also within the Royal Air Force Weybourne transmitter safeguarding zone. The assessment has identified the potential for unacceptable impacts from SEP and/or DEP on some radar operations without mitigation. Technical solutions have been proposed which reduce impacts to acceptable levels and facilitate continued safe operations and the Applicant will continue to engage with the Ministry of Defence to identify agreed mitigation for the Trimingham Air Defence Radar system, in parallel with the work being undertaken by the Offshore Wind Industry Council joint task force to identify an enduring regional solution.
105. A range of measures, in the form of appropriate notification to aviation stakeholders, lighting and marking will be employed to minimise effects to aviation flight operations. Potential impacts to helicopter access are addressed as part of the petroleum industry and other marine users assessment.
106. No significant cumulative impacts were identified.

3.1.11 Petroleum Industry and Other Marine Users

107. The petroleum industry and other marine users assessment considers activities associated with the offshore oil and gas industry, other offshore wind farm developments, telecommunications cables and interconnectors, marine aggregate extraction, marine disposal sites, unexploded ordnance, aquaculture and marine recreation.
108. Impacts with neighbouring infrastructure were minimised as much as possible at the site selection stage. Careful site selection subsequently formed the primary embedded mitigation for other marine users, with impacts largely assessed to be low.
109. The highest assessed impacts, including cumulative impacts, are those associated with nearby oil and gas operations and independent vessel and helicopter access studies were undertaken to quantify this impact. The impacts to the Waveney platform were identified to be unacceptable without additional mitigation.
110. Oil and gas associated vessel deviations were assessed and it was identified that vessels passing to the east of the operational Dudgeon offshore wind farm will be required to pass further to the east to avoid DEP. Vessels passing to the west of DEP to access the 'LAPS' Field assets will also be required to pass east of DEP or deviate further west passing south of the outer dowsing bank. There is considered to be sufficient sea room to accommodate this however, as established through consultation with the relevant stakeholders.
111. Additional measures were identified to mitigate impacts to oil and gas operations to acceptable levels. These include a one nautical mile buffer free of surface infrastructure in addition to commercial agreements, where necessary and justified.

3.2 Onshore

3.2.1 Onshore Ground Conditions and Contamination

112. The ground conditions and contamination assessment used a desk-based approach to review the known ground conditions within the Order Limits.
113. The impacts assessed include: the potential for any known contamination in the ground to be disturbed during construction, resulting in an impact to the surrounding soils and groundwater quality; the potential for ground contamination caused by accidental fuel spills during construction; and the extent of existing mineral resources and how they might be affected by SEP and DEP (for example areas identified by the local planning authority for potential future sand and gravel extraction).
114. A Code of Construction Practice will be produced for each stage of construction, which will provide details of the industry best practice measures that will be undertaken to reduce potential construction impacts onshore. Provided the best practice measures are in place, the construction of SEP and/or DEP is predicted to have no significant impacts in relation to ground conditions and contamination during construction.

- 115. Whilst constructing both SEP and DEP will affect a larger area compared to either SEP or DEP, the assessment predicted no significant impacts across all of the project development scenarios. No potential impacts on existing ground conditions are anticipated during the operation of SEP and DEP.
- 116. Cumulative impacts with other projects during the construction phase have been assessed as being not significant provided the best practice measures outlined in the Code of Construction Practice are in place.

3.2.2 Water Resources and Flood Risk

- 117. A desk-based review of both publicly available data, and data obtained from the Environment Agency and Internal Drainage Boards, was undertaken to inform the assessment. In addition, a walkover survey was undertaken at locations where the onshore cable corridor will cross key rivers to understand the structure of the river bed and banks.
- 118. The study area for this assessment was categorised by the four main surface water catchments: North Norfolk Rivers, River Bure, River Wensum, and the River Yare. The River Wensum is designated as a Special Area of Conservation and Site of Special Scientific Interest, and several of its tributaries, including Blackwater Drain, Swannington Beck and the River Tud will be crossed by the onshore cable corridor. Due to the designated status of the River Wensum, this river and its tributaries are considered to be receptors of high value.
- 119. The assessment considered potential impacts associated with the construction, operation and decommissioning of SEP and DEP. These potential impacts were: the direct disturbance of rivers and streams; soil entering rivers and streams; contamination arising from the use and storage of fuels, oils, lubricants and nutrients; and activities that could increase the risk of flooding in surrounding areas.
- 120. Overall, impacts to rivers (relating to duct installation works for the onshore cables) will be short-term. These will be undertaken sequentially in typically 1km sections at a time, and taking approximately four weeks for each 1km section. Impacts will be reversible once activities have been completed.
- 121. Mitigation measures have been identified, including: a commitment to cross a number of sensitive rivers and streams by drilling the cable ducts underneath channels, rather than trenching through them; appropriate storage of soils during excavation works; and installing drainage systems to manage excess water.
- 122. The assessment has established that watercourses and groundwater could be affected as a result of direct disturbance, the supply of soils and contaminants, and changes to water flows during the construction and decommissioning phases. With the inclusion of standard mitigation the residual impacts on all receptors during these phases will be negligible or minor adverse.
- 123. Whilst SEP or DEP has a smaller land take (and will result in a smaller area of disturbance in each catchment) than SEP and DEP, this does not result in any significant differences between the project development scenarios.
- 124. Other plans, projects and activities have been assessed to evaluate the potential for cumulative impacts where there is temporal and spatial overlap. Overall, cumulative impacts remain no greater than those assessed for SEP and DEP.

3.2.3 Land Use, Agriculture and Recreation

125. To inform the land use, agriculture and recreation impact assessment, a desk based literature review was undertaken of existing reports and survey data to provide an understanding of existing baseline conditions.
126. The assessment considered the potential impacts of the project on agricultural land and practices, agricultural drainage, soil quality, Agri-environmental Schemes, existing utilities, recreational assets and Public Rights of Way.
127. The onshore construction will principally be located within agricultural land with the potential for impacts to existing agricultural practices, agricultural drainage, Agri-environmental Schemes and to the soil itself. The onshore cable corridor will also cross a number of Public Rights of Way and construction activities could disrupt walkers and other users of the network of footpaths and other recreational users.
128. Mitigation measures include the appointment of an Agricultural Liaison Officer and specialist drainage contractor, ensuring agricultural drainage systems are maintained, minimising impacts to the best and most versatile agricultural land, and employing best practice measures through a Soils Management Plan. Wherever practicable, access for farm vehicles will be maintained.
129. In addition, access along Public Rights of Way will be maintained throughout construction. If a temporary closure is required a suitable diversion will be agreed in advance with the Countryside Access Officer at Norfolk County Council.
130. The majority of the impacts are temporary and fully reversible once construction is complete. Provided mitigation measures are in place, SEP and DEP is not predicted to have any significant impacts in relation to land use, agriculture and recreation, with the exception of the temporary disturbance to agricultural activities. Where impacts to agricultural practices or land under Agri-environmental Schemes are unavoidable, private agreements (or compensation in line with the compulsory purchase compensation code) will be sought with relevant landowners/occupiers.
131. No significant cumulative impacts with other relevant projects have been identified.
132. Whilst SEP or DEP has a smaller land take (and will result in a smaller area of disturbance) than SEP and DEP, this does not result in any significant differences between the project development scenarios.

3.2.4 Onshore Ecology and Ornithology

133. An ecological desk-study was undertaken which comprised a review of publicly available information (e.g. the Natural England Multi-Agency Geographic Information for the Countryside website) and obtaining biological records data from the Norfolk Biodiversity Information Service. In addition to the desk-study, a suite of ecological surveys have been undertaken in 2020 and 2021 and included habitats and plants, great crested newts, birds (breeding birds and wintering birds), water vole and otter, white clawed crayfish, bats, terrestrial invertebrates, reptiles and badgers. The scope of all surveys was agreed in advance with Natural England and undertaken by suitably qualified (and where required licensed) ecologists, at the appropriate time of year and in accordance with industry guidance.

134. All statutory and non-statutory sites designated for their nature conservation value have been avoided, where possible, during the site selection and route planning process. Where avoidance has not been possible, for example at the River Wensum Special Area of Conservation, alternative construction techniques have been selected to avoid impacts (e.g. trenchless techniques to drill underneath the feature).
135. Ancient woodland has been avoided and woodland parcels have been avoided where possible. Where hedgerows are crossed the working width will be reduced to 20m to minimise potential impacts. Hedgerows will be replanted back in the same location they were removed once the construction works have completed in that location. Trees will be replanted within the 60m wide Order limits but outside the final cable easement, which is 10m wide per Project. Planting will be implemented during the first planting season following completion of construction of either SEP and/or DEP (subject to landowner agreements).
136. Temporary habitat loss and fragmentation will occur during the construction phase of SEP and DEP; however habitats will be reinstated as far as practicable following construction and therefore the impacts are considered short-term and reversible.
137. Without mitigation there is the potential for construction activities to have significant impacts to several habitat types including woodland, hedgerows and grasslands as well as to several protected species including badgers, bats, water voles, otters, great crested newts and common reptiles. These impacts include disturbance and risk of injury, permanent and temporary habitat loss and habitat fragmentation. Mitigation measures have been identified, some of which are embedded into the project design to avoid and/or manage these impacts, for example but not limited to the adoption of trenchless crossing techniques when crossing designated sites and/or Main Rivers. Species-specific mitigation has been identified for those species that are known to be present and/or use the area where works are proposed. In addition, draft mitigation licences for bats and badgers have been prepared and submitted to Natural England for which a Letter of No Impediment has been granted. A great crested newt District Level Licensing application has also been submitted and accepted by Natural England.
138. Through the implementation of the embedded and additional mitigation measures the assessment concluded that the residual impacts on the majority of onshore ecology and ornithology receptors will be negligible or minor adverse. Residual impacts may remain after mitigation for reinstated hedgerow and woodland; however, these impacts are predicted to reduce significantly over time once planting has established and matures.
139. No significant impacts have been identified associated with the operation of SEP and DEP and no cumulative impacts have been identified with other relevant projects.
140. An Outline Ecological Management Plan has been submitted with the application setting out the ecological mitigation measures and monitoring requirements that will be implemented during the construction and operational phases of SEP and DEP, which includes the commitment to undertake pre-construction ecological surveys to ensure that the identified mitigation measures, licensing requirements and/or monitoring requirements remain appropriate and applicable.

3.2.5 Onshore Archaeology and Cultural Heritage

141. The existing onshore archaeology and cultural heritage baseline has been established by a desk based exercise and supplemented by a programme of aerial photographic assessment and non-intrusive surveys to identify potential archaeological features underground.
142. The onshore archaeological and cultural heritage baseline resource comprises both designated and non-designated heritage assets, and includes below ground archaeological remains and above ground built heritage assets and historic earthworks. The assessment also considers the historic landscape character of the study area.
143. The cable corridor runs through the Mannington and Wolterton Conservation Area, however all other designated heritage assets within the study area have been avoided as part of the site selection process. With mitigation measures in place, the residual level of impact upon Mannington and Wolterton Conservation Area will be non-significant. Indirect physical impacts and changes to the setting of a heritage asset have the potential to occur.
144. Non-designated heritage assets may be subject to direct and / or indirect physical impacts as a result of SEP and DEP. Direct and indirect impacts may arise as the result of ground excavation during construction.
145. Whilst SEP or DEP has a smaller land take (and will result in a smaller area of disturbance) than SEP and DEP, this does not result in any significant differences between the project development scenarios.
146. An Outline Written Scheme of Investigation has been submitted with the application, which outlines the stages of mitigation to be undertaken post-consent. This will inform further decisions regarding the subsequent archaeological mitigation strategy so that the historic environment resource can be safe-guarded in a manner that is both appropriate and proportionate to the significance of the archaeological remains identified and present. With this commitment in place any impacts are considered to be non-significant.
147. Cumulative impacts with other relevant projects are assessed as being non-significant.

3.2.6 Air Quality

148. The existing baseline for air quality was established using data from publicly available sources, such as air quality monitoring data collected by Local Authorities and air pollutant background concentration maps provided by the Department of Environment, Food and Rural Affairs (Defra). The onshore Order Limits do not pass through or close to any locations where air quality standards are unlikely to be achieved (i.e. Air Quality Management Areas), and background concentrations of pollutants are well below the relevant Objectives. This is to be expected in a predominantly rural area away from significant sources of pollution.

149. The air quality assessment was undertaken using air dispersion modelling using predicted traffic flows for the construction of SEP and/or DEP to assess the impact of road traffic emissions on nearby sensitive receptors. The effects of construction machinery and dust from construction activities were also assessed. Impacts on designated ecological sites were also considered based on the changes in traffic flows which will be experienced along roads in the vicinity and guidance provided by the Joint Nature Conservation Committee. Offshore air quality and operational impacts were scoped out of the assessment, as the effects of these impacts are unlikely to be significant due to there being no sensitive receptors offshore and the low levels of traffic required during operation, respectively.
150. The air quality assessment showed that predicted pollutant concentrations were below the respective air quality Objectives at all locations during construction. These Objectives take into account known health effects and, as such, adverse health effects are not anticipated to arise as a result of SEP and/or DEP with regard to air quality. Predicted traffic numbers used in the air quality dispersion modelling assessment were inclusive of traffic growth from committed developments (e.g. new residential and employment developments), in addition to peak construction traffic from the consented Hornsea Project Three, Norfolk Vanguard and Norfolk Boreas offshore wind farms, to provide a robust cumulative assessment of traffic impacts.
151. Best-practice mitigation measures to control dust and construction machinery emissions will be included in a Code of Construction Practice for each onshore phase of the works. With the implementation of these mitigation measures, the impact of dust and construction machinery emissions are not considered significant and cumulative impacts with other relevant projects are also assessed as being not significant.
152. Whilst SEP or DEP has a smaller footprint (and will result in a smaller area of soil excavated) than SEP and DEP, this does not result in any significant differences between the project development scenarios.

3.2.7 Noise and Vibration

153. To inform the noise and vibration impact assessment, baseline noise monitoring was undertaken in October 2021. Monitoring locations were representative of residential dwellings near to the proposed onshore substation site and the proposed landfall location.
154. Noise modelling was also undertaken in order to determine any potential impacts relating to the construction and operation of SEP and DEP at agreed locations.
155. Increased noise and vibration levels could occur where construction works are close to nearby properties; however, these impacts are anticipated to be of relatively short duration. Provided that best practice measures are in place, the project is predicted to have no significant impacts in relation to construction noise and vibration.
156. The construction of SEP and DEP will introduce additional construction traffic on the road network and hence temporarily increase road traffic noise levels at road side properties. Mitigation measures are proposed to reduce the peak construction traffic on certain roads reducing the road traffic noise impacts to not significant.

157. Whilst the onshore substation is at least 500m from the nearest residential property there is the potential that operational noise that could represent a disturbance during the night. There are many proven mitigation options that can be combined to ensure that noise levels at the nearby properties remain below the night time noise levels agreed with the local planning authority. This includes noise reduction technologies in the form of equipment housing and refining the layout of the substation during the detailed design process. With the inclusion of these proven methods no significant noise impacts are predicted at nearby residential properties.
158. Whilst SEP and DEP and Hornsea Project Three onshore substations are all near to the existing National Grid substation at Norwich Main, no cumulative noise impacts have been identified when all of these are in operation at the same time.

3.2.8 Traffic and Transport

159. An extensive traffic and transport study area has been established for SEP and DEP comprising of 140 roads (over 300 miles of road network).
160. The traffic and transport assessment for the SEP and DEP was based on predicted levels of traffic in 2025 as this represents the earliest possible construction year.
161. A transport baseline was determined through a series of desk based assessments using open source data obtained from the Department for Transport and Norfolk County Council Highways and commissioned traffic counts. Further traffic count data was obtained from the consented Norfolk Vanguard and Hornsea Project Three projects.
162. To minimise the potential impacts of traffic upon local communities, 'embedded' mitigation measures have been incorporated into the design of SEP and DEP. Key measures include:
- The selection of accesses and traffic routes to (where possible) avoid communities, including Attlebridge, Barford, Cawston, Horsford, Oulton and Weston Longville.
 - The use of trenchless crossing technology at all A and B roads and 16 other local roads to avoid the need for road closures.
 - Providing access to the onshore substation from the A140 to avoid traffic routing via the B1113 to Swardeston.
163. The impact of construction traffic was assessed on receptors along 140 roads including consideration of pedestrian delay, road safety, driver delay and abnormal (large) deliveries.
164. Mitigation measures include reducing construction vehicle numbers on certain routes and the use of escort vehicles or provision of passing places along narrow roads. Following the application of mitigation measures, the residual impacts of SEP and DEP construction traffic are assessed as not significant.
165. The measures for managing the environmental impact of construction traffic is detailed in the outline Construction Traffic Management Plan and a final version of this plan will be agreed with Norfolk County Council and National Highways prior to the commencement of construction.

166. No significant traffic impacts are anticipated during the operational and maintenance phase; therefore it was agreed with the Planning Inspectorate that operational scenarios would not be assessed within the traffic and transport impact assessment.
167. A cumulative impact assessment has also been undertaken to assess the potential for cumulative impacts with other significant projects, notably other offshore wind farms (Norfolk Vanguard/ Boreas and Hornsea Project Three) and highways schemes (e.g. widening of the A47). Roads that could be utilised by the other offshore wind farm projects (and therefore have the potential for cumulative impacts) were identified. The assessment noted Heavy Goods Vehicle limits imposed on certain routes for those other projects by Norfolk County Council, which was factored into the routing of construction traffic for SEP and DEP. In addition, the assessment identified the requirement for further caps to reduce the impact of cumulative traffic on selected roads. With the addition of this mitigation, the cumulative impact assessment concluded that there will be no significant residual traffic and transport impacts.
168. It has been agreed with Norfolk County Council and National Highways that the potential for cumulative impacts between the construction phases of the highway schemes plus SEP and DEP can be managed through the respective projects' Construction Traffic Management Plans.

3.3 Project Wide Impacts

3.3.1 Seascape Visual Impact Assessment

169. The Seascape and Visual Impact Assessment (SVIA) considers the potential impacts of SEP and DEP on seascape, landscape and visual resources. Relevant consultees agreed that a study area with a 50km radius from each Agreement for Lease would be appropriate to cover all potential material seascape, landscape and visual impacts.
170. The SVIA is based on a realistic worst-case scenario of SEP and DEP being built either together (concurrently or sequentially) or in isolation. The realistic worst-case scenario comprises the largest sized turbines that will achieve the maximum potential generation capacity likely to be implemented. Further mitigation will be considered post-DCO submission, which is set out in detail in the Design Statement.
171. The SVIA describes how SEP and/or DEP will extend existing offshore wind farms within areas of sea that are currently influenced by the presence of wind farms adjoining the proposed wind farm sites and in the wider seascape. SEP and/or DEP will be visible from offshore and onshore locations and seen in the context of other existing offshore wind farms at Inner Dowsing, Lincs, Lynn, Race Bank, Triton Knoll, Sheringham Shoal and Dudgeon. Offshore wind farms are already characteristic of the existing seascape character, and already visible in seaward views from areas of the coastal landscape including the Norfolk Coast Area of Outstanding Natural Beauty and the North Norfolk Heritage Coast.
172. There will be some effects on seascape, landscape and visual receptors (including designated and defined landscapes) during the construction, operation and decommissioning phases of SEP and/or DEP. Operational effects will be longer term and greater than effects during the construction and decommissioning phases.

173. The SVIA describes how SEP will cause greater or the same effects as DEP, on all seascape, landscape and visual receptors except those within close proximity to the DEP. Within this local area around DEP, effects caused by DEP will be greater than those caused by SEP given that these receptors lie in closer proximity to DEP than SEP.
174. Significant effects during the operational phase have been identified due to SEP on the settlements of Cromer and Sheringham; users of the Peddars Way, Norfolk Coast Path and England Coast Path; visual receptor group Blakeney to Mundesley; and visitors to the viewing gazebo at Oak Wood. No significant effects have been identified on other landscape and visual receptors for SEP during the operational phase.
175. No significant effects have been identified for DEP during the operational phase.
176. No significant effects have been identified during the construction and decommissioning phases for SEP and/or DEP.

3.3.2 Landscape and Visual Impact Assessment

177. The Landscape and Visual Impact Assessment (LVIA) describes the potential impacts of the onshore components (cable corridor, landfall and substation) on onshore landscape and visual resources as a result of SEP and DEP. Relevant consultees agreed with the following study areas as being appropriate to cover all material landscape and visual impacts:
- 1km from the extent of the onshore cable corridor; and
 - 4km from the site of the onshore substation site.
178. The LVIA describes (within the extent of each study area) the landscape and visual environments; assesses their sensitivity to change; and assesses the significance of landscape and visual impacts during the construction, operation and decommissioning phases.
179. For the onshore cable corridor, the greatest effects will occur during the construction phases of SEP and/or DEP and result from the maximum construction duration and land-take. During operation of SEP and/or DEP, the onshore cables will be buried and not result in any landscape or visual effects, except for effects as replacement planting matures, and where trees are not replaced over the cable easements. Link boxes will not result in any significant effects, as they will be buried during the operation phase. Cable ducts will be left in the ground and trenches will not be re-excavated during decommissioning, therefore, there will be no landscape or visual effects due to the onshore cable corridor during this phase of SEP and / or DEP.
180. For the onshore substation site, the greatest effects will result from the maximum footprint and height parameters. The assessment identified that the significance of effects will be the same during the construction, operation and decommissioning phases of SEP and / or DEP.
181. There will be some effects on landscape and visual receptors (including designated landscapes and landscapes protected by policy) during construction, operation and decommissioning phases of the onshore cable corridor and substation site for SEP and / or DEP, although limited to the immediate surroundings of the onshore developments.

182. The LVIA is based on a ‘mitigation by design’ approach, which means that during the course of the design development of the onshore components for SEP and/or DEP, landscape considerations have been accounted for as an integral part of the design process. These embedded mitigation measures are described in the ES and the Outline Landscape Management Plan.
183. The ‘mitigation by design’ approach is underpinned by the early decision to minimise the potential effects that might arise as a result of SEP and/or DEP on landscape and/or visual recourse.
184. With regard to the onshore cable corridor, the first key design intervention was to combine the cables into a single route and underground the cables, thus avoiding the visual intrusion of new pylons and overhead cables during the operational phase. Subsequent cable routing has been designed to avoid settlements, local roads, railways, watercourses and public rights of way as far as possible (and thus reduce potential visual effects of the construction period from those public places), and to avoid crossing woodlands and groups of trees. Where SEP and DEP does cross a woodland or group of trees trenchless crossing techniques will be used. Where such an interaction occurs, any trees, hedgerows and other vegetation associated with the feature will not be affected as a consequence of the trenchless crossing.
185. With regard to the onshore substation, key design interventions included the selection of the final onshore substation site (chosen from the two options assessed for the Preliminary Environmental Information Report (PEIR)) and reducing, in so far as possible, the height of the onshore substation’s platform height from the maximum parameter assessed for the PEIR.
186. The design considered, in combination with other topics, the implications of surrounding landscape features – such as woodland, tree belts, hedgerows, buildings and landform; the influence of the existing infrastructure within the context of the onshore substation sites; the sensitivity, and number, of their closet visual receptors; and the reduction in height of the maximum platform level from the PEIR.
187. Significant effects during the construction phase of the onshore cable corridor have been identified at Weybourne Wood Open Access Land within the North Norfolk Coast Area of Outstanding Natural Beauty being at most of a major-moderate significance and adverse. However, impacts are predicted to be of limited spatial extent, temporary and short-term duration and reversible. No other significant effects have been identified during the construction, operation or decommissioning phases of the onshore cable corridor for SEP and / or DEP.

188. Significant effects during the construction, operation and decommissioning phases of the onshore substation sites have been identified on the users of a group of Public Rights of Way, a permissive bridleway and Gowthorpe Lane that surround the fields in which the onshore substation sites lie. Effects will be at most of a major significance and adverse. However, these impacts are very localised and will reduce over time following the establishment of mitigation tree planting. Significant residual impacts will remain after mitigation for where there are temporary losses of trees and hedgerows, but these impacts will reduce to non-significant over time as replacement planting matures. No other significant effects have been identified during the construction, operation or decommissioning phases of the onshore substation site options for SEP and / or DEP. Full details of landscape/planting proposals are set out in the **Outline Landscape Management Plan**, submitted as part of the DCO application.

3.3.3 Socio-Economics and Tourism

189. The assessment of potential effects on socio-economics and tourism considers effects as a result of the construction, O&M and decommissioning of SEP and DEP. However, given the uncertainty associated with the approach to decommissioning and the position of the sector nationally and locally, it is not possible to undertake a detailed assessment of the decommissioning phase. However, decommissioning activities of SEP and DEP are anticipated to be similar to, but no worse than, the impacts identified during the construction phase.
190. The baseline description of the existing environment draws upon a range of secondary datasets, primarily from the Office for National Statistics, but also a number of other data sources, legislation and policy documents. This includes data on population, labour market and employment conditions as well as data on tourism volume and value.
191. A review of policy, strategy, and business analysis was undertaken. This showed that the offshore wind industry in East Anglia is growing quickly, with Equinor making a significant contribution to this growth. Economic modelling of direct and indirect impacts estimates SEP and DEP may create up to 2,190 UK jobs and £124.5 million GVA per annum during construction if both projects are built together concurrently (of which up to 450 jobs may be based in East Anglia and £23.7 million GVA will be generated within East Anglia if an East Anglia construction port is used); and up to 230 UK jobs and £18.4 million UK GVA per annum during operation if both projects are operational at the same time (of which 85 jobs may be based in East Anglia and £7.0 million GVA will be generated within East Anglia).
192. Whilst the creation of these jobs and economic value is a benefit, in the context of the size of the UK and East Anglia job markets these benefits are considered minor beneficial at the project scale. When considered cumulatively with other major developments in East Anglia the assessment found major or moderate beneficial impacts on the economy and employment during the construction and operational phases.

193. The assessment considered the potential negative impact as a result of change in demographics due to an influx of workers from outside East Anglia, and the pressure this will place on the housing market. The highest potential for a change in demographics will occur during the construction phase. However, data shows there is significant capacity in visitor accommodation within East Anglia to accommodate non-East Anglia based workers who require it. The impact on change in demographics was assessed as minor adverse.
194. The assessment of the impact of the construction of SEP and DEP on disturbance to social, community and healthcare infrastructure consider the various social and community infrastructure assets (such as schools, community support centres, public spaces, sports and recreation venues, and arts and culture venues) along the proposed onshore corridor to understand how these could be impacted by the proposed development. The assessment found there will be a negligible magnitude of impact on disturbance to social, community and health infrastructure and the impact was assessed as minor adverse during the construction and operational phases.
195. The construction and operation of SEP and DEP also has the potential to negatively impact tourism activity in Norfolk, primarily in areas that are close to work areas during construction and that have a view of the installed turbines during operation.
196. Data on volume and value of tourism in Norfolk shows that there were 52 million visits in 2019, injecting around £2.42 billion of visitor expenditure into the local economy. Although the baseline evidence shows volume and value of tourism declined significantly as a result of COVID-19. A review of the evidence base on tourism impacts suggests that offshore wind farm developments generate very limited or no lasting negative impacts on tourism during the construction and operational phases.
197. Whilst it is recognised there will be certain areas which will be particularly sensitive (North Norfolk Area of Outstanding Natural Beauty), the limited magnitude of effects means no significant negative effects on tourism were identified in the assessment of SEP and DEP or in the cumulative impact assessment. The assessment did find minor adverse impacts when considering the impact from both offshore and onshore infrastructure. It is noted that various measures related to other topics should be considered when assessing the impact from onshore infrastructure on tourism (such as commitments to managing traffic in the **Traffic and Transport** chapter).

3.3.4 Health

198. An assessment of activities which may have an impact on physical, mental or social wellbeing during the construction, operation and decommissioning of SEP and DEP was undertaken. Health impacts may differ between the general population and from vulnerable groups, which was also taken into account.
199. The human health effects that were considered included: construction and operational noise; generation of dust during construction; construction traffic; exposure to contaminated land and groundwater during construction and operation; exposure to electromagnetic fields during operation; employment; and wider benefits to society.

200. The onshore infrastructure is largely routed through agricultural land and away from towns and villages, therefore the potential number of people and communities potentially affected has been reduced through site selection and project design.
201. With the implementation of the mitigation measures identified within the separate topics (such as measures to minimise construction noise, traffic and to minimise the risk of dust generation), there are not predicted to be any significant health effects.
202. As with any electrical equipment the buried cable systems will produce electromagnetic fields. Public Health England has produced guidelines identifying electromagnetic field thresholds above which there is the potential for human health effects. The level of electromagnetic fields that will be produced by the SEP and DEP buried cable systems is significantly lower than the value Public Health England has identified as safe. The overall conclusion of the assessment is that there will be no effect from SEP and DEP alone or cumulatively with other projects to population health due to electromagnetic fields during operation.
203. SEP and DEP is likely to have a positive, albeit small, effect on delivering health policy on standards of living and fuel poverty by supporting the drive to meet UK's energy targets and generating new jobs during both construction and operation of SEP and DEP. Overall, a slight beneficial effect on the population health baseline will be expected. Cumulatively with other wind farm projects in Norfolk this is considered to be a potentially significant benefit to human health.

4 Conclusions

204. For the majority of offshore topics, the assessments conclude that following mitigation, SEP and/or DEP will not result in significant impacts, including cumulative impacts. The site selection and early design process has been used to avoid or minimise impacts, alongside additional mitigation where required.
205. The offshore ornithology cumulative assessment predicts impacts of moderate adverse significance for Sandwich tern and great black-backed gull. However, the SEP and DEP contribution to these is minor.
206. Significant residual impacts have been identified in relation to seascape, landscape and visual receptors, and on designated and defined landscapes. However, whilst these impacts may be considered significant, that does not necessarily mean that the impacts are unacceptable and the area is already influenced by the presence of wind farms adjoining the proposed wind farm sites and in the wider seascape.
207. Potential impacts associated with nearby oil and gas operations were identified and independent vessel and helicopter access studies were undertaken to quantify these impacts. Additional measures were identified to mitigate impacts to oil and gas operations to acceptable levels. These include a one nautical mile buffer free of surface infrastructure in addition to commercial agreements, where necessary and justified.

208. It was also predicted that the wind turbines will be detectable and have the potential to affect radar operations. Technical solutions have been proposed which reduce impacts to acceptable levels and facilitate continued safe operations and the Applicant will continue to engage with the Ministry of Defence to identify agreed mitigation for the Trimmingham Air Defence Radar system, in parallel with the work being undertaken by the Offshore Wind Industry Council joint task force to identify an enduring regional solution.
209. For the majority of onshore topics, the assessments conclude that following mitigation, SEP and DEP will not result in significant impacts, including cumulative impacts. This is primarily a result of the site selection work to ensure SEP and DEP is located away from local communities and other sensitive sites and features.
210. Potentially significant landscape and visual impacts may arise as a result of the onshore project substation; however, these impacts are very localised and will reduce over time following the establishment of mitigation tree planting. Significant residual impacts will remain after mitigation for where there are temporary losses of trees and hedgerows, but these impacts will also reduce to non-significant over time as replacement planting matures.
211. A total of 140 roads were assessed for the effects of construction traffic on local communities and other road users. A Construction Traffic Management Plan will be developed for each phase of the onshore construction and agreed with the relevant Highways Authorities with measures for managing construction traffic, which will reduce potential impacts to not significant.
212. The operation of the onshore substation could potentially lead to noise disturbance (during night-time) at the nearest residential properties. However, proven noise reducing technologies will ensure that the operational noise levels remain below those agreed with the local planning authority.
213. There are potential significant impacts associated with the number of highly sensitive watercourse crossings and the potential increases in sediment experienced during construction. However, these will be a short-term impacts and reversible once construction is complete and with the implementation of appropriate measures, the impacts are reduced and considered not to be significant.
214. Throughout the ES, Equinor has committed to implement mitigation that will ensure that impacts are below the level considered unacceptable under the relevant technical guidance and standards. This includes the potential for cumulative impacts, which have been considered in relation to each topic.

5 References

Planning Inspectorate (2019). SCOPING OPINION: Proposed Dudgeon and Sheringham Shoal Offshore Wind Farm Extensions.

Royal HaskoningDHV (2019). Dudgeon and Sheringham Shoal Offshore Wind Farm Extensions Scoping Report.