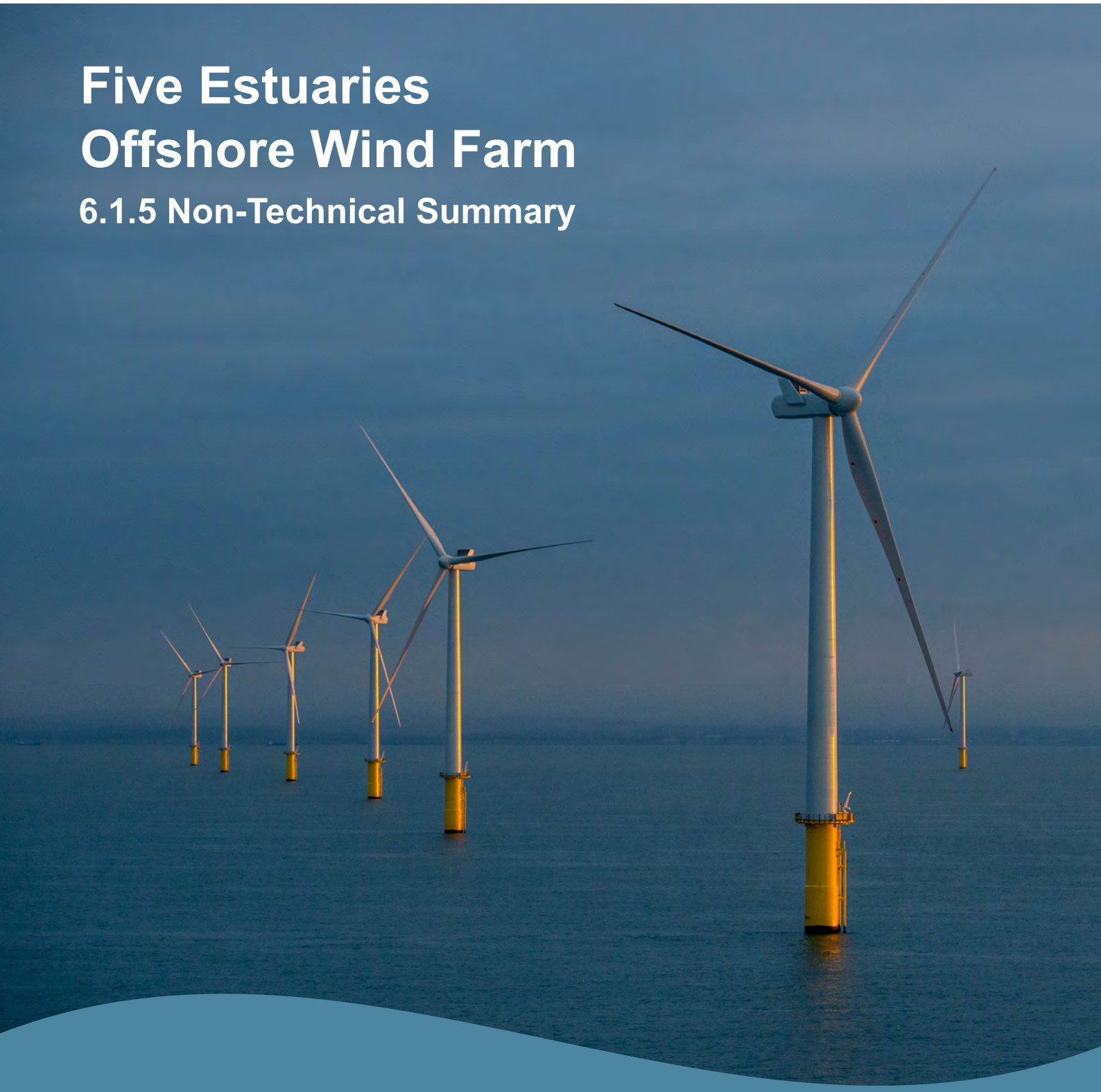
FIVE ESTUARIES
OFFSHORE WIND FARM

March 2024

Five Estuaries Offshore Wind Farm

6.1.5 Non-Technical Summary



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The Five Estuaries Offshore Wind Farm Project

Setting the scene

In 2019, the UK Parliament declared a national Climate Emergency, introduced a net zero carbon emissions target, and highlighted the need for decarbonisation of the UK economy. In April 2022, the UK Government announced further commitments to progress towards net zero emissions by 2050. These commitments included boosting the target for offshore wind to deliver up to 50 GW by 2030, enough to power every home in the UK.

As we are all aware, climate change is not the only crisis we face in the UK. Energy security is an ongoing issue resulting from international conflict, a general volatility in the price of energy and availability of fossil fuels. This is all contributing to an ongoing cost of living crisis; indeed, recent Ofgem price rises were in reaction to record increases in global gas prices.

The cost of offshore wind electricity generation has reduced dramatically in recent decades and is now less costly than gas and nuclear generation[1]. Offshore wind will continue to be one of the lowest-cost sources of new power generation through the 2020s and beyond. The UK is well-placed to continue harnessing offshore wind with over a third of the total European potential offshore wind resource.

The Five Estuaries Offshore Wind Farm project would not only contribute to national targets for offshore wind, reductions in carbon emissions and the overall cost of energy, it will also provide local jobs and improve the UK's energy security situation.

[1] Electricity Generation Costs 2020 (publishing.service.gov.uk)

The company

Five Estuaries Offshore Wind Farm Ltd is a joint venture company, made up of four partners who are committed to developing the Five Estuaries Offshore Wind Farm project. The joint venture partners comprise RWE (33.3%), a Macquarie-led consortium (25%), ESB (20.9%) and Sumitomo Corporation (20.9%). Five Estuaries is an extension of the operational Galloper Offshore Wind Farm Project. RWE is leading the development of the Five Estuaries Offshore Wind Farm Project on behalf of the project partners.

RWE is a leading partner in the delivery of the UK's Net Zero ambitions and energy security, as well as in contributing to the UK build-out target for offshore wind of 50 GW by 2030. RWE is already involved in ten operational offshore wind farms across the UK. RWE is developing nine offshore wind projects in the UK, representing a combined potential installed capacity of around 9.8 GW, with RWE's pro rata share amounting to 7 GW. RWE is also constructing the 1.4 GW Sofia offshore wind project in the North Sea off the UK's east coast.

RWE's unparalleled track record of more than 20 years in offshore wind has resulted in 19 offshore wind farms in operation, with a goal to triple its global offshore wind capacity from 3.3 GW today to 10 GW in 2030.

The company intends to maintain the pace of investment in the UK and invest around €8 billion net in new green technologies and infrastructure in the years 2024 to 2030 in the UK.

By the end of 2023, community benefits from UK onshore and offshore wind farm projects operated by RWE in the UK have invested more than totalled £38 million into local communities. Each year wind farm projects operated by RWE across the UK invest more than £5 million into community funds that support local community initiatives, with funding decisions made by local representatives.

RWE Renewables owns a stake in a number of operational OWFs on the East Coast of England, including Galloper (353 MW) and Greater Gabbard (504 MW). These generate enough low-carbon renewable energy each year to power the equivalent of over 780,000 UK homes. These two projects have led to the creation of 15 skilled apprentice opportunities, around 180 long-term skilled jobs to support the operation and maintenance of the OWFs, and around £3 billion in project investment overall. The teams have worked extensively with schools and educational institutes, as well as teachers and pupils along the East Coast, to deliver numerous career insight sessions and STEM presentations to promote knowledge of the renewables industry and associated job opportunities.

RWE is also actively involved in industry bodies including RenewableUK, EnergyUK and the East of England Energy Group. Over recent years RWE has supported numerous supply chain and industry events, via sponsorship and speaking opportunities, and participation in meet-the-buyer events, business breakfasts, awards and sponsorship. This activity is ongoing, including participation in the recently launched East Wind – the East of England's Offshore Wind Cluster forum.

The UK will continue to be a key focus in RWE's strategy to grow its renewables business and to become carbon neutral by 2040.

Improving infrastructure and coordination

The Five Estuaries Offshore Wind Farm project would provide a secure, local and clean source of low-cost energy to the UK. That energy would be delivered to the UK through a standalone electricity grid connection onshore. However, Five Estuaries has and will continue to coordinate with neighbouring projects. This has included sharing survey data with the proposed North Falls Offshore Wind Farm Project, coordinating designs with regards to the Onshore Export Cable Corridor (ECC), the number of electricity export cables, colocated area for each project's substation, and siting of other onshore infrastructure and construction methods. Coordination discussions are also ongoing with National Grids Norwich to Tilbury reinforcement project on interactions of two projects, including construction activities at its proposed East Anglia Connection Node substation.

Five Estuaries has been actively engaged in the Offshore Transmissions Network Review (OTNR); a government initiative launched in 2020 to review the approach to the design and delivery of offshore transmission. Having concluded in May 2023, the organisations involved along with the Department for Energy Security and Net Zero (DESNZ) are now implementing its findings to deliver a coordinated offshore transmission regime for Great Britain.

Subsequently, Five Estuaries, along with North Falls and Sea Link (National Grid Electricity Transmission), applied as a consortium for grant funding as part of the Offshore Coordination Support Scheme (OCSS). The projects are currently in early stages exploring the feasibility of coordination options between the two offshore wind farms and an offshore reinforcement to the national grid. This process is being carried out in parallel to the base case development for Five Estuaries with an onshore connection into the proposed EACN substation, part of National Grids Norwich to Tilbury Reinforcement Project, as an offshore connection is not a viable or deliverable alternative at this time. Further details on the OTNR and OCSS process are outlined in Volume 9, Report 29: Offshore Connection Scenario.

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Acronyms list

Term	Definition
DCO	Development Consent Order
EIA	Environmental Impact Assessment
ES	Environmental Statement
GW	Gigawatts
LAT	Lowest Astronomical Tide
MW	Megawatts
MHWS	Mean High Water Springs
NPS	National Policy Statement
NTS	Non-Technical Summary
NSIP	Nationally Significant Infrastructure Project
PEIR	Preliminary Environmental Information Report

Glossary of terms

Term	Definition
Array area	The offshore area where the Wind Turbine Generators will be located.
Construction	The period when the project is being built.
Decommissioning	When the life of the project has come to an end and the project becomes inactive and infrastructure starts to be removed.
Development Consent Order	An Order made under the Planning Act 2008 granting development consent for a Nationally Significant Infrastructure Project (NSIP).
Effect	The term used to express the consequence of an impact. The significance of effect is determined by correlating the magnitude of an impact with the importance or sensitivity of a receptor in accordance with defined criteria.
Environmental Impact Assessment	A process by which certain planned projects must be assessed before a decision to proceed can be made. It involves the collection and consideration of environmental information which fulfils the assessment requirements of the Infrastructure Planning (Environmental Impact Assessment) Regulations 2017, including the publication of an Environmental Statement.
Horizontal Directional Drilling	Method for the installation of cables underground using a drilling rig. HDD is an established example of a trenchless cabling installation technique.
Impact	The change upon a receptor that is caused, either directly or indirectly, by an action resulting from the construction, Operation and Maintenance (O&M) or decommissioning of the project being assessed.
Landfall area	Area where the export cables come ashore.
Lowest Astronomical Tide (LAT)	Lowest astronomical tide (LAT) is defined as the lowest tide level which can be predicted to occur under average meteorological conditions and under any combination of astronomical conditions.
Mean High Water Springs	The height of Mean High Water Springs (MHWS) is the average throughout the year, of two successive high waters, during a 24-hour period in each month when the range of the tide is at its greatest (Spring tides).
Nationally Significant Infrastructure Project (NSIP)	Large scale development which requires a DCO under the Planning Act 2008
Onshore and Offshore Export Cable Corridor	The corridor within which the export cables will be located, allowing connection of the wind farm array offshore to the National Grid network onshore.
Operation and Maintenance	The period when the project is operating and could undergo any maintenance as is required.
Preliminary Environmental Information Report	A draft environmental statement, which is submitted to stakeholders for consultation ahead of the final submission.

Term	Definition
Ramsar	Ramsar Sites are wetlands of international importance that have been designated under the criteria of the Ramsar Convention on Wetlands for containing representative, rare or unique wetland types or for their importance in conserving biological diversity.
Receptor	A specific component of the environment which could be adversely or beneficially affected by the development.
Red Line Boundary	The distinct location and area in which the proposed development will take place.
Site of Special Scientific Interest	In the UK, a site which is officially protected as it contains important or rare animals, plants or geology.
Special Area of Conservation	Protected areas in the UK designated under the Conservation of Habitats and Species Regulations 2017 (as amended) and the Conservation of Offshore Marine Habitats and Species Regulations 2017 in the UK offshore area.
Special Protection Area	Protected areas for birds in the UK classified under the Conservation of Habitats and Species Regulations 2017 (as amended) and the Conservation of Offshore Marine Habitats and Species Regulations 2017 in the UK offshore area.

1 Introduction

1.1 Purpose of this document

1.1.1 This Non-Technical Summary (NTS) accompanies the full Environmental Statement (ES) for the proposed Five Estuaries Offshore Wind Farm project. The aim of the NTS is to provide an overarching summary of key topics discussed in the ES, using non-technical language. It is important to recognise that this NTS is a standalone document containing high level summary information, and that detailed technical information is provided within relevant chapters of the ES.

1.1.2 The ES provides stakeholders, such as you, with the environmental information that has been collected and assessed. This provides an understanding of the potential impact, or as it is termed, the likely significant effect, of the Five Estuaries Offshore Wind Farm project on the environment. The assessments cover all stages of the project i.e. from construction, through operation to eventual decommissioning.

1.1.3 A complete listing of published ES documents is contained in the Guide to the Application.

1.2 Introducing the Five Estuaries Offshore Wind Farm project

1.2.1 The UK is facing significant climate, energy and cost of living challenges, requiring substantial investment in new technologies and infrastructure.

1.2.2 National planning policy makes a clear commitment to the delivery of low carbon renewable energy generation that will help us to tackle climate change, secure energy supplies and reduce the cost of energy. The UK Government expects offshore wind electricity generation to play a key role and has set an ambitious target to increase offshore wind electricity generation to up to 50GW on installed capacity by 2030.

1.2.3 Five Estuaries Offshore Wind Farm Ltd is proposing to develop and construct a new offshore wind farm, comprising up to 79 offshore wind turbines, located approximately 37 km off the coast of Suffolk. The Project will generate enough electricity to power up to hundreds of thousands of UK households each year. This will not only provide secure low carbon electricity for decades but will create significant long-term employment opportunities and economic benefits for the local community.

1.2.4 The Project includes wind turbine generators that will generate renewable electricity, an offshore substation(s) that will collect the energy and transfer it to shore via electricity export cables located securely on the seabed., The electricity export cables will make landfall at Sandy Point between Holland-on-Sea and Frinton-on-Sea on the Essex coast. Once onshore, electricity export cables will transfer the energy to an onshore substation in Tendring, approximately 22 km from the coast, before final export to the National Grid Electricity Transmission network.

1.2.5 The Planning Act 2008 provides the legal framework for consenting 'nationally significant infrastructure projects' such as offshore wind farms. Under the Act the main planning consent required to build and operate an offshore wind farm is a Development Consent Order (DCO) granted by the Secretary of State for Energy Security and Net Zero.

1.3 Consultation

1.3.1 Under the Planning Act 2008, Nationally Significant Infrastructure Projects (NSIPs) are required to carry out consultation before submitting an application. The groups of people who must be consulted include the communities and businesses in the vicinity of a project, people with an interest in the land potentially directly affected by the proposals, and statutory and other prescribed consultees (including local authorities, the Marine Management Organisation, National Highways, and the Environment Agency). Three stages of consultation were carried out between 2022 and 2024, more information about them is contained in the Consultation Report (5.1).

1.3.2 Under the Infrastructure Planning (Environmental Impact Assessment) Regulations 2017, we were required to consult on a draft of the environmental assessment information being prepared for the Project. The Preliminary Environmental Information Report set out this information, which was published as part of our second stage of consultation running from 14 March 2023 to 12 May 2023.

1.3.3 Between 4 December 2023 and 31 January 2024, we carried out our third stage of consultation on two separate elements; a targeted consultation with those with an interest in the land who were affected by changes to the design since our second consultation; and a consultation about proposed habitat compensatory measures for Lesser Black Backed Gull in East Suffolk.

1.4 The story so far

1.4.1 In February 2017, The Crown Estate announced the opportunity for developers to apply for project extensions to operating offshore wind farms. Eight applications were received, including Five Estuaries Offshore Wind Farm project, which, is an application to extend the operational Galloper Offshore Wind Farm project.

1.4.4 Following a successful application, the Five Estuaries Offshore Wind Farm project proceeded to the award of leasing rights as part of the 2017 extensions round. The agreement for lease was awarded in 2020.

1.4.5 The agreement for lease was then carried forward to the Environmental Impact Assessment (EIA) scoping phase. A scoping report was submitted by Five Estuaries Offshore Wind Farm Ltd to the Planning Inspectorate on 5th October 2021. A formal scoping opinion from the Planning Inspectorate was received on 12 November 2021.

1.4.6 Since 2022, we have carried out three stages of consultation along with continued engagement with technical stakeholders and members of the public. The results of these consultations and the ongoing engagement has fed into the development of the final proposals. Further information regarding consultation with stakeholders is provided in paragraph 4.1.3 onwards.

2 Policy and legislation

2.1 What permissions are being sought and what legislation applies?

2.1.1 Five Estuaries Offshore Wind Farm is a NSIP due to it being an "offshore generating station with a capacity of greater than 100 megawatts (MW)". Permission to build and operate an NSIP is given in a DCO, granted by the relevant Secretary of State in accordance with the Planning Act 2008 and the policy framework provided in the National Policy Statements (NPSs).

2.1.2 Under the Planning Act 2008, NPSs provide the basis for decisions regarding NSIPs, determined by the responsible Secretary of State. The UK's commitment to renewable energy has been captured in the publication of the following NPSs, which are of direct relevance for the development of Five Estuaries Wind Farm Project:

- EN-1 Overarching Energy;
- EN-3 Renewable Energy Infrastructure; and
- EN-5 Electricity Networks.

2.1.3 The NPSs were updated in November 2023 and have been referred to throughout the ES.

2.1.4 The onshore development area falls under the jurisdiction of Tendring District Council and Essex County Council and relevant local development plans have been considered in assessment. The ES has taken full account of wider planning considerations at the national and regional level both on the land and at sea.

2.2 Key policy drivers

2.2.1 The UK offshore wind industry is already making a significant contribution to the UK's transition to cleaner, low carbon energy on its ambition of being net zero by 2050. The government has set a target to deploy up to 50GW of offshore wind by 2030; this is five times more than the 10GW currently produced in the UK. In addition to the reduction of greenhouse gas emissions, offshore wind is also a key part of government strategy to support national energy security, production of affordable energy and economic opportunities from energy infrastructure investment in the UK.

2.2.2 Some of the key policy and legislative drivers of offshore wind are described below, but further information can be found in Volume 6, Part 1, Chapter 2: Policy and Legislation.

- **Combatting climate change** This is a global issue resulting from the emissions of greenhouse gasses into the atmosphere, such as carbon dioxide, mainly from human activity. The Climate Change Act 2008 forms the basis of the UK's approach to tackling and responding to climate change. The Act places a duty to ensure that net carbon and greenhouse gas emissions are reduced, initially by 80% relative to 1990 levels by 2050. In 2019, the UK government amended this target to enshrine in law

that net UK carbon for the year 2050 is at least 100% lower than the 1990 baseline, this is known as 'net zero'.

- **The Ten Point Plan for a Green Industrial Revolution** – released by the UK Prime Minister in November 2020, the plan aims to encourage a green industrial revolution, creating investment in British industries whilst protecting future generations from climate change and the destruction of habitats. Point 1 in the plan is "Advancing Offshore Wind," and had an aim to increase offshore wind capacity to 40 GW by 2030, including 1 GW of floating offshore wind.
- **The British Energy Security Strategy** – In response to increasing global energy prices, this strategy was published by the UK Government in April 2022 to support the acceleration of energy production in the UK and provide greater energy independence. This built upon many of the policies in the Ten Point Plan and the Energy White Paper. Targets associated with offshore wind and increased them further. The strategy aims to deliver up to 50 GW by 2030, including up to 5 GW of floating offshore wind. Additionally, the strategy includes are policies to increase energy efficiency in homes and help consumers with energy bills.

3 Key components of the Five Estuaries Offshore Wind Farm project

3.1 Where is the Project located and what will be built?

3.1.1 At their closest point, the wind turbines associated with the Five Estuaries Offshore Wind Farm project will be situated approximately 37 km off the coast of Suffolk (see Figure 3.6). The overall Project will comprise the following:

- **Array area** – where the offshore wind farm turbines will be located and additional infrastructure including the offshore substations, electricity cables to connect turbines and an offshore substation(s) platform. There are two proposed array areas for the Project that are located to the north and south of the existing shipping traffic separation scheme. The array areas comprise the Northern Array, which will cover 66.9 km2 and the Southern Array, which will cover 61.2 km^2.
- **Offshore export cable corridor** – where the offshore export cables will be installed, bringing power generated at the wind farm to shore. The distance of the offshore export cable corridor from the furthest offshore Northern Array to landfall is approximately 91.5 km. There will be two export cables totalling up to 196 km of export cables which will be securely installed in an offshore export cable corridor.
- **Landfall** – The area where the offshore export cables will be brought ashore to connect to the onshore transmission system. The offshore and onshore cables will be jointed together in an underground concrete chamber, called a transmission joint bay.
- **Onshore export cable corridor** – where the underground export cables will be placed in up to four trenches to transfer power to the onshore substation. The construction corridor for the onshore export cable corridor will also include a temporary haul road and temporary construction compounds. This will be up to 25 km in length from landfall to the connection point to the National Grid.
- **Onshore substation** – The area where the onshore export cables will transport the energy to, and where the energy is upgraded to 400 kV before being transmitted by underground cables to the proposed National Grid East Anglia Connection Node substation (EACN). The onshore substation will be the only permanent above ground structure.
- **Connection to the National Grid** – underground export cables will connect the Five Estuaries Offshore Wind Farm Project substation to the proposed new EACN substation. It is important to note that the EACN node also connects the Norwich to Tilbury reinforcement project however, this a separate project to the Five Estuaries Offshore Wind Farm project and is subject to a separate consenting process.

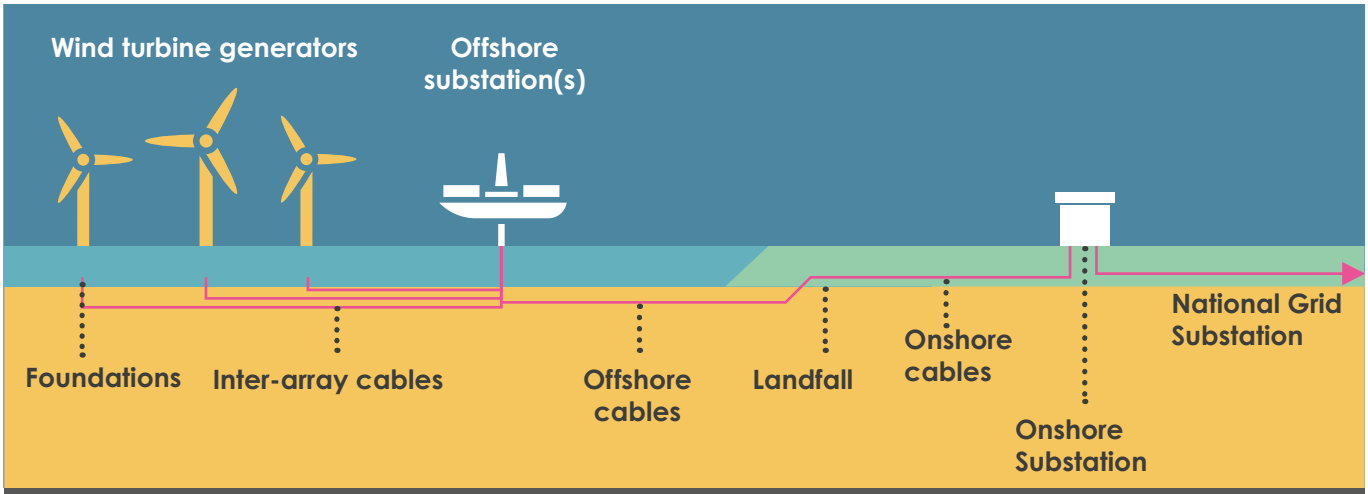


Figure 3.1 Outline schematic of the Five Estuaries Offshore Wind Farm project

3.1.2 As outlined in Figure 3.1, the offshore wind turbine generators are likely to be connected via subsea cables, to up to two Offshore Substation Platforms (OSPs). These will transform the voltage and transmit the power generated via further subsea cables within the offshore export cable corridor to a landfall location at Sandy Point between Holland-on-Sea and Frinton-on-Sea on the Essex coast. From there, onshore export cables will transfer the power to an onshore substation before transfer to a National Grid substation for export to the National Grid Electricity Network.

3.1.3 Additional information regarding the technical components of the Five Estuaries Offshore Wind Farm project is provided in summary in the following sections of this NTS and in detail in the accompanying offshore and onshore project descriptions:

- Volume 6, Part 2, Chapter 1: Offshore Project Description; and
- Volume 6, Part 3, Chapter 1: Onshore Project Description.

Offshore components

3.1.4 Key offshore components of the Five Estuaries Offshore Wind Farm project include the following:

- Up to 79 wind turbine generators;
- Foundations to secure the turbines and other infrastructure to the seabed;
- Up to two offshore substation platforms;
- Subsea inter-array cables linking turbines to each other and to the offshore substations;
- Subsea export cables to connect the wind farm to landfall; and
- Cable protection and scour protection.

Wind turbine generators

3.1.5 Wind turbine generators convert wind energy to electricity. Figure 3.2 provides an overview of the individual parts that make up a wind turbine generator. These include rotor blades, a nacelle (housing a generator, gearbox and control equipment), a tower and a transition piece which includes a foundation that is attached to the seabed.

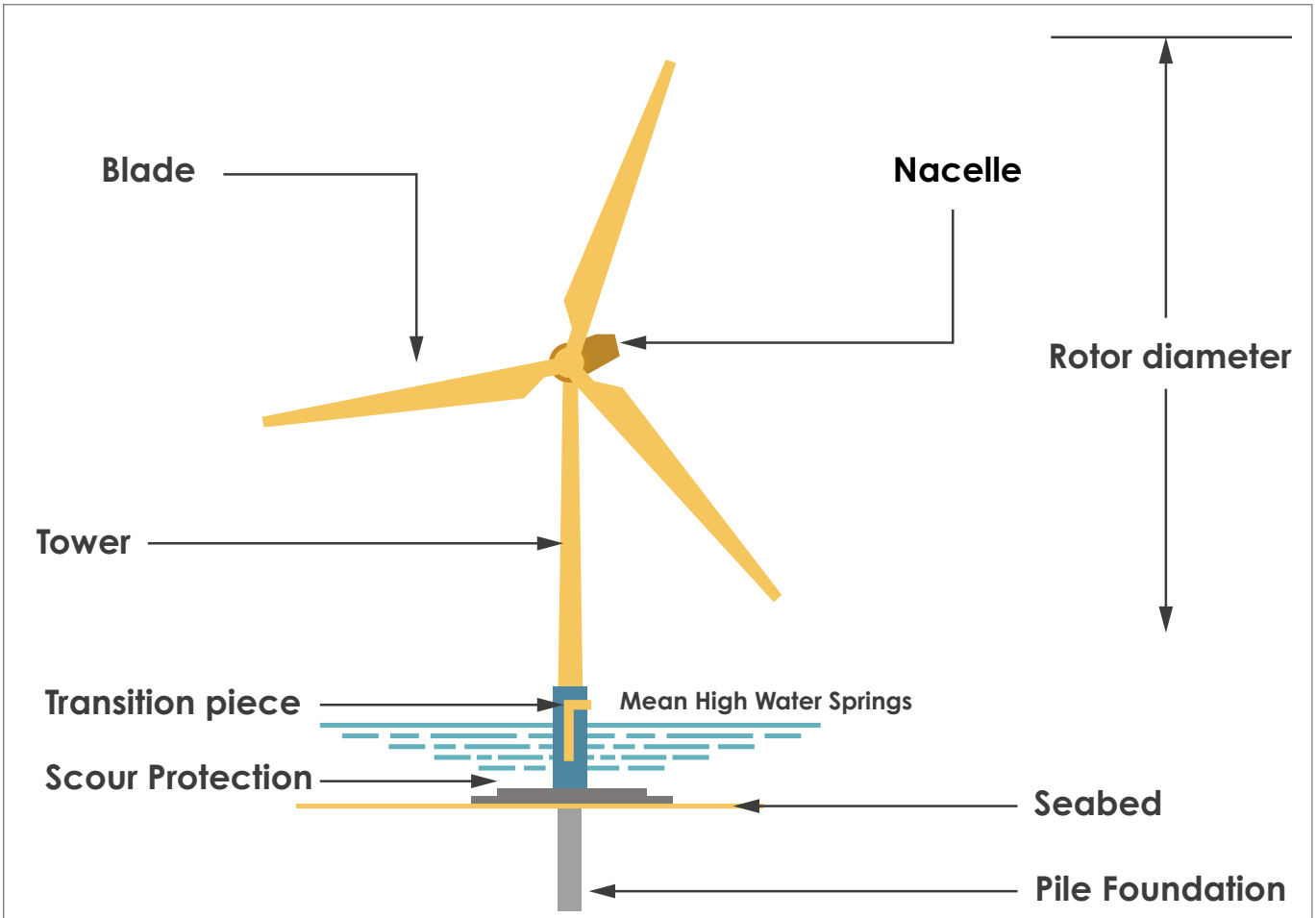
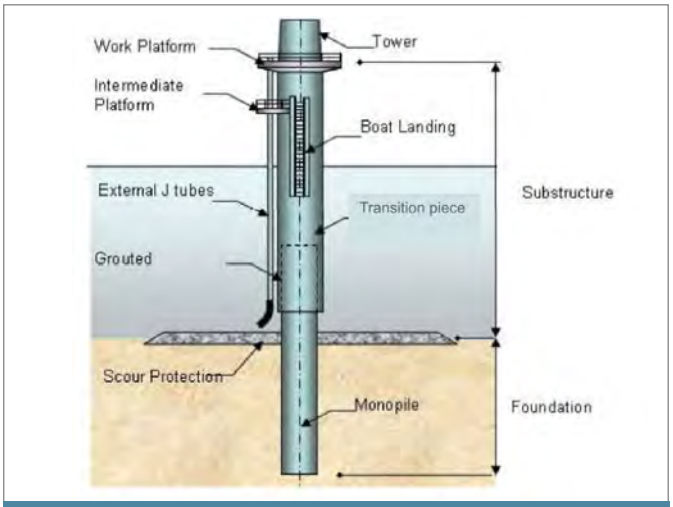


Figure 3.2: Diagram of an offshore wind turbine generator

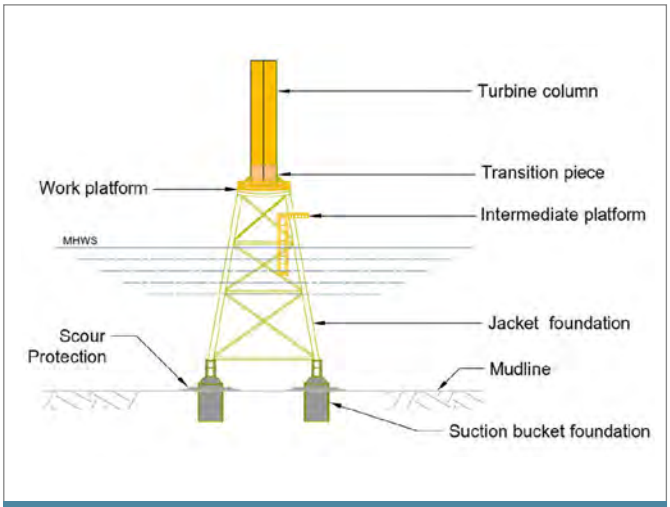
3.1.6 The Five Estuaries Offshore Wind Farm project has, as part of its assessment, considered a range of options such as 41 large (up to 399 m maximum height), or 79 small (up to 320 m maximum height) wind turbine generators. The stated height of the wind turbine generators is the maximum blade tip height above lowest astronomical tide. They will have a minimum clearance between the lowest blade height and mean high water springs of 28 m for both sizes of turbines.

Foundations

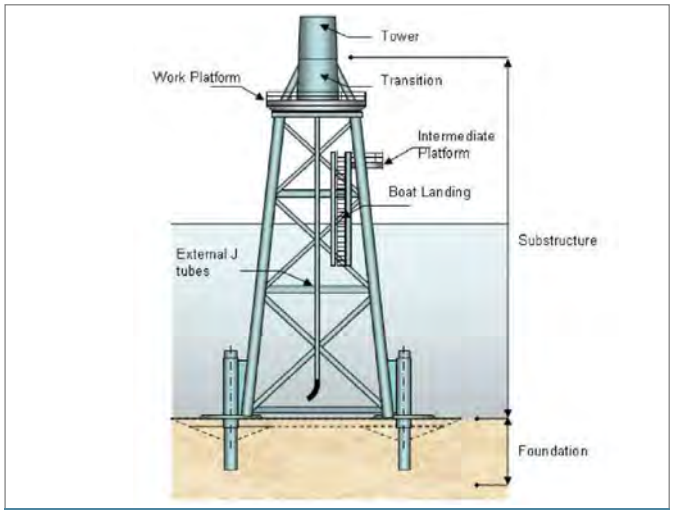
3.1.7 All wind turbines and other offshore structures will be secured to the seabed by foundations. Several foundation types are currently being considered for the Five Estuaries Offshore Wind Farm project (Figure 3.3).



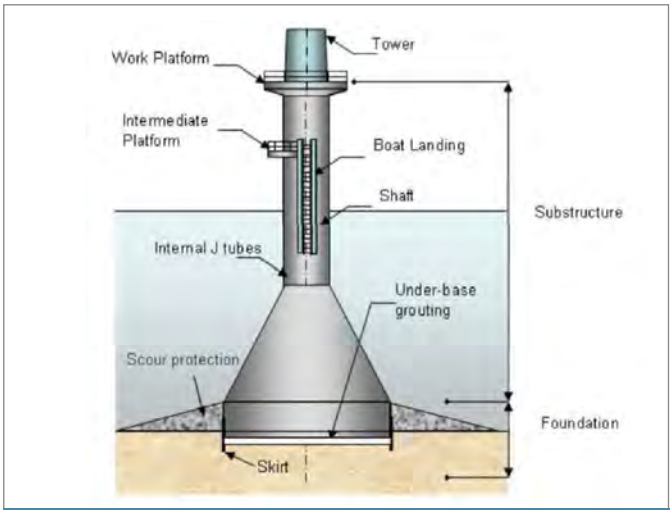
Monopile



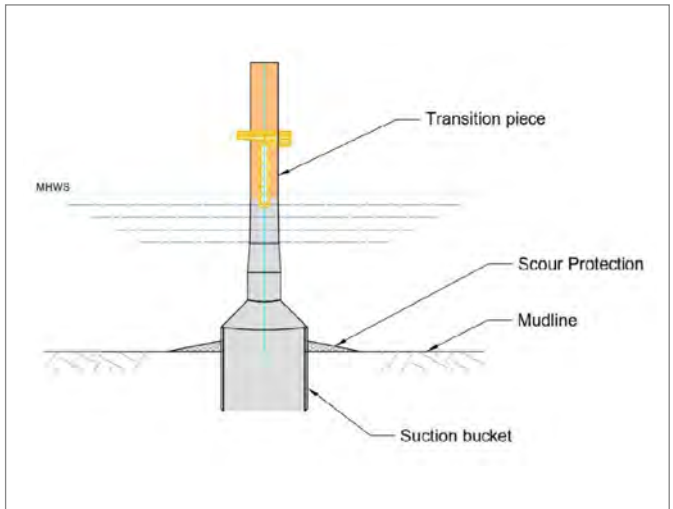
Multi-Leg Caisson Jacket



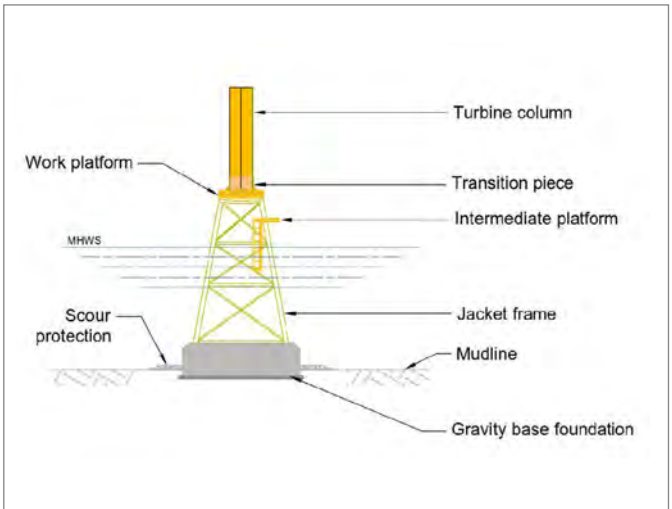
Multi-Leg Pin Piled Jacket



Mono Gravity Base System



Mono Suction Caisson



Multi Leg Gravity Based Jacket Foundation

Figure 3.3: Wind turbine generator foundation options

3.1.8 Factors influencing the choice of foundation include the type of wind turbine generator, the nature of seabed on the site, the water depth and sea conditions, as well as supply chain constraints. The foundation type selected in the final design for the wind turbine generators and offshore substation platforms will be dependent upon the findings of final site investigations (undertaken post consent) and project procurement processes.

Offshore substation platforms

3.1.9 Offshore substations collect the electricity generated by the wind turbine generators, via inter array cables, so that it can be concentrated and transferred to the national electricity grid. Five Estuaries Offshore Wind Farm project will require up to two offshore substations, situated alongside the wind turbine generators within the array area. Figure 3.4 provides an indicative example of an offshore substation platform.

Figure 3.4: Rampion offshore substation

Subsea cables

3.1.10 The two main types of subsea cables within the offshore area will include inter array cables, connecting individual wind turbines generators to the substation(s), and electricity export cables, which will transfer generated power to the landfall area.

3.1.11 There will be up to 200 km of inter-array cables and up to 196 km of export cables.

Cable protection

3.1.12 The preferred method of protecting the subsea cables will be to bury them within the sea bed. Where burial of cable is not possible, cable protection such as rock placement or concrete mattresses may be required on the seabed. Cable protection will also be used where cables cross existing cables on the seabed and where cables exit the foundation before they enter the seabed.

Landfall location and transition joint bays

3.1.13 The offshore electricity export cables will be connected to the onshore electricity export cables at landfall where the cable corridor meets the shore. The offshore export cables will come ashore at Sandy Point between Holland-on-Sea and Frinton-on-Sea on the Essex coast. The works at the landfall will use trenchless techniques, such as horizontal directional drilling to safely install the offshore cables under sections of beach and seawall to a transition joint bay compound.

3.1.14 Transition joint bays are areas where the offshore cables can be jointed to the onshore cables. They provide a stable, clean and safe working environment for cable jointing and are located close to the point at which electricity export cables transition onto land. Once the jointing work is completed the transition joint bays are covered and the land reinstated.

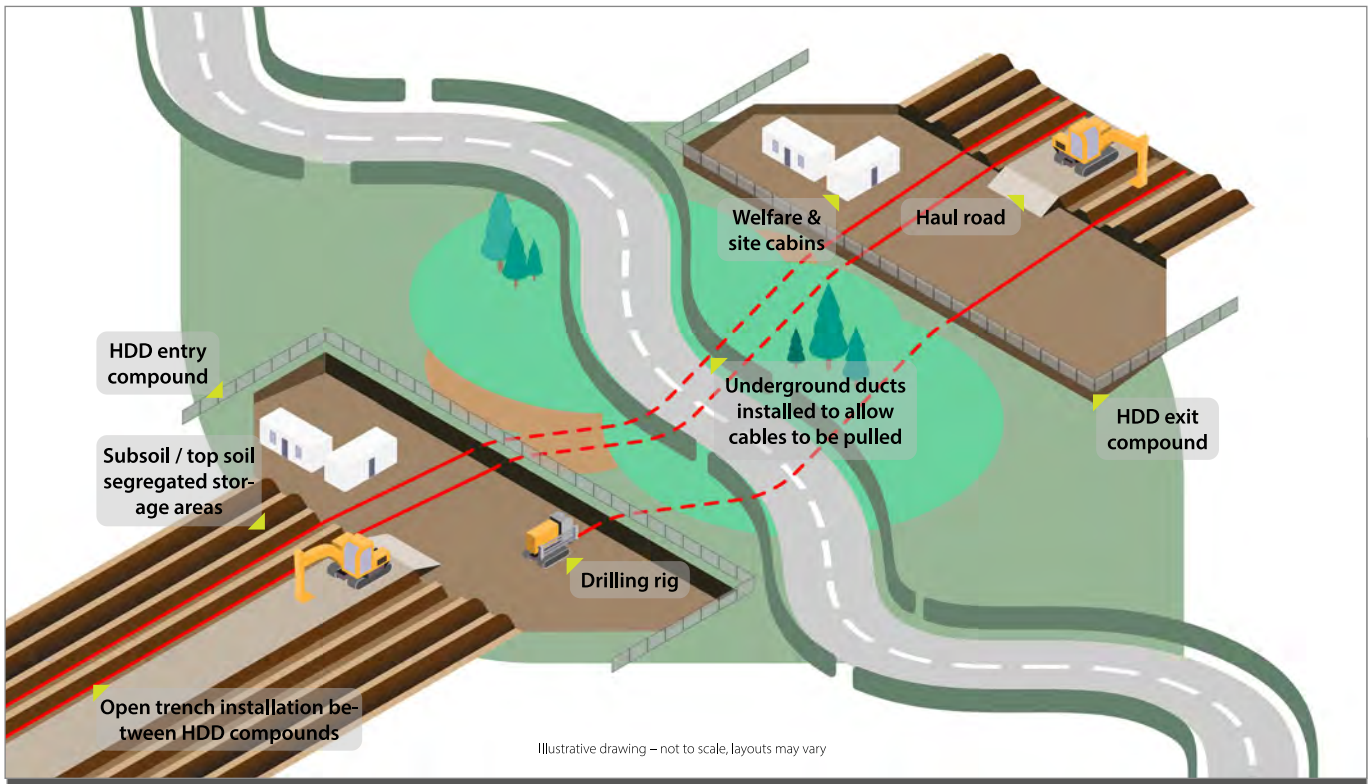


Figure 3.5: An illustration of horizontal directional drilling

Onshore components

3.1.15 There are a number of key elements to the works associated with the onshore aspects of the Five Estuaries Offshore Wind Farm project. These are shown in Figure 3.7 and include the following:

- Onshore export cable corridor;
- Traffic management, temporary construction compounds and access;
- Onshore substation; and
- National Grid connection point.

Working with North Falls Offshore Wind Farm

3.1.16 Working together to streamline design and minimise local impacts as far as possible is important to both Five Estuaries and North Falls. An important consideration for Five Estuaries during the site selection and design work has been the proximity of the proposed North Falls Offshore Wind Farm. Although North Falls and Five Estuaries are two separate projects each requiring their own Development Consent Order (DCO) application and being developed by different shareholder groupings, co-ordination between the two projects has been increasing as designs have progressed. In support of this, both parties signed a 'good neighbour agreement' in summer 2023, which has enabled closer liaison, information sharing and joint planning.

3.1.17 Through coordination, we have been able to almost fully align the onshore export cable corridors and agree on a shared location for each project's substation. Three scenarios for onshore delivery with North Falls Offshore Wind Farm have been considered within the assessments:

- Scenario 1 – Five Estuaries Offshore Wind Farm is developed before North Falls and undertakes onshore cable duct installation works for North Falls Offshore Wind Farm, but cable installation and the substation construction for its project only.
- Scenario 2 – Five Estuaries Offshore Wind Farm and North Falls Offshore Wind Farm would construct on different time scales; however, these would still overlap, and the projects would share temporary infrastructure.
- Scenario 3 – North Falls Offshore Wind Farm does not proceed to construction or both Five Estuaries Offshore Wind Farm and North Falls Offshore Wind Farm construct over three years apart. The Projects would be constructed independently.

3.1.18 Scenario 1 is assumed to be the Maximum Design Scenario for the ES and is generally used throughout the ES assessments.

3.1.19 In the offshore environment Five Estuaries has coordinated with North Falls on selection and definition of our export cable corridor and area where the cables make landfall as well as on mitigation and management measures to reduce impacts on shipping and navigation activities.

Onshore Export cable corridor

3.1.20 The Five Estuaries onshore export cable corridor will be approximately 22 km in length. The cable corridor for open trenched sections is expected to be up to 60 m wide. There will however be some exceptions where the ducts are installed using trenchless techniques which may require widths up to 90 m for standard trenchless crossings and up to 120 m for more complex/deeper trenchless crossings, such as at the railway and Tendring brook.

3.1.21 Two high voltage alternating current circuits will be required for Five Estuaries Wind Farm Project to transmit the power from the transition joint bays at the landfall to the onshore substation. Each cable circuit will consist of three onshore electricity cables as well as up to three fibre optic cables and one earth cable.

3.1.22 The main cable installation method will be through the use of open-cut trenching with High Density Polyethylene (HDPE) ducts installed, the trench backfilled, and cables pulled through the pre-laid ducts at a later date. Where the onshore cable meets obstructions such as rivers, roads and ecological constraints, trenchless techniques such as horizontal directional drilling will be used.

3.1.23 Following the installation of all Five Estuaries VE cables, and where applicable North Falls' ducts, the construction working width will be cleared and reinstated (unless an element, such as the haul road, is transferred for use by North Falls, in which case they will reinstate). This reinstatement will include replanting of hedgerows where they were removed, replacement of fences, removal of temporary land drains, ponds and reinstatement of permanent land drains.

Traffic management, temporary construction compounds and access

3.1.24 Access will be required from the public highway onto various parts of the Five Estuaries onshore site. Temporary access points will be installed to facilitate vehicle access from roads during construction.

3.1.25 A temporary haul road will be established along the onshore export cable corridor to provide safe access for construction vehicles travelling from temporary construction compounds to cable installation. This will also help to reduce the impact on the surrounding road network. A number of temporary crossing points will need to be constructed where the hauls roads cross minor roads. These would not be used for construction access.

3.1.26 A number of temporary construction compounds have been identified near to the temporary construction access points from the road network. These will be used for parking, laydown and storage of plant and equipment, local site offices and welfare.

Onshore substation

3.1.27 The proposed substation area is shown in Figure 3.7.

3.1.28 The substation will include equipment needed to deliver power to the national grid. The maximum height of any on-site building will be 15 m with the total land required for the onshore substation to the perimeter fence being up to a maximum of 58,800 m2. Further land surrounding the substation will be used for mitigation planting/screening and drainage attenuation ponds as necessary.

National Grid connection point

3.1.29 Following the connection of the onshore cables to the Five Estuaries substation, an underground connection will then be made to connections bays within the proposed National Grid Norwich to Tilbury reinforcement project and the associated EACN substation.

Lesser Black Backed Gull Compensation Area

3.1.30 An area has been identified at Orford Ness where fencing to protect breeding Lesser Black Backed Gulls from predators may be installed. This area, if implemented, would compensate for impacts to this species as a result of the operational wind farm. In addition to the installation of fencing, the habitat would be managed to make it more suitable for Lesser Black Backed Gulls and the success of this measure would be monitored throughout the lifetime of the Project.

3.2 Construction, operation, maintenance and decommissioning

Construction

3.2.1 In the offshore environment and as highlighted in paragraph 3.1.7, there are a number of foundation options being considered for the Five Estuaries Offshore Wind Farm project and therefore the specific installation method for each type will vary slightly. However, the foundations will be fabricated offsite, stored at a suitable port facility, and transported to the site as needed.

3.2.2 The foundations, wind turbines and offshore substation platforms are likely to be installed using specialist installation vessels. This will likely include a combination of jack-up vessels, anchored vessels and/or dynamically positioned vessels (anchorless positioning technology).

3.2.3 Onshore, construction will include installation of transition joint bays at the landfall, installation of the onshore export cable circuits using both trenching and trenchless techniques (such as horizontal directional drilling), construction of the onshore substation and works associated with the connection into the new National Grid substation. This will be done using standard construction equipment, e.g. excavators, earth movers/dozers, trenching equipment and drilling rigs.

3.2.4 Horizontal directional drilling is a trenchless technique used to install ducts under key infrastructure and natural features such as rivers (see Figure 3.5).

Operation and maintenance

3.2.5 Once construction is complete and the wind farm is fully commissioned, the project will move into the operation and maintenance phase. Upkeep of the infrastructure at sea may include routine servicing, component replacements, repairs, remedial works, and painting and cleaning.

3.2.6 Onshore, operations and maintenance requirements will be largely preventative and cover scheduled services of infrastructure. This may involve infrequent on-site inspections of the equipment at the substation and along the onshore export cable corridor. Unplanned maintenance works, which are considered to be extremely rare, may include for example repair of onshore cable faults, or replacement of equipment at the substation.

Decommissioning

3.2.7 The Five Estuaries Offshore Wind Farm project's operational lifetime is anticipated to be between 24 to 40 years. In the offshore environment, it is expected that any infrastructure above the seabed will need to be completely removed. The decommissioning sequence will generally be in the reverse order of construction and is expected to involve similar types and numbers of vessels and equipment and take place over a three-year period.

3.2.8 Onshore, and at the end of the operational lifetime of the Project, it is assumed that the majority of above ground infrastructure will be removed including the substation and onshore export cables.

3.2.9 A decommissioning plan will be developed and agreed prior to decommissioning of the infrastructure.

3.3 What has been considered in the site selection process?

3.3.1 The approach taken for the development of the Five Estuaries Offshore Wind Farm project has been based on early engagement with key stakeholders, the public and a range of environmental and technical appraisals. Stakeholder engagement has been a key influence on the Project design, with each phase of consultation carefully designed to provide opportunities for review and provision of additional information to guide site selection decisions and refine the project proposals.

3.3.2 A full description of the site selection process is provided in Volume 6, Part 1, Chapter 4: Site Selection and Alternatives.

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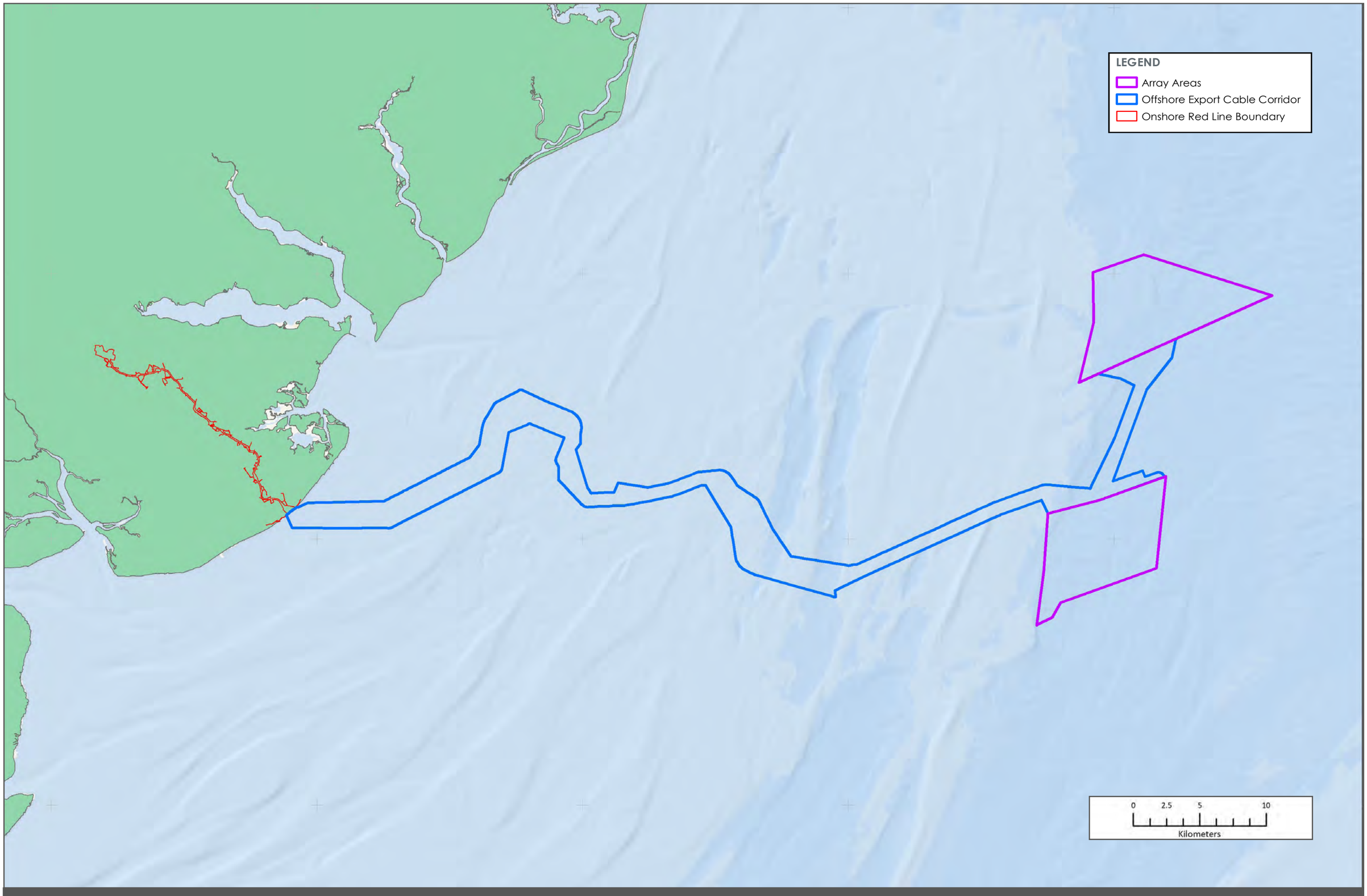


Figure 3.6: Five Estuaries Development Areas

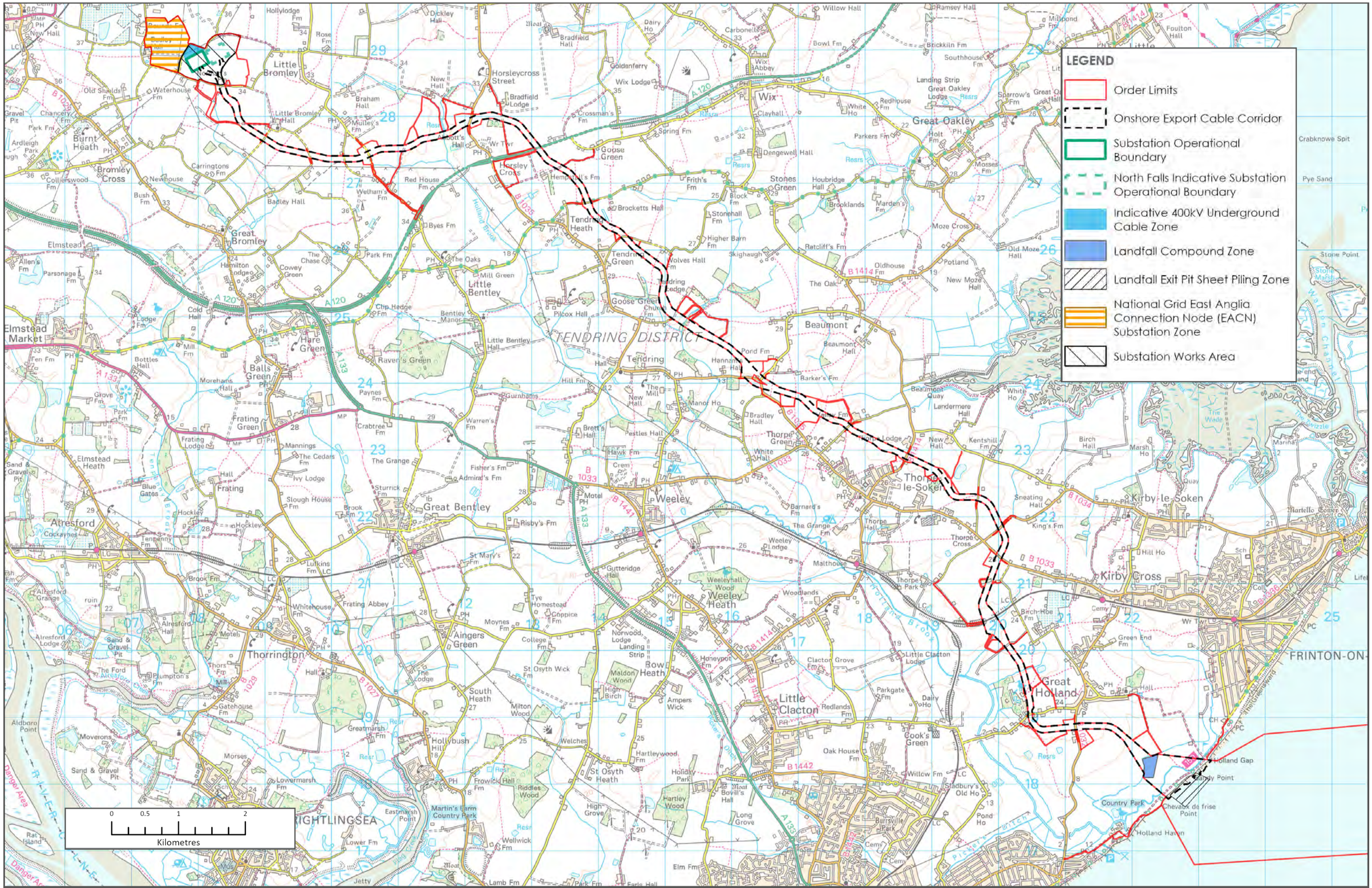


Figure 3.7: Five Estuaries onshore infrastructure search areas

4 Environmental Impact Assessment process

4.1 What is an EIA?

4.1.1 The purpose of an Environmental Impact Assessment or EIA is to identify the potential environmental impacts from a development and then propose the measures to avoid and reduce any significant negative impact. This information is then presented in an ES as part of the NSIP consenting process, to assist regulators in the decision-making process. Assessments are made on the significance of an effect on a wide range of receptors, including physical, biological and human.

4.1.2 A full description of the EIA methodology and cumulative effects assessment methodology is described in Volume 6, Part 1, Chapter 3: EIA Methodology.

Approach to EIA

4.1.3 The assessment of each topic forms a separate chapter within the ES, with interlinkages clearly identified, such as the link between fish ecology and fish as a prey resource for marine mammal ecology. Each chapter addresses the following:

- The statutory and policy context
- A summary of consultation, including feedback received to date;
- The scope and methodology of the assessment;
- A description of the existing environment;
- Any uncertainties and technical difficulties affecting the assessment;
- The key parameters for assessment;
- A description of embedded mitigation that has already been incorporated into the project design;
- An environmental assessment of the potential impacts relevant to that chapter and topic, and identification of any additional mitigation required;
- Identification of residual effects; and
- Identification of cumulative, transboundary and inter-related effects.

Assessment parameters

4.1.4 To ensure a robust EIA, a range of potential construction methodologies and infrastructure design options have been considered, and the 'Maximum Design Scenario' (known as the

'Rochdale Envelope' approach) has been presented and assessed for each parameter. This approach allows for the assessment of the worst-case impacts specific to each chapter topic.

4.1.5 Where precise details of the proposals are not known at the time of application submission, the Rochdale Envelope approach has been applied.

Cumulative Assessment

4.1.6 The EIA Regulations require a consideration of cumulative effects, which is to say that the overall impact of the project must be considered together with the impact of other proposed developments in the area. Cumulative effects are assessed and reported within each topic chapter of the ES

4.1.7 Existing projects are generally considered to be part of the existing baseline environment, except in cases where there is an ongoing effect. The exact approach taken by each technical topic is described within the cumulative effects assessment section of each chapter.

Mitigation

4.1.8 This is the stage of the EIA process where measures are identified to avoid, reduce or offset potential impacts from the proposed development.

4.1.9 For example, if a house was being built on an important piece of land which had conservation value, you would first determine if impacts could be avoided, for instance by building the house in another location. If that is not possible, you would determine if the impact could be reduced. This could be done by redesigning elements of the house, e.g. reducing its footprint or height. If, after reducing the impact, there is still a residual impact then you would look to offset the impact even further. For example, this could be done by planting an equivalent area of trees that may have been lost in the footprint of the house.

4.1.10 Five Estuaries Offshore Wind Farm Ltd. has followed this mitigation hierarchy across all EIA topics. In most cases, mitigation measures have already been identified and adopted as part of the evolution of the project design and specific to each topic. This could include project design measures, compliance with elements of good practice and use of standard protocols.

4.1.11 Where there is a need to reduce impacts further following the outcome of the assessment, extra measures may be required. These are termed additional mitigation measures.

Approach to consultation and scoping

4.1.12 Scoping is the process of identifying the issues to be addressed during the EIA process. As highlighted in Section 2.3, a scoping report was submitted by Five Estuaries Offshore Wind Farm Ltd to the Planning Inspectorate on 5th October 2021. A formal scoping opinion from the Planning Inspectorate was then received on 12th November 2021, highlighting areas that consultees wished to see addressed within the EIA. These responses, together with other consultation responses provided throughout the process so far, have been taken into account in identifying the scope for the EIA.

4.1.13 Engagement post scoping has included three stages of pre-application consultation with both statutory and non-statutory consultees and ongoing engagement including via the Evidence Plan Process (a series of regular engagement meetings with key stakeholders on technical matters).

4.1.14 Stage 1 consultation (30 June to 12 August 2022) was non-statutory consultation held on early proposals to gather initial feedback, primarily, from the communities potentially affected by onshore elements of the Project. This stage of consultation included two in-person events in Essex.

4.1.15 Stage 2 consultation (14 March to 12 May 2023) was statutory consultation under the Planning Act 2008, which included the Preliminary Environmental Information Report. This consultation was carried out to fulfil the statutory requirements for pre-application consultation and gather feedback on more detailed proposals and our preliminary environmental information. This stage of consultation included ten in-person events in Essex, Suffolk and Kent.

4.1.16 Stage 3 consultation (5 December 2023 to 31 January 2024) involved two focused consultations. The purpose of these consultations was to ensure that the relevant stakeholders potentially affected by changes to the Project since Stage 2 consultation had an opportunity to provide feedback before the application was finalised. These consultations were:

- A targeted consultation with those with an interest in the land affected by changes to our onshore proposals in Essex, that have been made since consultation earlier this year; and
- A consultation on proposals to improve the habitat for lesser black-backed gulls at a site in East Suffolk, to compensate for a potential impact on the species from our proposed offshore wind turbines.

4.1.17 Almost 900 pieces of feedback were received in response to these consultations. How they have influenced the Project and how the Applicant has considered all of the issues raised is set out in the Consultation Report (5.1).

4.1.18 In addition to consultation, ongoing engagement has taken place with technical stakeholders (via the Evidence Plan process), with marine stakeholders, with landowners and with members of the public. Most recently, in January 2024, two in-person events were held in Essex to present the near final proposals to the communities in the vicinity of the onshore elements of the Project.

5 Summary of environmental assessments

5.1 Marine geology, oceanography and physical processes

Chapter description and study area

5.1.1 This chapter assesses the potential impact of Five Estuaries Offshore Wind Farm project on Marine Geology, Oceanography and Physical Processes. Marine Physical Processes is a collective term for: Water levels, currents, waves (and winds), sediments and geology, seabed geomorphology and coastal geomorphology.

5.1.2 Water depths in the northern array range between 25 m and 55 m, whereas the southern array depths range between 22 m and 60 m. Peak current speeds are approximately 1.2 to 1.3 metres per second across the array areas with little difference between the northern array area and southern array area. The array areas are exposed to longer wave fetches (distances of open water over which waves can develop) from the north to northeast. The seabed is found to be dominated by coarse grained sediments, with sands and gravelly sands.

5.1.3 Information to inform this chapter and assessment was collected through a detailed review of existing literature and data sources, and site-specific surveys, including geophysical surveys.

Assessment

5.1.4 The assessment for Marine Geology, Oceanography and Physical Processes has considered several possible environmental effects including potential changes to suspended sediment concentrations and impacts to sandbanks during construction and decommissioning activities, and potential changes to wave and tidal processes and the potential of scour of seabed sediments during the operation and maintenance phase.

Mitigation measures

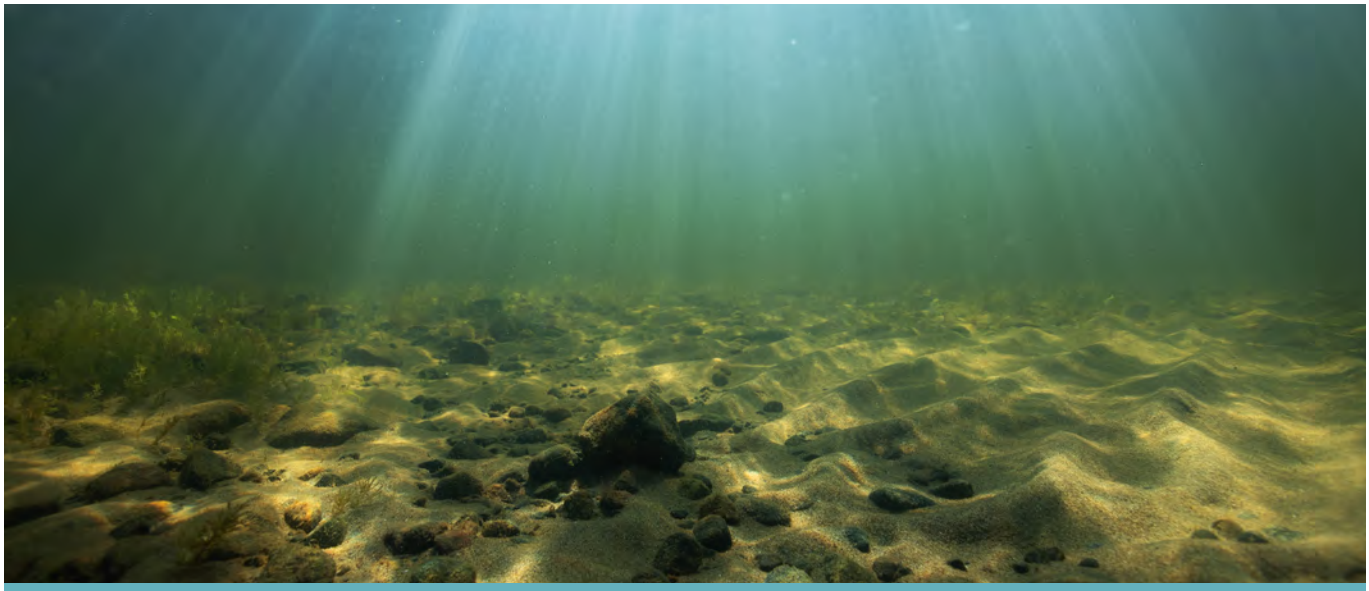
5.1.5 For this topic, specific measures include burying the export cable wherever possible and the development of and adherence to, a Cable Specification and Installation Plan which sets out measures to minimise adverse impacts on potentially sensitive receptors during cabling operations on the seabed.

Summary of effects

5.1.6 Overall, it is considered there will be no significant effects upon Marine Geology, Oceanography and Physical Processes receptors.

Further information

5.1.7 Further information can be found within Volume 6, Part 2, Chapter 2: Marine Geology, Oceanography and Physical Processes.



5.2 Marine water and sediment quality

Chapter description and study area

5.2.1 This chapter assesses the potential impact of Five Estuaries Offshore Wind Farm project on Marine Water and Sediment Quality.

5.2.2 The study area for Marine Water and Sediment Quality has been defined as follows:

- Seaward of mean high water springs;
- The area which encompasses the project red line boundary up to where landfall lies at Holland and Sea and Frinton-on Sea on the Essex Coast; and
- A further area which has been defined based on the expected maximum distance that water from within the VE array areas and offshore ECC might be transported on a single mean spring tide.

5.2.3 Data has been collected from a number of sources including site specific surveys in the array areas and offshore export cable corridor, which included contaminant analysis of the seabed. Additionally, the Environment Agency's Bathing Water classification data has been used.

Assessment

5.2.4 The assessment for Marine Water and Sediment Quality considered the potential impacts the project may have on the deterioration of water quality due to release of suspended sediments or contaminants as a result of construction activities. Similar impacts are also assessed during the operation and maintenance phase and the decommissioning phase.

Mitigation measures

5.2.5 For this topic, mitigation includes the production of a Project Environmental Management Plan to ensure good practice is followed to avoid release of any contaminants and ensure appropriate environmental managements measures are applied during construction and operation.

Summary of effects

5.2.6 Overall, it is considered there will be no significant effects upon Marine Water and Sediment Quality receptors.

Further information

5.2.7 Further information can be found within Volume 6, Part 2, Chapter 3: Marine Water and Sediment Quality.

5.3 Offshore ornithology

Chapter description and study area

5.3.1 This chapter assesses the potential impact of Five Estuaries Offshore Wind Farm project on Offshore Ornithology. Offshore ornithology primarily refers to seabirds which are adapted to live in the marine environment and rely on the sea to survive.

5.3.2 The ornithology study area was defined based on potential impacts to seabird designated features. The study area therefore compromises the Five Estuaries Wind Farm Project array area and a 4 km buffer, or area, placed around them. The study area also includes the export cable route up to and including the intertidal zone, ending at the mean high-water springs.

5.3.3 Data to inform this chapter has been collected during project specific aerial surveys and desk-based study of published scientific literature.

Assessment

5.3.4 The assessment for Offshore Ornithology has considered several possible environmental effects including the impacts of disturbance and displacement during construction and decommissioning and the impacts of birds colliding with the turbines during the operation of the windfarm.

Mitigation measures

5.3.5 For Offshore Ornithology, this includes the use of larger more widely spaced wind turbine generators with higher clearance above the sea level than previous developments. This will reduce the likelihood of birds colliding with the wind turbine generators. Mitigation also included implementation of a best practice protocols for minimising disturbance to designated bird features within the Outer Thames Estuary Special Protection Area.

Summary of effects

5.3.6 Overall, it is considered there will be no significant effects upon Offshore Ornithology receptors.

Further information

5.3.7 Further information can be found within Volume 6, Part 2, Chapter 4: Offshore Ornithology.

5.4 Benthic and intertidal ecology

Chapter description and study area

5.4.1 This chapter assesses the potential impact of Five Estuaries Offshore Wind Farm project on Benthic and Intertidal Ecology. Benthic ecology is the study of marine organisms that live on the sea floor, whereas Intertidal ecology is the study of intertidal ecosystems, where organisms live between the low and high tide lines.

5.4.2 The Five Estuaries benthic ecology study area is considered to have seabed (benthic) habitats typical of the wider southern North Sea, dominated by species that often reside in mobile sand habitats. The intertidal areas, or the foreshore where the export cable is expected to be buried, comprised of sandy habitats with varying proportions of gravel and hard substrate, which encourages a range of seasonal green and red algae and species such as barnacles and limpets to reside.

5.4.3 Information on the benthic subtidal and intertidal communities within the study area was collected through a detailed desktop review of existing literature and data sources, and site-based surveys.

Assessment

5.4.4 The assessment for Benthic and Intertidal Ecology has considered several possible environmental effects including the impacts of temporary habitat loss and increases in suspended sediment concentrations from construction activities, long term habitat loss / change and temporary disturbances from maintenance activities, as well as impacts arising during the operation and decommissioning phases.

5.4.5 The export cable corridor overlaps with 1.26 km^2 of the Margate and Long Sands Special Area of Conservation within the northern top of the site, however it is considered that any impact to the site will be limited.

Mitigation measures

5.4.6 For Benthic and Intertidal Ecology this includes a Project Environmental Management Plan to ensure good practice is followed to avoid release of any contaminants and ensure appropriate environmental management measures are applied during construction and operation. A Cable Specification and Installation Plan will set out appropriate cable burial depth in accordance with industry good practice, minimising the risk of cable exposure and thus the need for additional cable protection.

Summary of effects

5.4.7 Overall, it is considered that there will be no significant effects upon Benthic and Intertidal Ecology receptors.

Further information

5.4.8 Further information can be found within Volume 6, Part 2, Chapter 5: Benthic and Intertidal Ecology.

5.5 Fish and shellfish ecology

Chapter description and study area

5.5.1 This chapter assesses the potential impact of Five Estuaries Offshore Wind Farm project upon Fish and Shellfish Ecology. Fish and Shellfish Ecology refers to the interactions between fish and shellfish and the environment in which they live.

5.5.2 The study area for Fish and Shellfish Ecology is considered to be dynamic and varies according to the nature of the impact being studied and is therefore defined by the furthest reaching zone of influence, which relates to the impact of underwater noise from piling.

5.5.3 A detailed review was carried out to establish the information available on fish and shellfish populations in the study area. This revealed that a wide range of fish and shellfish species are expected to inhabit the study area, such as haddock, whiting and Nephrops.

Assessment

5.5.4 The assessment for Fish and Shellfish Ecology has considered several possible environmental effects including the impact of underwater noise and vibration and increased suspended sediment concentrations during the construction, operation and maintenance phases. Similar impacts have also been considered during the decommissioning phase.

Mitigation measures

5.5.5 For Fish and Shellfish Ecology, mitigation includes adhering to a piling Marine Mammal Mitigation Protocol (MMMP), which will be implemented during construction. Whilst this is specifically for marine mammals it also acts to reduce the impacts of underwater noise on fish and shellfish. A Project Environmental Management Plan will also be implemented to ensure the to ensure good practice is followed to avoid release of any contaminants and ensure appropriate environmental management measures are applied during construction and operation and a Cable Specification and Installation Plan which will set out appropriate

cable burial depth in accordance with industry good practice, minimising the risk of cable exposure and thus the need for additional cable protection.

5.5.6 Furthermore, additional mitigation includes adhering to a seasonal piling restriction, between 6 November until 1 January, during the peak Downs herring spawning period.

Summary of effects

5.5.7 Overall, it is considered there will be no significant effects upon Fish and Shellfish Ecology receptors.

Further information

5.5.8 Further information can be found within Volume 6, Part 2, Chapter 6: Fish and Shellfish Ecology.

5.6 Marine mammal ecology

Chapter description and study area

5.6.1 This chapter assesses the potential impact of Five Estuaries Offshore Wind Farm project on Marine Mammal Ecology. Marine Mammal Ecology is the study of mammals such as seals, whales and dolphins, and how they interact with the marine and coastal environment in which they live.

5.6.2 The Marine Mammal Ecology study area varies depending on the species, considering individual species ecology and behaviour. Therefore, the Marine Mammal Ecology study area has been defined at two spatial scales: the regional scale and at the project scale i.e., the Five Estuaries Offshore Wind Farm Project study area.

5.6.3 The key marine mammal species in the study area are Harbour Porpoise, Harbour Seal and Grey Seal.

Assessment

5.6.4 The assessment for marine mammal ecology has considered several possible environmental effects including the impacts from underwater noise associated with piling activities or the disposal of unexploded ordnance during the construction phase. Impacts during operation and maintenance and decommissioning could include disturbance and collision risk from vessels.

Mitigation measures

5.6.5 The production and implementation of a Marine Mammal Mitigation Protocol (MMMP) will minimise the impacts of piling and unexploded ordnance clearance (if required). This will sit alongside a Working in Proximity to Wildlife Plan to reduce the risk of disturbance from ships, boats and other vessels and the risk of them colliding with marine mammals.

Summary of effects

5.6.6 Overall, it is considered that there will be no significant effects upon Marine Mammal Ecology receptors.

Further information

5.6.7 Further information can be found within Volume 6, Part 2, Chapter 7: Marine Mammal Ecology.

5.7 Commercial fisheries

Chapter description and study area

5.7.1 This chapter assesses the potential impact of the Five Estuaries Offshore Wind Farm project on Commercial Fisheries. Commercial Fisheries refers to fishing activity that is legally permitted and the catch is sold for taxable profit.

5.7.2 The Five Estuaries study area has been defined by what is known as the International Council for the Exploration of the Sea (ICES) statistical areas, which is then further subdivided into statistical rectangles, for the purpose of recording fisheries landings. Four of these ICES statistical rectangles makeup the study area.

5.7.3 Key species landed in these statistical areas include cockles, sole, bass, lobsters and plaice.

Assessment

5.7.4 The assessment for Commercial Fisheries has considered several impacts, including reduction in access to, or exclusions from established fishing grounds and displacement leading to fishing gear conflict and increased pressure on adjacent fishing grounds, across all project phases (construction, operation and maintenance, and decommissioning).

Mitigation measures

5.7.5 For Commercial Fisheries this includes undertaking fisheries liaison via the implementation of a Fisheries Liaison and Co-existence Plan, appropriate marking and lighting to ensure infrastructure is clearly visible at sea, and where possible, subsea cable burial will be the preferred option to minimise the risk to fishing techniques on the seabed.

Summary of effects

5.7.6 Overall, it is considered that there will be no significant effects upon Commercial Fisheries receptors.

Further information

5.7.7 Further information can be found within Volume 6, Part 2, Chapter 8: Commercial Fisheries.

5.8 Shipping and navigation

Chapter description and study area

5.8.1 This chapter assesses the potential impact of Five Estuaries Offshore Windfarm project on Shipping and Navigation receptors.

5.8.2 Two distinct but overlapping study areas have been applied around the array areas, one of 10 nautical miles, and one of up to 20 nautical miles. This is to ensure that all potential shipping and navigation receptors are adequately covered and assessed.

5.8.3 Main vessel types recorded in the array traffic study area include cargo vessels, tankers and fishing vessels. A number of Roll-one/ Roll-off operators were also recorded.

Assessment

5.8.4 The assessment for shipping and navigation has considered several possible impacts including the impacts of vessel displacement and increased collision risk, and reduced access to local ports and harbours, across all phases of the development (construction, operation and maintenance and decommissioning) and across the array areas and offshore export cable corridor.

Mitigation measures

5.8.5 For Shipping and Navigation this includes general mitigation measures which apply across all parts of the project such as charting of infrastructure and relevant lighting and marking to minimise the risk of collision, but also more specific mitigation including an application for relevant safety zones during construction and traffic monitoring.

5.8.6 In addition to the above, consultation revealed a need to refine the northern array area, which has been reduced and pivoted, creating additional sea room to the north for transiting vessels. Further, the offshore export cable corridor has been refined and reduced at key locations to allow safe operation of existing shipping lanes accessing local ports.

Summary of effects

5.8.7 Overall, it is considered that there will be no significant effects upon Shipping and Navigation receptors.

Further information

5.8.8 Further information can be found within Volume 6, Part 2, Chapter 9: Shipping and Navigation.

5.9 Seascape, landscape and visual impact assessment

Chapter description and study area

5.9.1 This chapter assesses the potential impact upon the seascape, landscape and visual amenity surrounding the offshore elements of the Five Estuaries Offshore Wind Farm project.

5.9.2 The spatial scope of the seascape, landscape and visual assessment is defined as 60 km from the Project array areas. The northern and southern array areas are approximately 37 km and 44 km at the nearest point from the Suffolk coast respectively.

Assessment

5.9.3 A number of impacts have been assessed during all phases of the project (construction, operation and maintenance and decommissioning) including the impact of the array areas upon the seascape character and the characteristics of the designated landscapes, such as the Suffolk Coast and Heaths Area of Outstanding Natural Beauty.

5.9.4 The majority of the wind turbine generators will be viewed behind and in the same section of the view as the existing Greater Gabbard and Galloper offshore wind farms, thereby minimising additional visual impact.

5.9.5 In terms of cumulative effects with future projects, it is considered that the Five Estuaries Offshore Wind Farm array areas would have limited potential to interact with planned third-party projects such as East Anglia ONE North, East Anglia TWO and Sizewell C due to the long distance and lack of visibility from the Essex coastline.

5.9.6 Theoretical, cumulative visibility effects with proposed future East Anglia ONE North and East Anglia TWO projects are possible from parts of the Sussex coastline between Felixstowe and Lowestoft. However, the visual effects are not considered to be significant on balance, due to the low level of change, and the long distance over which the effect would be experienced.

Mitigation measures

5.9.7 For Seascape and Landscape impacts have been mitigated as far as practical by the refinement of the northern array boundary and reduction of the tallest tip height of the turbines from 420m above sea level to 399m above sea level.

Summary of effects

5.9.8 Overall, it is considered that there will be no significant effects upon the seascape, landscape and visual amenity surrounding the Five Estuaries Offshore Wind Farm.

Further information

5.9.9 Further information can be found within Volume 6, Part 2, Chapter 10: Seascape, Landscape and Visual Impact Assessment

5.10 Offshore archaeology and cultural heritage

Chapter description and study area

5.10.1 This chapter assesses the potential impact of the Five Estuaries Offshore Wind Farm project on offshore archaeology and cultural heritage receptors. The marine archaeology study area encompasses the Project's boundaries plus a 1 km buffer up to mean high water springs.

5.10.2 Across the array areas and offshore export cable corridor there are a number of records for wrecks, aircraft and obstructions. Site specific surveys have confirmed the presence of several of these structures.

Assessment

5.10.3 The assessment for marine archaeology has considered the effects of the construction, operation and decommissioning activities particularly through direct impacts to archaeological material which could be present in the area.

Mitigation measures

5.10.4 For Offshore Archaeology and Cultural Heritage mitigation includes the introduction of archaeological exclusion zones to be considered in routing/layout activities in order to avoid/preserve identified marine heritage receptors. Additionally, a Written Scheme of Investigation has been produced to establish the approach to further survey work to be undertaken for the project.

Summary of effects

5.10.5 Overall, it is considered that there will be no significant effects upon Offshore Archaeology and Cultural Heritage receptors.

Further information

5.10.6 Further information can be found within Volume 6, Part 2, Chapter 11: Offshore Archaeology and Cultural Heritage.

5.11 Infrastructure and other marine users

Chapter description and study area

5.11.1 This chapter assesses the potential impact of Five Estuaries Offshore Wind Farm project with respect to Infrastructure and Other Marine Users during the construction, operations and maintenance, and decommissioning phases that are not covered by other topic-specific chapters.

5.11.2 Other marine users considered include:

- Offshore renewables;
- Oil and gas;
- Nuclear energy facilities;
- Carbon, capture and storage;
- Cables and pipelines;
- Aggregate sites;
- Marine disposal sites; and
- Military areas.

Assessment

5.11.3 The assessment upon infrastructure and other marine users has considered impacts such as increased vessel traffic, activity or access displacement and direct disturbance and damage to existing assets and infrastructure in the area.

Mitigation measures

5.11.4 For Infrastructure and Other Marine Users this includes the development of a Cable Specification and Installation Plan to ensure cables are appropriately buried to minimise risks to sea users. Additionally, during construction notice to mariners are updated and reissued at weekly intervals to ensure that mariners are aware of any risks to navigational safety.

Summary of effects

5.11.5 Overall, it is considered that there will be no significant effects upon Infrastructure and Other Marine Users receptors.

Further information

5.11.6 Further information can be found within Volume 6, Part 2, Chapter 12: Infrastructure and Other Marine Users.

5.12 Military and civil aviation

Chapter description and study area

5.12.1 This chapter assesses the potential impact of Five Estuaries Offshore Wind Farm project on Military and Civil Aviation. Specifically, this chapter is concerned with the effects of the wind turbine generators upon civil and military radar systems and the potential of the turbines to act as obstacles to aviation.

5.12.2 The military and civil aviation study area includes the array area and airspace between the array area and the UK mainland from the Norwich Airport primary surveillance radar to the north-west, the London Southend Airport primary surveillance radar to the west and Kent International Airport to the south-west.

Assessment

5.12.3 The assessment for Military and Civil Aviation has considered several possible effects including the wind turbines causing interference on civil and military radar systems, where air traffic controllers and air defence controllers might be unable to provide an effective surveillance service due to interference on radar displays. Furthermore, the wind turbines could act as aviation obstacles due to their size and number.

Mitigation measures

5.12.4 For Military and Civil Aviation, this includes ensuring aviation lighting is fitted to all structures as appropriate in line with statutory guidance and regulator feedback, and that accurate positions of the turbines and other infrastructure are supplied to the relevant search and rescue authorities.

5.12.5 In addition to this, additional mitigation will also be implemented if necessary, in agreement with the Ministry of Defence, to minimise the interference to military radar.

Summary of effects

5.12.6 Overall, taking account of additional mitigation measures, it is considered that there will be no significant effects upon Military and Civil Aviation receptors.

Further information

5.12.7 1.1.6 Further information can be found within Volume 6, Part 2, Chapter 12: Military and Civil Aviation.

5.13 Landscape and visual impact assessment

Chapter description and study area

5.13.1 This chapter assesses the potential impact of Five Estuaries Offshore Wind Farm project upon the landscape and visual amenity surrounding the onshore elements of the Project.

5.13.2 The study area for landscape impacts associated with the onshore export cable corridor extends to a 500 m buffer either side of the onshore export cable corridor. With regards to the onshore substation, the study area is a 5 km buffer around the proposed substation, however this is considered to be precautionary as significant effects are unlikely to arise beyond 2 to 3 km.

Assessment

5.13.3 The landscape and visual impact assessment has considered several impacts across all phases of the project (construction, operation and maintenance and decommissioning) including impacts upon agricultural land and the landscape character and visual amenity associated with the landfall area, onshore export cable corridor and the onshore substation.

Mitigation measures

5.13.4 For the cable route, localised removal of taller hedgerows, hedgerow trees and trees would cause impacts. However, the majority of these will be avoided through careful routing of the onshore export cable corridor and placement of the onshore substation. The use of trenchless crossing techniques such as horizontal directional drilling is also committed to in a number of locations which further reduces impacts.

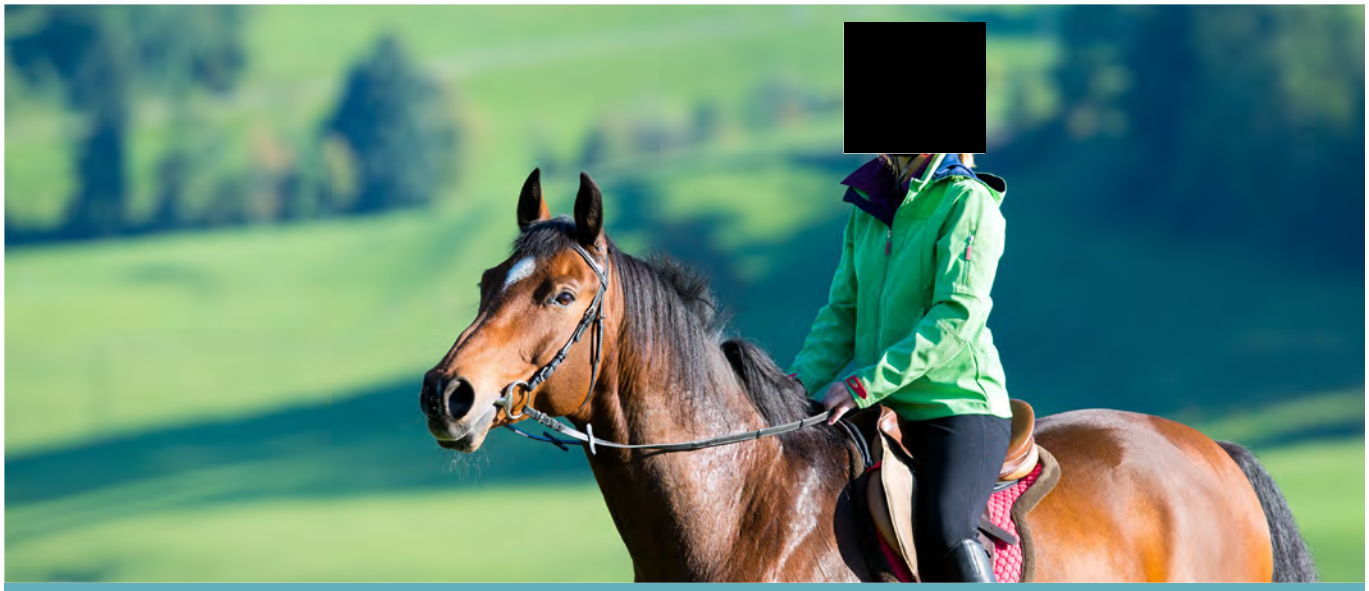
5.13.5 The onshore substation for the Five Estuaries Offshore Wind Farm project would likely give rise to some significant effects on landscape character in the immediate local area. The Project will mitigate these effects using mitigation planting and screening.

5.13.6 An Outline Landscape and Ecology Management Plan included in Volume 9 of the application sets out our approach to landscape planted mitigation and screening.

Summary of effects

5.13.7 Overall, it is predicted that there will be some significant effects upon landscape receptors, but these will be localised and will be gradually reduced as mitigation measures such as planting become established and grow to screen the new substation visually.

5.13.8 Further information can be found within Volume 6, Part 3, Chapter 2: Landscape and Visual Impact Assessment.



5.14 Socio-economics, tourism and recreation

Chapter description and study area

5.14.1 This chapter examines the direct or indirect interaction between the proposed Five Estuaries Offshore Wind Farm Project and the local community and wider society.

5.14.2 The study area for this assessment is split into two spatial levels: the wider study area and a local area of impact. The wider study area is intended to include the area where significant effects on employment and the local economy could occur, whereas the local area of impact focusses on receptors that could experience effects at a local level, specifically community, tourism and recreational assets.

Assessment

5.14.3 The assessment considers impacts during construction and operation upon levels of employment, the displacement of visitors in the wider study area and impacts on recreational activities both onshore and offshore. It is assumed that similar impacts, to a lesser extent, could be experienced during the decommissioning phase.

Mitigation measures

5.14.4 Mitigation measures include good project design, such as careful routing onshore to avoid major tourism and recreation assets, and compliance with good practice measures, which are included in the Code of Construction Practice.

5.14.5 An Outline Public Access Management Plan has been produced to seek out measures to minimise the effects to public rights of ways and popular walking routes.

5.14.6 An Outline Employment, Skills and Education Strategy has been produced to seek to identify and secure a greater contingent of local workforce, increasing skills locally and lowering the number of workers from outside of the area.

Summary of effects

5.14.7 Overall, it is considered that there will be no significant negative effects upon Socio-Economic, Tourism and Recreation receptors. Indeed, several positive impacts are anticipated including local jobs creation and investment in the local area.

Further information

5.14.8 Further information can be found within Volume 6, Part 3, Chapter 3: Socio-Economic, Tourism and Recreation.

5.15 Onshore biodiversity and nature conservation

Chapter description and study area

5.15.1 This chapter assesses the potential impact of Five Estuaries Offshore Wind Farm project on Onshore Biodiversity and Nature Conservation receptors. Onshore biodiversity refers to the wildlife that is likely to be found within the proposed development areas, specifically wildlife that are legally protected or are found, and are features, of designated sites.

5.15.2 The onshore biodiversity study area encompasses habitats and protected or notable species It covers water courses in close proximity and the intertidal environment (in relation to birds). There are a number of designated sites relatively close to the study area, including Special Protection Areas, Ramsar sites, Sites of Special Scientific Interest, Local Nature Reserves and Local Wildlife Sites.

5.15.3 Desk top studies and site surveys were undertaken to collect the relevant data for the study area. This was done in coordination with North Falls Offshore Wind Farm Project and relevant data was shared between the projects.

Assessment

5.15.4 The assessment of Onshore Biodiversity and Nature Conservation has considered a number of impacts including those from temporary habitat loss and disturbance, the potential spread of invasive species and any impacts from accidental pollution incidents. The assessment has used the outputs of species-specific ecology surveys. These include surveys of plants, invertebrates, great crested newts, reptiles, bats, badgers, water voles, dormouse and over wintering and breeding birds.

Mitigation measures

5.15.5 Mitigation measures include good project design, compliance with elements of good practice and use of standard protocols. This included careful routing onshore to avoid key areas of sensitivity. Licences will be required where temporary works effect habitat used by protected species.

5.15.6 The Code of Construction Practice includes a number of measures to minimise the impact to ecology during construction.

5.15.7 An Outline Landscape and Ecological Management Plan details proposed mitigation, compensation and biodiversity enhancement measures

Summary of effects

5.15.8 It is considered that there will be no significant effects upon Onshore Biodiversity and Nature Conservation, other than to skylark and corn bunting. After careful consideration of mitigation/ compensation for skylark and corn bunting within the Order Limits, residual significant effects remain at the local (skylark) and county (corn bunting) level.

Further information

5.15.9 Further information can be found within Volume 6, Part 3, Chapter 4: Onshore Biodiversity and Nature Conservation.

5.16 Ground conditions and land use

Chapter description and study area

5.16.1 This chapter assesses the potential impact of the Five Estuaries Offshore Wind project on Ground Conditions and Land Use. Ground conditions and land use refers to the type of land which is found within the study area i.e. its geological conditions and what the land is currently used for, such as agricultural land. It also includes information on groundwater levels and if the land is contaminated or not.

5.16.2 The study area for the Ground Conditions and Land Use assessment includes all onshore elements of Five Estuaries Offshore Wind Farm Project.

Assessment

5.16.3 The assessment for Ground Conditions and Land Use has considered several possible impacts upon soil during the construction, and the loss of agricultural land during operation. Decommissioning impacts are similar to construction impacts and include potential risks to soil quality.

Mitigation measures

5.16.4 For Ground Conditions and Land Use, the Code of Construction Practice includes measures to prevent pollution incidents and to manage soil effectively during stripping, handling and reinstating. It sets out what the Project should do in the event of encountering unexpected contaminated material during construction.

Summary of effects

5.16.5 Overall, it is considered that there will be no significant effects upon Ground Conditions and Land Use receptors.

Further information

5.16.6 Further information can be found within Volume 6, Part 3, Chapter 5: Ground Conditions and Land Use.

5.17 Hydrology, hydrogeology and flood risk

Chapter description and study area

5.17.1 This chapter assesses the potential impact of Five Estuaries Offshore Wind Farm project on Hydrology, Hydrogeology and Flood Risk receptors.

5.17.2 The study area for Hydrology and Flood Risk covers a 2 km buffer around the proposed onshore order limits, which includes the landfall, substation search areas and the onshore export cable corridor.

Assessment

5.17.3 The assessment of Hydrology, Hydrogeology and Flood Risk considers potential impacts to the water quality of water courses and groundwater, and if the Project could affect the risk of flooding in the local area across construction, operation and maintenance, and decommissioning.

5.17.4 There are a small number of environmentally designated sites within the study area. There are no Ramsar sites, SACs, or SPAs located in the site boundary, however a number of sites with potential hydraulic connection to the site have been identified within the 2 km study area.

Mitigation measures

5.17.5 Measures include good project design, compliance with elements of good practice and use of standard protocols. This has included careful routing onshore to minimise the number of main river crossings and to use trenchless techniques to cross them, such as horizontal directional drilling where feasible.

5.17.6 The overarching Code of Construction Practice includes measures to prevent pollution and to consider flood response.

Summary of effects

5.17.7 Overall, it is considered that there will be no significant effects upon Hydrology and Flood Risk receptors.

Further information

5.17.8 Further information can be found within Volume 6, Part 3, Chapter 6: Hydrology, Hydrogeology and Flood Risk.

5.18 Archaeology and cultural heritage

Chapter description and study area

5.18.1 This chapter assesses the potential impact of Five Estuaries Offshore Wind Farm project on Archaeology and Cultural Heritage receptors within the onshore environment.

5.18.2 Data has been collected through desk studies, site walkover and targeted geophysical surveys of the proposed onshore export cable corridor and substation area. This was done in coordination with North Falls Offshore Wind Farm project and relevant data was shared between the projects.

Assessment

5.18.3 The assessment for Archaeology and Cultural Heritage assesses the potential impact to buried archaeological remains during the construction phase and the potential permanent effects arising from the change to the historic landscape as a result of the onshore substation. It also considers the effect of the offshore wind farm on onshore heritage assets.

Mitigation measures

5.18.4 Mitigation measures included in the project design to prevent or reduce potential impacts on Archaeology and Cultural Heritage receptors include implementation of an agreed programme of archaeological investigation work during construction to ensure that any heritage assets or deposits of geoarchaeological/ paleoenvironmental interest are identified and recorded. This will be detailed in a Written Scheme of Investigation, prior to construction. An outline version of the archaeological Written Scheme of Investigation has been provided with the application.

Summary of effects

5.18.5 Overall, it is considered that there will be no significant effects upon Archaeology and Cultural Heritage Receptors.

Further information

5.18.6 Further information can be found within Volume 6, Part 3, Chapter 7: Onshore Archaeology and Cultural Heritage.

5.19 Traffic and transport

Chapter description and study area

5.19.1 This chapter assesses the potential impact of Five Estuaries Offshore Wind Farm project upon Traffic and Transport receptors.

5.19.2 The study area for Traffic and Transport considers probable routes for the construction, operational and decommissioning phases of the Project and includes the non-motorised user (walkers, cyclists and horse-riders) infrastructure and roads that would be impacted by the construction works (directly or indirectly). The construction phase will generate higher levels of traffic than decommissioning, and traffic will be significantly reduced during operation. Therefore, the study area is primarily based on anticipated construction traffic volumes and routing.

5.19.3 The study was informed by an initial desk-based study as well as automatic traffic counts across the study area.

5.19.4 Co-ordination with North Falls and National Grid Norwich to Tilbury Reinforcement project has helped determine cumulative traffic numbers through construction and operation, and to develop proposals to minimise community and environmental impacts.

Assessment

5.19.5 The assessment for Traffic and Transport assesses the potential impacts from the increase in vehicle movements, particularly during the construction period leading to driver delay and severance. Other impacts which have been assessed include the delivery of abnormal loads to site, impacts upon users of public rights of way, vulnerable road users and road safety.

Mitigation measures

5.19.6 Mitigation measures include good project design, compliance with elements of good practice and use of standard protocols. This included selecting construction HGV access routes where possible seek to reduce the impact of traffic upon local communities by avoiding minor roads.

5.19.7 A haul road will be used within the working corridor to remove as much HGV traffic from the local highway network as possible and minimise the number of HGV construction access points.

5.19.8 The project has committed to using trenchless techniques, such as horizontal directional drilling, to cross under the majority of roads and avoid road closures as much as possible.

5.19.9 An Outline Construction Traffic Management Plan has been prepared, setting out key measures and principles to manage construction effectively. An Outline Public Access Management Plan has been prepared to describe how we will maintain access for communities to public rights of way, this may include diverting public rights of way at relevant places and times. Finally, an Outline Workforce Travel Plan has been produced to ensure movements associated with construction personnel are done in the most sustainable manner possible, which minimise traffic numbers on the highway. Final versions in accordance with the outlines, will be produced when the Contractors are appointed and provided to the local planning authority for approval

Summary of effects

5.19.10 Overall, it is considered that there will be no significant effect upon Transport and Traffic receptors.

5.20 Airborne noise and vibration

Chapter description and study area

5.20.1 This chapter assesses the potential impact of the Five Estuaries Offshore Wind Farm Project on Airborne Noise and Vibration receptors. It will determine the effects of potentially loud noises and strong vibrations on nearby receptors.

5.20.2 The study area for Airborne Noise and Vibration was divided into three areas: the landfall area where the export cable comes onshore, the onshore export cable corridor and the onshore substation area.

5.20.3 A baseline sound survey has been undertaken to determine the existing sound environment. This was done in coordination with North Falls Offshore Wind Farm Project and relevant data was shared between the projects. A number of locations were selected across the landfall and onshore substation study area.

Assessment

5.20.4 Noise and Vibration impacts are assessed during construction across the landfall area, within the onshore export cable corridor and at the onshore substation area, this includes noise and vibration impacts from construction vehicles utilising the road network. The assessment also considers noise impacts from the operation of the substation.

Mitigation measures

5.20.5 Measures include undertaking works in accordance with the Code of Construction Practice, which outlines a number of good practice control measures to reduce construction noise.

5.20.6 In certain locations additional mitigation measure may be required to reduce potential impacts further, depending on the final location of construction works following detailed design. This may include for example, hoarding around the perimeter of construction areas to absorb and contain noise in sensitive locations.

Summary of effects

5.20.7 Overall, and taking into account additional mitigation measures, it is considered that there will be no significant upon Airborne Noise and Vibration receptors.

Further information

5.20.8 Further information can be found within Volume 6, Part 3, Chapter 9: Airborne Noise and Vibration.

5.21 Air quality

Chapter description and study area

5.21.1 This chapter assesses the potential impact of Five Estuaries Offshore Wind Farm Project on Air Quality receptors.

5.21.2 The study area is defined based on the assessments which have been undertaken to date. This includes a study area for the construction dust assessment, the road traffic assessment, non-road mobile machinery assessment and offshore activities assessment.

5.21.3 The characterisation of the existing environment has been undertaken using the latest publicly available data sources.

Assessment

5.21.4 A number of assessments have been undertaken, as mentioned above. These consider the potential effects of air quality as a result of construction dust and construction vehicle and plant emissions on human and ecological receptors.

Mitigation measures

5.21.5 Measures or commitments that have been adopted include project design measures, compliance with elements of good practice and use of standard protocols. These measures are contained in the Code of Construction Practice. Example measures include covering or seeding stockpiles and planning site layout to avoid dusty activities close to sensitive receptors.

Summary of effects

5.21.6 Overall, it is considered that there will be no significant effects upon Air Quality receptors.

Further information

5.21.7 Further information can be found within Volume 6, Part 3, Chapter 10: Air Quality.

5.22 Climate change

Chapter description and study area

5.22.1 This chapter assesses the potential impact of Five Estuaries Offshore Wind Farm Project on Climate Change receptors.

5.22.2 This chapter draws on other assessments such as air quality, traffic and transport, hydrology and marine geology and physical processes. It also sets out information on the potential vulnerability of the development to climate change and the Project's potential impact on global climate.

Assessment

5.22.3 The impact of the Project on climate change is assessed in each ES chapter.

5.22.4 The impact of the project on climate change is also assessed, acknowledging that despite the significant positive impact of avoiding carbon emissions through generation of electricity by offshore wind there are activities through the phases of the project which give rise to carbon emissions.

Mitigation measures

5.22.5 Measures or commitments have been identified and adopted as part of the evolution of the project design, relating to specific topics. These include project design measures, compliance with elements of good practice and use of standard protocols which also address risks posed by future climate change. Example measures include avoidance, so far as possible, of flood risk zones, and commitment to use trenchless techniques to cross sea defence structures, main rivers, non-main and ordinary watercourses to reduce the impact, and development of a Cable Specification and Installation Plan post consent to set out appropriate cable burial depth in accordance with industry good practice,

minimising the risk of cable exposure and ensure that cable crossings are appropriately designed to mitigate environmental effects.

Summary of effects

5.22.6 Overall, it is considered that there will be no significant negative effects upon Climate Change receptors. However, there will be a significant positive impact from the reduction in carbon emissions via clean energy production, which will also help to meet UK ambitions for Net Zero and low cost, secure sources of energy.

Further information

5.22.7 Further information, including a greenhouse gas assessment for the project can be found within Volume 6, Part 4, Chapter 1: Climate Change.

5.23 Human health and major disasters

Chapter description and study area

5.23.1 This chapter assesses the potential impact of Five Estuaries Offshore Wind Farm Project on Human Health and Major Disaster receptors. Specifically, this Chapter considers the potential impact to human health from the onshore infrastructure during the construction, operation and maintenance, and decommissioning phases.

5.23.2 This chapter draws primarily on other assessments such as air quality, traffic and transport, hydrology and socioeconomics, tourism and recreation. It also sets out information on major disasters.

Assessment

5.23.3 This chapter draws on the assessments from other chapters. Impacts on human health from air emissions such as dust and surface and ground water quality and flood risk are considered. Vulnerability to major disasters is considered. These include consideration of risks to aviation, shipping and navigation, flood risk, coastal erosion at the landfall, and future climate change scenarios/projections that could increase vulnerability.

Mitigation measures

5.23.4 A number of mitigation measures have been proposed across the different topic chapters which apply to human health and major disasters, including the use of a Construction Traffic Management Plan and Code of Construction Practice to reduce the impacts of the works on human health.

Summary of effects

5.23.5 Overall, it is considered that there will be no significant negative effects upon Human Health and Major Disasters.

Further information

5.23.6 Further information can be found within Volume 6, Part 4, Chapter 2: Human Health and Major Disasters.

5.24 Lesser Black Backed Gull Compensation Area EIA

Chapter description and study area

5.24.1 This chapter assesses the potential impact of the Lesser Black Backed Gull compensation area associated with the Five Estuaries Offshore Wind Farm Project.

5.24.2 The study area is limited to compensation area at Orford Ness and the access track from the boat landing on the Ore River.

Assessment

5.24.3 The assessment considers all onshore EIA topics including the potential impact of the installation of fencing and ongoing habitat management on biodiversity, hydrology, landscape and archaeology. It also assesses the potential for inter-related impacts between these works and the wider onshore infrastructure.

Mitigation measures

5.24.4 Due to the limited scale of the works in the compensation area, mitigation relates to the implementation of standard construction management measures to minimise impacts.

5.24.5 Should the fencing cross drainage ditches, there would be a need to monitor and clear any debris that may accumulate to mitigate potential impacts on hydrology.

Summary of effects

5.24.6 Overall, it is considered that there will be no significant effects upon receptors as a result of the implementation of the Lesser Black Backed Gull compensation area.

Further information

5.24.7 Further information can be found within Volume 6, Part 8, Chapter 1: Lesser Black Backed Gull Compensation Area EIA.

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