

Sheringham Shoal and Dudgeon Offshore Wind Farm Extension Projects

Scoping Report and Scoping Opinion

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Dudgeon and Sheringham Shoal Offshore Wind Farm Extensions

Scoping Report

October 2019



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Executive Summary

This Scoping Report supports a request for a formal Environmental Impact Assessment (EIA) Scoping Opinion from the Planning Inspectorate for the proposed Dudgeon Extension Project (DEP) and Sheringham Extension Project (SEP). The existing Sheringham Shoal and Dudgeon Offshore Wind Farms are owned by different partners, with Equinor New Energy Limited being the only partner with ownership in both. Equinor will lead on the development work for both extension projects, and will be the named Applicant.

DEP and SEP each have an expected capacity greater than 100MW and will therefore both be defined as Nationally Significant Infrastructure Projects and as such EIA is required as part of a Development Consent Order (DCO) application under the Planning Act 2008.

DEP is to the north and southeast of the existing Dudgeon Offshore Wind Farm and SEP is to the north and east of the existing Sheringham Shoal Offshore Wind Farm, with both sharing borders with the operational assets. Both projects would reduce greenhouse gas emissions, provide energy security, and maximise economic opportunities from investment for the UK.

Offshore export cables will connect offshore substation(s), situated within the wind farm area(s), to shore on the North Norfolk Coast. There are currently two landfall areas being considered, the Weybourne area and the Bacton area.

The projects will also require onshore infrastructure in order to connect the offshore wind farms to the National Grid, which will comprise underground cables from landfall to an onshore substation. The Applicant has accepted an offer from National Grid for connection at Norwich Main that could accommodate both Projects.

The exact locations of the offshore and onshore infrastructure are not yet finalised. Site selection activities are ongoing and responses to the Scoping Request and an ongoing program of consultation will help to inform the refinement of the projects as the EIA is progressed.

Equinor will seek to develop DEP and SEP as an integrated project with an integrated grid option providing transmission infrastructure which serves both projects. Such an approach will particularly benefit the planning and construction of the electrical infrastructure system, is likely to reduce the overall environmental impact and helps to respond to any concerns regarding the lack of a holistic approach to offshore wind development in general. However, given the different ownership of the projects, a separated grid option (transmission infrastructure which allows each project to transmit electricity entirely separately) will allow the projects to be constructed in a phased approach, if necessary. Therefore the application will seek consent for alternative grid solutions in the same overall corridors to allow for both the integrated and separated grid options. The EIA will consider the appropriate realistic worst-case scenario and present the results accordingly.

The EIA (and accompanying Habitats Regulations Assessment) will be completed by competent experts using best practice and following appropriate guidance. This Scoping Report is the first stage of the assessment process, outlining all of the receptors that will be considered and the planned approaches to characterising the existing environment and assessing potential impacts associated with the projects. Equinor is committed to engaging with the community and stakeholders and will undertake consultation throughout the EIA and application process, as outlined in this document.

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Glossary of Acronyms

AA	Appropriate Assessment
AAWT	Annual Average Weekday Traffic
ADR	Air Defence Radar
ADS	Archaeology Data Service
AfL	Agreement for Lease
AIS	Automatic Identification System
ALC	Agricultural Land Classification
AoI	Area of Interest
AONB	Area of Outstanding Natural Beauty
AQMA	Air Quality Management Area
ATC	Air Traffic Control
B&B	Bed and Breakfast
BAT	Best Available Technology
BDC	Broadland District Council
BEIS	Department for Business Energy and Industrial Strategy
BGS	British Geological Survey
BMV	Best and Most Versatile Land
BoCC	Birds of Conservation Concern
BPM	Best Practicable Means
BS	British Standard
BSI	British Standards Institution
CAA	Civil Aviation Authority
CAP	Civil Aviation Publication
Cefas	Centre for Environment, Fisheries and Aquaculture Science
CIA	Cumulative Impact Assessment
CIEEM	Chartered Institute of Ecology and Environmental Management
CIfA	Chartered Institute for Archaeologists
CION	Connection and Infrastructure Operations Note
COP	Conference of the Parties
CRM	Collision Risk Modelling
CWS	County Wildlife Site
DCO	Development Consent Order
DECC	Department for Energy and Climate Change
DEFRA	Department for the Environment and Rural Affairs
DEP	Dudgeon Extension Project
DMRB	Design Manual for Roads and Bridges
DOW	Dudgeon Offshore Wind Farm
EC	European Commission
EcIA	Ecological Impact Assessment
EEZ	Exclusive Economic Zone
EIA	Environmental Impact Assessment
EIFCA	Eastern Inshore Fisheries and Conservation Authority
EMF	Electromagnetic Field
EPA	Environmental Protection Act
EPP	Evidence Plan Process

EPS	European Protected Species
EPUK	Environmental Protection United Kingdom
EQS	Environmental Quality Standards
ERCoP	Emergency Co-Operation Plan
ES	Environmental Statement
ETG	Expert Topic Group
EU	European Union
EUNIS	European Nature Information System
FIR	Flight Information Regions
FLO	Fisheries Liaison Officer
FLOWW	Fishing Liaison with Offshore Wind and Wet Renewables Group
FRA	Flood Risk Assessment
GBS	Gravity Based Structure
GEART	Guidelines for the Environmental Assessment of Road Traffic
GIS	Geographical Information System
GPS	Global Positioning System
HAT	Height Above Tip
HDD	Horizontal Directional Drilling
HES	Historic Environment Services
HGV	Heavy Goods Vehicle
HMR	Helicopter Main Route
HRA	Habitats Regulations Assessment
HSC	Historic Seascape Characterisation / Character
HSE	Health and Safety Executive
HVAC	High-Voltage Alternating Current
HVDC	High-Voltage Direct Current
IAMMWG	Inter-Agency Marine Mammal Working Group
IAQM	Institute of Air Quality Management
IBTS	International Bottom Trawl Survey
ICES	International Council for Exploration of the Sea
IDB	Internal Drainage Board
IMARES	Institute of Marine Research
IPC	Infrastructure Planning Commission
IROPI	Imperative Reasons of Overriding Public Interest
ISO	International Standards Organisation
IUCN	International Union for the Conservation of Nature
IVLO	Institute for Agriculture, Fisheries and Food
JCP	Joint Cetacean Protocol
JNCC	Joint Nature Conservation Committee
km	Kilometre
LIDAR	Light Imaging, Detection And Ranging
LLCA	Local Landscape Character Area
LLFA	Lead Local Flood Authority
LLSOA	Lower Layer Super Output Area
LPA	Local Planning Authority
LVIA	Landscape and Visual Assessment
LWS	Local Wildlife Site

MarESA	Marine Evidence Based Sensitivity Assessment
MarLIN	Marine Life Information Network
MARPOL	International Convention for the Prevention of Pollution from Ships
MCA	Maritime and Coastguard Authority
MCAA	Marine and Coastal Access Act
MCZ	Marine Conservation Zone
MHWS	Mean High-Water Springs
MMMP	Marine Mammal Mitigation Protocol
MMO	Marine Management Organisation
MoD	Ministry of Defence
MP/TP	Monopile/Transition Piece Concept
MPA	Marine Protected Area
MPS	Marine Policy Statement
MSFD	Marine Strategy Framework Directive
MU	Management Unit
MW	Megawatts
NATS	National Air Traffic Services
NBIS	Norfolk Biodiversity Information Service
NERL	National Air Traffic Services En Route Ltd
NHER	Norfolk Historic Environment Record
NHES	Norfolk Historic Environment Service
NHLE	National Heritage List for England
NMFS	National Marine Fisheries Services
NNDC	North Norfolk District Council
NNDR	Norwich Northern Distributor Road
NNR	National Nature Reserve
NO_2	Nitrogen dioxide
NOAA	National Oceanic and Atmospheric Administration
NorCC	Norwich City Council
NP	National Park
NPPF	National Planning Policy Framework
NPS	National Policy Statement
NRHE	National Record of the Historic Environment
NSIP	Nationally Significant Infrastructure Project
NSR	Noise Sensitive Receptor
NUC	Not Under Command
O&G	Oil & Gas
OESEA	Offshore Energy Strategic Environmental Assessment
OFGEM	Office of Gas and Electricity Markets
OFTO	Offshore Transmission Operator
ONS	Office for National Statistics
OS	Ordnance Survey
OSPAR	Oslo/Paris Convention
OWF	Offshore Wind Farm
PEIR	Preliminary Environmental Information Report
PHE	Public Health England
PM_{10}	Particulate matter with an aerodynamic diameter of 10µm or less

$PM_{2.5}$	Particulate matter with an aerodynamic diameter of 2.5µm or less
PPG	Planning Practice Guidance
PPV	Peak Particle Velocity
PRA	Preliminary Risk Assessment
PRoW	Public Rights of Way
pSAC	proposed Special Area of Conservation
pSPA	Potential Special Protection Area
PSR	Primary Surveillance Radar
PTS	Permanent Threshold Shift
RAF	Royal Air Force
RAMSAR	Ramsar Convention on Wetlands
RBMP	River Basin Management Plan
ROV	Remote Operated Vehicle
SAC	Special Area of Conservation
SAR	Search and Rescue
SCANS	Small Cetaceans in the European Atlantic and North Sea
SCOS	Special Committee on Seals
SEA	Strategic Environmental Assessment
SEP	Sheringham Extension Project
SIP	Site Integrity Plan
SLM	Sound Level Meter
SLVIA	Seascape, Landscape and Visual Impact Assessment
SMRU	Sea Mammal Research Unit
SNC	South Norfolk Council
SNCB	Statutory Nature Conservation Body
SNS	Southern North Sea
SoS	Secretary of State
SPA	Special Protection Area
SPZ	Source Protection Zone
SSSI	Site of Special Scientific Interest
TEU	Treaty of the European Union
TTS	Temporary Threshold Shift
TWT	The Wildlife Trusts
UK	United Kingdom
UN	United Nations
UNECE	United Economic Commission for Europe
UXO	Unexploded Ordnance
VDV	Vibration Dose Value
VMS	Vessel Monitoring System
WDC	Whale and Dolphin Conservation
WFD	Water Framework Directive
WHO	World Health Organisation
WTG	Wind Turbine Generator
WWII	World War Two
WWT	Wildfowl and Wetlands Trust
ZTV	Zone of Theoretical Visibility

Glossary of Terms

Array cables	Cables which link the wind turbine generators to the offshore substation platforms.
Dudgeon Offshore Wind Farm Extension site	The Dudgeon Offshore Wind Farm Extension offshore wind farm boundary.
The Dudgeon Offshore Wind Farm Extension Project (DEP)	The Dudgeon Offshore Wind Farm Extension site as well as all onshore and offshore infrastructure.
European site	Sites designated for nature conservation under the Habitats Directive and Birds Directive. This includes candidate Special Areas of Conservation, Sites of Community Importance, Special Areas of Conservation and Special Protection Areas, and is defined in regulation 8 of the Conservation of Habitats and Species Regulations 2017.
Evidence Plan Process (EPP)	A voluntary consultation process with specialist stakeholders to agree the approach, and information to support, the EIA and HRA for certain topics.
Horizontal directional drilling (HDD) zones	The areas within the onshore cable route which would house HDD entry or exit points.
Interlink cables	Buried offshore cables which link offshore substation platforms.
Integrated Grid Option	Transmission infrastructure which serves both extension projects
Jointing bays	Underground structures constructed at regular intervals along the onshore cable route to join sections of cable and facilitate installation of the cables into the buried ducts.
Landfall	The point at the coastline at which the offshore export cables are brought onshore, connecting to the onshore cables at the transition joint bay above mean high water
Landfall search areas	The areas being considered within which the landfall would be located. A single landfall location will be identified prior to submission of the Preliminary Environmental Information Report (PEIR).
Offshore export cables	The cables which would bring electricity from the offshore substation platform(s) to the landfall.
Offshore scoping area	An area that encompasses all planned offshore infrastructure, including landfall options at both Weybourne and Bacton, and allows sufficient room for receptor identification and environmental surveys. This will be refined following further site selection and consultation.
Offshore substation platform	A fixed structure located within the wind farm area, containing electrical equipment to aggregate the power from the wind turbine generators and convert it into a more suitable form for export to shore.

Onshore cable route search area	The areas being considered within which the onshore cable route would be located. A single landfall location and onshore cable route will be identified prior to PEIR.
Onshore scoping area	An area that encompasses all planned onshore infrastructure and allows sufficient room for receptor identification and environmental surveys. This will be refined following further site selection and consultation.
Separated Grid Option	Transmission infrastructure which allows each project to transmit electricity entirely separately
Substation search area	An area within which the onshore substation is likely to be located. Further iterations of this area will be developed in 2020 following review of feedback from public drop-in exhibitions and other input from other stakeholders. An onshore project substation location will be defined prior to PEIR.
Study area	Area where potential impacts from the project could occur, as defined for each individual EIA topic.
Sheringham Shoal Offshore Wind Farm Extension site	Sheringham Shoal Offshore Wind Farm Extension offshore wind farm boundary.
The Sheringham Offshore Wind Farm Extension Project (SEP)	The Sheringham Offshore Wind Farm Extension site as well as all onshore and offshore infrastructure.
The Applicant	Equinor ASA

1 PART 1: INTRODUCTION

1.1 Project Overview

1. This document supports a request for a formal Environmental Impact Assessment (EIA) Scoping Opinion from the Planning Inspectorate for the proposed Dudgeon Extension Project and Sheringham Extension Project. The existing Dudgeon and Sheringham Shoal Offshore Wind Farms are owned by different partners, with Equinor New Energy Limited (hereafter called Equinor) being the only partner with ownership in both projects.
2. It has been agreed by the partners that Equinor will lead on the development work for both projects, and will be the named Applicant. This Scoping Report has been prepared on behalf of Equinor[1] and in accordance with Regulation 10 of the Infrastructure Planning (Environmental Impact Assessment) Regulations 2017.
3. The Scoping Report considers two projects:
   - Dudgeon Extension Project (hereafter DEP); and
   - Sheringham Extension Project (hereafter SEP).
4. DEP is located to the north and southeast of the existing Dudgeon Offshore Wind Farm and SEP is located to the north and east of the existing Sheringham Shoal Offshore Wind Farm (**Appendix 2**, **Figure 1.1.1**). Both DEP and SEP share borders with the operational assets.
5. DEP and SEP each have an expected capacity greater than 100MW and will therefore be defined as Nationally Significant Infrastructure Projects (NSIPs) under Section 15(3) of the Planning Act 2008.
6. Offshore export cables will connect the offshore substation(s), situated within the wind farm area/s, to shore on the North Norfolk Coast (**Appendix 2**, **Figure 1.1.1**). There are currently two landfall areas being considered, the Weybourne area and the Bacton area.
7. Onshore export cables will connect the projects to a new purpose-built substation in the vicinity of the existing Norwich Main substation south of Norwich. DEP and SEP will be connected to the National Grid at Norwich Main substation. **Figure 1.1.1** in **Appendix 2** shows search areas for the proposed onshore infrastructure.

1.1.1 Project Background

8. In 2018 The Crown Estate invited developers to bid for extensions to operating offshore wind farms. Equinor applied, on behalf of the partners in the operational wind farm projects, for an Agreement for Lease (AfL) for the extension of the Dudgeon and Sheringham Shoal Offshore Wind Farms. An acceptance letter from The Crown Estate was received in September 2019 and AfLs are expected to be signed in October 2019.
9. DEP and SEP have been offered a grid connection from National Grid accommodating both projects at Norwich Main substation.

[1] It should be noted that the Development Consent Order will have two named undertakers, one for each Nationally Significant Infrastructure Project – [Sheringham SPV company] and [Dudgeon SPV company]. It is these two companies which are the parties to the two Agreements for Lease with The Crown Estate.

1.1.2 Consenting strategy

10. A number of potential consenting strategies have been considered for DEP and SEP, and the Applicant has determined that the most appropriate approach is a single application for development consent addressing both wind farm extensions and their associated transmission infrastructure.
11. Separate Deemed Marine Licences will be requested as schedules to the Development Consent Order (DCO) to cover the arrays and associated transmission infrastructure.
12. Adopting a strategy to develop DEP and SEP through a single planning process and DCO application is believed to have benefits as it allows for consistency throughout, including the approach to assessments, consultation and examination, and will provide increased transparency for a potential compulsory acquisition process.
13. Whilst the Projects will be the subject of a single DCO application (with a combined EIA process and associated submissions), each project will be assessed individually so that mitigation is project specific (where appropriate). As such, the assessments will cover the possibility that one or the other (but not both) of the projects are developed, as well as both projects being developed, either concurrently or sequentially.
14. Equinor will seek to develop DEP and SEP as an integrated project with an integrated grid option. Such an approach will particularly benefit the planning and construction of the electrical infrastructure system. An integrated approach to electrical infrastructure would include:
    - a single offshore substation;
    - parallel export cable routes offshore and through landfall;
    - onshore cables in the same trench;
    - a single onshore substation; and
    - a single connection from the onshore substation to the Norwich Main substation.
15. An integrated grid option is likely to reduce the overall environmental impact as the total footprint is likely to be smaller than that for a separate grid option (details below). Integrating the electrical infrastructure of DEP and SEP also helps to respond to any concerns regarding the lack of a holistic approach to offshore wind development in general.
16. However, given the different ownership of the two projects, it is feasible that DEP and SEP may be constructed in a phased approach. This would require a separate grid option (i.e. standalone connections) which may include:
    - two offshore substations, one in each extension area;
    - an interlink cable between the two offshore substations;
    - parallel export cable routes offshore and through landfall;
    - onshore cables in parallel trenches;
    - an onshore substation; and
    - two connections from the onshore substation to the Norwich Main substation.
17. The EIA will consider the appropriate realistic worst-case scenario and present the results accordingly.

18. The application will seek consent for alternative grid solutions in the same overall corridors to allow for both the integrated and separate grid options. The latter approach has already been done with multiple NSIPs in a single DCO.
19. Equinor recognises the potential complexities associated with the consenting approach proposed and will work with key stakeholders through the pre-application process to understand how these can be best resolved.

1.1.3 The Scoping Report

1.1.3.1 Scoping Report Structure

20. The Scoping Report is set out as follows:
    - **Part 1 – Introduction (this section)**
        - Project Overview – this section introduces the Scoping Report and the proposed Projects;
        - Need for the Proposed Projects – a discussion of the key drivers for offshore wind and the proposed development;
        - Policy and Legislative Context – a high-level overview of where DEP and SEP sit within the policy and legislative context and how this proposed development aims to fulfil policy needs and meet all environmental requirements;
        - Site Selection and Assessment of Alternatives – an outline of the site selection process to date and the further assessment that will be undertaken in order to define the final proposed development description for the EIA;
        - Proposed Development Description – a high-level description of the key elements of the proposed development both offshore and onshore, and a description of the associated construction, operation and decommissioning phases; and
        - EIA Methodology – a description of how the EIA will be undertaken, the philosophy and approach behind the assessment and key areas of consideration.
    - **Part 2 – Offshore**
        - Offshore Environmental Baseline and Potential Impacts – a discussion of the baseline, potential impacts, approach to the EIA and data sourcing for each topic, covering the physical, biological and human environment; and
        - Summary of offshore designated sites – an overview of the relevant sites and species designated under the national and international legislation described in Part 1 and referred to under each topic, where relevant.

- **Part 3 – Onshore**
  - Onshore Environmental Baseline and Potential Impacts – a discussion of the baseline, potential impacts, approach to the EIA and data sourcing for each topic, covering the physical, biological and human environment; and
  - Summary of onshore designated sites – an overview of the relevant sites and species designated under the national and international legislation described in Part 1 and referred to under each topic, where relevant (included under the onshore ecology section).
- **Part 4 – Wider Scheme Aspects**
  - This section considers aspects that are relevant for both the onshore and offshore assessments (landscape, seascape and visual, socio-economic, health, and tourism and recreation).
- **Part 5 – Consultation**
  - A summary of the proposals for ongoing consultation and stakeholder engagement through the EIA process.
- **Part 6 – Summary and Conclusions**

1.1.4 Development Program

21. At the time of writing, the development program is being devised but with a target DCO submission date of Q3 2021. The following key milestones are planned:
    - Submission of Scoping Report to the Planning Inspectorate – Q4 2019;
    - Pre-application consultation with local communities and those who would be directly affected by the proposal – ongoing. A Statement of Community Consultation setting out the process of community consultation process will also be developed in Q1 2020;
    - Surveys, data gathering and environmental assessment supported by an Evidence Plan Process (EPP) and wider stakeholder engagement – 2019 to 2021;
    - Habitats Regulations Assessment Screening Report and Marine Conservation Zone (MCZ) Screening – 2020;
    - Preliminary Environmental Information Report (PEIR) submission and associated formal consultation based on a draft Environmental Statement (ES) (further details in **Section 1.6**) – early 2021;
    - Draft MCZ assessment and draft Habitats Regulations Assessment (HRA) report with the PEIR; and
    - DCO application submission (including final MCZ assessment and HRA report) – Q3 2021.

1.2 Need for the Proposed Projects

22. The key drivers underpinning the need for offshore wind power projects are:
    - The need to reduce greenhouse gas emissions;
    - The need for energy security;

- The need to maximise economic opportunities from energy infrastructure investment in the UK; and
- The need to produce affordable energy.

1.2.1 The need to reduce greenhouse gas emissions

23. Latest predictions, based on a 'business-as-usual' greenhouse gas concentration scenario, suggest global air temperatures could rise up to 5°C above pre-industrial levels by 2100 (CSSR, 2017).

24. Commitment was made during the 21st Conference of the Parties (COP) in Paris in 2015 to pursue efforts to limit the global temperature increase to within 2°C of the pre-industrial era, with aspirations for an improved limit of 1.5°C. This was ratified by the UK foreign secretary in November 2016 and implemented through the fifth UK Carbon Budget which commits the UK to a 57% reduction in carbon emissions by 2032, compared to emission levels in 1990 (HM Government 2016).

25. The Committee on Climate Change has also recommended that the UK government should support 1-2GW of new offshore wind per year in the 2020s (Committee on Climate Change 2015). In the longer term, through the Climate Change Act 2008, the UK made the commitment to an 80% reduction (compared to 1990 levels) in greenhouse gas emissions by 2050. More recently, in June 2019, the Government put forward the draft Climate Change Act 2008 (2050 Target Amendment) Order 2019 to amend the Climate Change Act 2008 by introducing a target for at least a 100% reduction of greenhouse gas emissions (compared to 1990 levels) in the UK by 2050, also known as a net zero target. The Order came into force on 27 June 2019.

1.2.2 The need for energy security

26. Overall net energy import reduced in 2018, accounting for 36.0% of the total energy used in the UK. Total energy production increased 2.9% from 2017, driven by growth from primary oil, wind, solar and bioenergy and waste (DECC, 2019). However, with declining fossil fuel reserves and aging nuclear power infrastructure there remains a need for new energy sources.

27. Many of the UK's older fossil fuel and nuclear plants have either reached the end of their operational life span, are no longer economical to run, and/or do not meet legal air quality limits. The UK Energy Security Strategy estimated that around a fifth of the energy capacity available in 2011 will close by 2020 (DECC, 2012).

1.2.3 The need to maximise economic opportunities

28. The UK is able to continue growth in the offshore wind sector by maximising domestic energy resources and utilising the vast offshore wind resource to which the UK has access. The UK also has a strong supply chain for offshore wind. The Green Paper: Building our Industrial Strategy (HM Government, 2017) focusses on delivering affordable energy and green growth.

29. According to the 2017 Report on Offshore Wind UK Content (RenewableUK, 2017), 48% of the total expenditure associated with UK offshore wind farms was spent in the UK in 2015. The UK content of expenditure during the development stage and operation of offshore wind projects was 73% and 75% respectively in 2015, whereas during manufacturing and construction the UK content was 29% (RenewableUK, 2017).

1.2.4 The need to produce affordable energy

30. In order to help meet the targets described in the sections above, renewable energy needs to be affordable. Through offshore wind developer led innovation there has been a significant reduction in the levelized cost of energy in recent years, specifically 32% cost reduction between 2012 and 2016 (ORE Catapult 2017). Developers are continuing to drive these changes through technology development and new work processes. The development of DEP and SEP will contribute to this process. In addition, there are specific cost efficiencies from synergies with the existing wind farms and the proposal for a shared export cable route , which optimises overall design and cost.

1.3 Policy and Legislative Context

31. UK legislation is underpinned by a number of international (e.g. EU and United Nations (UN)) agreements, which are outlined in this section. Following the triggering of Article 50 of the Treaty on European Union (TEU) on the 29th March 2017, by which the UK has committed to a withdrawal from the EU, the UK will continue to be committed to all EU treaties until finalisation of the withdrawal agreement and/or until 31st October 2019. At the time of writing, the exact nature of amendments to UK legislation which had an origin in EU law is uncertain, however any changes to relevant policy and legislation will be considered as the EIA process is taken forward.

32. A full explanation of the relevant policy and legislation for the project will be provided in the ES, along with details of the specific legislation relevant to each topic.

1.3.1 Climate Change and Renewable Energy Policy and Legislation

33. National, European and Global level climate change policy key aspects are presented in **Table 1-1**.

Table 1-1 Summary of relevant climate change policy

Policy	Key Commitments
United Nations Framework Convention on Climate Change (Kyoto Protocol)	• Limit global temperature increase to below 2°C, while pursuing efforts to limit the increase to 1.5°C; • Commitments by all Parties to prepare communicate and maintain a Nationally Determined Contribution (NDC); and • In 2023 and every 5 years thereafter, a global stocktake will assess collective progress toward meeting the purpose of the Agreement.

Policy	Key Commitments
European Union Renewables Directive/Renewable Energy Directive	• A reduction of 20% in greenhouse gases by 2020 (below 1990 levels); and • 20% of the total EU energy (electricity, heat and fuel) consumption to come from renewable sources by 2020.
The UK Energy Act (2013)	• Introduction of the Contracts for Difference (CfDs) support mechanism.
The Climate Change Act 2008 (2050 Target Amendment) Order 2019	• If met, this target would effectively mean that the UK will end its contribution to global emissions by 2050. Before this amendment, the UK had a long-term emissions reduction target of reducing greenhouse gas emissions by 80% by 2050, compared to 1990 levels, set by the Climate Change Act 2008.

1.3.2 Planning Legislation

34. The Planning Act 2008 (as amended by the Marine and Coastal Access Act (MCAA) 2009, the Localism Act 2011, the Growth and Infrastructure Act 2013, and the Infrastructure Act 2015) is the primary legislation that establishes the legal framework for applying for, examining and determining applications for NSIPs taking into account the guidance in National Policy Statements (NPSs).

1.3.2.1 National Policy Statements

35. NPSs are produced by the UK Government and set out national policy against which applications for major infrastructure projects will be assessed and determined by the Planning Inspectorate. NPSs include the Government's objectives for the development of nationally significant infrastructure. There are twelve NPSs in total, of which six are relevant to energy. The three NPSs of relevance to DEP and SEP are:
    - EN-1 Overarching Energy;
    - EN-3 Renewable Energy Infrastructure, which identifies the construction of offshore generating stations in excess of 100MW as NSIPs; and
    - EN-5 Electricity Networks, which covers the electrical infrastructure in conjunction with EN-1.

36. A summary of the NPS assessment requirements is provided in relation to each topic in **Appendix 1** of this Scoping Report. These are focused on the specific assessment requirements for each topic although the assessments taken forward in the EIA will have regard to all relevant aspects of the NPSs, for example with respect to potential mitigation or monitoring requirements.

1.3.2.2 Requirement for EIA and the EIA Process

37. EIA was introduced under the European Union (EU) EIA Directive 85/337/EEC (as amended by Directives 97/11/EC, 2003/35/EC and 2009/31/EC). In 2011, the original EIA Directive and amendments were translated into EIA Directive 2011/92/EU (as amended by Directive 2014/52/EU). The EIA Directive is transposed into English law for NSIPs by the Infrastructure Planning (Environmental Impact Assessment) Regulations 2017 (the EIA Regulations).

38. The EIA process will take account of guidance provided by the Planning Inspectorate. The following Advice Notes are considered to be of particular relevance:

- Advice Note Three: EIA consultation and notification (the Planning Inspectorate, 2017a);
- Advice Note Seven: Environmental Impact Assessment, Preliminary Environmental Information, Screening and Scoping (the Planning Inspectorate, 2017b);
- Advice Note Nine: Rochdale Envelope (the Planning Inspectorate, 2017c);
- Advice Note Ten: Habitats Regulations Assessment (the Planning Inspectorate, 2017d);
- Advice Note Twelve: Transboundary Impacts (the Planning Inspectorate, 2018a); and
- Advice Note Seventeen: Cumulative effects assessment relevant to nationally significant infrastructure projects (the Planning Inspectorate, 2018b).

1.3.2.3 Transboundary Considerations

39. The United Nations Economic Commission for Europe (UNECE) convention (the 'Espoo Convention') sets out the obligations of States to notify and consult each other on all major projects under consideration that are likely to have a significant adverse environmental effect across international boundaries (transboundary effects). The Planning Inspectorate issued Advice Note Twelve: Development with significant transboundary impacts consultation (Planning Inspectorate, 2015c). This note sets out the procedures for consultation in association with an application for development consent, where such development may have significant transboundary impacts. The Guidance provided in Advice Note Twelve will be followed by DEP and SEP (Planning Inspectorate, 2015c).

1.3.3 **Environmental Legislation**

40. A range of environmental legislation at International, European and National level will apply to DEP and SEP. These will be described in the ES and are summarised in the table below.

Table 1-2 Summary of relevant environmental legislation

Level	Legislation	Key aspects/aims
International	The OSPAR Convention	• Establish an area of Marine Protected Areas (MPAs)
	The Convention on Wetlands of International Importance especially as Waterfowl Habitat (Ramsar Convention)	• Establish Ramsar sites to protect important areas for wildfowl
	The Convention on Biological Diversity	• The conservation of biological diversity; • The sustainable use of the components of biological diversity; and • The fair and equitable sharing of the benefits arising out of the utilisation of genetic resources.
European	Water Framework Directive (WFD)(2000/60/EEC)	• Ensure a 'good ecological status' of inland, estuarine and groundwater bodies including coastal surface waters up to an offshore limit of one nautical mile.
	Marine Strategy Framework Directive (MSFD)(2008/56/EC)	• Establish a framework within which Member States will take measures to maintain or achieve 'good environmental status' (GES) in the marine environment by 2020.
	Habitats Directive (92/43/EEC)	• Implements the Bern and Bonn conventions. • Aims to conserve natural habitats of wild fauna and flora and is intended to protect biodiversity by requiring Member States to take measures to maintain or restore natural habitats and wild species, including protection for specific habitats listed in Annex I and species listed in Annex II of the Directive. • Establishment under Article 3 of the Directive of a European wide network of protected sites, known as Special Areas of Conservation (SACs).
	Birds Directive (2009/147/EC)	• Provides a framework for the conservation and management of wild birds in Europe.

Level	Legislation	Key aspects/aims
		• Establishment under Article 4 of the Directive a network of Special Protection Areas (SPAs) for rare or vulnerable species listed in Annex I of the Directive.
UK Legislation	Marine and Coastal and Access Act 2009	• Enables the designation of Marine Conservation Zones (MCZs) in England, Wales and UK offshore waters • Provisions for the coastal environment including improving access to the coast and undertaking Integrated Coastal Zone Management (ICZM).
	The Wildlife and Countryside Act 1981	• Enables the designation of Site of Special Scientific Interest (SSSI) to provide statutory protection to the best examples of flora, fauna, geological and physio-geological features. • Enables Statutory Nature Conservation Bodies to declare sites which are considered to be of national importance as National Nature Reserves (NNRs). • Makes it an offence to intentionally: kill, injure, or take wild birds and to take, damage or destroy the nest of any wild bird while that nest is in use or being built. • Makes it an offence to intentionally kill, injure or take any animal listed in Schedule 5 of the Act and protects occupied and unoccupied places used for shelter or protection. Makes it an offence to intentionally pick, uproot or destroy any wild plant listed in Schedule 8 and to plant or otherwise cause to grow any non-native, invasive species listed under Schedule 9 of the Act.
	Conservation of Habitats and Species Regulations 2017 (the 'Habitats Regulations')	• Transposes the requirements of Habitats Directive (see above) into UK law within 12 nautical miles. • Makes it an offence to kill, injure, capture or disturb European Protected Species

Level	Legislation	Key aspects/aims
		(EPS).
	Offshore Marine Conservation (Natural Habitats & c.) Regulations 2017	• Transposes the requirements of Habitats Directive (see above) into UK law outside of 12 nautical miles. • Makes it an offence to kill, injure, capture or disturb EPS.
	Countryside and Rights of Way Act 2000	• Gives Natural England the power to designate Areas of Outstanding Natural Beauty (AONBs).
	The Protection of Badgers Act 1992	• Makes it an offence to willfully kill, injure or take, or attempt to kill, injure or take a badger; and to cruelly ill-treat a badger. • Makes it an offence to intentionally or recklessly damage, destroy or obstruct a badger sett, or to disturb a badger whilst in a sett.
	Natural Environment and Rural Communities Act 2006 (NERC)	• Requires the relevant Secretary of State to compile a list of habitats and species of principal importance for the conservation of biodiversity.

1.3.4 Habitats Regulations Assessment

41. Under the Habitats and Species Regulations (2017), the relevant Secretary of State must consider whether a plan or project has the potential to have an adverse effect on the integrity and features of a Natura 2000 site. This process is known as Habitats Regulations Assessment (HRA). Under Regulation 61 of the Habitats and Species Regulations, Appropriate Assessment is required for a plan or project, which either alone or in-combination with other plans or projects, is likely to have a significant effect on a Natura 2000 site and is not directly connected with or necessary for the management of the site.

42. The HRA for DEP and SEP will follow the four-stage process defined by The Planning Inspectorate (2012b), as summarised below.

- Stage 1: Screening is the process which initially identifies the likely impacts upon a Natura 2000 site of a project or plan, either alone or in-combination with other projects or plans, and considers whether these impacts may be significant. It is important to note that the burden of evidence is to show, on the basis of objective information, that there will be no significant effect; if the effect may be significant, or is not known, that would trigger the need for an Appropriate Assessment;
- Stage 2: Appropriate Assessment is the detailed consideration of the impact on the integrity of the Natura 2000 site of the project or plan, either alone or in-combination with other projects or plans, with respect to the site's conservation

objectives and its structure and function. This is to determine whether there is objective evidence that adverse effects on the integrity of the site can be excluded. This stage also includes the development of mitigation measures to avoid or reduce any possible impacts;

- Stage 3: Assessment of alternative solutions is the process which examines alternative ways of achieving the objectives of the project or plan that would avoid adverse impacts on the integrity of the Natura 2000 site, should avoidance or mitigation measures be unable to prevent adverse effects; and
- Stage 4: Assessment where no alternative solutions exist and where adverse impacts remain. At Stage 4 an assessment is made as to whether the development is necessary for imperative reasons of overriding public interest (IROPI) and, if so, of the compensatory measures needed to maintain the overall coherence of the Natura 2000 network.

43. It is noted that The Crown Estate as Competent Authority undertook a plan level HRA with respect to the 2017 Offshore Wind Extensions Plan (TCE, 2019), which includes the proposed DEP and SEP. Following Appropriate Assessment, the HRA concluded that there will be no adverse effects on integrity in respect of any European Site or its ability to achieve its conservation objectives, alone and in-combination. The implementation of the Cable Route Protocol and the decision to amend the plan by not awarding rights to Race Bank Extension was cited as being sufficient mitigation to avoid adverse effects. As such, the Crown Estate was satisfied that there is sufficient scope and flexibility for project specific mitigation measures to be applied at the project level by developers to ensure no adverse effects on integrity.

44. As set out above, HRA will be undertaken for the proposed DEP and SEP, which will include consideration of any necessary mitigation measures to ensure no adverse effect on integrity. This Scoping Request details the information that will be collected to inform the HRA (to be completed alongside the EIA), subject to the outcome of the HRA screening process. The HRA screening process will be completed in due course (see **Section 1.1.4**).

1.4 Site Selection and Assessment of Alternatives

45. The offshore scoping area includes the two wind farm AfL areas, interlink cable corridors linking DEP and SEP and offshore export cable corridors from a new offshore substation(s) to each of the potential landfalls. The onshore scoping area includes two potential landfall options, a 500m wide onshore cable corridor and a 3km wide onshore substation search area. These footprints will be refined down to the areas required for the proposed infrastructure as the site selection and impact assessment work progresses and once the landfall has been selected, only one cable route will be taken forward. The final application footprint requirements that are anticipated are described in **Section 1.5**.

46. This section provides an overview of the main site selection activities that have been undertaken to develop the scoping area for the proposed development; as well as a summary of the alternatives considered. The site selection process is ongoing and will be described in further detail in the ES.

1.4.1 Offshore Array Site Selection

47. The DEP and SEP array boundaries were determined following a site selection process that considered The Crown Estate's AfL criteria alongside various environmental, technical and commercial constraints.

48. At the AfL stage, applications were made for two DEP areas to provide flexibility and a sufficiently large area to achieve the required generating capacity. The Dudgeon Extension AfL application therefore includes an extension to the northwest (Dudgeon North) and an extension to the southeast (Dudgeon South) of the existing Dudgeon Offshore Wind Farm (OWF).

49. Key Crown Estate criteria that influenced the site selection process included that wind farm extensions must share a boundary with the existing (parent) wind farm; and that other than the existing wind farm, the proposed extension must not encroach within a radius of 5km of any other wind farm (unless the tenant of any such wind farm confirms its agreement). The latter consideration limited the proposed Sheringham Extension to the west due to an application to extend the Race Bank offshore wind farm from its eastern boundary in the direction of Sheringham Shoal (**Appendix 2**, **Figure 1.1.1**).

50. Shipping activity was also a key constraint, particularly between the existing Dudgeon and Sheringham Shoal OWFs, which constrained the extensions from Dudgeon to the south and west, and the extension of Sheringham Shoal to the north and east (see **Appendix 2**, **Figure 2.8.1**).

51. The SEP boundary was chosen to maintain a similar distance from shore as the existing Sheringham Shoal wind farm, which is 17km north of the seaside town of Sheringham at its nearest point to the shore (see **Section 4.1**).

52. Offshore array site selection avoided existing infrastructure where possible. Although it is technically feasible to construct a wind farm around pipelines and cables, the site selection process endeavoured to avoid these and select areas no closer than 500m to existing pipelines and cables where possible. This determined several array boundaries including the eastern boundary of SEP limited by the existing Dudgeon export cable; and the boundaries (north and east) of the northern DEP area limited by existing gas pipelines.

53. Following the site selection process described above, and further refinement following discussion with The Crown Estate and stakeholders, the DEP and SEP areas were selected and included in the AfL applications. The wind farm AfL boundaries as, are illustrated in **Figure 1.1.1** in **Appendix 2**.

1.4.2 Grid connection

54. DEP and SEP will both connect to the National Grid at the existing Norwich Main substation. A strategic approach has therefore been taken to identify offshore and onshore cable corridor locations that can accommodate the infrastructure for both Projects with the aim of optimising overall design, minimising impacts and reducing the cost of energy where practicable.

1.4.3 Landfall Site Selection

55. Landfall location 'areas of search' were initially identified through constraints mapping and a site walkover by the Project Team.

56. The search area covered the North Norfolk coastline from The Wash to Happisburgh. A landfall south of Happisburgh was considered uneconomical due to the export cable length requiring a change from HVAC to HVDC technology. The site walkover therefore ran from Weybourne to Happisburgh and mapped out urban areas, cliff heights and other relevant constraints along the coastline. Cliff heights above 20m add significant challenges to the engineering design of the landfall, so all areas with cliff heights above 20m were excluded from further consideration. Urban areas were also excluded.

57. The search area was reduced further to exclude the area designated as The Wash and North Norfolk Coast Special Area of Conservation (SAC) due to the recent change in condition status of the SAC. As The Wash and North Norfolk Coast SAC status has changed to unfavourable condition it was decided to not consider an export cable route through the SAC.

58. Therefore the following broad areas where identified as potential landfall areas:

- Weybourne;
- Bacton; and
- Happisburgh.

59. The route to a landfall in the Happisburgh area is considerably longer than the other routes, and a Happisburgh landfall also adds additional onshore length to the export cable. For this reason, the Happisburgh area of search was removed from further consideration at an early stage.

60. At the time of writing this Scoping Report, landfall options at both Weybourne and Bacton remain under consideration.

61. The final landfall location for DEP and SEP will be based on the findings of ongoing consultation, including the EPP, and further technical and environmental surveys and studies in relation to, for example, coastal erosion, archaeological impacts, visual impacts and the Cromer Shoal Chalk Beds MCZ. Therefore this Scoping Report considers both options with the expectation that one will be selected and taken forward in the following stages of the EIA process. The offshore cable corridor will also be further refined through the EIA process, specifically in the inshore area to align with the final landfall location once this has been selected from the two options currently under consideration.

1.4.3.1 Offshore Cable Corridor Selection

62. The offshore export cables will connect to offshore substation(s) located inside the wind farm extension areas. Up to two offshore substations are currently allowed for in the scoping envelope, one in each extension area, as illustrated in **Figure 1.1.1** in **Appendix 2**, with the exact locations still to be confirmed. The two substations would be connected by interlink cables. There is potential for reducing the number of substations to one. If so, this single substation will be located in the SEP area.

63. In the event an offshore substation is required in DEP, array cables will connect the two Dudgeon extension areas to the DEP substation. If only one offshore substation at SEP is required array cables will connect DEP to the offshore substation in SEP.

64. In parallel with the landfall assessment, options for provisional offshore cable corridors were identified from DEP and SEP sites (and indicative offshore substation locations) to each of the two landfall areas of search that remain under consideration, around Bacton and Weybourne (see **Section 1.4.3**). Export of electricity to shore from DEP and SEP would follow the same cable route option.

65. The initial site selection strategy was to take the shortest, most direct route between the start and end cable connection points, minimising the footprint of cable installation and thereby minimising impacts and reducing the cost of energy production. Route deviations from this straight line approach were dictated by a variety of constraints. Offshore constraints included in the offshore cable corridor selection exercise were:

- Oil and gas infrastructure including platforms and pipelines;
- Cables;
- Aggregate extraction areas;
- Disposal sites;
- Shipping and navigation; and
- Nature conservation designations.

66. Of these, oil and gas pipelines, cables, and nature conservation designations were constraints that resulted in modification of the offshore cable corridor routes. The offshore cable corridors selected for scoping are shown in **Figure 1.1.1** in **Appendix 2**.

67. It was decided to route the Bacton corridor option to the west of the Bacton Gas Terminal gas pipelines, routing to landfall parallel to the Shearwater to Bacton gas pipeline. A landfall option west of the Bacton Gas Terminal avoids multiple pipeline crossings inside the Cromer Shoal Chalk Beds MCZ. After crossing the existing Dudgeon offshore export cable upon exiting the Sheringham Extension area, the Bacton corridor option is routed to the east and parallel to the Dudgeon cable to avoid further crossings.

68. Both corridor options cross the Cromer Shoal Chalk Beds MCZ and the Greater Wash SPA to reach landfall. However, they both take a direct (and therefore shorter) route to shore through the designations to minimise their footprint within them. Furthermore, the corridors widen upon entering the MCZ and the landfall areas, providing additional scope to avoid significant constraints (e.g. designated conservation features) during later route refinement.

1.4.4 Onshore site selection

69. At the time of writing the onshore site selection process is still in progress and the onshore scoping area encompasses a wider study area that will be refined as the site selection and assessment work is progressed. The onshore scoping area has been identified considering physical and environmental constraints, a grid connection at Norwich Main, and two potential landfall locations at Bacton and Weybourne.

70. Key principles that have informed the identification of the onshore scoping area, include:

- Preference for shortest onshore cable to minimise the overall footprints and the number of receptors that will be affected;
- Avoid key sensitive features, where possible; and

- Avoid populated areas, where possible.

71. The identification of the onshore scoping area has taken into account the following constraints:
    - Sites designated for nature conservation (e.g. SPA, Site of Special Scientific Interest (SSSI));
    - Sites designated for their landscape (e.g. AONB);
    - Historic designations (e.g. listed building or scheduled monuments);
    - Residential properties;
    - Flood zones / Source Protection Zones (SPZ);
    - Contaminated land; and
    - Other infrastructure (e.g. buried cables, railways, roads);

1.4.4.1 Grid Connection

72. National Grid is responsible for operating the electricity transmission network in England and Wales. The Connection and Infrastructure Options Note (CION) Process is the mechanism used by National Grid to evaluate potential transmission options to identify the connection point in line with their obligation to develop and maintain an efficient, coordinated and economical system of the electricity transmission network. As part of the economic assessment, the CION considers the total life cost of the connection – assessing both the capital and projected operational costs to the onshore network (over a project's lifetime) to determine the most economic and efficient design option.
73. Following the completion of the CION process National Grid made a grid connection offer in April 2019 for connection at Norwich Main National Grid Substation that would accommodate both Projects. The Applicant accepted this offer in May 2019.

1.4.4.2 Substation and National Grid Infrastructure

74. The Projects will require the construction of an onshore substation that would accommodate both Projects and will also include the electrical infrastructure National Grid requires to connect to the existing electricity transmission network.
75. Some of the onshore substation infrastructure would be shared between the Projects and the number of buildings required would be the same whether one or both projects are progressed. In addition, the infrastructure required by National Grid would be the same for one or two projects (a single bay connection).
76. Planning advice on the siting of onshore substations is set out by National Grid in the 'Horlock Rules' (National Grid, undated). The Horlock Rules are a set of guidelines produced by National Grid to assist those responsible for siting and designing substations to mitigate the environmental effects of such developments (National Grid, 2003). They are still referred to and used by National Grid when undertaking planning studies for new infrastructure although they now have to be considered alongside other guidance in NPS and the National Planning Policy Framework (NPPF).

77. The principles set out in the Horlock Rules are relevant to the infrastructure at the onshore substation and have been taken into consideration in defining the onshore study area and will inform the ongoing site selection process. Key considerations include:
    - Siting should, as far as reasonably practicable, seek to avoid internationally and nationally designated areas of the highest amenity, cultural or scientific value;
    - Areas of local amenity value, important existing habitats and landscape features including ancient woodland, historic hedgerows, surface and ground water sources and nature conservation areas should be protected as far as reasonably practicable;
    - The siting of substations etc. should take advantage of the screening provided by landform and existing features and the potential use of site layout and levels to keep intrusion into surrounding areas to a reasonably practicable minimum;
    - The proposals should keep the visual, noise and other environmental effects to a reasonably practicable minimum; and
    - The land use effects of the proposal should be considered when planning the siting of substations or extensions.

78. A 3km search area has been identified around the existing National Grid connection point at Norwich Main, within which a detailed site selection exercise will be undertaken for the location of the onshore substation. Consideration will be given to placing the electrical infrastructure as close as possible to the existing National Grid connection point (where feasible) in order to minimise the landscape and visual effects associated with introducing new electricity infrastructure to the environment.

1.4.4.3 Onshore Cable Route

79. The location of the onshore cable corridors to inform scoping were identified as part of an initial site selection process considering various possible onshore routes for DEP and SEP.

80. The process was largely driven by the location of the endpoints, i.e. the two potential landfall areas and the connection location at Norwich Main. The initial feasibility and route selection exercise has identified a 500m wide onshore cable corridor.

81. This corridor will be further refined as site selection progresses to identify a 100m wide corridor suitable for the required EIA surveys, e.g. onshore ecology surveys. The findings of those surveys and the impact assessment work will continue to inform site selection and allow a further refinement down to the 45m wide corridor that is required for the application.

1.5 Proposed Development Description

1.5.1 Introduction

82. This section provides an overview of DEP and SEP. It sets out the design and main components of the offshore wind farms and their infrastructure. It also describes the key activities that will be undertaken during construction, operations and maintenance (O&M phase) as well as decommissioning.

83. At this early stage the project description is indicative for the purpose of informing the scoping exercise. The description has been designed to include enough flexibility to accommodate further refinements during site selection and detailed design.

84. The project description will be further developed through the EIA process; in the next stage within the PEIR; and finally, within the Environmental Statement that will accompany the application for Development Consent.

85. **Table 1-3** provides an overview of the key components of DEP and SEP.

Table 1-3 UK Extension Overview

Infrastructure	Component	Detail
Wind farm array	Wind turbines	The wind turbines convert wind energy to electricity. Key components include rotor blades, gearboxes (in some cases), transformers, power electronics and control equipment. Offshore turbine models are continuously evolving and improving, therefore the exact wind turbine model will be selected post-consent from the range of models available at the point of procurement.
	Wind turbine and offshore substation foundations	The wind turbines and offshore substation/s will be permanently attached to the seabed with foundation structures. The foundation structures are either anchored down into the seabed by means of piling or suction buckets or sit on the seabed anchored by gravity only. These are typically fabricated from steel or concrete. A limited number of foundation designs are under consideration.
	Array cables	Array cables will connect the wind turbines to one of the offshore substations. Cables will be buried to the extent possible.
	Offshore substation/s	One or two substations to convert the power to higher voltages in order to transmit the power more efficiently (reduced electrical losses) to shore.
	Interlink cables	In order to improve the reliability of the transmission system, interlink cables may be installed connecting the offshore substations to each other.
	Cable protection	If soil conditions make burial unfeasible, as well as in the immediate proximity of turbine foundations, cables may be protected by a hard-protective layer such as rock or concrete mattresses.
Offshore export cables	Export cables	Cables connecting the offshore substation(s) to the landfall. Cables can be delivered in sections and jointed in-situ or be delivered in one length (factory joined).
Scour protection	Scour protection	In order to protect the seabed around foundation structures and cables from scour, scour protection

Infrastructure	Component	Detail
		(rocks or other materials) may be placed on the seabed to protect from current and wave action.
Onshore	Export cables	Buried cables connecting the landfall to the onshore substation at Norwich Main. Cables will be delivered in sections and buried in trenches. Sections will be connected together within jointing bays.
	Onshore substation	An onshore substation will be located as close as practical to the National Grid substation at Norwich Main and will include all necessary electrical and auxiliary equipment to meet the requirements of the National Grid 'Grid Code'.
	Energy balancing infrastructure	The onshore substation may incorporate energy balancing / storage infrastructure, such as a battery.
	Grid connection	DEP and SEP will connect to the national grid in the existing National Grid Electricity Transmission (NGET) substation at Norwich Main.

1.5.2 Design Envelope Approach

86. The use of the Design Envelope approach has been recognised in the Overarching National Policy Statement (NPS) for Energy (NPS EN-1) (DECC, 2011a) and the NPS for Renewable Energy Infrastructure (NPS EN-3) (DECC, 2011b). This approach has been used in all offshore wind farm DCO applications to date.

87. In the case of offshore wind farms, NPS EN-3 (paragraph 2.6.42) recognizes that: "Owing to the complex nature of offshore wind farm development, many of the details of a proposed scheme may be unknown to the applicant at the time of the application, possibly including:

- Precise location and configuration of turbines and associated development;
- Foundation type;
- Exact turbine tip height;
- Cable type and cable route; and
- Exact locations of offshore and/or onshore substations.

88. NPS EN-3 (paragraph 2.6.43) continues:

"The Secretary of State should accept that wind farm operators are unlikely to know precisely which turbines will be procured for the site until sometime after any consent has been granted. Where some details have not been included in the application to the Secretary of State, the applicant should explain which elements of the scheme have yet to be finalized, and the reasons." Therefore, some flexibility may be required in the consent.

89. NPS EN-3 also states that: "The 'Rochdale [Design] Envelope' is a series of maximum extents of a project for which the significant effects are established. The detailed design of the project can then vary within this 'envelope' without rendering the ES [Environmental Statement] inadequate".

90. The Design Envelope approach is widely recognised and is consistent with Planning Inspectorate (PINS) Advice Note Nine: Rochdale Envelope (PINS, 2017c) which states that: “The ‘Rochdale Envelope’ is an acknowledged way of dealing with an application comprising EIA development where details of a project have not been resolved at the time when the application is submitted”.

91. Throughout the Scoping Report and subsequent EIA, the Design Envelope (otherwise known as the "Rochdale Envelope") approach has been taken to allow meaningful assessments of DEP and SEP to proceed, whilst still allowing reasonable flexibility for future project design decisions.

1.5.2.1 Applying the ‘Rochdale Envelope’ Approach

92. Flexibility to respond to emerging economic circumstances and technological advances is essential if DEP and SEP are to proceed and be successful. A degree of flexibility will, therefore, be built into the design basis for the Development Consent Order application by applying a Rochdale Envelope approach that is consistent with PINS Advice Note Nine (PINS, 2017c).

93. This approach does introduce some complexity into the EIA process common to many large-scale developments, which are dependent on market conditions for their delivery. The 2017 Regulations require an Environmental Statement to provide a description of the location, design and size of the scheme to enable the likely significant environmental effects to be assessed and to enable the decision-maker, statutory consultees and the public to make properly informed responses.

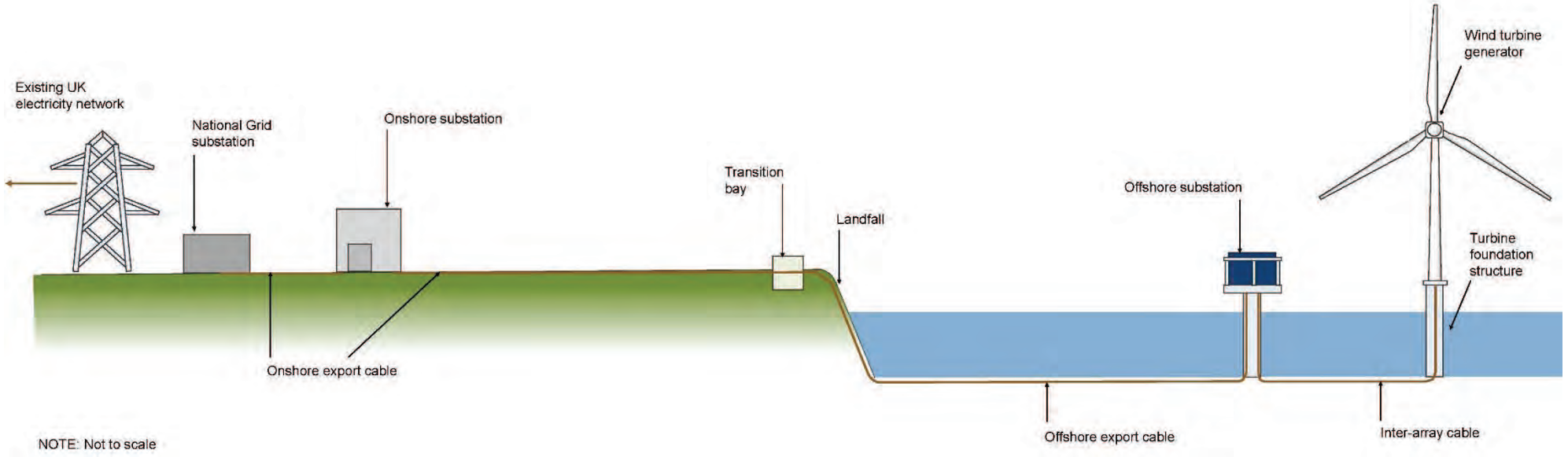
94. A balance has to be sought between defining the proposals in enough detail to predict their impacts, while leaving enough flexibility to enable DEP and SEP to be successfully delivered under conditions which may be subject to change. The design parameters will provide an ‘envelope’ as a basis for the impact assessment process.

95. Such an approach is a recognised practice, as reflected in case law on the ‘Rochdale Envelope’ principle. Suitably applied in EIA it can help to avoid the need for protracted re-submission procedures at a later stage, whilst giving a comprehensive assessment of the likely environmental effects.

1.5.3 Project infrastructure overview

96. An illustration of the main components of DEP and SEP is provided on **Figure 1.5.1** in **Appendix 2.**

Figure 1.5-1: Project infrastructure



1.5.4 Wind farm sites

1.5.4.1 Lease area

97. DEP and SEP consists of two extension assets and thus Agreement for Lease areas as illustrated in the map in **Figure 1.1.1** in **Appendix 2**. The DEP area is divided into two parts – DEP north and DEP south. The key characteristics of each area are summarised in **Table 1-4**.

Table 1-4 Dudgeon and Sheringham Extensions Overview

Area	Parameters	Values
SEP	AfL area	92.6km^2
	Closest distance to shore	17.5km
	Water depth	14 - 25m
DEP	AfL area	103.5km^2
	Closest distance to shore	31km
	Water depth	11 - 23m

1.5.4.2 Wind measurements

98. DEP and SEP are located adjacent to the operating Sheringham Shoal and Dudgeon Offshore Wind Farms. Wind and metocean data exist for the operational assets and will be used to support the planning of DEP and SEP. However, it may also be necessary to collect additional site-specific data for DEP and SEP. If wind measurements are needed this will be collected through the use of up to two floating LIDARs inside the respective AfL areas. The installation of floating LIDARs will be subject to separate marine licences and will be dealt with under a marine license application process, not the DCO process.

1.5.4.3 Wind Turbine Generators

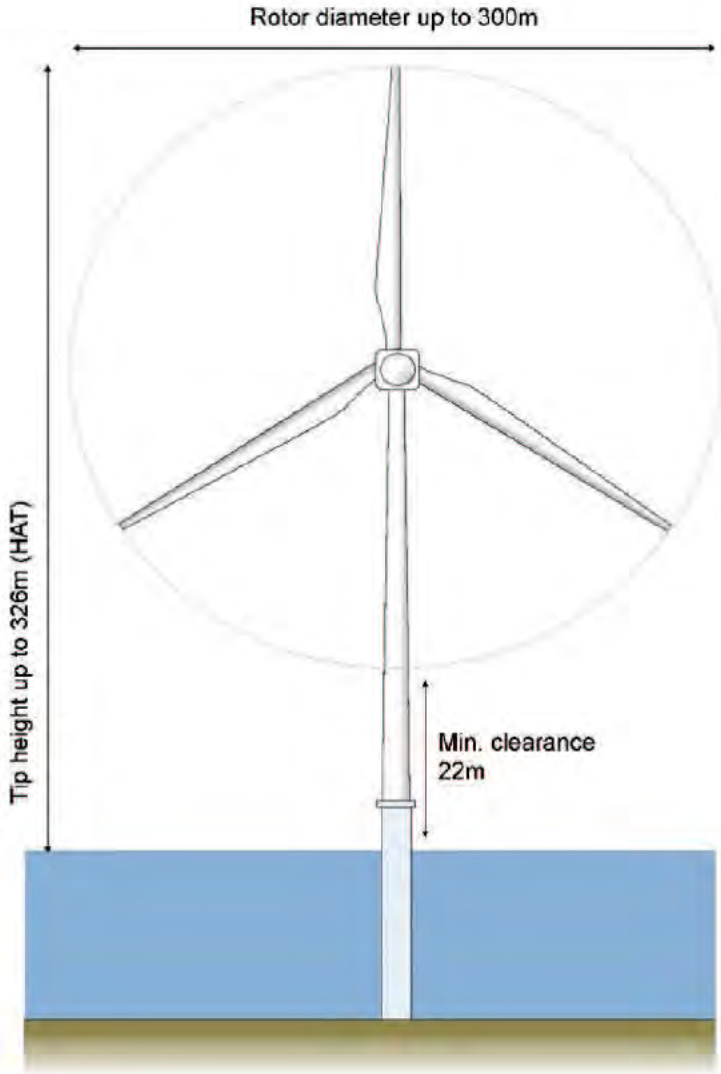
99. The size and capacity of the wind turbines will be decided at a later point in time, prior to final investment decision. Technology develops rapidly and available sizes of turbines are expected to increase over the coming years. The current wind turbine design envelope for DEP and SEP is outlined in **Table 1-5** and illustrated in **Figure 1.5.3**.

Table 1-5 Wind Turbine Design Envelope

Parameters	Indicative range
Rotor Diameter	~220 – 300m
Number of wind turbines – DEP	Up to 34 turbines
Number of wind turbines – SEP	Up to 27 turbines
Max Tip Height (HAT)	Up to ~326m
Air Gap above Highest Astronomical Tide (HAT)	Lowest air gap ~22m

Parameters	Indicative range
Indicative separation distance between turbines (inter-row), DEP and SEP	Shortest distance between turbines ~ 990m (4.5 rotor diameters)

Figure 1.5.2 Turbine schematics. 1: Max tip height above highest astronomical tide (HAT). 2 – Rotor diameter is diameter of circle, swept area is area inside circle. 3 – Air gap above HAT.



1.5.4.4 Wind Turbine Foundations

100. The wind turbine foundation type will be selected based on the results from the geotechnical investigations, wind turbine selection, metocean data, environmental considerations and the market situation for fabricating wind turbine foundations.

101. Available wind turbine foundation types are:
    - Monopile/Transition Piece concept (MP/TP concept);
    - Mono tower with suction bucket;
    - Jacket with pile;
    - Jacket with suction bucket; and
    - Gravity based structures (GBS).

102. Monopiles are usually constructed from welded steel tubular sections and driven vertically into the seabed using piling hammers. In challenging soil conditions piles may be drilled into the seabed. The MP/TP concept is considered to be feasible for turbines up to 12-14MW, but might also be feasible for larger turbines.

103. A suction bucket is based on a structure comparable to an upturned bucket that is lowered to penetrate into a pre-prepared (levelled) seabed. The monotower with suction bucket can be used for turbines up to 12-14MW, and possibly for larger turbines as well. Other than seabed surface preparation, the installation process does not result in the generation of spoil, nor does it require piling. It is, however, sensitive to the ground conditions.

104. A jacket foundation typically consists of three or four main legs which are linked by a supporting matrix of cross-braces. Jacket foundations are anchored to the seabed by using single piles or suction buckets at each leg.

105. Piled jacket foundations are currently the preferred foundation solution for larger turbines in deeper waters.

106. A gravity-based foundation sits on the seabed and is typically a heavy ballasted structure made of steel and/or concrete. They can vary in shape, but will have a base diameter of up to 50m. The gravity base structure is placed on a pre-prepared area of seabed which may include removal of soft, mobile sediments and the levelling of an area by installation of a layer of rock/gravel. The diameter of the levelled seabed area may reach up to 100m. A gravity foundation is suitable for large turbines and deep waters.

107. The wind turbine foundation alternatives are illustrated in **Figure 1.5.3**.and parameters listed in **Table 1-6**.

Classification: Open Status: Final

Figure 1.5.3 Wind turbine foundation types

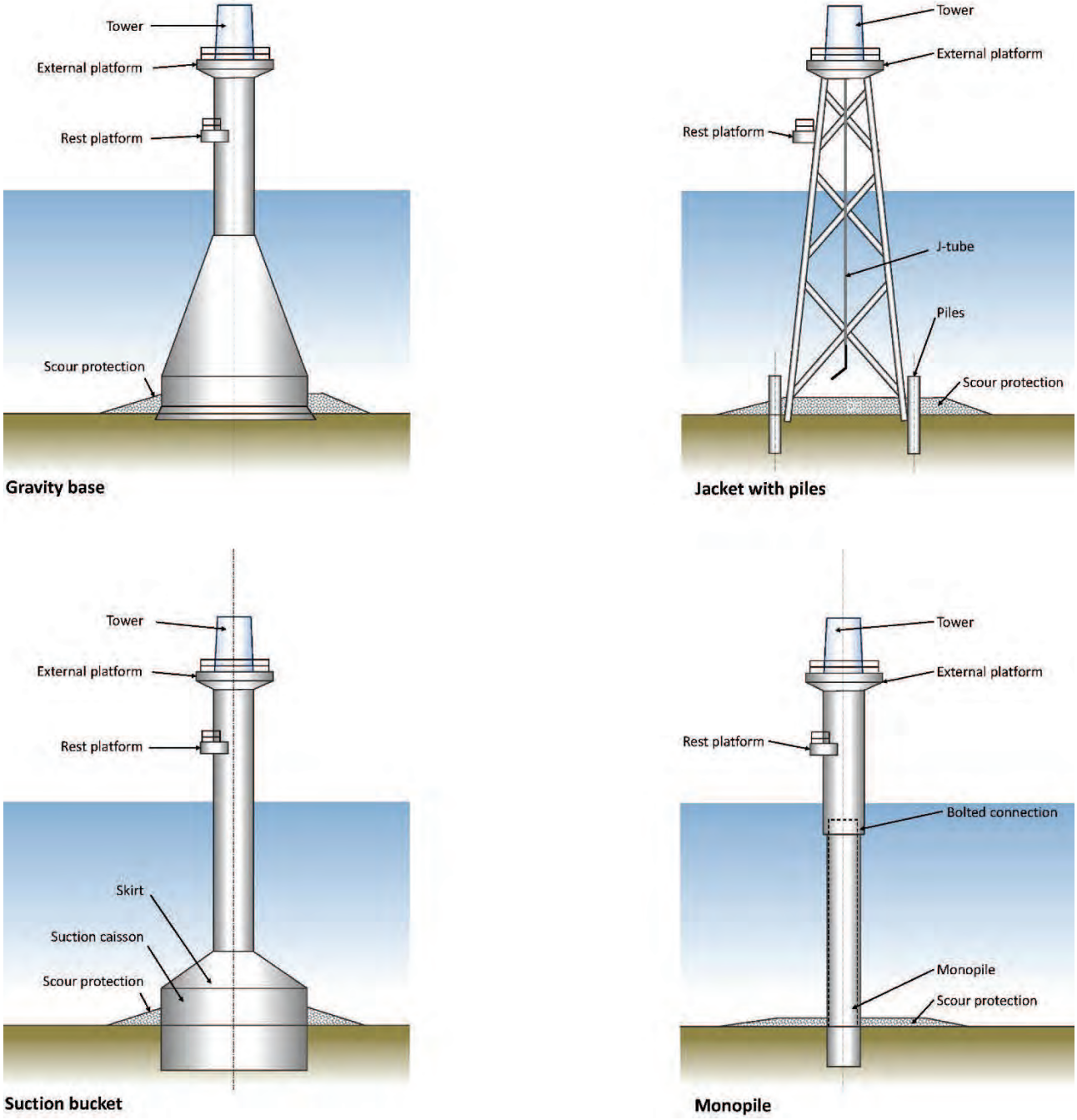


Table 1-6 Wind turbine foundation design envelope

Foundation type	Parameter	Indicative size
Monopile/Transition piece	Diameter	Up to 12m
	Hammer size	Up to 4500kJ
Jacket with piling	Leg spacing	< 30m
	Hammer size	< 3000kJ
Jacket with suction bucket	Leg spacing	< 35m
	Bucket diameter	< 20m
Gravity based structure	Diameter	< 50m
Mono tower with suction bucket	Diameter	< 30m

1.5.5 Electrical system

108. The electrical transmission system will collect the power produced at the wind turbines and transport it to the UK electricity transmission network. The transmission system will be constructed by Equinor and the ownership will be transferred to an Offshore Transmission Operator (OFTO) in accordance with applicable rules and regulations in a transaction managed by the Office of Gas and Electricity Markets (Ofgem).

1.5.5.1 Array cables

109. Array cables connect the turbines to each other and to the offshore substation. Cable system design will be based on radial strings from the offshore substation(s) and connecting multiple turbines per string. The current design also includes three additional array cables on DEP and two additional array cables on SEP to be used as links between radials. The array cables are expected to be 66kV AC. The length of each array cable, and string, will depend on the distance between the turbines and the distance between the first turbine on the string and the offshore substation. A realistic maximum distance of array cables will be defined for the purposes of the EIA and used as the basis for the assessments.

110. Array cables will connect DEP to the offshore substation located in the SEP area (in case there is only one offshore substation). Indicative array designs will be used to inform the definition of the worst-case parameters of array cables.

1.5.5.2 Offshore substation(s)

111. The cables from a string of turbines will be brought to an offshore substation, located appropriately to optimise the array cable and export cable lengths. At the substation, the generated power will be transformed to a higher AC voltage. This higher voltage will be determined by detailed studies, but is likely to be ~ 220kV.

112. There will be up to two offshore substations. In the case there are two substations being constructed there will be one substation located in each extension area, see **Figure 1.1.1**. The location of the offshore substation/s will be confirmed during the detailed design process but will be within the limits of each wind farm site.

113. The offshore substation foundation type will likely be a jacket or a GBS foundation. The jacket foundation will have 4 or 6 legs with up to three piles at each leg or one suction bucket at each leg. Leg spacing at the seabed will be up to 40m. In case of a GBS foundation the diameter of the foundation at seabed will be up to 50m.

1.5.5.3 Array cables

114. Cable system design will be based on radial strings from the offshore substation(s) and connecting multiple turbines per string. Array cables connect a turbine to the next turbine and the number of array cables will therefore be equal to number of turbines. The current design also includes three additional array cables on DEP and two additional array cables on SEP to be used as links between radials. The array cables will be 66kV AC. The length of each array cable, and string, will depend on the distance between the turbines and the distance between the first turbine on the string and the offshore substation.
115. Array cables will connect DEP to the offshore substation located in the SEP area (in case there is only one offshore substation). The current design accounts for up to 6 array cables linking DEP to the offshore substation at SEP. Each cable will require its own trench, totalling up to six trenches.

1.5.5.4 Interlink cables

116. Should the final design of DEP and SEP include two substations, up to two interlink cables may be installed to link the two substations. The interlink cables will improve the reliability of the transmission system. They will be 220kV AC cables and will be installed in separate trenches.

1.5.5.5 Offshore export cables

117. Two export cables (220kV AC) are likely to run from the offshore substation(s) to a transition joint bay at the landfall. The transition joint bay connects the offshore and onshore export cables. Each export cable will be installed in a separate trench and protected in line with good industry practice.
118. The export cables will be installed in separate installation campaigns as the installation vessel only can install one cable at the time. Installation of offshore cables typically takes place by ploughing or trenching depending on the soil conditions along the cable route. The purpose of cable burial is to ensure that the cables are protected from damage by external factors. Typical burial depth is between 0.5 to 1.5m, but no protection will also be considered. The appropriate level of protection will be determined based on an assessment of the risks posed to the project in specific areas. **Table 1-7** describes the main cable parameters.
119. It is likely that the export cables will have to cross other cables and/or pipelines. Detailed methodology for the crossing of cables and pipelines by the export cables will be determined in collaboration with the owners of the infrastructure to be crossed. A number of techniques can be utilised, including:
    - Pre-lay and post lay concrete mattresses;
    - Pre-lay and post lay rock dumping;
    - Pre-lay steel structures; or

- Other appropriate approaches.

120. There will be no separate cables for fibre optics. Fibre optics will be integrated with the export cables.

Table 1-7 Offshore cable parameters (based on an HVAC export cable system)

Item	Indicative parameters
DEP array cables	One per wind turbine plus potential cables for redundancy between strings
SEP array cables	One per wind turbine plus potential cables for redundancy between strings
Cables connecting DEP and SEP (array or interlink)	Up to 8
Export cables/trenches	Up to 2
Fibre optic cables	Bundled in export cable
Number of cable crossings	Up to 6
Length of cables	
Array cables	Dependent upon distance between turbines
DEP – SEP	Up to ~ 20km
Export cable SEP – Weybourne	~18km
Export cable SEP – Bacton	~30km
Export cable route scoping width	~500m – 1,000m (1,000m through the MCZ)

1.5.5.6 Landfall

121. There are currently two alternative landfall options (Weybourne and Bacton), as illustrated in **Figure 1.1.1** in **Appendix 1**. As described in **Section 1.4**, a preferred landfall will be selected during the EIA process. Cable installation methodology at the landfall will be selected based on a comparative assessment of impacts. It is assumed that suitable technologies may include open cut trenching or horizontal directional drilling (HDD). The offshore and onshore cables will be jointed in one or two transition bays onshore. **Table 1-8** shows the main construction parameters for the landfall site.

122. Open cut is a well-known installation methodology for underground cabling in relatively unconstrained areas. It can also be used to install cables in a landfall and would require an open trench to be dug out before cables are installed and the trench refilled.

123. If HDD is chosen as the appropriate installation methodology at the landfall, each export cable will require one HDD i.e. up to two in total. However, a spare HDD is accounted for in the scoping envelope. The HDD is drilled from an onshore construction compound and will exit the seabed in an exit pit at a suitable site with 8 – 10m water depth. The length of the HDD will depend upon factors such as water depth, seabed topography, shallow geology/soil conditions and environmental constraints. The onshore construction compound will be temporary in nature and reinstated after completion of the project.

124. The exit pits offshore of the HDDs will be spaced some distance apart, typically 20 – 50m. However, environmental and technical constraints may guide the actual separation distance to be used. The exit pits are likely to be 3m wide at the bottom to allow collection of drilling fluids. The total length will be approximately 10m, while the depth of the exit pits will reflect the depth at which the export cable will continue further offshore. However, it is likely that depths will be less than 1m. The export cables are generally protected in the HDD exit pits and in the offshore export cable trench. However, there is a section between the HDD exit pit and the cable trench of up to 50m where the export cables are not naturally protected. This stretch may require additional permanent protection measures in the form of rock protection. For the purposes of the EIA appropriate protective measures will be identified and discussed with key stakeholders prior to submission of the DCO application.

125. The onshore transition bay(s) will be located underground. A pit will be dug out and refilled once the transition bay(s) have been installed.

Table 1-8 Landfall construction parameters

Landfall	Indicative parameters
Number of HDD drills	Up to 3
Number of transition bays	Up to 2
Transition bay dimensions (length x width)	Up to 20 x 20m
Transition bay dimensions depth	Up to 2m
Landfall HDD compound (length x width)	Up to 80 x 80m
Length of HDD	Up to 1,500m

1.5.5.7 Onshore Export System

126. The width of the onshore cable corridor swathe will be up to 45m, increasing up to 60m at trenchless crossings (e.g. HDD). This increase allows for additional separation of cables buried at depth. This width accounts for the required construction footprint, including trenches, haul road, spoil storage, drainage etc.

127. The onshore underground cable system will be installed in trenches, either a common trench for the two circuits or one circuit per trench. Each circuit consists of three high voltage cables and one fibre optical cable. A trench holding two circuits may be up to 5m wide. A trench holding a single circuit may be up to 2.5m wide with approximately 5m separation distance between the trenches. A typical installation will require minimum 1m distance between the cable circuits. The required distance between cable circuits will be increased for deeper installations, typically up to 10m for trenchless crossings.

128. Jointing bays will be used to pull the cables into the ducts and/or to join the cable lengths to each other. Link boxes are used for earthing cables and will be installed inside a protective concrete chamber. The jointing bays are subsurface structures, while the link boxes will require access (for inspections) from the surface during operations and will therefore be located at or above ground level. At the jointing location there will be one link box per circuit. The frequency of jointing bays and link boxes will vary between 300 – 1000m.

Table 1-9: Onshore cable parameters

Onshore cable corridor	Indicative parameters
Cable corridor swathe width	Up to 45m
Cable corridor swathe at trenchless crossings	Up to 60m
No. cables	Up to 12
No. ducts	Up to 12
No. trenches	Up to 2
Depth to top of buried infrastructure (ducts)	>1m
Trenchless (HDD) crossings	To be identified
Trenchless (HDD) crossings compound (length x width)	Up to 100 x 50m
Typical jointing bay frequency	Up to every 300m
No. jointing bays per location	One per trench
Jointing bay (length x width x height)	Up to 20 x 10 x 1.5m
Depth to top of jointing bay (m)	> 1m
Link box frequency	Up to every 300m
Link box (length x width)	Up to 2 x 2m

1.5.5.8 Onshore Substation

129. An onshore substation will be constructed to accommodate the connection of both DEP and SEP to the transmission grid. The HVAC onshore substation will be located in proximity to National Grid's existing Norwich Main substation. It will contain the necessary electrical and auxiliary equipment and components for transforming the power from the wind farm to 400 kV and required to meet the UK Grid Code for connection to the transmission grid.

130. The maximum design scenario will be set out in the PEIR (e.g. max height, footprint, number and type of buildings). **Table 1-10** describes the main onshore substation construction parameters.

131. The outlined operational footprint of 200 x 200m does not necessarily take possible landscaping needs into account. The need and location of landscaping activities will be identified and agreed with relevant stakeholders at a later stage.

132. In case the DEP and SEP onshore substation is located adjacent to the existing Norwich Main substation, an overhead connection between the two substations will be considered. An underground cable connection will be used if the two substations are not adjacent to each other. The cable corridor between the two substations will be similar to the export cable corridor in design and width.

Energy Balancing Equipment

133. Energy and grid balancing equipment is becoming increasingly widespread to effectively and cost efficiently balance the supply and demand of electricity within the electrical transmission network as well as offer grid services and thus increase the overall reliability of the system. Since this is a rapidly evolving field a range of technologies are under development and will be considered and assessed within the Environmental Statement. The system could be housed in single or multiple building(s), several containers, in an open yard or a combination of the above.

134. All energy balancing equipment – if designed in - will be housed within the footprint of the onshore substation as defined at PEIR.

Table 1-10 Onshore substation construction parameters

Substation	Indicative parameters
Construction compound (length x width)	Up to 150 x 150m
Operational compound (length x width)	Up to 200 x 200m
Building height	Up to 25m
External equipment height	Up to 30m

1.5.5.9 Grid Connection

135. DEP and SEP will both connect to the existing transmission grid in National Grid's Norwich Main substation. The requirement for any NGET substation consents necessary to undertake works associated with DEP and SEP at Norwich Main is the responsibility of National Grid. The cumulative impacts will be considered as appropriate.

1.5.6 Offshore and onshore construction

1.5.6.1 Fabrication

136. All elements of the offshore wind farm including turbines, foundations, substations and electrical infrastructure will be fabricated offsite, stored at a suitable port facility and transported to site as needed. Fabrication contracts have not been placed and Equinor will run competitive tendering processes to identify the best suitable contractors to deliver the different elements of the development. Fabrication can take place in the UK, in Europe or elsewhere dependent upon the location of the chosen contractor.

1.5.6.2 Seabed preparation

137. Some form of seabed preparation may be required for each foundation type. Seabed preparation includes seabed levelling, ground reinforcement and removing surface and subsurface debris such as boulders, fishing nets, lost anchors etc. If debris are present below the seabed surface then excavation may be required for access and removal. Any unexploded ordnances found with live ammunition will be detonated and any remaining debris removed, where practicable.
138. Consent for UXO removal will be sought in a future Marine Licence application, when geophysical survey data of suitable spatial resolution is available to identify and quantify UXO risk.

1.5.6.3 Marine operations

139. Equinor gained extensive knowledge and experience of undertaking construction work in this area from the Dudgeon and Sheringham Shoal construction campaigns. This experience will be drawn upon and used in planning and execution of the construction activities of DEP and SEP.
140. Monopiles can be installed by using floating mono hull crane vessels or suitable jack-up vessels for these water depths and conditions. The contractor market has developed in recent years and there are several new installation vessels being planned or constructed which will be suitable for DEP and SEP.
141. It is expected that max hammer size for pile driving will be 4500kJ.
142. The vessels undertaking the piling of the monopiles will also be likely to install the transition pieces (TPs). There are currently initiatives looking into possible alternative solutions for construction, including the installation of a combined monopile and TP. The Applicant will follow this technology development closely and identify a construction philosophy which best takes all aspects into account.
143. Foundations and turbines are likely to be installed by using jack-up vessels. For the larger new turbines the market for installation vessels is limited, but it is expected that the availability of installation vessels will adapt to the increase in turbines sizes. Details of the anticipated jack-up operation footprints will be considered in the PEIR.

1.5.6.4 Onshore cable route

144. The onshore cable ducts will be installed using a trenching machine/open-cut trench techniques; and where necessary HDD or other trenchless methods to avoid surface disturbance at sensitive features. The cables will be direct laid or installed in ducts at the bottom of the trench(es).
145. The Cable burial includes the removal of topsoil, excavating the trench, installing the ducts and backfilling the trench. The cables will be pulled through the ducts after the trench has been backfilled. Cables and ducts are likely to be covered by approximately 1m soil. The cable route width of 45m takes account of the need for storing soils during construction.

146. Haul roads will be constructed along the cable route to allow access to the cable route during the construction phase. In the case of a phased development the haul roads may be left in situ between construction periods and removed once construction of the phased development has finalised. The cable route width of 45m takes account of the need for haul roads.
147. There will be need for several temporary compounds along the onshore cable corridor for material and equipment
148. **Figure 1.5.2** shows a typical open trench arrangement showing the duct installation during construction. The picture shows installation of ducts for two circuits in a tree folio arrangement (3 cables per circuit).
149. **Table 1-9** details the main onshore cable construction parameters.

Figure 1.5-4 Duct installation during construction (open cut trench)



1.5.6.5 Trenchless crossings (including landfall)

150. Where an open trench approach is not possible due to significant obstructions (e.g. a major road or watercourse or at the landfall) non-trenching techniques will be employed. It is anticipated that HDD technique or similar will be used.
151. The HDD method comprises three stages:
    - A pilot hole is drilled between the entry and exit point;
    - The hole is enlarged by passing a larger cutting tool through known as the back reamer; and
    - The cable duct is placed in the enlarged hole.
152. HDD is undertaken with the help of a drilling fluid, which is usually a mixture of water and bentonite (an inert clay-based material). During drilling the drilling fluid is continuously pumped to the cutting head or drill bit to facilitate the removal of cuttings, stabilise the borehole, cool the cutting head, and lubricate the passage of the product pipe.
153. Use of any trenchless technique will also require temporary construction compounds at the entry and exit points.

1.5.6.6 Onshore substation

154. Construction of the onshore substation will include:

- Establishing access roads;
- Site preparation/levelling for the temporary construction compounds and the permanent substation site. Dependent upon the onsite ground conditions at the substation location, piling may be required to support the construction of buildings and heavy equipment;
- Installation of underground utility/drainage and foundations for buildings and equipment;
- Construction of building(s) and installation of electrical equipment;
- Installation of permanent perimeter fencing around entire substation; and
- Landscaping to minimise visual impact.

1.5.7 Construction Program

155. The indicative high-level construction programs shown in **Figure 1.5-5** and **Figure 1.5-6** provide an overview of installation durations of the main project elements under the integrated and separated grid options respectively. The worst case scenario presented by the construction program will differ according to the receptor and impact in question (which, as set out in **Section 1.6**, will be identified in the EIA and assessed accordingly). **Figure 1.5-3** therefore shows construction activities undertaken as a single construction campaign for DEP and SEP, but also a program where construction activities are undertaken as two separate campaigns approximately 2 – 3 years apart.

Figure 1.5-5 Construction Program Integrated Grid Option

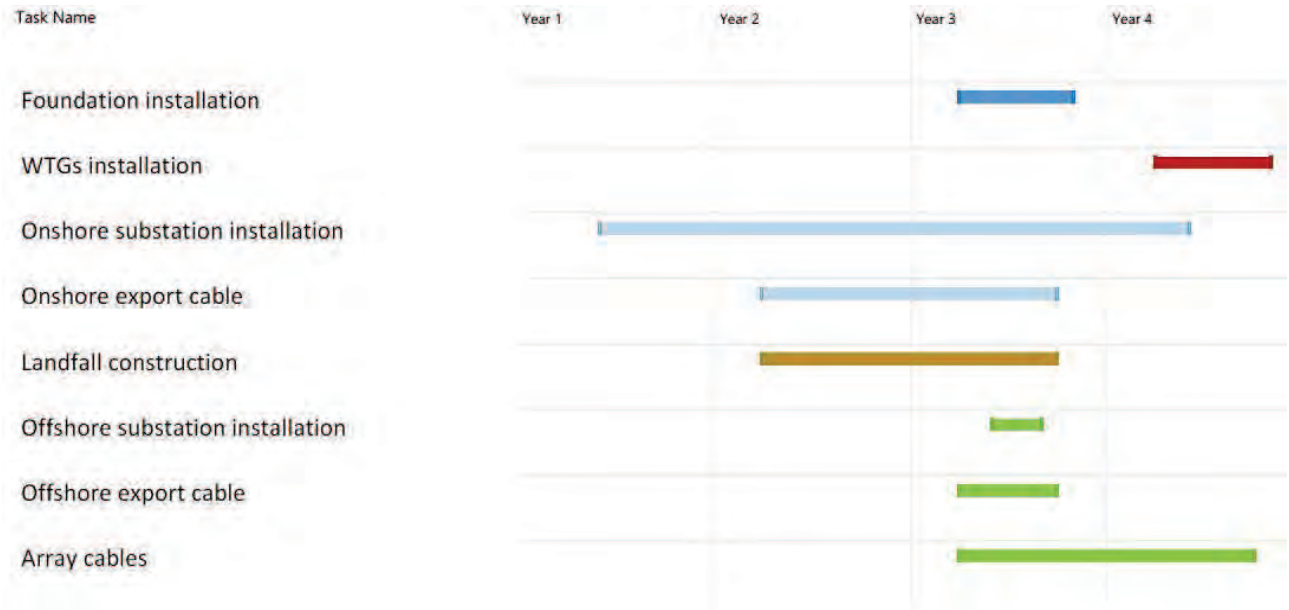
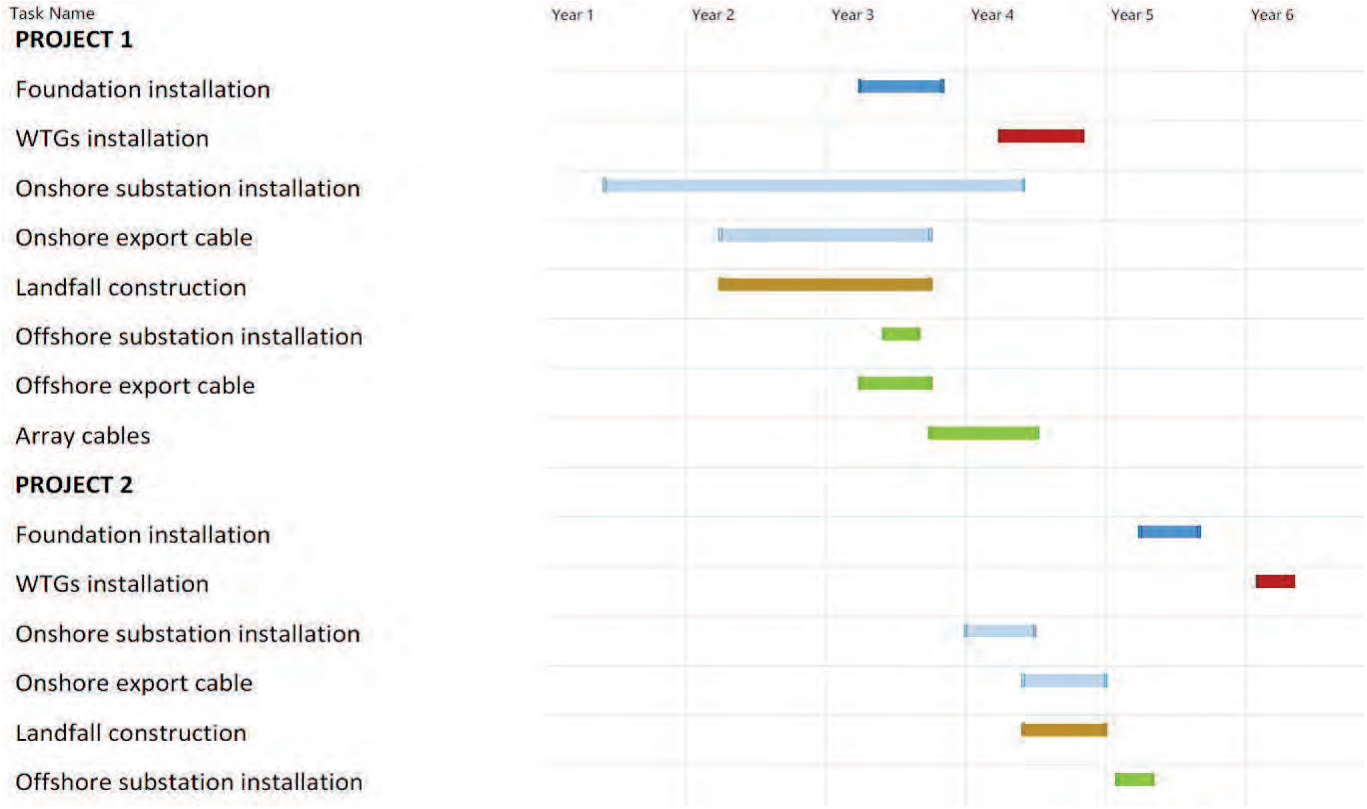


Figure 1.5-6 Construction Program Separated Grid Option



1.5.8 Operation, Maintenance and Decommissioning Phases

156. The Applicant will leverage the experience from the existing O&M organisations at Great Yarmouth and Wells-next-the Sea. Synergies will be identified and sought to be incorporated into the O&M strategy for DEP and SEP.

157. The overall operations and maintenance (O&M) strategy will be finalised once the technical specification is known, including wind turbine type, electrical transmission design and final project layout.

158. The general O&M strategy will rely primarily on crew vessels, supply vessels, and helicopters for the O&M services that will be performed at the wind farms.

159. Maintenance activities will be categorised into two levels: preventive and corrective maintenance. Preventive maintenance will be undertaken according to scheduled services whereas corrective maintenance would be needed to cover unexpected repairs, component replacements, retrofit campaigns and breakdowns.

160. At the end of the operational lifetime of the wind farm, assumed to be minimum 30 years, it is anticipated that all offshore structures above the seabed (foundations and electrical infrastructure) will be removed and the site of the onshore substation will be restored. All electrical cables will be left in-situ to minimise environmental impacts associated with their removal. The decommissioning sequence will take approximately three years and will be undertaken in reverse of the construction sequence, involving similar types and numbers of vessels and equipment. The decommissioning plan and program will be developed prior to construction and be updated during the projects' lifespan to take account of changing best-practice and new technologies.

1.6 EIA Methodology

1.6.1 Introduction

161. The EIA will be undertaken in accordance with the Planning Act 2008 and the EIA Regulations (see **Section 1.3**). Furthermore, the approach to the EIA and the production of the resulting ES document will closely follow relevant guidance including:
    - Overarching National Policy Statements for Energy EN-1, Renewable Energy Infrastructure EN-3, and Electricity Networks Infrastructure EN-5 (DECC, 2011b);
    - Assessment of the environmental impact of offshore wind-farms (OSPAR Commission, 2008);
    - Planning Inspectorate Advice Notes (e.g. the Planning Inspectorate, 2017a; 2017b; 2017c; 2018a; 2018b);
    - Relevant guidance issued by other government and non-governmental organisations; and
    - Receptor/topic specific guidance documents.
162. It will also have due regard to the requirements of the Habitats and Species Regulations 2010, The Offshore Marine Conservation (Natural Habitats, &c.) (Amendment) Regulations 2017 and the Marine and Coastal Access Act 2009.
163. The outputs of the EIA will be presented in a Preliminary Environmental Information Report (PEIR) and thereafter the final ES and associated documents in support of the application for development consent. It is intended that the PEIR will be a draft ES and will include full assessments for topics wherever possible to maximise stakeholder consultation and subsequent input prior to application. The final ES will update the assessments to take account of any final information and stakeholder feedback.

1.6.2 Stakeholder Consultation

164. Regular consultation with stakeholders is key to the success of the EIA process and will be undertaken throughout the assessment and site selection work. An Evidence Plan Process (EPP) has been set up and will be followed during the EIA to structure some of the technical stakeholder consultation where there are multiple interested parties. This process has been initiated during the production of this Scoping Report, with the first Steering Group meeting (attended by the MMO, Natural England and Norfolk County Council alongside Equinor and its advisors) being held in July 2019.
165. The EPP is a voluntary mechanism to help agree the information required by the Planning Inspectorate as part of an application for development consent to help ensure compliance with the EIA Regulations and Habitats Regulations. The EPP aims to give greater certainty to all parties on the nature, amount and range of evidence the Applicant should collect and present to support the application.
166. The EPP will include expert topic group (ETG) meetings that provide a platform to debate advice on each topic between multiple agencies. The process will be monitored by a steering group and will be formulated to meet the requirements of the Planning Act 2008 (see **Section 1.6.4**).

167. Ongoing discussions will be minuted to log areas of agreement/disagreement on key aspects of the EIA, such as data acquisition, survey methodologies and approach to assessment, data analysis results and impact assessment outcomes to ensure the EIA is as robust as possible. The approach provides increased certainty to key stakeholders on the amount and range of evidence to be presented within the application, as well as enabling the Applicant to address issues early in the pre-application stage.

1.6.3 Characterisation of the Existing Environment

168. The characterisation (description) of the existing environment will define the existing conditions in the area covered by DEP and SEP and relevant surrounding study areas. This will comprise the following steps:
    - Study areas will be defined for each receptor based on the relevant characteristics of the receptor (e.g. mobility/range);
    - Review of available existing information;
    - Review the likely or potential impacts that might be expected to arise from the development;
    - Determine if data is sufficient to make EIA judgments and, where relevant, HRA judgements with confidence;
    - If further data is required, ensure that data gathered are targeted and directed at answering the key questions and filling key data gaps; and
    - Review the information gathered to ensure the environment can be characterised in sufficient detail.

169. Consideration will also be given to the evolution of the baseline in the absence of the project; this will take account of current trends such as climate change and biodiversity loss.

170. The specific approach to establishing a robust baseline (upon which impacts can be assessed) is set out under each parameter within this Scoping Report (**Parts 2** to **4**). It is envisaged that this approach will be subject to review following the receipt of the Scoping Opinion from the Planning Inspectorate and subsequent consultation with statutory and non-statutory bodies. It is also recognised that this approach may evolve over time with the collection of new data from the study area and as the design of the project advances.

1.6.4 Assessment of Impacts

171. Potential impacts to be considered within the EIA will be agreed with stakeholders through an ongoing program of stakeholder engagement throughout the EIA process. The EPP will also inform the scope of the impact assessment for those environmental receptors covered by ETGs (namely Offshore Ornithology; Marine Mammal Ecology; Seabed (including benthic ecology, fish and shellfish ecology, and marine physical processes); Terrestrial Ecology and Ornithology; Seascape, Landscape and Visual; Traffic; and Archaeology (both onshore and offshore)).

172. The approach the EIA team will take to making balanced assessments will be guided by both EIA specialists and technical specialists using existing data, newly collected data, experience and expert judgement. In order to provide a consistent framework and system of common tools and terms, where appropriate, a matrix approach will be used to frame and present the professional judgements that are made. However, it should be noted that for each topic of the EIA, the latest guidance or best practice will be used and therefore definitions of sensitivity and magnitude of impact will be tailored to each receptor. The impact assessment will consider the potential for impacts during the construction, operation and decommissioning of DEP and SEP.

1.6.4.1 Determining Receptor Sensitivity and Value

173. The determination of receptor sensitivity is required to assess the potential impacts upon each receptor.

174. Receptor value considers whether, for example, the receptor is rare, has protected or threatened status, importance at local, regional, national or international scale, and in the case of biological receptors whether the receptor has a key role in the ecosystem function. These considerations are balanced against the properties of the receptor under consideration.

175. The ability of a receptor to adapt to change, tolerate, and/or recover from potential impacts will be key in assessing its sensitivity to the impact under consideration. For ecological receptors tolerance could relate to short term changes in the physical environment, for human environment receptors tolerance could relate to displacement effects and therefore impacts upon economics or safety. It also follows that the capacity to recover will be a key consideration in determining receptor sensitivity.

176. The overall receptor sensitivity is determined by considering a combination of value, adaptability, tolerance and recoverability and applying expert judgement and / or past experience.

177. Expert judgement is particularly important when determining the sensitivity of receptors. For example, an Annex II species (under the Habitats Directive) would have a high value, but if it was highly tolerant of an impact or had high recoverability it would follow that the sensitivity in this instance should reflect the ecology rather than default to the protected status alone.

1.6.4.2 Predicting the Magnitude of Impacts

178. To predict the significance of an impact, it is necessary to establish the magnitude and probability of an impact occurring through a consideration of:

- Scale or spatial extent (small scale to large scale or most of the population or a few individuals);
- Duration (short term to long term);
- Frequency; and
- Nature of change relative to the baseline.

1.6.4.3 Evaluation of Significance

179. After establishing the sensitivity and magnitude, the impact significance will be predicted using quantitative or qualitative criteria as appropriate to ensure a robust assessment. Where possible, a matrix such as the one presented in **Table 1-11** will be used to aid assessment of impact significance based on expert judgement. As stated earlier the matrix is used to aid transparency in the professional judgements that are made. For each section of the ES, the best methodology (based on the latest available guidance) will be followed and, when more appropriate, an approach other than the matrix may be used.

180. **Table** 1-12 provides an indication of the significance definitions that the Applicant proposes to use in the assessment process for the majority of parameters. These will be confirmed through the EIA process.

181. A description of the approach to impact assessment and the interpretation of significance levels will be provided within each section of the ES. This approach will ensure that the definition of impacts is transparent and relevant to each topic under consideration.

Table 1-11 Significance of an impact resulting from each combination of receptor sensitivity and the magnitude of the effect upon it.

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

Table 1-12 Impact significance definitions

Impact Significance	Definition
Major adverse	Very large or large change in receptor condition, both adverse or beneficial, which are likely to be important considerations at a regional or district level because they contribute to achieving national, regional or local objectives, or, could result in exceedance of statutory objectives and/or breaches of legislation.
Moderate adverse	Intermediate change in receptor condition, which are likely to be important considerations at a local level.
Minor adverse	Small change in receptor condition, which may be raised as local issues but are unlikely to be important in the decision-making process.
Negligible	No discernible change in receptor condition.
Minor beneficial	The impact is of minor significance but has been assessed as having some benefit to receptor condition.
Moderate beneficial	The impact is assessed as providing a moderate benefit to receptor condition.
Major beneficial	The impact is assessed as providing a significant benefit to receptor condition.

1.6.4.4 Mitigation

182. Where the impact assessment identifies that an aspect of the development is likely to give rise to significant environmental impacts, mitigation measures will be proposed and discussed with the relevant authorities to avoid impacts or reduce them to acceptable levels and, if possible, to enhance the environment.

183. Additionally 'biodiversity net gain' will be sought through the mitigation hierarchy for onshore elements so that it can be demonstrated that the Projects are improving biodiversity, in line with new governmental mandate. So far net gain discussions have focussed on onshore project elements only, but these have recently been expanded to consider potential mechanisms in the intertidal zone as well. The Projects will follow these discussions and any new guidance in relation to intertidal and offshore net gain.

184. For the purposes of the EIA, two types of mitigation have been defined and these will be identified in the ES:

- Embedded mitigation, consisting of mitigation measures that are identified and adopted as part of the project design, will be included and assessed in the EIA; and
- Additional mitigation, consisting of mitigation measures that are identified during the EIA process to reduce or eliminate any predicted impacts, which are subsequently adopted by the Applicant as project commitments.

1.6.4.5 Assessing Residual Impacts

185. Following identification of mitigation measures, impacts will be re-assessed and all residual impacts will be described. Where no mitigation measure is proposed, an explanation will be provided as to why the impact cannot be reduced.

1.6.4.6 Inter-relationships

186. The assessments will consider relevant inter-relationships, as indicated in Parts 2 to 4 below. The objective will be to identify instances where the accumulation of residual impacts on a single receptor, and the relationship between those impacts, might affect the requirement for mitigation.

1.6.4.7 Cumulative Impacts

187. Cumulative Impact Assessment (CIA) forms part of the EIA process. The scope of the CIA (in terms of relevant issues and projects) will be established with consultees (including other developers) as the EIA progresses. In addition, the Applicant will look at the experience from other projects off the Norfolk and Suffolk coast, the wider Southern North Sea, and other UK projects as well as incorporating continuing work from industry-wide initiatives with regard to cumulative impact.

188. The Planning Inspectorate Advice Notes Nine and Seventeen provide guidance on plans and projects that should be considered in the CIA including:

- Projects that are under construction;
- Permitted applications, not yet implemented;
- Submitted applications not yet determined;
- Projects on the Planning Inspectorate's Program of Projects;
- Development identified in relevant Development Plans, with weight being given as they move closer to adoption and recognising that much information on any relevant proposals will be limited; and
- Sites identified in other policy documents as development reasonably likely to come forward.

189. Only projects which are reasonably well described and sufficiently advanced to provide information on which to base a meaningful and robust assessment will be included in the CIA.

190. Projects which are sufficiently implemented during the site characterisation for DEP and SEP will be considered as part of the baseline for the EIA.

191. Offshore cumulative impacts may come from interactions with the following activities and industries:

- Other wind farms;
- Aggregate extraction and dredging;
- Licensed disposal sites;
- Navigation and shipping;
- Commercial fisheries;
- Sub-sea cables and pipelines;

- Potential port/harbour development; and
- Oil and gas activities.

192. Onshore plans or projects that may be considered include (but not limited to):
    - Other offshore wind farm infrastructure present onshore;
    - Other energy generation infrastructure;
    - Building/housing developments;
    - Installation or upgrade of roads;
    - Installation or upgrade of cables and pipelines;
    - Coastal protection works; and
    - National Grid works.

193. The full list of ongoing plans or projects to be included in the CIA will be developed as part of on-going consultation with technical consultees.

194. With respect to the consenting strategy as described in **Section 1.1.2** (namely a single application for development consent addressing both wind farm extensions and their associated transmission infrastructure), cumulative impacts will be considered in relation to both of the projects being developed together, as the worst case.

1.6.4.8 Transboundary Effects

195. Regulation 24 of the EIA regulations sets out procedures to address issues associated with a development that might have significant impact on the environment in another European Member State.

196. The procedures involve providing information to the Member State and for the Planning Inspectorate to engage in consultation with that State regarding the significant impacts of the development and the associated mitigation measures. Further advice on transboundary issues, in particular with regard to consultation is given in the Planning Inspectorate Advice Note Twelve (Planning Inspectorate, 2015c).

1.6.4.9 Assessment of Development Options

197. As described in **Section 1.1.2**, a combined EIA process will be followed for DEP and SEP, with combined associated submissions. Each project will be assessed individually, thereby covering the possibility that one or the other (but not both) of the projects are developed, as well as both projects being assessed together, either concurrently or sequentially. In the case that both projects are developed, the EIA will consider the appropriate realistic worst-case scenario with respect to the integrated or separate grid options (see **Section 1.1.2** for further details) and present the results accordingly.

198. Assessing the development options in this way will ensure a consistent and transparent approach to assessments, consultation and examination, and will facilitate comparison of the impacts associated with the different options alongside identification of the worst case option in terms of environmental impact.

1.6.5 Draft Outline of the Environmental Statement

199. The ES will document the EIA process and will describe the project and the EIA process with regard to the latest legislation, policy and guidance. Subject to the outcomes of the scoping process, the ES may comprise the following documents, parts and chapters:

- Volume 1 Non-Technical Summary
- Volume 2 Environmental Statement
  - Part 1: Introductory Chapters
    - Introduction
    - Need for the Project
    - Policy and Legislative Context
    - Site Selection and Assessment of Alternatives
    - Site Description
    - Project Description
    - EIA methodology
  - Part 2: Offshore Environment
    - Marine Geology, Oceanography and Physical Processes
    - Marine Water and Sediment Quality
    - Benthic and Intertidal Ecology
    - Fish and Shellfish Ecology
    - Marine Mammal Ecology
    - Offshore Ornithology
    - Commercial Fisheries
    - Shipping and Navigation
    - Offshore Archaeology and Cultural Heritage
    - Aviation and MoD
    - Other Marine Users
    - Offshore Designated Sites Summary
  - Part 3: Onshore Environment
    - Onshore Ground Conditions and Contamination
    - Air Quality
    - Water Resources and Flood Risk
    - Land Use
    - Onshore Ecology (including onshore nature conservation designations)
    - Onshore Ornithology
    - Onshore Archaeology and Cultural Heritage
    - Noise and Vibration
    - Traffic and Transport

    - Part 4: Wider Scheme Impacts
        - Landscape and Visual
        - Socio-Economics
        - Human Health
        - Tourism and Recreation
    - Part 5: Cumulative and Transboundary Impacts
    - Part 6: Summary of Impacts
- Volume 3: Technical appendices.

1.6.6 Other DCO Documents

200. The EIA work will inform and/or relate to a number of other documents, plans and strategies which will be included in the overall suite of application documents. The precise approach will be finalised as the application progresses but is likely to include:

- Environmental Protection Statement of Engagement.
- Report to Inform Habitats Regulations Assessment.
- Flood Risk assessment.
- Safety Zone Assessment.
- Navigation Risk Assessment.
- Schedule of Mitigation.
- Code of Construction Practice.
- Design and Access Statement.
- Outline Written Scheme of Investigation (onshore).
- Outline Written Scheme of Investigation (offshore).
- Public Rights of Way Strategy.
- Outline Landscape and Ecological Management Strategy.
- Draft Great Crested Newt Licence Application.
- Outline Traffic Management Plan.
- Outline Access Management Plan.
- Abnormal Loads assessment.
- Construction Environmental Management Plan.
- In Principle Monitoring Plan.
- Outline Offshore Operations and Maintenance Plan.
- Site Characterisation Report (in the case of dredging and disposal activities in the marine environment).
- Draft Marine Mammal Mitigation Protocol.
- In Principle Site Integrity Plan (in the case of potential impacts on the Southern North Sea Special Area of Conservation – to be determined).

2 PART 2: OFFSHORE

2.1 Marine Geology, Oceanography and Physical Processes

201. The specific assessment requirements for marine geology, oceanography and physical processes are set out within the overarching National Policy Statement (NPS) for Energy EN-1 and NPS for Renewable Energy Infrastructure (EN-3) and are summarised in **Table A1-1** in **Appendix 1**.

2.1.1 Existing Environment

2.1.1.1 Tidal Currents

202. Spring tide current flows across the DEP and SEP sites are directed approximately northwest on a flood tide and southeast on an ebb tide. Mean spring tide current velocities of about 1m/s occur at the sites with lower velocities closer to the coast across the export cable corridors. Closer to the coast, current directions are approximately shore-parallel. Tidal current residuals have variable directions and velocities from the coast across the extension sites.

2.1.1.2 Wave Regime

203. The most frequent waves across the extension sites are from the southwest to northwest sector, but their fetch lengths are relatively short, and significant waves are small (generally less than 1m). Waves from the northwest to northeast sector are less frequent, but they are not fetch-limited and generate larger waves. Nearshore wave conditions are less severe due to the protection afforded by Sheringham Shoal sand bank.

2.1.1.3 Bedload Sediment and Transport

204. Apart from Sheringham Shoal sand bank, sea bed sediment comprises a thin veneer (generally less than 0.5m but up to 1-2m in places) of gravelly sand resting on till. Chalk may be exposed at the sea bed closer to the coast. The sand comprising Sheringham Shoal is up to 10m thick and surrounded by sand waves up to 5m high. Over most of the regional area the dominant driver of sediment transport is tidal current flow, and so the net sediment transport directions and rates are reflected in the variable tidal current residuals.

205. The coast of north to northeast Norfolk at the landfall search areas is an almost continuous line of glacial till cliffs with a short length of chalk cliffs at Weybourne. The coast is exposed and dynamic with rapid cliff erosion occurring in places. Severe storm events can rapidly change beach levels and the degree of exposure of the natural or defended coastline. Net sediment transport is to the west at the Weybourne landfall search areas and to the southeast at the Bacton landfall search area.

2.1.1.4 Suspended Sediment

206. Typical mean summer suspended sediment concentrations along the export cable routes and at the extension sites are less than 10mg/l whereas mean winter concentrations are 30mg/l, although concentrations may increase significantly during storm events. These moderate ambient concentrations mean that the transient impact of sediment plumes arising from installation of the wind farm may be significant (although temporally limited) under specific circumstances.

2.1.2 **Potential Impacts**

207. The Marine Geology, Oceanography and Physical Processes assessment is likely to have key inter-relationships with Marine Water and Sediment Quality, Benthic and Intertidal Ecology and Fish and Shellfish Ecology and these will be considered where relevant throughout the EIA process.

2.1.2.1 Potential Impacts During Construction

Effects to hydrodynamic regime (waves and tidal currents)

208. Whilst there is potential for the physical presence of construction plant and offshore infrastructure to impact upon the hydrodynamic regime, this impact would increase incrementally as the wind farm extensions are constructed with the greatest potential impacts resulting from the completed wind farms. This impact is therefore covered under 'Potential impacts during operation', below, and is scoped out of further consideration in relation to the construction phase.

Effects on bedload sediment transport

209. Construction of the wind farm extensions will not change the geology of the site other than in the case of localised effects associated with foundation and cable installation. Due to the localised nature of these effects it is not anticipated that such changes would give rise to significant impacts on sea bed features, and neither would there be any changes in coastal morphology. However, further consideration (using conceptual methods) will be given to the potential effects on the form and function of the bedload sediment transport processes due to cable installation.

Effects on suspended sediment concentrations and transport

210. Sea bed preparation (for foundation and cable laying), drilling for foundations, and cable installation (including ploughing/trenching and burial, open cut and HDD) would lead to localised sediment disturbance and temporary increases in suspended sediment concentrations. The effect of construction activities on suspended sediment concentrations will be assessed using expert based assessment, predicated on a source-pathway-receptor conceptual model and verified and tested against previous numerical modelling for the existing Dudgeon and Sheringham Shoal Offshore Wind Farms.

2.1.2.2 Potential Impacts During Operation

Effects to hydrodynamic regime (waves and tidal currents)

211. Multiple large foundations and any persistent drill arising mounds are likely to increase local drag forces and tidal flows and potentially diffract and scatter waves which could lead to morphological and physical compositional changes to the sea bed. The potential for operational effects on waves and tidal currents will be assessed in the same conceptual way as construction effects on suspended sediment concentrations and transport.

Effects on bedload sediment transport

212. Previous studies have concluded that minimal impacts can be expected on the prevailing bedload sediment transport conditions, both within wind farm sites as well as in the far-field, provided that the foundations are adequately spaced (which will vary depending on the details of the foundations and wind farm layout). Impacts on sediment transport are likely to be localised to the areas immediately surrounding the individual foundations in the form of sea bed scour where the sediment is soft enough to be mobilised. Scour at each foundation will be assessed using well-established empirical methods applied to offshore wind farms elsewhere.

213. Where the export cables are buried there would be no effect on bedload sediments and sediment transport. However, it is possible that cable protection would be required at locations where the sea bed is characterised by hard geology and at the landfall exit points. The effects that cable protection may have on marine geology, oceanography and physical processes primarily relate to the potential for interruption of sediment transport, both offshore and at the coast, and the footprint they present on the sea bed. The effect of cable operation on sediment transport will be assessed using conceptual methods and expert based judgement.

Effects on suspended sediment concentrations and transport

214. There is potential for sediments to be re-suspended by scouring effects. Consideration will be given (using conceptual methods) to likely changes in suspended sediment concentrations due to scour during the operational phase.

2.1.2.3 Potential Impacts During Decommissioning

215. The removal of the foundations has the potential to affect hydrodynamic regime, sediments and sedimentary structures, and suspended sediment concentrations and transport. Any impacts arising from decommissioning are likely to be of lower magnitude than those associated with construction.

2.1.2.4 Potential Cumulative Impacts

216. There is the potential for cumulative impacts with a range of other activities including the existing wind farms, aggregate extraction and dredging, subsea cables and oil and gas activity. These will be identified and assessed in line with the approach set out in **Section 1**.

2.1.2.5 Potential Transboundary Impacts

217. Given that the likely hydrodynamic and sedimentary impacts of the extensions will be restricted to near-field change only, transboundary impacts are unlikely to occur, or are unlikely to be significant, and therefore it is proposed that transboundary impacts will not be considered further during the EIA for this topic.

2.1.2.6 Summary of Potential Impacts

218. A summary of potential impacts is shown in **Table 2-1**.

Table 2-1 Summary of impacts relating to marine geology, oceanography and physical processes (scoped in ✓, scoped out x)

Potential Impacts	Construction	Operation	Decommissioning
Effects on hydrodynamic regime (waves and tidal currents)	x	✓	✓
Effects on bedload sediment transport	✓	✓	✓
Effects on suspended sediment concentrations and transport	✓	✓	✓
Cumulative impacts	✓	✓	✓
Transboundary impacts	x	x	x

2.1.3 Approach to Assessment and Data Gathering

219. As part of the EIA process, the existing environment with respect to marine geology, oceanography and physical processes will be described, including, but not limited to the following:

- Bathymetry;
- Geology;
- Water levels;
- Tidal currents;
- Waves;
- Climate change;
- Sea bed sediment distribution;
- Bedload sediment transport;
- Suspended sediment transport;
- Morphological change;
- Coastal processes at the landfall; and
- Anticipated trends in baseline conditions.

220. For the effects on marine geology, oceanography and physical processes, the assessment will follow two approaches. The first type of assessment is impacts directly affecting receptors which possess their own intrinsic morphological value. The impact assessment will incorporate a combination of the sensitivity of the receptor, its value (if applicable) and the magnitude of the change to determine a significance of impact.

221. In addition to identifiable receptors, the second type of assessment would cover changes to marine geology, oceanography and physical processes which in themselves are not necessarily impacts to which significance can be ascribed (such as an increase in suspended sediment concentrations). However, such changes may indirectly impact other receptors such as benthic and intertidal ecology (for example). In this case, the magnitude of effect is determined in a similar manner to the first assessment method but the significance of impacts on other receptors is made within the relevant chapters of the ES pertaining to those receptors.

222. **Table 2-2** identifies the main desk-based sources that will be accessed to inform the characterisation of the existing environment.

Table 2-2 Data sources that will be used

Data source	Date	Data contents
Scira Sheringham Shoal Offshore Wind Farm Environmental Statement and associated technical supporting documents	2006	All marine geology, oceanography and physical processes information and data related to the existing offshore wind farm
HR Wallingford. 2006. Sheringham Shoal Wind farm: Coastal and seabed processes. HRW Report EX5117.	2006	Numerical modelling of the existing offshore wind farm
Dudgeon Offshore Wind Farm Environmental Statement and associated technical supporting documents	2009	All marine geology, oceanography and physical processes information and data, including numerical modelling, related to the existing wind farm
Geophysical monitoring of Dudgeon Offshore Wind Farm (Fugro EMU)	2014	Bathymetry, bedforms, sea bed sediment distribution, shallow geology
Post construction geophysical monitoring of Sheringham Shoal Offshore Wind Farm (Fugro EMU)	2014-15	Bathymetry and sea bed character
Post construction geophysical monitoring of Dudgeon Offshore Wind Farm (MMT)	2018	Bathymetry and sea bed character
Post construction environmental monitoring of Dudgeon Offshore Wind Farm (MMT)	2018	Sea bed sediments

223. The following surveys / studies will be undertaken in 2019-2020 to inform the assessment (**Table 2-3**). Surveys will be agreed in advance with stakeholders where required.

Table 2-3 Proposed baseline surveys

Survey/study	Timing	Spatial Coverage
Multibeam bathymetry	2019-2020	Extension areas and offshore cable corridor

Survey/study	Timing	Spatial Coverage
Side-scan sonar	2019-2020	Extension areas and offshore cable corridor
Sub-bottom profiling	2019-2020	Extension areas and offshore cable corridor

224. The assessment will be undertaken in accordance with following standards and guidance:
    - Guidance on Environmental Impact Assessment in Relation to Dredging Applications (Office of the Deputy Prime Minister, 2001);
    - Offshore Wind Farms: Guidance Note for Environmental Impact Assessment in respect of Food and Environmental Protection Act (FEPA) and Coast Protection Act (CPA) requirements: Version 2 (Cefas, 2004);
    - Review of Cabling Techniques and Environmental Effects applicable to the Offshore Windfarm Industry (BERR, 2008);
    - Coastal Process Modelling for Offshore Windfarm Environmental Impact Assessment (COWRIE, 2009); and
    - Guidelines for Data Acquisition to support Marine Environmental Assessments of Offshore Renewable Energy Projects (Cefas, 2011).

225. The assessment of effects on marine geology, oceanography and physical processes will be predicated on a source-pathway-receptor conceptual model, whereby the source is the initiator event, the pathway is the link between the source and the receptor impacted by the effect, and the receptor is the receiving entity. An example of this type of conceptual model is provided by cable installation which disturbs sediment on the seabed (source). This sediment is then transported by tidal currents until it settles back to the seabed (pathway). The deposited sediment could change the composition and elevation of the seabed (receptor).

226. Following the identification of the preferred offshore development area, further liaison with stakeholders will be undertaken to agree the approach and methodology to data collection for EIA purposes and the specific assessment methodology. A detailed method statement will be developed and agreed with stakeholders as part of the EPP.

2.2 Marine Water and Sediment Quality

227. The specific assessment requirements for Marine Water and Sediment Quality are set out within National Policy Statements EN-1 and EN-3 and are summarised in **Table A1-2** in **Appendix 1**.

2.2.1 Existing Environment

2.2.1.1 Sediment Information

228. The existing Dudgeon and Sheringham Shoal Offshore Wind Farms have carried out numerous site specific surveys in and around the DEP and SEP sites at the characterisation (EIA), pre-construction and post-construction stages of development (e.g. DOW, 2009; Scira, 2014, 2006; Fugro, 2015; Equinor, 2019). Due to their close proximity these provide a good indication of the general nature of the sediments that can be expected in the proposed extension sites, interlink and export cable corridors.

229. Post-construction surveys within and around the existing Dudgeon Offshore Wind Farm array and export cable corridor (Equinor, 2019) recorded sediment mainly comprised of sand and gravel. The proportion of mud (clay and silt) recorded was very low (maximum 7%) in all but one sample, which had a mud content of 24%. Similarly, the Sheringham Shoal Offshore Wind Farm Environmental Statement (Scira, 2006) identifies coarse to medium sands, gravels and pebbles as the main sediment types recorded across the site. A Sheringham Shoal Offshore Wind Farm post-construction benthic monitoring survey (Scira, 2014) confirmed deposits were predominantly characterised by sand and gravel with lower proportions of silt. Eight sample stations taken from a reference area, located within the proposed SEP site, recorded sediments dominated by sand and gravel components.

230. In terms of sediment quality, the results from sediment analysis undertaken to inform the Dudgeon Offshore Wind Farm Environmental Statement (DOW, 2009) indicate low levels of contamination across both the offshore wind farm and export cable corridor (i.e. below Cefas Action Level 1). At Sheringham Shoal Offshore Wind Farm, samples from five locations were analysed within and around the proposed cable corridor (Scira, 2006). Samples were only taken in the nearshore environment, as it was agreed that the potential for historical contamination in the wind farm area was limited, given the prevailing sedimentary and hydrodynamic regime and the lack of fine material to which contaminants could bind. Only one site exceeded Cefas Action Level 1, for arsenic, but the exceedance was marginal (i.e. only just above Action Level 1). Elevated levels of arsenic are typical of this region of the southern North Sea and are associated with estuarine and geological inputs from seabed rock weathering.

2.2.1.2 Water Quality

231. Information collated in the Environmental Statement for Sheringham Shoal notes that suspended solids loads vary from typical mean summer values of less than 10mg/l to typical mean winter values of 30mg/l. During storm events, the natural levels of suspended solids may increase well above these values (see **Section 2.1**) (Scira, 2006).

232. Information is available from Defra to assess progress against the UK Government and the Devolved Administration's vision of clean, healthy, safe, productive and biologically diverse oceans and seas. Charting Progress 2 (2014) states that, for the North Sea, toxicological hazard from metals in water samples analysed against EU Directive requirements (mainly in estuarine waters) and Shellfish Waters (mainly in coastal waters); nearly 99% of metal concentrations were below the UK Environmental Quality Standards (EQS) values in 2007, although 6% of copper concentrations exceeded the EQS. However, areas where these exceedances were recorded were located within estuarine environments, not in offshore waters. As a result, the report concludes that levels of contaminants in offshore UK waters are generally low.

233. The offshore cable route search areas run through Water Framework Directive (WFD) coastal water bodies, specifically the Norfolk East WFD coastal water body (GB650503520000), and the Weybourne corridor option is partly located within the Norfolk North WFD water body (GB640503300000) in the western part of the landfall approach (see **Figure 2.2.1**, **Appendix 2**). Both water bodies are 'heavily modified'; Norfolk North due to flood protection and Norfolk East due to flood and coastal protection. Both water bodies are currently classified to have an overall status of 'moderate' (Environment Agency, 2019a).

234. Classification for physico-chemical parameters in both water bodies is considered moderate due to dissolved inorganic nitrogen concentrations in the water. In the River Basin Management Plan, reasons for the elevated inorganic nitrogen concentrations are listed as diffuse pollution (arable land and therefore field runoff), and point sources associated with sewage discharges. In terms of chemical contaminants, both water bodies are considered to be at 'good' status, thus indicating no exceedances of EQS.

235. There are five designated bathing waters located within the vicinity of the offshore cable route search area (see **Figure 2.2.1**, **Appendix 2**). The WFD bathing waters in closest proximity to the landfall areas are Sheringham, and Mundesley. These bathing waters have been classified as having excellent bathing water quality since 2016 (Environment Agency, 2019b).

2.2.2 Potential Impacts

236. The Marine Water and Sediment Quality assessment is likely to have key inter-relationships with Marine Physical Processes, Benthic and Intertidal Ecology and Fish and Shellfish Ecology and these will be considered where relevant throughout the EIA process.

2.2.2.1 Potential Impacts During Construction

237. Potential effects during construction primarily relate to the potential for releasing sediment into the water column during either seabed preparation, drilling for foundations or during cable installation. This in turn could give rise to changes in water quality with increases in suspended solid concentrations and releases of any contamination associated with sediment particles.

238. Effects could also occur if construction vessels and equipment discharge, leak or spill contaminants into the water. However, all vessels involved will be required to comply with the International Convention for the Prevention of pollution from Ships (MARPOL) 73/78. A Project Environmental Management and Monitoring Plan (or similar) will also be put in place to ensure all works are undertaken in line with best practice for working in the marine environment. As a result, it is proposed that effects relating to leaks or spills are scoped out of the EIA.

2.2.2.2 Potential Impacts During Operation

239. Localised changes in tidal and wave regimes around each foundation structure could have the potential to result in scour of the seabed and therefore increase concentrations of suspended sediments in the water column. However, these are likely to be localised to the structures and short lived (i.e. only during storm conditions). Consequently, if it is present, sediment contamination is also unlikely to give rise to changes in marine water quality. As a result, it is proposed that these effects are scoped out from further consideration within the EIA.

240. As per the construction phase, there is also the potential for spillages during maintenance operations, however, best practice measures will be put in place during the operation phase to reduce the risk as far as possible. As a result, it is proposed that effects from spills and leaks during operation are scoped out of the EIA.

2.2.2.3 Potential Impacts During Decommissioning

241. It is anticipated that the decommissioning impacts would be similar in nature to those of construction, although the magnitude of effect is likely to be lower. The effects will therefore be considered in the EIA although detailed assessment will be undertaken at the time of decommissioning using the latest available information.

2.2.2.4 Potential Cumulative Impacts

242. There is the potential for cumulative impacts with a range of other plans, projects and activities namely the existing Dudgeon and Sheringham Shoal offshore wind farms, other nearby offshore wind farms at planning, construction, operation and decommissioning phases, aggregate and dredging activities, oil and gas activity and subsea cable installation. These will be identified and assessed in line with the approach set out in **Section 1**.

2.2.2.5 Potential Transboundary Impacts

243. As the effects on Marine Water and Sediment Quality are likely to be restricted to the project boundary and immediate surrounding area, transboundary effects are proposed to be scoped out of the assessment.

2.2.2.6 Summary of Potential Impacts

244. A summary of potential impacts is shown in **Table 2-4** below.

Table 2-4 Summary of impacts relating to marine sediment and water quality (scoped in ✓, scoped out x)

Potential Impacts	Construction	Operation	Decommissioning
Potential for increases in suspended sediment	✓	x	✓
Potential for the release of contamination	✓	x	✓
Potential for accidental spills and leaks	x	x	x

Potential Impacts	Construction	Operation	Decommissioning
Cumulative impacts	✓	✓	✓
Transboundary impacts	X	X	X

2.2.3 Approach to Assessment and Data Gathering

245. As part of the EIA process, the existing environment with respect to Marine Water and Sediment Quality will be described, including, but not limited to the following:

- Seabed sediment type;
- Sediment contaminant levels;
- Water Quality (physico-chemical and chemistry); and
- Designations (bathing waters and WFD water bodies).

246. **Table 2-5** identifies the desk-based sources that will be accessed to inform the characterisation of the existing environment.

Table 2-5 Data sources to be used

Data source	Date	Data contents
DOW	2009	Dudgeon OWF Environmental Statement.
Scira	2006	Sheringham Shoal OWF Environmental Statement.
Equinor	2018/2019	Dudgeon OWF post-construction survey reporting.
Scira	2014	Sheringham Shoal Offshore Wind Farm. Second Post-Construction Benthic Monitoring Survey.
Environment Agency Data Catchment Explorer	2019b	Database for information related to river basin management plans (RBMP) in England. Contains information on river basin districts and catchments and Water Framework Directive compliance data.
Bathing water profiles	2019a (updated annually)	Water quality at designated bathing water sites in England are assessed by the Environment Agency between May and September. Data is published by the Environment Agency online.
Information in Marine Geology, Oceanography and Physical Processes chapter	2020	This chapter will provide baseline information on sediment type, suspended solids concentrations and potential concentrations of sediments within any plumes created during construction.

247. The following survey will be undertaken to inform the assessment (**Table 2-6**). The survey methods and required analyses will be agreed in advance with stakeholders including the MMO, Cefas and Natural England. As set out in **Section 2.1**, the effect of construction activities on suspended sediment concentrations will be assessed using expert based assessment using a source-pathway-receptor conceptual model. This model would be verified and tested against previous numerical modelling for the existing Dudgeon and Sheringham Shoal Offshore Wind Farms. The results will be used to inform the assessment of effects on Marine Sediment and Water Quality.

Table 2-6 Proposed baseline surveys

Survey/study	Timing	Spatial Coverage
Grab samples (as part of the Benthic Ecology survey, see **Section 2.3**)	Early – mid 2020	Wind farm area and export cable corridors

248. The assessment will be undertaken in accordance with following standards and guidance:

- Cefas Action Levels (available at MMO, 2014) to assess the risk to water quality associated with sediment contamination. Where high levels of contamination are identified (i.e. close to or above Cefas Action Level 2), consideration against WFD EQS will be undertaken.

249. The assessment will follow the methodology as outlined in **Section 1.6** with topic specific definitions for sensitivity and magnitude.

250. Following the identification of the preferred offshore development area, further consultation with the relevant stakeholders will be undertaken to agree the approach and methodology to data collection for EIA purposes and the specific assessment methodology. A detailed method statement will be developed and agreed with stakeholders as part of the EPP.

2.3 Benthic and Intertidal Ecology

251. The specific assessment requirements for Benthic and Intertidal Ecology are set out within National Policy Statements EN-1 and EN-3 and are summarised in **Table A1-3** in **Appendix 1**.

2.3.1 Existing Environment

252. The existing Dudgeon and Sheringham Shoal Offshore Wind Farms have carried out numerous site specific surveys in and around the development sites at the characterisation (EIA), pre-construction and post-construction stages of development (e.g. DOW, 2009; Scira, 2006, 2014; Fugro, 2015; Equinor, 2019). Due to their close proximity these provide a good indication of the general nature of the benthic and intertidal ecology that can be expected in the proposed extension areas, interlink and export cable corridors.

2.3.1.1 Subtidal habitats

253. The EUNIS habitats present within the scoping area are predominantly coarse sediment, with patches of rock, fine sand and muddy sand (**Figure 2.3.1** in **Appendix 2**; EMODnet, 2019). Seabed sediments in the area are dominated by sand, gravel and cobbles with smaller areas of mud and silt and the potential for outcropping chalk in the nearshore (Scira, 2006, 2014; DOW, 2006; Fugro, 2015; Equinor, 2019).

2.3.1.2 Subtidal species

254. The biotopes recorded at both of the existing Dudgeon and Sheringham Shoal Offshore Wind Farm sites and export cable routes including those with protected features are described below (**Table 2-7**).

Table 2-7 Biotopes and biotope complexes recorded during the site-specific surveys.

Site	Biotope or biotope complex	Designation (MarLIN, 2019)
Sheringham Shoal (Scira, 2006)	SS.SBR.PoR.SspiMx - Sparse or moderately dense crusts of *S. spinulosa* on circalittoral mixed sediment	Listed under the EC Habitats Directive for the Annex 1 feature Reef, OSPAR Annex V, Habitat of Principal Importance, Habitat of Conservation Interest
	SS.SCS.ICS - Infralittoral coarse sand	None
Dudgeon (Fugro, 2015; Equinor, 2019)	CR.HCR.XFa.FluCoAs.SmAs - *Flustra foliacea*, small solitary and colonial ascidians on tide-swept circalittoral bedrock or boulders	None
	SS.SSA.IFiSa.NcirBat - *Nepthys cirrosa* and *Bathyporeia spp.* in infralittoral sand	Habitat of Principal Importance, Habitat of Conservation Interest
	SS.SMx.CMx.FluHyd - *Flustra foliacea* and *Hydrallmania falcata* on tide-swept circalittoral mixed sediment/ SS.SMx.IMx.CreAsAn - *Crepidula fornicata* with ascidians and anemones on infralittoral coarse mixed sediment	None
	CR.HCR.XFa.FluCoAs.SmAS - *Flustra foliacea*, small solitary and colonial ascidians on tide swept circallittoral bedrock and boulders	Listed under the EC Habitats Directive for the Annex 1 feature Reef
	SS.SCS.ICS.SLan - Dense *Lanice conchilega* and other polychaetes in tide-swept infralittoral sand and	SS.SCS.ICS.SLan - Habitat of Principal

Site	Biotope or biotope complex	Designation (MarLIN, 2019)
	mixed gravelly sand/ CR.MCR.CSab.Sspi – *Sabellaria spinulosa* encrusted circalittoral rock	Importance, Habitat of Conservation Interest CR.HCR.XFa.Mol - Listed under the EC Habitats Directive for the Annex 1 feature Reef
	SS.SCS.ICS.SLan - Dense *Lanice conchilega* and other polychaetes in tide-swept infralittoral sand and mixed gravelly sand/ CR.HCR.XFa.Mol – *Molgula manhattensis* with a hydroid and bryozoan turf on tide-swept moderately wave-exposed circalittoral rock	

255. Sand eels *Ammodytes sp.* are important prey species and are occasionally observed in association with SS.SSA.IFiSa.NcirBat (JNCC, 2015; MarLIN, 2019b). This biotope occurs throughout the existing Dudgeon Offshore Wind Farm site where the seabed was found to be comprised of medium to coarse sands (Equinor, 2019). *Ammodytes tobianus* were recorded in both pre- and post-construction surveys of the existing Dudgeon wind farm site (Fugro, 2015; Equinor, 2019). During the post-construction survey *A. tobianus* at a density of 1 per 0.1m^2 were recorded in a total of three samples within and just outside of the existing Dudgeon array (Equinor, 2019).

256. SS.SMx.IMx.CreAsAn is characterised by the presence of the invasive slipper limpet *Crepidula fornicata*. Post-construction surveys have noted an increase in the presence of slipper limpet within the existing Dudgeon and Sheringham Shoal arrays and export cable corridors (Equinor, 2019; Scira, 2014), however this is considered to be reflective of a regional increase in the presence and abundance of this species. The overall conclusion of the Dudgeon post-construction monitoring is that there are no significant differences in the benthic communities due to the construction of the wind farm (Equinor, 2019).

257. *Sabellaria spinulosa* is listed under Annex I of the Habitats Directive, and is a Habitat of Principal Importance when the density and elevation of the worm tubes meet certain criteria (Gubbay, 2007). Although non-Annex I reef *S.spinulosa* has been recorded at both of the existing sites, no Annex I *S.spinulosa* reefs have been recorded in the numerous surveys that have been undertaken over a long time period (Scira, 2006, 2014; Fugro, 2015; Equinor, 2019).

258. Similarly, biotopes CR.HCR.XFa.FluCoAs.SmAS and CR.HCR.XFa.Mol can also be listed under Annex I of the Habitats Directive for reefs if certain criteria are met (Irving, 2009). At the existing Dudgeon array and export cable corridor there was no evidence of reef-like structures in CR.HCR.XFa.FluCoAs.SmAS during the pre-construction survey (Fugro, 2015). This biotope was not present in the post-construction survey of the existing Dudgeon array and export cable corridor. CR.HCR.XFa.Mol was present as part of a mosaic on underlying chalk where *C.fornicata* was absent (Equinor, 2019). No reef-like structures were recorded by Sheringham Shoal post-construction benthic monitoring (Scira, 2014).

2.3.1.3 Intertidal habitats

259. The intertidal environment surveyed for both Sheringham Shoal and Dudgeon offshore wind farms was described as a highly mobile shingle beach, which was not deemed a suitable habitat for species colonisation and therefore detailed intertidal surveys were not carried out (DOW, 2012; Scira, 2006).

260. The intertidal environments at the landfall search areas are slightly different. At Weybourne (the landfall for the existing Dudgeon and Sheringham Shoal wind farms), the intertidal is predominantly comprised of moderate energy infralittoral seabed, moderate energy shallow circalittoral seabed, moderate energy infralittoral coarse sediment and littoral mud (Cefas, 2014; EMODnet, 2019). At Bacton, habitats include low and moderate energy infralittoral coarse sediment, littoral sand and muddy sand (JNCC, 2014; EMODnet, 2019).

2.3.1.4 Designated Sites and Protected Species and Habitats

Protected Species and Habitats

261. A number of protected species and habitats have been recorded in the offshore scoping area (**Table 2-7**). These include Habitats of Principal Importance and Habitats of Conservation Interest which are priority habitats and species within the UK listed under the Natural Environment and Rural Communities (NERC) Act (2006) Section 41. Biotopes that could be designated for bedrock, stony or biogenic reefs are also present which are described above.

262. Other protected species and habitats that could be present within the offshore scoping area are described in the following sections. The presence of protected species and habitats within the offshore scoping area will be further investigated during the site specific surveys described in **Table 2-10**.

Designated Sites

263. The proposed extension projects overlap with or are nearby a number of designated sites of relevance to benthic and intertidal ecology which are described below.

Cromer Shoal Chalk Beds MCZ

264. The Cromer Shoal Chalk Beds MCZ begins 200m from the North Norfolk Coast and extends 10km out to sea covering a total area of 321km^2 (DEFRA, 2016). The site is designated for features including exposed chalk and peat, which are rare in the North Sea. The chalk beds provide surfaces on which sessile organisms and algae can grow, in turn providing a habitat and nursery area for juvenile species. The chalk beds also provide a habitat for lobsters and crabs which support the local fishing industry (DEFRA, 2016).

265. Both of the export cable route search areas pass through the MCZ. The designated features that may be present within both of the export cable route search areas are:

- Moderate energy infralittoral and circalittoral rock;
- Subtidal chalk;
- Subtidal coarse sediment;
- Subtidal mixed sediments; and
- Subtidal sand.

The Wash and North Norfolk Coast SAC

266. The Wash and North Norfolk Coast SAC covers an area of 1,077.18km^2 within The Wash Estuary and south along the Norfolk Coast. It was ensured through the site selection process that the cable route search areas would not pass through the SAC. At the closest point, the scoping boundary is 1.33km from the site. The features of the SAC present close to the scoping boundary include sandbanks which are slightly covered by seawater all the time (1110) and mudflats and sandflats not covered by seawater at low tide (1140).

267. There is an area of mudflats and sandflats not covered by seawater at low tide which extends outside of the SAC into the offshore cable route search area in the Weybourne landfall search area (JNCC, 2014). Both of the offshore cable route search areas are situated in an area with high potential for Annex I habitat 1110 Sandbanks (JNCC, 2016). Impacts on these habitats will be investigated through the EIA process using the results of the site-specific surveys.

The Greater Wash SPA

268. The Greater Wash SPA stretches between the counties of Yorkshire to Suffolk over an area of 3,536km^2. The site is primarily designated for the protection of seabirds (red throated diver (*Gavia stellata*), common scoter (*Melanitta nigra*), little gull (*Hydrocoloeus minutus*), Sandwich tern (*Sterna sandvicensis*), common tern (*Sterna hirundo*) and little tern (*Sternula albifrons*). However supporting features include marine habitats and species which could be present within the scoping area including subtidal sandbanks and biogenic reef including *Sabellaria* reefs and mussel beds.

2.3.2 Potential Impacts

269. The Benthic and Intertidal Ecology assessment is likely to have key inter-relationships with Marine Physical Processes, Marine Water and Sediment Quality, Fish and Shellfish Ecology and Offshore Ornithology and these will be considered where relevant throughout the EIA process.

2.3.2.1 Potential Impacts During Construction

270. Activities that disturb the seabed, namely installation of foundations and cables, may result in habitat loss and increased suspended sediments. Remobilisation of suspended sediments may also result in the release of contaminants into the water column, although the risk of this is considered very low as data suggests the absence of significant levels of contaminants in the area (DOW, 2009; Scira, 2006) (see **Section 2.2**). Introduction of artificial hard substrates and the use of vessels during the construction phase could encourage the influx of invasive species (the effect of which is assessed during operation).

271. Underwater noise and particle motion from piling may also lead to disturbance. Whilst this is not considered likely to cause significant impacts on benthic and intertidal ecology receptors in EIA terms, the latest research will be considered and presented within the ES.

272. The scoping area for the export cable corridors is located within the Cromer Shoal Chalk Beds MCZ. Cable burial and any rock protection could have an adverse impact on the sensitive features that the site is designated for, as described above. Impacts could occur through disturbance of the seabed, changes in suspended solids, habitat structure changes, changes in water flow, smothering and siltation rate changes and abrasion or disturbance of the substrate on the surface of the seabed.

2.3.2.2 Potential Impacts During Operation

273. Potential impacts during operation will result from the physical presence of infrastructure such as foundations and any cable protection which will result in a change in seabed substratum and permanent (project lifetime) habitat loss.

274. Maintenance activities may also result in temporary impacts, similar to those observed during construction but lower in magnitude. There may also be beneficial impacts such as habitat creation, which will also be considered in the EIA.

275. Noise and vibration generated by the operational wind turbines can be conducted through the tower and foundations into the water. Monitoring studies of underwater noise from operational turbines have shown the noise levels from North Hoyle, Scroby Sands, Kentish Flats and Barrow wind farms to be only marginally above ambient noise levels (Cheesman, 2016). There is no evidence to suggest this low level of noise and vibration has a significant impact on benthic ecology, it is therefore proposed that this impact is scoped out from further consideration within the EIA.

276. Electromagnetic fields (EMF) as a result of the presence of offshore cables may be detected by some benthic species. Effects are likely to be highly localised, as EMFs are strongly attenuated and decrease as an inverse square of distance from the cable (Gill and Barlett, 2010). Bochert & Zettler (2006) report that brown shrimp *Crangon crangon*, common starfish *Asterias rubens* and polychaete worm *Nereis diversicolor* (also known as *Hediste diversicolor*) do not react when exposed to EMF. Gibb *et al.* (2014) state there is no evidence of EMF impacting *Sabellaria spinulosa*. It is therefore proposed that this impact should be scoped out from further consideration within the EIA due to the lack of evidence to suggest an impact. The impacts of EMF on fish and shellfish are considered separately in **Section 2.7**.

2.3.2.3 Potential Impacts During Decommissioning

277. It is anticipated that the decommissioning impacts would be similar in nature to those of construction described in **Section 2.3.2.1**, although the magnitude of effect is likely to be lower.

2.3.2.4 Potential Cumulative Impacts

278. There is the potential for cumulative impacts with a range of other plans, projects and activities namely the existing Dudgeon and Sheringham Shoal Offshore Wind Farms, other nearby offshore wind farms at planning, construction, operation and decommissioning phases, aggregate and dredging activities, subsea cables and oil and gas activity. These will be identified and assessed in line with the approach set out in **Section 1**.

2.3.2.5 Potential Transboundary Impacts

279. DEP and SEP are a minimum of 100km from any international territory boundary. As the effects on benthic and intertidal ecology are likely to be restricted to the project boundaries and immediate surrounding area, transboundary effects are proposed to be scoped out for this topic.

2.3.2.6 Summary of Potential Impacts

280. A summary of potential impacts is shown in **Table 2-8** below.

Table 2-8 Summary of impacts relating to intertidal and benthic ecology (scoped in ✓, scoped out x)

Potential Impacts	Construction	Operation	Decommissioning
Temporary physical disturbance	✓	✓	✓
Permanent habitat loss	x	✓	✓
Increased suspended sediment concentrations	✓	✓	✓
Re-mobilisation of contaminated sediments	✓	x	✓
Underwater noise and vibration	✓	x	✓
Colonisation of foundations and cable protection	x	✓	x
Invasive species	x	✓	x
Potential impacts on sites of marine conservation importance	✓	✓	✓
Impact of electromagnetic fields	x	x	x
Cumulative impacts	✓	✓	✓
Transboundary impacts	x	x	x

2.3.3 Approach to Assessment and Data Gathering

281. As part of the EIA process, the existing environment with respect to Marine and Intertidal Ecology will be described, including the presence of different habitats and species within the study area using existing survey data and data from new characterisation surveys that will be commissioned to inform the EIA.

282. Identification of potential sensitive receptors will be undertaken using available literature and the Marine Evidence Based Sensitivity Assessment (MarESA) method to determine sensitivity of benthic species and habitats (biotopes) using data from the Marine Life Information Network (MarLIN). This approach measures sensitivity of biotopes using available research on their resistance and resilience to different impacts.

283. As far as possible, impacts will be considered based on quantitative assessment of the area of habitat permanently or temporarily impacted by the works. The results of Marine Geology, Oceanography and Physical Processes and Marine Water and Sediment Quality chapters will be used to inform potential impacts relating to smothering and suspended sediments.

284. The existing Dudgeon and Sheringham Shoal Offshore Wind Farm characterisation surveys were undertaken some time ago. Although they provide some context and have been updated by the more recent pre- and post-construction monitoring studies, characterisation for EIA purposes for the proposed extension projects will be based on the latest available data including new site-specific surveys, as described in **Table 2-9** and **Table 2-10**.

285. Natural England has advised that broadscale monitoring of benthic habitats within the Cromer Shoal Chalk Beds MCZ will be undertaken in 2020. Equinor will work closely with stakeholders through the EPP, including with Natural England, to inform the assessment of impacts on the MCZ. The assessment will be undertaken in line with the available guidance (e.g. Defra, 2010; MMO, 2013) and will be informed by a screening process to identify whether the Project is capable of affecting an MCZ, its protected features or any ecological or geomorphological process on which the site is dependant. Where it is necessary, any further MCZ assessment will include a consideration of potential mitigation measures relevant to the achievement of the conservation objectives of the site in question, as set out in Figure 1 of MMO (2013). **Section 1.1.4** contains details of the planned key milestone dates for the assessment, which are subject to confirmation as the EIA process develops.

Table 2-9 Data sources to be used

Data source	Date	Data contents
DOW	2012	Dudgeon OWF Environmental Statement
Scira	2006	Sheringham Shoal OWF Environmental Statement
Scira	2014	Sheringham Shoal OWF Second Post-Construction Benthic Monitoring Survey
DOW	2019	Dudgeon OWF Environmental Post Construction Survey Report
MarLIN.ac.uk	2019	Information on the sensitivity of marine habitats and species compiled from existing literature
Natural England and Cefas	Various	Datasets and survey reports available concerning the Cromer Shoal Chalk Beds MCZ
Orsted	2016-2017	Hornsea Three cable corridor geophysical and benthic surveys including: • Hornsea Three Inshore Geophysical and DDV Survey (2017) • Hornsea Three Offshore Cable Corridor Benthic Grab/DDV Survey (2016)

Data source	Date	Data contents
Equinor	2019-2020	Site specific survey reports (details below)

286. The following surveys will be undertaken to inform the assessment (**Table 2-10**). Surveys will be undertaken in accordance with Ware and Kenny (2011) guidelines and agreed in advance with stakeholders including the MMO, Cefas and Natural England where required.

Table 2-10 Proposed characterisation surveys

Survey/study	Timing	Spatial Coverage
Geophysical survey – MCZ Multi-beam bathymetry, side scan sonar and sub-bottom profiler	Late 2019	Cromer Shoal Chalk Beds MCZ
Geophysical survey Multi-beam bathymetry, side scan sonar and sub-bottom profiler	Early – mid 2020	Wind farm arrays, interlink cable corridor, export cable corridor
Grab samples and drop-down camera/ video	Early – mid 2020	Whole site area

287. The site specific surveys will broadly include the following steps:
- Site specific geophysical surveys including multi-beam bathymetry, side scan sonar and sub-bottom profiler;
- Analysis of geophysical data to produce habitat maps; and
- The habitat maps will inform the design of benthic surveys which will include a combination of grab sampling and seabed imagery.

288. Following the identification of the preferred offshore development area, further consultation will be undertaken to agree the data collection approach and methodology for EIA purposes and the specific assessment methodology. A detailed method statement will be developed and agreed with stakeholders as part of the EPP.

2.4 Fish and Shellfish Ecology

289. The specific assessment requirements for fish and shellfish ecology are set out within National Policy Statements EN1 and EN-3 (DECC, 2011) and are summarised in **Table A1-4** in **Appendix 1**.

2.4.1 Existing Environment

2.4.1.1 Site specific surveys

290. A variety of surveys have been undertaken in relation to the existing Dudgeon and Sheringham Shoal offshore wind farms. Although these surveys were undertaken some time ago, the results provide a good indication of the fish and shellfish assemblage that is likely to be present in the vicinity of the proposed extension projects. However, the information will be updated where necessary through the EIA process (see further details in **Section 2.4.3**) and a summary of the existing survey information is provided below.

291. Otter and beam trawl surveys were conducted in spring and autumn 2008 to inform the Dudgeon EIA (DOW, 2009). The beam trawls recorded a community characterised by pink shrimp (*Pandalus montagui*), the shrimp *Pandalina brevirostris* and long clawed porcelain crab (*Pisidia longicornis*). The otter trawls recorded whiting (*Merlangius merlangus*), dab (*Limanda limanda*), velvet crab (*Necora puber*), brown crab (*Cancer pagurus*) and squid in greatest abundance. Gobies were the principal type of fish caught during autumn beam trawl surveys sampling juvenile fish, followed by common dragonet (*Callionymus lyra*). Elasmobranch species recorded were the Thornback ray (*Raja clavata*) and spotted ray (*Raja montagui*), the starry smooth-hound (*Mustelus asterias*), smooth-hound (*Mustelus mustelus*) and lesser spotted dogfish (*Scyliorhinus canicula*).

292. Otter and beam trawls surveys were also conducted in spring and autumn 2005 to inform the Sheringham Shoal EIA, including trawls inside the proposed SEP (Scira Offshore Energy Ltd, 2006). Pink shrimp, brown shrimp (*Crangon crangon*) and lesser weaver fish (*Echiichthys vipera*) were the dominant species recorded in the beam trawls. Atlantic herring (*Clupea harengus*), velvet crab and whiting were the most abundant species recorded by otter trawls. A Sheringham Shoal post-cable installation elasmobranch survey recorded a single starry smooth-hound in the export cable corridor just south of the wind farm array (Brown & May Marine, 2013).

293. Datasets from both Dudgeon and Sheringham shoal surveys were broadly similar in terms of species composition; however, there were variations in the abundance of species caught.

294. Digital aerial baseline surveys for offshore ornithology and marine megafauna for the proposed DEP and SEP are ongoing and will continue for a period of two years, until April 2020. These surveys have observed seabirds and marine mammals, however an unidentified shark was observed during August 2018 survey.

2.4.1.2 Species of Commercial Importance

295. The fish and shellfish community in the vicinity of the proposed development includes numerous species of commercial importance, particularly shellfish species including whelks, crab and lobster which are targeted by vessels deploying pots and traps. Although non-commercial species may be discarded at sea and are therefore not recorded in fisheries landings data, fisheries statistics nevertheless provide valuable information about fish and shellfish ecology over a broad area.

296. International Council for the Exploration of the Sea (ICES) rectangles are the smallest spatial unit for which landings data is widely available. The proposed DEP and SEP are located within ICES statistical rectangle 35F1 (offshore area), with the export cable corridors passing through both 35F1 and, as they approach landfall, 34F1 (inshore area), shown in **Figure 2.4.1**, **Appendix 2**. ICES rectangles 34F0 and 35F0 to the east cover areas where impacts are possible, considered as part of the wider regional area in the Dudgeon and Sheringham Shoal ESs (DOW, 2009; Scira Offshore Energy, 2006).

297. **Table 2-11** gives an indication of the fish and shellfish species landed from ICES rectangles 34F0, 34F1, 35F0 and 35F1 (MMO, 2018). Only species that have a landed weight in excess of one tonne over the period between 2013 and 2017 are listed.

Table 2-11 Fish and shellfish species reported in ICES rectangles covering the proposed DEP and SEP and cable corridors (MMO, 2018)

Species		ICES Rectangle			
Common name	**Scientific name**	**34F0**	**34F1**	**35F0**	**35F1**
Finfish					
Bass	*Dicentrarchus labrax*	✓	✓	✓	
Brill	*Scophthalmus rhombus*				✓
Cod	*Gadus morhua*	✓	✓	✓	
Dab	*Limanda limanda*	✓			
Flounder or Flukes	*Platichthys flesus*			✓	
Gurnard and Latchet	*Triglidae*	✓			
Herring	*Clupea harengus*		✓	✓	✓
Mackerel	*Scomber scombrus*		✓		
Plaice	*Pleuronectes platessa*	✓			✓
Sole	*Solea solea*	✓	✓	✓	✓
Sprat	*Sprattus sprattus*		✓		
Turbot	*Scophthalmus maximus*				✓
Whiting	*Merlangius merlangus*			✓	
Elasmobranchs					
Blonde ray	*Raja brachyura*		✓		✓
Dogfish	*Scyliorhinidae*	✓			
Lesser spotted dogfish	*Scyliorhinus canicular*	✓	✓		
Smooth-hound	*Mustelus mustelus*	✓	✓		
Thornback ray	*Raja clavata*	✓	✓	✓	✓
Crustaceans					
Brown shrimp	*Crangon crangon*	✓	✓	✓	✓
Crab	*Cancer pagurus*	✓	✓	✓	✓
Green shore crab	*Carcinus maenas*			✓	
Velvet crab	*Necora puber*			✓	
Lobster	*Homarus gammarus*	✓	✓	✓	✓
Pink shrimp	*Pandalus montagui*	✓		✓	
Molluscs					
Cockle	*Cerastoderma edule*	✓	✓	✓	✓
Mussel	*Mytilus edulis*	✓		✓	
Scallop	*Pectinida spp.*	✓		✓	✓
Whelk	*Buccinum undatum*	✓	✓	✓	✓

298. Within rectangles 34F1 and 35F1, the species landed in greatest quantities are whelk, crab and lobster; whereas cockles, brown shrimp and whelks are landed in the greatest quantities from the regional rectangles 34F0 and 35F0 to the west of the proposed development.

2.4.1.3 Spawning and nursery areas

299. **Table 2-12** lists the species which have spawning or nursery grounds identified as coinciding with the proposed development, as well as the importance of these species both commercially and in terms of conservation status.

Table 2-12 Spatial overlap between the proposed DEP and SEP, offshore cable corridors; and spawning and nursery areas of key species (Coull et al., 1998; Ellis et al., 2012).

Species	Spawning	Nursery	Commercial Importance	Conversation Designation
Sandeel	Y	Y	Low	UK BAP
Whiting	Y	Y	Medium (commercial value has increased)	UK BAP, IUCN (least concern)
Lemon sole	-	Y	Low	-
Sole	Y	-	High	UK BAP
Cod	-	Y	Medium	UK BAP, OSPAR, IUCN (vulnerable)
Herring	Y	Y	Medium	UK BAP, IUCN (least concern)
Mackerel	-	Y	Low	UK BAP, IUCN (least concern)
Plaice	-	Y	High	UK BAP, IUCN (least concern)
Thornback ray	-	Y	Medium	OSPAR, IUCN (near threatened)

300. Herring in the region spawn from August to October, preferring to lay their eggs on the seabed on clean gravel substrates. This specific seabed spawning habitat preference makes herring sensitive to activities that disturb the seabed, with herring also being sensitive to underwater noise. Surveys undertaken to inform the Dudgeon ES (DOW, 2009) did not identify the presence of spawning aggregations in the area of the wind farm although, as shown in **Table 2-12**, the proposed development is located within a potential herring spawning area. Sheringham Shoal fish surveys recorded immature herring in April, supporting the general classification of the areas as a herring nursery (Scira Offshore Energy, 2006). However, sediment characteristics in the area of the existing and proposed wind farms are set within the context of a very wide area of equal or superior quality spawning habitat (MarineSpace *et al.*, 2013). Available data suggests that there is little evidence of herring spawning in the area and larval studies (including International Herring Larvae Surveys) indicate that the area is generally sparse in recorded larval presence.

2.4.2 Potential Impacts

301. The Fish and Shellfish Ecology assessment is likely to have key inter-relationships with Marine Physical Processes, Marine Water and Sediment Quality, Benthic and Intertidal Ecology and Offshore Ornithology and these will be considered where relevant throughout the EIA process.

2.4.2.1 Potential Impacts During Construction

302. Potential impacts on fish and shellfish ecology during construction may result from physical disturbance of seabed habitats, suspension of sediment during cable and foundation installation works (including seabed preparation), and any associated deterioration of water quality. Underwater noise generated by construction activities, particularly if pile driving or UXO clearance is required, may result in disturbance and displacement of acoustically sensitive fish species (e.g. herring) and affect spawning and nursery areas. The impacts of wind farm construction will be considered separately from the export cable corridor, however potential interactions between the two will also be considered.

2.4.2.2 Potential Impacts During Operation

303. Potential impacts on fish and shellfish ecology during operation will primarily result from loss of habitat and changes to seabed substrata from the physical presence of infrastructure (i.e. foundations and any cable/scour protection above the seabed). Maintenance activities may also result in disturbance to seabed habitats; these would be of a similar type to those during construction but at a lower magnitude. Potential impacts from electromagnetic fields (EMF) from operational subsea cables will also be considered.

2.4.2.3 Potential Impacts During Decommissioning

304. It is anticipated that the impacts associated with decommissioning would be similar to those during the construction phase, although the magnitude of effect is likely to be lower (for example, noise impacts would be lower as there would be no piling).

2.4.2.4 Potential Cumulative Impacts

305. There is the potential for cumulative impacts with a range of other plans, projects and activities namely the existing Dudgeon and Sheringham Shoal offshore wind farms, other nearby offshore wind farms at planning, construction, operation and decommissioning phases, aggregate and dredging activities, subsea cables and oil and gas activity. These will be identified and assessed in line with the approach set out in **Section 1.6**.

2.4.2.5 Potential Transboundary Impacts

306. There is potential for transboundary impacts on fish populations which may be highly mobile. Potential transboundary impacts, including those associated with underwater noise, will be assessed as with the other cumulative impacts and the Applicant, where possible, will liaise with developers in other Member States to obtain up to date project information to inform the assessment.

2.4.2.6 Summary of Potential Impacts

307. A summary of potential impacts is provided in **Table 2-13** below.

Table 2-13 Summary of impacts relating to fish and shellfish (scoped in ✓, scoped out x)

Potential Impacts	Construction	Operation	Decommissioning
Physical disturbance and temporary loss of sea bed habitat, spawning or nursery grounds during intrusive works	✓	x	✓
Permanent habitat loss	x	✓	x
Increased suspended sediments and sediment re-deposition	✓	✓	✓
Re-mobilisation of contaminated sediment during intrusive works	✓	✓	✓
Underwater noise impacts to acoustically sensitive species during foundation piling	✓	x	x
Underwater noise impacts to acoustically sensitive species due to other activities (vessels, seabed preparation, cable installation, turbine operational noise etc.)	✓	✓	✓
Introduction of wind turbine foundations, scour protection and hard substrate	x	✓	x
Impacts from electromagnetic fields	x	✓	x
Impacts on commercially exploited species associated with their displacement from the area of activity / works	✓	✓	✓
Cumulative impacts	✓	✓	✓
Transboundary impacts	✓	✓	✓

2.4.3 Approach to Assessment and Data Gathering

308. Given that fish and some shellfish are highly mobile and range over large areas, data sets with large scale coverage can be useful for characterising the community likely to be present within a site. A key source of information describing the fish community comes from fisheries landings data (see **Table 2-14**). Fisheries data provides information on the broad scale spatial and temporal distribution of fishing effort and species landed, and will be integrated in detail for the assessment. However, fisheries reporting is largely limited to commercial species with many non-commercial species discarded at sea.

309. Other relevant information sources, including fishery-independent surveys such as the Cefas North Sea groundfish survey / International Bottom Trawl Survey (IBTS), will be reviewed and integrated into the assessment.
310. Pre and post-construction fish monitoring surveys undertaken for Dudgeon and Sheringham Shoal (see **Table 2-14**) provide some insight into the fish communities in and in close proximity to the proposed development and will be used to help inform assessment of the potential impacts of wind farm construction and operation on fish and shellfish ecology where appropriate.
311. A program of geophysical and benthic sampling will be undertaken across the proposed wind farm areas and export cable corridors (see details in **Section 2.3**). This will provide valuable information to characterise the seabed (including particle size analysis), alongside information on the benthic assemblage in general.
312. Monthly aerial surveys of the proposed extension areas including a 4km buffer around the sites are being completed. Although the primary purpose of these surveys is to collect data on the distribution of seabirds and marine mammals, they will also identify any large fish (namely elasmobranchs) near the sea surface.
313. As part of the EIA process, the existing environment with respect to fish and shellfish ecology will be described, including the following baseline information:
    - Spawning and nursery grounds;
    - Feeding grounds;
    - Shellfish production areas;
    - Overwintering areas for crustaceans; and
    - Migration routes.
314. **Table 2-14** below identifies the desk-based sources that will be accessed to inform the characterisation of the existing environment.

Table 2-14 Data sources used

Data source	Date	Data contents
Dudgeon Offshore Wind Farm Fish and Shellfish EIA Characterisation Surveys	May and October 2008	Otter trawls, beam trawls and sand eel trawls (for herring) in and around the Dudgeon wind farm site and export cable corridor.
Sheringham Shoal Offshore Wind Farm Fish and Shellfish EIA Characterisation Surveys	April, July and September 2005	Otter (April) and beam trawls in and around the now existing wind farm site and cable corridor.
Sheringham Shoal Offshore Wind Farm Fish and Shellfish Post Construction Surveys • Sheringham Shoal Wind Farm Post-cable Installation Elasmobranch Surveys	November 2012 and August 2013	Baited longlines were deployed at nine stations along the export cable route.
MMO fisheries statistics – Landings	2014 - 2018	Landing statistics data for UK registered vessels by year, month, ICES rectangle, species live weight

Data source	Date	Data contents
		(tonnes). ICES Rectangles 34F0, 35F0, 34F1 and 35F1.
International bottom trawl survey (IBTS)	2008 - 2019	North Sea IBTS - Species landed from stations in ICES Rectangles 35F0, 34F1 and 35F1.
Greater North Sea International Quarter 3 Otter Trawl Groundfish Survey Monitoring and Assessment Data (Moriarty and Greenstreet 2017)	1998 - 2016	North Sea.
Fish spawning and nursery grounds (Coull *et al.*, 1998; Ellis *et al.*, 2012))	-	Both studies map the distribution of predicted spawning and nursery habitats of a number of key species in waters around the UK.
International Herring Larval Survey (IHLS)	1967-2018	North Sea
Environmental Effect Pathways between Marine Aggregate Application Areas and Atlantic Herring Potential Spawning Habitat	2013	Regional Cumulative Impact Assessments.
Digital aerial surveys	May 2018 to April 2020	Provides information on seabirds, marine mammals and potentially large elasmobranch species that transit through the proposed DEP and SEP and surrounding 4km.
Consultation with fishing industry, EIFCA and FLO	2019-2020	Coverage includes proposed extension areas

315. Assessment of impacts will be informed through reference to sources describing the fish and shellfish species present, monitoring results from operational offshore wind farms, the findings from industry-wide studies (e.g. COWRIE funded research) such as those on EMF and piling noise impacts, as well as information obtained through consultation with local sea fisheries committees and commercial fishermen. With regard to noise, it is likely that modelling will be undertaken utilising site-specific physical parameters (geology and bathymetry) and project specific details.

316. The existing data described in **Table 2-14** available for this area is sufficient to undertake a robust assessment, as such further site specific surveys in addition to those outlined above will not be undertaken.

317. Following the identification of the preferred offshore development area, further liaison with the key stakeholders (MMO, Natural England, EIFCA and Cefas) will be undertaken to agree the evidence requirements for the assessment of potential impacts on fish and shellfish ecology. This will include information sources and data collection requirements, as well as the impact assessment approach and methodology. A detailed method statement will be developed and agreed with stakeholders as part of the EPP.

2.5 Marine Mammal Ecology

318. The overarching assessment requirements relevant for marine mammal ecology are set out within National Policy Statement EN-1, with more specific assessment requirements set out in NPS EN-3; these are summarised in **Table A1-5** in **Appendix 1**.

2.5.1 Existing Environment

319. A review of a number of other survey reports and literature, including the SCANS-III Survey Report (Hammond *et al*., 2017), the Joint Cetacean Protocol (JCP) Phase III Report (Paxton *et al*., 2016), and the UK Offshore Energy Strategic Environmental Assessment (OESEA) 3 Report (Department for Energy and Climate Change (DECC) [now the Department for Business, Energy and Industrial Strategy (BEIS)], 2016) indicates that harbour porpoise *Phocoena phocoena* are the most common cetacean species in the southern North Sea, while white-beaked dolphin *Lagenorhynchus albirostris* and minke whale *Balaenoptera acutorostrata* are shown to be present, but considered to be either uncommon (in the case of white-beaked dolphin) or a seasonal visitor in the summer months only (in the case of minke whale).

320. *As* shown by the Special Committee on Seals (SCOS) (2018) report and seals-at-sea density maps (Russel *et al*., 2017), both of the UK's resident seal species (grey and harbour seal) are likely to be present in the vicinity of DEP and SEP, potentially in low to moderate densities (see **Figure 2.5.1** and **Figure 2.5.2** in **Appendix 2** for the grey seal and harbour seal density maps respectively, based on the seals-at-sea density data (Russell *et al*., 2017).

321. The ongoing aerial baseline surveys for the proposed DEP and SEP (see **Section 2.5.3** for more information) have to date recorded a total of four marine mammal species, across 13 surveys between May 2018 and June 2019, including:

- Harbour porpoise*:* A total of 263 individuals, with relatively higher numbers in the summer months;
- Minke whale*:* One individual in July (within the DEP site);
- Harbour seal *Phoca vitulina:* A total of 17 individuals in the months of January, April, June, August and October;
- Grey seal *Halichoerus grypus:* A total of 13 individuals throughout the year (January, February, April, May, June, August, September, October and November); and
- Unidentified marine mammals: A total of 74 seals not identified to species level and 25 unidentified marine mammals, either seal or small cetacean species.

322. Key haul-out sites for both seal species are shown in **Figure 2.5.3** in **Appendix 2**. The Blakeney Point haul-out site is located closest to the proposed Project, 12.5km from the nearest Project boundary (including export cable corridors and landfall locations). Other haul-out sites are further from the proposed Project at Horsey (22.5km), Scroby Sands (37.1km), The Wash (57.2km) and Donna Nook (66.7km). There is the potential for seals from these haul-out sites to move along the coast and offshore to forage in and around DEP and SEP (see **Figure 2.5.1** and **Figure 2.5.2** in **Appendix 2**).

323. Through the EIA process, further information sources will be investigated to determine the marine mammal species that have the potential to be impacted by DEP and SEP. It is expected that the key species of interest and therefore the focus of the assessment will be on:

- Harbour porpoise;
- White-beaked dolphin;
- Minke whale;
- Grey seal; and
- Harbour seal.

324. There are three Special Areas of Conservation (SAC) designated for marine mammal species in proximity of the proposed Project (**Figure 2.5.3**, **Appendix 2**). These are: The Wash and North Norfolk Coast SAC designated for harbour seal (1.3km from the export cable corridor at the closest point); the Humber Estuary SAC designated for grey seal (60.5km from the project at the closest point); and the Southern North Sea SAC, designated solely for harbour porpoise (the Bacton landfall location is within the SAC 'winter area', where harbour porpoise densities are highest in winter, although the closest point to the wind farm AfL areas is 14.3km from the SAC 'summer area', where harbour porpoise densities are highest in summer). These three designated sites will be considered further for the potential for adverse effects through the assessment process.

2.5.2 Potential Impacts

325. The potential impacts from DEP and SEP through the construction, operation and decommissioning phases are outlined below and summarised in **Table 2-15**. All of the potential impacts screened in for further assessment will be related to the potential area of effect, using marine mammal density information from site specific surveys where possible (and the most recent and robust density information publicly available from other sources) to determine the number of marine mammals that could potentially be impacted, and assessed in the context of the relevant reference populations in order to identify the potential for any population effects.

326. The Marine Mammal Ecology assessment is likely to have key inter-relationships with Marine Physical Processes, Marine Water and Sediment Quality, Benthic and Intertidal Ecology, Fish and Shellfish Ecology, and Shipping and Navigation. These will be considered where relevant throughout the EIA process.

2.5.2.1 Potential Impacts During Construction

Underwater Noise

327. The potential impacts from underwater noise on marine mammals are:

- Physical injury and in extreme cases death;
- Permanent auditory injury / permanent loss of hearing sensitivity (Permanent Threshold Shift (PTS));
- Temporary auditory injury / temporary loss in hearing sensitivity (Temporary Threshold Shift (TTS));
- Disturbance and behavioural effects, including auditory masking; and
- Barrier effects.

328. Activities that have the potential to generate underwater noise associated with the construction of DEP and SEP are:
    - Clearance of unexploded ordnance (UXO);
    - Installation of foundations through pile driving;
    - Other construction activities such as seabed preparation, cable laying and rock placement; and
    - Construction vessel activity.

329. The potential impact of underwater noise will depend on a number of factors which include, but are not limited to:
    - Source levels of noise;
    - Frequency relative to the hearing bandwidth of the animal (dependent upon species);
    - Propagation range, which is dependent upon;
    - Sediment/sea floor composition;
    - Water depth;
    - Duration of exposure;
    - Distance of the animal to the source; and
    - Ambient noise levels.

330. An assessment of underwater noise will be undertaken through site specific underwater noise modelling (as outlined in **Section 2.5.3**) for all potential noise sources, using the most recent and robust marine mammal thresholds (such as the National Marine and Fisheries Service (NMFS) (2018) Marine Mammal Acoustic Technical Guidance; Southall *et al*., 2019).

331. The potential impacts associated with underwater noise will be considered fully during the EIA, taking into account the most recent and robust research, guidance and information available.

Vessel Interaction

332. Collisions between vessels and marine mammals are possible. Despite the potential for marine mammals to detect and avoid vessels, ship strikes are known to occur (Wilson *et al*., 2007). At present the type and number of vessels to be used during construction is unknown. An increase in vessels could potentially lead to an increase in vessel collision risk, as well as disturbance as a result of underwater noise and the presence of vessels.

333. The increased risk of collision with marine mammals and the disturbance as a result of underwater noise and the presence of vessels will be given further consideration in the EIA, taking into account the most recent and robust research, guidance and information available.

Disturbance at Seal Haul-Out Sites

334. Increased activity around landfall, including vessel and human activity could have the potential to disturb seals at haul-out sites, particularly during sensitive periods, such as the breeding season and moult period.

335. Disturbance from vessel transits to and from DEP and SEP also has the potential to disturb seals at haul-out sites, depending on the route and proximity to the haul-out sites.

336. Depending on the landfall selected and the vessel routes, there is the potential for disturbance at seal haul-out sites. Therefore, this will be assessed further within the EIA.

Changes to Water Quality

337. As outlined in **Section 2.2**, the potential for increases in suspended sediments and for the release of contamination during construction has been scoped in for further assessment in the EIA. Therefore, the potential for any impacts on marine mammals or their prey will be determined.

Changes to Prey Resource

338. As outlined in **Section 2.4**, the potential impacts on fish species and therefore the prey resource for marine mammals during construction can result from physical disturbance and temporary loss of seabed habitat; increased suspended sediment concentrations and sediment re-deposition; and underwater noise, that could lead to mortality, physical injury, auditory injury or behavioural responses, including disturbance and displacement of fish species and effects on spawning and nursery areas.

339. The potential for any changes to the prey resource for marine mammals will be assessed further in the EIA.

2.5.2.2 Potential Impacts During Operation

Underwater Noise

340. Potential sources of underwater noise during the operation and maintenance phase include:
    - Operational turbines;
    - Maintenance activities, such as any additional rock dumping and cable re-burial; and
    - Operation and maintenance vessel activity.

341. The potential for disturbance from underwater noise during the operation and maintenance phase will be based on the underwater noise modelling and assessment of similar activities for the construction phase.

342. The potential impacts associated with underwater noise will be considered further in the EIA, taking into account the most recent and robust research, guidance and information available.

Vessel Interaction

343. As outlined above, the increased risk of collision with marine mammals and the disturbance as a result of underwater noise and the presence of vessels will be given further consideration in the EIA. It is anticipated that the impacts associated with vessel activities during operation would be similar to those during the construction phase, although the magnitude of effect is likely to be lower.

Disturbance at Seal Haul-Out Sites

344. As outlined above, depending on the vessel routes, there is the potential for disturbance at seal haul-out sites. Therefore, this will be assessed further within the EIA. However, it is anticipated that the impacts associated with vessel activities during operation would be similar to those during the construction phase, although the magnitude of effect is likely to be lower.

Physical Barrier Effects

345. The presence of a wind farm could be seen as having the potential to create a physical barrier, preventing movement or migration of marine mammals between important feeding and / or breeding areas, or potentially increasing swimming distances if marine mammals circumvent the site.

346. The DEP and SEP are not located on any known marine mammal migration routes.

347. Data from operational wind farms show no evidence of exclusion of marine mammals, including harbour porpoise and seals (for example, Diederichs *et al*., 2008; Lindeboom *et al*., 2011; Marine Scotland, 2012; McConnell *et al*., 2012; Russell *et al*., 2014; Scheidat *et al*., 2011; Teilmann *et al*., 2006; Tougaard *et al*., 2005, 2009a, 2009b).

348. Both harbour porpoise and seals have been shown to forage within operational wind farm sites (e.g. Lindeboom *et al.,* 2011; Russell *et al.,* 2014) indicating no restriction to movements.

349. The spacing between wind turbines would allow animals to move between devices and through the operational wind farm.

350. Therefore, the potential for any barrier effects as result of the physical presence of the wind farms will not be considered further in the EIA. Note that the potential for any acoustic barrier effects as a result of underwater noise during construction will be included as part of the underwater noise assessment.

Electromagnetic Fields (EMF)

351. Studies indicate that magnetic fields decrease rapidly with vertical and horizontal distance from subsea cables and that the reduction is greater the deeper cables are buried (Normandeau *et al*., 2011).

352. Although it is assumed that marine mammals are capable of detecting small differences in magnetic field strength, this is unproven and is based on circumstantial information. There is also, at present, no evidence to suggest that existing subsea cables influence cetacean movements.

353. Harbour porpoise are known to move in and out of the Baltic Sea, over several operating subsea cables in the Skagerrak and western Baltic Sea with no apparent effect to their migratory movements. There is also no evidence to suggest that seal species respond to EMF (Gill *et al*., 2005).

354. In addition, as outlined above, data from a number of operational wind farms show no evidence of exclusion of marine mammals, including harbour porpoise and seals (for example, Diederichs *et al.,* 2008; Lindeboom *et al.,* 2011; Marine Scotland, 2012; McConnell *et al.,* 2012; Russell *et al.,* 2014; Scheidat *et al.,* 2011; Teilmann *et al.,* 2006; Tougaard *et al.,* 2005, 2009a, 2009b).

355. Recent EIAs for other offshore wind farm projects such as Norfolk Vanguard (Norfolk Vanguard Ltd, 2018) only considered the impact of EMF on marine mammal prey species. Therefore, the potential for EMF to impact on marine mammal species directly is proposed to be scoped out from further assessment in the EIA, however, the potential for EMF to impact on marine mammal prey species will be considered.

Changes to Water Quality

356. As outlined in **Section 2.2**, the potential for changes in water quality during operation has been scoped in for further assessment in the EIA.

Changes to Prey Resource

357. As outlined in **Section 2.4**, the potential impacts on fish species and therefore the prey resource for marine mammals during operation can result from permanent loss of habitat; introduction of hard substrate; operational noise; maintenance activities; and EMFs.

358. The potential for any changes to the prey resource for marine mammals will be assessed further in the EIA.

2.5.2.3 Potential Impacts During Decommissioning

359. It is anticipated that the impacts associated with decommissioning would be similar to those during the construction phase, although the magnitude of effect is likely to be lower (for example, there would be no piling and therefore impacts from underwater noise would be significantly reduced, although there would still be underwater noise from activities required to remove infrastructure).

2.5.2.4 Potential Cumulative Impacts

360. The Cumulative Impact Assessment (CIA) will identify where the predicted impacts of the construction, operation, maintenance and decommissioning of DEP and SEP could interact with impacts from different plans or projects within the same region and impact sensitive receptors, in this case marine mammals. The marine mammals CIA will assess plans and projects located within the relevant marine mammal Management Unit (MU).

361. In accordance with the Planning Inspectorate Advice Note Seventeen, commercial fisheries will not be considered in the CIA as the potential impacts from commercial fisheries, including direct impact of by-catch of marine mammals, the indirect impact through the loss of marine mammal prey species, and the disturbance from fishing related underwater noise and vessel presence, are considered to be part of the baseline conditions (see **Section 1.6.4.7**).

362. The potential cumulative impacts on marine mammals that will be assessed further in the EIA are:

- Underwater noise;
- Vessel interaction; and
- Changes to prey resources (including habitat loss).

2.5.2.5 Potential Transboundary Impacts

363. There is a significant level of marine development being undertaken or planned by other EU Member States (i.e. Belgium, the Netherlands, Germany and Denmark) in the southern North Sea. Populations of marine mammals (particularly cetaceans) are highly mobile and there is potential for transboundary impacts especially with regard to noise.

364. In addition, there is potential for the proposed Project to impact on marine mammals from international designated sites.

365. Transboundary impacts will be assessed as with the other cumulative impacts and where possible, in consultation with developers in other Member States to obtain up to date project information to feed into the assessment.

366. The potential for transboundary impacts will be addressed by considering the reference populations and potential linkages to non-UK sites as identified through telemetry studies for seals and ranges and movements of cetacean species.

367. The assessment of the effect on the integrity of the transboundary European sites as a result of impacts on the designated marine mammal populations will be undertaken and presented in the Habitats Regulations Assessment.

2.5.2.6 Summary of Potential Impacts

368. **Table 2-15** summarises the potential impacts relating to marine mammals scoped in and out from further assessment in the EIA.

Table 2-15 Summary of impacts relating to marine mammals (scoped in ✓, scoped out x)

Potential Impacts	Construction	Operation	Decommissioning
Underwater noise during UXO clearance	✓	x	x
Underwater noise during piling	✓	x	x
Underwater noise from other activities (for example rock placement and cable laying)	✓	✓	✓

Potential Impacts	Construction	Operation	Decommissioning
Underwater noise and presence of vessels	✓	✓	✓
Underwater noise from operational wind turbines	x	✓	x
Barrier effects from underwater noise	✓	x	✓
Collision risk with vessels	✓	✓	✓
Disturbance at seal haul-out sites	✓	✓	✓
Changes in water quality	✓	✓	✓
Changes to prey availability (including from habitat loss and EMF)	✓	✓	✓
Barrier effects from physical presence of wind farm	x	x	x
Electromagnetic fields direct effects	x	x	x
Cumulative impacts from underwater noise	✓	✓	✓
Cumulative impacts from collision risk	✓	✓	✓
Cumulative barrier impacts	x	x	x
Cumulative disturbance at seal haul-out sites	✓	✓	✓
Cumulative changes to prey availability (including habitat loss)	✓	✓	✓
Transboundary impacts	✓	✓	✓

2.5.3 Approach to Assessment and Data Gathering

369. The EIA will be informed by the site specific surveys outlined in **Table 2-16**. The digital aerial survey for offshore ornithology and marine megafauna began in May 2018 and will continue until April 2020, with at least one survey undertaken each month through that period.

Table 2-16 Baseline surveys

Survey/study	Timing	Spatial Coverage
Digital aerial survey for offshore	May 2019 to April 2020	The proposed DEP and SEP plus 4km buffer area.

Survey/study	Timing	Spatial Coverage
ornithology and marine megafauna	At least one survey per month	Transect lines with a 2.5km spacing, and 19 transect lines across the survey area.

370. Where possible, data from the site specific surveys will be used to generate density estimates for the sites. This will be considered against wider data sources from around DEP and SEP as well as available information for the southern North Sea. This will include, but not be limited to, available survey data from other offshore wind farms.

371. In addition, all relevant publicly available information will be used to inform the characterisation of the existing environment, including, but not limited to, the data sources listed in **Table 2-17**.

Table 2-17 Potential Data Source

Data source	Date	Spatial Coverage	Data contents
Small Cetaceans in the European Atlantic and North Sea (SCANS-III) data (Hammond *et al.*, 2017)	Summer 2016	North Sea and European Atlantic waters	Provides information including abundance and density estimates of cetaceans in European Atlantic waters in summer 2016, including the proposed offshore development area.
Management Units (MUs) for cetaceans in UK waters (Inter-Agency Marine Mammal Working Group (IAMMWG), 2015)	2015	UK waters	Provides information on MU for the proposed offshore development area.
Offshore Energy Strategic Environmental Assessment (including relevant appendices and technical reports) (Department of Energy and Climate Change (DECC) (now BEIS, 2016)	2016	UK waters	Provides information for the wider North Sea area.
The identification of discrete and persistent areas of relatively high harbour porpoise density in the wider UK	1994-2011	UK Exclusive Economic Zone (EEZ)	Data was used to determine harbour porpoise SAC sites.

Data source	Date	Spatial Coverage	Data contents
marine area (Heinänen and Skov, 2015)			Provides information on harbour porpoise in the North Sea area.
Revised Phase III data analysis of Joint Cetacean Protocol (JCP) data resources (Paxton *et al.*, 2016)	1994-2011	UK EEZ	Provides information on harbour porpoise in the North Sea area.
Survey for small cetaceans over the Dogger Bank and adjacent areas in summer 2011 (Gilles *et al.*, 2012)	Summer 2011	Dogger Bank and adjacent areas	Provides information for wider area.
Seasonal habitat-based density models for a marine top predator, the harbour porpoise, in a dynamic environment (Gilles *et al.*, 2016)	2005-2013	UK (SCANS II, Dogger Bank), Belgium, the Netherlands, Germany, and Denmark	Provides information for central and southern North Sea area.
Distribution of Cetaceans, Seals, Turtles, Sharks and Ocean Sunfish recorded from Aerial Surveys 2001-2008 (The Wildfowl and Wetlands Trust (WWT), 2009)	2001-2008	UK areas of the North Sea	Provides information for on species in the North Sea area.
MARINElife surveys from ferries routes across the southern North Sea area (MARINElife, 2019)	2017-2019	Southern North Sea	Provides information on species in southern North Sea area.
Sea Watch Foundation volunteer sightings off eastern England (Sea Watch Foundation, 2019)	2018-2019	East coast of England	Provides information on species sighted along east coast of England.
UK seal at sea density estimates and usage	1988-2012	North Sea	Provides information on abundance and density

Data source	Date	Spatial Coverage	Data contents
maps (Russell *et al.*, 2017)			estimates for seal species.
Seal telemetry data (e.g. Sharples *et al.*, 2008; Russell and McConnell 2014; Russell 2016)	1988-2010; 2015	North Sea	Provides information on movements and distribution of seal species.
Special Committee on Seals (SCOS) annual reporting of scientific advice on matters related to the management of seal populations (SCOS, 2018).	2018	North Sea	Provides information on seal species.
Counts of grey seal in the Wadden Sea (Brasseur *et al.*, 2018).	Winter 2017 to Spring 2018	Wadden Sea	Counts of grey seal during moult season.
Counts of harbour seal counts in the Wadden Sea (Galatius *et al.*, 2018).	August 2018	Wadden Sea	Counts of harbour seal during pupping season.

372. Consultation with key marine mammal stakeholders will be ongoing during the EIA and will include discussion of the best available information to use, for example, to determine species density estimates and define reference populations for the assessment.

373. Underwater noise modelling will be undertaken using the latest and best available information, in particular relating to criteria and thresholds for predicting the noise impact ranges for marine mammal species (e.g. NMFS, 2018; Southall *et al.*, 2019; Lucke *et al.*, 2009).

374. The assessment will be undertaken in accordance with following standards, legislation and guidance, including but not limited to:

- The Habitats Directive and Habitats Regulations;
- National and International Legislation in Relation to Marine Mammals;
- The relevant NPS requirements, as outlined in **Appendix 1**;
- The Marine Strategy Framework Directive (MSFD) 2008/56/EC (EC, 2008);
- The Marine Policy Statement (MPS) (HM Government, 2011); and
- The East Inshore and East Offshore Marine Plans (HM Government, 2014).

375. The principal guidance documents used to inform the assessment of potential impacts on marine mammals will include, but not be limited to:

- The Protection of Marine European Protect Species (EPS) from Injury and Disturbance: Draft Guidance for the Marine Area in England and Wales and the UK Offshore Marine Area (Joint Nature Conservation Committee (JNCC) et al., 2010);
- Guidelines for Ecological Impact Assessment in the UK and Ireland: Terrestrial, Freshwater and Coastal (Chartered Institute of Ecology and Environmental Management (CIEEM), 2016);
- Environmental Impact Assessment for Offshore Renewable Energy Projects – Guide (British Standards Institution (BSI), 2015);
- Approaches to Marine Mammal Monitoring at Marine Renewable Energy Developments Final Report (Sea Mammal Research Unit Ltd (SMRU Ltd) on behalf of The Crown Estate, 2010);
- Guidelines for Data Acquisition to Support Marine Environmental Assessments of Offshore Renewable Energy Projects (Centre for the Environment and Fisheries and Aquaculture Science (Cefas), 2011); and
- Statutory Nature Conservation Agency Protocol for Minimising the Risk of Injury to Marine Mammals from Piling Noise (JNCC, 2010a) and the Use of Explosives (JNCC, 2010b).

376. The impact assessment will use a matrix approach to assess the potential impacts for marine mammals following best practice and EIA guidance. The data sources summarised above will be used to characterise the existing environment). Each potential impact identified in **Section 2.5.2** has been determined based on experience and using expert judgement. These impacts will be agreed through consultation via the Scoping Process and EPP. An assessment of the impact significance will be made based on the sensitivity, value and magnitude of effect, the definitions of which will be agreed in consultation during the EPP.

377. A detailed method statement, including information sources and data collection requirements, as well as the impact assessment approach and methodology, will be developed and agreed as part of the EPP with the MMO, Natural England, Cefas, The Wildlife Trusts (TWT) and Whale and Dolphin Conservation (WDC).

2.6 Offshore Ornithology

378. The specific assessment requirements for offshore ornithology are set out within National Policy Statements EN-1 and EN-3 and are summarised in **Table A1-6** in **Appendix 1**.

2.6.1 Existing Environment

379. The ongoing digital aerial baseline surveys conducted at DEP and SEP to date indicate that the key species observed in the areas, and therefore of concern for the impact assessment are:

- Seabirds present during the breeding season: Sandwich tern *Thalasseus sandvicensis*, kittiwake *Rissa tridactyla*, common guillemot *Uria aalge*, razorbill *Alca torda*, gannet *Morus bassanus*, lesser black-backed gull *Larus fuscus*;

- Seabirds present during the non-breeding season: red-throated diver *Gavia stellata*, common guillemot, kittiwake, razorbill; and
- Seabirds present during passage periods: little gull *Hydrocoloeus minutus*, common tern *Sterna hirundo*, Arctic tern *Sterna paradisaea*, skua species.

380. Other seabird and waterbird species which were recorded at various times of the year will be accounted for during the assessment. The same applies to any other species not yet recorded which is found to be present in the study area (**Section 2.6.3.1**) during the second year of baseline surveys.

381. The AfL areas do not overlap with any ornithological designations, although the proposed export cable corridor options pass through the Greater Wash SPA. As breeding seabirds can travel considerable distances from their colonies when foraging it is necessary to give consideration to sites beyond the boundary of the study area, as a proportion of the birds using the habitats within DEP and SEP may originate from SPAs. A figure showing the study area and potentially relevant SPAs is presented in **Figure 2.6.1** in **Appendix 2**.

2.6.2 Potential Impacts

382. The Offshore Ornithology assessment is likely to have key inter-relationships with Fish and Shellfish Ecology, Marine Physical Processes, Marine Water and Sediment Quality, and Benthic and Intertidal Ecology. These will be considered where relevant.

2.6.2.1 Potential Impacts During Construction

383. The primary direct impact on offshore ornithology receptors during construction is displacement and disturbance of birds due to construction activities and vessel movement during the installation of offshore infrastructure at the offshore wind farm site and the export cable corridor. Indirect impacts on birds through changes in habitat or prey availability are possible and will also be considered. Impacts associated with the wind farm extensions and the export cable route search area will be considered separately and in-combination.

2.6.2.2 Potential Impacts During Operation

384. Potential direct impacts on offshore ornithology receptors during operation will result from the presence of turbines and offshore infrastructure, as well as from O&M activities. Collision risk, displacement, disturbance and barrier effects associated with the presence of turbines will all be considered. Displacement and disturbance associated with vessels and maintenance activity and indirect impacts on prey and habitats will also be considered. Displacement and barrier effects of local/resident birds will be considered together, whilst barrier effects in relation to migratory birds will be considered separately.

2.6.2.3 Potential Impacts During Decommissioning

385. During decommissioning, the potential impacts are anticipated to be similar to those described above for the construction phase although on a smaller scale. For example, noise impacts would be lower and there would therefore be less indirect impact upon birds through potential disturbance of prey species.

2.6.2.4 Potential Cumulative Impacts

386. The cumulative assessment will consider cumulative collision risk, displacement and barrier effects due to the presence of offshore infrastructure when considered alongside other projects. The species that will be included will be determined by the results of the baseline surveys and discussions with stakeholders. They are likely to comprise some or all of the key species listed in **Section 2.6.1**.

2.6.2.5 Potential Transboundary Impacts

387. Given the level of offshore wind development in southern North Sea waters by Belgian, Dutch, German and Danish projects, and the fact that birds are highly mobile and migratory, there is potential for transboundary impacts especially with regard to displacement, barrier effects and collision risk. However, the spatial scale and hence seabird reference populations sizes for a transboundary assessment would be much larger than for the UK alone. The assessment will consider these as far as is practicable.

388. Transboundary impacts will be assessed along with other cumulative impacts.

2.6.2.6 Summary of Potential Impacts

389. Potential impacts relating to offshore ornithology are summarised in **Table 2-18**.

Table 2-18 Summary of impacts relating to offshore ornithology (scoped in ✓, scoped out x)

Potential Impacts	Construction	Operation	Decommissioning
Disturbance and displacement (work activity, vessel movements, presence of turbines and infrastructure, lighting)	✓	✓	✓
Indirect impacts through effects on habitats and prey species	✓	✓	✓
Collision risk with turbines	×	✓	×
Barrier effect due to presence of turbines	×	✓	×
Cumulative impacts (disturbance and displacement, collision and barrier effect)	✓	✓	✓
Transboundary impacts	✓	✓	✓

2.6.3 Approach to Assessment and Data Gathering

2.6.3.1 Data Gathering

390. A program of digital aerial bird surveys to inform the assessment commenced in May 2018 and is scheduled to collect monthly survey data for 24 months, concluding in April 2020. A polygon encompassing both AfL areas is being surveyed along with a 4km buffer of the polygon (**Figure 2.6.1** in **Appendix 1**). Parallel transects situated 2.5km apart and aligned approximately in a north to south orientation have been selected to ensure that samples are obtained across a wide range of feeding and locational habitats within each transect. In total, the study area includes 19 transects which sample approximately 124.35km^2, or 10% of the total study area. The transect spacing and survey coverage was considered appropriate given the expected ornithological interests expected at the site, and has been successfully employed at many other offshore wind farm sites in UK waters.

391. As shown on **Figure 2.6.11** in **Appendix 1**, due to a small change in the SEP 'area of interest' boundary (as it was termed at the time) in October 2018, a small section of the survey area, at the southern end of the 4km buffer, was not covered between May and September 2018. As the key species present during this part of the year are generally not expected to be impacted by displacement, it is not anticipated that this will reduce the robustness of the assessment.

392. Digital aerial surveys collect data on the species of bird (or group/genus if is not possible to distinguish species), location, numbers, sex and age (where possible), flight heights (though the accuracy of these is potentially not sufficient for some purposes of the assessment; **Section 2.6.3.1**), and flight direction. The assessment will describe the nature of site usage by the birds recorded (e.g. seasonal variation, extent of foraging, overwintering or on passage) in order to determine the importance of the site for seabirds throughout the year relative to the wider area. A list of species recorded to date that are likely to be of significance to the assessment is provided in **Section 2.6.1**.

393. Information from other surveys carried out in the vicinity of the AfL areas will be utilised during the assessment, such as those undertaken for other operational offshore wind farms in the Greater Wash area. This will include GPS tracking on breeding Sandwich terns from the North Norfolk Coast SPA as part of the Dudgeon offshore wind farm post-construction monitoring (Collier *et al.*, 2018, 2017, 2016), and boat-based tracking of breeding Sandwich terns from the North Norfolk Coast SPA undertaken as part of the Sheringham Shoal offshore wind farm post-construction monitoring (Harwood *et al.*, 2018).

2.6.3.2 Key Aspects of the Assessment

394. Following the identification of the preferred offshore development area, further liaison with the key stakeholders, Natural England and RSPB, will be undertaken to agree the specific assessment methodology. A detailed method statement will be developed and agreed with these stakeholders as part of the EPP.

395. Detailed data analysis for the assessment will include the calculation of abundance and density estimates (with associated confidence intervals and levels of precision) and will consider seasonal differences in site usage by each key species, as well as the importance of the site for the life stages of each species (breeding and non-breeding adults and sub-adults). Reference populations for each species during different temporal periods for the assessment will be based on the best available information at the time of undertaking the assessment and will be agreed with stakeholders. Consideration of SPA connectivity will be provided in the assessment and will also be discussed with stakeholders.

396. It is recognised that a key issue for the assessment will be collision risk to Sandwich tern, following the Appropriate Assessment in 2012 leading to the refusal of consent of the Docking Shoal project (DECC, 2012). Investigations are already underway to review the work underpinning that assessment, with a view to updating it using as-built project parameters and more recent information collected from operational offshore wind farms and breeding colonies. The initial steps for this work have been discussed with Natural England and will continue to be addressed with key stakeholders as part of the Ornithology ETG.

397. As set out in **Section 1.3.4** above, Equinor has noted the conclusions of The Crown Estate's 2017 Offshore Wind Extensions Plan HRA (TCE, 2019), which concluded that there is sufficient scope and flexibility for project specific mitigation measures to be applied at the project level by developers to ensure no adverse effects on integrity, alone and in-combination.

398. With respect to the assessment that will be undertaken for DEP and SEP, the use of site-specific flight height data (the collection of which is possible for the majority of records of birds in flight) may be considered for Collision Risk Modelling (CRM), though current advice from the aerial survey contractor, Hi Def Aerial Surveying, is that the errors associated with site-specific flight height data may be greater than is required for this purpose. The secondary option is to use the generic flight height data which has been utilised in many offshore wind applications to date (Johnston *et al*., 2014a, 2014b), likely using Option 2 of the Band CRM (Band, 2012). A further option specific to Sandwich tern is investigating the use of flight height data obtained during the Sheringham Shoal Offshore Wind Farm post-construction monitoring (Harwood *et al*., 2018); the potential of this is currently being investigated. It is proposed to keep the approach under review during the assessment process and to consult with stakeholders through the EPP process.

399. The impact assessment will be undertaken in line with the most recent guidance (CIEEM, 2018) and expert opinion. Key guidance documents on specific areas of the assessment such as displacement and collision risk will also be utilised (McGregor *et al*., 2018; UK SNCBs, 2017, 2014). The sensitivity of each species will be determined based on the size of its population, its conservation status and its known sensitivity to offshore wind farms. Species identified as sensitive receptors will be subject to impact assessment in line with the potential impacts listed above.

400. A wide range of other relevant literature will be consulted during the assessment, for example studies assessing the distribution of seabirds at sea using GPS tracking (Cleasby *et al*., 2018; Wakefield *et al*., 2017; Wischnewski *et al*., 2017), foraging ranges *(*Oppel *et al., 2018;* Thaxter *et al*., 2012), flight speeds and behaviour at offshore wind farms *(*Fijn and Gyimesi, *2018;* Skov *et al*., 2018), and studies on the impacts of offshore wind development on seabirds. Information on these example topics and any other relevant subject areas will be drawn from offshore wind assessments, published and 'grey' literature as required.

2.7 Commercial Fisheries

401. The specific assessment requirements for commercial fisheries are set out within National Policy Statements EN-1 and EN-3 and are summarised in **Table A1-7** in **Appendix 1**.

2.7.1 Existing Environment

402. The proposed DEP and SEP are located within ICES statistical rectangle 35F1, with the export cable corridors passing through both 35F1 and, as they approach landfall, 34F1 (see **Figure 2.7.1** in **Appendix 2**). ICES rectangles are the smallest spatial unit for which landings data is widely available. These, along with the project footprint, will therefore be used to define the boundaries of the commercial fisheries study area and describe the fishing activity within it. The proposed development is within the jurisdiction of the Eastern Inshore Fisheries and Conservation Authority (EIFCA).

403. The sea off North Norfolk and within the Greater Wash area has long supported exploitable populations of a range of shellfish species, including crab, lobster, cockles, whelks, mussels and brown shrimp. MMO UK fleet landings data from ICES rectangles 34F1 and 35F1 show the most valuable species to be whelk, crab and lobster. Between 2013 and 2017, whelk, crab and lobster generated £4.6 million, £2.8 million and £1.8 million respectively from the combined rectangles.

404. There are several fishing ports within the vicinity of the Dudgeon and Sheringham Shoal offshore wind farms from which fishing vessels potentially access the proposed DEP and SEP areas. These are:

- Blakeney;
- Boston;
- Brancaster;
- Cromer;
- Great Yarmouth;
- Grimsby;
- Kings Lynn;
- Lowestoft;
- Sheringham; and
- Well-next-the-Sea.

405. The majority of fishing vessels targeting the area in and around the proposed extensions are UK-based. Dutch and Belgian beam trawlers have been recorded operating to the east of the extension areas (DOW, 2009).

406. Non-UK vessels do not generally have rights to fish within the 12nm limit. However, there are allocated zones, typically between 6nm and 12nm from shore, where historic rights allow access by the fishing fleets of authorised EU Members States (DOW, 2009). The proposed DEP is located entirely beyond 12nm but the proposed SEP straddles the 12nm limit, and the Bacton export cable corridor passes through an area of Belgian historic fishing rights, as shown in **Figure 2.7.1** in **Appendix 2**.

407. Historical consultation with local fishermen undertaken for the Dudgeon ES suggests that the proposed development is located within extensive potting grounds targeting crab and lobster (DOW, 2009). The Dudgeon North Extension and potentially the Dudgeon South Extension may be located within whelk potting grounds identified by the consultation (DOW, 2009).

2.7.2 Potential Impacts

408. The Commercial Fisheries assessment is likely to have key inter-relationships with Fish and Shellfish Ecology, which also has inter-relationships with Marine Geology, Oceanography and Physical Processes, Marine Water and Sediment Quality, and Benthic and Intertidal Ecology. There is also the potential for inter-relationships with Shipping and Navigation. These will be considered where relevant.

2.7.2.1 Potential Impacts During Construction

409. Potential impacts during construction will be associated with changes in fish abundance / resource (see **Section 2.4**) or restricted access to fishing areas (i.e. from construction safety zones). Impacts to be assessed will include loss of, or restricted access to fishing areas, disturbance or displacement of commercial species, increased collision risk (**Section 2.8**) or risk of gear loss.

2.7.2.2 Potential Impacts During Operation

410. Potential impacts during operation will focus on the permanent presence of offshore structures and vessel operations associated with maintenance activities, including any safety exclusion zones. Areas between turbine structures have generally been open to fishing activities during the operation of the existing Sheringham Shoal and Dudgeon wind farms, except where limited-duration maintenance activities have been necessary. The assessment will include impacts to stocks of commercially exploited species, permanent loss of fishing grounds, effects associated with displacement of fishing activity, increased collision risk (see **Section 2.8**) and risk of gear loss. It is anticipated that the installation of larger turbines at a lower density within the extension AfL areas (relative to the parent wind farms) will reduce the footprint of offshore structures and reduce any effects of the wind farm array areas on fishing activities.

2.7.2.3 Potential Impacts During Decommissioning

411. It is anticipated that the impacts associated with decommissioning would be similar to those during the construction phase. Foundations are likely to be removed at or below the seabed and cables may also be removed. A decommissioning plan will be developed and approved by the Regulatory Authorities to ensure that any hazards to fishing activities are identified and either removed or marked clearly on charts, which will mitigate the risk. The result of decommissioning is likely to be an increase in available fishing grounds.

2.7.2.4 Potential Cumulative Impacts

412. Cumulative impacts from the proposed development, other offshore wind farms and marine activities are possible. They will be considered as part of the assessment where consultation with the fishing industry confirms that such interactions are a concern. Those identified will be assessed in line with the approach set out in **Section 1.6**.

2.7.2.5 Transboundary Impacts

413. There is potential for transboundary impacts upon fisheries, particularly with regard to Dutch and Belgian vessels and the displacement of fishing effort, potentially into international waters. Consultation with stakeholders in other EU Member States will be undertaken, and the most up to date information on fisheries, plans and projects in the adjacent waters of other Member States will be used to inform the assessment.

2.7.2.6 Summary of Potential Impacts

414. Potential impacts relating to commercial fisheries are summarised in **Table 2-19**.

Table 2-19 Summary of impacts relating to commercial fisheries (scoped in ✓, scoped out x)

Potential Impacts	Construction	Operation	Decommissioning
Impacts on commercially exploited species associated with their displacement from the area of activity / works	✓	✓	✓
Displacement of fishing activity leading to increased pressure on other areas outside the wind farm sites	✓	✓	✓
Loss of, or restricted access to, traditional fishing grounds	✓	✓	✓
Loss of, or damage to, fishing gear	✓	✓	✓
Increased collision risk	Included in shipping and navigation assessment	Included in shipping and navigation assessment	Included in shipping and navigation assessment
Increased transit times to reach fishing grounds	✓	✓	✓
Cumulative impacts with other activities	✓	✓	✓
Transboundary impacts	✓	✓	✓

2.7.3 Approach to Assessment and Data Gathering

415. As part of the EIA process, the existing environment with respect to commercial fisheries will be described, including, but not limited to the following which will be described in detail in a technical report:

- An overview of fishing activity in the study area:
  - Identifying major commercial fish and shellfish species and their seasonality;
  - Past and present status of fisheries;
  - Details of fishing gears used; and
  - Vessels, gear and operating patterns.
- Details of principal fishing fleets in the study area derived from:
  - Surveillance sightings;
  - Landings data;
  - Vessel Monitoring System (VMS) data; and
  - Consultation with the fishing community, including information available from the existing Sheringham Shoal and Dudgeon wind farms.

416. Identification of potential sensitive receptors will be undertaken using existing studies from nearby wind farm sites and discussions with the EIFCA, the current Dudgeon and Sheringham Shoal FLO, and the local fishing fleet.

417. **Table 2-20** below identifies the desk-based sources that will be accessed to inform the characterisation of the existing environment.

Table 2-20 Desk-based data sources to be used to inform the assessment

Data source	Estimated Date	Data contents
UK Marine Management Organisation (MMO) fisheries statistics	2009-2019	Landing statistics data for UK registered vessels by year, month, ICES rectangle, vessel gear type, port of landing, species live weight (tonnes) and value. UK vessels landing into UK and European ports. Non-UK vessels landing into UK ports.
UK MMO Surveillance Sightings	2016-2020	Sightings of vessels by gear type (all nationalities) recorded in UK waters on weekly surveillance fly overs during daylight hours. Recording sighting date; ICES rectangle; ICES sub square; latitude; longitude; vessel/gear type; activity; nationality; course; speed; and number of sightings.
UK MMO Satellite Tracking (VMS) data	2016-2020	Fishing activity for UK registered vessels 15m and over. Aggregated VMS locations recorded in 0.05° by 0.05° grids from UK vessels only in European waters.
Belgian, French and Dutch vessel VMS data and landings from the study area	As available	Vessel activity and effort data, and landings data to non-UK ports will be sourced, where available, from other EU Members States and presented in the ES.

Data source	Estimated Date	Data contents
Consultation with fishing industry, EIFCA and FLO	2019-2020	Coverage includes proposed extension areas
DOW Environmental Statement – Section 13 Commercial Fisheries	2009	Coverage includes proposed extension areas
Scira Offshore Energy Sheringham Shoal Offshore Wind Farm Environmental Statement – Section 12 Commercial Fisheries	2006	Coverage includes proposed extension areas. Although dated, this provides historic environmental baseline information from prior to the construction of Sheringham Shoal and Dudgeon.

418. The potential impacts of the wind farms on commercial fisheries receptors that will be taken forward for assessment will be as specified in the Cefas and MCEU (2004) guidelines for offshore wind developments.

419. Following the identification of the preferred offshore development area, further liaison with the relevant parties such as the MMO, EIFCA and FLO will be undertaken to agree the specific evidence requirements for the assessment of potential impacts on commercial fisheries. This will include information sources and data collection requirements, as well as the impact assessment approach and methodology.

2.8 Shipping and Navigation

420. The specific assessment requirements for Shipping and Navigation are set out within National Policy Statement EN-3 and are summarised in Table A1-8 in **Appendix 1**.

2.8.1 Existing Environment

421. The DEP and SEP will be located within the southern North Sea where busy shipping routes exist. As illustrated in **Figure 2.8.1** in **Appendix 2**, there are shipping routes in between the existing Dudgeon and Sheringham Shoal Offshore Wind Farms and also between Sheringham Shoal Offshore Wind Farm and the North Norfolk coast. Shipping density on each of these routes is estimated at between 1,500 and 6,000 vessel transits per annum (MMO, 2017). The proposed wind farm extensions largely avoid these routes, however the DEP and SEP export cables will cross them. There are no IMO routeing measures in the vicinity of the proposed wind farm extensions.

422. The routes are used by a variety of vessels, primarily cargo vessels, tankers and passenger vessels (MMO, 2014). This shipping safely co-exists alongside a number of notable marine activities (see **Figure 2.8.1** in **Appendix 2**) which also contribute to recorded shipping in the area, including:
    - Offshore wind farms including the Dudgeon, Sheringham Shoal, Race Bank, Inner Dowsing and Lynn offshore wind farms;
    - Oil and gas activities;
    - Commercial fishing activities (as described in **Section 2.7)**;
    - Marine aggregate dredging activities and dredger transit routes (**Figure 2.8.1** in **Appendix 2**);
    - Disposal sites;
    - Recreational activities (sailing yachts and motor craft including fishing, water sports and SCUBA diving); and
    - Search and Rescue (SAR) activities.

423. An assessment of these activities using historical and current data will be undertaken to inform the ES and a Navigational Risk Assessment (NRA).

2.8.2 Potential Impacts

424. The Shipping and Navigation assessment is likely to have key inter-relationships with Commercial Fisheries, Other Marine Users, and Aviation and MoD. These will be considered where relevant.

2.8.2.1 Potential Impacts During Construction

425. Potential impacts to shipping and navigation arising through the construction activities include:

Displacement of activities

426. Vessel activities and routeing currently undertaken within the proposed wind farm sites and export cable corridors would be displaced during construction due to the presence of buoyed construction areas (including 500m rolling safety zones around fixed structures where work is being undertaken), construction vessels and partially completed or pre-commissioned structures. This displacement could apply to commercial shipping, commercial fishing vessels, and vessels associated with other the marine activities identified. Although the proposed extension areas avoid the main shipping lanes, any vessels operating within or transiting through the extension areas will be displaced. Offshore export cable installation activities would also displace vessels operating within or transiting through the offshore cable corridors for short periods of time. However, because the proposed extension areas are located outside the main shipping lanes, it is anticipated, subject to the findings of the full EIA, that the level of displacement will be low.

Increased collision risk

427. The presence of construction vessels transiting to the construction site, as well as the presence of stationary vessels within the construction area, would introduce an additional vessel to vessel collision risk. Vessels associated with the construction would include large vessels restricted in their manoeuvrability (for example, heavy lift vessels, jack ups, or cable lay vessels). Furthermore, displacement of vessels from the proposed wind farm extension sites and the cable route may increase the density of vessels in other areas, causing an increased vessel collision risk in those areas. Displacement of vessels should be minimised by the location of the proposed extension areas outside the main shipping lanes, however, any increased collision risk will be assessed by a NRA.

Increased allision risk

428. Although the proposed wind farm extension areas avoid the shipping routes shown on **Figure 2.8.1** in **Appendix 1**, the physical presence of partially completed structures, or completed structures awaiting commissioning, would create an increased vessel to structure allision risk to passing traffic. There is also an increased risk of allision by a vessel operating within the construction boundary to fixed structures, for example, in the unlikely event that a vessel is not under command (NUC) as a consequence of an emergency situation such as a machinery failure on-board. There is a particular risk to vessels actively engaged in fishing within the site, due to the time spent in proximity to the structures when compared to a passing vessel.

Interaction with partially completed subsea cables

429. Prior to completion of the proposed DEP and SEP, export and array cable installation, submarine cables may be unburied (or partially buried) on the seabed. Any exposed cable creates a snagging risk to vessel anchors and fishing gear. Snagging would compromise vessel stability and could also damage subsea cables.

2.8.2.2 Potential Impacts During Operation

Displacement of activities

430. Once the wind farm extensions are completed it is assumed that the majority of large commercial vessels would be displaced from transiting through or undertaking any activity within the wind farm site(s), although smaller vessels (e.g. fishing or recreation) may still choose to transit through the site. Any affected vessel routes and activities would already have been displaced during the construction phase of the scheme. The scale of impact would depend on the final size and location of the wind farm, as well as the position and spacing of the structures within the wind farms. Although vessel density data shows that the proposed wind farm extensions avoid the main shipping lanes, some minor displacement could occur. During periods of major maintenance in the operational phase, either within a wind farm site or cable corridor, 500m safety zones may be established around structures where work is being undertaken. These may cause further (temporary) displacement.

Increased collision risk:

431. Displacement of shipping has the potential to increase shipping density in other areas, potentially leading to an increased vessel-to-vessel collision risk. As part of the NRA process, the following (vessel-to-vessel) collision scenarios will be modelled:
    - Base case without wind farm extensions;
    - Base case with wind farm extension(s);
        - Presence of DEP only.
        - Presence of SEP only.
        - Presence of both Extension Projects.
    - Future case without wind farm extensions (assuming a 10% increase in traffic); and
    - Future case with wind farm extensions (assuming a 10% increase in traffic);
        - Presence of DEP only.
        - Presence of SEP only.
        - Presence of both Extension Projects.

432. The future case increase may be altered from 10% during the NRA process if consultation feedback demonstrates that a change is necessary.

433. It is also noted that during periods of major maintenance, the presence of vessels working at the site(s) or within the offshore cable corridor creates an additional collision risk, particularly as it is likely that major maintenance would require large vessels with restricted manoeuvrability.

Increased allision risk

434. The physical presence of the completed wind farm structures would create an increased allision risk to passing traffic during the operational phase. There is also an increased risk of allision by a vessel NUC within the wind farm site(s). As would be the case during the construction phase, there would be a particular risk to vessels actively engaged in fishing within the site, due to the time spent in proximity to the structures when compared to a passing vessel. Potential impacts on commercial fishing activity will be considered in the commercial fisheries assessment. As part of the NRA process, the following (vessel-to-structure and vessels NUC) allision scenarios will be modelled based on a realistic worst-case layout:
    - Base case with wind farm extensions; and
    - Future case with wind farm extensions (assuming a 10% increase in traffic).

435. As described above, each scenario will be modelled to assess the presence of the wind farm extensions individually, and together.

Interaction with subsea cables

436. Any exposed cables associated with proposed DEP and SEP would create a snagging risk to vessel anchors or demersal fishing gear. Snagging could compromise vessel stability, potentially leading to a vessel capsizing or sinking, and could also damage subsea cables. This impact could be associated with both the export and array cables. Protection methods used for non-buried cables may also pose a risk to vessels in shallow areas (e.g. nearshore), such as recreational and fishing vessels, by reducing under keel clearance.

2.8.2.3 Potential Impacts During Decommissioning

437. It is anticipated that the decommissioning impacts would be similar in nature to those of construction, although the magnitude of effect is likely to be lower.

2.8.2.4 Potential Cumulative Impacts

438. Given the rate of offshore infrastructure development in the southern North Sea, in both the UK sector and in the waters of other EU Member States, there is the potential for cumulative impacts on shipping and navigation, including that associated with existing wind farms, oil and gas activities, commercial fishing activities, aggregate dredging, and vessel activities associated with recreational activities. These will be identified and assessed in line with the approach set out in **Section 1.6.4**.

2.8.2.5 Potential Transboundary Impacts

439. There is potential for transboundary impacts on shipping and navigation. The NRA and ES will consider transboundary activities (including impacts from other offshore wind developments) with regard to vessel routeing and international ports, and the presence of international commercial fishing fleets, if relevant.

2.8.2.6 Summary of Potential Impacts

440. Potential impacts relating to shipping and navigation are summarised in **Table 2-21** below.

Table 2-21 Summary of impacts relating to Shipping and Navigation (scoped in (✓), scoped out (x))

Potential Impacts	Construction	Operation	Decommissioning
Displacement of vessel routeing activities	✓	✓	✓
Increased collision risk	✓	✓	✓
Increased allision risk	✓	✓	✓
Interaction with subsea cables	✓	✓	✓
Impacts on emergency response resources	✓	✓	✓
Cumulative impacts	✓	✓	✓
Transboundary impacts	✓	✓	✓

2.8.3 Approach to Assessment and Data Gathering

441. As part of the EIA and associated NRA, the existing environment with respect to Shipping and Navigation will be described, including, but not limited to the following:
    - Existing commercial shipping and navigation routes;
    - Oil and gas platforms and other infrastructure;
    - Commercial fishing fleet activities;
    - Marine aggregate sites and transit routes;
    - Recreational activities; and
    - Search and Rescue activities.

442. Identification of potential sensitive receptors will be undertaken through a desk-based assessment and in consultation with national and local stakeholders including, but not limited to, the MCA, RNLI, Trinity House, Chamber of Shipping, relevant Port Authorities, National Federation of Fishermen's Organisation (NFFO) and the Royal Yachting Association (RYA) and other international organisations, where relevant. International stakeholders will be consulted where potential transboundary impacts are identified.

443. **Table 2-22** below identifies the desk-based sources that will be accessed to inform the characterisation of the existing environment.

Table 2-22 Data sources used

Data source	Date	Data contents
Marine Traffic Survey AIS data	Most recent year	Vessel movement information within the coastal and offshore area
Marine Accident Investigation Branch (MAIB) maritime incident data	Most recent 10 years	All maritime incident data for UK registered ships
RNLI maritime incident data	Most recent 10 years	Maritime incident data including recreational mariners
Marine aggregates dredging data (Crown Estate and BMAPA)	Most recent year	Location of active or proposed aggregate dredging sites and dredger transit routes
Admiralty Charts (UK Hydrographic Office)	Most up-to-date	Location of: - Oil and gas platforms - Pipelines - Oil wells - Anchorage areas - Explosive dumping grounds - Aggregate extraction sites - Licenced disposal sites - Cable routes
RYA UK Coastal Atlas of Boating (GIS Dataset)	September 2016	Information on recreational cruising activity within 12 nautical miles of the UK coast

Data source	Date	Data contents
Fisheries VMS satellite data	Most recent year	Movement of fishing vessels within the UK coastal area

444. The primary input to the NRA and ES will be up-to-date marine traffic survey data, including AIS, radar, and visual observations. This data will cover a minimum of 28 days, account for seasonal variations, and be collected within 24 months of submission. Surveys will be undertaken in accordance with MCA guidelines outlined below in Paragraph 447 and agreed in advance with stakeholders as required.

445. AIS is required to be fitted aboard all vessels engaged on international voyages of 300 gross tonnage (GT) and upwards, cargo vessels of 500GT and upwards not engaged on international voyages and passenger vessels (carrying 12 or more passengers) irrespective of size built on or after 1st July 2002. It is also mandatory for fishing vessels over 15m to carry AIS. Vessels not required to carry AIS may still broadcast voluntarily via AIS Class A or B (a cost-efficient version for non-mandatory vessels) and would also be recorded and assessed as part of the NRA and ES.

446. Vessels within the proposed DEP and SEP sites not broadcasting via AIS will be recorded where possible by radar and visual observation.

447. The assessment for the NRA and ES will be undertaken in accordance with following standards and guidance:

- MCA Marine Guidance Note (MGN) 543 (M+F) Offshore Renewable Energy Installations Guidance on UK Navigational Practice, Safety and Emergency Response Issues (MCA, 2016);
- MCA Methodology for Assessing the Marine Navigational Safety Risks of Offshore Renewable Energy Installations (MCA, 2015);
- International Maritime Organisation (IMO) guidelines for Formal Safety Assessment (IMO, 2018); and
- MCA Marine Guidance Note MGN 372 (M+F) (MGN 372 M+F) Offshore Renewable Energy Installations (OREIs) Guidance to Mariners Operating in the Vicinity of UK OREIs (MCA 2008).

448. Following the identification of the preferred offshore development area, further liaison with stakeholders will be undertaken to agree the approach and methodology to data collection for EIA purposes and the specific assessment methodology. A detailed method statement will be developed and agreed with the MCA as part of the consultation process.

449. The MCA require that their methodology (MCA, 2015) is used to prepare an NRA, including an IMO Formal Safety Assessment (FSA). The NRA would have a baseline data gathering phase broadly similar to the EIA, which would include marine traffic surveys, desk-based assessment and consultation to allow the identification of higher risk areas. This phase is then followed by the FSA, in line with the IMO FSA Process (IMO, 2002) and the DECC guidance (DECC, 2013). Both the NRA and the EIA will produce an assessment of the risks posed by a development to shipping and navigation, and present the mitigation required to minimise these risks.

450. The results of the baseline assessment will be used to identify the potential impacts arising from the construction, operation, and decommissioning of the proposed development relevant to shipping and navigation. Where a pathway exists through which an impact can be transmitted to a receptor, the overall "severity of consequence" is determined. This process requires a degree of subjectivity and professional judgement; therefore, the assessment will incorporate the output of consultation with national and local stakeholders relevant to shipping and navigation, and the lessons learnt from existing developments.

451. Following completion of the NRA, impacts that have a clear pathway of effect on receptors would be considered as part of the FSA process and would therefore be detailed within the ES.

452. The MCA MGN 543 (MCA, 2016) highlights issues that need to be taken into consideration when assessing the impact on navigational safety from offshore renewable energy developments in the UK. Specific annexes of the guidance that address particular issues include:

- Annex 1: Site position, structures and safety zones;
- Annex 2: Developments, collision avoidance and communications;
- Annex 3: MCA's wind farm shipping template for assessing wind farm boundary distances from shipping routes;
- Annex 4: Safety and mitigation measures recommended for OREI during construction, operation and decommissioning; and
- Annex 5: SAR and emergency response matters.

2.9 Offshore Archaeology and Cultural Heritage

453. The specific assessment requirements for offshore archaeology and cultural heritage (historic environment) are set out within National Policy Statement EN-1 and are summarised in **Table A1-9** in **Appendix 1**

2.9.1 Existing Environment

454. The Historic Seascape Character (HSC) of coastal and marine areas around England has been mapped through a series of projects funded by Historic England and consolidated into a single national database (LUC, 2017a, 2017b, 2017c). The key cultural processes which form the HSC within the offshore scoping area (below MHWS, including the intertidal zone) include:

- Palaeolandscapes (as part of the 10,000 year old land mass that bridged England with what is now main land Europe);
- World War II defence area (within the intertidal and coastal strip at the landfall only);
- Wreck hazards and both historic and current navigation activities (indicative of high historic maritime activity and the potential for maritime remains);
- Fishing (including bottom trawling, drift netting, fishing grounds, fixed netting and potting) both historic (from the Medieval period onwards) and current; and
- A current industry and communications character associated with renewable energy, hydrocarbon pipelines and submarine telecommunications cables.

455. Previous offshore archaeological assessments undertaken for both Dudgeon Offshore Wind Farm and Sheringham Shoal Offshore Wind Farm have demonstrated the presence of archaeological remains, and high potential for further archaeological remains to be present on, or buried within, the seabed, as yet undiscovered.

456. Geoarchaeological assessment undertaken for the Dudgeon Offshore Wind Farm led to the identification of a sub-seabed sedimentary sequence charting the transition from late glacial into the early Holocene. Well-dated palaeoenvironmental reconstructions from the North Sea Basin are rare and this new data on changing local physical and vegetation environments, occurring against a background of global climate change and rising sea levels, was one of the first studies from the offshore renewables industry to be published as a scientific paper in a peer-reviewed journal (Brown *et. al.*, 2018). Geoarchaeological recording undertaken for Sheringham Shoal also demonstrated the presence of Holocene deposits, including peat considered likely to correspond to Holocene palaeochannels and terrestrial environments. In addition, possible pre-Devensian Pleistocene deposits were also identified, associated with the "Weybourne Channel" interpreted from the seismic data acquired for the project (Wessex Archaeology, 2006).

457. The assessment of marine geophysical data for both projects also revealed the presence of wrecks, crashed aircraft and geophysical anomalies of possible archaeological interest, a number of which were investigated with a Remote Operated Vehicle (ROV) in conjunction with Unexploded Ordnance (UXO) survey. Identified finds included aircraft propellers and engines, as well as anchors, metal and wooden wreck debris and UXO dating from World War II. A cannon and anchor discovered during the Sheringham Shoal ROV investigations, are now on display in The Mo, Sheringham's town museum. **Figure 2.9.1** in **Appendix 2** illustrates identified seabed features from previous archaeological assessments.

2.9.2 Potential Impacts

458. Heritage assets may be affected by direct physical change or by change in their setting (Historic England – GPA 2, 2015b).

459. Direct impacts to heritage assets, either present on the seafloor or buried within seabed deposits, may result in damage to, or total destruction of, archaeological material or the relationships between that material and the wider environment (stratigraphic context or setting). These relationships are crucial to developing a full understanding of an asset.

460. The DEP and SEP also has the potential to directly and indirectly change the hydrodynamic and sedimentary process regimes, both locally and regionally. Changes in coastal processes can lead to re-distribution of erosion and accretion patterns, while changes in tidal currents, for example, may affect the stability of nearby morphological and archaeological features. Indirect impacts to heritage assets may occur if buried heritage assets become exposed to marine processes, due to increased wave/tidal action for example, as these will deteriorate faster than those protected by sediment cover. Conversely, if increased sedimentation results in an exposed site becoming buried this may be considered a beneficial impact.

461. Impacts to the significance of a heritage asset may also occur if a development changes the surroundings in which a heritage asset is located, experienced and appreciated (i.e. its setting). Similarly, historic character may also be affected if the proposed scheme results in a change to the prevailing character of the area and/or alters perceptions of the seascape.

462. The Offshore Archaeology and Cultural Heritage Assessment is likely to have key inter-relationships with onshore archaeology and cultural heritage, seascape, landscape and visual impact, and marine physical processes. Information from assessments undertaken for these topics will also help to establish potential impacts to the offshore archaeology and cultural heritage resource.

2.9.2.1 Potential Impacts During Construction

463. Direct impacts may occur if archaeological material is present within the footprint of DEP and SEP associated with the following activities:

- Seabed preparation (including UXO and boulder clearance);
- Installation of wind turbine foundations;
- Installation of ancillary infrastructure;
- Installation of offshore cabling;
- Seabed contact by legs of jack-up vessels and / or anchors; and
- Cable installation at the landfall.

464. Indirect impacts to heritage assets may occur if the physical presence of construction plant and offshore infrastructure impacts the hydrodynamic regime, or if seabed preparation associated with foundation and cable installation leads to localised effects upon sedimentary processes.

465. There would also be potential for temporary impacts to the setting of heritage assets and to the HSC from the presence of vessels associated with the installation of offshore infrastructure and activities at the landfall.

2.9.2.2 Potential Impacts During Operation

466. Direct impacts may occur if archaeological material is present within the footprint of works required for routine maintenance activities which disturb the seabed (for example, seabed contact by legs of jack-up vessels and / or anchors) or in exceptional circumstances such that cabling would need replacing, for example. However, given that much of the areas within which such activities would take place would already have been disturbed during construction there would be limited scope for further impact.

467. Indirect impacts to heritage assets may occur if the physical presence of the installed infrastructure impact the hydrodynamic or sedimentary regime including the potential for increased scour around foundations.

468. There would also be potential for impacts to the setting of heritage assets and to the HSC from the presence of the installed infrastructure and ongoing maintenance activities.

2.9.2.3 Potential Impacts During Decommissioning

469. If cables and foundations are left in place there would be no potential for direct impact. Direct impacts to heritage assets may occur if the accessible infrastructure is removed, although the anticipated effect on archaeological material would be limited as any remains at the locations of the installed infrastructure will already have been impacted/mitigated during the construction phase. If archaeological material is present within the footprint of jack-ups or vessel anchors deployed during decommissioning activities, direct impacts may also occur.
470. The removal of installed infrastructure has the potential to affect the hydrodynamic regime, and sedimentary processes which in turn may have an indirect impact upon heritage assets.
471. There would also be potential for temporary impacts to the setting of heritage assets and to the HSC from the presence of vessels associated with the decommissioning of offshore infrastructure and activities at the landfall.
472. In general terms, it is anticipated that the decommissioning impacts would be similar in nature to those of construction, although the magnitude of effect is anticipated to be lower.

2.9.2.4 Potential Cumulative Impacts

473. Individual heritage assets would not be subject to cumulative direct impacts from other known plans or projects as they are discrete and there would be no physical overlap of different infrastructure. However, although individual assets are discrete, taken together they could have collective heritage significance, therefore multiple impacts upon similar assets could occur cumulatively. In addition, there is potential for multiple developments to affect the larger-scale archaeological features such as palaeolandscapes and to affect the setting of heritage assets and the HSC of the North Sea. There is also the potential for cumulative indirect impacts associated with changes to marine physical processes.
474. There is, therefore, the potential for cumulative impact associated with the construction, operation and decommission of other plans or projects. These will be identified and assessed in line with the approach set out in **Section 1.6.4.8**.

2.9.2.5 Potential Transboundary Impacts

475. Indirect transboundary impacts may occur associated with changes to marine physical processes, where those changes cross an international boundary. Direct transboundary impacts may also occur if wrecks or aircraft of non-British nationality are subject to impact from development. Such wrecks may fall within the jurisdiction of another country, and may include, for example, foreign warships lost in UK waters. Similarly, where palaeolandscapes within the North Sea cross international boundaries, direct transboundary impacts may occur. However, data sharing across national boundaries of data produced through UK offshore wind farm development, and that of the Netherlands, Belgium and Germany, for example, has the potential to result in a significant beneficial transboundary impact.

2.9.2.6 Summary of Potential Impacts

476. A summary of potential impacts is provided in **Table 2-23** below.

Table 2-23 Summary of impacts relating to Offshore Archaeology and Cultural Heritage (scoped in ✓, scoped out x)

Potential Impacts	Construction	Operation	Decommissioning
Direct impacts to heritage assets.	✓	✓	✓
Indirect impacts to heritage assets associated with changes to marine physical processes.	✓	✓	✓
Change to the setting of heritage assets, which could affect their heritage significance.	✓	✓	✓
Change to character which could affect perceptions of the HSC.	✓	✓	✓

2.9.3 Approach to Assessment and Data Gathering

477. As part of the EIA process, the existing environment with respect to offshore archaeology and cultural heritage will be described, including, but not limited to the following:
    - Seabed prehistory (i.e. archaeological remains on the seabed corresponding to the activities of prehistoric populations that may have inhabited what is now the seabed when sea levels were lower);
    - Maritime archaeology (i.e. the remains of boats and ships and archaeological material associated with prehistoric and historic maritime activities);
    - Aviation archaeology (i.e. the remains of crashed aircraft and archaeological material associated with historic aviation activities);
    - Historic seascape character (i.e. the attributes that contribute to the formation of the historic character of the seascape); and
    - Heritage assets, including surface and buried archaeology (also encompassing palaeoenvironmental deposits) within the intertidal zone below MHWS.

478. The existing baseline and proposed assessment methodologies of potential impact above MHWS will be set out in the onshore archaeology and cultural heritage assessment (see **Section 3.5**).

479. **Table 2-24** identifies the desk-based sources that will be accessed to inform the characterisation of the existing environment with respect to offshore archaeology and cultural heritage.

Table 2-24 Data sources to be used for the assessment of offshore archaeology and cultural heritage

Data source	Data contents
United Kingdom Hydrographic Office (UKHO)	Records of wrecks and obstructions data including 'dead' and salvaged wrecks that are no longer charted as navigational hazards.
National Record of the Historic Environment (NRHE)	Maritime records, including documented losses of vessels, and records of terrestrial monuments and findspots, including the archaeological excavation index.
National Heritage List of England (NHLE)	Records of designated heritage assets within England, maintained by Historic England. GIS data for all Protected Wrecks, Scheduled Monuments, Listed Buildings, Registered Parks and Gardens and Registered Battlefields.
Norfolk Historic Environment Record (NHER)	Contains data on all recorded non-designated heritage assets, maintained by Norfolk Historic Environment Services (HES). The data includes findspots, monuments and locally listed buildings. Information on previous events (archaeological surveys and investigations) will also be obtained.
British Geological Survey (BGS)	Historic borehole logs and the wider geological background for the region.
National HSC	GIS data and character texts for mapped HSC.
Existing archaeological studies and published sources	Background information on the archaeology of the North Sea and North Norfolk region, including the results of archaeological assessments carried out for the Sheringham Shoal OWF and Dudgeon OWF and recent work undertaken in the wider North Sea.

480. The following surveys / studies will be undertaken between 2019 and 2020 to inform the assessment (**Table 2-25**). In addition, if any geotechnical investigations are completed the samples will be made available for geoarchaeological assessment.

Table 2-25 Proposed baseline surveys offshore archaeology and cultural heritage

Survey/study	Timing	Spatial Coverage
Multibeam bathymetry	2019-2020	Extension areas and offshore cable corridor
Side-scan sonar	2019-2020	Extension areas and offshore cable corridor
Sub-bottom profiling	2019-2020	Extension areas and offshore cable corridor
Magnetometer	2019-2020	Extension areas and offshore cable corridor
Walkover survey	2020	Cable corridor at the landfall below MHWS

481. The PEI / ES related assessment will be undertaken in accordance with following standards and guidance:

- JNAPC Code of Practice for Seabed Development (Joint Nautical Archaeology Policy Committee and The Crown Estate, 2006);
- Historic Environment Guidance for the Offshore Renewable Energy Sector (Wessex Archaeology, 2007);
- Guidance for Assessment of Cumulative Impacts on the Historic Environment from Offshore Renewable Energy (Oxford Archaeology, 2008);
- Chartered Institute for Archaeologists' Standard and Guidance for Historic Environment Desk-Based Assessments (2014a) and Code of Conduct (2014b); and
- The Setting of Heritage Assets: Historic Environment Good Practice Advice in Planning 3 (Historic England, 2017)

482. The assessment will broadly include the following steps:

- Marine geophysical survey data, including multibeam echo sounder, side scan sonar, magnetometer and sub bottom profiler data, will be acquired to inform the EIA during 2019/2020. For the purposes of archaeological assessment, processing and interpretation of the marine geophysical data will be carried out by a qualified and experienced archaeological contractor in accordance with industry good practice as set out in available guidance such as Marine Geophysics Data Acquisition, Processing and Interpretation (Historic England, 2013). The results of the assessment will inform a marine archaeological desk-based assessment in support of the ES.
- Pre-consent geotechnical investigations are not currently planned. However, the geoarchaeological assessment of geotechnical data acquired for the project would form an essential part of pre-construction archaeological assessment should the proposed project be granted consent.
- The marine archaeological desk-based assessment will be undertaken to establish the baseline for both known and potential heritage assets within the defined project areas based upon the desk-based sources listed in **Table 2-24** and the results of the archaeological assessment of marine geophysical survey data. Dependent upon the results, a walkover survey at the landfall may be carried out to ground truth existing records of heritage assets and identify any potential unrecorded heritage assets. This may also be required to inform an assessment of potential setting impacts upon heritage assets below MHWS within the intertidal zone.
- Following the identification of the preferred offshore development area, liaison with relevant stakeholders, i.e. Historic England and the Norfolk County Council Historic Environment Service (NCC HES) will be undertaken to further agree the approach and methodology to data collection for EIA purposes and the specific assessment methodologies. A method statement will be developed and agreed with stakeholders (Historic England and the NCC HES) as part of the EPP.

2.10 Aviation and MoD

483. The specific assessment requirements for Aviation and Ministry of Defence (MoD) are set out within National Policy Statement EN-1 and are summarised in **Table A1-10** in **Appendix 1**.

2.10.1 Existing Environment

484. The airspace within / above and surrounding the proposed Dudgeon and Sheringham Shoal Offshore Wind Farm Extensions is used by a range of both civil and military aircraft as described below and illustrated in **Figure 2.10.1** in **Appendix 2**.

Airports, air traffic services

485. The nearest UK airport to the Dudgeon and Sheringham Shoal Offshore Wind Farm Extensions is Norwich International Airport, approximately 45.6km to the nearest point of the proposed Sheringham Extension boundary. Northrepps Aerodrome is a small privately-owned airfield located 21km from the nearest point to the proposed Sheringham Extension boundary. Coltishall airfield, previously RAF Coltishall, is located to the north of Norwich International Airport and approximately 37km from the nearest point to the Sheringham Extension boundary. A British aircraft manufacturer, Swift Aircraft, is now based at the airfield using the runway for flights. Royal HaskoningDHV (2013) assessed that the distance to the nearest airfield to the Dudgeon Offshore Wind Farm was too great for an unacceptable hazard to flight safety to occur. Whilst the extension projects weren't assessed and are located closer to the airfield, it is reasonable to conclude that the same applies to the Dudgeon and Sheringham Shoal Offshore Wind Farm Extensions. Flight safety is assessed based on aircrafts take-off and landing. Whilst the distance is shorter, aircraft taking-off and landing will be at an altitude significantly greater than the tallest infrastructure related to any phase of the development.

486. The world is divided into Flight Information Regions (FIR) defining Air Traffic Services (ATS) provision responsibility for aircraft. The Dudgeon and Sheringham Shoal Offshore Wind Farm Extensions lie wholly within the London FIR (under the regulation of the UK Civil Aviation Authority (CAA)).

487. Two civilian radar systems, which provide Air Traffic Control (ATC) services, are relevant in the context of the proposed wind farm extensions. Both are National Air Traffic Services (NATS) operated systems: Cromer located 34km from the proposed development; and Claxby at a distance of 110km.

488. NATS (En Route) (NERL) has produced self-assessment maps for applicants to ascertain whether their proposed developments have an impact upon NERL infrastructure and operations. CAA guidance CAP764 (CAA, 2016) sets out a requirement for a consultation zone within a 10km radius of air-ground-air communication stations and navigation aids, and within a 15 nautical mile radius around secondary surveillance radar infrastructure. Within these consultation zones, NERL would carry out an in-depth assessment of potential impacts. Furthermore, for primary surveillance radars, a simple line-of-sight method has been developed to assist in determining whether a further, more detailed assessment needs to be carried out. Tip heights from 20m to 200m have been considered in describing the areas where turbines of the relevant height would be within line-of-sight of at least one of the primary surveillance radars operated or used by NERL (NATS 2019).

489. As can be seen on **Figure 2.10.1** in **Appendix 2**, the secondary surveillance radar consultation zone extends over the proposed Sheringham Extension AfL area. Furthermore, primary surveillance radars have line-of-sight to turbines with 200m tip height within and beyond the proposed extension areas. With turbine heights up to 276m above HAT (i.e. 38% higher than included by NERL) impacts on NATS navigational aids or radio communication infrastructure cannot be ruled out for the Dudgeon and Sheringham Shoal Offshore Wind Farm Extensions.

Airspace use and restrictions

490. The airspace in the proposed development area is uncontrolled (i.e. it is not under the radar control of an aeronautical station) and is within what is known as the 'open FIR', meaning the airspace is essentially open for anyone who wishes to use it and without requiring clearance.

491. The proposed extensions are partially situated beneath The Wash Aerial Tactics Area (ATA); airspace regularly used by military aircraft for training with flight levels between approximately 5,000ft – 17,500ft. The area is not designated as a danger area nor as restricted or prohibited airspace and therefore is open to anyone who wishes to use it. Good airmanship would however dictate that non-military aircraft would ensure that flight activity through this airspace is co-ordinated with the appropriate agencies.

492. It was agreed with the MoD that infrared lighting of the Dudgeon OWF required independent testing to ensure compatibility with military night vision goggles (Statoil, 2015). Early engagement will be sought with the MoD on this issue.

493. An agreement has previously been reached with NATS for the existing Dudgeon OWF, employing technical mitigation measures to avoid impacts upon NATS infrastructure and its operations. This agreement, and the applicability of similar technical mitigation, will be considered during the design of the Dudgeon and Sheringham Shoal Offshore Wind Farm Extensions through consultation with NATS from an early stage.

Military airfields

494. Aircraft operating from Royal Air Force (RAF) stations located in East Anglia (Honington, Marham, Lakenheath, Wattisham, Wittering and Mildenhall) and Lincolnshire (Scampton, Waddington, Cranwell, Barkston Heath, Wyton and Coningsby) may transit through the airspace above the proposed development.

Air Defence Radar (ADR)

495. The RAF is responsible for the UK's Air Surveillance and Control System which is part of the ADR network. Two UK sites, Trimingham on the North Norfolk coast and Staxton Wold in North Yorkshire, are close enough to the Dudgeon and Sheringham Shoal Wind Farm Extensions that the turbines could be detectable on primary surveillance radar (Royal HaskoningDHV 2013). As set out on **Figure 2.10.1** in **Appendix 2**, secondary surveillance radar areas for Trimingham and Cromer also overlap with the Sheringham Extension AfL area. Impacts on ADR can therefore not be ruled out.

496. Engagement with the MoD to seek agreement on any potential radar issues in the UK with the Dudgeon and Sheringham Extensions will be sought to develop any necessary technical solutions or other mitigation measures prior to construction.

Helicopter operations

497. A network of Helicopter Main Routes (HMRs) has been established to support the transport of personnel and material to offshore oil and gas installations. CAA Policy and Guidelines on Wind Turbines (CAA, 2016) states that HMRs have no defined lateral dimensions, although 2nm either side of the route centreline should ideally be kept obstacle free. However, it is not mandatory for helicopters to use established HMRs. For example, when operating in good weather conditions, helicopters may route direct to their destination. It may be considered that some turbine development within 2nm of the route centreline could be manageable. Two HMRs traverse the proposed Dudgeon extension areas, HMR 4 crossing Dudgeon South and HMR 5 crossing Dudgeon North and connecting to the Waveney gas platform just north of the Dudgeon North extension boundary (**Figure 2.10.1** in **Appendix 1**).

498. The presence of wind turbines may also restrict helicopter access to platforms (e.g. Waveney) and associated vessels such as drilling rigs, survey and support vessels operating in the vicinity of platforms and/or subsea assets. In order to help achieve a safe operating environment, consultation zones of 9nm radius exist around helicopter-serviced offshore installations. As set out in CAA guidance (2016), these consultation zones do not prohibit offshore wind development within 9nm of offshore installations, but trigger consultation between helicopter operators, the operators of existing installations and offshore wind developers in order to determine a solution that would maintain safe offshore helicopter operations. There are four platforms within 9nm of the proposed extensions (**Figure 2.10.1** in **Appendix 1**) for which consultation will be undertaken. Furthermore, Independent Oil and Gas has approvals for the installation and operation of a normally unmanned production platform, Blythe, and an additional well, Elgood, to be tied back to Blythe (Independent Oil and Gas, 2019). Elgood and Blythe would be located adjacent to the northeastern and eastern boundaries of Dudgeon OWF respectively. If the development proceeds, helicopter access is likely to be required, and consultation will be undertaken as necessary.

499. The proposed extensions are located within the area covered by the Maritime and Coastguard Agency's (MCA) Search and Rescue (SAR) operations. The MCA is responsible for the initiation and coordination of civil maritime SAR within the UK SAR region. The proposed project will lead to a material change in the current operating environment should a SAR helicopter operation be required within or in proximity to the extensions. An Emergency Response Co-Operation Plan (ERCoP) will be compiled in conjunction with the MCA, including SAR corridors with entry and exit locations.

Meteorological office radar

500. The closest Met Office radar system is Old Buckenham which, once constructed, will be located 66km from the closest point on the Sheringham Extension AfL boundary.

501. The Statement of the European Union Meteorological Network Operational Programme for the Exchange of weather Radar information (OPERA) Group, on the cohabitation between weather radars and wind turbines, suggests that at 20–45km turbines are generally visible in lowest scan with low impact, and beyond 45km they are generally not observed but can be due to propagation conditions. This is likely the case for single turbines or small onshore wind farms (OPERA, 2010). However, OPERA state that larger wind farms are continually visible even at ranges of up to 90km (OPERA, 2010). Considering the above and the distance between the proposed Dudgeon and Sheringham Shoal Offshore Wind Farm Extensions and the planned Old Buckenham station, potential impacts to weather radar will be considered further in the EIA.

2.10.2 Potential Impacts

502. The Aviation and MoD assessment is likely to have inter-relationships with Shipping and Navigation. These will be considered where relevant.

2.10.2.1 Potential Impacts During Construction

503. **Effects on aviation radar**: There will be no impact to civilian or military radar resulting from construction activity specifically. There is potential for impacts to arise from the presence of partially constructed wind turbines and this will be considered as part of the assessment during operation.
504. **Risk of aviation collision**: During construction, the presence and movement of construction vessels (e.g. tall cranes) may present an increased potential collision risk to low flying aircraft and helicopter flight operations.
505. **Effects on helicopter operations (including SAR)**: Helicopter operators, offshore platform operators and SAR operators may have concerns regarding the physical presence of wind turbines as they are constructed near HMRs and offshore platforms, which could restrict helicopter flightpaths and landing approaches. There are also potential impacts of construction on the available airspace between wind farm related helicopter operations and those associated with oil and gas activity and SAR.

2.10.2.2 Potential Impacts During Operation

506. **Effects on aviation radar**: There is potential for the NATS PSR at Cromer to detect the wind turbines leading to induced clutter on Air Traffic Control (ATC) displays. The MoD ADRs at RAF Trimingham and Staxton Wold would theoretically have line of sight to the majority of the Dudgeon and Sheringham Shoal Offshore Wind Farm Extensions wind turbines which, without suitable mitigation, would create operational effects to the ADR. Consultation with these stakeholders will be undertaken to identify any technical mitigation measures that may be required.
507. **Risk of aviation collision**: The wind turbines may be difficult to visually detect from the air in poor meteorological conditions and at night. This could increase collision risk to aircraft and helicopter flight operations.

508. **Effects on helicopter operations (including SAR)**: Helicopter operators, offshore platform operators and SAR operators may have concerns relating to the physical presence of the wind turbines. This could be mitigated by re-routing helicopters around the wind farm extensions or constraining the minimum flight altitude of helicopters when operating on the HMR. Such measures may, however, result in an increase in flight distance, requiring helicopters to carry more fuel and thus less payload, and increase logistical cost and safety risk to offshore personnel. There are also potential impacts of operation on the available airspace between wind farm related helicopter operations and those associated with oil and gas activity and SAR.
509. **Impact on military training areas**: The MoD may have concerns relating to the extensions being below an area of military training (The Wash ATA). However, the training area has a Flight level between 5,000ft and 17,500ft which is well above the proposed WTG height and this restricts potential effects to those relating to radar rather than physical obstruction.

2.10.2.3 Potential Impacts During Decommissioning

510. **Effects on aviation radar**: Wind turbines within line of sight to civilian or military radar infrastructure could have an impact on aviation radar, as described above. Any such impacts would be of the same magnitude or smaller than during the operational phase and would gradually be reduced to zero as the decommissioning process is completed.
511. **Risk of aviation collision**: Vessels and equipment required in the process of wind farm decommissioning, in particular large cranes and partially decommissioned wind turbines, may present a physical obstruction and effect operations of low flying aircraft and helicopter flight operations.
512. **Effects on helicopter operations (including SAR)**: Helicopter operators, offshore platform operators and SAR operators may have concerns relating to partially dismantled wind turbines and the presence of decommissioning vessels. This could be mitigated through re-routing helicopters around the wind farm extensions or constraining the minimum flight altitude of helicopters when operating on the HMR. There are also potential impacts of operation on the available airspace between wind farm related helicopter operations and those associated with oil and gas activity and SAR.

2.10.2.4 Potential Cumulative Impacts

513. There is the potential for cumulative impacts of wind turbines causing permanent (project lifetime) interference with a range of other activities namely civil and military aviation radar, other offshore wind farms, and other infrastructure projects and activities in the North Sea. This is particularly relevant in the context of the proposed projects which will extend the footprint and lifetime of the wind farm infrastructure installed at the existing OWFs. The cumulative impacts during construction, operation and decommissioning will be assessed in line with the approach set out in **Section 1.6**.

2.10.2.5 Transboundary Impacts

514. Considering the distance that the Dudgeon and Sheringham Extensions are from international boundaries, transboundary impacts are not anticipated and are proposed to be scoped out of the assessment.

2.10.2.6 Summary of Potential Impacts

515. A summary of potential impacts is shown in **Table 2-26**.

Table 2-26 Summary of impacts relating to Aviation and MoD (scoped in ✓, scoped out x)

Potential Impacts	Construction	Operation	Decommissioning
Effects on aviation radar	✓	✓	✓
Risk of aviation collision	✓	✓	✓
Effect on HMRs and offshore platforms	✓	✓	✓
Effects on military training areas	x	✓	x
Cumulative impacts	✓	✓	✓
Transboundary impacts	x	x	x

2.10.3 Approach to Assessment and Data Gathering

516. Identification of potential sensitive receptors will be undertaken through desk-based review of available data (including from the existing Dudgeon and Sheringham Shoal OWFs) and through consultation with stakeholders. Impacts will be assessed in line with industry regulations for safe obstacle avoidance or whether radar separation (from radar clutter) can be maintained in the presence of wind turbines.

517. **Table 2-27** below identifies the desk-based sources that will be accessed to inform the characterisation of the existing environment.

Table 2-27 Data sources used

Data source	Date	Data contents
CAA, CAP 764	2016	Policy and Guideline on Wind Turbines - CAA policy and guidance on a range of issues associated with wind turbines and their effect on aviation.
CAA, CAP 670	2014	Air Traffic Services Safety Requirements - Overview of requirements and the regulatory framework, generic requirements and guidance, specific requirements for Air Traffic Control (ATC).
CAA	2017	Visual Flight Rules Chart.
CAA, CAP 393	2016	The Air Navigation: Order 2019 and the Regulations - the rule of the air regulations; the air navigation (general, cosmic radiation, keeping record a dangerous goods) regulations; the permanent air navigation regulations; and the civil aviation authority regulations.
MoD	2014	MoD Obstruction Lighting Guidance.
Wind Energy and Aviation Interests: Interim Guidelines	2002	Details both military and independent airport operator issues and consultation procedures - The Wind Energy, Defence and Civil Aviation Interests Working Group's 2002 Report.

Data source	Date	Data contents
CAA, VFR	2017	Visual Flight Rules Chart- lower airspace rules.
CAA, CAP 032	2018	UK Integrated Aeronautical Information Package (UKIAIP)- main resource for information and flight procedures at all licensed UK airports as well as airspace, en-route procedures, charts and other air navigation information.
CAA, CAP 168	2014a	Standards required at UK National licensed aerodromes relating management systems, operational procedures, physical characteristics, assessment and treatment of obstacles, visual aids, rescue and fire-fighting services and medical services.
MCA, MGN 543	2008	Safety of Navigational Practice, Safety and Emergency Response – contains information for operators and developers in formulating their emergency response plans and site safety management.
Military Aeronautical Information Publications	2018	Eurocontrol Guidance to enable military organisation to implement an harmonised way to elaborate and to publish Military Aeronautical Publications (AIPs) in Europe.
MoD	2011	MoD UK Low-Flying System (UK FLS) Priority Map - Statistics on military low flying training activity conducted in the UK low Flying Systems for the Financial Year.

518. The assessment will broadly include the following steps:
    - Desk-based studies including line of sight analysis that would identify and examine aviation, MCA and MoD receptors;
    - Consultation and meetings with specific stakeholders in order to provide a detailed understanding of potential impacts; and
    - Consenting requirements using guidance from the data sources identified in **Table** 2-27.

519. Following the identification of the preferred offshore development area, further liaison with stakeholders will be undertaken to agree the approach and methodology to data collection for EIA purposes and the specific assessment methodology. It is expected that consultation will be required with the following agencies:
    - UK CAA;
    - Norwich Airport;
    - UK MCA (SAR and Lighting requirements);
    - UK meteorological office;
    - UK MoD;
    - UK NATS / NERL; and
    - Oil and Gas Industry (helicopter and platform operators).

2.11 Offshore Designated Sites

520. The specific assessment requirements that are applicable to Offshore Designated Sites are set out within National Policy Statement EN-1 and EN-3 are summarised in **APPENDIX 1 NPS ASSESSMENT REQUIREMENTS**.

2.11.1 Existing Environment

2.11.1.1 Water Framework Directive (WFD)

Transitional and Coastal Water Bodies

521. As outlined in **Section 2.2** the two export cable corridor options pass through the Norfolk East coastal water body (GB650503520000). The Weybourne corridor is partly located within the Norfolk North coastal water body (GB640503300000). Both of these water bodies are 'heavily modified' due to flood and flood and coastal protection respectively. The water body status for both is 'moderate' (Environment Agency, 2019a).

522. The Stiffkey & Glaven transitional water body is located approximately 4km west of the Weybourne corridor landfall scoping area. This water body is not designated as artificial or heavily modified, and its status in 2016 was 'Bad' (Environment Agency 2019a).

Bathing Waters

523. There are five designated bathing waters in the vicinity of the proposed export cable corridors. The closest designated bathing waters are at Mundesley, approximately 610m northeast of the Bacton landfall. Sheringham bathing waters are approximately 2.5km east of the Weybourne landfall. Both have had 'Excellent' bathing water quality status since 2016 (Environment Agency, 2019b).

2.11.1.2 Natura 2000 Sites

524. Both of the proposed export cable corridors pass through the Greater Wash SPA which is designated for breeding seabirds as well as breeding and wintering passage waterbirds (**Figure 2.11.1**). Since many of the Natura 2000 sites in the North Sea are designated for mobile species (e.g. seabirds and marine mammals), or for features with the potential to be indirectly impacted (e.g. by underwater noise or changes to water quality) it is necessary to consider sites beyond the project boundary. **Table 2-28** lists Natura 2000 sites in the vicinity of the proposed development which may have the potential to be impacted. This is not an exhaustive list and a Habitats Regulations Assessment (HRA) screening exercise, to be undertaken as part of the EIA process, will identify those sites on which the proposed development would have likely significant effects.

Table 2-28 Natura 2000 sites in the vicinity of the proposed development.

Site Name		Distance* (km)	Designated Features
Greater Wash SPA		0	Breeding seabirds, breeding and wintering passage waterbirds Non-breeding seabirds
North Norfolk Coast SPA and Ramsar		1	Breeding seabirds, wintering and passage waterbirds
The Wash and North Norfolk Coast SAC		1	Harbour seal Sandbanks, mudflats and sandflats, large shallow inlets and bays, reefs and saltmarshes
Inner Dowsing, Race Bank and North Ridge SAC		2	Sandbanks and reefs
Southern North Sea SAC		14	Harbour porpoise
North Norfolk Sandbanks and Saturn Reef SAC		14	Sandbanks and reefs
Outer Thames Estuary SPA		30	Wintering and breeding seabirds
Breydon Water SPA		34	Breeding seabirds, wintering and passage waterbirds
The Wash SPA and Ramsar		42	Breeding, wintering and passage seabirds, passage and wintering waterbirds.
Gibraltar Point SPA and Ramsar		46	Breeding seabirds, wintering and passage waterbirds
Haisborough Hammond and Winterton SAC		54	Sandbanks and reefs
Humber Estuary SPA and Ramsar		55	Breeding, wintering and passage waterbirds
Minsmere-Walberswick SPA and Ramsar		59	Breeding seabirds, breeding wintering and passage waterbirds
Alde-Ore Estuary SPA and Ramsar		83	Breeding seabirds and breeding, wintering and passage waterbirds
Debden Estuary SPA and Ramsar		84	Wintering and passage waterbirds

Site Name		Distance* (km)	Designated Features
Stour and Orwell Estuaries SPA and Ramsar		94	Breeding, wintering and passage waterbirds Sandflat, mudflat and estuary and lagoons
Flamborough and Filey Coast SPA		115	Breeding seabirds

*Measured from the closest point of the proposed development scoping area to the closest point of the designated site, rounded to the nearest kilometre.

2.11.1.3 Marine Conservation Zones (MCZs)

525. Both of the proposed export cable corridor options pass through the Cromer Shoal Chalk Beds MCZ (**Figure 2.11.1** in **Appendix 2**). The site is designated for features including exposed chalk and peat, which are rare in the North Sea, as well as several other seabed habitat features (see **Section 2.3**).

2.11.2 Potential Impacts

526. Potential direct and indirect impacts to designated sites are described in the relevant sections:
    - Potential impacts to WFD designated sites and bathing waters are described in **Section 2.2**;
    - Potential impacts to offshore sites designated for seabed habitat features are described in **Section 2.3**;
    - Potential impacts to SACs designated for marine mammals are described in **Section 2.5**; and
    - Potential impacts to SPAs and/or Ramsar sites designated for birds are described in **Section 2.6**.

2.11.3 Approach to Assessment and Data Gathering

527. Potential impacts to WFD designations will be assessed within the Marine Water and Sediment Quality chapter of the EIA and through a WFD assessment.
528. Impacts on the MCZ will be assessed within the Benthic and Intertidal Ecology and Marine Geology, Oceanography and Physical Processes chapters of the EIA; and will be supported by an MCZ assessment (see **Section 2.3.3** for further details).
529. A HRA will be undertaken to ascertain if the proposed project will result in likely significant effects on the designated interest features of European protected sites (see **Sections 1.1.4 and 1.3.4**). Where a likely significant effect is identified, information will be provided to address the subsequent requirements of the HRA process.
530. The assessments will be supported by the surveys specified in the relevant topic chapters, and by engagement with regulators and stakeholders as part of the EPP.

2.12 Offshore Air Quality

531. The specific assessment requirements for air quality are set out within National Policy Statement EN-1 and are summarised in **Table A1-12** in **Appendix 1**.

2.12.1 Existing Environment

532. The main source of atmospheric emissions offshore is likely to be from shipping, and the associated pollutants of concern are nitrogen oxides (NO_x), particulate matter (PM) and sulphur dioxide (SO_2).

533. The International Maritime Organisation has enacted regulations to reduce shipping emissions under Annex VI of the International Convention for the Prevention of Pollution from Ships (MARPOL). The North Sea is a designated Emission Control Area under MARPOL, and from 1st January 2020 the sulphur content of fuel oil will be limited to 0.5%. It is expected that between 2011 and 2020, sulphur emissions from shipping in UK waters will have fallen by 83% as a result of the MARPOL regulations. Emissions of NOx from shipping are projected to increase by 10% between 2011 and 2020 (Defra, 2017) due to an increase in shipping and a lack of regulation of this pollutant.

534. Pollutant concentrations should only be compared to the relevant Air Quality Objectives where there is representative exposure. There are no offshore human receptors which are sensitive to air quality, and marine-based ecological designations are unlikely to be sensitive to air pollution impacts, or they are usually dominated by other sources of inputs (Centre for Ecology and Hydrology, 2019). The main receptors which may be affected would be a small number of isolated locations of relevant human exposure (e.g. residences) close to the shoreline and land-based designated ecological sites.

2.12.2 Potential Impacts

2.12.2.1 Potential Impacts During Construction, Operation and Decommissioning

535. Engine exhausts from construction, O&M and decommissioning vessels will provide a small additional contribution to atmospheric emissions from existing sea traffic. The number of vessels required during construction will be minimal and the associated atmospheric emissions will be small in comparison to those from the total shipping in this region of the North Sea. The number and types of O&M and decommissioning vessels are not anticipated to be any greater or substantially different to those required for construction, and therefore the magnitude of air quality effects should not be any greater. Most construction works and O&M works would be carried out at a distance from the shore, being centred on the wind farms themselves.

536. Given the likely negligible increases of air pollutants on site, the regulation of emissions under MARPOL and the distance from any shore-based receptors, it is expected that effects would be insignificant. It is therefore proposed that all offshore air quality impacts should be scoped out from further consideration within the EIA.

2.12.2.2 Potential Cumulative Impacts

537. It is unlikely that any significant cumulative air quality impacts would occur, as there are few other sources of pollution offshore. It is therefore proposed that all cumulative offshore air quality impacts should be scoped out from further consideration within the EIA.

2.12.2.3 Summary of Potential Impacts

538. A summary of potential impacts is shown in **Table 2-29.**

Table 2-29 Summary of impacts relating to offshore air quality (scoped in ✓, scoped out x)

Potential Impacts	Construction	Operation	Decommissioning
Impacts at human receptors	x	x	x
Impacts at ecological receptors	x	x	x
Cumulative impacts	x	x	x
Transboundary impacts	x	x	x

2.13 Other Marine Users

539. The specific assessment requirements for Other Marine Users are set out within National Policy Statement EN-3 and are summarised in **Table A1-13** in **Appendix 1**.

2.13.1 Existing Environment

540. This section considers interactions with other offshore industries and marine users, except for those already covered as EIA topics in their own right, such as Commercial Fisheries (**Section 2.7**), Shipping and Navigation (**Section 2.8**) and Aviation and MoD (**Section 2.10**). The locations of infrastructure and activities associated with other marine users are illustrated in **Figure 2.13.1** in **Appendix 2**.

2.13.1.1 Offshore wind infrastructure

541. Other nearby operational OWFs include the parent Dudgeon and Sheringham Shoal wind farms; and also Race Bank, Lincs, Inner Dowsing and Lynn OWFs (**Table 2-30**).

542. Export cables for the existing Dudgeon and Sheringham Shoal OWFs make landfall to the west of Weybourne, the Dudgeon export cable route being immediately to the west of the proposed DEP and SEP landfall option at Weybourne and constraining the western boundary of the proposed export cable corridor at the site selection stage. The export cable corridor for the proposed Hornsea 3 offshore wind farm (application currently in examination) makes landfall to the west of Weybourne and also to the west of the proposed DEP and SEP landfall option.

543. The consented Triton Knoll offshore wind farm is 13.2km to the northwest of the Dudgeon North extension, with the export cables making landfall in Lincolnshire. Installation of the offshore array and infrastructure is due to begin in late 2019/early 2020 (Triton Knoll website, 2019).

544. The western boundary of the proposed Sheringham Extension was positioned in order to maintain a minimum 5km separation (in line with The Crown Estate's requirements) from the proposed Race Bank Extension. However, as a result of The Crown Estate's plan level Habitats Regulations Assessment, it has been determined that an application to extend the Race Bank OWF will not progress to the award of leasing rights as part of the 2017 extensions round.

Table 2-30 Offshore wind farm projects in the southern North Sea and their approximate distance from the nearest Dudgeon and Sheringham Extension Projects AfL area

Offshore Wind Farm	Distance from DEP (km)	Distance from SEP (km)
Race Bank (operational)	19.2	10.0
Triton Knoll (under construction)	13.2	19.2
Lincs (operational)	46.0	34.4
Lynn (operational)	51.3	37.2
Inner Dowsing (operational)	49.7	38.2

2.13.1.2 Oil and gas infrastructure

545. The nearest oil and gas infrastructure is associated with the Anglia, Lancelot, and Waveney gas fields. There is no surface oil and gas infrastructure within the proposed extensions or export cable corridors. The Perenco-operated Waveney gas platform is located approximately 0.55km from the northern boundary of the Dudgeon North Extension. There are no active wells located within the proposed extensions or export cable corridors.

546. There is a concentration of pipelines linking southern North Sea gas fields to the Bacton Gas Terminal on the Norfolk coast. The proposed Bacton export cable corridor option has been positioned to minimise the number of pipeline crossings, making landfall north of the Bacton Terminal and west of the associated pipelines (**Figure 2.13.1** in **Appendix 2**). The Shearwater to Bacton gas pipeline is the most easterly of the pipelines routing to Bacton. It traverses the Dudgeon South Extension and routes parallel to the proposed Bacton export cable corridor. The Durango to Waveney gas production pipeline also traverses the proposed Dudgeon North Extension. Gas pipeline PL27, linking the Viking gas field in the east and the Threddlethorpe Gas Terminal on the Lincolnshire coast to the west, routes parallel and approximately 500m from the northern boundary of the proposed Dudgeon North Extension. There are no pipelines in close proximity to the proposed Sheringham Extension.

547. Much of the Dudgeon North Extension overlaps with oil and gas blocks licensed for exploration and production (48/16, 48/17c, 48/17d, 48/18c and 48/22c) whereas the Sheringham Extension does not overlap with any licenced blocks. The Dudgeon South Extension overlaps with two licenced blocks, 48/23a and 48/28b.

2.13.1.3 Telecommunication cables and interconnectors

548. The disused Stratos telecommunications cable makes landfall near Weybourne and inside the proposed Weybourne export cable corridor as it approaches the coast. From here the cable is routed in a north easterly direction, passing to the southeast of the proposed wind farm extensions (KIS-ORCA, 2019) (**Figure 2.13.1** in **Appendix 2**). There are no other telecommunications cables or interconnectors in the vicinity of the proposed development.

2.13.1.4 Marine aggregate extraction

549. The nearest licenced areas for aggregate production are areas 515/1 and 515/2, licenced to Westminster Gravels Ltd and located to the north and west of the proposed wind farm extensions. The nearest aggregate production area, 515/2, is 8km north of the Dudgeon North Extension. Some dredging vessels transit the proposed wind farm extensions (BMAPA, 2009), although the extensions are outside the main dredger transit routes (**Figure 2.13.1** in **Appendix 2**).

2.13.1.5 Disposal sites

550. There is a closed disposal site (HU147) within the Dudgeon OWF boundary. The nearest open disposal site is associated with the Race Bank OWF export cable corridor (HU126) located 10km from the Sheringham Extension (**Figure 2.13.1** in **Appendix 2**). OWF disposal sites are typically licenced for the disposal of sediment arisings from seabed levelling works, primarily during wind farm construction. There are no identified historical dumps for sewage sludge or radioactive wastes, activities that have been banned by OSPAR.

2.13.1.6 Unexploded Ordnance (UXO)

551. The southern North Sea has been a major area of naval and airborne warfare, most notably during World War 1 and World War 2. Consequently it is possible for UXO to be found in almost any area of the southern North Sea. There are no identified explosives dumping grounds in the vicinity of the proposed development. Magnetometer surveys have been completed across the provisional offshore export cable corridors in 2019 and further surveys will be conducted pre-construction covering DEP and SEP to identify potential UXO.

2.13.2 **Potential Impacts**

552. The Other Marine Users assessment is likely to have key inter-relationships with Marine Physical Processes, Shipping and Navigation, and Aviation and MoD. These will be considered where relevant.

2.13.2.1 Potential Impacts During Construction

553. In general terms, construction works such as the installation of cables or wind turbine foundations have the potential to impact on other marine users within, or adjacent to, the construction footprint. The presence of additional vessels in the area during construction may also impact other marine users.

554. **Offshore wind infrastructure:** The AfL extension areas do not overlap with any other wind farm infrastructure and therefore there is no pathway for them to interfere directly with other OWF developments. However, the proposed export cable corridor options are likely to require crossing of the existing Dudgeon export cables (**Figure 2.13.1** 2n **Appendix 1**). Furthermore, if the Hornsea Project Three OWF is consented, its offshore export cable corridor would cross both the proposed Weybourne and Bacton export cable route options. Where cable crossings are required, crossing agreements will be sought with cable owners and operators and appropriate installation and protection measures developed.

555. **Oil and gas infrastructure:** There is potential for interactions between existing and future oil and gas activity and the proposed projects. Equinor has sought to avoid direct conflict with existing oil and gas infrastructure through the site selection process. The extension areas are large enough to enable siting of turbines to avoid the gas pipelines that traverse them, however it may be necessary for inter-array cables to cross these pipelines. Where crossings are required for subsea cables, crossing agreements will be sought with pipeline owners and operators and appropriate installation and protection measures developed. The Dudgeon North Extension boundary is in close proximity to the normally unmanned Waveney gas platform and the potential effect of the proposed development on this and other nearby oil and gas infrastructure will be assessed, supported by engagement with the relevant operators. Any conflicts with oil and gas industry vessel and helicopter operations will be assessed as part of the Shipping and Navigation (**Section 2.8**) and Aviation and MoD (**Section 2.10**) assessments respectively, and used to inform the overall assessment of impacts on the oil and gas industry.

556. The licensing of new areas for oil and gas exploration and production, and the associated works, is ongoing and this will be monitored by Equinor. Independent Oil and Gas has approvals for installation and operation of a normally unmanned production platform, Blythe, and an additional well, Elgood, to be tied back to Blythe. Elgood and Blythe would be located adjacent to the northeastern and eastern boundaries of Dudgeon OWF respectively, connected by a pipeline around the Dudgeon OWF boundary. First gas is expected in Q2 2020 (Independent Oil and Gas (2019).

557. Telecommunication cables and interconnectors: The Weybourne export cable corridor option may require crossing of the disused Stratos telecommunications cable. Given that the cable is disused no impact on telecommunications cables is anticipated and it is proposed to scope this impact out of the EIA.

558. Marine aggregate extraction: As there is no overlap of aggregate licence areas with the extension areas or export cable corridors, there are limited pathways for impacts upon aggregate dredging activities. It is therefore proposed to scope this impact out of the EIA. Any dredger transit conflicts will be addressed as part of the Shipping and Navigation (**Section 2.8**).

559. Disposal sites: As there is no overlap of disposal sites with the extension areas or export cable corridors there are limited pathways for impacts upon disposal sites and associated activities. It is therefore proposed to scope this impact out of the EIA.

560. **UXO:** Operations such as piling or cable installation works could result in the detonation of abandoned UXO if it were present and live. The consequences of this would depend upon the quantity of explosive and the distance of receptors from the explosion. Detailed geophysical surveys and investigations prior to construction will identify any UXO and measures will be taken to mitigate the risk, possible through clearance by controlled, remote detonation. This is a health and safety risk which will be carefully mitigated rather than being an environmental issue. It is therefore proposed that these impacts should be scoped out from further consideration within the EIA. Potential impacts from UXO clearance works will be assessed where relevant to other receptors (e.g. fish ecology, marine mammal ecology).

2.13.2.2 Potential Impacts During Operation

561. The presence of permanent offshore infrastructure has the potential to impact other marine users either within, or adjacent to, the proposed extensions or export cable corridors. Any impacts of wind turbine and offshore substation structures on vessel activities, including those related to the oil and gas industry, marine aggregate extraction, recreational sailing and other OWFs will be addressed as part of the Shipping and Navigation assessment (**Section 2.8**). Potential impacts on helicopter operations associated with the oil and gas industry will be addressed as part of the Aviation and MoD assessment (**Section 2.10**). It is also recognised that the presence of the extensions may impact on potential future oil and gas exploration, appraisal and development activity.

562. Vessel movements during operation and maintenance of the wind farm extensions may also affect other users. However, impacts from operational vessel activities are anticipated to be similar to those during the construction phase, although the magnitude of effect is likely to be lower.

563. If cables require maintenance or replacement, standard industry techniques would be followed to ensure that other operators' cables and pipelines are not impacted by maintenance works. It is therefore proposed to scope this impact out of the EIA.

2.13.2.3 Potential Impacts During Decommissioning

564. It is anticipated that the impacts associated with decommissioning would be similar to those during the construction phase, although the magnitude of effect is likely to be lower.

2.13.2.4 Potential Cumulative Impacts

565. There is the potential for cumulative impacts with a range of other plans, projects and activities namely the existing Dudgeon and Sheringham Shoal Offshore Wind Farms, other nearby offshore wind farms at planning, construction, operation and decommissioning phases, aggregate and dredging activities, subsea cables and oil and gas activity. These will be identified and assessed in line with the approach set out in **Section 1**.

2.13.2.5 Potential Transboundary Impacts

566. Potential for transboundary impacts on commercial fishing and shipping will be assessed in **Section 2.7** and **Section 2.8** respectively. Transboundary impacts are largely dependent upon physical overlap and, with the possible exception of fishing and shipping, no pathways exist for transboundary impacts on other marine users beyond the footprints of the projects.

2.13.2.6 Summary of Potential Impacts

567. A summary of potential impacts is shown in **Table 2-31**.

Table 2-31 Summary of impacts relating to other marine users (scoped in ✓, scoped out x)

Potential Impacts	Construction	Operation	Decommissioning
Potential interference with other wind farms	x	x	x
Potential interference with oil and gas operations	✓	✓	✓
Potential impacts on subsea cables and pipelines	✓	✓	✓
Impacts on aggregate dredging activities	x	x	x
Impacts on disposal sites	x	x	x
Detonation of UXO	x	x	x
Cumulative impacts	✓	✓	✓
Transboundary impacts	x	x	x

2.13.3 Approach to Assessment and Data Gathering

568. As part of the EIA process, the existing environment with respect to other marine users will be described, including, but not limited to the following:
    - Offshore wind farms infrastructure and activities;
    - Oil and gas infrastructure and activities;
    - Telecommunication cables and interconnectors,
    - Marine aggregate sites and transit routes;
    - Disposal sites; and
    - UXO.

569. Equinor will undertake consultation to identify any additional areas of concern to be considered within the EIA. Identification of potential sensitive receptors will be undertaken through a desk-based assessment and in consultation with all relevant developers, operators and marine users within the vicinity of the offshore protect area to ascertain any concerns relating to the project. These will include the relevant oil and gas licence holders and operators of adjacent infrastructure, operators of the existing and planned OWF export cables for which crossing agreements would be required.

570. **Table 2-32** below identifies the desk-based sources that will be accessed to inform the characterisation of the existing environment.

Table 2-32 Data sources to be used

Data source	Date	Data contents
The Crown Estate - Offshore Wind Farms	2019	Planned, consented, under construction and operational wind farm areas and wind farm export cables and cable agreements. Proposed offshore wind extension projects.
Oil and Gas Authority	2019	Oil and gas surface and subsurface infrastructure, wells and pipelines.
Offshore Renewable & Cable Awareness (KIS-ORCA)	2019	Marine cables.
The Crown Estate - Marine Minerals	2019	Marine aggregates production and exploration options areas.
BMAPA - Dredger transit routes	2009	Dredger transit routes (All passage plans).
Cefas – Disposal sites	2019	GIS Shapefile of Disposal Sites.

571. The assessment will be undertaken in accordance with following standards and guidance:

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

572. The EIA will be based on existing data and information gathered through consultation. The EIA will focus on the Dudgeon and Sheringham Extensions and export cable corridors, and consider infrastructure or users that overlap with those boundaries. The assessment will consider agreed or best practice mitigation and be based on expert judgement.

3 PART 3: ONSHORE

3.1 Onshore Ground Conditions and Contamination

573. The specific assessment requirements for ground conditions and contamination are set out within National Policy Statement EN-1 and are summarised in **Table A1-14** in **Appendix 1**.

3.1.1 Existing Environment

3.1.1.1 Geology and Hydrogeology

574. The underlying geology across the onshore ground conditions and contamination study area (the study area) is the same as onshore scoping area and is summarised below in **Table 3-1** and illustrated in **Figure 3.1.1a** in **Appendix 2** (superficial deposits) and **Figure 3.1.1b** in **Appendix 2**(bedrock geology).

575. The Environment Agency's groundwater vulnerability maps indicate that the study area is located within an area of medium to high groundwater vulnerability. A high groundwater vulnerability designation indicates that the soil is easily able to transmit pollution to groundwater, which is characterised by high leaching potential in soils and the absence of low permeability superficial deposits. A medium groundwater vulnerability designation indicates that there are areas present which offer some groundwater protection.

576. The chalk bedrock is designated as a Principal Aquifer and a number of groundwater Source Protection Zones (SPZ) are identified within the onshore study area, with both inner and outer zones of the SPZs.

Table 3-1 Summary of Geology and Aquifer Designations

Stratum	Unit	Aquifer Designation
Superficial Deposits	Head – gravel, sand, silt and clay	Secondary A Aquifer
	Sheringham Cliffs Formation – clay, silt, sand and gravel	Secondary B Aquifer
	Weybourne Town Till Member – silt	Secondary Undifferentiated Aquifer
	Lowestoft Formation – sand and gravel	Secondary A Aquifer
	Alluvium – clay, silt, sand and gravel	Secondary A Aquifer
	Briton's Lane Sand and Gravel Member – sand and gravel	Secondary A Aquifer
	River Terrace Deposits – sand and gravel	Secondary A Aquifer
	Happisburgh Glacidenic Formation and Lowestoft Formation (undifferentiated) – sand and gravel	Secondary B Aquifer
	Bacton Green Till Member – sand, silt and clay	Secondary B Aquifer
	Wroxham Crag Formation – sand and gravel	

Stratum	Unit	Aquifer Designation
Bedrock	White Chalk Subgroup	Principal Aquifer

577. There are a number of licensed groundwater abstractions within the study area which are mostly associated with agriculture. There are also likely to be a large number of private water supplies within the study area.

3.1.1.2 Designated Sites

578. Geological Sites of Special Scientific Interest (SSSIs) are present at both landfall search areas; Weybourne Cliffs SSSI (Weybourne landfall search area) and Mundesley Cliffs SSSI (Bacton landfall search area). Weybourne Town Pit geological SSSI, is also located in proximity to Weybourne landfall search area. Caistor St. Edmund Chalk Pit geological SSSI is located at the edge of the substation search area.

579. Information on designated sites related to ecology can be found in **Section 3.4.**

3.1.1.3 Land Quality

580. The study area is largely agricultural in nature, which represents potential for both diffuse and point sources of pollution to be present in relation to historical and current agricultural activities. Settlements within or adjacent to the study area including, but not limited to, Sheringham, Saxthorpe, Cawston, Easton, Hethersett, North Walsham, Marsham and Norwich also have the potential to contain historic sources of ground contamination. Several historic landfills and landfill sites have been identified within the study area (**Figure 3.1.2** in **Appendix 2**), the permitted wastes at these sites include inert, industrial, commercial, household, special and liquid sludge, however, not each site was permitted to receive all waste types listed.

3.1.2 Potential Impacts

581. The Onshore Ground Conditions and Contamination assessment is likely to have key inter-relationships with Water Resources and Flood Risk, Land Use and Agriculture, and Ecology. These will be considered where relevant.

3.1.2.1 Potential Impacts During Construction

582. The following potential construction stage impacts have been identified:

- Direct impacts to the Secondary Aquifers within the superficial deposits may occur due to the intrusive nature of earthworks, trenching and drilling (if required). The significance of the disturbance will be dependent on the depth of the aquifer unit in relation to the proposed depth of the intrusive works. During construction, surface layers will be excavated allowing increased infiltration of rainwater and surface run-off to the subsurface. This could potentially mobilise any residual contamination already present in the overlying strata that could potentially migrate into the underlying shallow superficial aquifers.
- Direct impacts to the Principal Aquifers associated with the bedrock may occur from deep ground workings associated with trenchless crossings. There is the potential for drilling mud to leak along the drill path, or from the immediate area,

which could cause contamination of groundwater. Trenchless techniques also have the potential to create preferential pathways allowing potential contamination of the Principal and Secondary Aquifers.

- Direct impacts to the Principal Aquifers may also occur as a result of piling. Piling may be required to provide foundations for the onshore substation, and has the potential to create preferential pathways through the superficial deposits allowing potential contamination of the underlying Principal Aquifers.
- Excavation activities, including directional drilling, surface excavation and earth moving during cable laying and site preparation for the onshore substation and other onshore infrastructure (including piling) has the potential to mobilise existing ground contamination which could result in impacts to human health through dermal contact, inhalation and ingestion.
- There is the possibility that the hydraulic regime of the local area will be affected by the project, for example by backfilling the onshore cable trench with less compacted soil that could potentially influence the groundwater regime by altering porosity and creating preferential groundwater flow paths.
- Construction activities have the potential to result in direct impacts to Mineral Safeguarding Areas located within the proposed application boundary through prevention of future extraction of identified reserves.

583. Additional impacts to controlled waters are discussed below in **Section 3.2.**

3.1.2.2 Potential Impacts During Operation

584. Installation of cables along the onshore cable route and the permanent footprint of both landfall and the onshore substation infrastructure within the proposed development would prevent future extraction of resources within the permanent footprint of the project for the duration of the project's lifetime.

585. Additional significant impacts from the operation of the project are considered unlikely. Routine operation and maintenance (O&M) activities will follow standard procedures therefore minimising any potential impacts.

586. The operational easement may have the potential to result in direct impacts to Mineral Safeguarding Areas located within the proposed application boundary through prevention of future extraction of identified reserves

3.1.2.3 Potential Impacts During Decommissioning

587. It is anticipated that the decommissioning impacts would be similar in nature to those of construction, although the magnitude of effect is likely to be lower.

3.1.2.4 Potential Cumulative Impacts

588. Cumulative effects on ground conditions and contamination resulting from the effects of the proposed development and other developments will be assessed in accordance with the guidance and methodologies set out in **Section 1.6**. The assessment will be dependent on the availability and accessibility of information for other developments.

3.1.2.5 Summary of Potential Impacts

Table 3-2 Summary of Potential Impacts – Ground Conditions and Contamination (scoped in (√) and scoped out (x))

Potential Impacts	Construction	Operation	Decommissioning
Impacts to human health due to: • Disturbance and mobilisation of contaminants from existing sources; • Alterations to exposure pathways; and • Introduction of new contaminant sources.	✓	x	x
Impacts to controlled waters due to: • Disturbance and mobilisation of contaminants from existing sources; • Alterations to exposure pathways; and • Introduction of new contaminant sources.	✓	x	x
Impact to geologically significant areas and designated geological sites	✓	x	✓
Cumulative impacts	✓	x	✓
Transboundary impacts	x	x	x

3.1.3 Approach to Assessment and Data Gathering

589. As part of the EIA process, the existing environment with respect to ground conditions and contamination will be described, including, but not limited to the following:

- Hydrology;
- Geology;
- Hydrogeology and groundwater;
- Potential contamination sources; and
- Sensitive land uses and environment.

590. The baseline for ground conditions and contamination will be established following current guidance which advocates a phased risk-based approach. A desk based Preliminary Risk Assessment (PRA) will be undertaken to establish a preliminary conceptual site model and the identification of potential pollutant linkages. The key guidance which will be used to inform the assessment will include the following:
    - Defra, Environmental Protection Act 1990: Part 2A, Contaminated Land Statutory Guidance;
    - Environment Agency, Model Procedures for the Management of Land Contamination, Contaminated Land Report 11 (CLR11);
    - British Standard BS10175 Investigation of Potentially Contaminated Sites – Code of Practice; and
    - CIRIA publication C665 Assessing risks posed by hazardous ground gases to buildings.

591. The desk-based study forms the initial step in the assessment of ground conditions and provides valuable information for the design of intrusive investigation works that may be required in the event of the PRA identifying potentially unacceptable risks associated with the ground conditions. The PRA will be progressed based on data obtained from a Landmark Envirocheck © report which incorporates historical maps, site sensitivity data, and regulatory information, and will be supplemented with information from the sources listed below in **Table 3-3**.

Table 3-3 Data sources used

Data source	Date	Data contents
Landmark Envirocheck	2019	Historical maps, site sensitivity data and regulatory information.
Public Health England	2019	Radon gas risk.
Environment Agency	2019	Historic landfill sites, permitted waste sites – authorized landfill site boundaries and groundwater source protection zones.
Coal Authority	2019	Closed mining sites.
British Geological Survey	2019	Solid geology, superficial geology and borehole records.
Defra	2019	SSSI, Ramsar sites, Nature Reserves, Special Areas of Conservation, groundwater vulnerability and aquifer designations – superficial and bedrock.

592. Following the identification of the proposed application boundary, further liaison with the stakeholders will be undertaken to agree the approach and methodology to data collection for EIA purposes and the specific assessment methodology. A detailed method statement will be developed and agreed with stakeholders accordingly.

3.2 Water Resources and Flood Risk

593. The specific assessment requirements for freshwater quality and resource are set out within National Policy Statement EN-1 and are summarised in **Table A1-15** in **Appendix 1**.

3.2.1 Existing Environment

3.2.1.1 Surface water

Surface water drainage

594. The freshwater and quality and resource study area (the study area) is the same as onshore scoping area and encompasses three main surface water catchments (**Figure 3.2.1** in **Appendix 2**):

- The River Bure catchment: The main river rises near Briston, from where it flows in an easterly direction until it reaches Aylsham. From here, it continues to flow to the south east until it enters the sea at Great Yarmouth. Major tributaries include the River Ant, which is known for part of its length as the North Walsham and Dilham Canal. The downstream reaches of the River Bure include a wide range of wetland features, including Hoveton Great Broad and Marshes, Woodbastwick Fens and Marshes, Bure Marshes and the Norfolk Broads. The cable route search area crosses the upper River Bure and the upper River Ant sub-catchments.
- The River Wensum catchment: The river rises near Whissonsett, from where it flows north towards Fakenham before continuing in a broadly south easterly direction towards Norwich, where it flows into the River Yare. The River Wensum is a chalk river and is designated as a Special Area of Conservation (SAC) and SSSI. The cable route search area crosses the River Wensum and its tributary, the River Tud.
- The River Yare catchment: The river rises near Shipdham, from where it flows in an easterly direction towards Norwich. From here, it continues in a broadly easterly direction until it meets the sea at Great Yarmouth. Major tributaries include the Rivers Tilley, Tas and Wensum (the two rivers join downstream of the cable route search area and would be considered separately in the context of any assessment). The cable route search area crosses the River Yare and Tilley upstream of Norwich, and the onshore substation search area and National Grid infrastructure is largely located in the River Tas sub-catchment.

595. The study area, as defined by the three main drainage catchments identified above, comprises a number of surface sub-catchments, which are analogous to the Water Framework Directive (WFD) water body catchments identified by the Environment Agency in the Anglian River Basin Management Plan (RBMP) (Defra and Environment Agency, 2016) (**Figure 3.2.2** in **Appendix 2**). The main sub-catchments (and their WFD water body IDs) are listed below:

- Scarrow Beck (GB105034055740)
- Bure (u/s confluence with Scarrow Beck) (GB105034055690)
- Glaven (North Norfolk) (GB105034055780)

- Blackwater Drain (Wensum) (GB105034051120)
- Swannington Beck (GB105034051070)
- Mun (North Norfolk) (GB105034055900)
- East Ruston Stream (GB105034055670)
- North Walsham and Dilham Canal (disused) (GB105034055710)
- East Ruston Stream (GB105034055670)
- King's Beck (GB105034055730)
- Bure (Scarrow Beck to Horstead Mill) (GB105034050932)
- Mermaid Stream (GB105034050900)
- Heavingham Watercourse (GB105034050870)
- Wensum US Norwich (GB105034055881)
- Tud (GB105034051000)
- Yare (Tiffey to Wensum) (GB105034051281)
- Yare (u/s confluence with Tiffey - Lower (GB105034051290)
- Tiffey (GB105034051282)
- Intwood Stream (GB105034051240)
- Tas (Tasburgh to R. Yare) (GB105034051230)

596. These sub-catchments are themselves divided into a large number of ordinary watercourses, including those managed by the local IDB (although these are too numerous to list at this stage).

Surface water quality

597. A review of the Environment Agency's Catchment Data Explorer WFD water quality data for the surface water bodies identified predominantly good physico-chemical and chemical water quality conditions across the main surface water catchments. However, parts of the River Bure, Wensum and Yare catchments are affected by discharges from agriculture, waste water treatment and domestic sources, which result in sub-catchments with low dissolved oxygen and elevated concentrations of nutrients (e.g. phosphates) (Environment Agency, 2016).

Flood risk

598. Environment Agency flood zone maps (Environment Agency, 2012) indicate that the majority of the study area is located within an area of low flood risk (Flood Zone 1). Flood Zone 1 is defined as land that has less than a 1 in 1,000 annual probability of river flooding (<0.1%). However, any onshore infrastructure located closer to the main rivers of the River Bure, River Wensum and River Yare and their tributaries (as identified above) have a higher risk of flooding (up to Flood Zone 3 - high risk of flooding), as identified in **Figure 3.2.3** in **Appendix 2**.

3.2.1.2 Groundwater

599. The chalk bedrock underlying the study area comprises two groundwater bodies, as defined under the WFD (**Figure 3.2.4** in **Appendix 2**):

- North Norfolk Chalk; and
- Broadland Rivers Chalk and Crag.

600. The Crag and the Chalk aquifers are classified as Principal Aquifers by the Environment Agency. The superficial deposits are classified as Secondary A, B and undifferentiated aquifers. The Environment Agency's groundwater vulnerability maps indicate the study area is located within an area of high groundwater vulnerability (overlying a permeable aquifer). This indicates soils which may be able to transmit a wide range of pollutants into any groundwater stored in the underlying strata.

601. The chalk bedrock is designated as a Principal Aquifer and a number of groundwater Source Protection Zone (SPZ) areas are identified within the study area, with both inner and outer zones of the SPZs extending across the areas covered by the study area and particularly within the substation search area. There are a number of licensed groundwater abstractions within the study area which are mostly associated with agriculture. There are also likely to be a large number of private water supplies within the study area.

3.2.2 Potential Impacts

602. The Water Resources and Flood Risk assessment is likely to have key inter-relationships with Onshore Ground Conditions and Contamination, Land Use and Agriculture, and Ecology. These will be considered where relevant.

3.2.2.1 Potential Impacts During Construction

603. The following potential construction-stage impacts have been identified and will be assessed:

- Direct disturbance of surface water bodies: Onshore construction activities have the potential to directly alter the geomorphology, hydrology, water quality and physical habitat value of surface water bodies as a result of the installation of cabling and structures to allow temporary access across surface watercourses.
- Increased sediment supply: Construction activities will involve earthworks and create temporary areas of bare ground by removing surface vegetation cover. These construction activities could increase the potential for the erosion of soil particulates, resulting in an increase in the supply of fine sediment (e.g. clays, silts and fine sands) to surface watercourses through surface water runoff and the erosion of exposed soils. Increased sediment supply could affect the geomorphology of the watercourse by increasing turbidity in the water column and encouraging enhanced deposition of fine sediment on the bed of the channel. Furthermore, increased sediment loads could potentially smother existing bed habitats, reduce light penetration and reduce dissolved oxygen concentration, adversely affecting stream biota (e.g. macrophytes, aquatic invertebrates and fish such as brown trout, bullhead and brook lamprey) and adversely affecting the quality of in-channel habitats. Any impacts of increased sediment supply would be particularly pronounced in chalk river catchments (such as the River Wensum and its tributaries), which naturally have low suspended sediment loads and coarse bed substrates (i.e. gravels and cobbles) with a low proportion of fine sediment.
- Supply of contaminants: There is the potential for the accidental release of lubricants, fuels and oils from construction machinery working in and adjacent to

surface watercourses, through spillage, leakage and in-wash from vehicle storage areas after rainfall (during the main construction activities, including associated access to sites). There is also the potential for accidental release of foul waters (from welfare facilities) and construction materials (including concrete and inert drilling fluids from trenchless crossings) into the aquatic system during construction. If a significant leakage or spillage occurs, there is the potential for adverse impacts upon water quality if contaminants enter the surface drainage network or percolate into groundwater. Construction activities which disturb the ground (including excavation and piling) could therefore potentially introduce contaminants into the underlying groundwater bodies (particularly shallow aquifers). These activities could therefore adversely affect the quality of the underlying groundwater (including the Principal Aquifer and any secondary aquifers) and could potentially impact upon any licensed and unlicensed abstractions within it (including potable water abstractions protected by SPZ1 or SPZ2).

- Changes to surface water runoff and flood risk: The construction of the Projects has the potential to increase surface water runoff, which could adversely affect the hydrology and geomorphology of the surface drainage network (e.g. as a result of increased discharge resulting in bed and bank scour, and the in wash of greater volumes of fine sediment due to increased surface runoff). Furthermore, any changes in surface flows could also increase flood risk, particularly to third-party land and property in areas within Flood Zones 2 or 3.

3.2.2.2 Potential impacts during operation

604. The following potential operational impacts have been identified and will be assessed:

- Supply of contaminants: The operation of the Projects, including planned and unplanned maintenance, could result in the supply of fine sediment, fuels, oils and lubricants from the road network and other impermeable surfaces. This could potentially affect the geomorphology and water quality in the surface drainage network. Furthermore, there is potential for the supply of contaminants to surface waters during operation through surface runoff or accidental spillage or leakage of fuel oils or lubricants from vehicles during operational activities, which could impact upon surface water quality and that of connected groundwaters. This could have subsequent impacts upon aquatic ecology and the use of water resources for licensed and unlicensed abstractions.
- Changes to surface water runoff and flood risk: The permanent above-ground infrastructure will result in permanent changes to land use. In most cases, the change in use from existing agricultural land will create a permanent increase in impermeable area, which could result in a corresponding decrease in local infiltration and an increase in surface water runoff. Any changes to surface drainage patterns could potentially, if unmitigated, increase flood risk to third party

land and property, especially if the discharge of any drainage is not sufficiently controlled.

3.2.2.3 Potential Impacts During Decommissioning

605. It is anticipated that the decommissioning impacts would be similar in nature to those of construction, although the magnitude of effect is likely to be lower. The detail and scope of the decommissioning works will be determined by the relevant legislation and guidance at the time of decommissioning and agreed with the regulator.

3.2.2.4 Potential Cumulative Impacts

606. Onshore cumulative impacts will be considered as part of the EIA process. Any other project with the potential to result in impacts that may act cumulatively with DEP and SEP will be identified during consultation and following a review of available information. These projects would then be included in the Cumulative Impact Assessment (CIA).

607. The assessment will consider the potential for significant cumulative impacts to arise as a result of the construction, operation and decommissioning of the Projects, including the substation, cable route and National Grid infrastructure, in the context of other developments that are existing, consented or at application stage.

3.2.2.5 Summary of Potential Impacts

608. Potential impacts on freshwater quality and resource scoped in to the assessment are summarised in **Table 3-4**.

Table 3-4 Summary of Potential Impacts – Freshwater Quality and Resource (scoped in (√) and scoped out (x))

Potential Impacts	Construction	Operation	Decommissioning
Direct disturbance of surface water bodies	✓	x	✓
Increased sediment supply	✓	✓	✓
Supply of contaminants	✓	✓	✓
Changes to surface water runoff and flood risk	✓	✓	✓
Cumulative impacts	✓	✓	✓
Transboundary impacts	x	x	x

3.2.3 Approach to Assessment and Data Gathering

609. As part of the EIA process, the existing environment with respect to freshwater quality and resource will be described, including, but not limited to the following:

- The hydrology, geomorphology and quality of surface freshwater features, including rivers, canals, lakes and drainage ditches;
- The quality and quantity of groundwaters;
- Surface and groundwater abstractions;

- Designated sites with potential to be affected by changes to freshwater quality and resource; and
- Flood risk.

610. The assessment would be informed by a desk-based assessment and review of available data from the Environment Agency and Lead Local Flood Authority (LLFA) using the data sources identified in **Table 3-5.**

Table 3-5 Data sources used

Data source	Date	Data contents
Environment Agency	2019	The Catchment Data Explorer (https://environment.data.gov.uk/catchment-planning/) provides information on WFD River Basin Districts Management Catchments, Operational Catchments and WFD water bodies.
Environment Agency	2012	Flood Map for Planning showing the flood zones within the onshore scoping area https://flood-map-for-planning.service.gov.uk/.
Environment Agency	Undated	Habitat designations (e.g. for the River Hull Headwaters Site of Special SSSI) and species data (detailed macrophyte, invertebrate, diatom and fisheries data) for WFD water bodies.
LLFA	Undated	Historic flood incident information relating to high, surface water and/or drainage flooding.
LLFA and Environment Agency	Undated	Any previous site investigation data and public sewer records.
Department for Environment, Food and Rural Affairs (Defra)	Undated	MAGIC map (www.magic.defra.gov.uk) showing aquifer designations, designated sites and SPZs.
Natural England	Undated	MAGIC map (www.magic.defra.gov.uk) showing for information on designated sites and reasons for designation.
British Geological Survey (BGS)	Undated	1:50,000 geological mapping of the scoping area.

611. The surveys listed in **Table 3-6** will be undertaken during 2020 to inform the assessment. Surveys will be undertaken in accordance with established best practice methodologies and agreed in advance with stakeholders including the Environment Agency, Natural England, and the LLFA where required.

Table 3-6 Proposed baseline surveys

Survey/study	Timing	Spatial Coverage
Geomorphological baseline survey	Spring 2020	This would cover the areas where crossings of watercourse will need to be made, in order to characterise the existing state of the watercourse

612. Two key groups of impacts have been identified for the purposes of this assessment:
    - Water resources: These include potential effects on the physical (including hydrology and geomorphology), biological or chemical character of surface waters or groundwater, potentially impacting on secondary receptors such as wetlands or abstractions, and WFD water body status; and
    - Flood risk: These include potential effects of the proposed development on surface and subsurface drainage, flow conveyance and flood risk.

613. Whilst there are clear links between the two impact groups, the assessment of receptor sensitivity and the magnitude of effect may differ. Definitions of receptor sensitivity and value and impact magnitude and significance will be developed with reference to guidance for the assessment of water resources impacts provided by the Department of Transport (2015) and Highways Agency (2008).

614. The approach to assessment and data gathering will be discussed and agreed through production of a method statement and discussion with stakeholders as part of the EPP. Consultation will be undertaken at key stages throughout the EIA process. Following the identification of the proposed application boundary, further liaison with the stakeholders including the Environment Agency, Natural England, the LLFA and appropriate water companies will be undertaken to agree the approach and methodology for data collection for EIA purposes and the specific assessment methodology.

3.2.3.1 Supporting assessments

615. The EIA will be supported by two additional assessments:
    - A FRA would be undertaken in accordance with the National Planning Policy Framework (NPPF) and following suitable guidance (e.g. MHCLG, 2014) to assess the flood risk to the development and surrounding areas. This would inform the identification of any required mitigation measures.
    - A WFD Compliance Assessment will be required to assess compliance with the requirements of the WFD in line with The Water Environment (Water Framework Directive) (England and Wales) Regulations 2017. Initially this would consist of three stages (screening, scoping and detailed assessment), in accordance with the Planning Inspectorate's guidance (PINS, 2017).

3.3 Land Use and Agriculture

616. The specific assessment requirements for land use and agriculture are set out within National Policy Statement EN-1 and are summarised in **Table A1-16** in **Appendix 1**.

3.3.1 Existing Environment

617. The existing environment will be informed by the Natural England Agricultural Land Classification (ALC) dataset. ALC grades agricultural land from Grade 1 (best quality) through to Grade 5 (poorest quality) based on factors including climate, nature of the soil and site-based factors. The predominant land use types, including ALC baseline information is shown in **Figure 3.3.1** in **Appendix 2** and networks of Public Rights of Way (PRoW), utilities and roads are illustrated in **Figure 3.3.2** in **Appendix 2** and described for the relevant search areas below.

618. The land use study area (the study area) is same as the onshore scoping area and predominantly agricultural in nature. The city of Norwich is the major urban centre for this part of Norfolk and is located to the north of the substation search area. Other urban areas include the coastal towns of Sheringham and Cromer , and also North Walsham. There is a patchwork of 'non-agricultural' land across the study area, which includes of areas of woodland and water bodies (e.g. rivers, lakes and ponds).

619. The Weybourne landfall search area falls within an area of ALC Grade 3 agricultural land the majority of which is under Entry Level plus Higher-Level Stewardship Schemes. The aim of Higher-Level Stewardship Schemes is for farmers to undertake environmental management schemes which offer "significant benefits" to high-priority areas. The village of Weybourne lies just to the south of the Weybourne landfall search landfall with the Norfolk Coast Path and Peddars Way National Trail running along this part of the Norfolk coast.

620. The Bacton landfall search area lies within an area of ALC Grade 1 agricultural land between Bacton Green and Mundesley; some of which is included in an Entry Level Plus Higher-Level Stewardship Scheme. The Bacton landfall search area includes the existing Bacton Gas Terminal. The Norfolk Coast Path National Trail is also present along this stretch of the Norfolk coast, along with a second PRoW which links the village of Paston to the coast.

621. The study area passes close to the current Bacton Gas Terminal and passes to the travels south and then east to meet the substation search area to the south of Norwich. Only one urban area is encountered at North Walsham within the study area.

622. The study area passes through all grades of agricultural land, but predominantly ALC Grades 2 and 3. ALC Grade 2 areas are present near Bodham, Plumstead and Cawston and Brampton and Skeyton with the remainder comprising mostly ALC Grade 3. ALC Grade 4 (moderate to poor quality agricultural land) is found in corridors alongside the River Tud and River Wensum. Large parts of the study area are under Entry Level Plus Higher-Level Stewardship Schemes with one area of Organic Entry-Level plus Higher Level Stewardship Scheme.

623. The study area includes areas of woodland and several large waterbodies including the River Wensum, the River Bure and the River Yare as well as tributaries and other smaller watercourses. A-roads which cross the study area include the A148, the A149 and A140 , the A1067, A47 and A11 as well as a numerous B-roads, PRoWs and National Cycle Routes 1, 30 and 31 are present.

624. The study area includes nine historic landfill sites.

625. The substation search area is comprised of ALC Grade 3 – good to moderate quality agricultural land with a corridor of ALC Grade 4 moderate to poor quality agricultural land surrounding the River Tas. Entry Level Plus Higher-Level Stewardship Schemes are present throughout much of substation search area.

626. The A47 heads east to west along the northern part of the substation search area, and the A140 (heading north to south) bisects the search area. There are numerous small PRoWs throughout the substation search area. No large urban areas exist within the area, but the city of Norwich lies to the north and the villages of Swardeston, Mulbarton and Stoke Holy Cross lie within the search area.

3.3.2 Potential Impacts

627. The Land Use and Agriculture assessment is likely to have key inter-relationships with Water Resources and Flood Risk, Onshore Ground Conditions and Contamination, Ecology, and Traffic and Transport. These will be considered where relevant.

3.3.2.1 Potential Impacts During Construction

Agricultural Productivity

628. There is potential for adverse impacts to soil structure and future agricultural productivity of soils impacted during construction through the use of heavy machinery and disturbance. Ground conditions and potential contamination is discussed in **Section 3.1.**

Drainage

629. There is potential for an adverse impact to the natural and artificial field drainage systems during construction works.

Disruption to farming practices

630. There is potential for adverse impacts on farming and other land use practices through the temporary loss of land availability, restricted access and disruption caused by working areas and construction traffic.

Temporary closure of PRoWs/cycle paths

631. Temporary closures and alternative routes may be necessary during construction depending on the approach to crossing each of these features.

Existing utilities

632. During the construction phase, cable installation activity has the potential to impact on water, power and gas infrastructure.

Public health and safety

633. Issues relating to public health are considered in **Section 4.3**.

3.3.2.2 Potential Impacts During Operation

Permanent loss of land

634. The presence of permanent infrastructure at the substation will result in the permanent loss of land including farmland, and therefore also a loss in agricultural productivity of these areas.

635. The Best and Most Versatile (BMV) agricultural land includes ALC Grades 1, 2 and 3a. The Natural England dataset for this part of Norfolk is no longer broken down into ALC Grades 3a and 3b soils. Taking a precautionary approach all ALC Grade 3 land will be assumed to fall into the ALC Grade 3a category when assessing the area of BMV potentially affected by the project.

Disruption to farming practices

636. There is the potential for farming practices to be restricted due to the presence of cables and access restrictions.

Permanent closure of PRoWs/cycle paths

637. PRoWs or cycle paths in the footprint of the substation have the potential to be permanently closed or redirected, however this will be avoided wherever possible through sensitive siting of onshore infrastructure.

Public health and safety

638. Issues of public concern and health such as Electromotive Force (EMF) arising in relation to buried cables will be considered further in **Section 4.3**.

Drainage

639. Permanent infrastructure and hardstanding at the substation, plus the presence of buried cables has the potential to permanently impact upon land drainage. Impacts on drainage will be considered further in **Section 3.2**.

Soil heating

640. Buried cable systems emit some heat, potentially causing impacts on soil characteristics and productivity. The electrical system is designed to minimise heat loss to a level which is not likely to affect crop growth.

3.3.2.3 Potential Impacts During Decommissioning

641. It is anticipated that the decommissioning impacts would be similar in nature to those of construction, although the magnitude of effect is likely to be lower. The detail and scope of the decommissioning works will be determined by the relevant legislation and guidance at the time of decommissioning and agreed with the regulator

3.3.2.4 Potential Cumulative Impacts

642. Onshore cumulative impacts will be considered as part of the EIA process. Any other project with the potential to result in impacts that may act cumulatively with DEP and SEP will be identified during consultation and following a review of available information. These projects would then be included in the Cumulative Impact Assessment (CIA).

643. The assessment will consider the potential for significant cumulative impacts to arise as a result of the construction, operation and decommissioning of the Projects, including the substation, cable route and National Grid infrastructure, in the context of other developments that are existing, consented or at application stage.

3.3.2.5 Summary of Potential Impacts

Table 3-7 Summary of Potential Impacts – Land Use and Agriculture (scoped in (√) and scoped out (x))

Potential Impacts	Construction	Operation	Decommissioning
Agricultural productivity	✓	✓	✓
Drainage	✓	✓	✓
Disruption to farming practices	✓	✓	✓
Temporary closure of PRoWs/cycle paths	✓	×	✓
Existing utilities	✓	×	✓
Permanent loss of land	×	✓	×
Permanent closure/diversion of PRoWs	×	✓	×
Soil heating	×	✓	×
Cumulative impacts	✓	✓	✓
Transboundary impacts	X	X	X

3.3.3 Approach to Assessment and Data Gathering

644. The existing environment with respect to land use and agriculture will be characterised by the following:

- Agricultural activities;
- Agricultural land classifications;
- Soil type;
- Environmental Stewardship Schemes;
- PRoW and National Cycle Routes; and
- Utilities.

645. **Table 3-8** below identifies the desk-based sources that will be accessed to inform the characterisation of the existing environment.

Table 3-8 Data sources to be used

Data source	Data contents
Ordnance Survey	A-roads, railway lines and Urban areas
Norfolk County Council	Public Rights of Way
Environment Agency	Historic and current landfill sites
Natural England	Coastal paths
Natural England	Agricultural Land Classifications
National Grid	High Pressure Pipelines

Data source	Data contents
Sustrans	Regional and National Cycle Routes
Google Earth	Aerial Photography

646. Any additional data sets will be identified through ongoing consultation with stakeholders. No surveys are proposed to inform the assessment of impacts related to land use and agriculture.

647. The EIA for land use will identify the likely impacts of the Project, assess the effects and identify appropriate mitigation measures if required. The assessment will consider both direct and indirect impacts.

648. The methodology for the assessment of the effects on land use will be informed by the following current guidance:

- NE124 – Look after your land with Environmental Stewardship (Natural England, 2012);
- Design Manual for Roads and Bridges (DMRB) Volume 11, Section 3, Part 6 (Land Use);
- DEFRA guidance including the Construction Code of Practice for the Sustainable Use of Soils on Construction Sites (2009).

3.4 Ecology and Ornithology (including Sites of Nature Conservation Interest)

649. The specific assessment requirements for onshore ecology and ornithology are set out within the National Policy Statement EN-1 and are summarised in **Table A1-17** in **Appendix 1**.

3.4.1 Study Area

650. The ecology and ornithology study area (the study area) is same as the onshore scoping area. In addition, European designated sites for nature conservation within 20km and nationally designated sites for nature conservation within 3km of the onshore scoping study area have been taken into account.

651. The study area has been identified for the collation of baseline data for protected species and designated sites which could be impacted as a result of the project (**Figure 3.4.1** in **Appendix 2**).

652. The onshore cable corridor, as shown on **Figure 3.4.1** in **Appendix 2**, is currently presented as a 500m wide footprint for scoping, but will be refined down to a 100m wide corridor (informed by ongoing site selection activities) for undertaking ecological surveys. Site selection will continue to be informed by the findings of the EIA and the application footprint will be based on a 45m wide corridor.

3.4.2 Existing Environment

653. The study area includes the coastline between Weybourne and Bacton and covers an inland area that is a predominately agricultural landscape that is interspersed with areas of arable and grazing pasture. Hedgerows are a common feature within the landscape and most commonly act as field boundaries with pockets of woodland also present. There are 15 European designated sites and 18 Sites of Special Scientific Interest (SSSI) that are located within the onshore study area (i.e. within 20km and 3km of the scoping boundary respectively), as listed in **Table 3-9.** In addition, there are numerous County Wildlife Sites throughout this part of Norfolk, which represent an important biodiversity network in addition to the nationally and internationally designated habitats.

Table 3-9 European designated sites within 20km, and nationally designated sites within 3km, of the onshore study area

Designated Site	Site Description	Proximity to study area
European designated sites		
Greater Wash SPA	Qualifying species: • Common scoter, *Melanitta nigra* • Common tern, *Sterna hirundo* • Little gull, *Hydrocoloeus (Larus) minutus* • Little tern, *Sterna albifrons* • Red-throated diver, *Gavia stellata* • Sandwich tern, *Sterna sandvicensis*	Located within study area
North Norfolk Coast Ramsar	A stretch of coastline consisting of shingle beaches, dunes, saltmarsh, intertidal mud and sand flats, brackish lagoons, reedbeds, and grazing marshes. The site supports nationally and internationally important numbers of various species of breeding or wintering waterbirds. It also includes several important botanical areas.	0.7km
The Wash and North Norfolk Coast SAC	Qualifying habitats and species: • Sandbanks – partially covered by sea water permanently • Mudflats and sandflats not covered by seawater at low tide • Coastal lagoons • Large shallow inlets and bays • Reefs • *Salicornia* and other annuals colonising mud and sand • Atlantic salt meadows (*Glauco-Puccinellietalia maritimae*) Located within onshore study area	0.7km

Designated Site	Site Description	Proximity to study area
	Mediterranean and thermo-Atlantic halophilous scrubs (*Sarcocornetea fruticosi*) • Otter, *Lutra lutra* • Harbour (common) seal, *Phoca vitulina*	
North Norfolk Coast SPA	Qualifying species: • Avocet *Recurvirostra avosetta* • Bittern *Botaurus stellaris* • Common tern *Sterna hirundo* • Dark-bellied Brent goose *Branta bernicla bernicla* • Knot *Calidris canutus* • Little tern *Sterna albifrons* • Marsh Harrier *Circus aeruginosus* • Montagu's harrier *Circus pygargus* • Pink-footed goose *Anser brachyrhynchus* • Sandwich tern *Sterna sandvicensis* • Wigeon *Anas penelope*	1.6km
North Norfolk Coast SAC	Qualifying habitats and species: • Coastal lagoons • Perennial vegetation of stony banks • Mediterranean and thermo-Atlantic halophilous scrubs *Sarcocornetea fruticosi* • Embryonic shifting dunes • Shifting dunes along the shoreline with *Ammophila arenaria* ('White dunes') • Fixed dunes with herbaceous vegetation ('Grey dunes') • Humid dune slacks • Otter, *Lutra lutra* • Petalwort, *Petalophyllum ralfsii*	0.8km
Paston Great Barn SAC	Designated as it supports the only known barbastelle maternity roost in Norfolk (1 of 3 in the UK).	Located within study area
Breydon Water Ramsar/SPA	Halvergate Marshes form the largest expanse of traditionally managed grazing/grass marshes with their intersecting system of drainage ditches, in Broadland.	18km

Designated Site	Site Description	Proximity to study area
Broadland Ramsar	Nationally and internationally important wetland complex", which is situated on fenland peats in the floodplain of the River Bure.	3.8km
North Norfolk Coast SPA	Qualifying habitats and species: • Avocet • Bittern • Common tern • Dark-bellied brent goose Non-breeding • Knot • Little tern • Marsh harrier • Montagu's harrier • Pink-footed goose • Sandwich tern • Wigeon	Located within study area
Great Yarmouth North Denes SPA	Great Yarmouth North Denes is located on the North Sea coast of Norfolk in East Anglia about 30km east of Norwich. Behind a wide shingle beach, the North Denes dune system is actively accreting. These low dunes are stabilised by marram *Ammophila arenaria* and there are extensive areas of grey hair-grass *Corynephorus canescens*. The location supports important numbers of breeding little tern that feed outside the SPA in nearby waters.	14.2km
Overstrand Cliffs SAC	Annex I habitats that is a primary reason for selection of this site is 1230 Vegetated sea cliffs of the Atlantic and Baltic Coasts	8.7km
Winterton-Horsey Dunes SAC	Annex I habitats that are a primary reason for selection of this site: • 2150 Atlantic decalcified fixed dunes (*Calluno-Ulicetea*) • 2190 Humid dune slacks	14.1km
Norfolk Valley Fens SAC	Annex I habitats that are a primary reason for selection of this site: • 7230 Alkaline fens	Located within study area
The Broads SAC/SPA	Annex I habitats that are a primary reason for selection of this site: • 3140 Hard oligo-mesotrophic waters with benthic vegetation of *Chara spp*.	3.8km

Designated Site	Site Description	Proximity to study area
	• 3150 Natural eutrophic lakes with *Magnopotamion* or *Hydrocharition* - type vegetation • 7140 Transition mires and quaking bogs • 7210 Calcareous fens with *Cladium mariscus* and species of the *Caricion davallianae* • 7230 Alkaline fens • 91E0 Alluvial forests with *Alnus glutinosa* and Fraxinus excelsior (*Alno-Padion, Alnion incanae, Salicion albae*)	
River Wensum SAC	Designated features: • H3260 Watercourses of plain to montane levels with *R. fluitantis* • S1016 Desmoulin's whorl snail *Vertigo moulinsiana* • S1092 Freshwater crayfish *Austropotamobius pallipes* • S1096 Brook lamprey *Lampetra planeri* • S1163 Bullhead *Cottus gobio*	Located within study area
Nationally designated sites		
Swannington Upgate Common SSSI	Designated for its geology, dry acid heath and wet heath, acid valley alder woodland and water bodies.	Located within study area.
Alderford Common SSSI	Wide range of habitats developed in response to variations in soils and topography.	Located within study area.
Kelling Heath SSSI	A distinct outwash plain, providing perhaps the best example of a glacial outwash plain in England.	0.6km
Bryant's Heath, Felmingham SSSI	An area of dry acidic heathland on glacial sands.	0.6km
Eaton Chalk Pit SSSI	Consists of a series of abandoned chalk mines which are now used by various species of bat.	0.9km
Sidestrand And Trimingham Cliffs SSSI	A mosaic of habitats which supports a broad assemblage of invertebrates.	1.8km

Designated Site	Site Description	Proximity to study area
Edgefield Little Wood SSSI	Situated on acidic glacial sands and gravels. The wood consists of the locally rare pendunculate oakwood.	1.9km
Paston Great Barn SSSI	Designated as it supports the only known barbastelle maternity roost in Norfolk (1 of 3 in the UK).	Located within study area.
Booton Common SSSI	Comprised of a mosaic of wet calcareous fen grassland and acid heath communities.	1.7km
Flordon Common SSSI	Species rich calcareous fen.	2.9km
Shotesham-Woodton Hornbeam Woods.	A group of four woodlands	2.6km
Sheringham and Beeston Regis Commons SSSI.	Acidic heathland and species-rich calcareous spring fen.	2.8km
The River Wensum SSSI	Calcareous lowland river supporting invertebrates, fish and crayfish.	Located within study area.
East Ruston Common SSSI	Large area of unimproved heathland and fen.	1.8km
Shotesham Common SSSI	Unimproved grassland, marshy grassland and wet neutral grassland.	Located within study area.
Buxton Heath SSSI	Diverse heath with fen habitat in a basin of glacial sands which a rare habitat.	2.3km
Cawston and Marsham Heaths SSSI	Form the largest area of heather-dominated heathland remaining in east Norfolk.	0.1km
Westwick Lakes SSSI	Comprises manmade lakes with unusual flora and plankton fauna.	Part of SSSI

Designated Site	Site Description	Proximity to study area
		located within study area.
Weybourne Cliffs SSSI	Colonies of sand martins in the cliff-face and fulmars on the cliff ledges.	Located within study area.

654. The area of coastline for both Weybourne landfall search area and Bacton landfall search area (see **Figure 3.4.1** in **Appendix 2**) include dune habitat between Mundesley and Bacton; and sandy cliffs to the west of Weybourne for Weybourne landfall search area. Much of the coastline for both landfall search areas is afforded protection as SSSIs for their geology, national importance and Weybourne landfall search area (Weybourne Cliffs SSSI), colonies of marine birds.

655. Approximately 1.6km to the west of the Weybourne landfall search area is The Wash and North Norfolk Coast Special Area of Conservation, North Norfolk Coast SSSI, Greater Wash Special Protection Area, North Norfolk Coast SAC and the North Norfolk Coast Ramsar. The coast is of great ornithological interest, with nationally and internationally important breeding colonies of several species. The geographical position of the North Norfolk Coast and its range of habitats make it especially valuable for migratory birds and wintering waterfowl, in particular Brent and pink-footed geese. A species of particular note is the sandwich tern; breeding colonies total up to 4,500 pairs, which represent approximately 1/12th of the world population.

656. Bird species with breeding populations of national importance include up to 1,000 pairs of common terns *Sterna hirundo*, 27 pairs (recorded in 1982) of avocets *Recurvirostra avosetta* and up to 100 pairs of bearded tits *Panurus biarmicus*. Bittern *Botaurus stellaris* and marsh harrier *Circus aeruginosus* are regular breeders in small numbers and garganey *Anas querquedula* and black-tailed godwit *Limosa limosa* also breed on occasion.

657. Migratory birds, notably waders and passerines, are often present in great abundance in the spring and autumn. Wintering birds include large numbers of brent geese *Branta bernicla* and smaller numbers of pink-footed geese *Anser brachyrhynchus* and white-fronted geese *Anser albifrons*. Ducks and waders are also present in great abundance on the marshes and intertidal areas. The shingle banks and foreshore provide suitable habitats for wintering passerines such as twite *Acanthis flavirostris,* snow buntings *Plectrophenax nivalis* and shore larks *Eremophila alpestris.*

658. These migratory and wintering birds will have ranges that may overlap with the boundary of the both landfall search areas. Both have suitable habitat for feeding and potentially breeding.

659. A review of publicly available data of the area from two similar projects (namely Hornsea Offshore Wind Farm Project Three and Norfolk Vanguard) has been undertaken to obtain an understanding of the protected species present within the wider area and with the potential to be present within the study area.

Table 3-10 Protected species recorded within Hornsea Offshore Wind Farm Project Three and Norfolk Vanguard applications

Species	Hornsea Offshore Wind Farm Project Three	Norfolk Vanguard
Badger *Meles meles*	✓	✓
Bats – 9 species recorded.	✓	✓
Water vole *Arvicola amphibius*	✓	✓
Otter *Lutra lutra*	✓	✓
Great crested newt *Triturus cristatus*	✓	✓
Reptiles – records of slow worm *Anguis fragilis* and grass snake *Natrix natrix*	✓ (grass snake)	✓
Wintering birds	✓	✓
Invertebrates –white clawed crayfish *Austropotamobius pallipes* have been recorded within proximity of the onshore study areas.	✓	✓
Breeding birds - Birds of Conservation Concern (BoCC) Red List or Section 41 listed species such as skylark *Alauda arvensis*, song thrush *Turdus philomelos*, dunnock *Prunella modularis*, bullfinch *Pyrrhula*, linnet *Linaria cannabina* and yellowhammer *Emberiza citrinella*	✓	✓

3.4.3 Potential Impacts

660. The Ecology and Ornithology assessment is likely to have key inter-relationships with Land Use and Agriculture, Water Resources and Flood Risk, Onshore Ground Conditions and Contamination, Noise and Vibration, and Air Quality. These will be considered where relevant.

3.4.3.1 Potential Impacts During Construction

661. Construction activities which could affect onshore ecological receptors include: intrusive groundworks, including directional drilling, piling, and open cut trench excavation; construction of any temporary work areas or permanent above ground infrastructure; and general construction activities such as plant movement.

662. There is the potential for the loss of biodiversity through works such as excavation and construction. The impact upon biodiversity will be assessed, paying particular attention to species and habitats protected under the Habitats Directive and Birds Directive. Impacts upon sites, habitats and species protected through EU and UK law or through local policy that represent the elements of UK biodiversity most at risk of loss, isolation or degradation will be prioritised with impacts upon all habitats and species to be assessed, including demonstrating a net gain for biodiversity.

663. There is the potential for direct impacts where ecological receptors and the footprint of the proposed works overlap leading to potential loss or fragmentation of habitats and the risk of killing protected species, as well as indirect impacts where the proximity of the works may lead to a disturbance / displacement effect on protected species associated with noise, vibration, lighting, presence of workforce, disruption to groundwater, etc. In addition, invasive species present within the proposed application boundary will be considered along with the potential risk of spreading invasive species.

3.4.3.2 Potential Impacts During Operation

664. The permanent above ground presence of the onshore substation and National Grid infrastructure has the potential to lead to the permanent loss of areas of ecological value or fragmentation of habitats depending on the preferred locations for development. Operational noise associated with the onshore substation and National Grid infrastructure has the potential to cause disturbance effects depending on their proximity to noise sensitive ecological receptors, particularly birds and bats. Areas above the buried cable systems would return to their previous land use and would not represent permanent loss or fragmentation of habitats.

665. During the operation phase the onshore substation will be unmanned, with only limited human presence during planned and unplanned maintenance visits. In addition, any operational lighting (other than security lighting) at the onshore substation will be limited to these infrequent maintenance visits. Operational activities would not be required along the onshore cable route other than for periodic inspections or in the event of unplanned maintenance works, although these are not considered to present a significant risk to onshore ecology.

3.4.3.3 Potential Impacts During Decommissioning

666. It is anticipated that the decommissioning impacts would be similar in nature to those of construction, although the magnitude of effect is likely to be lower as mitigation would have been undertaken to minimise impacts to terrestrial ecology during construction.

3.4.3.4 Potential Cumulative Impacts

667. Assessment of cumulative impacts will be undertaken as part of the EIA. The approach to Cumulative Impact Assessment (CIA) will follow standard practice for assessment of onshore ecology and ornithology, considering the impacts from other developments alongside the impacts of the Project. The other developments to be considered for cumulative impact on terrestrial ecology will be identified during production of the EIA. Only projects which are reasonably well described and sufficiently advanced to provide information on which to base a meaningful and robust assessment will be included in the CIA.

668. Some impacts could also result in in-combination effects upon onshore ecology and ornithology, an assessment of which will be undertaken within the EIA.

669. The project could interact with other plans or projects to affect terrestrial ecology such as:

- Other offshore wind farm infrastructure;
- Other energy generation infrastructure;
- Building and / or housing developments;
- Installation or upgrade of roads;
- Installation or upgrade of cables and pipelines; and
- Coastal protection works.

670. When these project impacts occur, in-combination with other developments within the area, there is the potential for the impacts to be of greater significance than when assessed individually.

671. Projects identified as having a potential cumulative impact include Norfolk Vanguard, Norfolk Boreas and Hornsea Project Three, three offshore wind projects which make landfall on the North Norfolk Coast and have onshore cables routes leading to Necton and Norwich respectively. Agreement of the projects to be taken into account as part of the CIA will be undertaken during the subsequent stages of the EIA.

3.4.3.5 Summary of Potential Impacts

Table 3-11 Summary of Potential Impacts – Onshore ecology and ornithology (scoped in (✓) and scoped out (x)

Potential Impacts	Construction	Operation	Decommissioning
Direct impacts to statutory and non-statutory designated nature conservation sites and associated qualifying features	✓	✓	✓
Indirect impacts (e.g. noise, dust, groundwater supply) to statutory and non-statutory designated nature conservation sites and associated qualifying features	✓	✓	✓
Direct impacts (permanent and temporary loss) to habitats due to the footprint of the onshore works	✓	✓	✓
Direct and indirect impacts (disturbance – noise, lighting etc / potential killing) to adjacent habitats and protected species	✓	✓	✓
Spread of invasive non-native species as a result of construction activities	✓	x	✓
Cumulative impacts	✓	✓	✓
Transboundary impacts	✓	✓	✓

3.4.4 Approach to Assessment and Data Gathering

672. On completion of all baseline ecological surveys, the Ecological Impact Assessment (EcIA) will be undertaken following the guidance outlined in the Chartered Institute of Ecology and Environmental Management's (CIEEM) Guidelines for Ecological Impact Assessment in the UK and Ireland: Terrestrial, Freshwater and Coastal (2018). The approach to both the EcIA and data gathering (i.e. surveys) will be discussed prior to their commencement and agreed as part of the EPP. Consultation with stakeholders will be undertaken at key stages throughout the EIA and development of the project.

673. Identification of potential sensitive receptors will be undertaken using the Joint Nature Conservation Committee (JNCC) and MAGIC websites and NBIS.

Table 3-12 Data sources that will be used to inform the assessments (to be reviewed and updated, where required, to inform the next stage of the project)

Data source	Data contents
JNCC MAGIC website	Internationally designated nature conservation sites (i.e. Ramsar sites)
JNCC MAGIC website	European designated nature conservation sites (i.e. Special Protection Area (SPA), SAC)
JNCC MAGIC website	Nationally designated nature conservation sites (i.e. SSSI, National Nature Reserves (NNR)
JNCC MAGIC website	Local authority sites - Local Nature Reserves (LNR)
JNCC	UK Habitats of Principal Importance
Norfolk Biodiversity Information Service	Locally designated nature conservation sites (i.e. County Wildlife Sites (CWS), Local Wildlife Sites (LWS)
Norfolk Biodiversity Information Service	Protected Species records

674. Field surveys will be undertaken to define the baseline ecology and to inform the assessment of potential impacts in the relation to the confirmed locations of the onshore infrastructure. In the first instance, this will include an Extended Phase 1 Habitat Survey. The findings from the Extended Phase 1 Habitat Survey will inform the requirement and location of further species-specific surveys that will be required.

675. **Table 3-12** below identifies the desk-based sources that will be accessed to inform the characterisation of the existing environment.

676. **Table 3-13** summarises the field surveys that will be undertaken between March 2020 and October 2020 to inform the EcIA. All of the field surveys will be undertaken in accordance with industry standard practice and good practice guidelines / and agreed in advance with stakeholders where required through the EPP.

Table 3-13 Proposed Baseline Surveys

Survey/study	Timing	Spatial Coverage
Extended Phase 1 Habitat Survey (including a check for the presence of invasive non-native species)	March – May 2020	Survey will cover the onshore cable corridor (100m for ecological surveys) plus a 50m buffer. The survey will also consider waterbodies within 250m of the onshore cable corridor and 500m of the onshore substation and National Grid infrastructure. The findings of this survey will inform the requirements for further species-specific surveys (i.e. Phase 2 surveys).
Badger surveys	March – May 2020	This survey will be undertaken concurrently with the Extended Phase 1 Habitat Survey and will record all evidence of badger activity such as setts, hairs, latrines and snuffle holes.

Survey/study	Timing	Spatial Coverage
Water vole and otter presence / absence surveys	mid-April – June 2020 (first survey visit – all waterbodies) July – September 2020 (second survey visit – all waterbodies)	Surveys will focus on all suitable aquatic habitats which have the potential to be affected by the project.
Breeding bird surveys	April – July 2020	Surveys will concentrate on those habitats noted as supporting breeding birds which have the potential to be affected by the project.
Great crested newt presence / absence surveys	March – June 2020	eDNA surveys will be undertaken of those water bodies identified as having suitability to support breeding populations of great crested newts (within 250m of the onshore cable corridor and 500m of the onshore substation and National Grid infrastructure).
Reptile presence / absence surveys	March – September 2020	Surveys will focus on all suitable habitats that may support significant populations of reptiles which have the potential to be affected by the project.
Dormice presence / absence surveys	April – May 2020	Surveys will concentrate on all suitable woodland habitats which have the potential to be affected by the project.
Invertebrate (terrestrial and aquatic) surveys	April – May 2020	Surveys of all terrestrial and aquatic habitats which may support rare or notable invertebrates, and which have the potential to be affected by the project.
Bat activity surveys	April – October 2020	Surveys will focus on all suitable commuting / foraging habitats which may be affected by the project.
Bat emergence / re-entry surveys	May – September 2020	Surveys will focus on those features (i.e. structures / trees) that have been assessed as having medium or high potential to support roosting bats.
Botanical surveys	April – August 2020	Surveys will be undertaken of those habitats noted as containing important habitat types or which may contain rare or notable plants which have the potential to be affected by the project.

Survey/study	Timing	Spatial Coverage
Wintering bird surveys	Winter 2020/2021 if required	Surveys will cover all habitats identified as suitable for supporting wintering birds. Surveys would include observational and transect recording to understand the area's usage by wintering bird species.

677. The ecological field and assessment work will be undertaken in accordance with following standards and guidance:
    - Chartered Institute of Ecology and Environmental Management (CIEEM) (2018) Guidelines for Ecological Impact Assessment in the UK and Ireland: Terrestrial, Freshwater and Coastal.
    - British Standard 42020:2013 – Biodiversity. Code of Practice for planning and development;
    - CIRIA Guidance note C692 Environmental Good Practice on Site Guide (3rd Edition);
    - Defra Biodiversity Metric calculation tool, user guide and technical supplement (Version 2.0) (2019);
    - Natural England (2015) Standing advice on protected species (bats (all species), great crested newt *Triturus cristatus*, badger, water vole *Arvicola amphibius*, otter *Lutra lutra*, reptiles, protected plants, invertebrates, white-clawed crayfish *Austropotamobius pallipes*, ancient woodlands and veteran trees);
    - Bat Conservation Trust and Institute of Lighting Engineers (2018) Bats and Artificial Lighting in the UK;
    - Dean et al. (2016) The Water Vole Mitigation Handbook (The Mammal Society Guidance Series);
    - Edgar et al. (2010). Reptile Habitat Management Handbook;
    - English Nature (2001) Great Crested Newt Mitigation Guidelines;
    - Joint Nature Conservation Committee (JNCC) (2003) Herpetofauna Worker's Manual;
    - Strachan and Moorhouse (2011) Water Vole Conservation Handbook, 3rd Edition; and
    - GB Non-native Species Secretariat (2015) Species Information.

678. Following refinement of the study area for ecological surveys, further liaison with stakeholders will be undertaken to agree the approach and methodology to data collection for EIA purposes and the specific assessment methodology. A detailed method statement will be developed and agreed with stakeholders as part of the EPP.

3.5 Onshore Archaeology and Cultural Heritage

679. The specific assessment requirements for onshore archaeology and cultural heritage (historic environment) are set out within National Policy Statement EN-1 and are summarised in **Table A1-18** in **Appendix 1**.

3.5.1 Existing Environment

680. North Norfolk has a rich and varied history, with nationally significant archaeological remains being identified in the region alongside a built heritage resource which include some nationally and regionally significant examples of country estate manor houses with their associated parklands, as well as numerous historic ecclesiastical and vernacular buildings.

681. In order to inform this scoping exercise, a search of designated heritage assets from the National Heritage List for England (NHLE) has been carried out for the onshore archaeology and cultural heritage study area (the study area) which is the same as the onshore scoping area. The locations of designated heritage assets within the study area are illustrated on **Figure 3.5.1** and **Figure 3.5.2** in **Appendix 2**. As there are currently two options for the onshore cable corridor (see **Section 1.4**), the designated heritage assets located within each option are identified separately.

682. Within the study area there are 11 Scheduled Monuments, 226 Listed Buildings (including eight at Grade I and 32 at Grade II*) and five Registered Parks and Gardens.

683. These designated heritage assets include some highly significant remains with archaeological interest and numerous built heritage assets. The Roman Town of *Venta Icenorum* (NHLE 1021463) is located in the north-east section of the substation search area, alongside three other Scheduled Monuments, including an Anglo-Saxon Cemetery (NHLE 1003953). Within the study area there are important designed landscapes at Sheringham Hall (NHLE 1001020) and Heydon Hall (NHLE 1000187) (both Grade II* Registered Parks and Gardens), Barningham Hall (NHLE 1001002) (Grade II Registered), and the Scheduled Roman Settlement at Brampton (NHLE 1003698).

684. At this scoping stage, data for non-designated heritage assets from the Norfolk Historic Environment Record (NHER) has not been acquired. This would, however, be an essential requirement to inform the subsequent EIA process, PEIR and later ES (see **Section 1.6** and **Section 3.5.3**, below).

685. The region as a whole (incorporating the onshore scoping area) has high potential for archaeological remains of local, regional and national importance. For example, excavations around the outskirts of Norwich have identified a large amount of buried archaeological remains, particularly of prehistoric date, which can often be found flanking the river valleys. Archaeological excavations prior to the construction of the Norwich Southern Bypass in the 1980's (Ashwin & Bates, 2000) and the Norwich Northern Distributor Road in 2016 (Moan, 2018) revealed evidence for significant prehistoric settlement and funerary practices, as well as numerous medieval roadside settlements. Similar evidence has also been identified within the more rural localities, which the study area passes through, with cropmark evidence for probable prehistoric monuments such as round barrows being relatively commonplace within the county (*ibid*.).

3.5.2 Potential Impacts

686. Heritage assets may be affected by direct physical change or by change in their setting (Historic England – GPA 2, 2015b).

687. Potential impacts to heritage assets include both direct and indirect impacts, as well as changes in the setting of heritage assets, which could affect heritage significance.

688. A direct, physical impact is one where construction works directly involved with the project (e.g. excavations and groundworks) result in a direct physical change to the fabric of a heritage asset (e.g. partial or complete removal).

689. An indirect, physical, impact is one that results from the project, but not resulting from direct (planned) intervention by the project's construction (e.g. vibration from groundworks/construction traffic affecting the fabric of a heritage asset or changes in ground conditions resulting in an effect on preservation conditions beyond the project parameters).

690. Impacts to the significance of a heritage asset may also occur if a development changes the surroundings in which a heritage asset is located, experienced and appreciated (i.e. its setting). Similarly, historic character may also be affected if the proposed scheme results in a change to the prevailing character of the area.

691. The Onshore Archaeology and Cultural Heritage assessment is likely to have key inter-relationships with Traffic and Transport, and Landscape and Visual. These will be considered where relevant.

3.5.2.1 Potential Impacts During Construction

692. Construction activities which could affect the onshore archaeology and cultural heritage resource are: any intrusive groundworks, including directional drilling, piling, and open cut trench excavation; construction of any temporary works areas or permanent above ground infrastructure; general construction activities such as plant movement or increased traffic movements due to construction.

693. The potential impacts during construction that will be assessed are:

- Direct, physical, impacts to designated heritage assets;
- Direct, physical, impacts to non-designated heritage assets;
- Indirect, physical, impacts to designated heritage assets;
- Indirect, physical, impacts to non-designated heritage assets;
- Temporary change to the setting of designated heritage assets, which could affect their heritage significance; and
- Temporary change to the setting of non-designated heritage assets, which could affect their heritage significance.
- Potential Impacts During Operation
- As the majority of the onshore project infrastructure is buried sub-surface (i.e. infrastructure associated with the buried cable systems), this element of the operational project will have limited potential to further impact the onshore archaeology and cultural heritage resource. Activity which could have an ongoing impact to the onshore archaeology and cultural heritage resource will be the presence of the onshore substation and the potential visibility of the offshore infrastructure from coastal heritage assets. Any permanent above ground infrastructure has the potential to result in a change to the setting of heritage assets, which could affect heritage significance.
- The potential impacts during operation are:

- Permanent change to the setting of designated heritage assets, which could affect their heritage significance; and
- Permanent change to the setting of non-designated heritage assets, which could affect their heritage significance.

3.5.2.2 Potential Impacts During Decommissioning

694. It is anticipated that the decommissioning impacts could be similar in nature to those of construction, depending on the extent and depths to which any further intrusive sub-surface decommissioning groundworks may occur. This will be considered in more detail as the EIA process progresses.

3.5.2.3 Potential Cumulative Impacts

695. The project could interact cumulatively with other projects, which also have the potential for impacts associated with the onshore archaeology and cultural heritage resource. These cumulative impacts are considered primarily as:
    - Direct, physical impact to the archaeological resource of the immediate and wider region; and
    - Change in the setting of designated and/or non-designated heritage assets which could affect their heritage significance.

696. Where these impacts occur because of the project, in-combination with other developments within the area with similar associated impacts, there is the potential for the impacts to be of greater significance than when assessed individually.

697. Projects identified as having a potential cumulative impact include Norfolk Vanguard and Norfolk Boreas, two offshore wind farm projects which make landfall on the North Norfolk Coast, as well as the original Dudgeon and Sheringham Shoal Offshore Wind Farm Projects. Identification of further projects will be undertaken during the PEIR stage, and further consideration given at that juncture.

3.5.2.4 Summary of Potential Impacts

Table 3-14 Summary of Potential Impacts – Onshore Archaeology and Cultural Heritage (scoped in (✓) and scoped out (x))

Potential Impacts	Construction	Operation	Decommissioning
Direct, physical, impacts to designated heritage assets.	✓	x	✓
Direct, physical, impacts to non-designated heritage assets.	✓	x	✓
Indirect, physical, impacts to designated heritage assets.	✓	✓	✓
Indirect, physical, impacts to non-designated heritage assets.	✓	✓	✓
Change to the setting of designated heritage assets, which could affect their heritage significance.	✓	✓	✓
Change to the setting of non-designated heritage assets, which could affect their heritage significance.	✓	✓	✓
Cumulative impacts	✓	✓	✓
Transboundary impacts	✓	✓	✓

3.5.3 Approach to Assessment and Data Gathering

698. Assessment of the onshore archaeology and cultural heritage resource will be an iterative and ongoing process that will be combined with ongoing site selection work to refine the development footprint. To date, designated heritage assets, as recorded within the NHLE, have been identified within the onshore cable corridor options (500m either side of the cable option centre-line) and a 3km buffer (substation search area) around the onshore grid connection substation location.

699. The existing baseline and proposed assessment methodologies of potential impact below MHWS (including the intertidal zone) will be set out in the offshore archaeology and cultural heritage assessment (see **Section 2.9**).

700. The impact assessment upon the onshore archaeology and cultural heritage resource will follow a heritage significance-based approach to historic environment decision-making, as set out in the NPPF, Section 16: Conserving and enhancing the historic environment (Ministry of Housing, Communities and Local Government, 2019). The assessment will also follow all relevant and appropriate guidance as produced by Historic England (e.g. Historic England, 2015a, b and 2017).

701. As part of the EIA, a commercial search of the NHER will be undertaken, to provide the data set on previously recorded non-designated heritage assets and events. Further research will also be undertaken to inform the baseline data, including assessment of archaeological archive reports, published archaeological articles, monographs and other sources.

As part of the EIA process, the existing environment with respect to onshore archaeology and cultural heritage will be described, including, but not limited to the following:

- Known non-designated heritage assets within 500m of the onshore proposed application boundary;
- Designated heritage assets within 1km of the project boundary and 5km of the onshore substation, to inform a setting assessment of heritage assets identified as potentially being affected by the development through a change in their setting.
- Designated heritage assets along the coast which could be affected by the presence of offshore infrastructure will be included in the assessment, identified through professional judgement and consideration of a Zone of Theoretical Visibility (ZTV) developed by the LVIA consultants.

703. Identification of heritage assets potentially affected by the project will be undertaken through spatial analysis of the heritage data within a GIS framework. Initial consideration of the setting of heritage assets and any potential for impact upon heritage significance will be undertaken as part of the setting assessment, informed by walkover surveys and site visits. A full consideration of and conclusions re. setting impacts and effects will be made in the final ES, following finalisation of the project design.

704. **Table 3-15**, below identifies the sources that will be accessed to inform the characterisation of the existing environment within respect to onshore archaeology and cultural heritage.

Table 3-15 Data sources to be used for the assessment of onshore archaeology and cultural heritage

Data source	Data contents
British Geological Survey (BGS)	Historic borehole logs and the wider geological background for the region.
National Heritage List of England (NHLE)	Contains data on all designated heritage assets within England, maintained by Historic England. GIS data for all Scheduled Monuments, Listed Buildings, Registered Parks and Gardens and Registered Battlefields.
Norfolk Historic Environment Record (NHER)	Contains data on all recorded non-designated heritage assets, maintained by Norfolk Historic Environment Services (HES). The data includes findspots, monuments and locally listed buildings. Information on previous events (archaeological surveys and investigations) will also be obtained.

Data source	Data contents
National Record for the Historic Environment (NRHE)	Maintained by HE and contains information derived from the former National Buildings Record (NBR) and National Archaeological Record (NAR).
Walkover Surveys and Site Visits	Data from walkover surveys and site visits will be used, identifying current land-use and any potential unrecorded non-designated heritage assets.
Zone of Theoretical Visibility (ZTV) Model	Any ZTV produced by the LVIA team will be assessed to help inform settings assessment.
Existing archaeological studies and published sources	Background information on the archaeology of North Norfolk, including the results of archaeological assessments carried out for Sheringham Shoal, Dudgeon, Norfolk Boreas and Norfolk Vanguard. Archaeological monographs (E.g. East Anglian Archaeology) and unpublished archaeology archive reports will also be reviewed to inform the baseline data.

705. The following surveys (**Table 3-16)** will be undertaken in 2020 to inform the assessment. Surveys will be undertaken in accordance with industry guidelines and agreed in advance with the relevant historic environment stakeholders.

Table 3-16 Proposed baseline surveys onshore archaeology and cultural heritage

Survey/study	Timing	Spatial Coverage
Walkover Surveys	TBC (2020)	Targeted areas of the proposed application boundary will be visited to identify current land use and any potential unrecorded non-designated heritage assets, as well as ground truthing of certain previously recorded assets.
Setting Assessment Site Visits	TBC (2020)	Heritage assets identified as potentially being affected by the development (through a change in their setting) will be visited to inform the setting assessment.
Priority Geophysical Survey	TBC (2020)	Targeted areas for geophysical survey, identified through desk-based baseline collation, e.g. Aerial photographic and LiDAR analysis.

706. Following these initial baseline surveys, consideration of the requirement for any initial targeted archaeological evaluation (e.g. trial trenching) will be undertaken. Any targeted trial trenching may be undertaken at areas where the baseline surveys have identified a high potential for buried archaeological remains to be present. Any initial phase of targeted trial trenching would, however, be highly dependent on landowner access permissions being agreed. A more comprehensive (onshore project wide) approach to trial trenching is anticipated to take place in the post-consent stages.

707. Identification of any areas to potentially be subject to intrusive evaluation, as part of the DCO application, would be decided through consideration of the baseline data and non-intrusive surveys and would be discussed and agreed in consultation with Norfolk County Council Historic Environment Service (NCC HES).

708. The PEI / ES related assessment will be undertaken in accordance with following standards and guidance:
    - Conserving and enhancing the historic environment. (Ministry of Housing, Communities & Local Government (2014, updated 2018)
    - The Historic Environment in Local Plans: Historic Environment Good Practice Advice in Planning 1 (Historic England, 2015a)
    - Managing Significance in Decision-Taking in the Historic Environment: Historic Environment Good Practice Advice in Planning 2 (Historic England, 2015b)
    - The Setting of Heritage Assets: Historic Environment Good Practice Advice in Planning 3 (Historic England, 2017)
    - Standard and guidance for historic environment desk-based assessment (CIfA, 2017)
    - Code of Conduct (CIfA, 2014b)

709. The assessment will be supported by a series of related technical reports and appendices. The identification of these report requirements is ongoing but will at least include a Desk-Based Assessment (DBA), undertaken to identify the currently recorded designated and non-designated heritage assets within defined study areas. The DBA will include assessment of cartographic sources, in respect to a historic map regression exercise of the onshore project boundary and/or targeted parts of the onshore cable corridor and substation location, to identify changes in land use throughout history and provide information on potential heritage assets.

710. Other technical reports to be produced which will inform the baseline data collection and collation, ultimately informing assessment, are:
    - Aerial Photographic and LiDAR assessment.
    - Geoarchaeological desk-based review; and
    - Geophysical Survey(s).

711. A settings assessment will also be undertaken as part of the DBA, which will identify heritage assets and their associated heritage significance which could be affected by change in setting as a result of the proposed development. This will follow the Historic England five-step approach (Historic England 2017).

712. Following this scoping stage technical-level consultation with Historic England and NCC HES will begin in order to further identify and agree the primary methodologies, present initial findings and ensure potential historic environment issues are identified and considered during the EIA.

3.6 Air Quality

713. The specific assessment requirements for air quality are set out within National Policy Statement EN-1 and are summarised in **Table A1-19** in **Appendix 1**.

3.6.1 Existing Environment

714. The existing environment in the air quality study area (the study area) is same as the onshore scoping area and largely rural in nature with the principal source of pollutants in the area likely to be from road traffic. There are no statutory Air Quality Management Areas (AQMAs) designated within the study area; as such, existing air quality is considered to be good.

715. Receptors sensitive to changes in air quality include human receptors within 350m of dust-generating construction works and within 200m of roads along which project-generated traffic may travel. Designated ecological sites within 50m of construction works and 200m of the road network may also be affected.

3.6.2 Potential Impacts

716. The Air Quality assessment is likely to have key inter-relationships with Traffic and Transport, Ecology, and Health. These will be considered where relevant.

3.6.2.1 Potential Impacts During Construction

717. Impacts during construction may occur at human and ecological receptors as a result of the following:

- The generation of dust and particulate matter during onshore construction works (e.g. earthworks, soil stockpiles etc.);
- Increases in emissions from road vehicles generated during construction which will contribute to existing pollutant concentrations at human receptors and deposition levels at designated ecological sites.

3.6.2.2 Potential Impacts During Operation

718. Operation of the proposed built infrastructure will not give rise to any emissions to air, and maintenance activities will not lead to a significant change in vehicle flows within the study area. On this basis the potential air quality impacts during the operational phase of the development are anticipated to be negligible. It is therefore proposed to scope operational phase air quality out of the ES.

3.6.2.3 Potential Impacts During Decommissioning

719. It is anticipated that the decommissioning impacts would be similar in nature to those of construction, although the magnitude of effect is likely to be lower. The detail and scope of the decommissioning works will be determined by the relevant legislation and guidance at the time of decommissioning and agreed with the regulator.

3.6.2.4 Potential Cumulative Impacts

720. Onshore cumulative impacts will be considered as part of the EIA process. Any other project with the potential to result in impacts that may act cumulatively with DEP and SEP will be identified during consultation and following a review of available information. These projects would then be included in the CIA.

721. The assessment will consider the potential for significant cumulative impacts to arise as a result of the construction, operation and decommissioning of the Projects, including the substation, cable route and National Grid infrastructure, in the context of other developments that are existing, consented or at application stage.

3.6.2.5 Summary of Potential Impacts

722. Potential impacts on air quality scoped in to the assessment are summarised in **Table 3-17**.

Table 3-17 Summary of impacts relating to air quality (scoped in (✓) and scoped out (x))

Potential Impacts	Construction	Operation	Decommissioning
Generation of dust and particulate matter affecting human and ecological receptors	✓	x	✓
Increases in road traffic emissions affecting human and ecological receptors	✓	x	✓
Cumulative impacts	✓	x	✓
Transboundary impacts	x	x	x

3.6.3 Approach to Assessment and Data Gathering

723. As part of the EIA process, the existing environment with respect to air quality will be described, including, but not limited to the following:

- Identification of any AQMAs along routes which project-generated vehicles may travel;
- Baseline pollutant concentrations at identified human receptors; and
- Baseline deposition and pollutant concentrations at designated ecological sites.

724. Identification of potential sensitive receptors will be undertaken using Ordnance Survey mapping data and the Defra MAGIC map database. No field surveys are proposed to inform the characterisation of the existing environment.

725. **Table 3-18** below identifies the desk-based sources that will be accessed to inform the characterisation of the existing environment.

Table 3-18 Data sources used

Data source	Date	Data contents
Local Authority Air Quality Annual Status Reports	2019 or latest available	Air quality monitoring data collected by the Local Authorities within the air quality study area
Centre for Ecology and Hydrology Air Pollution Information System	2019	Critical Loads and Levels for designated ecological sites

Data source	Date	Data contents
Defra 1km x 1km background pollution mapping	2019	2017-based background pollutant mapping data

726. The assessment will be undertaken in accordance with following standards and guidance:
    - Institute of Air Quality Management (IAQM) (2014) Guidance on the Assessment of Dust from Demolition and Construction;
    - IAQM and Environmental Protection UK (EPUK) (2017) Land-Use Planning and Development Control: Planning for Air Quality;
    - IAQM (2019) A Guide to the Assessment of Air Quality Impacts on Designated Nature Conservation Sites;
    - Highways Agency (now Highways England) (2007) Design Manual for Roads and Bridges HA207/07 Air Quality; and
    - Defra (2016) Local Air Quality Management Technical Guidance LAQM.TG(16).

727. A qualitative assessment of the potential for dust generation as a result of the construction of the project will be undertaken in accordance with IAQM guidance (IAQM, 2014). The risk of dust impacts as a result of construction activities will be determined, and mitigation measures will be recommended which are commensurate with the identified risk, to ensure impacts are not significant.

728. The increase in traffic flows generated by the project will be screened using criteria in IAQM and EPUK (IAQM and EPUK, 2017) and DMRB guidance (Highways Agency, 2007). Where traffic flows exceed the screening criteria and there are relevant receptors located within 200m of the road, a detailed dispersion modelling assessment will be undertaken to consider impacts at these locations. Concentrations of nitrogen dioxide (NO_2) and particulate matter (PM_{10} and $PM_{2.5}$) will be predicted at human receptors, and concentrations of NOx and associated nutrient nitrogen and/or acid deposition will be calculated at ecological receptors. The significance of effects will be determined in accordance with IAQM and EPUK guidance (IAQM and EPUK, 2017).

729. Following the identification of the proposed application boundary, further liaison with the relevant stakeholders (including local authorities and Natural England) will be undertaken to agree the approach and methodology to data collection for EIA purposes and the specific assessment methodology. A detailed method statement will be developed and agreed with stakeholders as part of this exercise.

3.7 Noise and Vibration

730. The specific assessment requirements for noise and vibration, as detailed in the NPSs, are summarised in **Table A1-20** in **Appendix 1**.

3.7.1 Existing Environment

731. The noise and vibration study area (the study area) is same as the onshore scoping area.

732. The landfall search areas are predominantly rural with small villages and isolated residential properties which are likely to experience low ambient noise levels presently. Weybourne landfall search area is located on the North Norfolk Coast near Weybourne. The Bacton landfall search area is located between Bacton and Mundesley.

733. The main noise sources at the landfall search areas are likely to be local roads and trains using the Cromer to Holt (passing through Sheringham) railway line, and Weybourne Airfield (Weybourne landfall search area); and local roads and the industrial area at the Bacton Gas Terminal (Bacton landfall search area).

734. The cable route search area is also predominantly rural in nature. The largest settlements within the area are at North Walsham, Sheringham, Hethersett, Wymondham, Aylsham, Thorpe Marriott and Taverham. The main noise sources within the cable route search area are likely to be:

- The A47 and the A1067 roads in the central section of the project search area;
- The A140 and the A149 roads in the east of the area;
- The A47 Norwich Southern Bypass, The Norwich Northern Distributor Route, and A11 Hethersett Bypass;
- The Norwich to Holt railway line in the east of the area:
- Industrial areas at North Walsham, Wymondham and Hethersett; and
- Felthorpe Airfield and Norwich International Airport.

735. The substation search area is located in proximity to the existing Norwich Main substation. The nearest settlements (and therefore potential the most sensitive receptors) are Dunston to the east, Swardeston to the west, Mulbarton to the south-west and Swainsthorpe to the south.

736. Background noise within the substation search area is likely to be dominated by road traffic on the A47 (Norwich Southern Bypass), Ipswich Road Interchange, and the A140; trains using the Great Eastern Main Line, and operational substations associated with Norwich Main. The area is generally rural in nature with the village of Mulbarton (to the south-west) containing the largest concentration of residential properties. Smaller villages and isolated residential properties are also located within and around the search area.

3.7.2 Potential Impacts

737. The Noise and Vibration assessment is likely to have key inter-relationships with Traffic and Transport, Ecology, and Health. These will be considered where relevant.

3.7.2.1 Potential Impacts During Construction

738. Cable installation activities will include directional drilling, surface excavation and earth moving. Excavation and earth moving will also be undertaken as part of the site preparation for the substation and other onshore infrastructure.

739. There is also the potential for piling of foundations for the substation and for National Grid infrastructure, and (if necessary) to provide a stable temporary platform for the drilling rigs at the landfall and along the onshore cable route associated with trenchless crossings.

740. There may be a potential requirement for evening and night time working for some activities which are often required to be continuous from start to completion, such as concrete pouring and trenchless crossings (including the landfall works). These temporary works activities have the potential to impact the closest noise sensitive receptors.

741. In summary, the potential temporary impacts of construction noise may arise from:

- Piling if required at the substation or at trenchless crossings;
- The proximity of the proposed activities to noise sensitive premises (including residential properties) and noise sensitive areas including Public Rights of Way (PRoW), , the Norfolk Broads National Park, Norfolk Coast Area of Outstanding Natural Beauty (AONB) at the Norfolk Coast, and sites designated for nature conservation;
- Proximity of works to significant designated heritage sites and monuments;
- Activities carried out on the surface along the proposed cable corridor (mainly earth moving and excavation);
- Construction activities at the substation and national grid sites including concrete pouring and any potential landscaping works i.e. fencing, construction of earth berms;
- Directional drilling activities, including at the landfall;
- Temporary increases in light and heavy goods vehicles associated with delivering and removing materials (including spoil and fill) and plant; and
- Vibration where piling, drilling and trenchless crossing works are required.

3.7.2.2 Potential Impacts During Operation

742. Potential operational noise impacts will be limited to the operation of the onshore substation and National Grid infrastructure and the proximity of noise sensitive receptors to the permanent above ground electrical infrastructure. Operational noise impacts may arise from the operation of equipment within the onshore substation (e.g. reactors, filters, and transformers). Potential operational noise impacts may arise from:

- The inherent operational noise from the proposed development, and any associated characteristics (tonality, intermittency, impulsivity, other acoustic characteristics);
- The proximity of the proposed development to noise sensitive premises (including residential properties) and noise sensitive areas;
- The proximity of the proposed development to quiet places and other areas that are particularly valued for their acoustic environment or landscape quality;
- The proximity of the proposed development to designated sites where noise may have an adverse impact on protected species or other wildlife; and
- Onshore substation and infrastructure maintenance activities.

743. There are unlikely to be any noise and vibration impacts relating to operational or maintenance vehicular traffic as the site will be unmanned with only periodic maintenance visits. As such, it is proposed that operational noise impacts from traffic are scoped out of further assessment.

744. Operational onshore project substation plant such as transformers and other sound power equipment vibration effects are considered negligible as industry standard requires the use of vibration isolation pads/mounts to prevent transmission of ground borne vibration. The proposed onshore project substation will be designed to achieve negligible levels of ground-borne vibration.

745. Therefore, it is considered there will be no significant sources of vibration associated with the operational substation and operational vibration impacts have therefore been scoped out of further assessment.

3.7.2.3 Potential Offshore Airborne Noise Impacts During Construction and Operation

746. Underwater noise disturbance to biological receptors is considered within the relevant sections for those offshore receptors.

747. Airborne noise offshore is likely to be generated by a mix of natural and anthropogenic sources. Vessel movements are expected to be the main source of anthropogenic noise within the site. Wind, wave and precipitation activity offshore would be the primary sources of natural airborne noise.

748. During the construction phase, increased vessel activity and device installation have the potential to increase airborne noise within the offshore scoping area. At locations in closer proximity to the shoreline, construction activities that will generate airborne noise will be limited to installation of the export cable, which may require trenching, ploughing or jetting the cable. In general, noise generated by cable laying vessels is generally low and is unlikely to be significantly elevated above background levels. Furthermore, vessel-based works inshore will also be short in duration.

749. During decommissioning, there is the potential for some offshore decommissioning activities to create airborne noise, although it is expected that this would be lower than during the construction phase.

750. Given the distance between the proposed offshore wind farm arrays and the coast (15.9km - SEP; and 27km – DEP) at their closest points) operational turbine noise will not be audible to onshore receptors.

751. Due to the limited pathway for offshore airborne noise to onshore noise sensitive receptors it is proposed that offshore airborne noise is scoped out of the EIA.

3.7.2.4 Potential Impacts During Decommissioning

752. It is anticipated that the decommissioning impacts would be similar in nature to those of construction, although the magnitude of effect is likely to be lower. The detail and scope of the decommissioning works will be determined by the relevant legislation and guidance at the time of decommissioning and agreed with the regulator.

3.7.2.5 Potential Cumulative Impacts

753. Onshore cumulative impacts will be considered as part of the EIA process. Any other project with the potential to result in impacts that may act cumulatively with DEP and SEP will be identified during consultation and following a review of available information. These projects would then be included in the Cumulative Impact Assessment (CIA).

754. The assessment will consider the potential for significant cumulative impacts to arise as a result of the construction, operation and decommissioning of the Projects, including the substation, cable route and National Grid infrastructure, in the context of other developments that are existing, consented or at application stage.

3.7.2.6 Summary of Potential Impacts

755. A summary of the potential noise and vibration impacts during the construction, operation and decommissioning phases are detailed in **Table 3-19**.

Table 3-19 Summary of Potential Impacts – Noise and Vibration (scoped in (✓) and scoped out (x))

Potential Impacts	Construction	Operation	Decommissioning
Noise affecting human and ecological receptors	✓	✓	✓
Vibration affecting human and ecological receptors	✓	x	✓
Cumulative impacts	✓	✓	✓
Transboundary impacts	x	x	x

3.7.3 Approach to Assessment and Data Gathering

756. Noise and vibration associated with the onshore Project construction works would be assessed using the guidance contained in BS 5228:2009+A1:2014, which defines the accepted prediction methods and source data for various construction plant and activities.

757. Construction noise impacts would be based on the likely construction program and associated activities, including cable installation, earthworks and directional drilling works. Noise impacts associated with peak construction traffic and identified access routes will also be undertaken.

758. The spatial scope of the construction noise assessment would include the following geographic coverage:

- Onshore scoping area where activities could affect noise sensitive receptors; and
- Traffic routes subject to significant changes in traffic flows (and/or percentage HGV) associated with the construction of the project.

759. Operational impacts would include noise impacts associated with the onshore substation and National Grid infrastructure. The guidance and methodology contained in BS 4142:2014+A1:2019 would be used to assess noise impacts arising from the onshore substation and National Grid infrastructure.

760. Following further refinement of the study area during site selection process and identification of the proposed application boundary, further liaison will be undertaken with the relevant stakeholders North Norfolk District Council (NNDC), Broadland District Council (BDC), South Norfolk Council (SNC), and Norwich City Council (NorCC) to agree the approach to data collection and the assessment methodology. A detailed method statement will be developed and agreed with these stakeholders.

761. Identification of potential noise sensitive receptors for the purposes of the characterisation of the existing environment will be undertaken using the data sources detailed in **Table 3-20**.

Table 3-20 Data sources used

Data source	Date	Data contents
Google Maps Aerial Photography	2017	Location of noise sources and sensitive receptors with the onshore noise and vibration scoping area
Environment Agency LIDAR Data	2018	Topographical data
Ordnance Survey Maps	2019	Vector map

762. Details of the proposed baseline survey are shown in **Table 3-21**. The survey will be undertaken in accordance with BS7445 and BS4142:2014+A1:2019 guidelines and agreed in advance with NNDC, BDC, SNC, and NorCC where required.

Table 3-21 Proposed baseline surveys

Survey/study	Timing	Spatial Coverage
Baseline noise survey at agreed nearest noise sensitive receptors	Q2 2020	Onshore noise and vibration study area – landfall, onshore cable corridor, onshore substation
		Shorter term (daily), baseline sound surveys along the route of the cable corridor consisting of daytime and night-time attended noise measurements at locations representative of sensitive receptors;
		Longer term (up to a week) baseline sound surveys in the area of the onshore substation and infrastructure consisting of unattended, continuous noise measurements at locations representative of agreed sensitive receptors.

763. The assessment will be undertaken in accordance with following standards and guidance:

- British Standard (BS) 4142:2014+A1:2019 – Method for Rating and Assessing Industrial and Commercial Sound;
- BS 5228-1:2009+A1:2014 Code of Practice for Noise and Vibration Control on Construction and Open Sites – Part 1: Noise;
- BS 5228-1:2009+A1:2014 Code of Practice for Noise and Vibration Control on Construction and Open Sites – Part 2: Vibration;
- BS 8233:2014 Guidance on Sound Insulation and Noise Reduction for Buildings;
- BS 7445-1:2003 Description and measurement of environmental noise. Guide to quantities and procedures;
- BS 7445-2:1991 Description and measurement of environmental noise. Guide to the acquisition of data pertinent to land use;
- BS 6472-1:2008 Guide to Evaluation of Human Exposure to Vibration in Buildings;
- Calculation of Road Traffic Noise (CRTN) 1988;

- Design Manual for Roads and Bridges (DMRB), 2011;
- World Health Organization (1999) Guidelines for Community Noise;
- World Health Organization (2009) Night Noise Guidelines for Europe; and
- World Health Organization (2018) Environmental Noise Guidelines for the European Region.

3.8 Traffic and Transport

764. The specific assessment requirements for Traffic and Transport are set out within National Policy Statement EN-1 and EN-3 and are summarised in **Table A1-21** in **Appendix 1**.

3.8.1 Existing Environment

765. Norfolk has one of the largest highway networks in the country with over 6,000 miles of roads. The construction access strategy will seek to direct the majority of Heavy Goods Vehicle (HGV) movements via the 'A' road network. Within the scoping area, the principal highway network (managed by Norfolk County Council Highways) includes the A148, A149, A140, A1067, whilst the A47 forms part of the strategic network managed by Highways England. The main A roads within the traffic and transport study area (the study area) are depicted within **Figure 3.8.1** in **Appendix 2**.

766. The A47 is identified in the Norfolk County Council Local Transport Plan (LTP) as one of Norfolk's key strategic connections, forming part of the Trans-European Transport Network, providing the main east-west road connection and route to the Midlands and north of England. Local to the scoping area the A47 provides a key link between Norwich to the south and King's Lynn and then Peterborough to the west.

767. The A47 is predominately single carriageway road, however around the major urban areas (Norwich, Dereham, Swaffham and King's Lynn) the road widens to dual carriageway. Highways England have identified a number of schemes along the A47 to address congestion hotspots; these works are programmed to commence construction in 2020 and include the proposed widening the A47 to dual carriageway between North Tuddenham and Easton.

768. The A148 routes north to Cromer as a single carriageway road to a junction with the A140. The A140 continues south as predominately single carriageway to Norwich carrying in the region of 12,179 vehicles per day.

769. The A149 routes west from Cromer to Hunstanton as a single carriageway road. Then the A149 continues south to Norwich carrying in the region of 3,282 vehicles per day.

770. The A140 has a priority junction with the A149. The A140 is a predominantly rural single carriageway that runs south towards Norwich carrying in the region of 11,725 vehicles per day of which 4.5% are HGVs.

771. The A1067 routes generally west to east between Fakenham and Norwich. The A140 is a rural single carriageway carrying in the region of 9,140 vehicles per day of which 5% are HGVs.

772. The Norwich Northern Distributor Road (recently renamed to the A1270 - Broadland Northway) was fully opened to traffic in May 2018. The road links Norwich Airport and can act as relief for A47 congestion on the A47 and local roads by providing an amenable route around the city centre.

773. The Norfolk County Council LTP (2011) raises concerns with regard to road safety, noting that: "*Road safety continues to be a major public concern and is reflected in our conversations with residents*."

774. A review of the collision rates published within Department for Transport (2017) shows that the rate of people killed or seriously injured (per billion vehicles miles) in Norfolk is 429. This rate is slightly lower than the average for the East of England (436) and lower than that for England as a whole (550).

3.8.2 Potential Impacts

775. The Traffic and Transport assessment is likely to have key inter-relationships with Land Use and Agriculture, Noise and Vibration, Air Quality and Health. These will be considered where relevant.

3.8.2.1 Potential Impacts During Construction

776. The onshore construction phase will require the import of materials and plant to the onshore work areas. At this stage, the likely material quantities and workforce numbers have not yet been determined, however, it is envisaged that daily traffic demand is likely to be significant with a large component being HGV deliveries and the potential requirement for abnormal loads to consider.

777. Table 3-22 sets out the potential construction traffic impacts and the likely user groups affected.

Table 3-22 Potential impact of traffic assessment

Potential Impact of traffic	Affected user groups
Driver delay	Commuters, tourists and business users
Severance	Local communities and tourists in the area
Pedestrian/cycle amenity	Local communities and tourists in the area
Road safety	Commuters, tourists, business users and local community
Abnormal loads	Commuters, tourists and business users

778. Traffic borne impacts upon air quality and noise and vibration are considered separately in **Section 3.6** and **Section 3.7**.

779. The preferred base port (or ports) for the offshore construction of the proposed DEP and SEP is not known and any decision would not be expected until post-consent. Such facilities would be provided or brought into operation by means of one or more planning applications or as port operations with permitted development rights. It is therefore proposed to scope out at the assessment the onshore impacts of the traffic and transport impacts associated with offshore construction activities.

3.8.2.2 Potential Impacts During Operation

780. The onshore substation will not be permanently manned; however, staff will periodically visit to carry out routine checks and maintenance. Most annual maintenance will be short, but if necessary some campaigns may be longer.

781. Any inspections/maintenance of the cable route will be infrequent and subject to very low vehicle demand.

782. Similar to this construction phase no decision has been made on a preferred base port for the offshore operation and maintenance of DEP and SEP. Therefore, it is proposed to scope out of the assessment the onshore traffic and transport impacts of offshore operation and maintenance activity

783. A separate planning exercise will be undertaken to consider traffic and transport impacts in context with any permitted development rights established at the selected site(s).

784. It is therefore proposed to scope out the operational traffic and transport effects from the EIA.

3.8.2.3 Potential Impacts During Decommissioning

785. It is anticipated that the decommissioning impacts would be similar in nature to those of construction, although the magnitude of effect is likely to be lower.

3.8.2.4 Potential Cumulative Impacts

786. Onshore cumulative impacts will be considered as part of the EIA process. Any other project with the potential to result in impacts that may act cumulatively with DEP and SEP will be identified.

787. Consultation with the highway authorities (Norfolk County Council and Highways England) will seek to identify any significant developments that could have a cumulative impact with the construction phase of DEP and SEP (e.g. the widening of the A47, other Nationally Significant Infrastructure projects, large residential development over 100 homes etc.

788. The assessment would consider the potential for significant cumulative impacts to arise because of the construction of the project in the context of other developments that are existing, consented or at application stage.

3.8.2.5 Summary of Potential Impacts

789. **Table 3-23** below highlights the potential impacts and user group impacts that will be scoped in and out during each phase of DEP and SEP.

Table 3-23 Summary of Potential Impacts – Traffic and Transport (scoped in (✓) and scoped out (x))

Potential Impact	Construction	Operation	Decommissioning
Driver Delay	✓	x	✓
Severance	✓	x	✓
Pedestrian/Cycle amenity	✓	x	✓
Road safety	✓	x	✓
Abnormal loads	✓	x	✓
Onshore traffic associated with the offshore construction	x	x	x
Cumulative impacts	✓	x	✓
Transboundary impacts	x	x	x

3.8.3 Approach to Assessment and Data Gathering

790. The principal guidelines for the assessment of the environmental impacts of road traffic associated with new developments are the 'Guidelines for the Environmental Assessment of Road Traffic' (GEART) published by the Institute of Environmental Assessment in January 1993. The guidance provides a framework for the assessment of traffic borne environmental impacts, such as pedestrian severance and amenity, driver delay, accidents and safety; and noise, vibration and air quality.

791. GEART suggests the following rules to define the extent and scale of the assessment required:

- Rule 1: Include highway links where traffic flows are predicted to increase by more than 30% (or where the number of HGVs is predicted to increase by more than 30%).
- Rule 2: Include any other specifically sensitive areas where traffic flows, or the number of HGVs are predicted to increase by 10% or more.

792. The above criterion applied to the proposed DEP and SEP' traffic demand will dictate the extent of the study area and the scale of the impact assessment.

793. In addition to GEART, the Design Manual for Roads and Bridges (DMRB) published by Highways England provides standards and documentation relating to the design, assessment and maintenance of trunk roads in the United Kingdom. Whilst the DMRB has been prepared for trunk roads and motorways, it is proposed that DMRB is adopted as best practice within any assessment for the design of accesses, and to augment the GEART assessment of severance and amenity impacts.

794. Traffic demand will be derived by way of a 'first principles' approach whereby traffic generation is calculated from an understanding of likely material demand and resourcing requirements. These numbers will be informed by industry experts, drawing on their experience of delivering and operating offshore wind farm projects.

795. The DEP and SEP' traffic demand will then be assigned to the highway links within the study area and the increase in traffic flow to baseline conditions determined. The magnitude of effect associated with these increases will be determined to inform the impact assessment.

796. The **Table 3-24** highlights the magnitude of effects and the threshold levels that have been adapted from GEART.

Table 3-24 Magnitude of effects thresholds

Effect	Very low	Low	Medium	High
Highway Safety	Informed by a review of existing collision patterns and rates based upon the existing personal injury collision records and the forecast increase in traffic			
Driver delay	Informed by projected traffic increases through sensitive junctions			
Pedestrian amenity	Change in traffic flow (or HGV component) less than 100%		Greater than 100% increase in traffic (or HGV component) and a review based upon the quantum of vehicles, vehicle speed and pedestrian footfall.	
Severance	Change in total traffic flow of less than 30%	Change in total traffic flows of 30-60%	Change in total traffic flows of 60-90%	Changes in total traffic flows of over 90%

797. The magnitude of effect would then be combined with the sensitivity of each discrete highway link within the transport study area to determine the overall impact of DEP and SEP traffic. The link sensitivity would be determined by the concentration of sensitive receptors served by that link. **Table 3-25** provides broad definitions of the different sensitivity levels which are to be applied to the assessment.

Table 3-25 Sensitive Receptors

Sensitivity	Definition
Low	Sensitive receptors and / or highway environment can accommodate changes in volumes of traffic
Medium	A low concentration of sensitive receptors (e.g. residential dwellings, pedestrian desire lines, etc.) and limited separation from traffic provided by the highway environment
High	High concentrations of sensitive receptors (e.g. hospitals, schools, areas with high tourist footfall etc.) and limited separation provided by the highway environment
Negligible	Routes of no material influence to the assessment not included in the traffic and transport study area.

798. All proposed delivery routes will be assessed for their suitability to accommodate forecast HGV traffic and abnormal loads.

799. As details of the proposed traffic demand become known a detailed method statement will be prepared and submitted to the highway authorities (Norfolk County Council and Highways England) to confirm the traffic impact assessment methodology.

800. **Table 3-26** below identifies the desk-based sources that will be accessed to inform the characterisation of the existing environment.

Table 3-26 Data sources used

Data source	Date	Data contents
Department for Transport Traffic Counts	Latest year available	Baseline annual average daily traffic flows for all road and A roads.
Online Mapping	n/a	Details of existing highway baseline including sensitive receptors, walking and cycling routes.
Norfolk County Council Collison Data	Latest five-year period available	Personal injury collision data for all links within the study area
NSIP Planning Applications	n/a	Relevant baseline data from recent submissions including - Norfolk Vanguard Offshore Wind Farm, Norfolk Boreas Offshore Wind Farm and Hornsea Project Three Offshore Wind Farm.

801. The following surveys / studies will be undertaken to inform the assessment. Surveys will be undertaken in accordance with relevant guidelines and agreed in advance with stakeholders.

802. **Table 3-27** highlights the proposed baseline surveys that will be undertaken to inform the assessment.

Table 3-27 Proposed baseline surveys

Survey/study	Timing	Spatial Coverage
Traffic Counts	Latest year available	Baseline annual average daily traffic flows for all road and A roads.

4 PART 4: WIDER SCHEME ASPECTS

4.1 Seascape, Landscape and Visual

803. A Seascape, Landscape and Visual Impact Assessment (SLVIA) will be undertaken to identify the likely significant effects of the proposed DEP and SEP on seascape, landscape and visual amenity.

804. The specific assessment requirements for seascape, landscape and visual are set out within National Policy Statements EN-1 and EN-3, as summarised in **Table A1-22** in **Appendix 1**.

4.1.1 Existing Environment

4.1.1.1 Seascape and landscape character

805. Seascape is defined by Natural England (2010) as: "An area of sea, coastline and land, as perceived by people, whose character results from the actions and interactions of land with sea, by natural and / or human factors." A Seascape Character Area (SCA) assessment for the East Inshore and East Offshore marine plan areas (MMO 2012) covers the areas that DEP and SEP would be located. The wind farm sites are located within the East Midlands Offshore Gas Fields (SCA 03), East Midlands Shipping Waters (SCA 07), and Norfolk Coastal Waters (SCA 09). These coastal waters are exposed and remote in nature, with a character that is strongly influenced by the presence of the existing Dudgeon and Sheringham Shoal offshore wind farms, a dense concentration of shipping activity, and extensive offshore commercial activities, such as fishing and dredging.

806. A number of landscape designations are present along the coast and inland and include the nationally important Norfolk Coast Area of Outstanding Natural Beauty (AONB), which is present along the majority of the north Norfolk coast between Hunstanton and Mundesley and approximately 15.9km from the SEP and 26.7km from the SEP. Both landfall options overlap with the AONB to some extent – refer to **Figure 4.1.1** in **Appendix 2**. The north Norfolk coast between Hunstanton and Weybourne is also designated as heritage coast (North Norfolk Heritage Coast) as well as being a Ramsar site, SAC and SSSI.

807. Landscape character principally applies to areas lying to the landward side of the high-water mark. The English Landscape is classified at the national level by National Character Areas (NCAs). This mapping and the associated descriptions have been revised and developed by Natural England into NCA profiles, which provide a recognised national spatial framework. The onshore scoping area covers a coastal and rural landscape in which agriculture is the predominant land use. Settlements are typically small, occurring as villages and towns along the Norfolk coast, and then more intermittently inland, with a finer network of small clusters of properties and isolated farmsteads characterising the rural area.

808. The onshore areas are characterised by the following NCAs:

- North West Norfolk (NCA 76);
- North Norfolk Coast (NCA 77);
- Central North Norfolk (NCA 78);

- North East Norfolk and Flegg (NCA 79);
- The Broads (NCA 80);
- South Norfolk and High Suffolk Claylands (NCA 83); and
- Mid-Norfolk (NCA 84).

809. The Norfolk and Suffolk Broads National Park (the Broads) is Britain's largest protected wetland and third largest inland waterway, and is located approximately 34km from the SEP turbine array and 37km from the DEP turbine at its closest point. Significant impacts on the landscape character of the Broads from the wind turbines are unlikely due to the long distance of the turbine arrays from the Broads. In addition, there is limited visibility to the sea afforded from the landscapes of the Broads, which are located further inland, are very low-lying and are partially screened by surrounding landforms and intervening vegetation (woodland and hedgerows). On this basis, it is proposed that potential operational landscape impacts associated with the offshore presence of the proposed wind farm extensions on the Broads be scoped out of the assessment.

810. The Option 2 onshore cable route scoping area is, however, located within approximately 1.2km of the Broads, near East Ruston. There are also several Registered Parks and Gardens in the onshore study area (see **Figure 4.1.1** in **Appendix 2**).

811. Historic landscape/seascape character will be addressed as part of the historic environment assessments (see **Sections 2.9** and **3.5**).

4.1.1.2 Visual Receptors

812. The principal seascape visual receptors in the study area are likely to be focused along the closest sections of the Norfolk coastline. A detailed assessment will be undertaken in the SLVIA for those visual receptors that are most susceptible to changes along the Norfolk coastline and immediate hinterland, including:

- Coastal settlements – including Wells-next-the-Sea; Sheringham; Cromer; Trimingham; Mundesley; Bacton; Happisburgh; and Eccles on Sea;
- Recreational routes – including Norfolk Coast Path; Regional Cycle Routes 30 and 31; National Cycle Route 1;
- Main road routes – various roads that lead to the coast such as the A140, A148, A149, A1082, B1159, and B1145; and
- Visitors to tourist facilities – such as the sea fronts / beaches of the main coastal towns and resorts, holiday villages and nature reserves and visitors centres (**Figure 4.1.2** in **Appendix 2**).

813. With respect to the onshore works the principal visual receptors are likely to be people walking on the Norfolk Coast Path and other public rights of way in proximity to the onshore infrastructure. Views of the onshore infrastructure may also be experienced by residents of settlements such as Swardeston, Swainsthorpe and Stoke Holy Cross as well as residents of scattered individual farm houses and estates and by motorists travelling within the study area.

4.1.2 Potential Impacts

814. The Seascape, Landscape and Visual assessment is likely to have key inter-relationships with Shipping and Navigation, Traffic and Transport, Tourism and Recreation, and Archaeology and Cultural Heritage. These will be considered where relevant.

4.1.2.1 Potential Impacts During Construction

Offshore

815. Potential visual impacts related to the offshore construction would be seen in the context of the existing shipping and other offshore commercial activities, including the presence of the existing wind farms. The seascape, landscape and visual impacts that could arise during construction include:

- Temporary impacts on coastal/seascape character;
- Temporary impacts on landscape character; and
- Temporary visual impacts on views.

Onshore

816. Potential impacts during construction would occur in relation to the construction of the landfall, onshore cable corridor, onshore substation and National Grid infrastructure. These would include potential impacts on the landscape character and visual amenity of the site and surrounding area. The impacts would relate principally to the construction process, and presence of associated plant, materials, infrastructure and temporary structures, as well as the presence of emerging structures, where they would be visible above ground.

4.1.2.2 Potential Impacts During Operation

Offshore

817. The potential for significant visual impacts to arise in respect of the offshore components during operation would be in the context of the existing Sheringham Shoal and Dudgeon offshore wind farm turbines. The extension areas are typically located seaward of the existing turbine arrays – Equinor deliberately selected the boundaries of the SEP array to be no closer to the coastline than the existing wind farm. However, the extensions would introduce taller turbines and effectively widen the footprint of the existing wind farms on the horizon. The following impacts will be assessed:

- Impacts on coastal / seascape character – either affecting the pattern of elements that define the character or affecting the visual/perceptual seascape characteristics;
- Impacts on landscape character – within onshore landscape types and landscape designations, primarily as a result of visibility of the offshore wind turbines during operation; and
- Impacts upon visual receptors (groups of people) associated with the visibility of the proposed offshore extension sites; including specific viewpoints and on the visual amenity/experience of the landscape.

Onshore

818. Potential impacts during operation relate principally to the presence of the onshore substation (since the onshore cables will be buried). Potential impacts on landscape character and visual amenity will be assessed, with particular consideration of sensitive receptors such as valued landscapes, residents, recreational users of the countryside and road-users. Potential impacts during operation would be considered in the context of the proximity of this infrastructure to the existing electrical infrastructure at Norwich Main.

4.1.2.3 Potential Impacts During Decommissioning

819. It is anticipated that the decommissioning impacts would be similar in nature to those of construction, but would be more limited in geographical extent and timescale.

820. Decommissioning will include potential impacts on the landscape character and visual amenity of the sites and surrounding area. The impacts would relate principally to the decommissioning process, associated plant, materials, infrastructure and temporary structures, as well as the presence of dismantled structures, where they would be visible above ground.

4.1.2.4 Potential Cumulative Impacts

821. Potential cumulative impacts would relate to the association with other large scale developments (existing and proposed), located either in, or close to the study area. Further consideration will be given to these potential cumulative scenarios as part of the EIA in-combination with other projects.

4.1.2.5 Summary of Potential Impacts

Table 4-1 Summary of impacts relating to seascape, landscape and visual

Potential Impacts	Construction	Operation	Decommissioning
Impacts of the offshore works on seascape / landscape character and visual amenity	✓	✓	✓
Impacts of the offshore works on seascape, landscape and visual receptors	✓	✓	✓
Impacts of the offshore works on the landscape character of the Norfolk and Suffolk Broads National Park	x	x	x
Impacts of the onshore works on landscape character and visual amenity	✓	✓	✓
Impacts of the onshore works on landscape and visual receptors	✓	✓	✓
Cumulative impacts with other offshore projects	✓	✓	✓
Cumulative impacts with other onshore projects	✓	✓	✓

4.1.3 Approach to Assessment and Data Gathering

822. The assessment will be undertaken in accordance with the methods outlined in the following best practice guidance documents:
    - The Landscape Institute with the Institute of Environmental Management and Assessment (2013). Guidelines for the Assessment of Landscape and Visual Impacts, Third Edition;
    - Landscape and Seascape Character Assessments published by Natural England and the Department for Environment, Food and Rural Affairs (2014);
    - An Approach to Landscape Character Assessment (2014). Natural England;
    - Scottish Natural Heritage (2012). Assessing the Cumulative Impact of Onshore Wind Energy Developments;
    - Scottish Natural Heritage (February 2017). Visual Representation of Wind Farms: Version 2.2; and
    - The Landscape Institute (2011). Landscape Institute Advice Note 01/11, Photography and photomontage in landscape and visual impact assessment.

823. Data will be gathered from official, reliable and the most up-to-date sources. This will include Ordnance Survey map based data as well as data on landscape characterisation, landscape designations and other Governmental and local authority data of relevance.

824. The methodology to undertake the SLVIA will reflect ‘Guidelines for Landscape and Visual Impact Assessment: Third Edition’ (GLVIA3) (Landscape Institute, 2013). The significance of effects will take into account the sensitivity of the landscape or visual receptor / view and the magnitude of change that will result from DEP and SEP. In accordance with GLVIA3, the approach will require the application of professional judgment, but generally, the higher the sensitivity and the higher the magnitude of change, the increased likelihood there is for a significant effect.

825. The SLVIA will determine whether the impacts are beneficial, neutral or adverse in accordance with defined criteria; and will be assessed as short-term or long-term, and permanent or temporary/reversible.

Table 4-2 Data sources that will be used to inform the assessments

Data source	Data
Ordnance Survey	Mapping information
North Norfolk District Council	North Norfolk Landscape Character Assessment
Broadland District Council	Broadland Landscape Character Assessment
Norfolk Coast Partnership	Norfolk Coast AONB Management Plan
The Broads Authority	Identification of a landscape of national importance
MAGIC website	AONBs, Historic Parks and Gardens, National Character Areas, National Trails.
Norfolk County Council	PRoW definitive map

4.2 Socio-Economics

826. The specific assessment requirements for socio-economics are set out within National Policy Statement EN-1 and are summarised in **Table A1-23** in **Appendix 1**.

827. Tourism aspects of socio-economics are considered in **Section 4.4**.

4.2.1 Existing Environment

828. The existing environment relevant to the EIA would consider two receptor groups:
- Economic receptors, essentially people or businesses that would benefit from or be adversely affected by DEP and SEP and associated development; and
- Social receptors, which are the social infrastructure relevant to a community, that would benefit from or be adversely affected by DEP and SEP and associated development. Impacts on social receptors subsequently impact on the population often in ways that influence their health and wellbeing.

829. Norfolk is one of three counties in the East Anglia region of Eastern England. It has a population of just over 900,000 people and is administered by Norfolk County Council. Forty percent of the county's population live in the built-up areas of Norwich (213,000), Great Yarmouth (63,000), King's Lynn (46,000) and Thetford (25,000). Norwich also has a population of roughly 20,000 students attending its two universities (University of East Anglia (UEA) and Norwich University of the Arts).

830. Of the population in Norfolk, 58.8% is aged between 16 and 64 and of those 74.4% are employed and 3.9% are unemployed (ONS, 2018). Skilled trades, technical and professionals comprise 52.7% of employment, the remainder being retail, leisure, caring, plant and process, and elementary and unskilled occupations (ONS, 2018) of which construction (14.3%), professional, scientific and technical (13.4%), and agriculture (10.2%) are the largest employers by number followed by the retail (7.8%) and accommodation/food services (7.1%) (ONS, 2018).

831. The scoping area includes areas managed by Norfolk County Council and the local district councils of North Norfolk, Broadland and South Norfolk. The substation search area slightly encroaches on land managed by Norwich City Council.

832. The scoping area passes through the jurisdiction of North Norfolk, Broadland and South Norfolk District Councils, and is predominantly located on agricultural land.

833. Businesses within the immediate vicinity of the cable corridor include pubs, tourist attractions such as a dinosaur park and heritage railway (see **Section 4.4**), hotels, restaurants, farms, garages, a motorcycle training centre, various types of shop, garden centre, shooting ground, paintball centre, swimming pool, and a country park.

834. Areas within the landfall search area have suffered from coastal erosion and flooding. A coastal 'sand scaping' protection scheme has recently been approved for the coastline adjacent to Bacton Gas Terminal.

835. The main economic activities within the landfall search areas are associated with arable farming and tourism, as well as employment associated with the Bacton Gas Terminal. Mundesley Holiday Village and Castaways Holiday Park are located within 50m of the Bacton landfall search area.

836. Settlements within/near to the landfall search area include Weybourne, Sheringham, Bacton and Mundesley. All of these settlements have B&Bs, hotels, cafes and restaurants, and public houses.

837. The substation search area is in the district of South Norfolk. The area contains some notable tourist attractions (see **Section 4.4**) as well as the settlements of Keswick, Intwood, Caistor St Edmund, Dunston, Stoke Holy Cross, Swainsthorpe, and Mulbarton.

838. The offshore project area is primarily used by commercial fisheries (see **Section 2.7**) and shipping (see **Section 2.8**). Significant natural gas infrastructure exists to the north of the site and much of it feeds into the Bacton Gas Terminal at the north end of the landfall search area.

4.2.2 Potential Impacts

839. Offshore wind farm projects, particularly at the scale planned for DEP and SEP, can have positive socio-economic effects in terms of providing local and national employment, and continuing to develop the wind energy market at a national level, i.e. encouraging wind energy manufacturers to be based in the UK. It is anticipated that the economic impact, both direct and indirect will be most significant during the construction phase, with a lesser direct impact on the local economy during the operational phase. However, there are potential negative impacts on social infrastructure where the project components and activities to construct them impact on specific receptors, unless they are identified and avoided through micro-siting and mitigation measures. The impacts described below exclude tourism and recreation, which are considered in **Section 4.4.**

840. Economic impacts will vary considerably at each stage, dependent on a range of factors, such as:

- The technologies and infrastructure to be deployed onshore and offshore;
- Construction, O&M and decommissioning methodologies;
- Procurement/contracting strategy;
- Availability and capacity of the supply chain;
- Number of workers;
- Where the workers come from; and

- The duration of employment.

841. The Socio-economics assessment is likely to have key inter-relationships with Commercial Fisheries, Tourism and Recreation, and Land Use and Agriculture. These will be considered where relevant.

4.2.2.1 Potential Impacts During Construction

- Supply chain: The proposed wind farms will require local goods and services, which will be supplied by local businesses such as security, catering, hotel facilities or maintenance;
- Infrastructure: Potential for upgrade of existing or new ports and improved infrastructure;
- Employment: Whilst some of the offshore work contractors are likely to be non-UK residents, the onshore and landfall works have the potential to use local contractors certainly for some elements of the work and may also require local recruitment. Though it is likely that contractors could come from anywhere within the UK. Overall, there is likely to be some local recruitment / employment but linked to relevant contractor location.
- Local expenditure: There will be a social and economic impact that relates to the new spending power generated from employees directly and indirectly attached to the wind farms. A significant amount of the earning capacity of these individuals is expected to be spent locally, boosting the local economy.
- Loss of or disruption to social infrastructure: The working areas and exclusion areas during construction could result in the obstruction to or disruption of key social infrastructure elements. This could be loss of area or complete cessation of the activities present at such receptors for the duration of construction.
- Disturbance (noise, air, visual, and traffic) to social infrastructure: During the installation of the onshore infrastructure, noise, dust and visual disturbance could all cause potential impacts on social infrastructure receptors or the users thereof. However, these will be temporary in nature. Impacts from dust and noise are considered in **Section 3.6** and **Section 3.7**, and visual impacts are considered in **Section 4.1.**

4.2.2.2 Potential Impacts During Operation

- Employment: The design life of the offshore wind farm is 25 years, rising to potentially 60 years following any future re-powering, and will require the employment of staff for operations, maintenance, potentially re-powering after 25 years, and ultimately decommissioning.
- Wider impacts: The potential wider social economic impacts over an operational life of up to 50 years are wide ranging but relate to aspects such as indirect economic expenditure and in-migration and the associated demographic change that could arise, and these will be identified and assessed as part of the EIA.

- Loss of or disruption to social infrastructure: The permanent footprint of the project infrastructure could result in the obstruction to or disruption of key social infrastructure elements. This could result in the permanent loss of area or complete cessation of the activities present at such receptors.
- Disturbance (noise, air, visual, and traffic) to social infrastructure: There would be no ongoing activities during the operation phase that would result in disturbance to social infrastructure receptors with the exception of maintenance activities, which could result in increased noise, dust, traffic, or visual disturbance. However, these will be temporary in nature albeit intermittent throughout the operational phase. Impacts from dust and noise are considered in **Section 3.6** and **Section 3.7**, and visual impacts are considered in **Section 4.1**.

4.2.2.3 Potential Impacts During Decommissioning

842. Impacts from decommissioning are anticipated to be similar to those from construction activities.

4.2.2.4 Potential Cumulative Impacts

843. There is potential for Dudgeon and Sheringham Shoal to bring socio-economic benefits, for example by providing opportunities for business, jobs and training. The clustering of offshore wind farm development in the southern North Sea will, over time, provide longer term opportunities for the supply chain and skills sectors than a single development.

844. Conversely, there is also potential to cumulatively impact upon other industries negatively as a result of displacement of workers currently employed in other industries. This will be considered further in the EIA.

4.2.2.5 Summary of Potential Impacts

Table 4-3 Summary of socioeconomic impacts to be considered Transport (scoped in (✓) and scoped out (x))

Potential impacts	Construction	Operation	Decommissioning
Direct economic benefit	✓	✓	✓
Increased employment	✓	✓	✓
Change in demographics due to in-migration	x	✓	x
Loss of or disruption to local infrastructure	✓	✓	✓
Disturbance (noise, air, visual, and traffic) to social infrastructure	✓	✓	✓
Pressure on local health infrastructure (doctors' surgeries / hospitals / dentists)	✓	✓	✓

Potential impacts	Construction	Operation	Decommissioning
Cumulative socio-economic impacts	✓	✓	✓

4.2.3 Approach to Assessment and Data Gathering

845. A review of the socio-economic baseline features will be undertaken and presented in the ES, including:
    - Regional and local labour market and trends;
    - High level indication of temporary and rented accommodation supply and trends;
    - Current workforce;
    - Local and regional population and trends;
    - Local and regional employment and trends; and
    - Education (including special educational needs and school standards).

846. Social data relating to crime, health and leisure will also be considered where this is available, along with the identification of social infrastructure such as schools, nurseries, libraries, doctors, dentists, pharmacies, social care homes, post offices, public houses, community halls, churches and other places of worship. Data on health is presented in **Section 4.3**.

847. Data sources for this baseline review would include:
    - ONS (Office for National Statistics);
    - norfolkinsight.co.uk; and
    - NOMIS.

848. All data will be linked to the Lower Layer Super Output Areas (LLSOAs) for the areas within the relevant disturbance zone of the likely impacts, whether they are direct (physical) or indirect (transport and access, noise, air / dust) impacts. All LLSOAs for Norfolk will be linked to the tabulated dated on social and economic data listed above.

849. The Overarching NPS for Energy (EN-1) states that where a project is likely to have an impact on socio-economics at a local or national scale the assessment should consider all relevant impacts, including those listed at the start of this section.

850. There is no set of recognised standards for the assessment of socio-economic impacts. In light of this, the socio-economic assessment will present a qualitative assessment of the anticipated impacts and benefits, their extent and when they are expected to occur.

851. The absolute scale of economic impacts (i.e. the number of jobs which construction, operation and maintenance, and decommissioning activity is expected to support) would be calculated using an approach consistent with methods for economic impact assessment set out in HM Treasury Green Book (2003). The socio-economic impact magnitude will be determined by consideration of the predicted deviation from baseline conditions.

4.3 Health

852. The specific assessment requirements for human health are set out within National Policy Statement EN-1 and are summarised in **Table A1-24** in **Appendix 1**. Information on assessment requirements for specific impacts on health can be found in the relevant chapters.

4.3.1 Existing Environment

853. Human health will be considered within the relevant onshore technical topics during the EIA, including noise and vibration, flood risk, traffic and transport, air quality, and ground contamination.

854. Receptors that are sensitive to potential impacts on health will be identified within the topic specific ES chapters, and a review of these will be presented within the health assessment. A review of the health interactions of the project and those in the receiving environment will be drawn from those other assessments.

4.3.1.1 Overview

855. Life expectancy in Norfolk is 80 years for males and 83.7 years for females.

856. Ninety four percent of the population of Norfolk considered themselves to be in very good to fair health, and only 5.6% of the population considered themselves to be in bad or very bad health (ONS, 2011). However, 27% of households had a person with a long-term health issue or disability (ONS, 2011).

857. Of the adult population, smokers comprised 11.6% and 16.2% of females and males respectively, whilst 7.9% of 15-year olds considered themselves to be regular smokers (ONS, 2011).

858. Nearly 3,000 people died as a result of preventable (lifestyle) cardiovascular disease or cancer. Over 60% of adults are classified as overweight or obese, with 22.7% of 4-5 year olds overweight and 32.1% of 10-11 year olds overweight. Though over 65% of adults considered themselves to be active.

859. There were 6,150 hospital admissions for alcohol related conditions and 1,498 emergency admissions for self-harm in one year. There were 39.07 people per 100,000 killed or severely injured on roads in Norfolk in 2011 (The Guardian, 2012).

860. Thirty seven percent of households had an adult residing in them who was unemployed, and 3.8% of the working age population was long-term unemployed. Twenty five percent of households had dependent children, and 14.8% of children lived in low-income families.

861. Additional data on health-related statistics will be sought to highlight key sensitivities within the County and the various districts and parishes of Norfolk. In terms of deprivation Norfolk is around the average for the UK (ranked 85 out of 152), though there are pockets of high deprivation in urban locations such as Norwich, Dereham, Swaffham, Great Yarmouth, but also coastal areas including Hemsby, and Cromer.

4.3.2 Potential Impacts

862. The Health assessment is likely to have key inter-relationships with Noise and Vibration, Air Quality and Tourism and Recreation. These will be considered where relevant.

4.3.2.1 Potential Impacts During Construction

863. Potential health related effects experienced during construction would be determined through the topic specific assessments, but are expected to include:
    - Noise disturbance;
    - Dust and other air emissions;
    - Exposure to contaminated soils;
    - Hazardous waste and substances;
    - Increased flood risk;
    - Navigation risk;
    - Obstruction to or loss of green space;
    - Disruption to local road network (reduced access to services and amenities);
    - Transport related accidents;
    - Community anxiety and stress; and
    - Loss of or increased pressure on existing healthcare services.

4.3.2.2 Potential Impacts During Operation

864. Potential health related impacts during operation would be determined through the topic specific assessments, but are expected to include:
    - Noise disturbance associated with the operational substation and National Grid Infrastructure;
    - Obstruction to or loss of green space;
    - Generation of electromagnetic fields (EMFs);
    - Increased flood risk;
    - Navigation risk; and
    - Community anxiety and stress.

4.3.2.3 Potential Impacts During Decommissioning

865. It is anticipated that the decommissioning impacts would be similar in nature and extent to those of construction.

4.3.2.4 Potential Cumulative Impacts

866. Cumulative impacts will be considered as part of the EIA process. Any other projects with the potential to result in impacts that may act cumulatively with DEP and SEP will be identified during consultation. These projects will then be included in the CIA and therefore are scoped into the assessment.

867. The assessment would consider the potential for significant cumulative impacts to arise as a result of the construction, operation, and decommissioning of DEP and SEP in the context of other developments that are existing, consented or at application stage.

4.3.2.5 Summary of Potential Impacts

Table 4-4 Summary of impacts relating to human health Transport (scoped in (✓) and scoped out (x))

Potential Impacts	Construction	Operation	Decommissioning
Noise disturbance	✓	✓	✓
Emissions to air (including dust)	✓	x	✓
Exposure to contaminated soils	✓	x	✓
Accidental / incidental chemical spills / leaks to surface / ground / coastal waters or soils	✓	x	✓
Increased Flood Risk	✓	✓	✓
Navigation Risk	✓	✓	✓
Obstruction to or loss of open space and associated health benefits	✓	✓	✓
Disruption to local road network (reduced access to services and amenities)	✓	✓	✓
Transport related accidents	✓	✓	✓
Community stress and anxiety as a result of increased pollution (water) risk, flood risk, noise, visual, heavy traffic, or crime due to in-migrant workers	✓	✓	✓
Loss of or pressure on existing healthcare services	✓	✓	✓
Cumulative impacts	✓	✓	✓
Transboundary impacts	x	x	x

4.3.3 Approach to Assessment and Data Gathering

868. There are no specific guidelines which inform the management or assessment of health impacts. The Overarching National Policy Statement for Energy (EN-1) (DECC, 2011a) states that where the proposed project has an effect on human beings, the ES should assess these effects for each element of the project, identifying any adverse health impacts, and identifying measures to avoid, reduce or compensate for these impacts as appropriate.

869. In line with good practice, the assessment process will include the identification and review of the potential public health impacts of the full life-cycle (i.e. construction, operation and decommissioning) of the project's features, including their emissions. The findings will be taken from individual chapters from the ES and collated in the health assessment. In addition, feedback will be sought from consultees on potential health impacts, with particular reference to the Health and Safety Executive (HSE) and Public Health England (PHE).

870. Data sources relating to human receptors are discussed in the following sections:

- 2.2 Marine Water and Sediment Quality
- 3.1 Onshore Ground Conditions and Contamination
- 3.6 Air Quality
- 3.7 Noise and Vibration
- 4.1 Seascape, Landscape and Visual
- 4.2 Socio-Economics; and
- 4.4 Tourism and Recreation.

871. **Table 4-5** summarises the data sources used to obtain the baseline scoping data.

Table 4-5 Baseline data sources

Data source	Date	Data contents
ONS	29/07/2019	Health statistics at local, county, and regional levels.
OS Maps	29/07/2019	OS maps combined with ONS data for lower level super output areas to identify detailed community and population data at relevant spatial locations.
Public Health England	29/07/2019	Health statistics for various regions and demographics.

4.4 Tourism and Recreation

872. The specific assessment requirements for tourism and recreation are set out within National Policy Statement EN-1 (under socio-economics), and are summarised in **Table A1-25** in **Appendix 1**.

873. Socio-economic aspects of tourism and recreation are considered in **Section 4.2**.

4.4.1 Existing Environment

874. Tourism is very important to the economy of Norfolk, providing over 65,000 jobs and contributing more than £3.25 billion to the local economy (Visit Norfolk, 2017). Norfolk's attractions include its un-spoilt coastline, beautiful countryside, internationally important nature reserves, picturesque market towns and traditional seaside resorts. **Figure 4.4.1** in **Appendix 2** shows the most notable features in the immediate vicinity of the landfall search areas.

4.4.1.1 Coastal Tourism and Recreation

875. The Weybourne landfall search area is within the Norfolk Coast Area of Outstanding Natural Beauty (AONB). North Norfolk is described as 'an extremely diverse tourism offer, primarily due to its varying landscape comprising an attractive coastline, much of which is AONB, extensive countryside, coastal birdlife, seaside resorts, historic towns and villages and the Norfolk Broads'. Coastal recreational activities include coastal walks, cycling and sight-seeing amongst many others. Both landfall search areas are within Norfolk's Deep History Coast, known for its archaeological finds.

876. The main coastal resort in proximity to the Weybourne landfall search area is the village of Weybourne and its associated beach. The larger coastal settlement of Sheringham is approximately 2km east of the landfall site and is itself a popular tourist resort. Weybourne is known for its beach-angling (due to deep water), the Muckleburgh Tank Collection, and as a stop on the North Norfolk steam railway, as well as various other recreational activities.

877. Bacton and Mundesley are the two resorts in proximity to Bacton landfall search area, both known for their wide, sandy beaches. Mundesley is the larger of the two resorts and has a Blue Flag beach as well as various recreation amenities (see **Table 4-6**).

878. Marine recreational activities include sailing and motor craft activities, and include fishing, SCUBA diving and other water sports. Offshore, in the vicinity of the proposed wind farm extensions, any sailing would likely consist of offshore cruising and racing. A number of offshore routes fan out from the coastal area, which are likely to intersect the proposed developments. These routes will be identified in the NRA, included in **Section 2.8**.

879. Within the inshore area, which is traversed by the proposed export cable route options and encompasses a RYA general boating area, inshore sailing is typically undertaken by smaller vessels including dinghies and recreational craft. Inshore racing takes place around racing marks and navigational buoyage. Recreational SCUBA diving is known to take place at locations within the Cromer Shoal Chalk Beds MCZ as well as on local wrecks. There are no boat trips or water sports facilities within the coastal and near-shore scoping area, although there are some operating out of/in Sheringham, close to Weybourne landfall search area. Recreational sailing and vessels are covered separately in **Section 2.8**. Other water sport activities including surfing, wind and kite surfing, kayaking, canoeing and recreational fishing are pursued close to shore, and potentially in proximity to the proposed export cable routes.

880. The Blue Flag beach at Mundesley (Bacton landfall search area) provides good swimming opportunities.

881. Various Public Right of Ways (PRoWs) and cycle routes are located within the study area of both landfall options, including national cycle routes 30 and 33 (see **Figure 4.4.1** in **Appendix 2**). The Weybourne landfall search area crosses the Peddars Way and Norfolk Coastal Path (see **Figure 4.4.1** in **Appendix 2**). The specific amenities offered by each resort are detailed in **Table 4-6**.

Table 4-6 Coastal resort amenities

Resort	Landfall search area	Assets
Sheringham	Weybourne	Blue Fag beach, clifftop walking, public houses, restaurants, theatre, heritage steam railway, Norfolk Coast AONB, Heritage Coast.
Weybourne	Weybourne	Military museum, park, steam railway, pebbled beach, public house, windmill, deep nearshore waters for beach angling, Norfolk Coast AONB, Heritage Coast.
Mundesley	Bacton	Victorian seaside village with Blue Flag beach, clifftop walking, cinema, public houses, golf course, museum, WWII memorial, windmill, restaurants, Norfolk Coast AONB.
Bacton	Bacton	Beaches, clifftop walking, 15th century church, public houses.

4.4.1.2 Inland Tourism and Recreation

882. The onshore scoping area runs through the North Norfolk, Broadland and South Norfolk Districts. The majority of North Norfolk's tourism is at its coasts and within the main towns, although the North Norfolk AONB is approximately 3.5km wide as it follows the coast, which offers an inland attraction to tourists.

883. The Broadland, Norwich and South Norfolk Joint Core Strategy describe a 'rich concentration of historic assets, dominated by the medieval city of Norwich and its surrounding market towns, and also includes historic buildings, halls and parklands in the surrounding countryside'.

884. Amenities in proximity to the onshore scoping area include campsites, caravan parks, some B&Bs/guesthouses, fishing lakes, Sheringham Park, PRoWs, national cycle routes 1, 30 and 33, commons/public open spaces, archery and paintball parks, Baconsthorpe Castle, and the North Norfolk and Bure Valley steam railways. The award-winning 'Roarr!' Dinosaur adventure centre is also located within the onshore scoping area.

885. Ventura Icenorum Roman town, Dunston Common, and Dunston Hall hotel and golf course are located within the substation search area.

4.4.2 Potential Impacts

886. The Tourism and Recreation assessment is likely to have key inter-relationships with Socio-economics, Seascape, Landscape and Visual, and Traffic and Transport (in particular with regard to labour resources). These will be considered where relevant.

4.4.2.1 Potential Impacts During Construction

Coastal

- Visual impacts: Associated with cable laying vessels and vessels moving to and from the offshore construction zone, as well as plant, machinery, personnel at the coastal landfall (see **Section 4.1**).

- Disruption to marine and coastal recreational activities: Offshore and landfall construction activities and associated Safety Zones may disrupt marine and coastal recreational activities, and these will need to be identified and assessed. This obstruction or disruption will be temporary in nature. Marine users will be informed of Safety Zones, and these will be removed or reduced following completion of construction. The risk of collision with structures and reduced navigable area as a result of the construction activity will be assessed and is discussed in **Section 2.8**.
- Restricted beach access: There is the potential for beach access to be obstructed during works at the landfall, for health and safety purposes. However, this will be temporary in nature, with access restored upon completion of construction.
- Deterioration of Bathing water / Blue flag beaches and resulting effect on tourism and recreation: The landfall and associated nearshore cable construction works could result in deterioration to the Bathing Water / Blue Flag beach status of nearby beaches. Such deterioration could discourage visits by both residents and non-residents and result in local economic decline. Impacts to water quality are discussed in **Section 2.2**.

Onshore (inland)

- Loss of or disruption to recreation / tourism assets: The working areas and exclusion areas during construction could result in the obstruction to or disruption of key recreational assets or activities.
- Obstruction to local recreation and tourism provisions and businesses: Local businesses and tourism facilities may be temporarily disrupted through access route diversions as a result of construction work (see **Section 3.7.3**).
- Alternate routes/closure of PRoWs and cycle paths: Temporary closures or alternative routes for PRoWs (including National Trails), cycle routes and other long-distance paths could discourage visitors.
- Disturbance to recreation / tourism assets from noise, dust and visual impact: During the installation of the onshore infrastructure, noise, dust and visual disturbance could all cause potential impacts to tourism or recreational receptors. However, these will be temporary in nature. Impacts from dust and noise are considered in **Section 3.6** and **Section 3.7**, and visual impacts are considered in **Section 4.1**.
- Reduction in available accommodation due to construction personnel: Where there is a non-resident construction workforce there will need to be temporary / short-term accommodation during the construction phase. Whilst this will be a positive economic impact for accommodation providers, the reduction in available accommodation could reduce the availability of accommodation for tourists and could be considered a potential negative impact. This could have both temporary, short- and longer-term impacts.

4.4.2.2 Potential Impacts During Operation

- Disruption to coastal and marine recreational activities: The main source of impact is associated with Safety Zones during maintenance activities in the coastal and marine environment. Impacts on recreational vessels from a navigational perspective will be considered in **Section 2.8**.
- Permanent closure of PRoWs: If any PRoWs require permanent closure as a result of the proposed infrastructure, this would reduce availability of access as well as attractiveness the area for informal recreational activities such as walking. However, the project will seek to avoid placing permanent operational above ground infrastructure on a PRoW.
- Disturbance to recreation / tourism assets from onshore noise, dust and visual impact: There would be no ongoing activities during the operational phase that would result in disturbance to tourism or recreation receptors with the exception of maintenance activities, which could result in increased noise, dust, traffic, or visual disturbance. However, these will be temporary in nature albeit intermittent throughout the operational phase. Impacts from dust and noise are considered in **Section 3.6** and **Section 3.7**, and visual impacts are considered in **Section 4.1.**
- Disturbance to recreation / tourism assets from offshore visual impact: The operational offshore wind farms may be located as close as 15.9km to the North Norfolk coast (SEP). The largest turbines under consideration would have a tip height of 276m, which would have visibility along a large stretch of the North Norfolk cost and inland. Whilst the existing Sheringham Shoal and Dudgeon Offshore Wind Farm turbines are visible from the coast the larger turbines proposed have the potential to increase the zone of theoretical visibility of the wind farms, which may result in an effect on tourism and recreation receptors. Visual impacts are considered in more detail in **Section 4.1**.
- Reduction in available accommodation due to maintenance personnel: The attendance of non-resident maintenance personnel during the annual maintenance season represents a need for temporary / short-term accommodation throughout the operational lifetime. Accommodation providers may prioritise workers' accommodation over tourist visitors, thus reducing the available provision (albeit intermittently) and resulting in a potential long-term impact.

4.4.2.3 Potential Impacts During Decommissioning

887. No decision has been made regarding the final decommissioning policy for the substation as it is recognised that industry best practice, rules and legislation change over time. However, the substation and cable relay station equipment will likely be removed and reused or recycled. It is expected the onshore cables will be removed from ducts and recycled, with the transition pits and ducts left in situ.

888. The detail and scope of the decommissioning works will be determined by the relevant legislation and guidance at the time of decommissioning and agreed with the regulator. A decommissioning plan would be provided.

889. It is anticipated that the decommissioning impacts will be similar in nature to those of construction. There is the potential for a positive impact as a result of reverting land to previous or improved condition, making the area more attractive to visitors.

4.4.2.4 Potential Cumulative Impacts

890. Onshore cumulative impacts will be considered as part of the EIA process. Any other project with the potential to result in impacts that may act cumulatively with DEP and SEP will be identified during consultation and following a review of available information.

891. The assessment would consider the potential for significant cumulative impacts to arise as a result of the construction, operation and decommissioning of DEP and SEP in the context of other developments that are existing, consented or at application stage.

892. For a cumulative impact to arise during construction, for example, on beach users, recreational sea users and on tourism and recreational facilities, a development would have to happen at the same time and be within a similar area.

4.4.2.5 Summary of Potential Impacts

Table 4-7 Summary of potential impacts on Tourism and Recreation Transport (scoped in (✓) and scoped out (x))

Potential impacts	Construction	Operation	Decommissioning
Coastal and marine			
Visual impacts	✓	✓	✓
Disruption to marine and coastal recreational activities	✓	✓	✓
Restricted beach access	✓	x	✓
Deterioration to Bathing water / Blue flag beaches and resulting effect on tourism and recreation	✓	x	✓
Onshore (inland)			
Visual impacts	✓	✓	✓
Loss of and disturbance to local tourism and recreation assets	✓	x	✓
Alternate routes / temporary/permanent closure of PRoWs	✓	✓	✓

Potential impacts	Construction	Operation	Decommissioning
Disturbance to recreation / tourism assets from noise, dust and visual impact	✓	x	✓
Reduction in available accommodation due to construction personnel	✓	✓	✓
Cumulative impacts	✓	✓	✓

4.4.3 Approach to Assessment and Data Gathering

893. There are no specific statutory guidelines which inform the assessment of impacts upon tourism and recreation receptors. The assessment will focus on the factors that have the potential to reduce the number of tourists visiting or returning to an area. The tourism baseline will be described on the basis of trends for visitor numbers, visitor origin, expenditure, secondary benefits from tourism, and the timing of visitor periods.

894. A desk-based study will be undertaken to identify tourism and recreation features which may be affected by the proposed DEP and SEP, using sources of information online (see **Table 4-8**) and through continued consultation with statutory stakeholders, as well as feedback and information from survey teams carrying out other surveys in the cable corridor and landfall areas (such as terrestrial ecology).

Table 4-8 Tourism and Recreation data sources

Data source	Data contents
visitnorfolk.co.uk	General information on tourism in Norfolk and location/details of specific attractions.
Google Maps	Locating/searching for attractions within the development area.
Bing OS Maps	Searching for tourism assets within the development area including PRoWs and cycle paths.
North Norfolk District Council	Information on local plans and designations.
Broadland District Council	Information on local plans and designations.
RYA	UK Coastal Atlas of Recreational Boating (September 2019). GIS dataset of recreational boating activity around the UK, comprising spatial data including indicators of intensity of use, general boating areas, offshore routes, as well as the locations of clubs, training centers and marinas.
Defra Sea Angling Survey (2012)	A survey of shore-based and private boat recreational sea angling activity and economic value of sea angling in England.
SeaSearch	A project for volunteer scuba divers and snorkelers who survey and map types of near-shore sea bed around Britain.
Finstrokes dive sites	Source of dive site information for SCUBA divers.

895. The assessment will be undertaken in accordance with following relevant guidance:
    - The RYA's Position on Offshore Renewable Energy Developments: Paper 1 (of 4) – Wind Energy, June 2019 (RYA, 2019); and
    - Guidance on Environmental Impact Assessment of Offshore Renewable Energy Development on Surfing Resources and Recreation (SAS, 2009).

896. Consultation with the local communities and landowners will be undertaken to further understand features of importance for local tourism and recreation.

5 PART 5: CONSULTATION

897. This Scoping Report supports the submission to the Planning Inspectorate for the purposes of requesting a Scoping Opinion under the Planning Act 2008 and associated EIA Regulations.

898. Informal consultation will be undertaken with key stakeholders throughout the EIA process to build on the feedback provided in the Scoping Opinion and to further define the scope of studies, surveys and assessments, as required. This will be supported by an Evidence Plan Process for certain topics and issues, as described in **Section 1.6**.2.

899. In line with the requirements of the Planning Act a process of pre-application formal consultation will also be undertaken with prescribed bodies, Local Planning Authorities and people with an interest in the land to which the application relates (under Section 42 of the Planning Act), with local communities (under Section 47) and more widely through the general notification of a proposed application (under Section 48).

900. In accordance with Section 47 of the Planning Act a Statement of Community Consultation (SoCC) will be prepared setting out how the applicant proposes to consult people living in the vicinity about the proposed application, for example through public consultation events. The applicant will make the SoCC available for inspection by the public in a way that is reasonably convenient for people living in the vicinity of the land and also publish a notice stating where and when the SoCC can be inspected.

6 PART 6: SUMMARY AND CONCLUSIONS

901. **Table 6-1** summarises the potential impacts for each of the environmental receptors outlined in the sections above. All impacts that have been scoped in for assessment are considered to represent potential likely significant effects under Regulation 10 of the Infrastructure Planning (Environmental Impact Assessment) Regulations 2017.

902. PINS is requested to specifically confirm that the topics listed as scoped out in the table are agreed as scoped out.

Table 6-1 Summary of impacts scoped in (√) and out (x))

Potential impacts	Construction	Operation	Decommissioning
Marine Geology, Oceanography and Physical Processes			
Effects on hydrodynamic regime (waves and tidal currents)	x	✓	✓
Effects on bedload sediment transport	✓	✓	✓
Effects on suspended sediment concentrations and transport	✓	✓	✓
Cumulative impacts	✓	✓	✓
Transboundary impacts	x	x	x
Marine water and sediment quality			
Potential for increases in suspended sediment	✓	x	✓
Potential for the release of contamination	✓	x	✓
Potential for accidental spills and leaks	x	x	x
Cumulative impacts	✓	✓	✓
Transboundary impacts	x	x	x
Benthic and intertidal ecology			
Temporary physical disturbance	✓	✓	✓
Permanent habitat loss	x	✓	✓
Increased suspended sediment concentrations	✓	✓	✓
Re-mobilisation of contaminated sediments	✓	x	✓

Potential impacts	Construction	Operation	Decommissioning
Underwater noise and vibration	✓	x	✓
Colonisation of foundations and cable protection	x	✓	x
Invasive species	x	✓	✓
Potential impacts on sites of marine conservation importance	✓	✓	✓
Impact of electromagnetic fields	x	x	x
Cumulative impacts	✓	✓	✓
Transboundary impacts	x	x	x
Fish and shellfish ecology			
Physical disturbance and temporary loss of sea bed habitat, spawning or nursery grounds during intrusive works	✓	x	✓
Permanent habitat loss	x	✓	x
Increased suspended sediments and sediment re-deposition	✓	✓	✓
Re-mobilisation of contaminated sediment during intrusive works	✓	✓	✓
Underwater noise impacts to acoustically sensitive species during foundation piling	✓	x	x
Underwater noise impacts to acoustically sensitive species due to other activities (vessels, seabed preparation, cable installation etc.)	✓	✓	✓
Introduction of wind turbine foundations, scour	x	✓	x

Potential impacts	Construction	Operation	Decommissioning
protection and hard substrate			
Impacts from electromagnetic fields	x	✓	x
Impacts on commercially exploited species associated with their displacement from the area of activity / works	✓	✓	✓
Cumulative impacts	✓	✓	✓
Transboundary impacts	✓	✓	✓
Marine mammal ecology			
Underwater noise during UXO clearance	✓	x	x
Underwater noise during piling	✓	x	x
Underwater noise from other activities (for example rock placement and cable laying)	✓	✓	✓
Underwater noise and presence of vessels	✓	✓	✓
Underwater noise from operational wind turbines	x	✓	x
Barrier effects from underwater noise	✓	x	✓
Collision risk with vessels	✓	✓	✓
Disturbance at seal haul-out sites	✓	✓	✓
Changes in water quality	✓	✓	✓
Changes to prey availability (including from habitat loss and EMF)	✓	✓	✓
Barrier effects from physical presence of wind farm	x	x	X
Electromagnetic fields direct effects	x	x	X

Potential impacts	Construction	Operation	Decommissioning
Cumulative impacts from underwater noise	✓	✓	✓
Cumulative impacts from collision risk	✓	✓	✓
Cumulative barrier impacts	x	x	X
Cumulative disturbance at seal haul-out sites	✓	✓	✓
Cumulative changes to prey availability (including habitat loss)	✓	✓	✓
Transboundary impacts	✓	✓	✓
Offshore ornithology			
Disturbance and displacement (work activity, vessel movements, presence of turbines and infrastructure, lighting)	✓	✓	✓
Indirect impacts through effects on habitats and prey species	✓	✓	✓
Collision risk with turbines	×	✓	×
Barrier effect due to presence of turbines	×	✓	×
Cumulative impacts (disturbance and displacement, collision and barrier effect)	✓	✓	✓
Transboundary impacts	✓	✓	✓
Commercial fisheries			
Impacts on commercially exploited species associated with their displacement from the area of activity / works	✓	✓	✓
Displacement of fishing activity leading to increased pressure on other areas outside the wind farm sites	✓	✓	✓

Potential impacts	Construction	Operation	Decommissioning
Loss of, or restricted access to, traditional fishing grounds	✓	✓	✓
Loss of, or damage to, fishing gear	✓	✓	✓
Increased collision risk	Included in shipping and navigation assessment	Included in shipping and navigation assessment	Included in shipping and navigation assessment
Increased transit times to reach fishing grounds	✓	✓	✓
Cumulative impacts with other activities	✓	✓	✓
Transboundary impacts	✓	✓	✓
Shipping and navigation			
Displacement of vessel routeing activities	✓	✓	✓
Increased collision risk	✓	✓	✓
Increased allision risk	✓	✓	✓
Interaction with subsea cables	✓	✓	✓
Impacts on emergency response resources	✓	✓	✓
Cumulative impacts	✓	✓	✓
Transboundary impacts	✓	✓	✓
Offshore Archaeology and Cultural Heritage			
Direct, physical, impacts to designated heritage assets.	✓	x	✓
Direct, physical, impacts to non-designated heritage assets.	✓	x	✓
Indirect, physical, impacts to designated heritage assets.	✓	✓	✓
Indirect, physical, impacts to non-designated heritage assets.	✓	✓	✓

Potential impacts	Construction	Operation	Decommissioning
Change to the setting of designated heritage assets, which could affect their heritage significance.	✓	✓	✓
Change to the setting of non-designated heritage assets, which could affect their heritage significance.	✓	✓	✓
Cumulative impacts	✓	✓	✓
Transboundary impacts	✓	✓	✓
Aviation and MoD			
Effects on aviation radar	✓	✓	✓
Risk of aviation collision	✓	✓	✓
Effect on HMRs and offshore platforms	✓	✓	✓
Effects on military training areas	x	✓	x
Cumulative impacts	✓	✓	✓
Transboundary impacts	x	x	x
Air Quality			
Impacts at human receptors	x	x	x
Impacts at ecological receptors	x	x	x
Cumulative impacts	x	x	x
Transboundary impacts	x	x	x
Offshore Designated Sites			
Impacts at human receptors	x	x	x
Impacts at ecological receptors	x	x	x
Cumulative impacts	x	x	x
Transboundary impacts	x	x	x
Other Marine Users			
Potential interference with other wind farms	x	x	x
Potential interference with oil and gas operations	✓	✓	✓

Potential impacts	Construction	Operation	Decommissioning
Potential impacts on subsea cables and pipelines	✓	✓	✓
Impacts on aggregate dredging activities	x	x	x
Impacts on disposal sites	**x**	**x**	**x**
Detonation of UXO	x	x	x
Cumulative impacts	✓	✓	✓
Transboundary impacts	x	x	x
Onshore ground conditions and contamination			
Impacts to human health due to: • Disturbance and mobilisation of contaminants from existing sources; • Alterations to exposure pathways; and • Introduction of new contaminant sources.	✓	x	x
Impacts to controlled waters due to: • Disturbance and mobilisation of contaminants from existing sources; • Alterations to exposure pathways; and • Introduction of new contaminant sources.	✓	x	x
Impact to geologically significant areas and designated geological sites	✓	x	✓
Cumulative impacts	✓	x	✓
Transboundary impacts	x	x	x
Water resources and flood risk			
Direct disturbance of surface water bodies	✓	x	✓
Increased sediment supply	✓	✓	✓
Supply of contaminants	✓	✓	✓

Potential impacts	Construction	Operation	Decommissioning
Changes to surface water runoff and flood risk	✓	✓	✓
Cumulative impacts	✓	✓	✓
Transboundary impacts	x	x	x
Land Use and Agriculture			
Agricultural productivity	✓	✓	✓
Drainage	✓	✓	✓
Disruption to farming practices	✓	✓	✓
Temporary closure of PRoWs/cycle paths	✓	x	✓
Existing utilities	✓	x	✓
Permanent loss of land	x	✓	x
Permanent closure/diversion of PRoWs	×	✓	×
Soil heating	×	✓	×
Cumulative impacts	✓	✓	✓
Transboundary impacts	x	x	x
Ecology and Ornithology (Including Sites of Nature Conservation Interest			
Direct impacts to statutory and non-statutory designated nature conservation sites and associated qualifying features	✓	✓	✓
Indirect impacts (e.g. noise, dust, groundwater supply) to statutory and non-statutory designated nature conservation sites and associated qualifying features	✓	✓	✓
Direct impacts (permanent and temporary loss) to habitats due to the footprint of the onshore works	✓	✓	✓
Direct and indirect impacts (disturbance – noise, lighting etc / potential killing)	✓	✓	✓

Potential impacts	Construction	Operation	Decommissioning
to adjacent habitats and protected species			
Spread of invasive non-native species as a result of construction activities	✓	x	✓
Cumulative impacts	✓	✓	✓
Transboundary impacts	✓	✓	✓
Onshore Archaeology and Cultural Heritage			
Direct, physical, impacts to designated heritage assets.	✓	x	✓
Direct, physical, impacts to non-designated heritage assets.	✓	x	✓
Indirect, physical, impacts to designated heritage assets.	✓	✓	✓
Indirect, physical, impacts to non-designated heritage assets.	✓	✓	✓
Change to the setting of designated heritage assets, which could affect their heritage significance.	✓	✓	✓
Change to the setting of non-designated heritage assets, which could affect their heritage significance.	✓	✓	✓
Cumulative impacts	✓	✓	✓
Transboundary impacts	✓	✓	✓
Air Quality			
Generation of dust and particulate matter affecting human and ecological receptors	✓	x	✓
Increases in road traffic emissions affecting human and ecological receptors	✓	x	✓
Cumulative impacts	✓	x	✓
Transboundary impacts	x	x	x

Potential impacts	Construction	Operation	Decommissioning
Noise and Vibration			
Noise affecting human and ecological receptors	✓	✓	✓
Vibration affecting human and ecological receptors	✓	x	✓
Cumulative impacts	✓	✓	✓
Transboundary impacts	x	x	x
Traffic and Transport			
Driver Delay	✓	x	✓
Severance	✓	x	✓
Pedestrian/Cycle amenity	✓	x	✓
Road safety	✓	x	✓
Abnormal loads	✓	x	✓
Onshore traffic associated with the offshore construction	x	x	x
Cumulative impacts	✓	x	✓
Transboundary impacts	x	x	x
Seascape, Landscape and Visual			
Impacts of the offshore works on seascape / landscape character and visual amenity	✓	✓	✓
Impacts of the offshore works on seascape, landscape and visual receptors	✓	✓	✓
Impacts of the offshore works on the landscape character of the Norfolk and Suffolk Broads National Park	x	x	x
Impacts of the onshore works on landscape character and visual amenity	✓	✓	✓

Potential impacts	Construction	Operation	Decommissioning
Impacts of the onshore works on landscape and visual receptors	✓	✓	✓
Cumulative impacts with other offshore projects	✓	✓	✓
Cumulative impacts with other onshore projects	✓	✓	✓
Socio-Economics			
Direct economic benefit	✓	✓	✓
Increased employment	✓	✓	✓
Change in demographics due to in-migration	x	✓	x
Loss of or disruption to local infrastructure	✓	✓	✓
Disturbance (noise, air, visual, and traffic) to social infrastructure	✓	✓	✓
Pressure on local health infrastructure (doctors' surgeries / hospitals / dentists)	✓	✓	✓
Cumulative socio-economic impacts	✓	✓	✓
Health			
Noise disturbance	✓	✓	✓
Emissions to air (including dust)	✓	x	✓
Exposure to contaminated soils	✓	x	✓
Accidental / incidental chemical spills / leaks to surface / ground / coastal waters or soils	✓	x	✓
Increased Flood Risk	✓	✓	✓
Navigation Risk	✓	✓	✓
Obstruction to or loss of open space and associated health benefits	✓	✓	✓

Potential impacts	Construction	Operation	Decommissioning
Disruption to local road network (reduced access to services and amenities)	✓	✓	✓
Transport related accidents	✓	✓	✓
Community stress and anxiety as a result of increased pollution (water) risk, flood risk, noise, visual, heavy traffic, or crime due to in-migrant workers	✓	✓	✓
Loss of or pressure on existing healthcare services	✓	✓	✓
Cumulative impacts	✓	✓	✓
Transboundary impacts	x	x	x
Tourism and Recreation			
Coastal and marine			
Visual impacts	✓	✓	✓
Disruption to marine and coastal recreational activities	✓	✓	✓
Restricted beach access	✓	x	✓
Deterioration to Bathing water / Blue flag beaches and resulting effect on tourism and recreation	✓	x	✓
Onshore (inland)			
Visual impacts	✓	✓	✓
Loss of and disturbance to local tourism and recreation assets	✓	x	✓
Alternate routes / temporary/permanent closure of PRoWs	✓	✓	✓
Disturbance to recreation / tourism assets from noise, dust and visual impact	✓	x	✓

Potential impacts	Construction	Operation	Decommissioning
Reduction in available accommodation due to construction personnel	✓	✓	✓
Cumulative impacts	✓	✓	✓

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APPENDIX 1 NPS ASSESSMENT REQUIREMENTS

1. NPS EN-1 and EN-3 assessment requirements relevant to EIA topics are summarised below.

Table A1-1 Marine Geology, Oceanography and Physical Processes

NPS Requirement	NPS reference
'where relevant, applicants should undertake coastal geomorphological and sediment transfer modelling to predict and understand impacts and help identify relevant mitigating or compensatory measures'	EN-1 – 5.5.6
'the ES should include an assessment of the effects on the coast. In particular, applicants should assess: • the impact of the proposed project on coastal processes and geomorphology, including by taking account of potential impacts from climate change. If the development will have an impact on coastal processes the applicant must demonstrate how the impacts will be managed to minimise adverse impacts on other parts of the coast. • the vulnerability of the proposed development to coastal change, taking account of climate change, during the project's operational life and any decommissioning period.'	EN-1 – 5.5.7
'the applicant should be particularly careful to identify any effects of physical changes on the integrity and special features of Marine Conservation Zones, candidate marine Special Areas of Conservation (SACs), coastal SACs and candidate coastal SACs, coastal Special Protection Areas (SPAs) and potential SCIs and Sites of Special Scientific Interest (SSSI).'	EN-1 – 5.5.9
'an assessment of the effects of installing cable across the intertidal zone should include information, where relevant, about: • increased suspended sediment loads in the intertidal zone during installation.'	EN-3 – 2.6.81
'where necessary, assessment of the effects on the subtidal environment should include: • loss of habitat due to foundation type including associated seabed preparation, predicted scour, scour protection and altered sedimentary processes. • environmental appraisal of inter-array and cable routes and installation methods. • increased suspended sediment loads during construction.'	EN-3 – 2.6.113
'the assessment should include predictions of the physical effect that will result from the construction and operation of the required infrastructure and include effects such as the scouring that may result from the proposed development.'	EN-3 – 2.6.194

Table A1-2 Marine Water and Sediment Quality

NPS Requirement	NPS reference
Adverse effects on the water environment, including transitional waters and coastal waters, from discharges and increased risk of spills and leaks of pollutants. Could result in surface and ground waters of protected areas failing to meet environmental objectives established under the Water Framework Directive [WFD].	EN1 - 5.15.1
The application should undertake an assessment of the existing status of, and impacts of the proposed project, on water quality, water resources and physical characteristics of the water environment.	EN-1 – 5.15.2
Marine water quality affected through the disturbance of sea bed sediments or the release of contaminants with subsequent indirect effects on habitats, biodiversity and fish stocks.	EN-3 – 2.6.189
The Environment Agency regulates emissions to land, air and water out to 3 nautical miles (nm). Where development is located within 3nm of the coast, the Environment Agency should be consulted at the pre-application stage.	EN-3 – 2.6.191
Beyond 3nm, the Marine Management Organisation (MMO) is the regulator. The applicant should consult the MMO and Centre for Environment, Fisheries and Aquaculture Science (Cefas) at the pre-application stage.	EN-3 – 2.6.192

Table A1-3 Benthic and Intertidal Ecology

NPS Requirement	NPS reference
Clearly set out any effects on internationally, nationally and locally designated sites of ecological or geological conservation importance, on protected species and on habitats and other species identified as being of principal importance for the conservation of biodiversity.	EN-1 - 5.3.3
The ES should include an assessment of the effects on the coast. In particular, applicants should assess…the effects of the proposed project on marine ecology, biodiversity and protected sites	EN-1 – 5.5.7
Assessment of offshore ecology and biodiversity should be undertaken by the applicant for all stages of the lifespan of the proposed offshore wind farm and in accordance with the appropriate policy for offshore wind farm EIAs.	EN-3 – 2.6.64
Any relevant data that has been collected as part of post-construction ecological monitoring from existing, operational offshore wind farm should be referred to where appropriate.	EN-3 – 2.6.66
The assessment should include the potential for the scheme to have both positive and negative impacts on marine ecology and biodiversity.	EN-3 – 2.6.67

NPS Requirement	NPS reference
An assessment of the effects of installing cable across the intertidal zone should include information, where relevant, about: 1. Any alternative landfall sites that have been considered by the applicant during the design phase and an explanation for the final choice; 2. Any alternative cable installation methods that have been considered by the applicant during the design phase and an explanation for the final choice; 3. Potential loss of habitat; 4. Disturbance during cable installation and removal (decommissioning); 5. Increased suspended sediment loads in the intertidal zone during installation; and 6. Predicted rates at which the intertidal zone might recover from temporary effects.	EN-3 – 2.6.81
Where necessary, assessment of the effects on the subtidal environment should include: 7. Loss of habitat due to foundation type including associated sea bed preparation, predicted scour, scour protection and altered sedimentary processes; 8. Environmental appraisal of array cables and cable routes and installation methods; 9. Habitat disturbance from construction vessels' extendible legs and anchors; 10. Increased suspended sediment loads during construction; and 11. Predicted rates at which the subtidal zone might recover from temporary effects.	EN-3 – 2.6.113
Construction and decommissioning methods should be designed appropriately to minimise effects on subtidal habitats, taking into account other constraints. Mitigation measures which the Infrastructure Planning Commission (IPC) (now the Planning Inspectorate) should expect the applicants to have considered may include: • surveying and micrositing of the export cable route to avoid; adverse effects on sensitive habitat and biogenic reefs; • burying cables at a sufficient depth, taking into account other constraints, to allow the seabed to recover to its natural state; and • the use of anti-fouling paint might be minimised on subtidal surfaces, to encourage species colonisation on the structures.	EN-3 – 2.6.119
Where cumulative effects on subtidal habitats are predicted as a result of the cumulative effects of multiple cable routes, it may be appropriate for applicants for various schemes to work together to ensure that the number of cables crossing the subtidal zone is minimised and installation/decommissioning phases are coordinated to ensure that disturbance is reasonably minimised.	EN-3 – 2.6.120

Table A1-4 Fish and Shellfish Ecology

NPS Requirement	NPS reference
Clearly set out any effects on internationally, nationally and locally designated sites of ecological or geological conservation importance, on protected species and on habitats and other species identified as being of principal importance for the conservation of biodiversity.	EN-1 - 5.3.3
There is the potential for the construction and decommissioning phases…to interact with seabed sediments and therefore have the potential to impact fish communities, migration routes, spawning activities and nursery areas of particular species. In addition, there are potential noise impacts, which could affect fish during construction and decommissioning and to a lesser extent during operation.	EN-3 – 2.6.73
The applicant should identify fish species that are the most likely receptors of impacts with respect to: • spawning grounds; • nursery grounds; • feeding grounds; • over-wintering areas for crustaceans; and • migration routes.	EN-3 – 2.6.74
EMF during operation may be mitigated by use of armoured cable for inter-array and export cables that should be buried at a sufficient depth. Some research has shown that where cables are buried at depths greater than 1.5m below the seabed impacts are likely to be negligible. However, sufficient depth to mitigate impacts will depend on the geology of the seabed.	EN-3 – 2.6.76
During construction, 24 hour working practices may be employed so that the overall construction programme and the potential for impacts to fish communities is reduced in overall time.	EN-3 – 2.6.77

Table A1-5 Marine Mammal Ecology

NPS Requirement	NPS reference
Clearly set out any effects on internationally, nationally and locally designated sites of ecological or geological conservation importance, on protected species and on habitats and other species identified as being of principal importance for the conservation of biodiversity.	EN-1 – 5.3.3
Assessment of offshore ecology and biodiversity should be undertaken by the applicant for all stages of the lifespan of the proposed offshore wind farm and in accordance with the appropriate policy for offshore wind farm EIAs.	EN-3 – 2.6.64
Any relevant data that has been collected as part of post-construction ecological monitoring from existing, operational offshore wind farm should be referred to where appropriate.	EN-3 – 2.6.66

NPS Requirement	NPS reference
The assessment should include the potential for the scheme to have both positive and negative impacts on marine ecology and biodiversity.	EN-3 – 2.6.67
There are specific considerations from piling noise which apply to offshore wind energy infrastructure proposals with regard to marine mammals, including cetaceans and seals, which have statutory protection. Offshore piling may reach noise levels which are high enough to cause injury, or even death, to marine mammals. If piling associated with an offshore wind farm is likely to lead to the commission of an offence (which would include deliberately disturbing, killing or capturing a European Protected Species), an application may have to be made for a wildlife licence to allow the activity to take place.	EN-3 – 2.6.90 and 2.6.91
Where necessary, assessment of the effects on marine mammals should include details of: • likely feeding areas; • known birthing areas/haul out sites; • nursery grounds; • known migration or commuting routes; • duration of the potentially disturbing activity including cumulative / in-combination effects with other plans or projects; • baseline noise levels; • predicted noise levels in relation to mortality, permanent threshold shift (PTS) and temporary threshold shift (TTS); • soft-start noise levels according to proposed hammer and pile design; and • operational noise.	EN-3 – 2.6.92

Table A1-6 Offshore Ornithology

NPS Requirement	NPS reference
Clearly set out any effects on internationally, nationally and locally designated sites of ecological conservation importance, on protected species and on habitats and other species identified as being of principal importance for the conservation of biodiversity.	EN-1 – 5.3.3
Assessment of offshore ecology and biodiversity should be undertaken by the applicant for all stages of the lifespan of the proposed offshore wind farm and in accordance with the appropriate policy for offshore wind farm EIAs.	EN-3 – 2.6.64
Any relevant data that has been collected as part of post-construction ecological monitoring from existing, operational offshore wind farm should be referred to where appropriate.	EN-3 – 2.6.66
The assessment should include the potential of the scheme to have both positive and negative effects on marine ecology and biodiversity.	EN-3 – 2.6.67

NPS Requirement	NPS reference
The scope, effort and methods required for ornithological surveys should have been discussed with the relevant statutory advisor.	EN-3 – 2.6.102
Relevant data from operational offshore wind farms should be referred to in the applicant's assessment.	EN-3 – 2.6.103
It may be appropriate for assessment to consider collision risk modelling for certain species of birds.	EN-3 – 2.6.104

Table A1-7 Commercial Fisheries

NPS Requirement	NPS reference
Where the project is likely to have socio-economic impacts at local or regional levels, the applicant should undertake and include in their application an assessment of these impacts as part of the ES.	EN-1 – 5.12.2
The construction and operation of offshore windfarms can have both positive and negative effects on fish and shellfish stocks.	EN-3 – 2.6.122
The offshore windfarm and any associated infrastructure may be a hindrance to certain types of commercial fishing activity such as trawling and longlining, but other fishing activities may be able to take place within operational windfarms without unduly disrupting or compromising navigational safety. Consequently, the establishment of a windfarm can increase the potential for some fishing activities, such as potting.	EN-3 – 2.6.123
In some circumstances, transboundary issues may be a consideration as fishermen from other countries may fish in waters within which offshore windfarms are sited.	EN-3 – 2.6.124
Early consultation should be undertaken with statutory advisors and with representatives of the fishing industry which could include discussion of impact assessment methodologies. Where any part of the proposal involves a grid connection to shore, appropriate inshore fisheries groups should be consulted.	EN-3 – 2.6.127
Where a number of offshore windfarms have been proposed within an identified zone, it may be beneficial to undertake such consultation at a zonal, rather than a site specific, level.	EN-3 – 2.6.128
The assessment by the applicant should include surveys of the effects on fish stocks of commercial interest and any potential reduction in such stocks, as well as any likely constraints on fishing activity within the project boundaries. Robust baseline data should have been collected and studies conducted as part of the assessment.	EN-3 – 2.6.129

NPS Requirement	NPS reference
Where there is a possibility that safety zones will be sought around offshore infrastructure, potential effects should be included in the assessment on commercial fishing.	EN-3 – 2.6.130
Where the precise extents of potential safety zones are unknown, a realistic worst case scenario should be assessed. Applicants should consult the MCA. Exclusion of certain types of fishing may make an area more productive for other types of fishing. The assessment by the applicant should include surveys of the effects on fish stocks of commercial interest and the potential reduction or increase in such stocks that will result from the presence of the windfarm development and of any safety zones.	EN-3 – 2.6.131

Table A1-8 Shipping and Navigation

NPS Requirement	NPS reference
Applicants should establish stakeholder engagement with interested parties in the navigation sector early in the development phase of the proposed offshore wind farm and this should continue throughout the life of the development including during the construction, operation and decommissioning phases. Such engagement should be taken to ensure that solutions are sought that allow offshore wind farms and navigation uses of the sea to successfully co-exist.	EN-3 – 2.6.153
Assessment should be underpinned by consultation with the MMO, Maritime and Coastguard Agency (MCA), the relevant General Lighthouse Authority, the relevant industry bodies (both national and local) and any representatives of recreational users of the sea, such as the Royal Yachting Association (RYA), who may be affected.	EN-3 – 2.6.154
Information on internationally recognised sea lanes is publicly available and this should be considered by applicants prior to undertaking assessments. The assessment should include reference to any relevant, publicly available data available on the Maritime Database.	EN-3 – 2.6.155
Applicants should undertake a Navigational Risk Assessment (NRA) in accordance with relevant Government guidance prepared in consultation with the MCA and the other navigation stakeholders listed above.	EN-3 – 2.6.156
Where there is a possibility that safety zones will be sought around offshore infrastructure, potential effects should be included in the assessment on navigation and shipping.	EN-3 – 2.6.158
Where the precise extents of potential safety zones are unknown, a realistic worst-case scenario should be assessed. Applicants should consult the MCA and refer to the Government guidance on safety zones.	EN-3 – 2.6.159
The potential effect on recreational craft, such as yachts, should be considered in any assessment.	EN-3 – 2.6.160

Table A1-9 Offshore Archaeology and Cultural Heritage (historic environment)

NPS Requirement	NPS reference
As part of the ES the applicant should provide a description of the significance of the heritage assets affected by the proposed development and the contribution of their setting to that significance. The level of detail should be proportionate to the importance of the heritage assets and no more than is sufficient to understand the potential impact of the proposal on the significance of the heritage asset.	EN-1 – 5.8.8
Where a development site includes, or the available evidence suggests it has the potential to include, heritage assets with an archaeological interest, the applicant should carry out appropriate desk-based assessment and, where such desk-based research is insufficient to properly assess the interest, a field evaluation.	EN-1 – 5.8.9
Where proposed development will affect the setting of a heritage asset, representative visualisations may be necessary to explain the impact.	EN-1 – 5.8.9
The applicant should ensure that the extent of the impact of the proposed development on the significance of any heritage assets affected can be adequately understood from the application and supporting documents.	EN-1 – 5.8.10
Consultation with the relevant statutory consultees (including English Heritage) should be undertaken by the applicants at an early stage of the development.	EN-3 – 2.6.140
Assessment should be undertaken as set out in Section 5.8 of EN-1. Desk based studies should take into account any geotechnical or geophysical surveys that have been undertaken to aid the wind farm design,	EN-3 – 2.6.141
Assessment should also include the identification of any beneficial effects on the historic marine environment, for example through improved access or the contribution to new knowledge that arises from investigation.	EN-3 – 2.6.142
Where elements of an application (whether offshore or onshore) interact with features of historic maritime significance that are located onshore, the effects should be assessed in accordance with the policy at Section 5.8 in EN-1.	EN-3 – 2.6.143

Table A1-10 Aviation and MoD

NPS Requirement	NPS reference
Where the proposed development may have an effect on civil or military aviation and/or other defence assets an assessment of potential effects should be set out in the ES.	EN-1 – 5.4.10

NPS Requirement	NPS reference
The applicant should consult the MoD, CAA, NATS and any aerodrome – licenses or otherwise- likely to be affected by the proposed development in preparing an assessment of the proposal on aviation or other defence interests.	EN-1 – 5.4.11
Any assessment of aviation or other defence interests should include potential impacts on the project upon the operation of CNS infrastructure, flight patterns (both civil and military), other defence assets and aerodrome operational procedures. It should also assess the cumulative effects of the project with other relevant projects in relation to aviation and defence.	EN-1 – 5.4.12
If any relevant changes are made to proposals during the pre-application and determination period, it is the responsibility of the applicant to ensure that the relevant aviation and defence consultees are informed as soon as reasonably possible.	EN-1 – 5.4.13
The effects on civil and military aerodromes, aviation technical sites and other defence assets have been addressed by the applicant and that any necessary assessment of the proposal on aviation or defence interests has been carried out. In particular, it should be satisfied that the proposal has been designed to minimise adverse impacts on the operation and safety of aerodromes and that reasonable mitigation is carried out.	EN-1 – 5.4.14
If there are conflicts between the Government's energy and transport policies and military interests in relation to the application, the decision maker should expect the relevant parties to have made appropriate efforts to work together to identify realistic and pragmatic solutions to the conflicts. In so doing, the parties should seek to protect the aims and interests of the other parties as far as possible.	EN-1 – 5.4.15
There are statutory requirements concerning lighting to tall structures where lighting is requested on structures that go beyond statutory requirements by any of the relevant aviation and defence consultees, the decision maker should satisfy itself of the necessity of such lighting taking into account the case put forward by the consultees. The effect of such lighting on the landscape and ecology may be a relevant consideration.	EN-1 – 5.4.16
Where after reasonable mitigation, operational changes, obligations and requirements have been proposed, the decision maker considers that: • A development would prevent a licensed aerodrome from maintaining its licence; • The benefits of the proposed development are outweighed by the harm to aerodromes serving business, training or emergency service needs, taking into account the relevant importance and needs for such aviation infrastructure;	EN-1 – 5.4.17

NPS Requirement	NPS reference
• The development would significantly impede or compromise the safe and effective use of defence assets or significantly limit military training; or • The development would have an impact on the safe and efficient provision of en route air traffic control services for civil aviation, in particular through an adverse effect on the infrastructure required to support communications, navigation or surveillance systems; consent should not be granted.	
Where a potential offshore wind farm is proposed close to existing operational offshore infrastructure, or has the potential to affect activities for which a licence has been issued by Government, the applicant should undertake an assessment of the potential effect of the proposed development on such existing or permitted infrastructure or activities. The assessment should be undertaken for all stages of the lifespan of the proposed wind farm in accordance with the appropriate policy for offshore wind farm EIAs.	EN-3 – 2.6.179
Applicants should engage with interested parties in the potentially affected offshore sectors early in the development phase of the proposed offshore wind farm, with an aim to resolve as many issues as possible prior to the submission of an application to the IPC.	EN-3 – 2.6.180
Such stakeholder engagement should continue throughout the life of the development including construction, operation and decommissioning phases where necessary. As many of these offshore industries are regulated by Government, the relevant Secretary of State should also be a consultee where necessary. Such engagement should be taken to ensure that solutions are sought that allow offshore wind farms and other uses of the sea to successfully co-exist.	EN-3 – 2.6.181

Table A1-11 Offshore Designated Sites

NPS Requirement	NPS reference
Where the development is subject to EIA the applicant should ensure that the ES clearly sets out any effects on internationally, nationally and locally designated sites of ecological or geological conservation importance, on protected species and on habitats and other species identified as being of principal importance for the conservation of biodiversity. The applicant should provide environmental information proportionate to the infrastructure where EIA is not required to help the IPC consider thoroughly the potential effects of a proposed project.	EN-1 – 5.3.3
The ES (see **Section 4.2**) should include an assessment of the effects on the coast. In particular, applicants should assess: • the effects of the proposed project on marine ecology, biodiversity and protected sites;	EN-1 – 5.5.7

NPS Requirement	NPS reference
The applicant should be particularly careful to identify any effects of physical changes on the integrity and special features of Marine Conservation Zones, candidate marine Special Areas of Conservation (SACs), coastal SACs and candidate coastal SACs, coastal Special Protection Areas (SPAs) and potential coastal SPAs, Ramsar sites, Sites of Community Importance (SCIs) and potential SCIs and Sites of Special Scientific Interest.	EN-1 – 5.5.9
Factors that will determine the likely noise impact include: • the proximity of the proposed development to designated sites where noise may have an adverse impact on protected species or other wildlife	EN-1 – 5.11.3
Infrastructure development can have adverse effects on the water environment, including transitional waters and coastal waters. During the construction, operation and decommissioning phases, discharges would occur. There may also be an increased risk of spills and leaks of pollutants to the water environment. These effects could lead to adverse impacts on health or on protected species and habitats and could, in particular, result in surface waters, ground waters of protected areas failing to meet environmental objectives established under the Water Framework Directive [WFD].	EN-1 - 5.15.1
In sites with nationally recognised designations (Sites of Special Scientific Interest, National Nature Reserves, National Parks, the Broads, Areas of Outstanding Natural Beauty and Registered Parks and Gardens), consent for renewable energy projects should only be granted where it can be demonstrated that the objectives of designation of the area will not be compromised by the development, and any significant adverse effects on the qualities for which the area has been designated are clearly outweighed by the environmental, social and economic benefits.	EN-3 – 2.5.33

Table A1-12 Offshore Air Quality

NPS Requirement	NPS reference
Where the project is likely to have adverse effects on air quality the applicant should undertake an assessment of the impacts of the proposed project as part of the Environmental Statement (ES).	EN-1 5.2.6
The ES should describe: • any significant air emissions, their mitigation and any residual effects distinguishing between the project stages and taking account of any significant emissions from any road traffic generated by the project; • the predicted absolute emission levels of the proposed project, after mitigation methods have been applied; • existing air quality levels and the relative change in air quality from existing levels; and • any potential eutrophication impacts	EN-1 5.2.7

Table A1-13 Other Marine Users

NPS Requirement	NPS reference
Where a potential offshore wind farm is proposed close to existing operational offshore infrastructure, or has the potential to affect activities for which a licence has been issued by Government, the applicant should undertake an assessment of the potential effect of the proposed development on such existing or permitted infrastructure or activities for all stages of the lifespan of the proposed wind farm.	EN-3 – 2.6.179
Applicants should engage with interested parties in the potentially affected offshore sectors early in the development phase of the proposed offshore wind farm, with an aim to resolve as many issues as possible prior to the submission of an application.	EN-3 – 2.6.180
Such stakeholder engagement should continue throughout the life of the development including construction, operation and decommissioning phases where necessary. As many of these offshore industries are regulated by Government, the relevant Secretary of State should also be a consultee where necessary. Such engagement should be taken to ensure that solutions are sought that allow offshore wind farms and other uses of the sea to successfully co-exist.	EN-3 – 2.6.181

Table A1-14 Ground Conditions and Contamination

NPS Requirement	NPS reference
'Clearly set out any effects on internationally, nationally and locally designated sites of ecological or geological conservation importance, on protected species and on habitats and other species identified as being of principal importance for the conservation of biodiversity.'	EN-1 – 5.3.3
'The applicant should show how the project has taken advantage of opportunities to conserve and enhance biodiversity and geological conservation interests'.	EN-1 – 5.3.4
'The development should aim to avoid significant harm to biodiversity and geological conservation interests, including through mitigation and consideration of reasonable alternatives; where significant harm cannot be avoided, then appropriate compensation measures should be sought'.	EN-1- 5.3.7
'For developments on previously developed land, Applicants should ensure that they have considered the risk posed by land contamination.'	EN-1 Section 5.10.8.
'Applicants should safeguard any mineral resources on the proposed site as far as possible, taking into account the long-term potential of the land use after any future decommissioning has taken place'.	EN-1- 5.10.9
'The applicant should include an assessment of the impact of the waste arising from development on the capacity of waste management	EN-1- 5.14.6

NPS Requirement	NPS reference
facilities to deal with other waste arising in the area for at least five years of operation.	

Table A1-15 Water Resources and Flood Risk (freshwater quality and resource)

NPS Requirement	NPS reference
'Applications for energy projects of 1 hectare or greater in Flood Zone 1 in England or Zone A in Wales and all proposals for energy projects located in Flood Zones 2 and 3 in England or Zones B and C in Wales should be accompanied by a flood risk assessment (FRA).'	EN-1 – 5.7
'Where the project is likely to have effects on the water environment, the applicant should undertake an assessment of the existing status of, and impacts of the proposed project on, water quality, water resources and physical characteristics of the water environment as part of the ES or equivalent. The ES should in particular describe: • The existing quality of waters affected by the proposed project and the impacts of the proposed project on water quality, noting any relevant existing discharges, proposed new discharges and proposed changes to discharges; • Existing water resources affected by the proposed project and the impacts of the proposed project on water resources; • Existing physical characteristics of the water environment (including quantity and dynamics of flow) affected by the proposed project and any impact of physical modifications to these characteristics; and • Any impacts of the proposed project on water bodies or protected areas under the Water Framework Directive and source protection zones (SPZs) around potable groundwater abstractions.'	EN-1 – 5.15

Table A1-16 Land Use and Agriculture

NPS Requirement	NPS reference
The ES should identify existing and proposed land uses near the project, any effects of replacing an existing development or use of the site with the proposed project or preventing a development or use on a neighbouring site from continuing. Applicants should also assess any effects of precluding a new development or use proposed in the development plan.	EN-1 Section 5.10.5.
Applicants should seek to minimise impacts on the best and most versatile agricultural land (defined as land in grades 1, 2 and 3 of the Agricultural Land Classification) and preferably use land in areas of poorer quality (grades 4 and 5) except where this would be inconsistent with other sustainability considerations. Applicants should also identify	EN-1 Section 5.10.8.

NPS Requirement	NPS reference
any effects and seek to minimise impacts on soil quality taking into account any mitigation measures proposed.	
Applicants should determine whether their proposal, or any part of it, is within an established Green Belt and if it is, whether their proposal may be inappropriate development within the meaning of Green Belt policy.	EN-1 Section 5.10.10.

Table A1-17 Onshore Ecology and Ornithology

NPS Requirement	NPS reference
The applicant should ensure that the ES clearly sets out any effects on internationally, nationally and locally designated sites of ecological or geological conservation importance, on protected species and on habitats and other species identified as being of principal importance for the conservation of biodiversity.	EN-1 – 5.3.3
The applicant should show how the project has taken advantage of opportunities to conserve and enhance biodiversity and geological conservation interests.	EN-1 – 5.3.4
'Many SSSIs are also designated as sites of international importance and will be protected accordingly. Those that are not, or those features of SSSIs not covered by an international designation, should be given a high degree of protection.'	EN-1 – 5.3.10
The applicant should include appropriate mitigation measures as an integral part of the proposed development and demonstrate that: • During construction, they will seek to ensure that activities will be confined to the minimum areas required for the works; • During construction and operation best practice will be followed to ensure that risk of disturbance or damage to species or habitats is minimised, including as a consequence of transport access arrangements; • Habitats will, where practicable, be restored after construction works have finished; and • Opportunities will be taken to enhance existing habitats and, where practicable, to create new habitats of value within the site landscaping proposals.	EN-1 – 5.3.18

Table A1-18 Onshore Archaeology and Cultural Heritage (historic environment)

NPS Requirement	NPS reference
As part of the ES the applicant should provide a description of the significance of the heritage assets affected by the proposed development and the contribution of their setting to that significance.	EN-1 – 5.8.8
Where a development site includes, or the available evidence suggests it has the potential to include, heritage assets with an archaeological	EN-1 – 5.8.9

NPS Requirement	NPS reference
interest, the applicant should carry out appropriate desk-based assessment and, where such desk-based research is insufficient to properly assess the interest, a field evaluation.	
Where proposed development will affect the setting of a heritage asset, representative visualisations may be necessary to explain the impact.	EN-1 – 5.8.9
The applicant should ensure that the extent of the impact of the proposed development on the significance of any heritage assets affected can be adequately understood from the application and supporting documents.	EN-1 – 5.8.10
There should be a presumption in favour of the conservation of designated heritage assets and the more significant the designated heritage asset, the greater the presumption in favour of its conservation should be. Substantial harm to or loss of a grade II listed building, park or garden should be exceptional. Substantial harm to or loss of designated assets of the highest significance, including Scheduled Monuments; registered battlefields; grade I and II* listed buildings; grade I and II* registered parks and gardens; and World Heritage Sites, should be wholly exceptional.	EN-1 – 5.8.14

Table A1-19 Air Quality

NPS Requirement	NPS reference
Where the project is likely to have adverse effects on air quality the applicant should undertake an assessment of the impacts of the proposed project as part of the Environmental Statement (ES).	EN-1 5.2.6
The ES should describe: • any significant air emissions, their mitigation and any residual effects distinguishing between the project stages and taking account of any significant emissions from any road traffic generated by the project; • the predicted absolute emission levels of the proposed project, after mitigation methods have been applied; • existing air quality levels and the relative change in air quality from existing levels; and any potential eutrophication impacts	EN-1 5.2.7

Table A1-20 Noise and Vibration

NPS Requirement	NPS reference
Where noise impacts are likely to arise, the applicant should include: • A description of the noise generating aspects of the development proposal leading to noise impacts including the identification of any distinctive tonal, impulsive or low frequency characteristics of the noise; • Identification of noise sensitive premises and noise sensitive areas that may be affected; • The characteristics of the existing noise environment;	EN-1 – 5.11.4

NPS Requirement	NPS reference
• A prediction of how the noise environment will change with the proposed development; • In the shorter term such as during the construction period; • In the longer term during the operating life of the infrastructure; • At particular times of the day, evening and night as appropriate; • An assessment of the effect of predicted changes in the noise environment on any noise sensitive premises and noise sensitive areas; and • Measures to be employed in mitigating noise. • The nature and extent of the noise assessment should be proportionate to the likely noise impact.	
The noise impact of ancillary activities associated with the development, such as increased road and rail traffic movements, or other forms of transportation, should also be considered.	EN-1 – 5.11.5
Operational noise, with respect to human receptors, should be assessed using the principles of the relevant British Standards and other guidance.	EN-1 – 5.11.6

Table A1-21 Traffic and Transport

NPS Requirement	NPS reference
If a project is likely to have significant transport implications, the applicant's ES should include a transport assessment, using the NATA/WebTAG methodology stipulated in Department for Transport guidance, or any successor to such methodology. Applicants should consult the Highways Agency and Highways Authorities as appropriate on the assessment and mitigation.	EN-1 5.13.3
Where appropriate, the applicant should prepare a travel plan including demand management measures to mitigate transport impacts. The applicant should also provide details of proposed measures to improve access by public transport, walking and cycling, to reduce the need for parking associated with the proposal and to mitigate transport impacts.	EN-1 5.13.4
The applicant should have assessed the various potential routes to the site for delivery of materials and components where the source of the materials is known at the time of the application and selected the route that is the most appropriate. It is possible that the exact location of the source of construction materials, such as crushed stone or concrete will not be known at the time of the application to the IPC. In these circumstances, the impact of additional vehicles on the likely potential routes should have been assessed.	EN-3 2.7.75
The applicant should assess whether the access roads are suitable for the transportation of components which will include whether they are sufficiently wide, or bridges sufficiently strong for the heavier components to be transported to the site. Any sections of the route which will require modification to allow for the transportation of components to site should be identified and potential effects assessed as part of the ES.	EN-3 2.7.76

NPS Requirement	NPS reference
There may be a number of wind farms proposed that use a common port and/or access route and pass through the same towns. Where a cumulative impact is likely then a cumulative transport assessment should form part of the EIA to consider the impacts of abnormal traffic movements relating to the project in question in-combination with those from any other relevant development. Consultation with the relevant local highways authorities is likely to be necessary	EN-3 2.7.77

Table A1-22 Seascape, Landscape and Visual

NPS Requirement	NPS reference
The landscape and visual assessment should include reference to any landscape character assessment and associated studies as a means of assessing landscape impacts relevant to the proposed project.	EN-1 – 5.9.5
The applicant's assessment should include the effects during construction of the project and the effects of the completed development and its operation on landscape components and landscape character.	EN-1 – 5.9.6
The assessment should include the visibility and conspicuousness of the project during construction and of the presence and operation of the project and potential impacts on views and visual amenity. This should include light pollution effects, including on local amenity, and nature conservation.	EN-1 – 5.9.7
Where a proposed offshore wind farm will be visible from the shore, an SVIA should be undertaken which is proportionate to the scale of the potential impacts.	EN-3 – 2.6.202
Where necessary, assessment of the seascape should include an assessment of three principal considerations on the likely effect of offshore wind farms on the coast: • limit of visual perception from the coast; • individual characteristics of the coast which affect its capacity to absorb a development; and • how people perceive and interact with the seascape.	EN-3 – 2.6.203
As part of the SVIA, photomontages are likely to be required. Viewpoints to be used for the SVIA should be selected in consultation with the statutory consultees at the EIA Scoping stage.	EN-3 – 2.6.204
Magnitude of change to both the identified seascape receptors (such as seascape units and designated landscapes) and visual receptors (such as viewpoints) should be assessed in accordance with the standard methodology for SVIA.	EN-3 – 2.6.205
Where appropriate, cumulative SVIA should be undertaken in accordance with the policy on cumulative assessment outlined in Section 4.2 of EN-1.	EN-3 – 2.6.206

Table A1-23 Socio-Economics

NPS Requirement	NPS reference
The assessment should consider all relevant socio-economic impacts, which may include: • The creation of jobs and training opportunities; • The provision of additional local services and improvements to local infrastructure, including the provision of educational and visitor facilities; • Effects on tourism; • The impact of a changing influx of workers during the different construction, operation and decommissioning phases of the energy infrastructure; and • Cumulative impacts.	EN-1 – 5.12.3

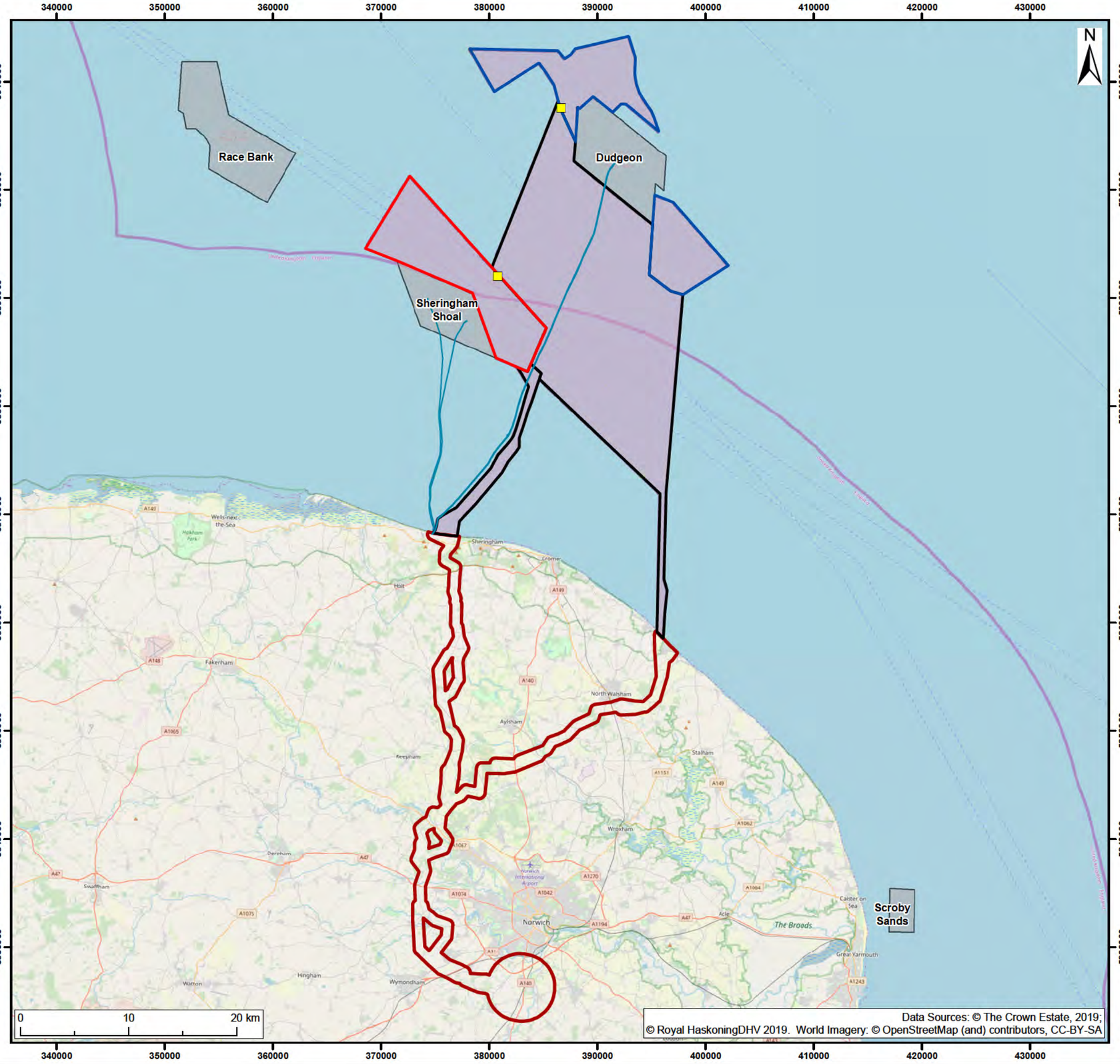
Table A1-24 Health

NPS Requirement	NPS reference
Where the proposed project has an effect on human beings, the ES should assess these effects for each element of the project, identifying any adverse health impacts, and identifying measures to avoid, reduce or compensate for these impacts as appropriate. EN-1 indicates that direct impacts on health may include: • Increased traffic; • Air or water pollution; • Dust; • Odour; • Hazardous waste and substances; • Noise; • Exposure to radiation; and • Increase in pests.	EN-1 – 4.13.2

Table A1-25 Tourism and Recreation

NPS Requirement	NPS reference
This assessment should consider all relevant socio-economic impacts, which may include: • The provision of additional local services and improvements to local infrastructure, including the provision of educational and visitor facilities; • Effects on tourism; and • Cumulative impacts	EN-1 – 5.12.3

APPENDIX 2 FIGURES





Legend:

- Dudgeon Extension Project AfL Area
- Sheringham Extension Project AfL Area
- Indicative Offshore Substation Location
- Offshore Cable Corridor
- Offshore Scoping Area
- Onshore Scoping Area
- Existing Offshore Wind Farms
- Existing Offshore Wind Farm Export Cable
- UK 12nm limit

SUI	REV	DATE	DESCRIPTION	DRW	CHK	APR
A1	C01	02/10/2019	Approved & accepted stage complete	LB	MW	AP

Title:

Scoping Study Areas

Figure: 1.1.1 | Drawing No: PB8164-RHD-ZZ-XX-DR-Z-0003

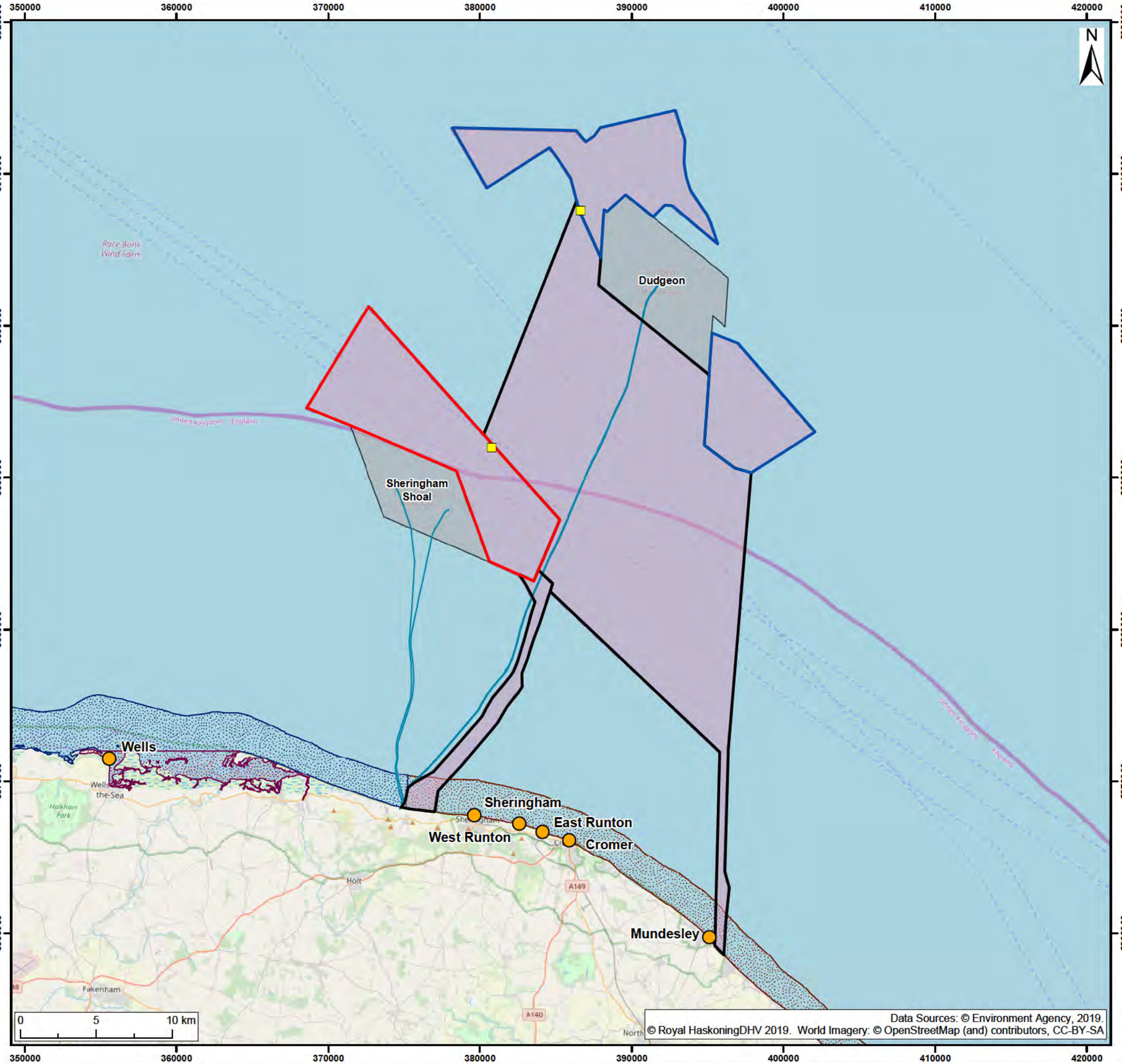
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Report: Scoping Report

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Legend:

- Dudgeon Extension Project AfL Area
- Sheringham Extension Project AfL Area
- Offshore Cable Corridor
- Offshore Scoping Area
- Indicative Offshore Substation Location
- Existing Offshore Wind Farm
- Existing Offshore Wind Farm Export Cable
- Bathing Water Monitoring Location

WFD Transitional and Coastal Water Bodies

- Norfolk East
- Norfolk North
- Stiffkey & Glaven

A1	C01	01/10/2019	Approved & accepted stage complete	LB	RS	AP
SUI	REV	DATE	DESCRIPTION	DRW	CHK	APR

Title:

WFD water bodies and Protected Areas (Bathing Waters)

Figure: 2.2.1 | Drawing No: PB8164-RHD-ZZ-OF-DR-Z-0010

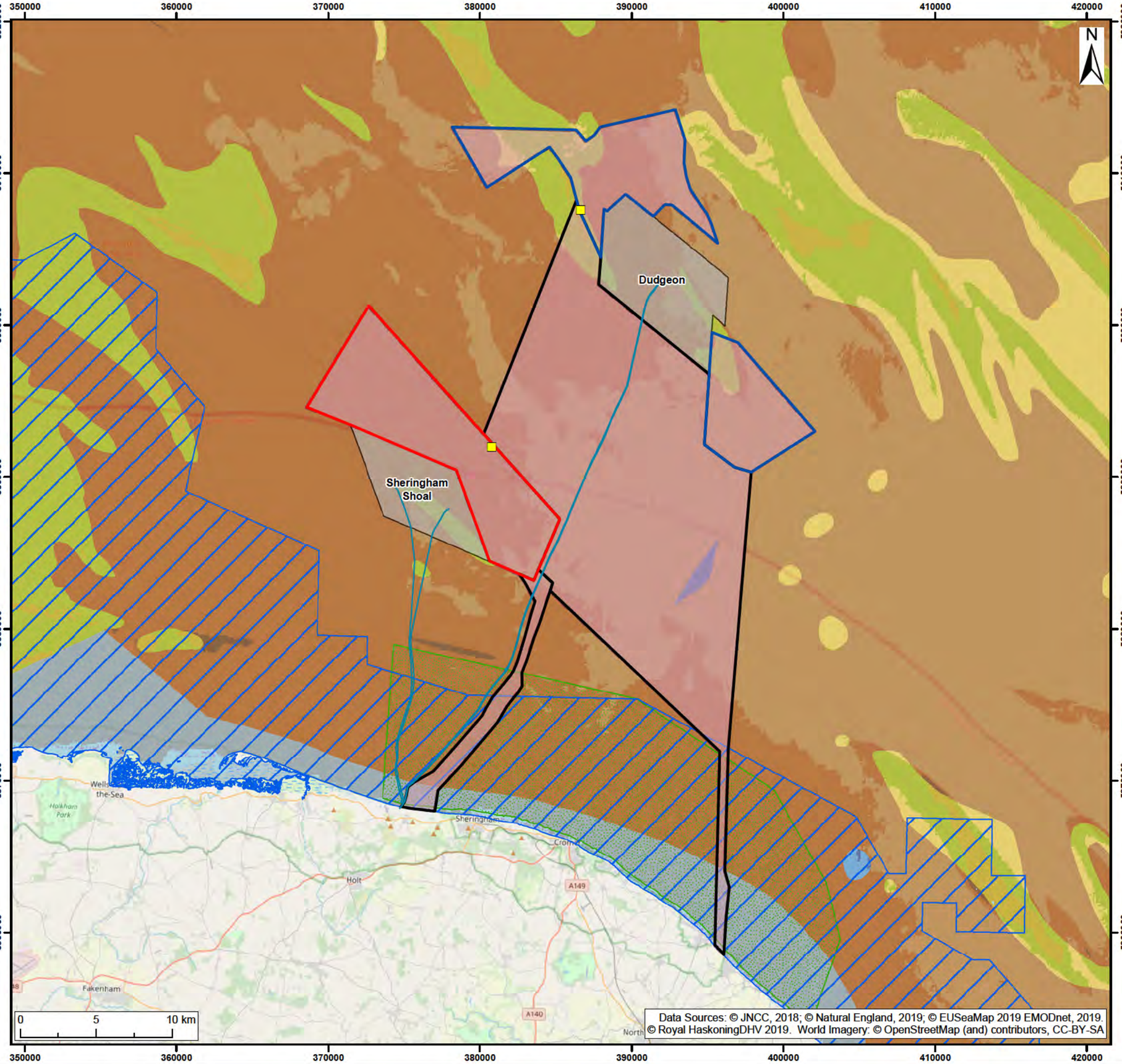
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Legend:

- Dudgeon Extension Project AfL Area
- Sheringham Extension Project AfL Area
- Offshore Cable Corridor
- Offshore Scoping Area
- Indicative Offshore Substation Location
- Existing Offshore Wind Farm
- Existing Offshore Wind Farm Export Cable
- Cromer Shoal Chalk Beds Marine Conservation Zones (MCZ)
- Greater Wash Special Protection Area (SPA)

EUNIS Habitat

- A5.13: Infralittoral coarse sediment
- A5.14: Circalittoral coarse sediment
- A5.15: Deep circalittoral coarse sediment
- A5.23 or A5.24: Infralittoral fine sand or Infralittoral muddy sand
- A5.25 or A5.26: Circalittoral fine sand or Circalittoral muddy sand
- A5.27: Deep circalittoral sand
- A5.44: Circalittoral mixed sediments
- A5.45: Deep circalittoral mixed sediments
- No EUNIS habitat assigned

SUI	REV	DATE	DESCRIPTION	DRW	CHK	APR
A1	C01	01/10/2019	Approved & accepted stage complete	LB	RS	AP

Title:

Marine Designated Sites and Habitats

Figure: 2.3.1

Drawing No: PB8164-RHD-ZZ-OF-DR-Z-0005

Co-ordinate system: WGS 1984 UTM Zone 31N

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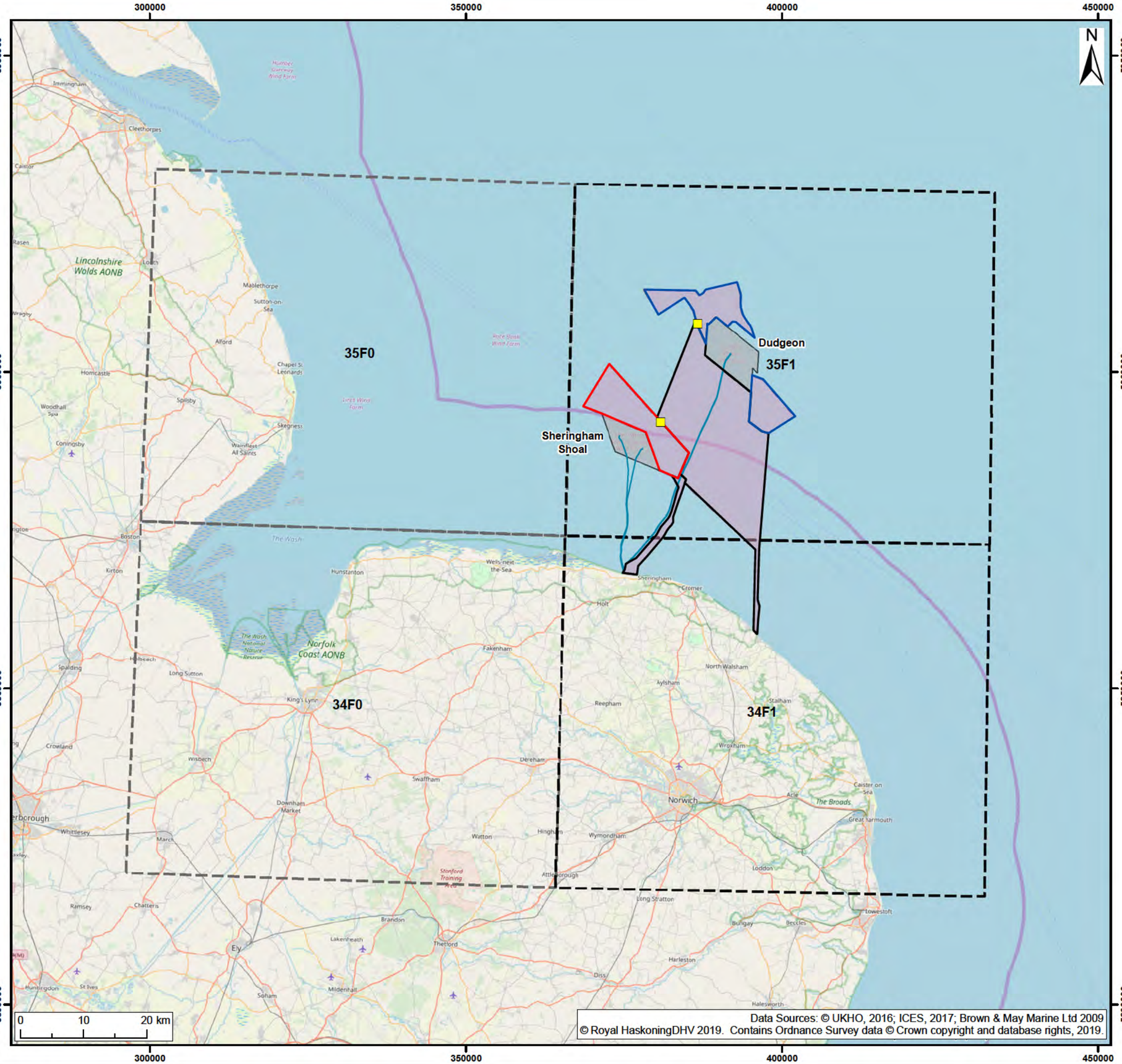
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Legend:

- Dudgeon Extension Project AfL Area
- Sheringham Extension Project AfL Area
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- Offshore Scoping Area
- Indicative Offshore Substation Location
- Existing Offshore Wind Farm
- Existing Offshore Wind Farm Export Cable
- Regional Study Area
- Local Study Area

A1	C01	01/10/2019	Approved & accepted stage complete	LB	RS	AP
SUI	REV	DATE	DESCRIPTION	DRW	CHK	APR

Title:

ICES Rectangles Boundaries

Figure: 2.4.1 | Drawing No: PB8164-RHD-ZZ-OF-DR-Z-0014

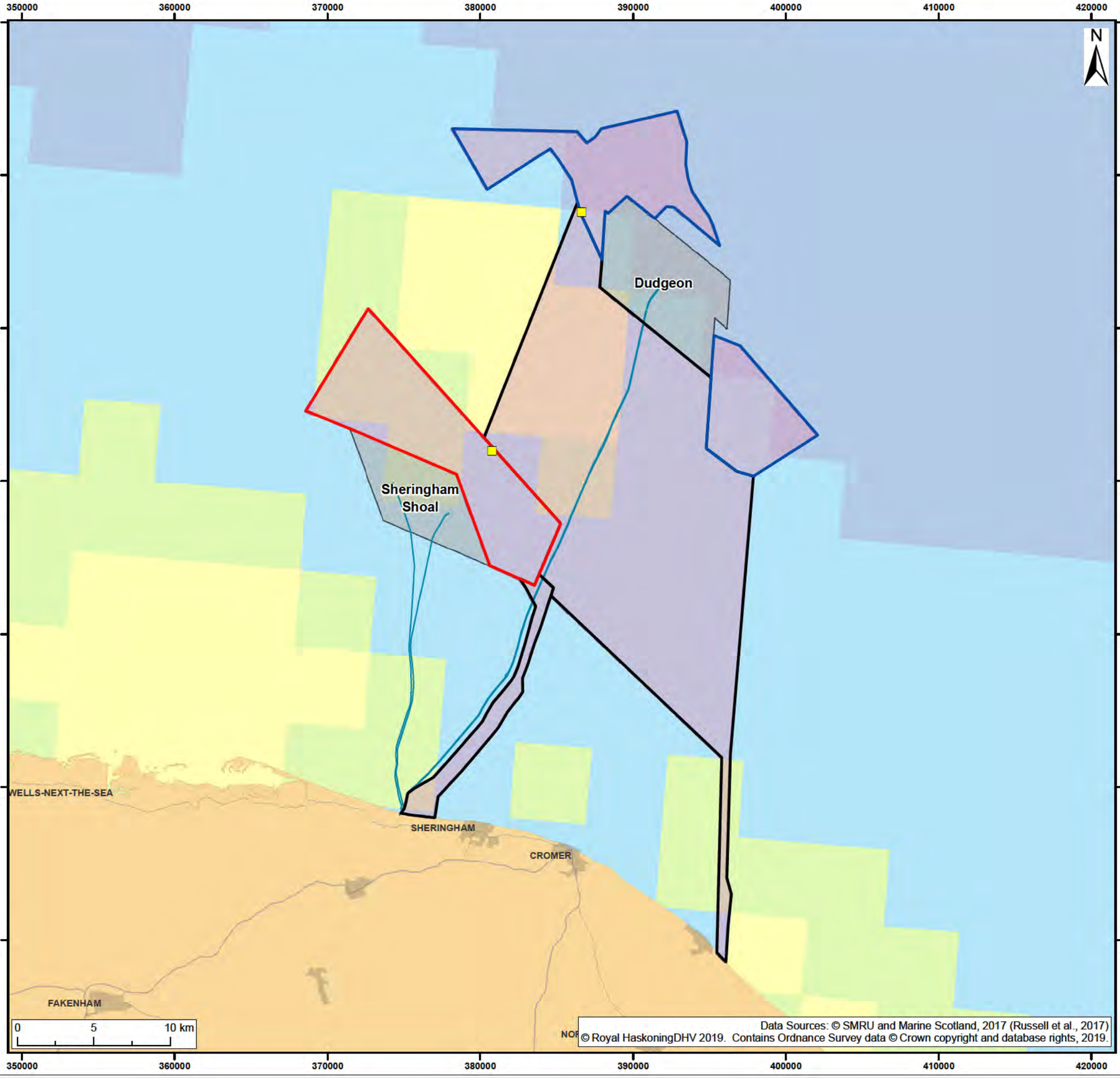
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Legend:

- Dudgeon Extension Project AfL Area
- Sheringham Extension Project AfL Area
- Offshore Cable Corridor
- Offshore Scoping Area
- Indicative Offshore Substation Location
- Existing Offshore Wind Farm
- Existing Offshore Wind Farm Export Cable

Grey Seal at-sea Usage

Density of seals per 25km²

- 0-1
- 1-5
- 5-10
- 10-50
- 50-100
- 100-150
- 150+

SUI	REV	DATE	DESCRIPTION	DRW	CHK	APR
A1	C01	01/10/2019	Approved & accepted stage complete	LB	RS	AP

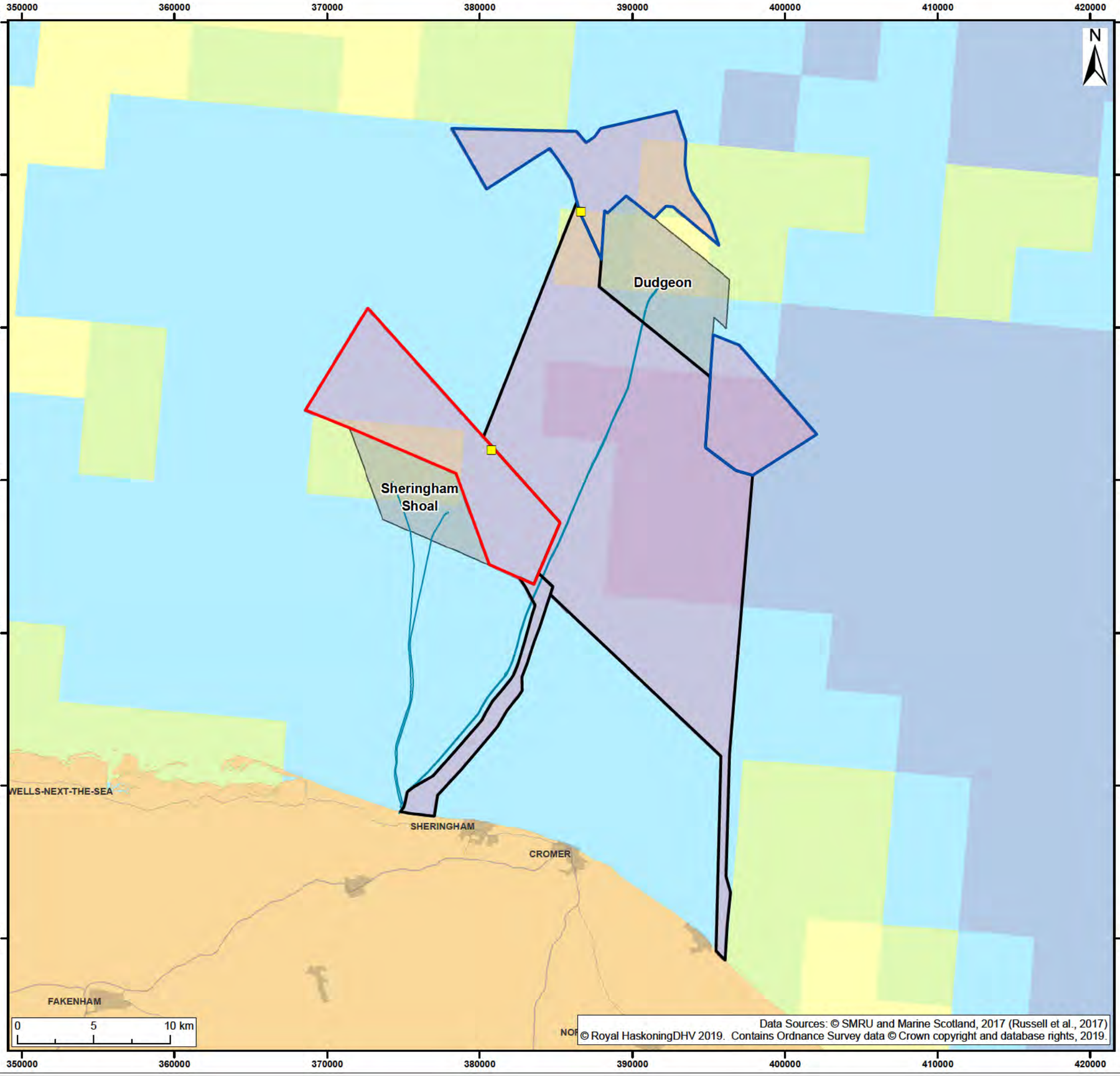
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Grey Seal Density

Figure: 2.5.1	Drawing No: PB8164-RHD-ZZ-OF-DR-Z-0008	
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Legend:

- Dudgeon Extension Project AfL Area
- Sheringham Extension Project AfL Area
- Offshore Cable Corridor
- Offshore Scoping Area
- Indicative Offshore Substation Location
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- Existing Offshore Wind Farm Export Cable

Harbour Seal at-sea Usage

Density of Seals per 25km²

- 0-1
- 1-5
- 5-10
- 10-50
- 50-100
- 100-150
- 150+

SUI	REV	DATE	DESCRIPTION	DRW	CHK	APR
A1	C01	01/10/2019	Approved & accepted stage complete	LB	RS	AP

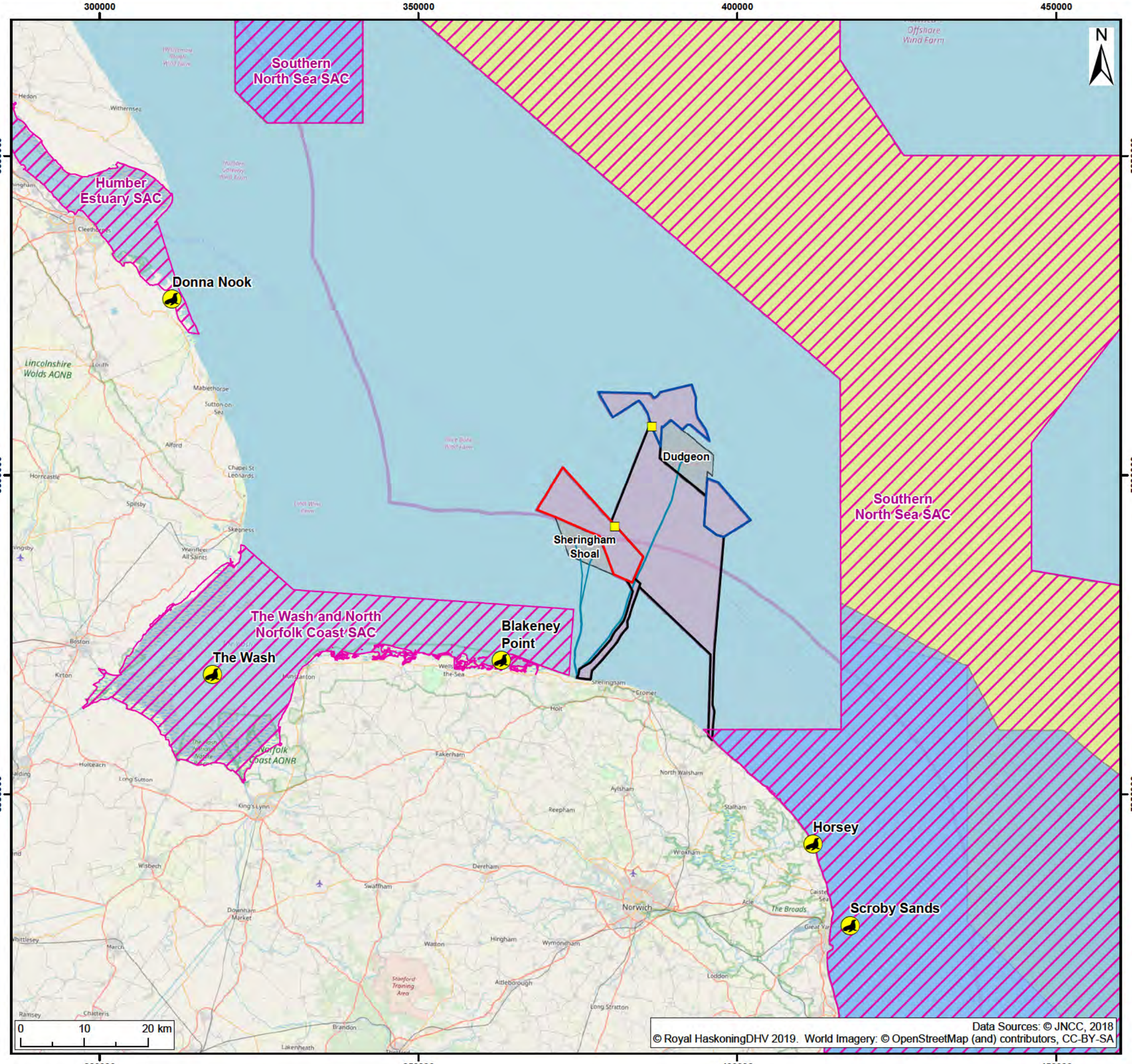
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Harbour Seal Density

Figure: 2.5.2	Drawing No: PB8164-RHD-ZZ-OF-DR-Z-0009	
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Legend:

- Dudgeon Extension Project AfL Area
- Sheringham Extension Project AfL Area
- Offshore Cable Corridor
- Offshore Scoping Area
- Indicative Offshore Substation Location
- Existing Offshore Wind Farm
- Existing Offshore Wind Farm Export Cable
- Special Area of Conservation (SAC)
- Summer Area
- Winter Area
- Seal Haul Out Area

A1	C01	01/10/2019	Approved & accepted stage complete	LB	RS	AP
SUI	REV	DATE	DESCRIPTION	DRW	CHK	APR

Title:

Marine Mammal Special Areas of Conservation (SAC) and Seal Haul Out Sites

Figure: 2.5.3 | Drawing No: PB8164-RHD-ZZ-OF-DR-Z-0007

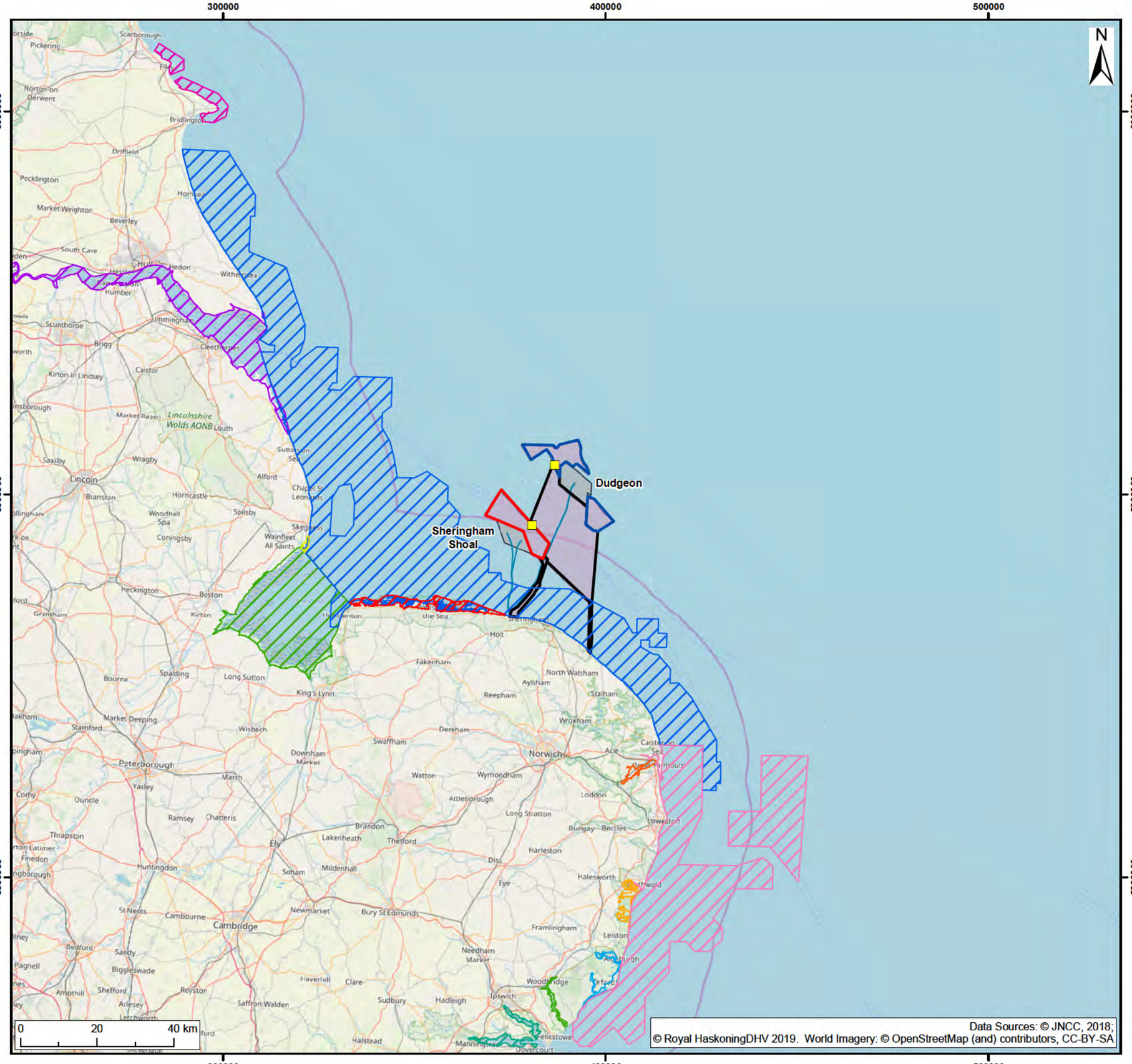
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Legend:

- Dudgeon Extension Project AfL Area
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- Existing Offshore Wind Farm Export Cable

Special Protection Areas (SPA)

- Alde-Ore Estuary
- Breydon Water
- Deben Estuary
- Flamborough and Filey Coast
- Gibraltar Point
- Greater Wash
- Humber Estuary
- Minsmere-Walberswick
- North Norfolk Coast
- Outer Thames Estuary
- Stour and Orwell Estuaries
- The Wash

A1	C01	01/10/2019	Approved & accepted stage complete	LB	RS	AP
SUI	REV	DATE	DESCRIPTION	DRW	CHK	APR

Title:

SPAs located near the Dudgeon and Sheringham Shoal Extensions

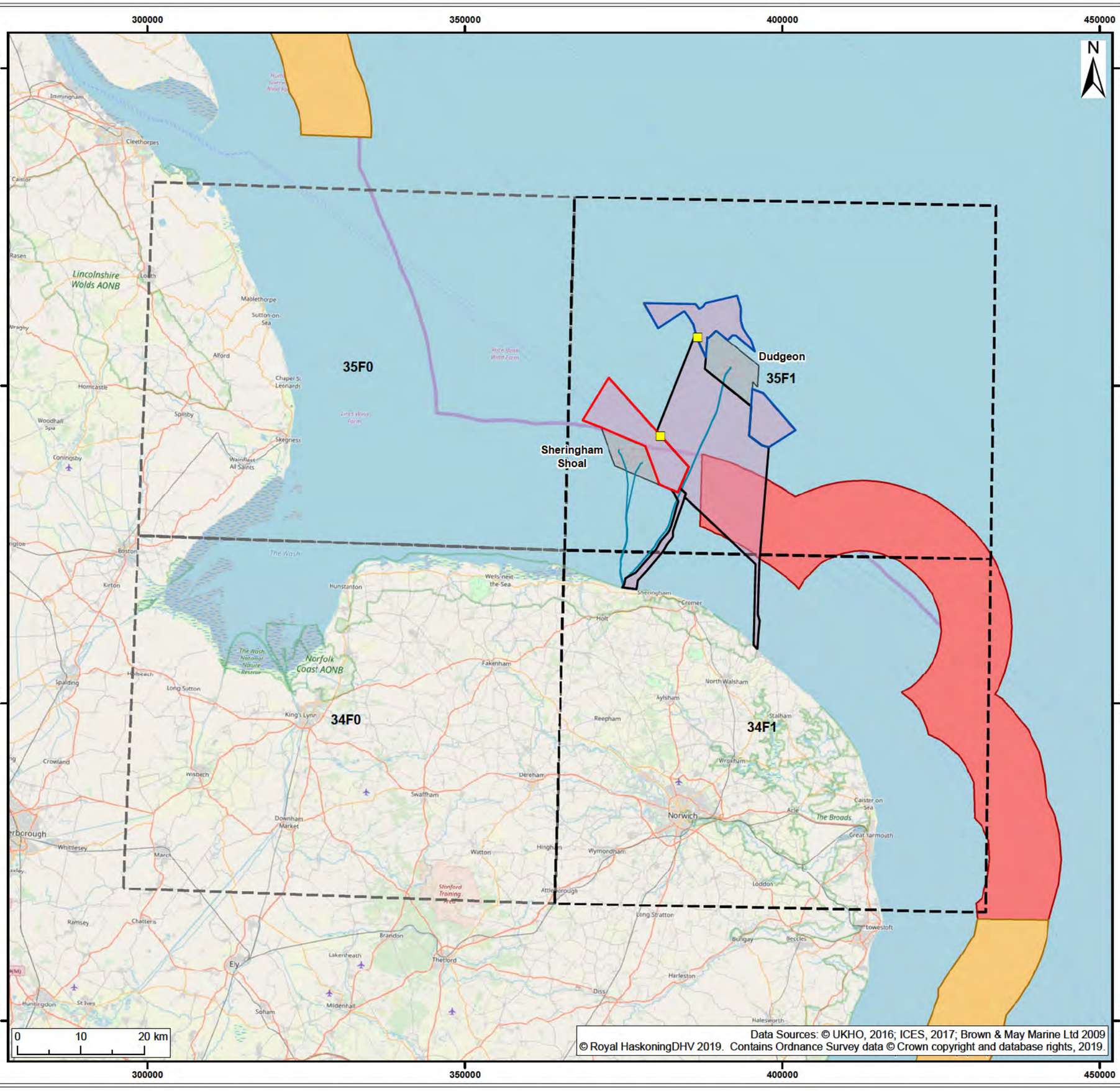
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Co-ordinate system:	Page Size:	Scale:
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Project:	Report:
Dudgeon and Sheringham Shoal Offshore Wind Farm Extensions	Scoping Report

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Legend:

- Dudgeon Extension Project AfL Area
- Sheringham Extension Project AfL Area
- Offshore Cable Corridor
- Offshore Scoping Area
- Indicative Offshore Substation Location
- Existing Offshore Wind Farm
- Existing Offshore Wind Farm Export Cable
- Regional Study Area
- Local Study Area

Historic Fishing Rights

- Belgian
- French

A1	C01	01/10/2019	Approved & accepted stage complete	LB	RS	AP
SUI	REV	DATE	DESCRIPTION	DRW	CHK	APR

Title:

Historic Fishing Rights

Figure: 2.7.1

Drawing No: PB8164-RHD-ZZ-OF-DR-Z-0013

Co-ordinate system: WGS 1984 UTM Zone 31N

Page Size: A3

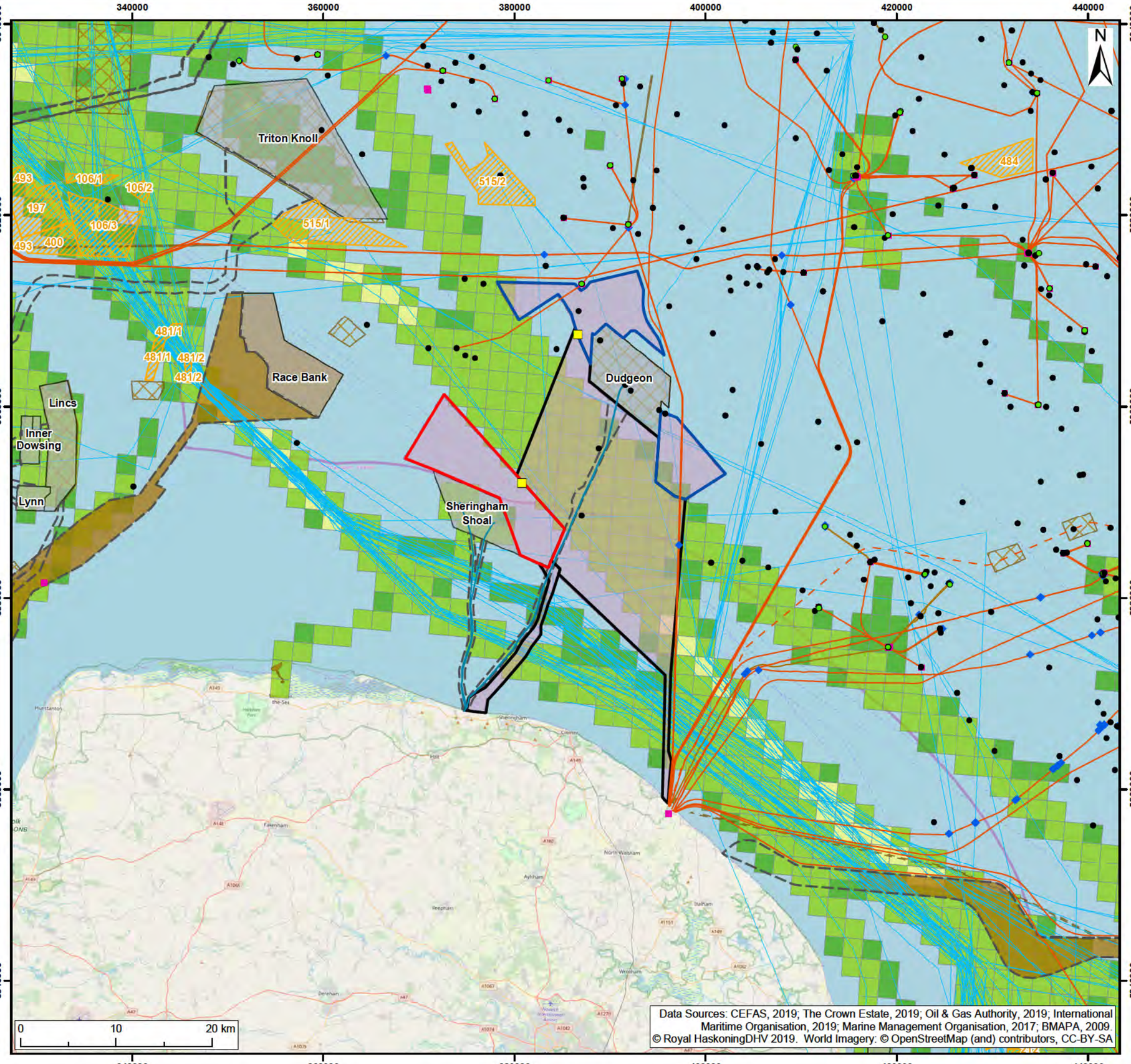
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Project: Dudgeon and Sheringham Shoal Offshore Wind Farm Extensions

Report: Scoping Report

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Legend:

- Dudgeon Extension Project AfL Area
- Sheringham Extension Project AfL Area
- Offshore Cable Corridor
- Offshore Scoping Area
- Indicative Offshore Substation Location
- Existing Offshore Wind Farm
- Existing Offshore Wind Export Cable Corridor
- Existing Offshore Wind Farm Export Cable

Disposal Sites

- Open
- Closed
- Disused

Aggregate Areas

- Aggregate Production Area
- Dredger Transit Route

Oil & Gas Infrastructure

- Surface Infrastructure (Active)
- Subsurface Infrastructure (Active)

Wells

- Abandoned/Plugged
- Completed
- Drilling

Pipelines

- Active
- Not in use
- Precommission

A1	C01	01/10/2019	Approved & accepted stage complete	LB	RS	AP
SUI	REV	DATE	DESCRIPTION	DRW	CHK	APR

Title:

Shipping and Navigation activities

Figure: 2.8.1 | Drawing No: PB8164-RHD-ZZ-OF-DR-Z-0011

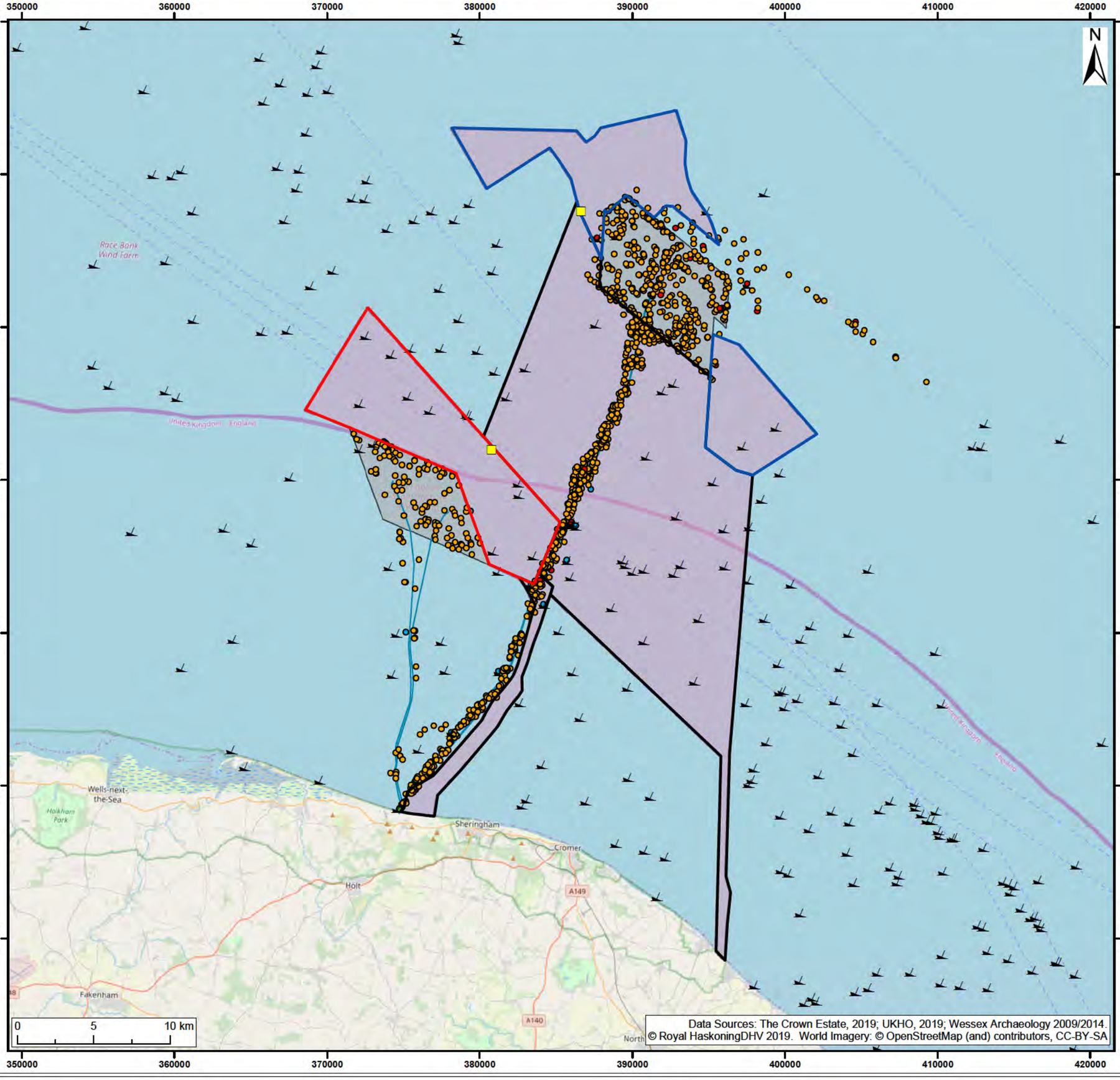
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Project: Dudgeon and Sheringham Shoal Offshore Wind Farm Extensions

Report: Scoping Report

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Legend:

- Dudgeon Extension Project AfL Area
- Sheringham Extension Project AfL Area
- Offshore Cable Corridor
- Offshore Scoping Area
- Indicative Offshore Substation Location
- Existing Offshore Wind Farm
- Existing Offshore Wind Farm Export Cable
- UKHO Wreck

Seabed Features

- A1
- A2
- A3
- O1

SUI	REV	DATE	DESCRIPTION	DRW	CHK	APR
A1	C01	01/10/2019	Approved & accepted stage complete	LB	RS	AP

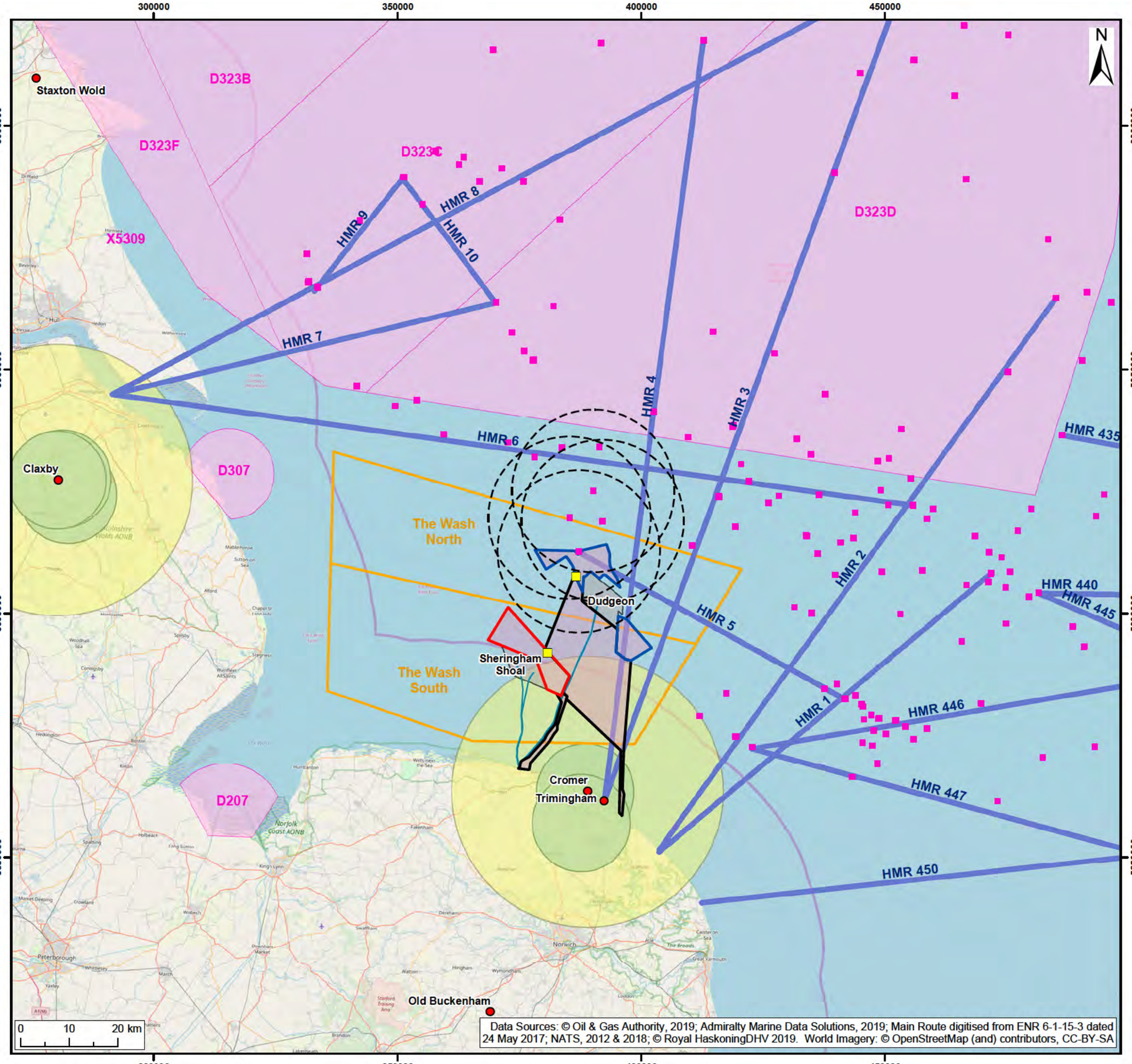
Title:

Seabed Features from Previous Archaeological Assessments

Figure: 2.9.1	Drawing No: PB8164-RHD-ZZ-OF-DR-Z-0018	
Co-ordinate system: WGS 1984 UTM Zone 31N	Page Size: A3	Scale: 1:250,000
Project: Dudgeon and Sheringham Shoal Offshore Wind Farm Extensions	Report: Scoping Report	

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Legend:

- Dudgeon Extension Project AfL Area
- Sheringham Extension Project AfL Area
- Offshore Cable Corridor
- Offshore Scoping Area
- Indicative Offshore Substation Location
- Existing Offshore Wind Farm
- Existing Offshore Wind Farm Export Cable
- UK PEXA
- Aerial Tactics Areas
- 9NM Consultation Zone
- Offshore Platforms
- Helicopter Main Routes (HMR)
- Radar Station Location
- Air-Ground-Air Communication Site - 10km Safeguarded Zone
- Secondary Surveillance Radar (SSR) - 15nm Safeguarded Zone

A1	C01	01/10/2019	Approved & accepted stage complete	LB	RS	AP
SUI	REV	DATE	DESCRIPTION	DRW	CHK	APR

Title:

Aviation and MoD Receptors

Figure: 2.10.1 | Drawing No: PB8164-RHD-ZZ-OF-DR-Z-0012

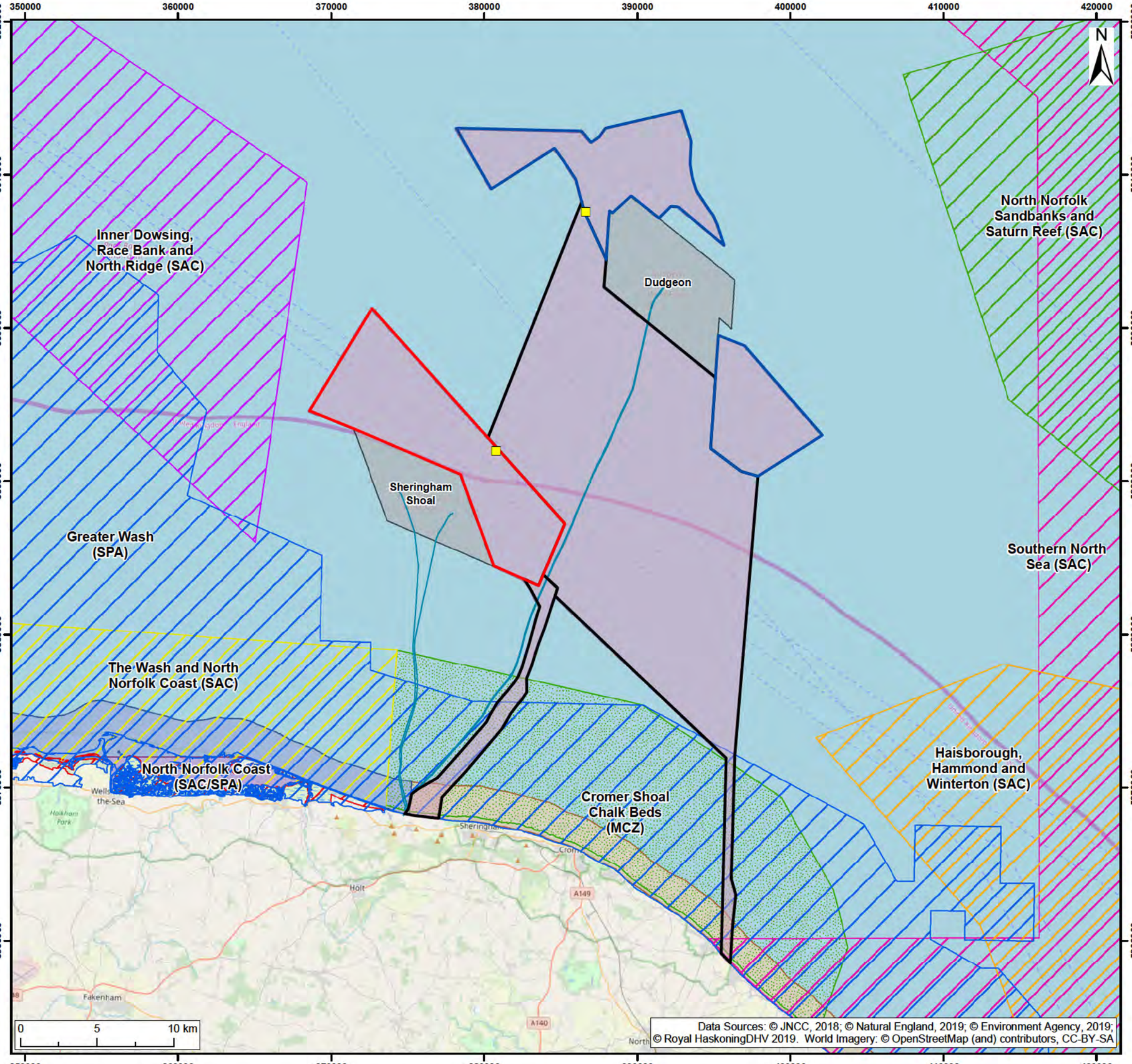
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Project: Dudgeon and Sheringham Shoal Offshore Wind Farm Extensions

Report: Scoping Report

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Legend:

- Dudgeon Extension Project AfL Area
- Sheringham Extension Project AfL Area
- Offshore Cable Corridor
- Offshore Scoping Area
- Indicative Offshore Substation Location
- Existing Offshore Wind Farm
- Existing Offshore Wind Farm Export Cable
- Marine Conservation Zone (MCZ)
- Special Protection Area (SPA)

Special Area of Conservation (SAC)

- Haisborough, Hammond and Winterton
- Inner Dowsing, Race Bank and North Ridge
- North Norfolk Coast
- North Norfolk Sandbanks and Saturn Reef
- Southern North Sea
- The Wash and North Norfolk Coast

WFD Transitional and Coastal Water Bodies

- Norfolk East
- Norfolk North
- Stiffkey & Glaven

A1	C01	01/10/2019	Approved & accepted stage complete	LB	RS	AP
SUI	REV	DATE	DESCRIPTION	DRW	CHK	APR

Title:

Offshore Designated Sites

Figure: 2.11.1 | Drawing No: PB8164-RHD-ZZ-OF-DR-Z-0016

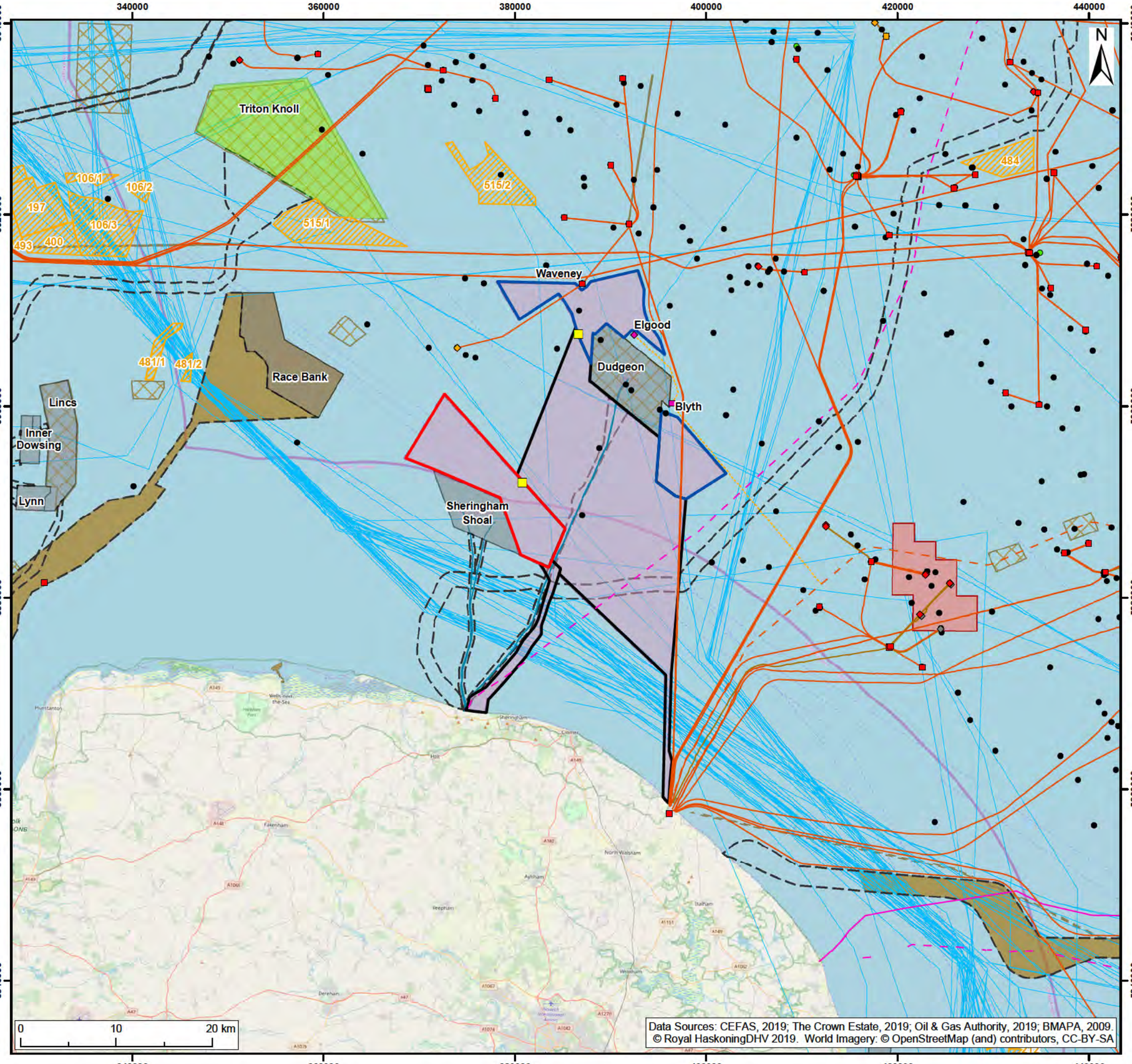
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Project: Dudgeon and Sheringham Shoal Offshore Wind Farm Extensions

Report: Scoping Report

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Legend:

- Dudgeon Extension Project AfL Area
- Sheringham Extension Project AfL Area
- Offshore Cable Corridor
- Offshore Scoping Area
- Indicative Offshore Substation Location

Offshore Wind Farm

- Consented
- In operation
- Existing Offshore Wind Export Cable Corridor
- Existing Offshore Wind Farm Export Cable

Disposal Sites

- Open
- Closed
- Disused

Aggregate Areas

- Aggregate Production Area
- Dredger Transit Route
- Gas Storage Lease Area

Oil & Gas Infrastructure

Surface Infrastructure

- Active
- Precommission
- Proposed

Subsurface Infrastructure (wellheads and manifolds)

- Active
- Precommission
- Not In Use
- Proposed

Wells

- Abandoned/Plugged
- Completed
- Drilling

Pipelines

- Active
- Precommission
- Not in use
- Proposed

Cables

- Active
- Disused

SUI	REV	DATE	DESCRIPTION	DRW	CHK	APR
A1	C01	02/10/2019	Approved & accepted stage complete	LB	RS	AP

Title:

Other Marine Users

Figure: 2.13.1 | Drawing No: PB8164-RHD-ZZ-OF-DR-Z-0017

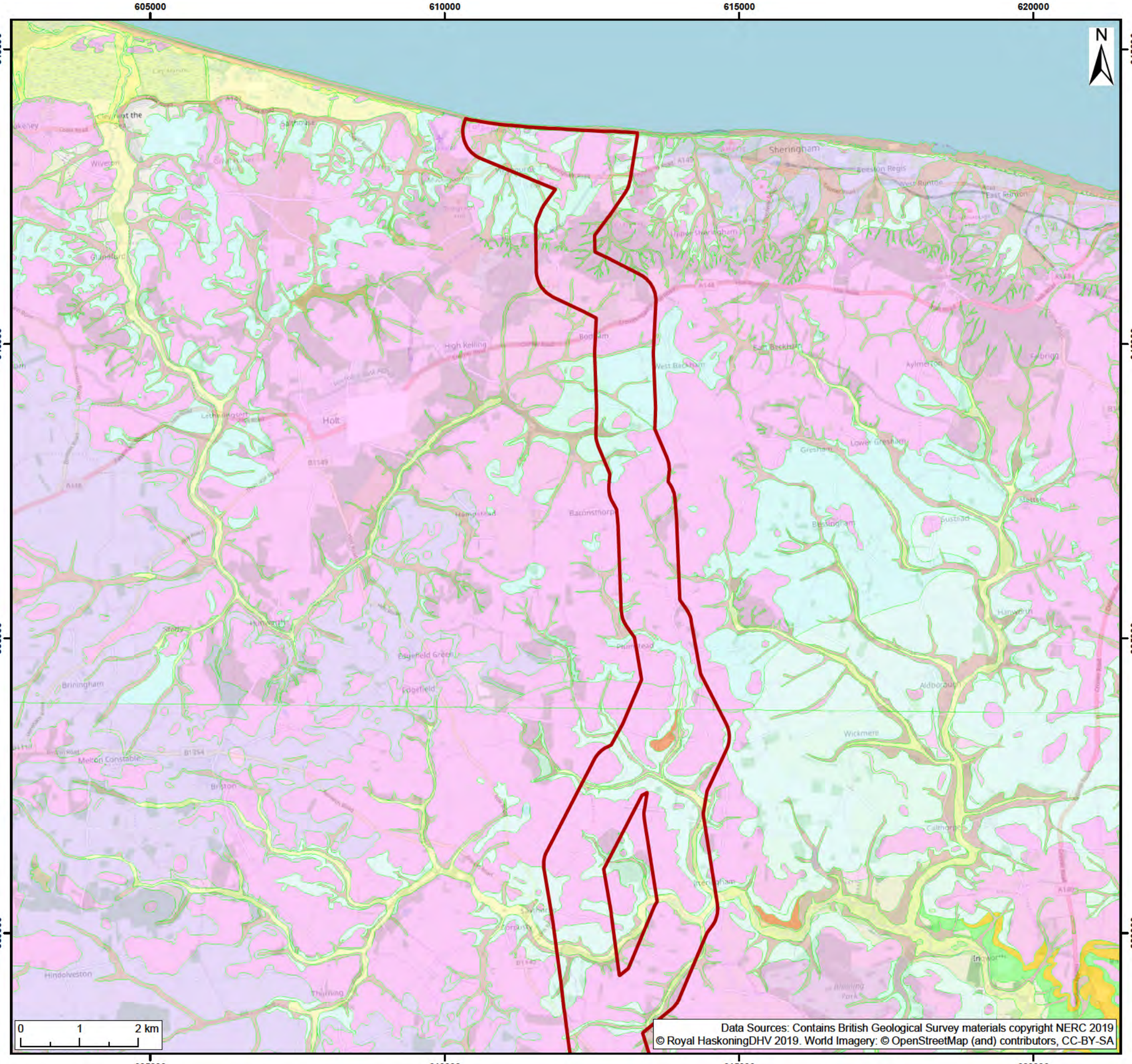
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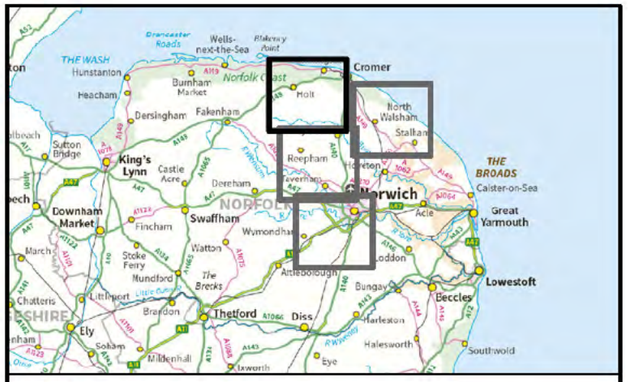
Project: Dudgeon and Sheringham Shoal Offshore Wind Farm Extensions

Report: Scoping Report

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Legend:

- Onshore Scoping Area

Superficial Geology

- Alluvium - Clay, Silt, Sand, Gravel
- Baction Green TIll Member - Diamicton
- Briton's Lane Sand and Gravel Member - Sand and Gravel
- Glaciofluvial Deposits, Mid Pleistocene - Sand and Gravel
- Happisburgh Glacigenic Formation - Diamicton
- Happisburgh Glacienic FOrmation - Sand and Gravel
- Head - Gravel, Sand, silt and Clay
- Lowestoft Formation - Sand and Gravel
- Marine Beach Deposits - Sand and Gravel
- Peat - Peat
- Reclaimed Intertidal Deposits - Silt and Clay
- River Terrace Deposits, 1 - Sand and Gravel
- Sheringham Cliffs Formation - Clay, Silt, Sand and Gravel
- Storm Beach Deposits - Gravel, Sand and Silt
- Tidal Flat Deposits - Gravel, Sand, Silt and Clay
- Weybourne Town Till Member - Diamicton

SUI	REV	DATE	DESCRIPTION	DRW	CHK	APR
A1	C01	02/10/2019	Approved & accepted stage complete	LB	MW	AP

Title:

Superficial Geology

Figure: 3.1.1a | Drawing No: PB8164-RHD-ZZ-ON-DR-Z-0023

Co-ordinate system: British National Grid | Page Size: A3 | Scale: 1:65,000

Project: Dudgeon and Sheringham Shoal Offshore Wind Farm Extensions

Report: Scoping Report

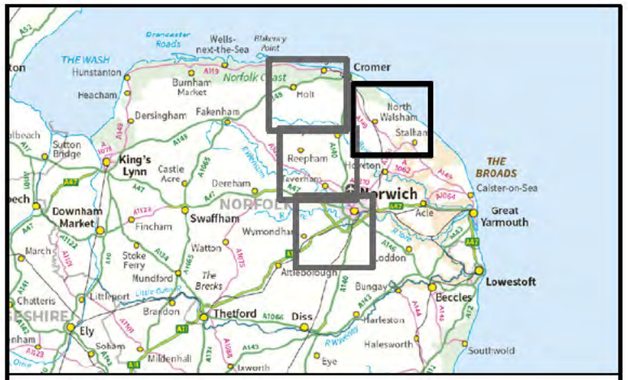
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625000 630000 635000 640000

335000 330000 325000

N



Legend:

- Onshore Scoping Area

Superficial Geology

- Alluvium - Clay, Silt, Sand, Gravel
- Baction Green TIll Member - Diamicton
- Blown Sand - Sand
- Breydon Formation - Clay and Silt
- Breydon Formation - Peat
- Briton's Lane Sand and Gravel Member - Sand and Gravel
- Coastal Barrier Deposits - Sand and Gravel
- Happisburgh Glacigenic Formation - Diamicton
- Happisburgh Glacienic FOrmation - Sand and Gravel
- Head - Clay, Silt, Sand and Gravel
- Marine Beach Deposits - Sand and Gravel
- River Terrace Deposits (Undifferentiated) - Sand and Gravel
- Sand and Gravel of Uncertain Age and Origin - Sand and Gravel
- Trimingham Sand Member - Sand and Gravel
- Walcott Till Member - Diamicton

A1	C01	02/10/2019	Approved & accepted stage complete	LB	MW	AP
SUI	REV	DATE	DESCRIPTION	DRW	CHK	APR

Title:

Superficial Geology

Figure: 3.1.1a | Drawing No: PB8164-RHD-ZZ-ON-DR-Z-0023

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Project: Dudgeon and Sheringham Shoal Offshore Wind Farm Extensions

Report: Scoping Report

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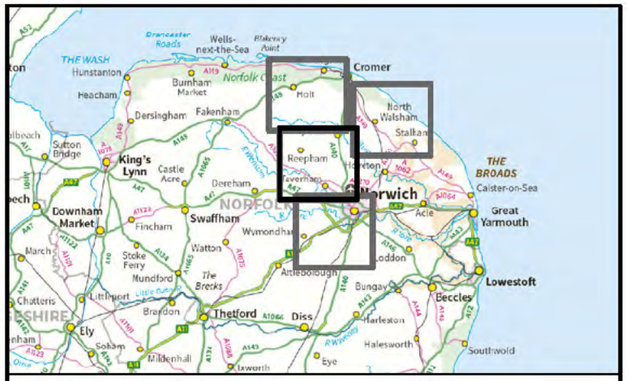
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610000 615000 620000

325000 320000 315000

N



Legend:

Onshore Scoping Area

Superficial Geology

- Alluvium - Clay, Silt, Sand, Gravel
- Briton's Lane Sand and Gravel Member - Sand and Gravel
- Happisburgh Glacigenic Formation - Diamicton
- Happisburgh Glacienic FOrmation - Sand and Gravel
- Head - Clay, Silt, Sand and Gravel
- Lowestoft Formation - Diamicton
- Lowestoft Formation - Sand and Gravel
- River Terrace Deposits, 1 - Sand and Gravel
- Sheringham Cliffs Formation - Clay, Silt, Sand and Gravel
- Sheringham Cliffs Formation - Sand
- Sheringham Cliffs Formation - Sand and Gravel

A1	C01	02/10/2019	Approved & accepted stage complete	LB	MW	AP
SUI	REV	DATE	DESCRIPTION	DRW	CHK	APR

Title:

Superficial Geology

Figure: 3.1.1a | Drawing No: PB8164-RHD-ZZ-ON-DR-Z-0023

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Project: Dudgeon and Sheringham Shoal Offshore Wind Farm Extensions

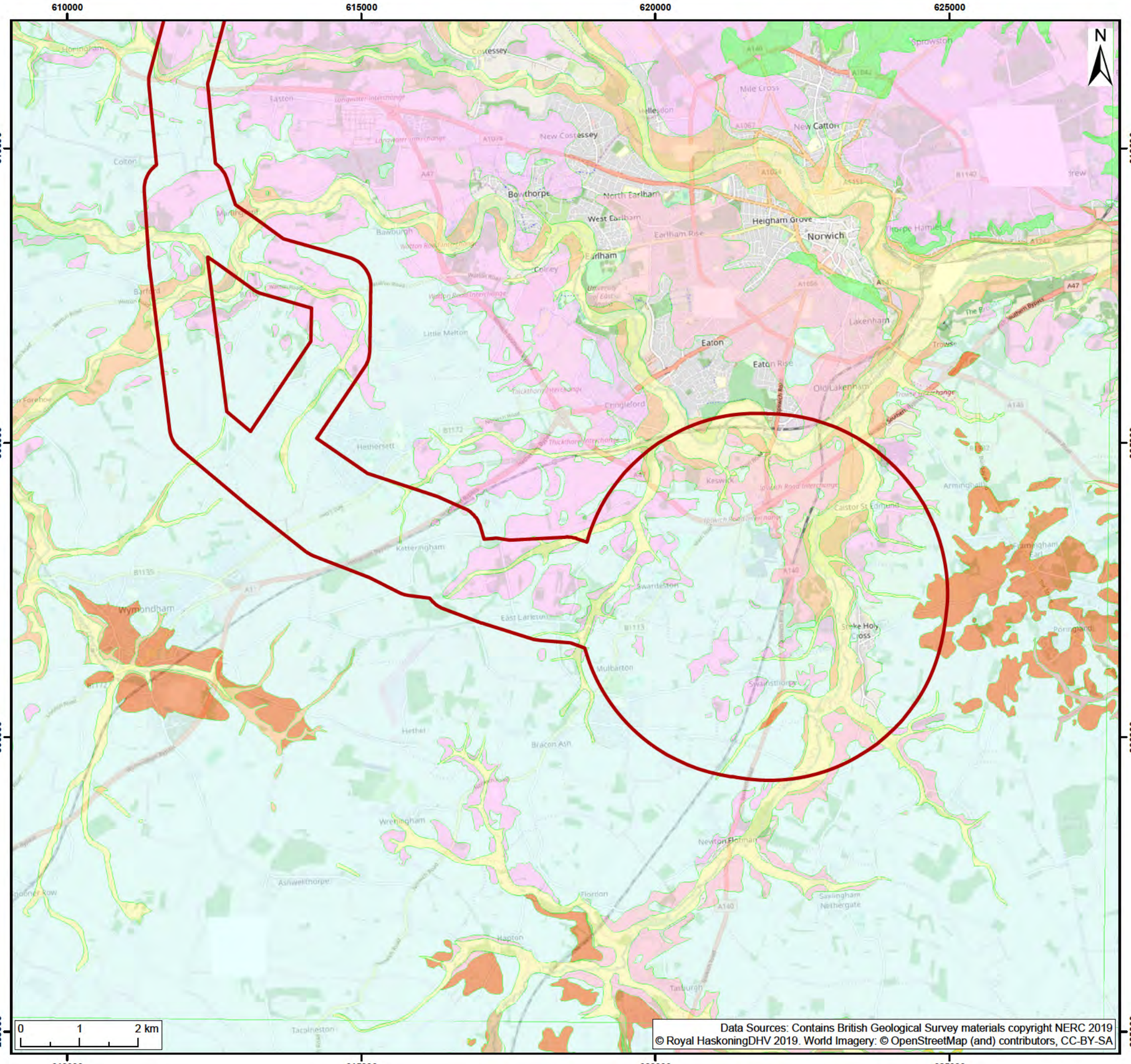
Report: Scoping Report

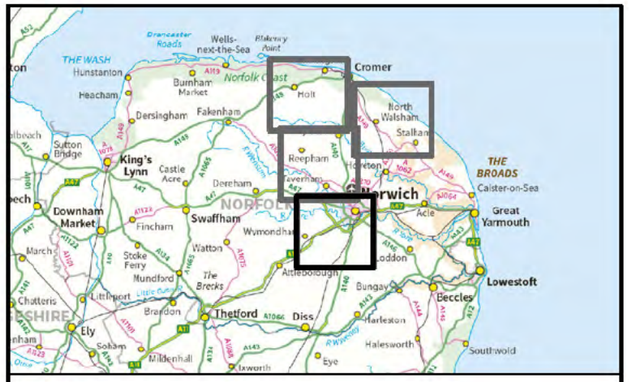
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Legend:

Onshore Scoping Area

Superficial Geology

- Alluvium - Clay, Silt, Sand, Gravel
- Happisburgh Glacigenic Formation - Diamicton
- Happisburgh Glacigenic FOrmation and Lowestoft Formation (Undifferentiated) - Sand and Gravel
- Leet Hill Sand and Gravel Member - Sand and Gravel
- Lowestoft Formation - Diamicton
- Lowestoft Formation - Sand and Gravel
- Peat - Peat
- River Terrace Deposits, 1 - Sand and Gravel
- Sheringham Cliffs Formation - Sand and Gravel

A1	C01	02/10/2019	Approved & accepted stage complete	LB	MW	AP
SUI	REV	DATE	DESCRIPTION	DRW	CHK	APR

Title:

Superficial Geology

Figure: 3.1.1a

Drawing No: PB8164-RHD-ZZ-ON-DR-Z-0023

Co-ordinate system: British National Grid

Page Size: A3

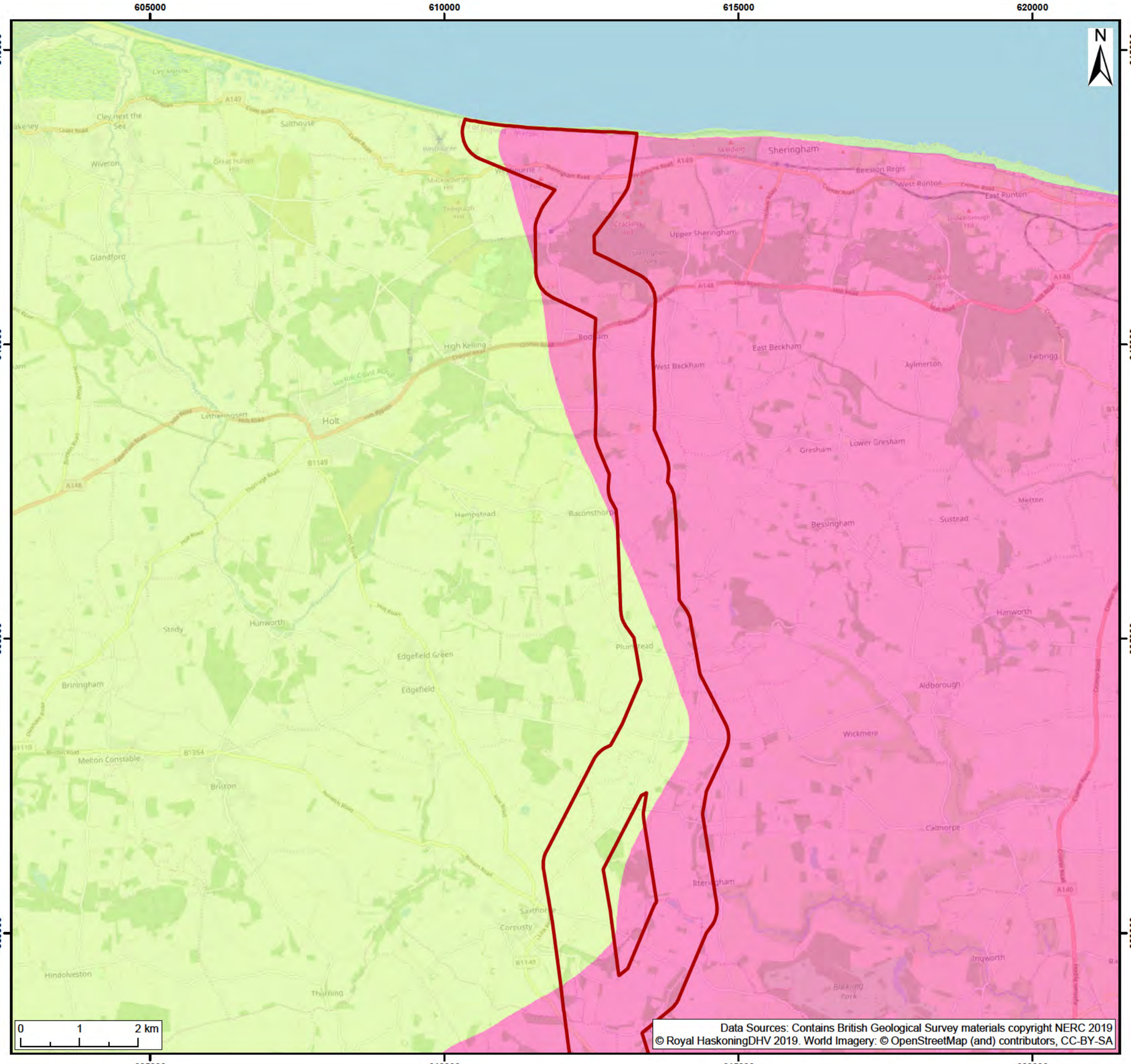
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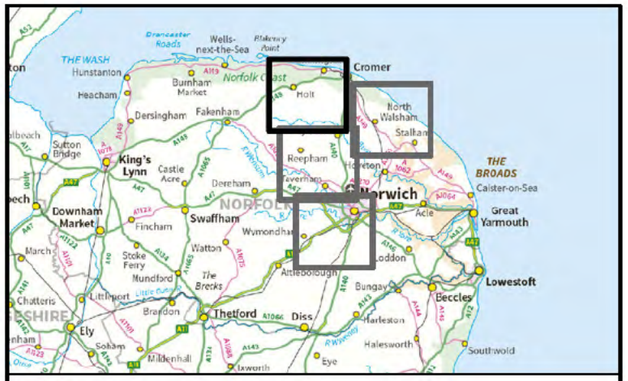
Project: Dudgeon and Sheringham Shoal Offshore Wind Farm Extensions

Report: Scoping Report

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Legend:

- Onshore Scoping Area

Bedrock Geology

- CHALK FORMATION
- CRAG GROUP - SAND AND GRAVEL

A1	C01	02/10/2019	Approved & accepted stage complete	LB	MW	AP
SUI	REV	DATE	DESCRIPTION	DRW	CHK	APR

Title:

Bedrock Geology

Figure: 3.1.1b | Drawing No: PB8164-RHD-ZZ-ON-DR-Z-0022

Co-ordinate system:	Page Size:	Scale:
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Project: Dudgeon and Sheringham Shoal Offshore Wind Farm Extensions

Report: Scoping Report

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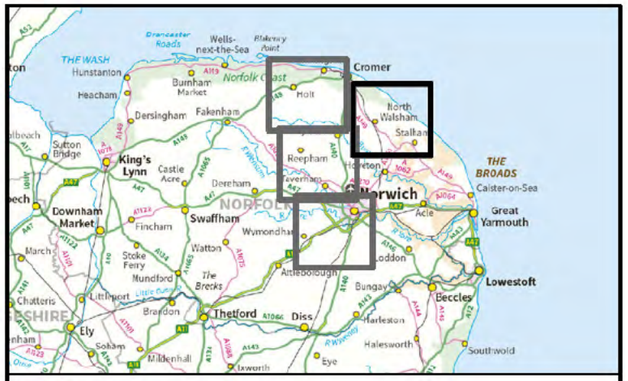
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625000 630000 635000 640000

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0 1 2 km



Legend:

Onshore Scoping Area

Bedrock Geology

CHALK FORMATION

CRAG GROUP - SAND AND GRAVEL

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SUI	REV	DATE	DESCRIPTION	DRW	CHK	APR
A1	C01	02/10/2019	Approved & accepted stage complete	LB	MW	AP

Title:

Bedrock Geology

Figure: 3.1.1b | Drawing No: PB8164-RHD-ZZ-ON-DR-Z-0022

Co-ordinate system:	Page Size:	Scale:
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Project:
Dudgeon and Sheringham Shoal Offshore Wind Farm Extensions

Report:
Scoping Report

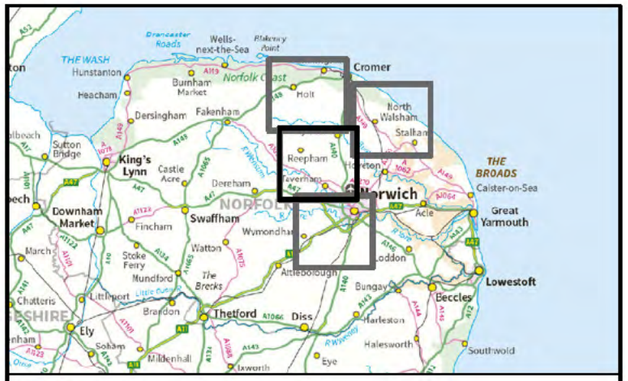
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610000 615000 620000

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N



Legend:

- Onshore Scoping Area

Bedrock Geology

- CHALK FORMATION
- CRAG GROUP - SAND AND GRAVEL

A1	C01	02/10/2019	Approved & accepted stage complete	LB	MW	AP
SUI	REV	DATE	DESCRIPTION	DRW	CHK	APR

Title:

Bedrock Geology

Figure: 3.1.1b

Drawing No: PB8164-RHD-ZZ-ON-DR-Z-0022

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Project: Dudgeon and Sheringham Shoal Offshore Wind Farm Extensions

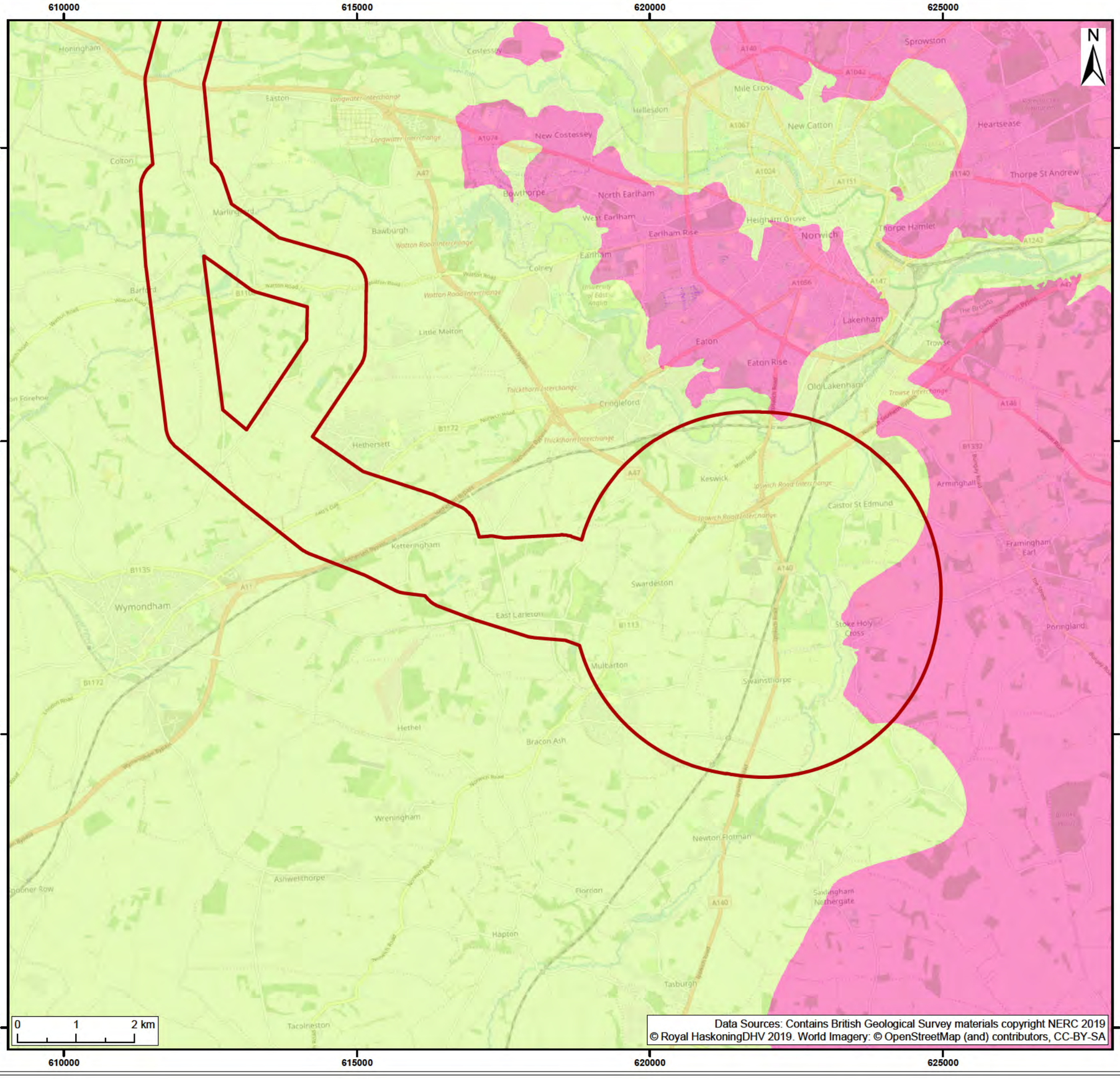
Report: Scoping Report

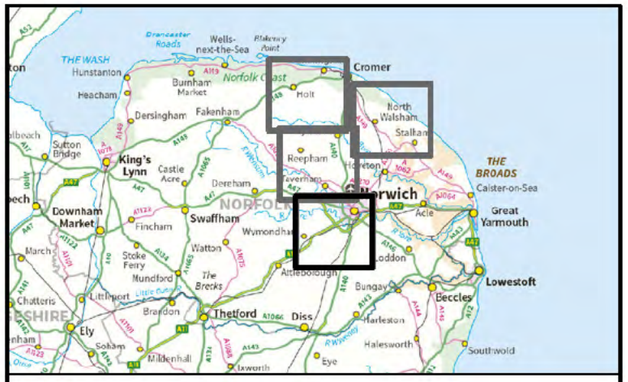
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0 1 2 km

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Legend:

- Onshore Scoping Area

Bedrock Geology

- CHALK FORMATION
- CRAG GROUP - SAND AND GRAVEL

A1	C01	02/10/2019	Approved & accepted stage complete	LB	MW	AP
SUI	REV	DATE	DESCRIPTION	DRW	CHK	APR

Title:

Bedrock Geology

Figure: 3.1.1b | Drawing No: PB8164-RHD-ZZ-ON-DR-Z-0022

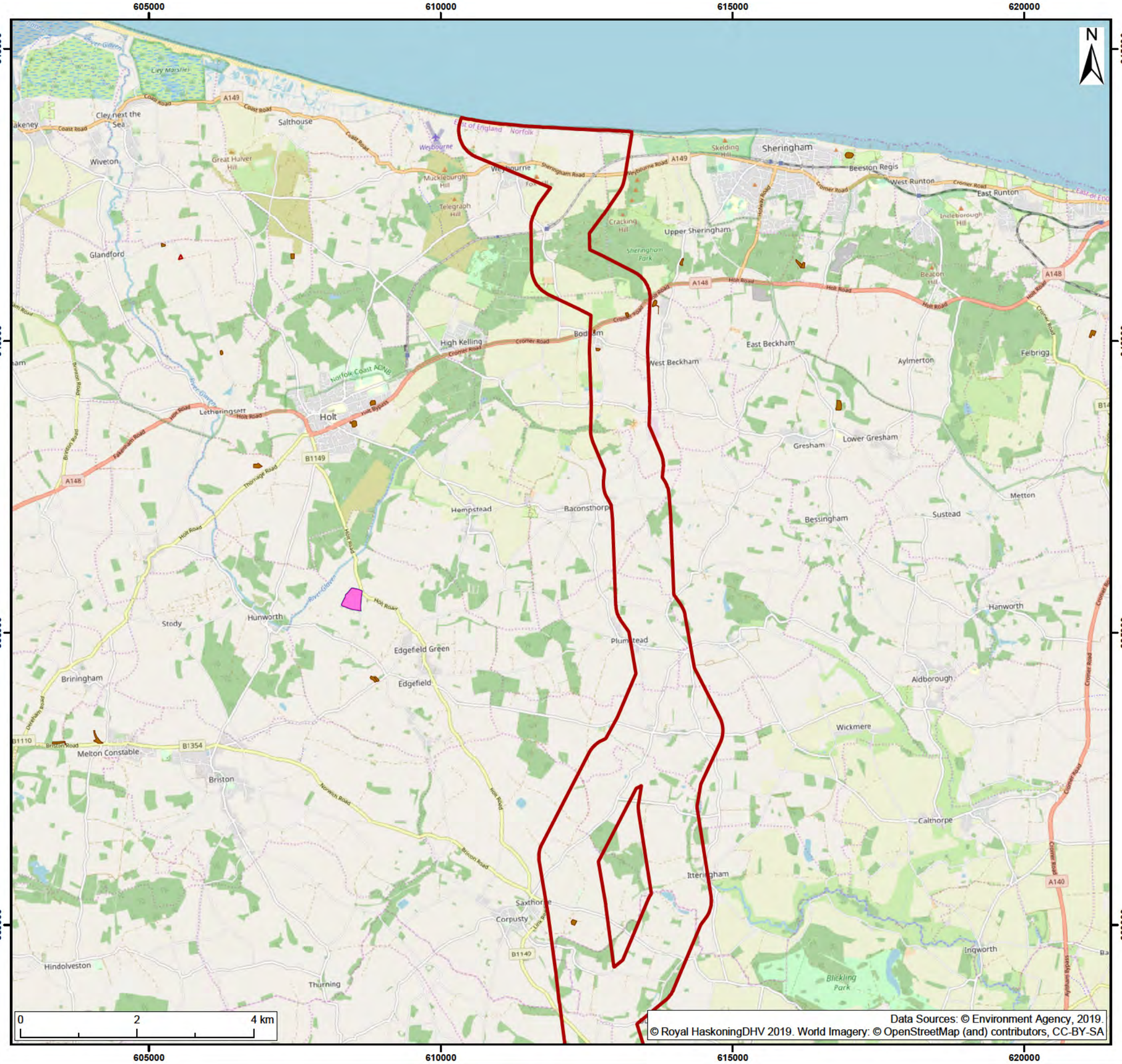
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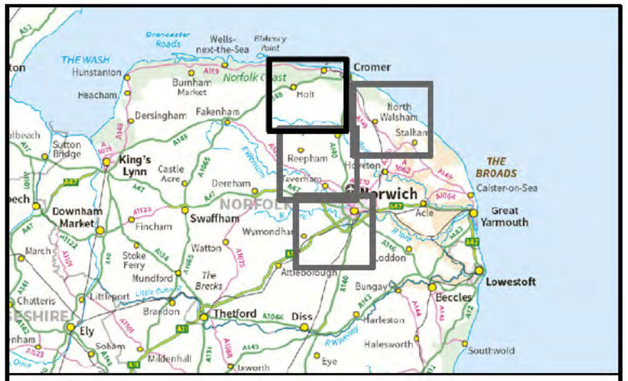
Project: Dudgeon and Sheringham Shoal Offshore Wind Farm Extensions

Report: Scoping Report

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Legend:

- Onshore Scoping Area
- Historic Landfill Sites

Authorised Landfill Sites

- 5.2 A(1) a): Waste Landfilling
- A4 Household, Commercial & Industrial Waste Landfill
- A5: Landfill taking Non-Biodegradable Wastes

A1	C01	02/10/2019	Approved & accepted stage complete	LB	MW	AP
SUI	REV	DATE	DESCRIPTION	DRW	CHK	APR

Title:

Historic and authorised landfill sites

Figure: 3.1.2 | Drawing No: PB8164-RHD-ZZ-ON-DR-Z-0021

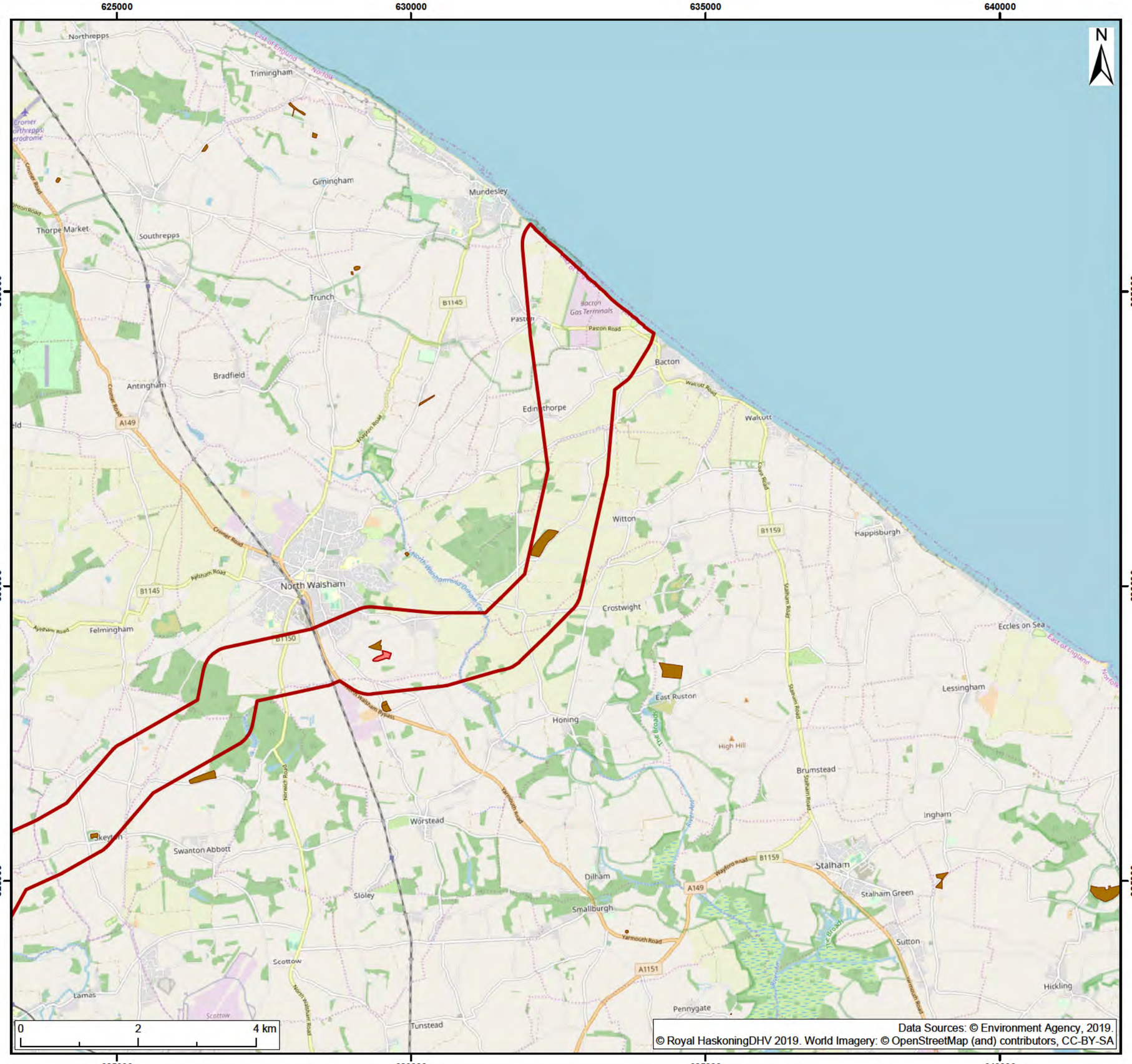
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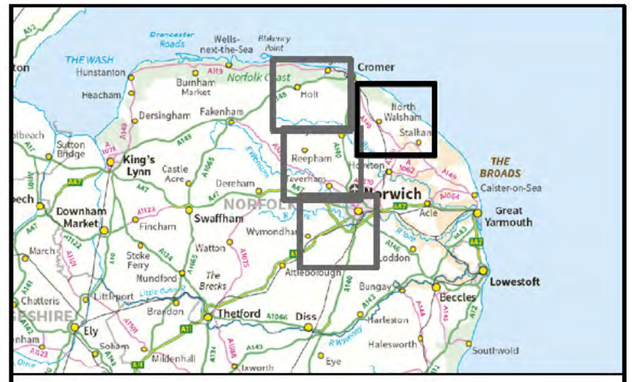
Project: Dudgeon and Sheringham Shoal Offshore Wind Farm Extensions

Report: Scoping Report

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Legend:

- Onshore Scoping Area
- Historic Landfill Sites

Authorised Landfill Sites

- A5: Landfill taking Non-Biodegradable Wastes

A1	C01	02/10/2019	Approved & accepted stage complete	LB	MW	AP
SUI	REV	DATE	DESCRIPTION	DRW	CHK	APR

Title:

Historic and authorised landfill sites

Figure: 3.1.2	Drawing No: PB8164-RHD-ZZ-ON-DR-Z-0021

Co-ordinate system: British National Grid	Page Size: A3	Scale: 1:65,000

Project: Dudgeon and Sheringham Shoal Offshore Wind Farm Extensions	Report: Scoping Report

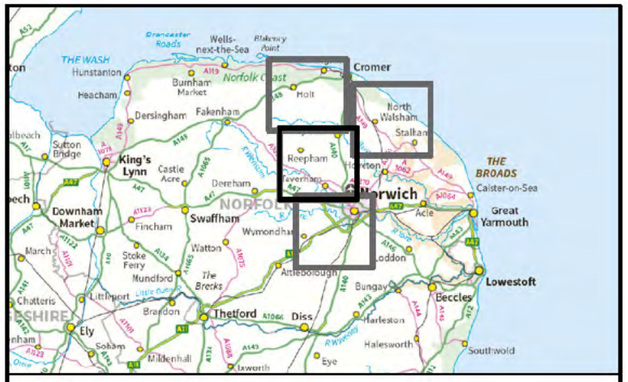
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610000 615000 620000

325000 320000 315000

N



Legend:

- Onshore Scoping Area
- Historic Landfill Sites

Authorised Landfill Sites

- A1: Co-Disposal Landfill Site
- A5: Landfill taking Non-Biodegradable Wastes
- A6: Landfill taking other wastes
- L05: Inert Landfill

SUI	REV	DATE	DESCRIPTION	DRW	CHK	APR
A1	C01	02/10/2019	Approved & accepted stage complete	LB	MW	AP

Title:

Historic and authorised landfill sites

Figure: 3.1.2 | Drawing No: PB8164-RHD-ZZ-ON-DR-Z-0021

Co-ordinate system: British National Grid | Page Size: A3 | Scale: 1:65,000

Project: Dudgeon and Sheringham Shoal Offshore Wind Farm Extensions

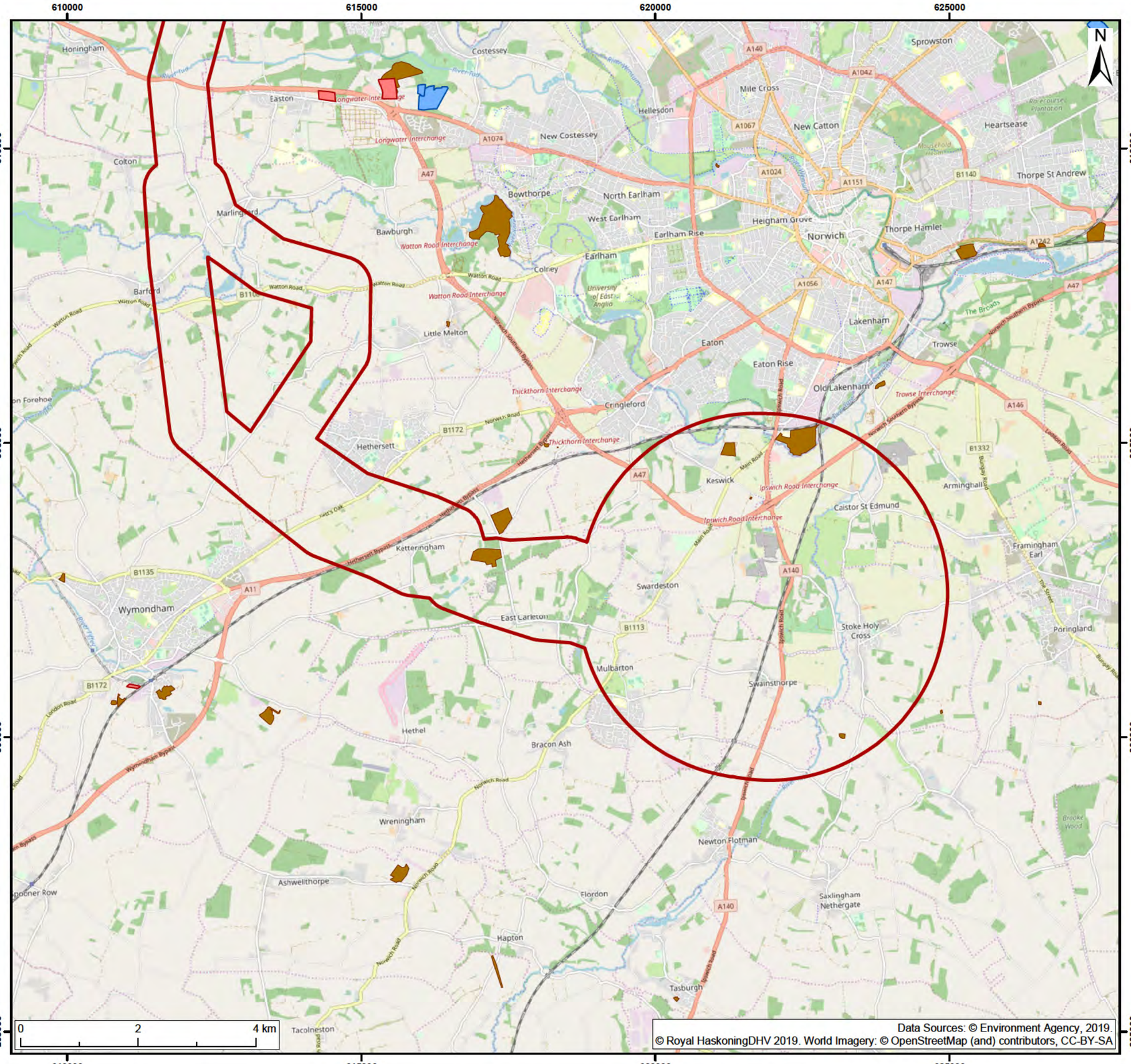
Report: Scoping Report

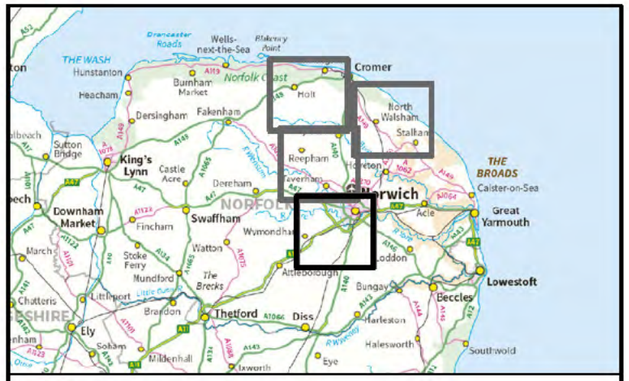
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0 2 4 km

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Legend:

- Onshore Scoping Area
- Historic Landfill Sites

Authorised Landfill Sites

- A4 Household, Commercial & Industrial Waste Landfill
- A5: Landfill taking Non-Biodegradable Wastes

A1	C01	02/10/2019	Approved & accepted stage complete	LB	MW	AP
SUI	REV	DATE	DESCRIPTION	DRW	CHK	APR

Title:

Historic and authorised landfill sites

Figure: 3.1.2

Drawing No: PB8164-RHD-ZZ-ON-DR-Z-0021

Co-ordinate system: British National Grid

Page Size: A3

Scale: 1:65,000

Project: Dudgeon and Sheringham Shoal Offshore Wind Farm Extensions

Report: Scoping Report

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600000 610000 620000 630000 640000

340000 330000 320000 310000 300000

N

Glaven

Bure

North Walsham and
Dilham Canal (disused)

Ant

Bure

Wensum

Tud

Yare

Tiffey

Tas

0 4 8 km

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Legend:

- Onshore Scoping Area
- Main Rivers

Surface Water Catchment

- Bure
- North Norfolk
- Wensum
- Yare

A1	C01	02/10/2019	Approved & accepted stage complete	LB	MW	AP
SUI	REV	DATE	DESCRIPTION	DRW	CHK	APR

Title:

Surface Water Resources

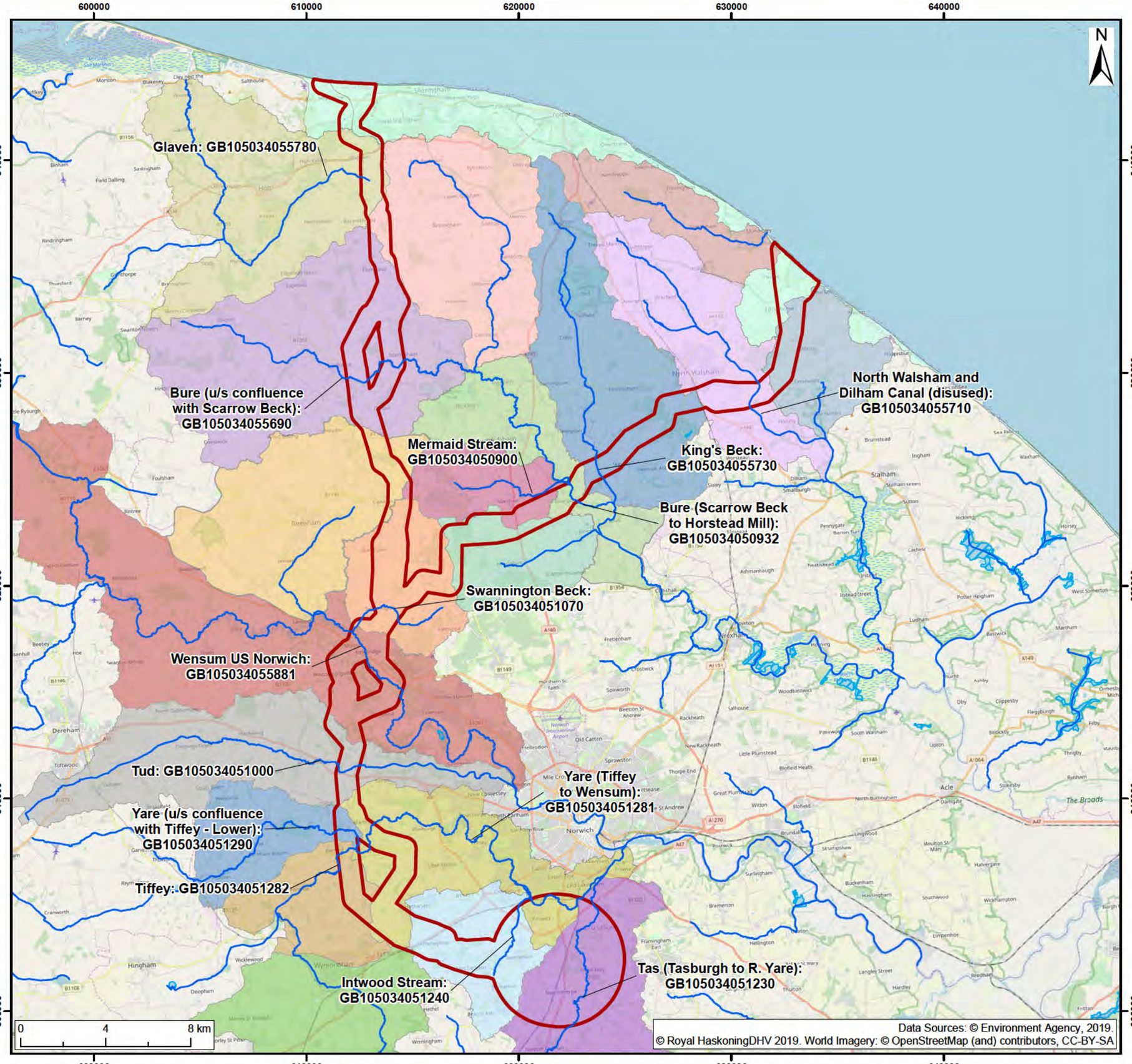
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Project:	Report:
Dudgeon and Sheringham Shoal Offshore Wind Farm Extensions	Scoping Report

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Legend:

- Onshore Scoping Area
- WFD Lake Water Bodies

WFD River Water Body Catchment

- Blackwater Drain (Wensum)
- Bure (Scarrow Beck to Horstead Mill)
- Bure (u/s confluence with Scarrow Beck)
- East Ruston Stream
- Glaven
- Hevingham Watercourse
- Intwood Stream
- King's Beck
- Mermaid Stream
- Mun
- North Walsham and Dilham Canal (disused)
- Not part of a river WB catchment
- Scarrow Beck
- Swannington Beck
- Tas (Tasburgh to R. Yare)
- Tiffey
- Tiffey (u/s Wymondham STW)
- Tud
- Wensum US Norwich
- Yare (Tiffey to Wensum)
- Yare (u/s confluence with Tiffey - Lower)
- WFD River Water Bodies

A1	C01	02/10/2019	Approved & accepted stage complete	LB	MW	AP
SUI	REV	DATE	DESCRIPTION	DRW	CHK	APR

Title:

WFD Water Bodies

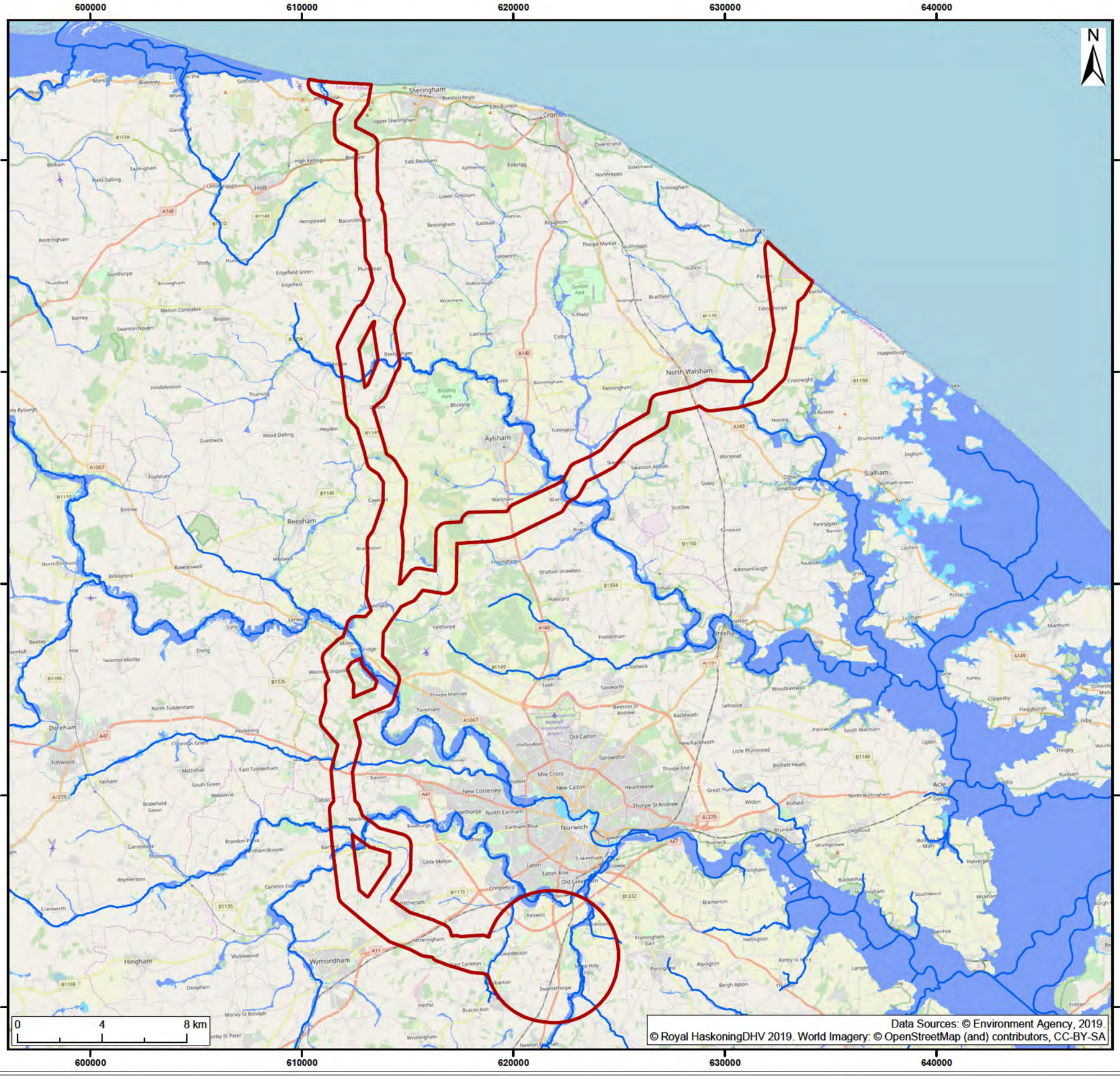
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Project: Dudgeon and Sheringham Shoal Offshore Wind Farm Extensions	Report: Scoping Report

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Legend:

- Onshore Scoping Area
- Main Rivers
- Flood Zone 3
- Flood Zone 2

A1	C01	02/10/2019	Approved & accepted stage complete	LB	MW	AP
SUI	REV	DATE	DESCRIPTION	DRW	CHK	APR

Title:

Flood Risk

Figure: 3.2.3

Drawing No: PB8164-RHD-ZZ-ON-DR-Z-0018

Co-ordinate system: British National Grid

Page Size: A3

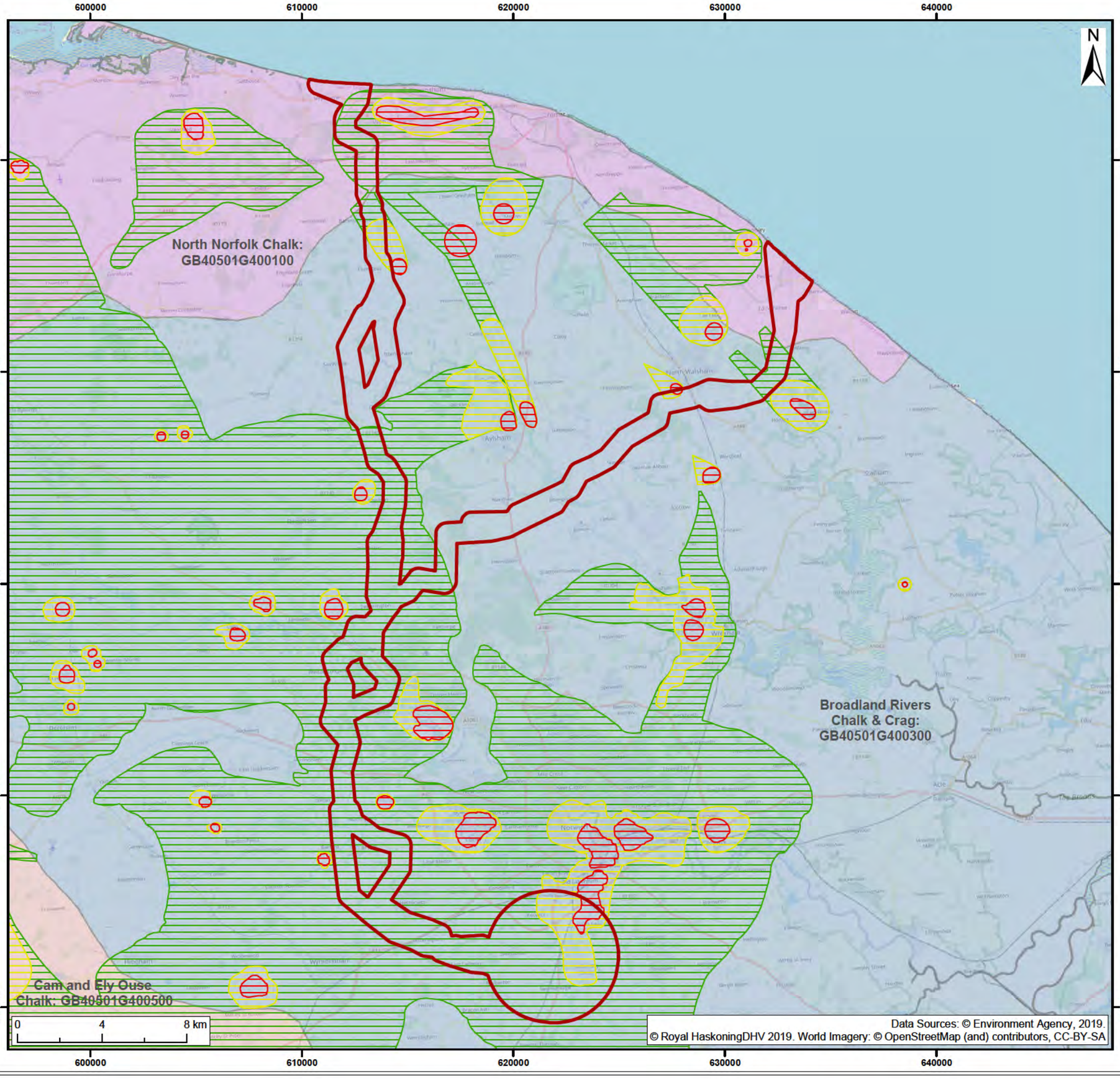
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Project: Dudgeon and Sheringham Shoal Offshore Wind Farm Extensions

Report: Scoping Report

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Legend:

- Onshore Scoping Area

WFD Groundwater Bodies

- Broadland Rivers Chalk & Crag
- Cam and Ely Ouse Chalk
- North Norfolk Chalk

Source Protection Zone

- Zone I
- Zone II
- Zone III

A1	C01	02/10/2019	Approved & accepted stage complete	LB	MW	AP
SUI	REV	DATE	DESCRIPTION	DRW	CHK	APR

Title:

Groundwater Resources

Figure: 3.2.4	Drawing No: PB8164-RHD-ZZ-ON-DR-Z-0016

Co-ordinate system:	Page Size:	Scale:
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Project:	Report:
Dudgeon and Sheringham Shoal Offshore Wind Farm Extensions	Scoping Report

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605000 610000 615000 620000

345000 340000 335000 330000

N



Legend:

- Onshore Scoping Area

Agricultural Land Classification

- Grade 1
- Grade 2
- Grade 3
- Grade 4
- Non Agricultural
- Urban

Environmental Stewardship Schemes

- Entry Level Stewardship
- Entry Level plus Higher Level Stewardship
- Higher Level Stewardship
- Organic Entry Level plus Higher Level Stewardship

A1	C01	02/10/2019	Approved & accepted stage complete	LB	MW	AP
SUI	REV	DATE	DESCRIPTION	DRW	CHK	APR

Title:

Main Land Use Types

Figure: 3.3.1

Drawing No: PB8164-RHD-ZZ-ON-DR-Z-0012

Co-ordinate system: British National Grid

Page Size: A3

Scale: 1:65,000

Project: Dudgeon and Sheringham Shoal Offshore Wind Farm Extensions

Report: Scoping Report

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0 2 4 km

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625000 630000 635000 640000

335000 330000 325000

N



Legend:

- Onshore Scoping Area

Agricultural Land Classification

- Grade 1
- Grade 2
- Grade 3
- Grade 4
- Non Agricultural
- Urban

Environmental Stewardship Schemes

- Entry Level plus Higher Level Stewardship
- Higher Level Stewardship

0 2 4 km

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A1	C01	02/10/2019	Approved & accepted stage complete	LB	MW	AP
SUI	REV	DATE	DESCRIPTION	DRW	CHK	APR

Title:

Main Land Use Types

Figure: 3.3.1

Drawing No: PB8164-RHD-ZZ-ON-DR-Z-0012

Co-ordinate system: British National Grid

Page Size: A3

Scale: 1:65,000

Project: Dudgeon and Sheringham Shoal Offshore Wind Farm Extensions

Report: Scoping Report

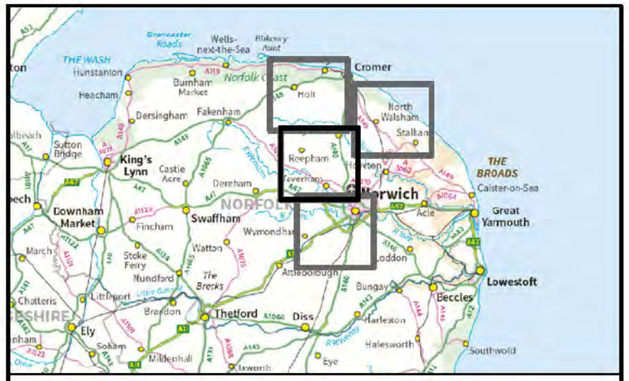
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N



Legend:

- Onshore Scoping Area

Agricultural Land Classification

- Grade 2
- Grade 3
- Grade 4
- Non Agricultural
- Urban

Environmental Stewardship Schemes

- Entry Level plus Higher Level Stewardship
- Higher Level Stewardship

0 2 4 km

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A1	C01	02/10/2019	Approved & accepted stage complete	LB	MW	AP
SUI	REV	DATE	DESCRIPTION	DRW	CHK	APR

Title:

Main Land Use Types

Figure: 3.3.1

Drawing No: PB8164-RHD-ZZ-ON-DR-Z-0012

Co-ordinate system: British National Grid

Page Size: A3

Scale: 1:65,000

Project: Dudgeon and Sheringham Shoal Offshore Wind Farm Extensions

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610000 615000 620000 625000

310000 305000 300000 295000

N

0 2 4 km

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Legend:

- Onshore Scoping Area

Agricultural Land Classification

- Grade 2
- Grade 3
- Grade 4
- Non Agricultural
- Urban

Environmental Stewardship Schemes

- Entry Level plus Higher Level Stewardship
- Higher Level Stewardship

A1	C01	02/10/2019	Approved & accepted stage complete	LB	MW	AP
SUI	REV	DATE	DESCRIPTION	DRW	CHK	APR

Title:

Main Land Use Types

Figure: 3.3.1	Drawing No: PB8164-RHD-ZZ-ON-DR-Z-0012

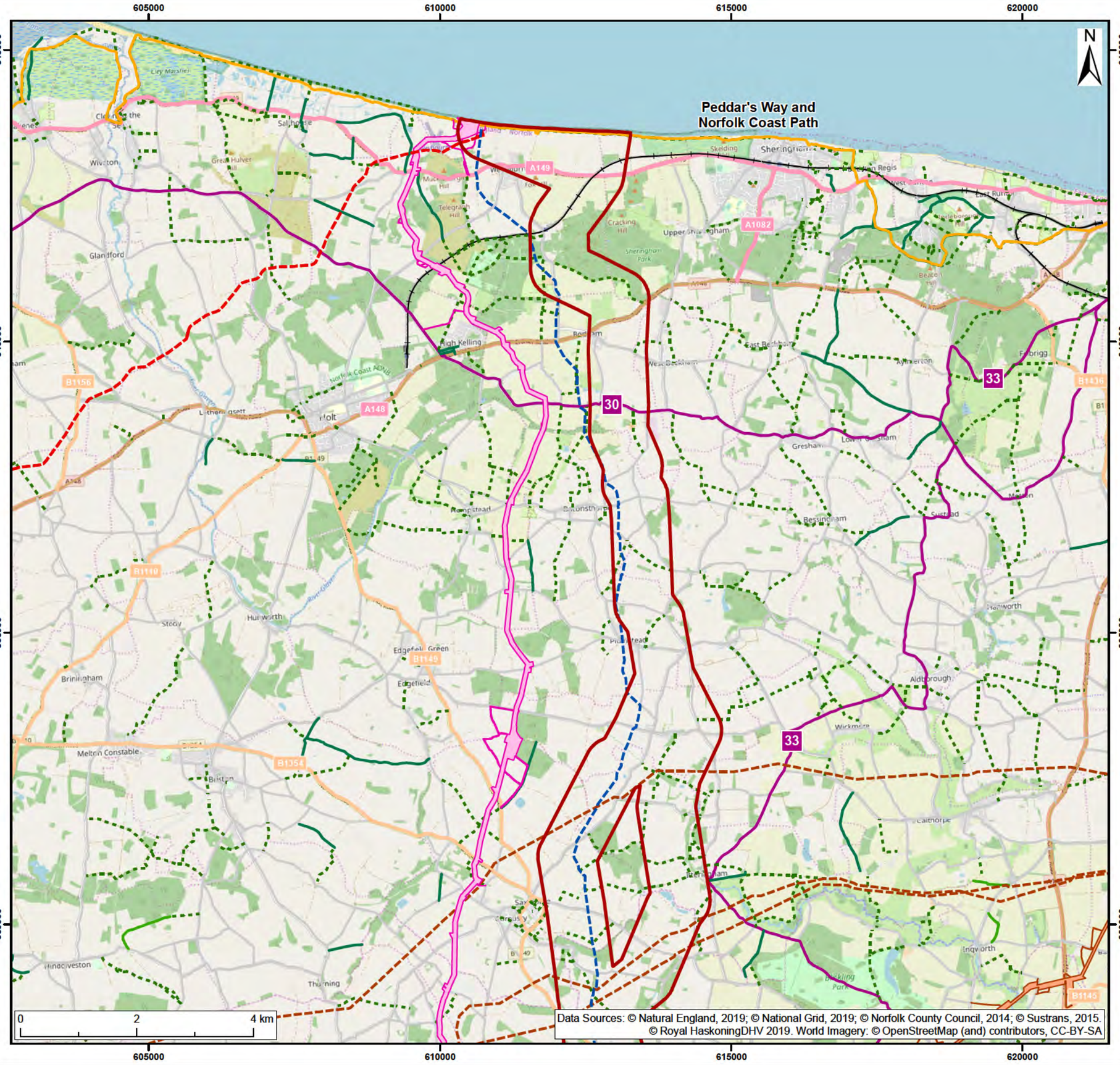
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Project: Dudgeon and Sheringham Shoal Offshore Wind Farm Extensions

Report: Scoping Report

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Legend:

- Onshore Scoping Area
- Sheringham Shoal Underground Cable
- Dudgeon Underground Cable
- Norfolk Vanguard/Norfolk Boreas onshore red line boundary
- Hornsea Project Three onshore red line boundary
- High Pressure Gas Pipe location
- Railway line
- A Road
- B Road
- Minor Road
- Primary Road
- Regional Cycle Route

Public Rights of Way

- Footpath
- Bridleway
- Restricted byway
- National Trails

A1	C01	02/10/2019	Approved & accepted stage complete	LB	MW	AP
SUI	REV	DATE	DESCRIPTION	DRW	CHK	APR

Title:

PRoWs Urban Areas, Roads and Utilities

Figure: 3.3.2 | Drawing No: PB8164-RHD-ZZ-ON-DR-Z-0013

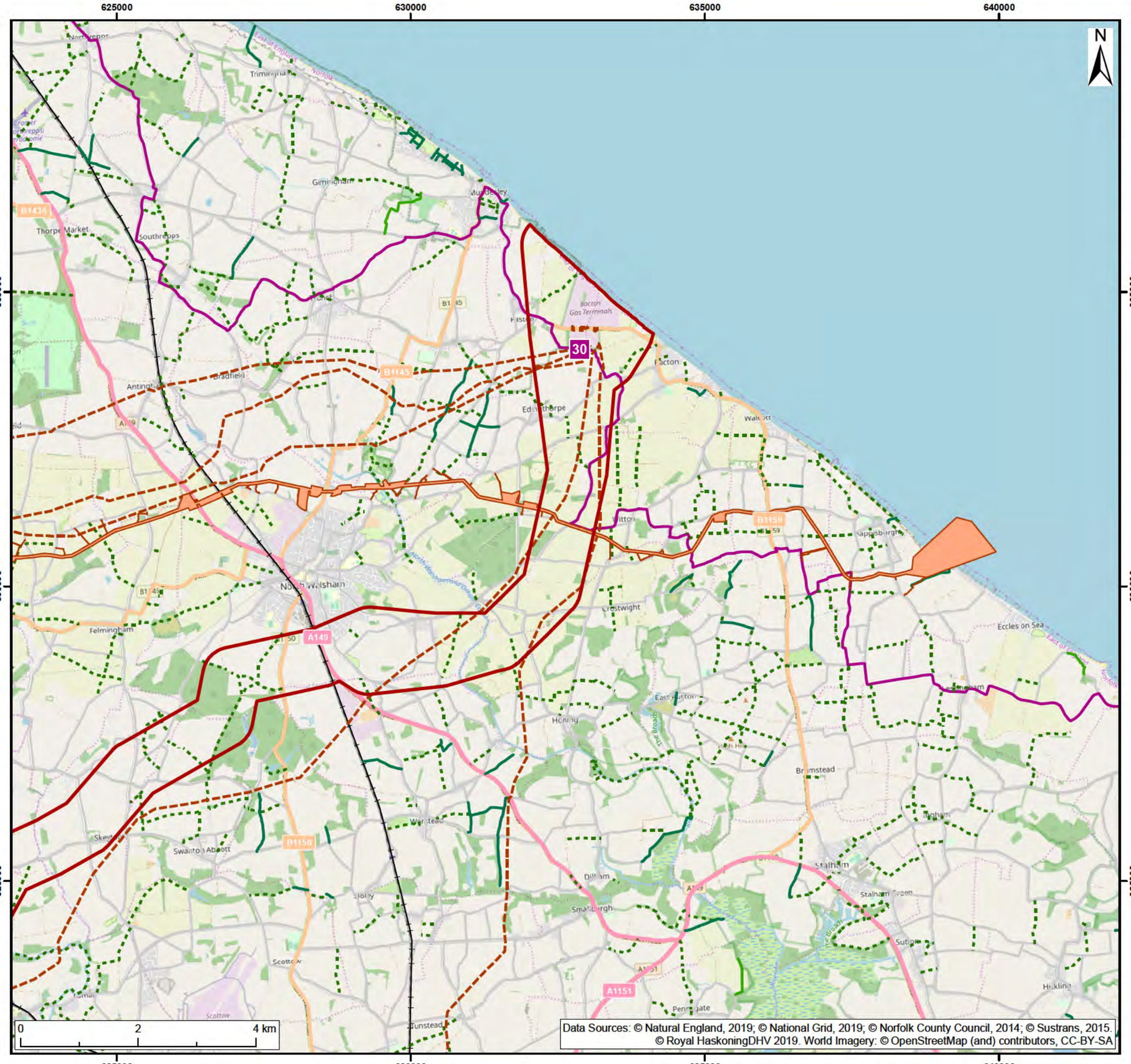
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Project: Dudgeon and Sheringham Shoal Offshore Wind Farm Extensions

Report: Scoping Report

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Legend:

- Onshore Scoping Area
- Norfolk Vanguard/Norfolk Boreas onshore red line boundary
- High Pressure Gas Pipe location
- Railway line
- A Road
- B Road
- Minor Road
- Regional Cycle Route

Public Rights of Way

- Footpath
- Bridleway
- Restricted byway

SUI	REV	DATE	DESCRIPTION	DRW	CHK	APR
A1	C01	02/10/2019	Approved & accepted stage complete	LB	MW	AP

Title:

PRoWs Urban Areas, Roads and Utilities

Figure: 3.3.2	Drawing No: PB8164-RHD-ZZ-ON-DR-Z-0013

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Project:

Dudgeon and Sheringham Shoal Offshore Wind Farm Extensions

Report:

Scoping Report

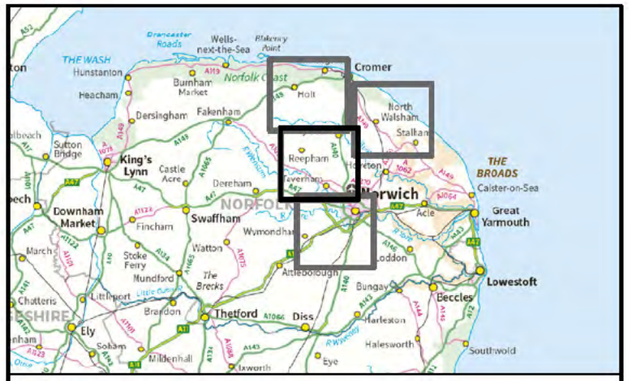
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325000 320000 315000

N



Legend:

- Onshore Scoping Area
- Sheringham Shoal Underground Cable
- Norfolk Vanguard/Norfolk Boreas onshore red line boundary
- Hornsea Project Three onshore red line boundary
- High Pressure Gas Pipe location
- Railway line
- A Road
- B Road
- Minor Road
- Primary Road
- National Cycle Route
- Regional Cycle Route

Public Rights of Way

- Footpath
- Bridleway
- Restricted byway

A1	C01	02/10/2019	Approved & accepted stage complete	LB	MW	AP
SUI	REV	DATE	DESCRIPTION	DRW	CHK	APR

Title:

PRoWs Urban Areas, Roads and Utilities

Figure: 3.3.2 | Drawing No: PB8164-RHD-ZZ-ON-DR-Z-0013

Co-ordinate system: British National Grid | Page Size: A3 | Scale: 1:65,000

Project: Dudgeon and Sheringham Shoal Offshore Wind Farm Extensions

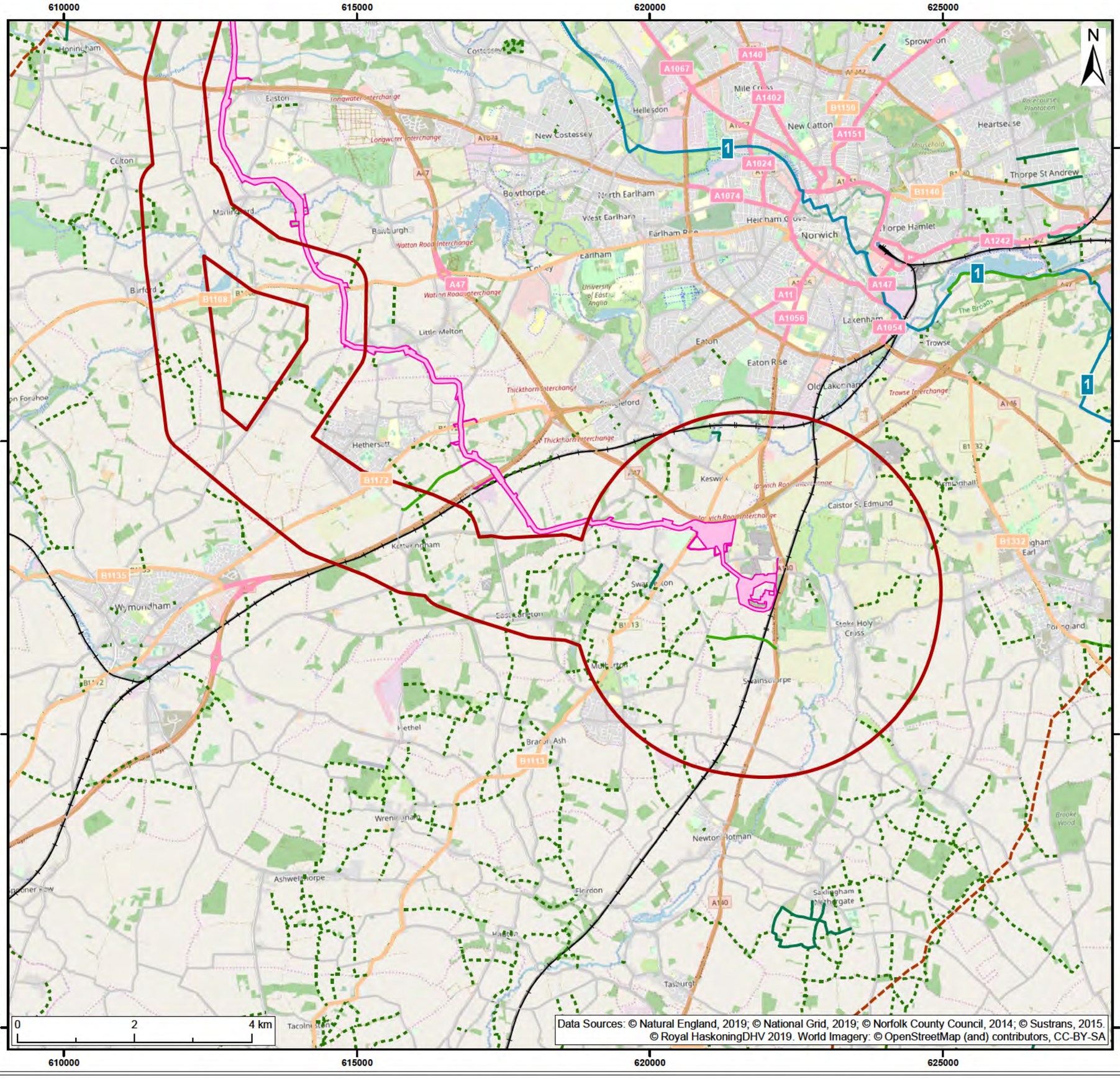
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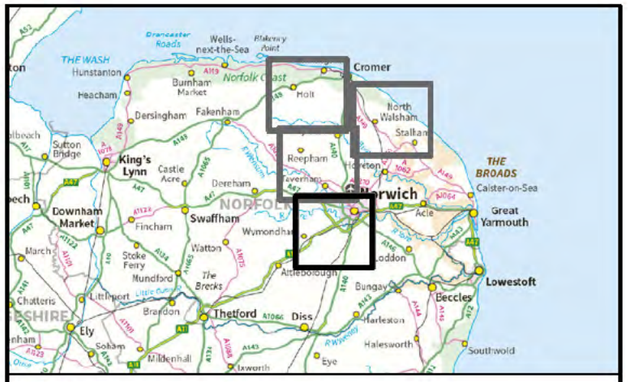
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0 2 4 km

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Legend:

- Onshore Scoping Area
- Hornsea Project Three onshore red line boundary
- High Pressure Gas Pipe location
- Railway line
- A Road
- B Road
- Minor Road
- Primary Road
- National Cycle Route

Public Rights of Way

- Footpath
- Bridleway
- Restricted byway

A1	C01	02/10/2019	Approved & accepted stage complete	LB	MW	AP
SUI	REV	DATE	DESCRIPTION	DRW	CHK	APR

Title:

PRoWs Urban Areas, Roads and Utilities

Figure: 3.3.2	Drawing No: PB8164-RHD-ZZ-ON-DR-Z-0013

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Project:	Report:
Dudgeon and Sheringham Shoal Offshore Wind Farm Extensions	Scoping Report

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600000 610000 620000 630000 640000

340000 330000 320000 310000 300000

N

0 4 8 km



Legend:

- Onshore Scoping Area
- Ancient Woodland
- Ramsar
- Special Area of Conservation (SAC)
- Special Protection Area (SPA)
- Sites of Special Scientific Interest (SSSI)

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SUI	REV	DATE	DESCRIPTION	DRW	CHK	APR

Title:

Nature Conservation Designations within 3km of the Onshore Scoping Area

Figure: 3.4.1

Drawing No: PB8164-RHD-ZZ-ON-DR-Z-0010

Co-ordinate system: British National Grid

Page Size: A3

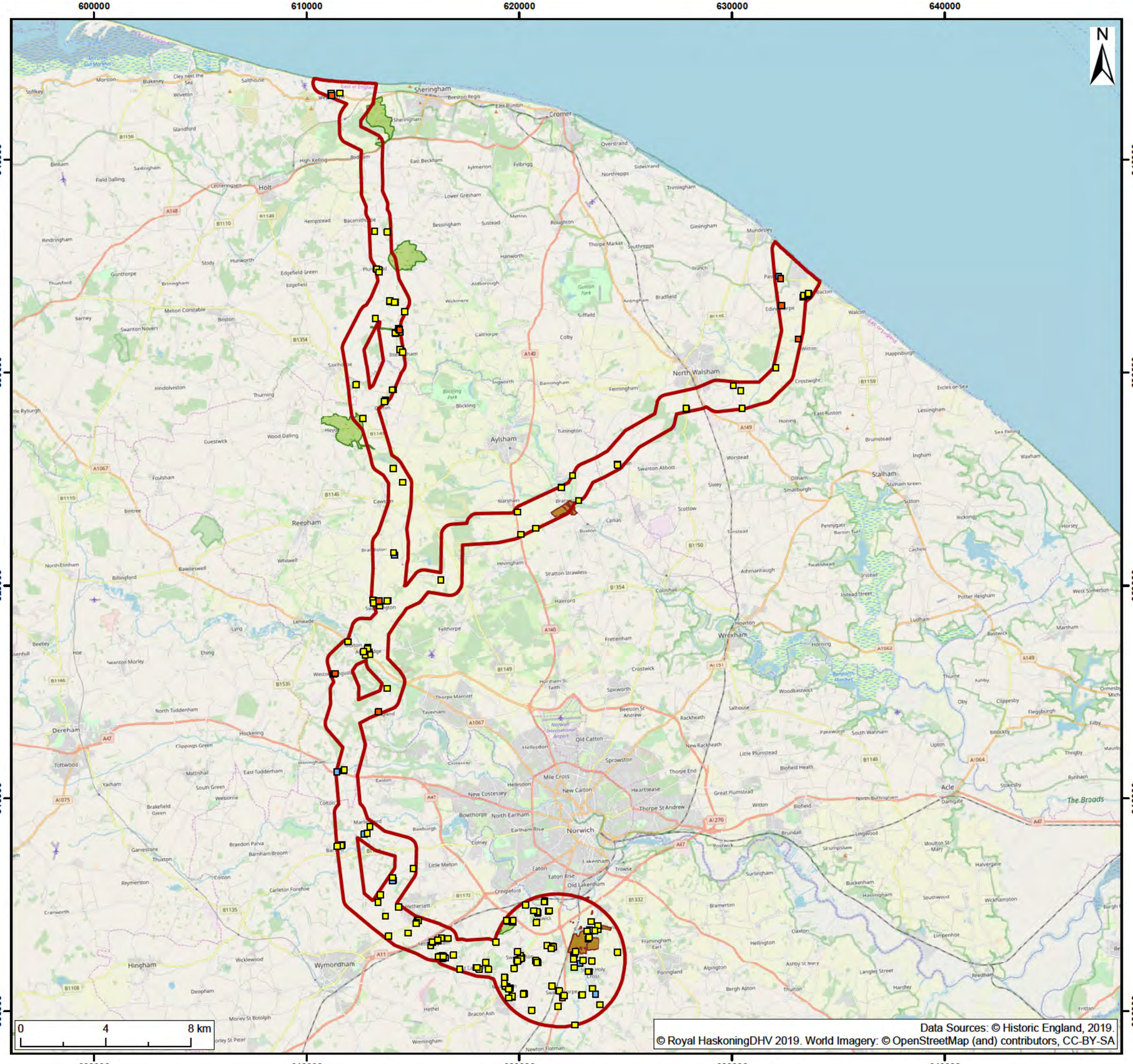
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Report: Scoping Report

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Legend:

- Onshore Scoping Area
- Registered Park and Garden
- Scheduled Monument

Listed Building

- Grade I
- Grade II
- Grade II*

A1	C01	02/10/2019	Approved & accepted stage complete	LB	MW	AP
SUI	REV	DATE	DESCRIPTION	DRW	CHK	APR

Title:

Designated Heritage Assets within Scoping boundary

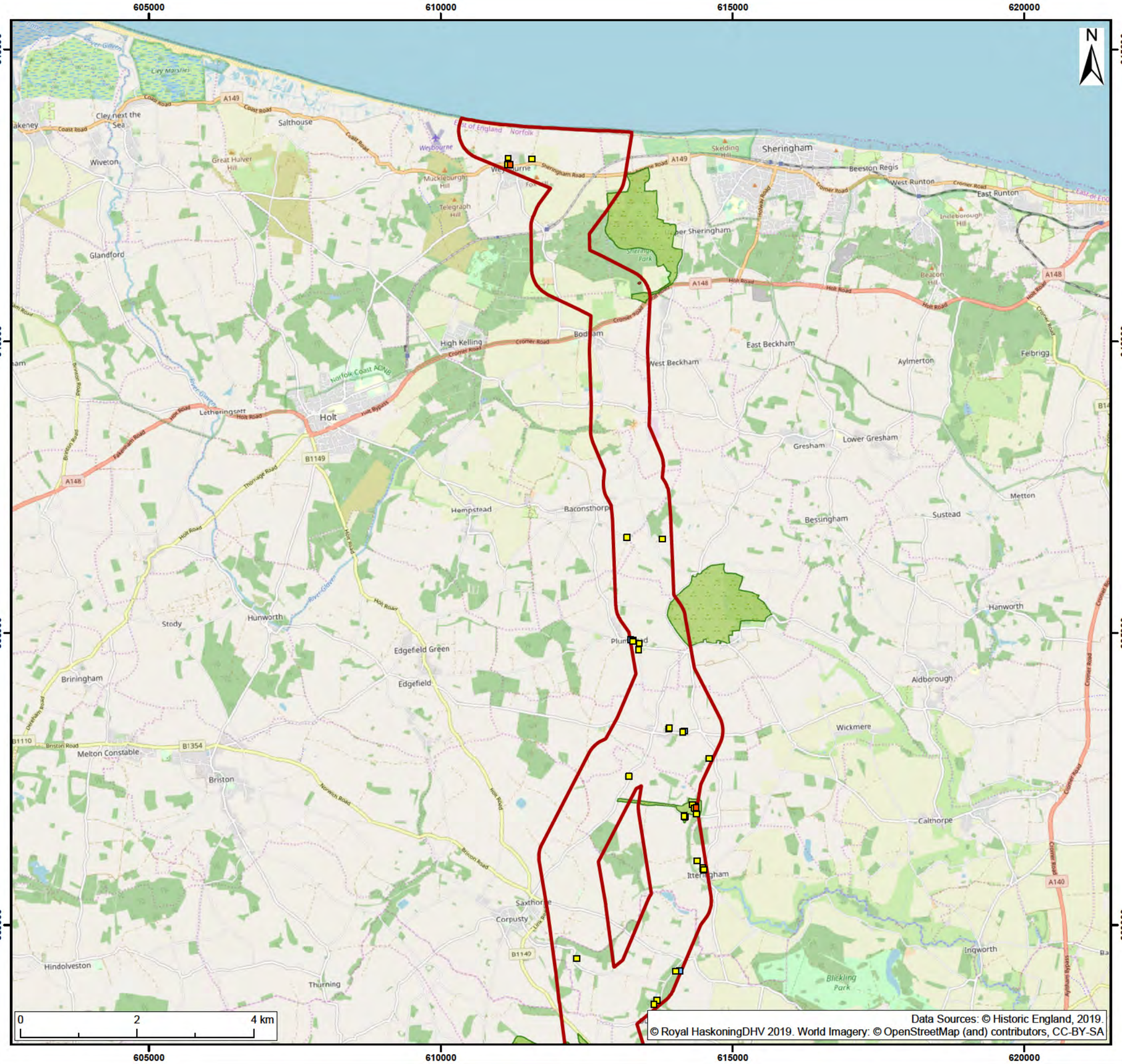
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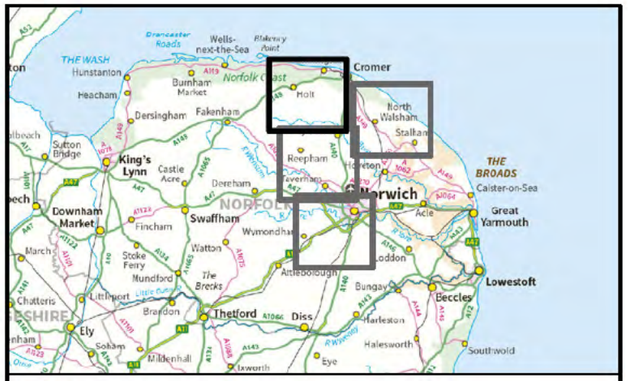
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Project: Dudgeon and Sheringham Shoal Offshore Wind Farm Extensions	Report: Scoping Report

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Legend:

- Onshore Scoping Area
- Registered Park and Garden
- Scheduled Monument

Listed Building

- Grade I
- Grade II
- Grade II*

A1	C01	02/10/2019	Approved & accepted stage complete	LB	MW	AP
SUI	REV	DATE	DESCRIPTION	DRW	CHK	APR

Title:

Designated Heritage Assets within Scoping boundary, Detailed figure (Sheet 1 of 4)

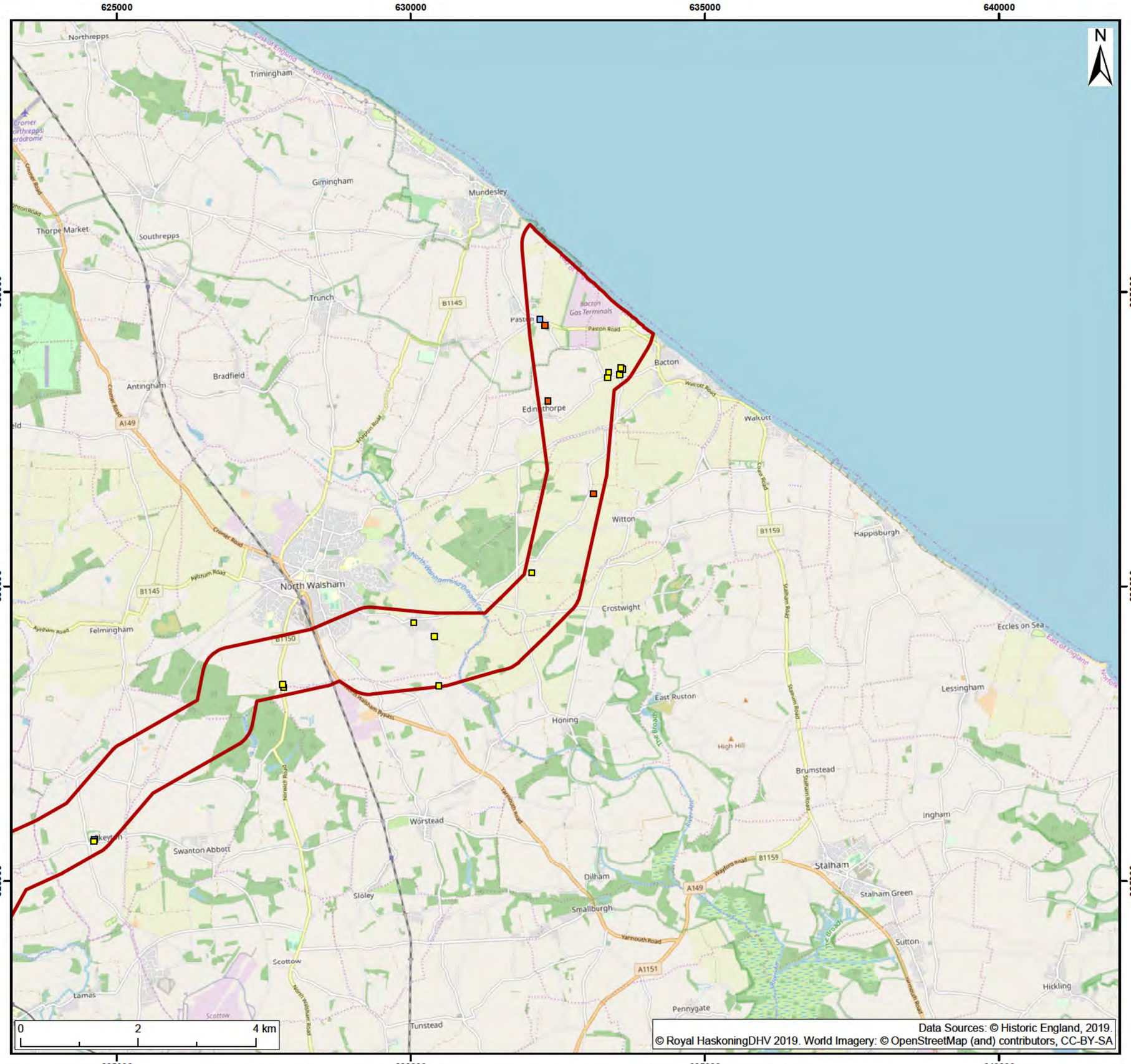
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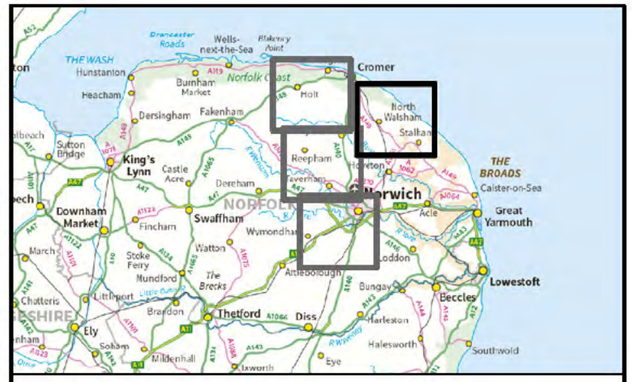
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Project: Dudgeon and Sheringham Shoal Offshore Wind Farm Extensions	Report: Scoping Report

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Legend:

- Onshore Scoping Area
- Scheduled Monument

Listed Building

- Grade I
- Grade II
- Grade II*

A1	C01	02/10/2019	Approved & accepted stage complete	LB	MW	AP
SUI	REV	DATE	DESCRIPTION	DRW	CHK	APR

Title:

Designated Heritage Assets within Scoping boundary, Detailed figure (Sheet 2 of 4)

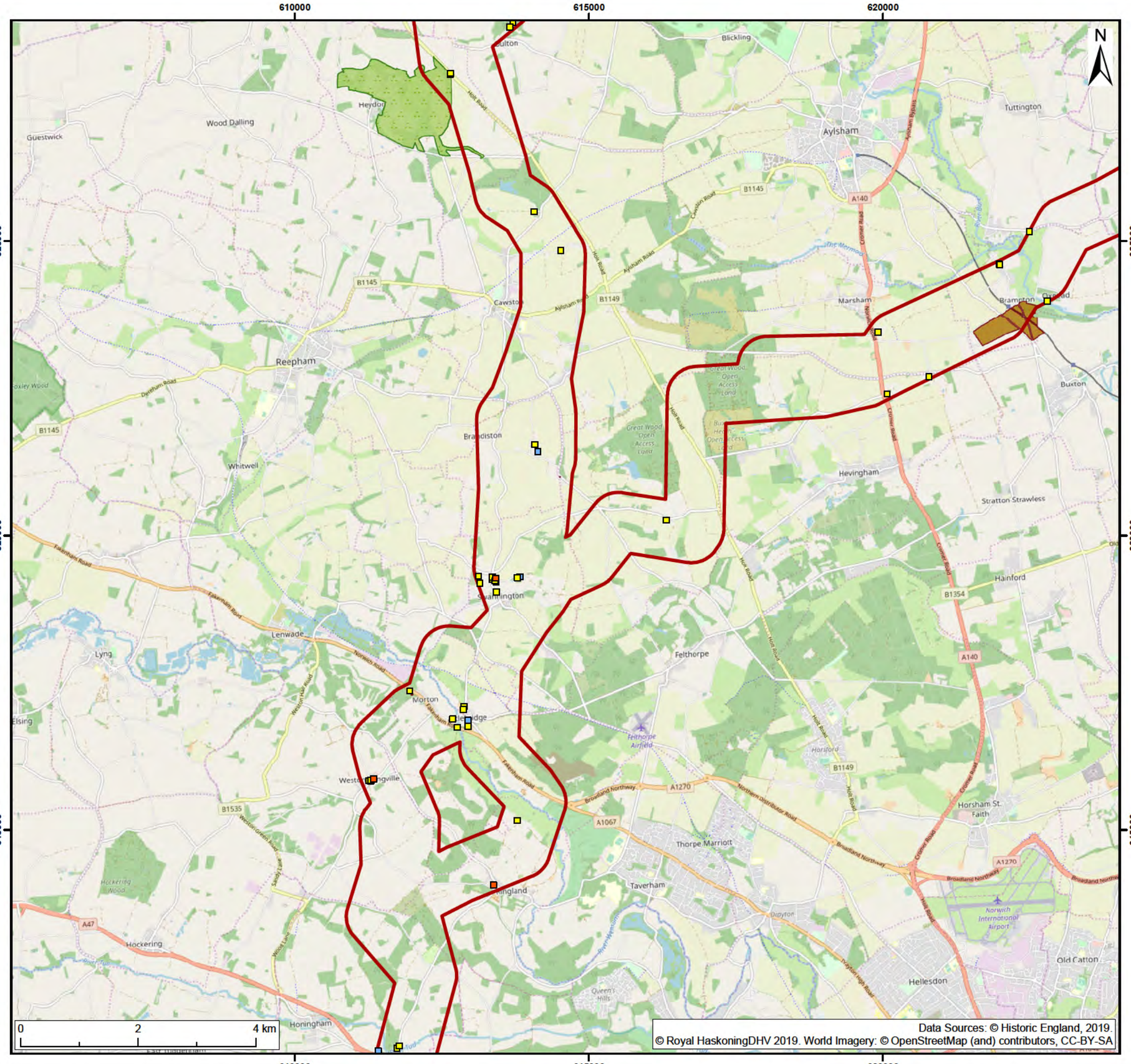
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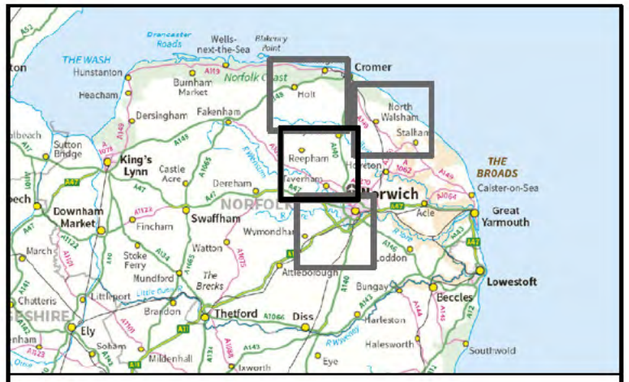
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Project:	Report:
Dudgeon and Sheringham Shoal Offshore Wind Farm Extensions	Scoping Report

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Legend:

- Onshore Scoping Area
- Registered Park and Garden
- Scheduled Monument

Listed Building

- Grade I
- Grade II
- Grade II*

A1	C01	02/10/2019	Approved & accepted stage complete	LB	MW	AP
SUI	REV	DATE	DESCRIPTION	DRW	CHK	APR

Title:

Designated Heritage Assets within Scoping boundary, Detailed figure (Sheet 3 of 4)

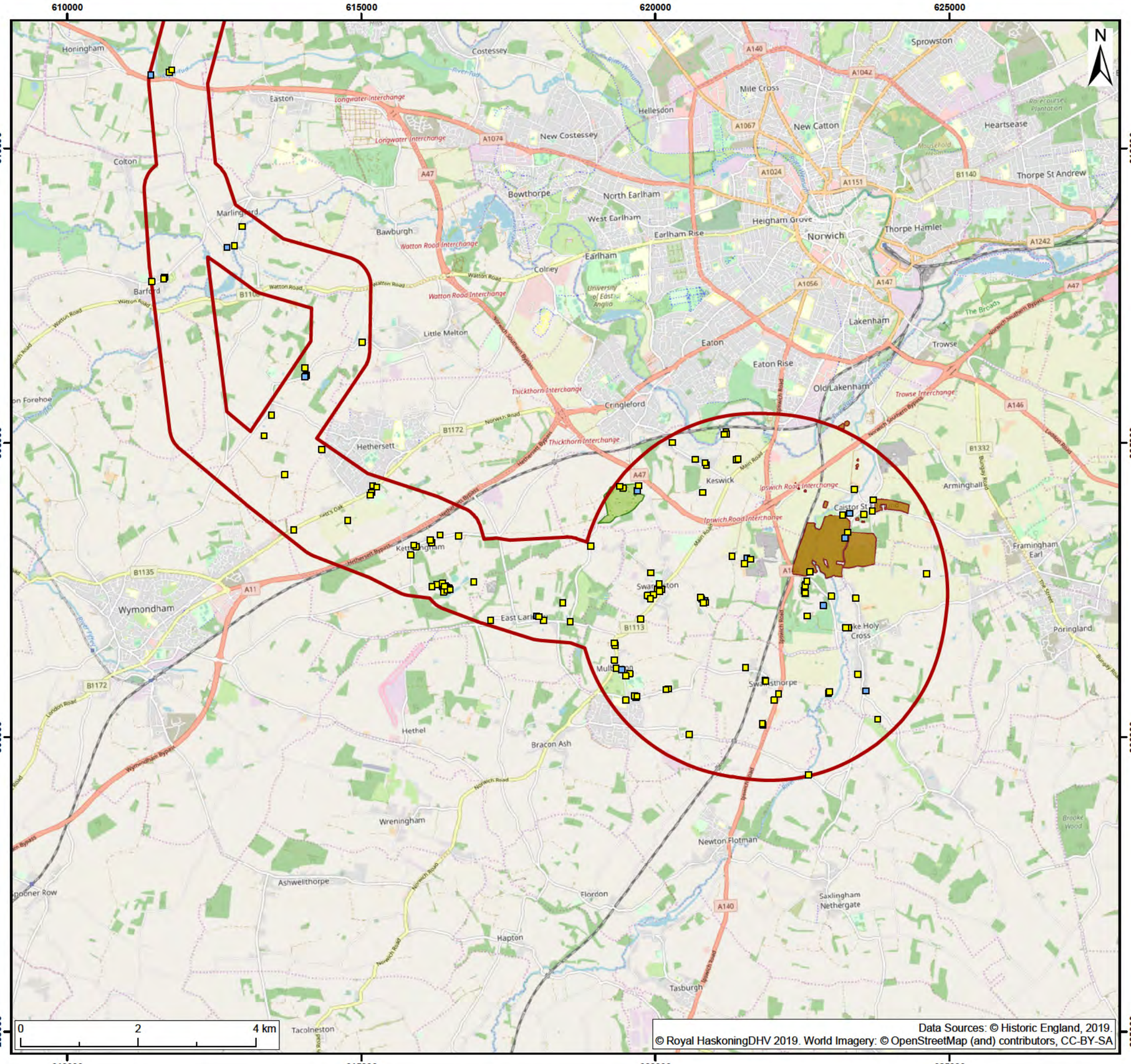
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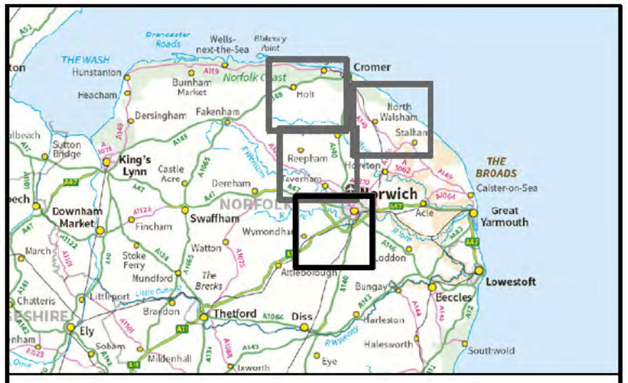
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Project: Dudgeon and Sheringham Shoal Offshore Wind Farm Extensions	Report: Scoping Report

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Legend:

- Onshore Scoping Area
- Registered Park and Garden
- Scheduled Monument

Listed Building

- Grade II
- Grade II*

A1	C01	02/10/2019	Approved & accepted stage complete	LB	MW	AP
SUI	REV	DATE	DESCRIPTION	DRW	CHK	APR

Title:

Designated Heritage Assets within Scoping boundary, Detailed figure (Sheet 4 of 4)

Figure: 3.5.2

Drawing No: PB8164-RHD-ZZ-ON-DR-Z-0009

Co-ordinate system: British National Grid

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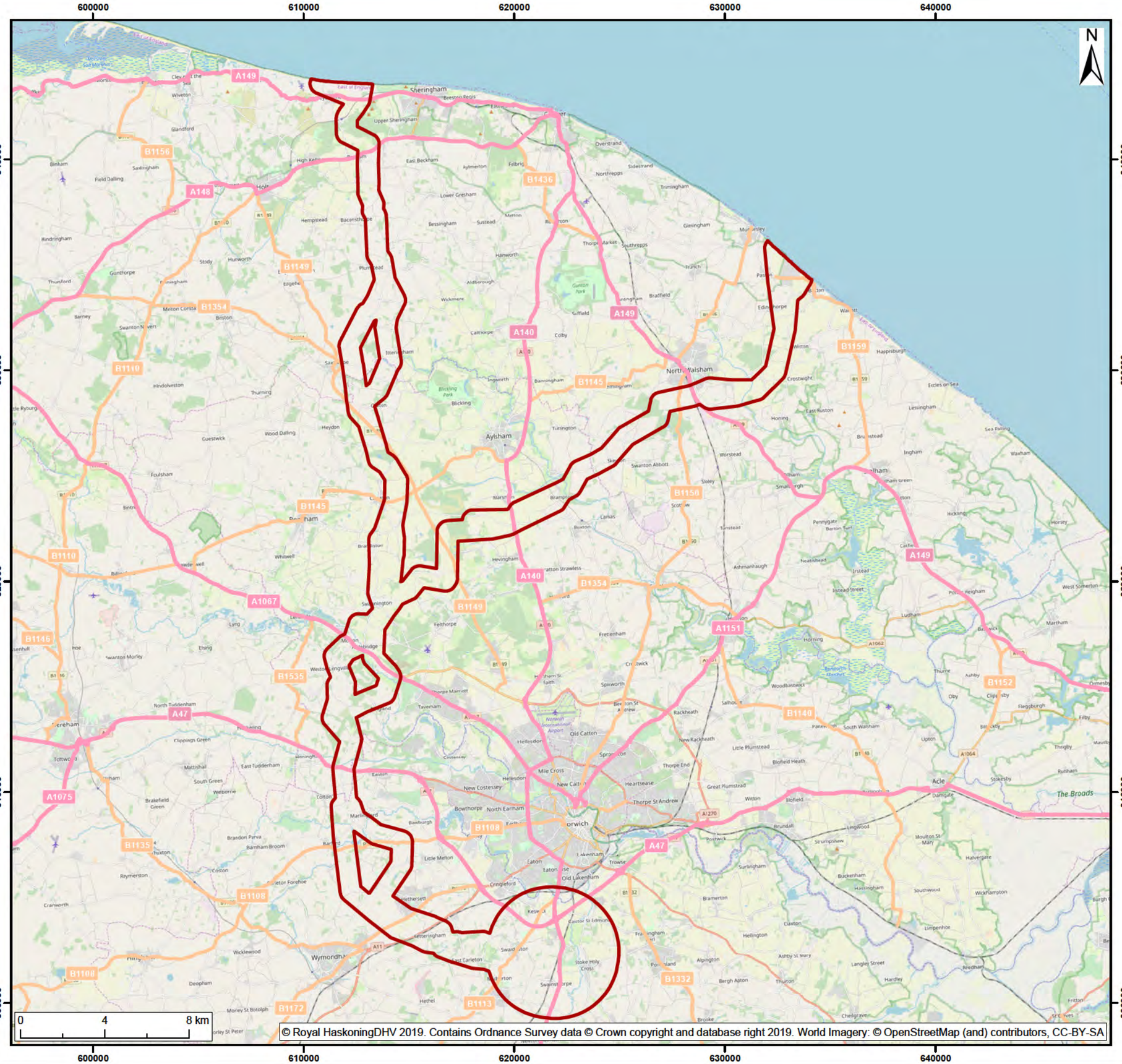
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Project: Dudgeon and Sheringham Shoal Offshore Wind Farm Extensions

Report: Scoping Report

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Legend:

- Onshore Scoping Area
- A Road
- B Road

A1	C01	01/10/2019	Approved & accepted stage complete	LB	MW	AP
SUI	REV	DATE	DESCRIPTION	DRW	CHK	APR

Title:

Strategic Road Network

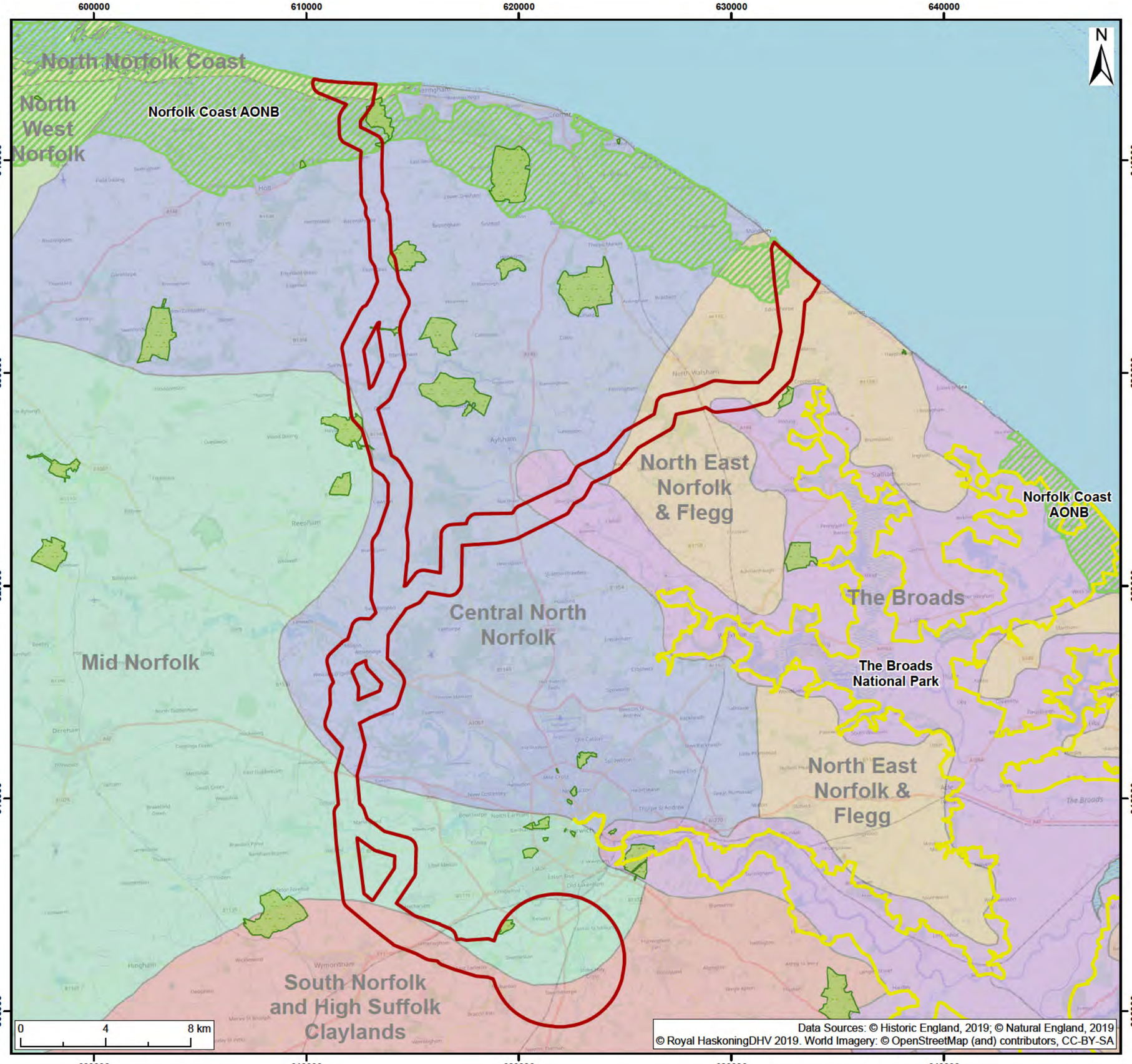
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Project: Dudgeon and Sheringham Shoal Offshore Wind Farm Extensions	Report: Scoping Report

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Legend:

- Onshore Scoping Area
- Area of Outstanding Natural Beauty (AONB)
- National Park
- Registered Park and Garden

National Character Area

- Central North Norfolk
- Mid Norfolk
- North East Norfolk and Flegg
- North Norfolk Coast
- North West Norfolk
- South Norfolk and High Suffolk Claylands
- Suffolk Coast and Heaths
- The Broads

A1	C01	24/07/2019	Approved & accepted stage complete	LB	MW	AP
SUI	REV	DATE	DESCRIPTION	DRW	CHK	APR

Title:

Landscape Designations
(Sheet 2 of 2)

Figure: 4.1.1

Drawing No: PB8164-RHD-ZZ-ON-DR-Z-0014

Co-ordinate system: British National Grid

Page Size: A3

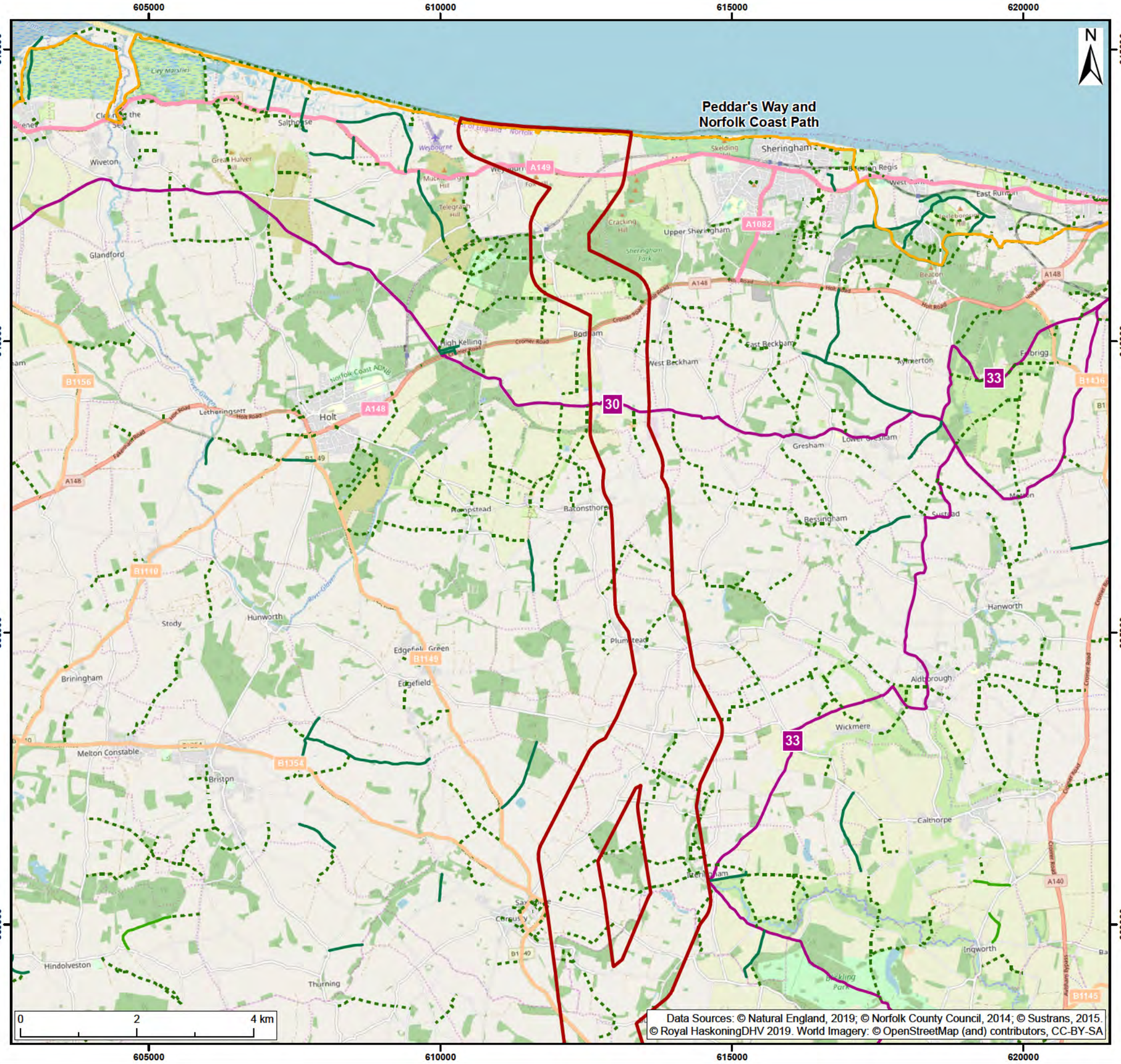
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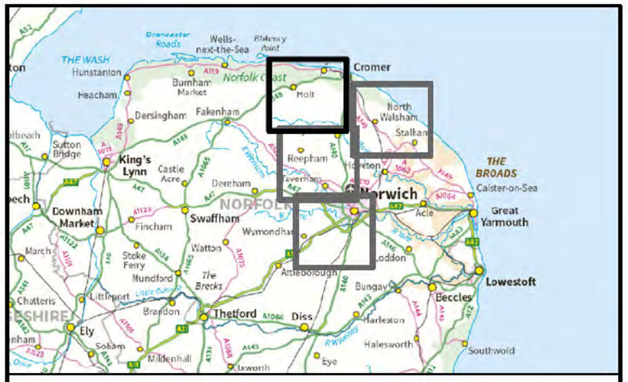
Project: Dudgeon and Sheringham Shoal Offshore Wind Farm Extensions

Report: Scoping Report

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Legend:

- Onshore Scoping
- A Road
- B Road
- Regional Cycle Route

Public Rights of Way

- Footpath
- Bridleway
- Restricted byway
- National Trails

A1	C01	02/10/2019	Approved & accepted stage complete	LB	MW	AP
SUI	REV	DATE	DESCRIPTION	DRW	CHK	APR

Title:

Visual Receptors

Figure: 4.1.2

Drawing No: PB8164-RHD-ZZ-ON-DR-Z-0015

Co-ordinate system: British National Grid

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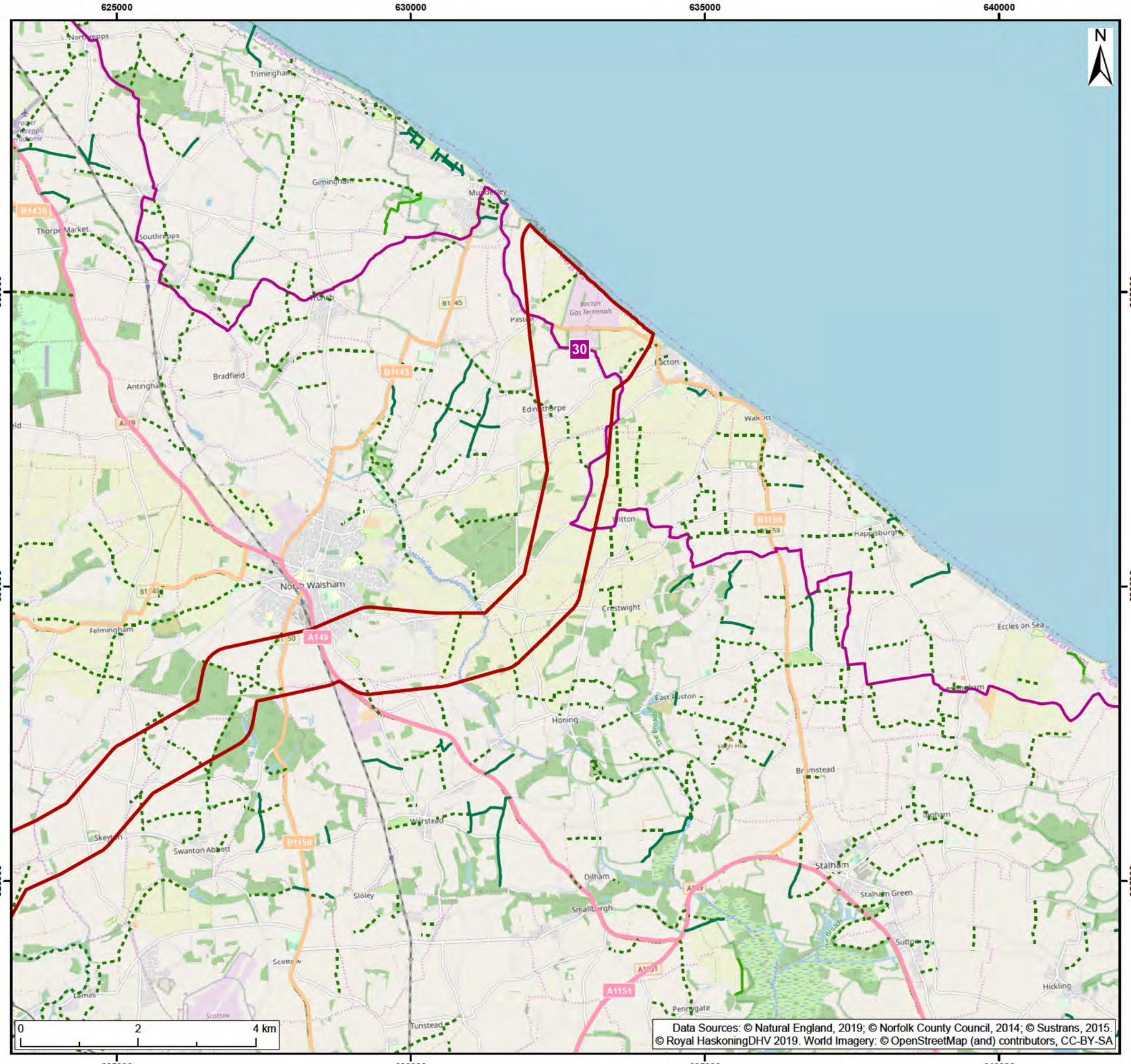
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Project: Dudgeon and Sheringham Shoal Offshore Wind Farm Extensions

Report: Scoping Report

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Legend:

- Onshore Scoping
- A Road
- B Road
- Regional Cycle Route

Public Rights of Way

- Footpath
- Bridleway
- Restricted byway

A1	C01	02/10/2019	Approved & accepted stage complete	LB	MW	AP
SUI	REV	DATE	DESCRIPTION	DRW	CHK	APR

Title:

Visual Receptors

Figure: 4.1.2

Drawing No: PB8164-RHD-ZZ-ON-DR-Z-0015

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Project: Dudgeon and Sheringham Shoal Offshore Wind Farm Extensions

Report: Scoping Report

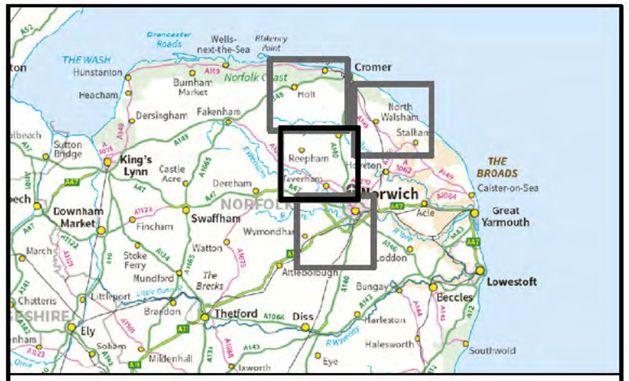
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Legend:

- Onshore Scoping
- A Road
- B Road
- National Cycle Route
- Regional Cycle Route

Public Rights of Way

- Footpath
- Bridleway
- Restricted byway

A1	C01	02/10/2019	Approved & accepted stage complete	LB	MW	AP
SUI	REV	DATE	DESCRIPTION	DRW	CHK	APR

Title:

Visual Receptors

Figure: 4.1.2

Drawing No: PB8164-RHD-ZZ-ON-DR-Z-0015

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Project: Dudgeon and Sheringham Shoal Offshore Wind Farm Extensions

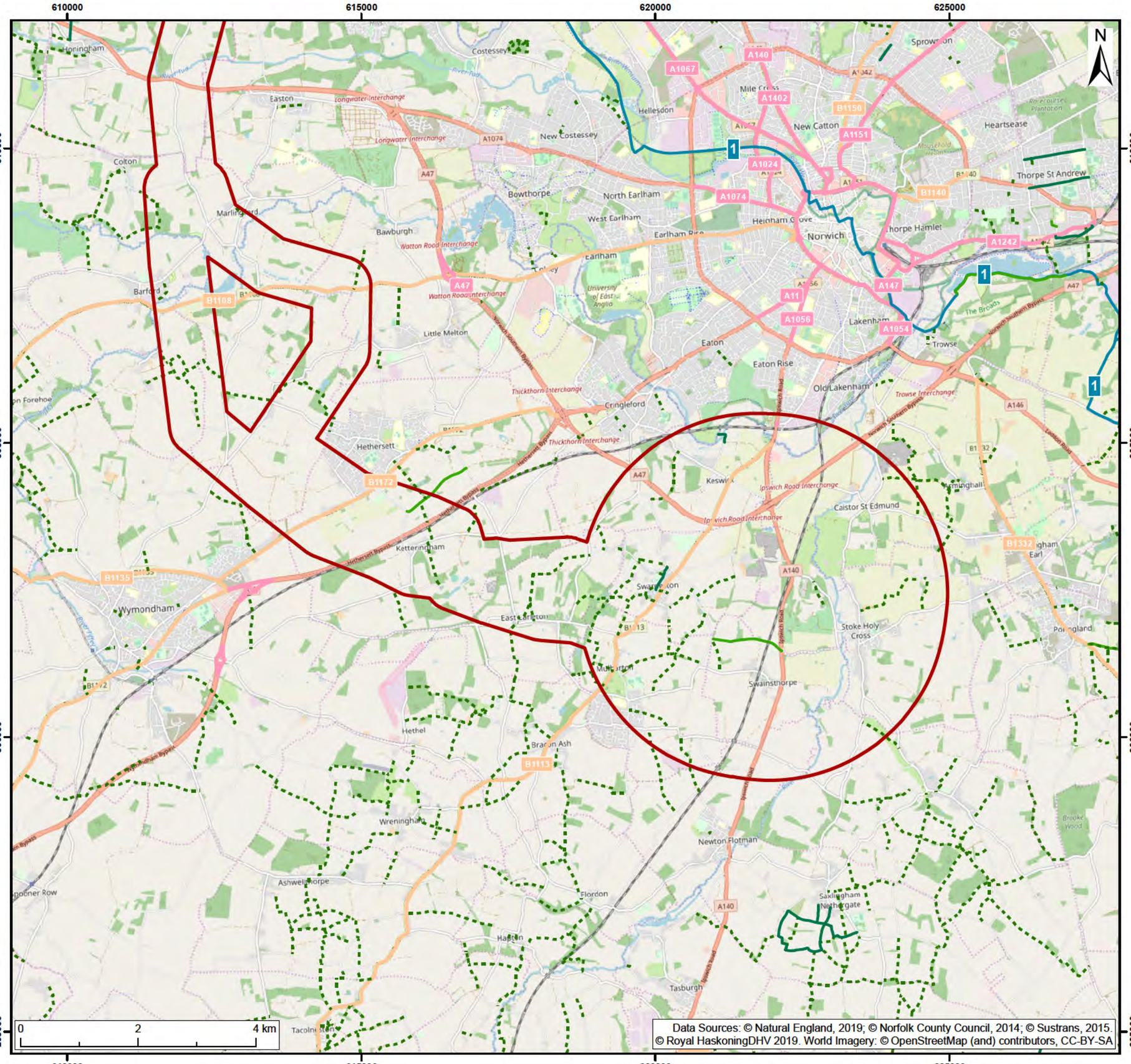
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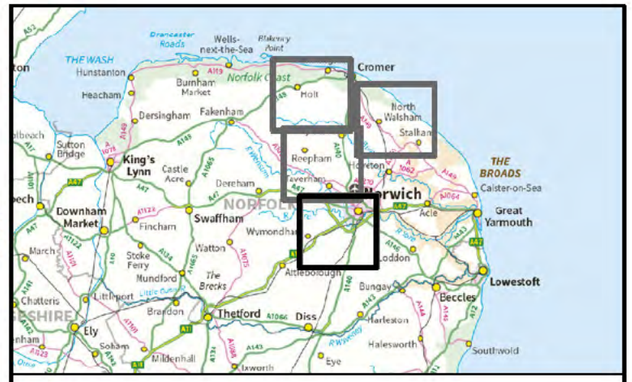
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0 2 4 km

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Legend:

- Onshore Scoping
- A Road
- B Road
- National Cycle Route

Public Rights of Way

- Footpath
- Bridleway
- Restricted byway

A1	C01	02/10/2019	Approved & accepted stage complete	LB	MW	AP
SUI	REV	DATE	DESCRIPTION	DRW	CHK	APR

Title:

Visual Receptors

Figure: 4.1.2

Drawing No: PB8164-RHD-ZZ-ON-DR-Z-0015

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Project: Dudgeon and Sheringham Shoal Offshore Wind Farm Extensions

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Weybourne Beach

Weybourne

Sheringham

North Norfolk Steam Railiway Sheringham to Holt

Sheringham

Sheringham Park

Baconsthorpe Castle

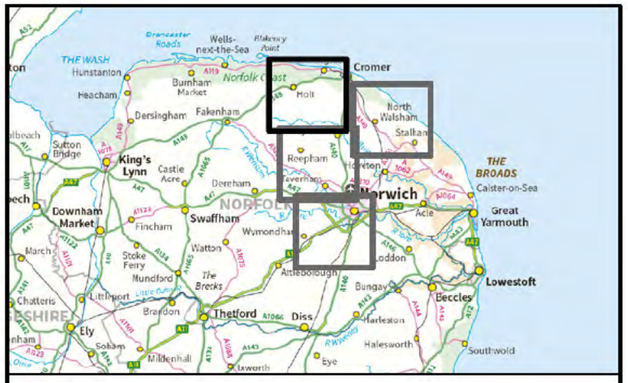
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33

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0 2 4 km

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Legend:

- Onshore Scoping Area

Notable Tourist Attractions

- Attraction Location (point locations)
- Blue Flag Beach
- Regional Cycle Route

Public Rights of Way

- Footpath
- Bridleway
- Restricted byway
- Peddar's Way and Norfolk Coast Path

A1	C01	02/10/2019	Approved & accepted stage complete	LB	MW	AP
SUI	REV	DATE	DESCRIPTION	DRW	CHK	APR

Title:

Notable Tourist attractions near to/in the Scoping Area

Figure: 4.4.1

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Co-ordinate system: British National Grid

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Project: Dudgeon and Sheringham Shoal Offshore Wind Farm Extensions

Report: Scoping Report

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Mundesley Village

Mundesley

Bacton

30

Thorpe Market

Southrepps

Gimingham

Trimingham

Bradfield

Antingham

North Walsham

Felmingham

Crostwight

Honing

East Ruston

Brumstead

Skeyton

Swanton Abbott

Worstead

Dilham

Sloley

Smallburgh

Stalham

Stalham Green

Sutton

Hickling

Eccles on Sea

Happisburgh

Walcott

Edingthorpe

Paston

Bacton Gas Terminals

Scottow

Lamas

Tunstead

Penrigate

0 2 4 km

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Legend:

- Onshore Scoping Area

Notable Tourist Attractions

- Attraction Location (point locations)
- Blue Flag Beach
- Regional Cycle Route

Public Rights of Way

- Footpath
- Bridleway
- Restricted byway

A1	C01	02/10/2019	Approved & accepted stage complete	LB	MW	AP
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Title:

Notable Tourist attractions near to/in the Scoping Area

Figure: 4.4.1 | Drawing No: PB8164-RHD-ZZ-ON-DR-Z-0011

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Project: Dudgeon and Sheringham Shoal Offshore Wind Farm Extensions

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Bure Steam Railway Aylsham to Wroxham

Roarr! Dinosaur Adventure Park

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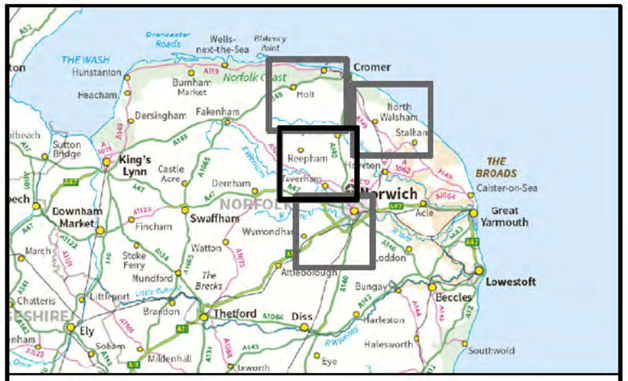
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0 2 4 km

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Legend:

- Onshore Scoping Area

Notable Tourist Attractions

- Attraction Location (point locations)
- National Cycle Route
- Regional Cycle Route

Public Rights of Way

- Footpath
- Bridleway
- Restricted byway

A1	C01	02/10/2019	Approved & accepted stage complete	LB	MW	AP
SUI	REV	DATE	DESCRIPTION	DRW	CHK	APR

Title:

Notable Tourist attractions near to/in the Scoping Area

Figure: 4.4.1	Drawing No: PB8164-RHD-ZZ-ON-DR-Z-0011

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Project: Dudgeon and Sheringham Shoal Offshore Wind Farm Extensions

Report: Scoping Report

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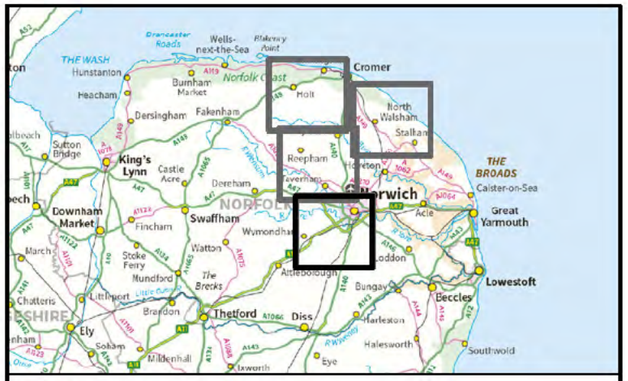
Ventura Icenorum Roman Town

Dunston Common

Dunston Hall Hotel and Golf Course

0 2 4 km

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Legend:

- Onshore Scoping Area

Notable Tourist Attractions

- Attraction Location (point locations)
- Attraction Location (areas)
- National Cycle Route

Public Rights of Way

- Footpath
- Bridleway
- Restricted byway

A1	C01	02/10/2019	Approved & accepted stage complete	LB	MW	AP
SUI	REV	DATE	DESCRIPTION	DRW	CHK	APR

Title:

Notable Tourist attractions near to/in the Scoping Area

Figure: 4.4.1

Drawing No: PB8164-RHD-ZZ-ON-DR-Z-0011

Co-ordinate system: British National Grid

Page Size: A3

Scale: 1:65,000

Project: Dudgeon and Sheringham Shoal Offshore Wind Farm Extensions

Report: Scoping Report

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The Planning Inspectorate
Yr Arolygiaeth Gynllunio

SCOPING OPINION:

Proposed Dudgeon and Sheringham Shoal Offshore Wind Farm Extensions

Case Reference: EN010109

Adopted by the Planning Inspectorate (on behalf of the Secretary of State) pursuant to Regulation 10 of The Infrastructure Planning (Environmental Impact Assessment) Regulations 2017

November 2019

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1. INTRODUCTION

1.1 Background

1.1.1 On 09 October 2019, the Planning Inspectorate (the Inspectorate) on behalf of the Secretary of State (SoS) received a scoping request from Equinor New Energy Limited (the Applicant) under Regulation 10 of the Infrastructure Planning (Environmental Impact Assessment) Regulations 2017 (the EIA Regulations) for the proposed Dudgeon and Sheringham Shoal Offshore Wind Farm Extensions (the Proposed Development).

1.1.2 In accordance with Regulation 10 of the EIA Regulations, an Applicant may ask the SoS to state in writing its opinion *'as to the scope, and level of detail, of the information to be provided in the environmental statement'.*

1.1.3 This document is the Scoping Opinion (the Opinion) provided by the Inspectorate on behalf of the SoS in respect of the Proposed Development. It is made on the basis of the information provided in the Applicant's report entitled Dudgeon and Sheringham Shoal Offshore Wind Farm Extensions Scoping Report (dated October 2019) (the Scoping Report). This Opinion can only reflect the proposals as currently described by the Applicant. The Scoping Opinion should be read in conjunction with the Applicant's Scoping Report.

1.1.4 The Applicant has notified the SoS under Regulation 8(1)(b) of the EIA Regulations that they propose to provide an Environmental Statement (ES) in respect of the Proposed Development. Therefore, in accordance with Regulation 6(2)(a) of the EIA Regulations, the Proposed Development is EIA development.

1.1.5 Regulation 10(9) of the EIA Regulations requires that before adopting a scoping opinion the Inspectorate must take into account:

(a) any information provided about the proposed development;

(b) the specific characteristics of the development;

(c) the likely significant effects of the development on the environment; and

(d) in the case of a subsequent application, the environmental statement submitted with the original application.

1.1.6 This Opinion has taken into account the requirements of the EIA Regulations as well as current best practice towards preparation of an ES.

1.1.7 The Inspectorate has consulted on the Applicant's Scoping Report and the responses received from the consultation bodies have been taken into account in adopting this Opinion (see Appendix 2).

1.1.8 The points addressed by the Applicant in the Scoping Report have been carefully considered and use has been made of professional judgement and experience in order to adopt this Opinion. It should be noted that when it comes to consider the ES, the Inspectorate will take account of relevant

legislation and guidelines. The Inspectorate will not be precluded from requiring additional information if it is considered necessary in connection with the ES submitted with the application for a Development Consent Order (DCO).

1.1.9 This Opinion should not be construed as implying that the Inspectorate agrees with the information or comments provided by the Applicant in their request for an opinion from the Inspectorate. In particular, comments from the Inspectorate in this Opinion are without prejudice to any later decisions taken (eg on submission of the application) that any development identified by the Applicant is necessarily to be treated as part of a Nationally Significant Infrastructure Project (NSIP) or Associated Development or development that does not require development consent.

1.1.10 Regulation 10(3) of the EIA Regulations states that a request for a scoping opinion must include:

(a) a plan sufficient to identify the land;

(b) a description of the proposed development, including its location and technical capacity;

(c) an explanation of the likely significant effects of the development on the environment; and

(d) such other information or representations as the person making the request may wish to provide or make.

1.1.11 The Inspectorate considers that this has been provided in the Applicant's Scoping Report. The Inspectorate is satisfied that the Scoping Report encompasses the relevant aspects identified in the EIA Regulations.

1.1.12 In accordance with Regulation 14(3)(a), where a scoping opinion has been issued in accordance with Regulation 10 an ES accompanying an application for an order granting development consent should be based on *'the most recent scoping opinion adopted (so far as the proposed development remains materially the same as the proposed development which was subject to that opinion)'*.

1.1.13 The Inspectorate notes the potential need to carry out an assessment under The Conservation of Habitats and Species Regulations 2017 and The Conservation of Offshore Marine Habitats and Species Regulations 2017 (the Habitats Regulations). This assessment must be co-ordinated with the EIA in accordance with Regulation 26 of the EIA Regulations. The Applicant's ES should therefore be co-ordinated with any assessment made under the Habitats Regulations.

1.2 The Planning Inspectorate's Consultation

1.2.1 In accordance with Regulation 10(6) of the EIA Regulations the Inspectorate has consulted the consultation bodies before adopting a scoping opinion. A list of the consultation bodies formally consulted by the Inspectorate is provided at Appendix 1. The consultation bodies have been notified under Regulation

11(1)(a) of the duty imposed on them by Regulation 11(3) of the EIA Regulations to make information available to the Applicant relevant to the preparation of the ES. The Applicant should note that whilst the list can inform their consultation, it should not be relied upon for that purpose.

1.2.2 The list of respondents who replied within the statutory timeframe and whose comments have been taken into account in the preparation of this Opinion is provided, along with copies of their comments, at Appendix 2, to which the Applicant should refer in preparing their ES.

1.2.3 The ES submitted by the Applicant should demonstrate consideration of the points raised by the consultation bodies. It is recommended that a table is provided in the ES summarising the scoping responses from the consultation bodies and how they are, or are not, addressed in the ES.

1.2.4 Any consultation responses received after the statutory deadline for receipt of comments will not be taken into account within this Opinion. Late responses will be forwarded to the Applicant and will be made available on the Inspectorate's website. The Applicant should also give due consideration to those comments in preparing their ES.

1.3 Article 50 of the Treaty on European Union

1.3.1 On 23 June 2016, the United Kingdom (UK) held a referendum and voted to leave the European Union (EU). On 29 March 2017 the Prime Minister triggered Article 50 of the Treaty on European Union, which commenced a period of negotiations regarding the UK's exit from the EU. On 26 June 2018 The European Union (Withdrawal) Act 2018 received Royal Assent and work to prepare the UK statute book for Brexit has begun. The European Union (Withdrawal) Act 2018 will make sure that UK laws continue to operate following the UK's exit. There is no immediate change to legislation or policy affecting national infrastructure. Relevant EU Directives have been transposed into UK law and those are unchanged until amended by Parliament.

2. THE PROPOSED DEVELOPMENT

2.1 Introduction

2.1.1 The following is a summary of the information on the Proposed Development and its site and surroundings prepared by the Applicant and included in their Scoping Report. The information has not been verified and it has been assumed that the information provided reflects the existing knowledge of the Proposed Development and the potential receptors/ resources.

2.2 Description of the Proposed Development

2.2.1 The Applicant's description of the Proposed Development is provided in section 1.5 of the Scoping Report.

2.2.2 The Proposed Development comprises extensions to the existing Dudgeon Offshore Wind Farm and the existing Sheringham Shoal Offshore Wind farm which are located off the North Norfolk Coast. The Dudgeon Extension Project (DEP) component covers 92.6km^2 and would comprise up to 34 turbines and the Sheringham Extension Project (SEP) component covers 103.5km^2 and would comprise up to 27 turbines. Each turbine would have a maximum rotor diameter of up to 300m and a maximum tip height of 326m.

2.2.3 There are three potential development options:

(i) DEP and SEP together;

(ii) DEP only; or

(iii) SEP only.

2.2.4 The offshore elements of the Proposed Development would comprise turbines, array cables, one or two offshore substation(s) and potentially interlink cables, cable protection and scour protection. Offshore export cables would connect an offshore substation to the landfall, of which there are currently two alternative options (Weybourne and Bacton). The offshore scoping area is shown on Figure 1.1.1 of the Scoping Report.

2.2.5 From the landfall, onshore export cables would connect to a new onshore substation which would be located as close as practicable to the existing National Grid substation at Norwich Main located south of Norwich. The new onshore substation would be connected to the Norwich Main substation via a grid connection. Energy balancing infrastructure may also be incorporated in the form of a battery storage solution. The onshore scoping area is shown on Figure 1.1.1 of the Scoping Report.

2.2.6 Paragraph 45 of the Scoping Report states that once the landfall has been selected, only one cable route will be taken forward into the DCO application. The offshore cable corridor would be refined in the inshore area to align with the final landfall location, with the export of electricity to shore from DEP and SEP following the same cable route option.

2.2.7 There are two options for the electrical infrastructure depending on the ownership and phasing of the Proposed Development. There would either be an integrated solution with the transmission infrastructure serving both DEP and SEP together, or two standalone connections (within the same overall corridors), as described in paragraphs 14 to 16 of the Scoping Report. However, the export of electricity to shore from DEP and SEP would follow the same cable route option; therefore the final offshore and onshore cable corridors would accommodate the infrastructure for both DEP and SEP.

2.3 The Planning Inspectorate's Comments

Description of the Proposed Development

2.3.1 The ES should include the following:

- a description of the Proposed Development comprising at least the information on the site, design, size and other relevant features of the development; and
- a description of the location of the development and description of the physical characteristics of the whole development, including any requisite demolition works and the land-use requirements during construction and operation phases.

2.3.2 The anticipated generating capacity of the Proposed Development is not stated in the Scoping Report, although paragraph 5 explains that DEP and SEP would each have an expected capacity greater than 100MW. The maximum technical capacity (ie electrical output) of the individual wind turbines and of the Proposed Development as a whole should be confirmed within the ES.

2.3.3 The Inspectorate welcomes that the onshore and offshore footprints of the Proposed Development will be refined to the areas required for the proposed infrastructure. However, the broad description provided, which includes the broad offshore scoping area, two alternative landfalls and cable options and the 3km search area of the onshore project substation, reduces certainty and limits the Inspectorate's ability to provide meaningful comments on the project description and the resultant likely significant effects at this stage. The Inspectorate notes that timely refinement of options will support a more robust assessment of likely significant effects and increase certainty for those likely to be affected.

2.3.4 The construction programme for the 'separated' grid option, as depicted on Figure 1.5-6 of the Scoping Report, does not identify the timeframes for installation of the offshore export cable and array cables of Project 2. The Inspectorate assumes this is an error and advises this is corrected in any similar figures to be included in the ES.

2.3.5 The ES should also specify the anticipated working hours for construction. Any need for unsocial hours of working should be detailed.

2.3.6 The Scoping Report provides limited detail on operation and maintenance activities. The ES should provide a full description of the nature and scope of

these activities, including the types of activity, their frequency, and how works will be carried out for both the onshore and offshore elements of the Proposed Development.

2.3.7 The anticipated operational lifespan of the Proposed Development is inconsistently reported throughout the Scoping Report; this should be clearly and consistently defined within the ES to provide a clear indication of the likely duration of operational impacts.

2.3.8 The information regarding decommissioning in paragraph 160 of the Scoping Report is noted. The ES should include the rationale in support of the assessment of potential significant effects during the decommissioning phase, including a description of anticipated decommissioning activities. Where there is uncertainty around the impacts of decommissioning this should be clearly explained along with the implications for the assessment of significant effects.

Offshore

2.3.9 The ES should clearly describe the different permutations of the Proposed Development that would arise should both, or just one of DEP/SEP, be constructed. This should include a clear description of the electrical infrastructure that would be installed in each circumstance. Figures to depict the arrangements for these alternative options would aid in this understanding.

2.3.10 Section 1.5.6.2 of the Scoping Report identifies the need for seabed preparation for foundations. Any requisite seabed preparation for the array cables, the interlink cables and the export cable route should also be described and any resultant likely significant effects assessed within the ES. Should seabed preparation involve dredging, the ES should identify the quantities of dredged material and identify the likely location for disposal.

2.3.11 The ES should identify the worst-case footprint of seabed disturbance that would arise from all offshore construction activities, for example seabed clearance/preparation, and vessel jack up and anchoring. The maximum footprints of all permanent components should also be identified.

2.3.12 Table 1-3 of the Scoping Report identifies the potential need for both cable and scour protection. No quantities (ie volume or footprint) have been specified at this stage and cable protection has only been identified for array cables. The ES should quantify the anticipated worst-case amount of scour and cable protection (including for cable crossings) that would be utilised for the Proposed Development, including for the export cables.

2.3.13 The Scoping Report identifies a number of wind turbine foundation options which could be used for the Proposed Development. The different foundation types could result in different impacts to the seabed, for example the area of seabed to be disturbed, volumes of spoil arisings and noise levels from installation. The Inspectorate acknowledges the foundation type will not be known by time of application, therefore the Applicant should ensure that the ES clearly identifies and assesses the

worst-case scenario for the different environmental aspects and matters that could be significantly affected.

2.3.14 Table 1-7 of the Scoping Report states that the length of array cables will be dependent upon the final distance between turbines. The Inspectorate expects the ES to confirm the maximum length of both array and interlink cables so that the likely significant effects of these elements can be understood.

2.3.15 Paragraph 141 of the Scoping Report states that the maximum hammer size for pile driving would be 4500kJ. The ES should also describe the maximum diameter of piles should they be used.

Onshore

2.3.16 The Scoping Report states that the cable corridor is 500m wide, however the scale on the figures indicates a greater width than this. The Inspectorate acknowledges that the final cable corridor will be refined for the application. The Applicant should ensure that the project description within the ES and any figures reflect one another appropriately.

2.3.17 The Scoping Report identifies the need for jointing bays and link boxes up to every 300m. The Scoping Report does not state whether their locations will be determined by the time of the application, however, from experience gained in other offshore wind farms the Inspectorate anticipates this may not be the case. Assuming this outcome, the ES should identify a worst case scenario for the number of jointing pits and link boxes. Where commitments are made at specific locations to mitigate any potential effects, these should be secured for example through a detailed construction method statement or Code of Construction Practice (CoCP)/Construction Environmental Management Plan (CEMP).

2.3.18 The Scoping Report states that the Proposed Development may incorporate balancing equipment/storage infrastructure, such as a battery which would be housed within the footprint of the onshore substation. The Scoping Report states that a range of technologies are under development and will be assessed with the ES. The ES should include sufficient detail (perhaps in the form of parameters) to describe such equipment in order to provide confidence that any potential effects have been assessed in the ES.

2.3.19 The Scoping Report has identified the need for access roads to the onshore substation. The ES should identify whether new routes, either temporary or permanent, are required to access the onshore cable corridor and/or the temporary compounds. The likely significant effects of all temporary and permanent accesses should be included in the assessment scope.

2.3.20 Given the length of the onshore cable, there is the potential for numerous points at which the cable will need to cross roads, railways, watercourses, gas, water and electrical infrastructure. The ES should identify the locations and type of all such crossings. Where commitments are made

within the ES to use a specific method as mitigation (e.g. trenchless techniques at sensitive locations), the Applicant should ensure that such commitments are adequately secured.

2.3.21 The Scoping Report states that the onshore substation may connect to the existing Norwich Main substation through either an overhead connection or an underground connection, depending on their proximity to one another. The Inspectorate expects the ES to provide greater clarity as to the necessary connection works in order to inform a meaningful assessment of likely significant effects.

Alternatives

2.3.22 The EIA Regulations require that the Applicant provide 'A description of the reasonable alternatives (for example in terms of development design, technology, location, size and scale) studied by the developer, which are relevant to the proposed project and its specific characteristics, and an indication of the main reasons for selecting the chosen option, including a comparison of the environmental effects'.

2.3.23 The Scoping Report provides an overview on the main site selection activities undertaken to develop the scoping areas and a summary of the alternatives considered to date. References are made to environmental receptors which the Applicant has considered, although these are described at a very high level in relation to onshore site selection (section 1.4.4).

2.3.24 The Inspectorate acknowledges the Applicant's intention to consider alternatives within the ES (paragraph 199). The Inspectorate would expect to see a discrete section in the ES that provides details of the reasonable alternatives studied and the reasoning for the selection of the chosen option(s), including a comparison of the environmental effects.

Flexibility

2.3.25 The Inspectorate notes the Applicant's desire to incorporate flexibility into their draft DCO (dDCO) and its intention to apply a Rochdale Envelope approach for this purpose. Where the details of the Proposed Development cannot be defined precisely, the Applicant will apply a worst case scenario. The Inspectorate welcomes the reference to Planning Inspectorate Advice Note nine 'Using the 'Rochdale Envelope' in this regard.

2.3.26 The Applicant should make every attempt to narrow the range of options and explain clearly in the ES which elements of the Proposed Development have yet to be finalised and provide the reasons. At the time of application, any Proposed Development parameters should not be so wide-ranging as to represent effectively different developments. The development parameters will need to be clearly defined in the dDCO and in the accompanying ES. It is a matter for the Applicant, in preparing an ES, to consider whether it is possible to robustly assess a range of impacts resulting from a large number of undecided parameters. The description of the Proposed Development in the ES

must not be so wide that it is insufficiently certain to comply with the requirements of Regulation 14 of the EIA Regulations.

2.3.27 It should be noted that if the Proposed Development materially changes prior to submission of the DCO application, the Applicant may wish to consider requesting a new scoping opinion.

2.3.28 The Inspectorate understands that flexibility is being sought in a number of areas, for example:

- the option to develop either SEP or DEP alone, or both together (either consecutively or phased); and
- an integrated electrical infrastructure approach or separate grid connections (including the number of offshore substations).

2.3.29 The Applicant should ensure that the project description in the ES clearly identifies the differences for each permutation. The ES should define and assess the worst case scenario for which development consent is being sought.

2.3.30 The ES should describe and assess the impacts resulting from staggered construction and the potential for one extension project to be operational whilst the other is constructed.

3. ES APPROACH

3.1 Introduction

3.1.1 This section contains the Inspectorate's specific comments on the scope and level of detail of information to be provided in the Applicant's ES. General advice on the presentation of an ES is provided in the Inspectorate's Advice Note Seven 'Environmental Impact Assessment: Process, Preliminary Environmental Information and Environmental Statements'[1] and associated appendices.

3.1.2 Aspects/ matters (as defined in Advice Note Seven) are not scoped out unless specifically addressed and justified by the Applicant and confirmed as being scoped out by the Inspectorate. The ES should be based on the Scoping Opinion in so far as the Proposed Development remains materially the same as the Proposed Development described in the Applicant's Scoping Report.

3.1.3 The Inspectorate has set out in this Opinion where it has/ has not agreed to scope out certain aspects/ matters on the basis of the information available at this time. The Inspectorate is content that the receipt of a Scoping Opinion should not prevent the Applicant from subsequently agreeing with the relevant consultation bodies to scope such aspects/ matters out of the ES, where further evidence has been provided to justify this approach. However, in order to demonstrate that the aspects/ matters have been appropriately addressed, the ES should explain the reasoning for scoping them out and justify the approach taken.

3.1.4 Where relevant, the ES should provide reference to how the delivery of measures proposed to prevent/ minimise adverse effects is secured through DCO requirements (or other suitably robust methods) and whether relevant consultation bodies agree on the adequacy of the measures proposed.

3.2 Relevant National Policy Statements (NPSs)

3.2.1 Sector-specific NPSs are produced by the relevant Government Departments and set out national policy for NSIPs. They provide the framework within which the Examining Authority (ExA) will make their recommendation to the SoS and include the Government's objectives for the development of NSIPs. The NPSs may include environmental requirements for NSIPs, which Applicants should address within their ES.

3.2.2 The designated NPSs relevant to the Proposed Development are the:

- Overarching NPS For Energy (NPS EN-1);

[1] Advice Note Seven: Environmental Impact Assessment: Process, Preliminary Environmental Information and Environmental Statements and annex. Available from: https://infrastructure.planninginspectorate.gov.uk/legislation-and-advice/advice-notes/

- NPS on Renewable Energy Infrastructure (NPS EN-3); and
- NPS for Electricity Networks Infrastructure (NPS EN-5).

3.3 Scope of Assessment

General

3.3.1 The Inspectorate recommends that in order to assist the decision-making process, the Applicant uses tables:

- to demonstrate how the assessment has taken account of this Opinion;
- to identify and collate the residual effects after mitigation for each of the aspect chapters, including the relevant interrelationships and cumulative effects;
- to set out the proposed mitigation and/ or monitoring measures including cross-reference to the means of securing such measures (eg a dDCO requirement);
- to describe any remedial measures that are identified as being necessary following monitoring; and
- to identify where details are contained in the Habitats Regulations Assessment (HRA report) (where relevant), such as descriptions of European sites and their locations, together with any mitigation or compensation measures, are to be found in the ES.

Baseline Scenario

3.3.2 The ES should include a description of the baseline scenario with and without implementation of the development as far as natural changes from the baseline scenario can be assessed with reasonable effort on the basis of the availability of environmental information and scientific knowledge.

3.3.3 In relation to the offshore environment, the Scoping Report states that it will draw on data from the ES's for, and post-construction monitoring of, the existing Dudgeon and Sheringham Offshore Wind Farms. The Inspectorate agrees that this data will provide a useful starting point to inform the environmental baseline. The Inspectorate advises the Applicant seeks to agree with relevant consultation bodies the degree to which this existing information is applicable for the Proposed Development and can be used to inform the baseline; particular consideration should be given to the methods and the spatial and temporal scope of previous surveys.

3.3.4 Paragraph 190 of the Scoping Report states that projects which are sufficiently implemented during the site characterisation for DEP and SEP will be considered as part of the baseline for EIA. The ES should clearly define what is meant by 'sufficiently implemented'.

3.3.5 Although the majority of onshore aspect chapters have identified a study area for the purposes of scoping, the Inspectorate assumes that given the onshore route will be refined and the onshore substation location determined prior to

application, this is unlikely to be the same study area for the assessments in the ES. The Inspectorate notes that where surveys are proposed, the aspect chapters of the Scoping Report have identified (at a high level), the spatial coverage of baseline surveys. The extent of study areas should relate to the zone of influence of potential effects and should be clearly defined and justified within the ES. Reference should be made to recognised professional guidance, where relevant. Figures depicting the extent of study areas should be provided where relevant.

3.3.6 Some aspect chapters of the Scoping Report have identified specific receptors, but the majority of the Scoping Report identifies broad categories of receptors only. Specific receptors should be clearly identified within the ES, alongside a categorisation of their sensitivity and value. Section 1.6.4.1 of the Scoping Report explains that receptor sensitivity would be identified in order to assess the potential impacts upon each receptor and discusses considerations that will be taken into account in doing so. The Inspectorate expects a transparent and reasoned approach to be applied to assigning receptor sensitivity and that this will be clearly set out in the ES.

Forecasting Methods or Evidence

3.3.7 The ES should contain the timescales upon which the surveys which underpin the technical assessments have been based. For clarity, this information should be provided either in the introductory chapters of the ES (with confirmation that these timescales apply to all chapters), or in each aspect chapter.

3.3.8 The Inspectorate expects the ES to include a chapter setting out the overarching methodology for the assessment, which clearly distinguishes effects that are 'significant' from 'non-significant' effects. Any departure from that methodology should be described in individual aspect assessment chapters.

3.3.9 The ES should include details of difficulties (for example technical deficiencies or lack of knowledge) encountered compiling the required information and the main uncertainties involved.

3.3.10 The Scoping Report explains that SEP/DEP would have separate offshore export cables which would be installed in separate trenches in separate installation campaigns. The ES should identify the spatial separation between the two cables and assess any likely significant effects that could arise from repetitive disruption/disturbance to receptors within the export cable corridor.

3.3.11 The onshore export system would comprise either a common trench for the two circuits or two separate trenches. The ES should identify a worst case scenario for the assessment, which considers the implications of constructing two separate trenches over temporally distinct time periods and the maximum land take required. The potential for repeat disruption/disturbance should be assessed.

3.3.12 Tables 1-11 and 1-12 of the Scoping Report provide significance matrix and impact significance definitions, respectively. The ES should clearly distinguish between significant and non-significant residual effects.

3.3.13 The approach to assessing and interpreting significance levels should be consistent across aspect chapters. Where matrices are used, they too should be consistent so that a given magnitude/ sensitivity combination results in the same level of overall significance. The terminology used to define magnitude and sensitivity should also be consistent, where possible, and the ES should clearly explain where and how professional judgement has been applied in assessing the significance of effects.

3.3.14 The aspect chapters of the Scoping Report confirm that cumulative effects will be assessed within the ES and that the scope (in terms of relevant issues and projects) will be established with consultation bodies (including other developers). The Scoping Report states that the full list of plans and projects to be included in the assessment will be developed as part of on-going consultation with technical consultation bodies. Section 1.6.4.7 of the Scoping Report states that that "*only projects which are reasonably well described and sufficiently advanced to provide information on which to base a meaningful and robust assessment will be included in the CIA"*. The tiered approach set out in Advice Note Seventeen enables Applicant's to group plans and projects according to the level of information available; the Inspectorate recommends that this approach is adopted.

3.3.15 The Inspectorate notes the proximity of the Proposed Development to other proposed NSIPs, including Norfolk Vanguard, Norfolk Boreas and Hornsea Project Three offshore wind farms. Whilst there is the possibility that these projects may not overlap temporally, the assessment should take into account the effects of repetitive impacts over a prolonged duration.

3.3.16 The Scoping Report explains that an Evidence Plan Process with specialist stakeholders has commenced in effort to agree the approach and information required to support the assessment of certain environmental aspects. A large number of aspect chapters, state that the assessment methodology will be agreed through this process or through the production of method statements. As a result, there is little detail regarding the proposed assessment methodologies for a number of the aspect chapters. This approach to agreeing the finer details of the assessment is welcomed. The Applicant should ensure that any agreements reached during this process are evidenced within the ES.

Residues and Emissions

3.3.17 The EIA Regulations require an estimate, by type and quantity, of expected residues and emissions. Specific reference should be made to water, air, soil and subsoil pollution, noise, vibration, light, heat, radiation and quantities and types of waste produced during the construction and operation phases, where relevant. This information should be provided in a clear and consistent fashion and may be integrated into the relevant aspect assessments.

Mitigation and Monitoring

3.3.18 Although the Scoping Report states that mitigation will be developed for the Proposed Development if required, no specific examples have been provided at this stage. Any mitigation relied upon for the purposes of the assessment should be explained in detail within the ES. The likely efficacy of the mitigation proposed should be explained with reference to residual effects. The ES should also address how any mitigation proposed is secured, with reference to specific DCO requirements or other legally binding agreements.

3.3.19 The ES should clearly demonstrate how the Applicant has had regard to the mitigation hierarchy, for example by giving consideration to the avoidance of key receptors.

3.3.20 Paragraph 13 of the Scoping Report confirms that each project will be assessed individually so that mitigation is project specific (where appropriate). Where mitigation is proposed for one of SEP or DEP, this should be clearly explained and delineated within the ES.

3.3.21 The ES should also identify and describe any proposed monitoring of significant adverse effects and how the results of such monitoring would be utilised to inform any necessary remedial actions.

Risks of Major Accidents and/or Disasters

3.3.22 The Scoping Report does not address the risk of major accidents and/or disasters. The ES should include a description and assessment (where relevant) of the likely significant effects resulting from accidents and disasters applicable to the Proposed Development. The Applicant should make use of appropriate guidance (e.g. that referenced in the Health and Safety Executives (HSE) Annex to Advice Note 11) to better understand the likelihood of an occurrence and the Proposed Development's susceptibility to potential major accidents and hazards. The description and assessment should consider the vulnerability of the Proposed Development to a potential accident or disaster and also the Proposed Development's potential to cause an accident or disaster. The assessment should specifically assess significant effects resulting from the risks to human health, cultural heritage or the environment. Any measures that will be employed to prevent and control significant effects should be presented in the ES.

3.3.23 HSE's consultation response identifies a number of major accident hazard sites and major accident hazard pipelines within the scoping study areas presented in the Scoping Report; any likely significant effects to, or that could result from, these features should be assessed in the ES.

3.3.24 Relevant information available and obtained through risk assessments pursuant to European Union legislation such as Directive 2012/18/EU of the European Parliament and of the Council or Council Directive 2009/71/Euratom or relevant assessments carried out pursuant to national legislation may be used for this purpose provided that the requirements of this Directive are met. Where appropriate, this description should include measures envisaged to

prevent or mitigate the significant adverse effects of such events on the environment and details of the preparedness for and proposed response to such emergencies.

Climate and Climate Change

3.3.25 The Scoping Report recognises climate change policy and UK commitments. However, it does not address the likely significant effects the Proposed Development would have on climate (for example having regard to the nature and magnitude of greenhouse gas emissions) and the vulnerability of the project to climate change. The ES should include a description and assessment of these matters (where relevant). Where relevant, the ES should describe and assess the adaptive capacity that has been incorporated into the design of the Proposed Development. This may include, for example, alternative measures such as changes in the use of materials or construction and design techniques that will be more resilient to risks from climate change.

Transboundary Effects

3.3.26 Schedule 4 Part 5 of the EIA Regulations requires a description of the likely significant transboundary effects to be provided in an ES.

3.3.27 Regulation 32 of the EIA Regulations inter alia requires the Inspectorate to publicise a DCO application on behalf of the SoS if it is of the view that the proposal is likely to have significant effects on the environment of another EEA state, and where relevant, to consult with the EEA state affected. The Inspectorate considers that where Regulation 32 applies, this is likely to have implications for the examination of a DCO application.

3.3.28 The Scoping Report states that transboundary impacts will be assessed for the following aspects:

- Fish and shellfish ecology;
- Marine mammals;
- Offshore ornithology;
- Commercial fisheries;
- Shipping and navigation;
- Offshore archaeology and cultural heritage; and
- Ecology and Ornithology (including Sites of Nature Conservation Interest); and
- Onshore archaeology and cultural heritage.

3.3.29 The Inspectorate recommends that the ES should identify whether the Proposed Development has the potential for significant transboundary effects and if so, what these are and which EEA States would be affected.

A Reference List

3.3.30 A reference list detailing the sources used for the descriptions and assessments must be included in the ES.

3.4 Confidential Information

3.4.1 In some circumstances it will be appropriate for information to be kept confidential. In particular, this may relate to information about the presence and locations of rare or sensitive species such as badgers, rare birds and plants where disturbance, damage, persecution or commercial exploitation may result from publication of the information. Where documents are intended to remain confidential the Applicant should provide these as separate paper and electronic documents with their confidential nature clearly indicated in the title and watermarked as such on each page. The information should not be incorporated within other documents that are intended for publication or which the Inspectorate would be required to disclose under the Environmental Information Regulations 2004.

4. ASPECT BASED SCOPING TABLES - OFFSHORE

4.1 Marine Geology, Oceanography and Physical Processes

(Scoping Report section 2.1)

ID	Ref	Applicant's proposed matters to scope out	Inspectorate's comments
4.1.1	Para 208 & Table 2-1	Effects on hydrodynamic regime (waves and tidal currents) - construction	The Inspectorate agrees that the potential for the presence of construction plant and offshore infrastructure to impact upon the hydrodynamic regime during the construction phase is unlikely to result in significant effects and can therefore be scoped out of the ES.
4.1.2	Para 209	Effects on seabed features	The Scoping Report states that "*Due to the localised nature of these effects, it is not anticipated that such changes would give rise to significant impacts on sea bed features*". The Inspectorate disagrees with this assertion, particularly in relation to the Cromer Shoal Beds Marine Conservation Zone (MCZ) as the geological features cannot reform once damaged. Natural England's consultation response also demonstrates concern in this regard. The Inspectorate considers that the ES should include an assessment of likely significant effects to seabed features resultant from the Proposed Development.
4.1.3	Table 2-1	Transboundary impacts - construction, operation and decommissioning	The Scoping Report considers that hydrodynamic and sedimentary impacts would be restricted to near-field change. The Applicant has not provided references to studies to back up this claim, nor has it identified a study area for this aspect chapter within which it considers effects are likely (see below). Nevertheless, having regard to the location of the Proposed

ID	Ref	Applicant's proposed matters to scope out	Inspectorate's comments
			Development (a minimum of 100km from any international territory boundary), the nature of the likely potential hydrodynamic and sedimentary impacts, the Inspectorate considers that transboundary impacts associated with this matter are unlikely to result in significant effects and can therefore can be scoped out of the ES.

ID	Ref	Other points	Inspectorate's comments
4.1.4	Para 205	Coastal erosion	The Scoping Report states "the coast is exposed and dynamic with rapid cliff erosion occurring in places". The potential impacts of landfall works on coastal processes, including erosion and deposition, should be assessed with appropriate cross reference to other technical reports including landscape and visual impacts. The assessment should assess potential impacts associated with climate change during the Proposed Development's operational life and any decommissioning period, as well as the relevant Shoreline Management Plan.
4.1.5	Paras 209, 211, 213, 214 & 225	Conceptual methods	The Scoping Report refers to the use of conceptual methods to assess impacts. No details are provided as to what conceptual methods would be utilised. The ES should provide details of all methods used along with any assumptions and limitations and an explanation of how these have been factored in to the assessment.
4.1.6	Section 2.1.2.2	Potential impacts during operation	The ES should assess any likely significant effects from changes in current and wave action resulting from introduced scour protection measures.

ID	Ref	Other points	Inspectorate's comments
4.1.7	Para 212	Evidence	The Scoping Report refers to 'previous studies' however does not reference these. The ES should provide clear references to any studies used to inform the approach and support its conclusions.
4.1.8	Table 2-2	Existing data sources	A number of desk-based data sources relating to the existing Sheringham Shoal and Dudgeon offshore wind farms are proposed be used to inform the characterisation of the existing environment. The Inspectorate considers that these will provide useful baseline information, however their limitations in terms of age of data and spatial coverage should be acknowledged within the ES. The Applicant should make efforts to agree with relevant consultation bodies what is an appropriate level of information to inform the baseline characterisation.
4.1.9	Para 219 & Tables 2-2 and 2-3	Suspended sediment baseline	It is unclear how the existing suspended sediment concentrations within the application site will be determined based on the existing data sources available (which do not cover the spatial extent of the SEP/DEP) and the proposed baseline surveys (which are for multibeam bathymetry, side-scan sonar and sub-bottom profiling). The ES should clearly identify the data sources used to inform the suspended sediment baseline.
4.1.10	Para 224	Guidance	The Inspectorate is unclear as to the relevance of the 'Guidance on Environmental Impact Assessment in Relation to Dredging Applications (Office of the Deputy Prime Minister, 2001)', as no dredging has been proposed within the Scoping Report. The Applicant should ensure that all guidance utilised to inform the assessment is relevant and its relationship to the assessment is clearly explained.

ID	Ref	Other points	Inspectorate's comments
4.1.11	n/a	Receptors	The Inspectorate notes that irrespective of the chosen landfall, the offshore cable route would pass through Cromer Shoal Chalk Beds MCZ and the Greater Wash Special Protection Area (SPA). The ES should assess the likely significant effects of changes to hydrodynamic and sedimentary processes on these receptors. This comment also applies to the Marine Water and Sediment Quality assessment.
4.1.12	n/a	Climate change	The assessment should take into the effects of climate change. Information from UKCP18 on waves, winds, storm surge and sea level rise, should be incorporated into the future baseline.

4.2 Marine Water and Sediment Quality

(Scoping Report section 2.2)

ID	Ref	Applicant's proposed matters to scope out	Inspectorate's comments
4.2.1	Para 239 & Table 2-4	Increases in suspended sediment - operation	The Scoping Report acknowledges the potential for scour of the seabed to result in increased suspended sediments in the water column; however, it considers these would be localised and short lived (ie only during storm conditions). The proposal to scope out impacts from this aspect chapter is inconsistent with the proposal to scope in effects on suspended sediment concentrations during operation in the Marine Geology, Oceanography and Physical Processes chapter (paragraph 214). Given the acknowledgement within the Scoping Report that there is potential for the resuspension of sediment during the operational phase, the Inspectorate is unable to rule out potential significant effects to Marine Water and Sediment Quality and therefore does not agree this matter can be scoped out.
4.2.2	Para 239 & Table 2-4	Release of contamination - operation	The Scoping Report states that any sediment contamination within suspended sediment resulting from scour of the seabed is unlikely to give rise to changes in marine water quality. The Scoping Report does not justify this statement. It states that contamination in the existing Sheringham Shoal and Dudgeon wind farm sites are considered to be low, however no site specific data for SEP/DEP has been provided at this stage. The Inspectorate acknowledges that the majority of contaminant disturbance would likely be during the construction phase. However, in the absence of site specific data on contaminant levels, the Inspectorate does not consider it has sufficient

ID	Ref	Applicant's proposed matters to scope out	Inspectorate's comments
			information to rule out a likely significant effect resulting from re-suspension of contaminants from scouring effects. As such, the Inspectorate does not agree this can be scoped out of the ES.
4.2.3	Paras 238, 240, 241 & Table 2-4	Accidental spills and leaks - construction, operation and decommissioning	The Scoping Report states that all construction vessels would be required to comply with the International Convention for the Prevention of Pollution from Ships (MARPOL 73/38) and notes that a Project Environmental Management and Monitoring Plan (or similar) would be put in place to ensure works are undertaken in line with best practice for working in the marine environment. For operation, the Scoping Report states best practice measures would be put in place to reduce risks as far as possible. The Inspectorate agrees that, with the implementation of such measures, any potential impacts on water and sediment quality are unlikely to result in significant effects and therefore further assessment is not required. However, the Inspectorate seeks assurances that such measures would be employed and therefore considers the matter should still be covered within the ES, along with details of the measures to be employed and how they are secured by the DCO (or through the Marine Licence or other suitable mechanism). The ES should include a draft version (with sufficient detail) of any plans containing such measures.
4.2.4	Para 243 & Table 2-4	Transboundary impacts - construction, operation and decommissioning	The Scoping Report states that effects on Marine Water and Sediment Quality are likely to be restricted to the project boundary and the immediate surrounding area. As with the Marine Geology, Oceanography and Physical Processes chapter, the Applicant has not provided references to studies to back up this claim, nor has it identified a study area for this aspect chapter

ID	Ref	Applicant's proposed matters to scope out	Inspectorate's comments
			within which it considers effects are likely. Nevertheless, having regard to the location of the Proposed Development (a minimum of 100km from any international territory boundary), the nature of potential impacts to water and sediment quality, the Inspectorate considers that transboundary impacts associated with this matter are unlikely to result in significant effects and can therefore can be scoped out of the ES.

ID	Ref	Other points	Inspectorate's comments
4.2.5	Table 2-5	Data sources to be used	Table 2-5 of the Scoping Report refers to information in the Marine Geology, Oceanography and Physical Processes chapter to be collected in 2020. It states that this will provide baseline information on sediment type and suspended solid concentrations. As noted in Table 4.1 of this Opinion, it is currently unclear how suspended baseline sediment concentrations will be established. The ES should clearly identify the data sources used to inform the suspended sediment baseline.
4.2.6	Table 2-6	Proposed baseline surveys	It is unclear at this stage what site-specific information will be obtained to inform the baseline. The Scoping Report states that the analysis of the grab samples proposed in Table 2-5 (which would be conducted as part of the Benthic Ecology survey) will be agreed with stakeholders including the MMO, Cefas and Natural England. For the avoidance of doubt, the Inspectorate expects the contaminant levels from grab samples to be analysed to inform

ID	Ref	Other points	Inspectorate's comments
			the baseline contaminant levels across the site.
4.2.7	Para 248	Cefas Action Levels	The Scoping Report states that where high levels of contamination are identified (ie close to or above Cefas Action Level 2), consideration against Water Framework Directive Environmental Quality Standards will be undertaken. The Inspectorate understands that Cefas Action Levels between Level 1 and 2 generally trigger further investigation of the material proposed for disposal at sea, and contaminants in dredged material above chemical Action Level 2 (cAL2) are generally considered unsuitable for sea disposal[2]. The ES should explain the approach taken in order to characterise the receiving environment for cALs, including how they relate to the assessment of likely significant effects and any measures necessary to mitigate any such effects.

[2] https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/485576/High_level_review_of_current_UK_action_level_guidance_report__1053_.pdf

4.3 Benthic and Intertidal Ecology

(Scoping Report section 2.3)

ID	Ref	Applicant's proposed matters to scope out	Inspectorate's comments
4.3.1	Para 270 & Table 2-8	Invasive species - construction and decommissioning	Paragraph 270 of the Scoping Report states that the introduction of artificial hard substrates and the use of vessels during construction could encourage the influx of invasive species, the effect of which will be assessed during operation. It is unclear why the potential for the introduction of invasive species from construction vessels is not proposed to be assessed during construction stage, as construction vessels could carry and spread invasive species. As such, the Inspectorate considers the effects of invasive species should be assessed throughout the lifetime of the Proposed Development. The ES should identify and assess any likely significant effects associated with the potential introduction and spread of INNS, including the colonisation of hard substrates, in the marine environment from offshore works. Any measures to prevent or reduce these effects should be described in the ES.
4.3.2	Para 273 & Table 2-8	Permanent habitat loss - construction	The Scoping Report proposes to assess permanent habitat loss during operation and decommissioning only. A number of construction activities have the potential to result in a degree of habitat loss during construction. The Inspectorate considers that 'temporary habitat loss' should be scoped in for all phases of the Proposed Development as any interaction with the seabed may cause loss of habitat for some species. This should include as assessment of likely significant effects from cable protection. The consultation responses from the MMO and NE

ID	Ref	Applicant's proposed matters to scope out	Inspectorate's comments
			support this position. The Inspectorate therefore does not agree that construction phase effects can be scoped out of the assessment.
4.3.3	Para 275 & Table 2-8	Underwater noise and vibration - operation	The Scoping Report proposes to scope out underwater noise and vibration during the operational phase. This is on the basis that monitoring studies of operational turbines (North Hoyle, Scroby Sands, Kentish Flats and Barrow wind farms) have shown noise levels from wind farms to be only marginally above ambient noise levels and there is no evidence to suggest that this low level of noise and vibration has a significant effect on benthic ecology. The Inspectorate is concerned that the evidence presented within the Scoping Report to support the proposed scope of works may not be comparable to conditions likely to prevail for the SEP and DEP. The Inspectorate is also aware of current evidence gaps supporting the proposed approach in relation to vibration. The consultation responses from the MMO and NE both point to concerns in this regard. The Inspectorate does not, therefore, agree that sufficient evidence has been provided to clearly demonstrate there would be no likely significant effect. The Inspectorate considers that an assessment of the likely significant effects associated with these matters should be included in the ES. The Applicant is encouraged to make effort to agree the extent of any such assessment with relevant statutory consultation bodies including the MMO and NE.
4.3.4	Para 276 & Table 2-8	Impact of electromagnetic fields (EMF) - construction, operation and decommissioning	The Scoping Report proposes to scope out the assessment of effects from EMF on benthic species as any impacts are likely to be highly localised and impacts from EMFs are strongly attenuated decreasing as an inverse square of distance from the cable. The Scoping Report references studies which show EMFs do not impact

ID	Ref	Applicant's proposed matters to scope out	Inspectorate's comments
			benthic species and habitats. The Inspectorate considers that the evidence presented by in the Scoping Report is sufficient to demonstrate no likely significant effects in this regard and this matter can be scoped out of the ES.
4.3.5	Para 279 & Table 2-8	Transboundary impacts - construction, operation and decommissioning	The Scoping Report states that effects on Benthic and Intertidal Ecology are likely to be restricted to the Proposed Development boundary and the immediate surrounding area. Having regard to the location of the Proposed Development (a minimum of 100km from any international territory boundary),the nature of potential impacts to benthic and intertidal ecology, the Inspectorate considers that transboundary impacts are unlikely to result in significant effects and therefore can be scoped out of the ES.
4.3.6	Table 2-8	Re-mobilisation of contaminated sediments - operation	Table 2-8 of the Scoping Report proposes to scope out re-mobilisation of contaminated sediments during operation, however there is no text within the chapter to support this approach. For the reasons given above in Table 4.2 of this Opinion, and as the Scoping Report scopes in this matter for effects to fish and shellfish, the Inspectorate does not consider it has sufficient information to scope this matter out. Any likely significant effects should be assessed within the ES.
4.3.7	Table 2-8	Colonisation of foundations and cable protection - construction and decommissioning	The Inspectorate agrees that effects are unlikely to be significant during construction and that this matter can therefore be scoped out. However, any likely significant effects to colonisers of artificial substrates from decommissioning activities should be assessed.

ID	Ref	Other points	Inspectorate's comments
4.3.8	Para 257	*Sabellaria spinulosa*	The Scoping Report identifies the potential for S. spinulosa reef to be present in the application site. The ES should assess any impacts occurring during construction and also any potential impacts occurring during maintenance activities on reef that may colonise the cables during the operational phase.
4.3.9	Para 270	Temporary disturbance – construction	The ES should assess the significant effects associated with temporary habitat loss which could arise from construction activities that extend beyond the permanent footprint of the infrastructure, for example from construction vessels' extendible legs and anchors.
4.3.10	Para 271	Underwater noise	The Inspectorate welcomes the intent to assess effects from underwater noise and vibration during the construction and decommissioning phases. The Applicant should make effort to agree the methodology with the relevant consultation bodies and it should be clearly explained within the ES. The baseline environment should be established and potential noise and vibration impacts assessed against this baseline. The criteria/thresholds used to determine the likely significance of effect should be clearly explained and justified, based on scientific publications, where available. The modelling software should be detailed within the ES; along with the project specific detail that it utilises. This comment equally applies to the assessment of underwater noise impacts to Fish and Shellfish Ecology and Marine Mammals.
4.3.11	Para 273	Scour and scour protection - operation	The ES should assess any likely significant effects resulting from the loss of habitat due to scour, scour protection and altered

ID	Ref	Other points	Inspectorate's comments
			sedimentary processes.
4.3.12	Para 274	Habitat creation - operation	The Scoping Report states that there may be beneficial impacts such as habitat creation during operation. Any increase and/or change in biodiversity and species abundance as a result of the Proposed Development may not necessarily be beneficial if it is not representative of seabed/designated site features. This should be taken into account in the Applicant's assessment.
4.3.13	Para 278	Cumulative effects	The cumulative effects assessment should assess impacts on fisheries management areas that could potentially interact with the Proposed Development and where significant effects are likely to occur.

4.4 Fish and Shellfish Ecology

(Scoping Report section 2.4)

ID	Ref	Applicant's proposed matters to scope out	Inspectorate's comments
4.4.1	Table 2-13	Physical disturbance and temporary loss of seabed habitat, spawning or nursery grounds during intrusive works - operation	The Inspectorate is content that intrusive works during operation are not likely to occur on a scale that would result in significant effects and this matter can be scoped out of the assessment.
4.4.2	Table 2-13	Permanent habitat loss - construction and decommissioning	The Scoping Report proposes to assess permanent habitat loss during operation and decommissioning only. A number of construction activities have the potential to result in a degree of habitat loss during construction. The Inspectorate considers that 'temporary habitat loss' should be scoped in for all phases of the Proposed Development as any interaction with the seabed may cause loss of habitat for some species. This should include as assessment of likely significant effects from cable protection. The consultation responses from the MMO and NE support this position. The Inspectorate therefore does not agree that construction and decommissioning phase effects can be scoped out of the assessment.
4.4.3	Table 2-13	Introduction of wind turbine foundations, scour protection and hard substrate - construction and decommissioning	During construction/decommissioning, turbines would be incrementally constructed/removed, with turbine foundations and scour protection also being installed/removed. As such, there is potential for effects to occur after installation of the first turbines (during construction) and until removal of the last (during decommissioning). Based on the information provided at this

ID	Ref	Applicant's proposed matters to scope out	Inspectorate's comments
			stage, the Inspectorate is unable to rule out a significant effect and does not agree that this matter can be scoped out of the ES. The ES should explain the assumptions that have been used to inform the assessment.
4.4.4	Table 2-13	Underwater noise during foundation piling - operation and decommissioning	The Inspectorate is content that this matter is only relevant to the construction phase with no significant effects anticipated during operation and decommissioning and therefore can be scoped out of the assessment for operation and decommissioning.
4.4.5	Table 2-13	Impacts from EMF - construction and decommissioning	The Inspectorate is content that this matter is only relevant to the operational phase with no significant effects anticipated during operation and decommissioning and therefore can be scoped out of the assessment for construction and decommissioning.
4.4.6	Para 316	Site specific surveys	The Scoping Report concludes that the existing data described in Table 2-14 is sufficient to undertake a robust assessment and therefore the Applicant does not propose to undertake further site specific surveys. Table 2-14 refers to characterisation surveys for the existing Dudgeon and Sheringham Shoal Offshore wind farm ES's (undertaken in 2008 and 2005 respectively) and post-construction surveys at Sheringham Shoal (2012 and 2013). The table also identifies numerous other sources, including MMO landings data. The Inspectorate agrees that new fish characterisation surveys are not necessary as the sources of data proposed to inform the desk-based assessment will be adequate. The Applicant must ensure that the ES presents a robust baseline upon which to base its assessment and should acknowledge any

ID	Ref	Applicant's proposed matters to scope out	Inspectorate's comments
			limitations associated with the data sources. The Applicant should make effort to agree the baseline used in the assessment with the relevant consultation bodies.

ID	Ref	Other points	Inspectorate's comments
4.4.7	Section 2.4.1	Existing environment	The Scoping Report identifies species of commercial importance and spawning and nursery areas. In accordance with NPS EN-3, the ES should also identify any feeding grounds, over-wintering areas for crustaceans and migration routes that could be significantly affected by the Proposed Development. The location of these areas, in relation to the Proposed Development, should be depicted in the ES using appropriate figures.
4.4.8	Para 285	Cromer Shoal MCZ	Cromer Shoal MCZ is predominantly designated for subtidal chalk habitat with a thin veneer of gravelly sand on top of the bedrock. The Inspectorate recommends the Applicant makes efforts to agree necessary pre-application surveys with NE in order to provide confidence that cable installation will be feasible within the site.
4.4.9	Para 286	Benthic surveys	The Applicant should ensure that benthic surveys are undertaken at appropriate times of year, taking into account weather conditions and the ability to collect satisfactory datasets.
4.4.10	Para 300	Herring	The most recently published International Herring Larvae Survey 2019 should be used to inform the baseline. The assessment of herring potential spawning habitat should be

ID	Ref	Other points	Inspectorate's comments
			undertaken using the method described in MarineSpace (2013) and informed by Particle Size Analysis data from the geophysical and benthic sampling surveys. Any likely significant effects on these areas should be assessed in the ES.
4.4.11	Para 302	Potential impacts during construction	The potential for impacts from suspended sediment during cable and foundation installation works has been scoped into the assessment. The ES should assess the likely significant smothering effects this could have on fish populations, including spawning and nursery areas, present within the zone of influence.
4.4.12			The Inspectorate considers that increased underwater noise during construction has the potential to result in temporary threshold shift, recoverable injury and mortality to sensitive species. Significant effects associated with these impacts should be assessed in the ES. The Applicant is encouraged to make effort to discuss and agree the approach to this assessment with relevant consultation bodies including the MMO.
4.4.13	Para 302	Underwater noise	The Scoping Report proposes to assess the effects of disturbance and displacement of acoustically sensitive fish species and spawning and nursery areas from underwater noise. The effects of mortality, injury, behavioural changes and auditory masking should also be assessed, where significant effects are likely. The Scoping Report provides little information on how the assessment will be undertaken. The assessment should explain how the characteristics of the receptors have been taken into account eg fish species and their capability to flee from noise sources. The Applicant should make efforts to agree the approach with the MMO.

ID	Ref	Other points	Inspectorate's comments
4.4.14	n/a	Inter-relationships – fishing pressure	Reduced fishing pressure within the array has the potential to result in positive effects to commercially targeted species. The ES should assess any benefits associated with the reduced pressure, where significant effects are likely.
4.4.15	n/a	Sandeel	The MMO notes that sandeel are of ecological importance as prey species for marine mammals and birds. It highlights that sand eel has a spatial dependency on a specific substrate and show site fidelity. The Inspectorate considers that the ES should include information to characterise the sandeel habitat in the array and export cable corridor and assess any likely significant effects to the species from the project alone and cumulatively with other plans or projects.
4.4.16	n/a	Migratory fish species	The ES should assess any likely significant effects to migratory fish transiting the area eg to/from the Wash and River Humber.

4.5 Marine Mammal Ecology

(Scoping Report section 2.5)

ID	Ref	Applicant's proposed matters to scope out	Inspectorate's comments
4.5.1	Para 350 & Table 2-15	Barrier effects from underwater noise - operation	The Scoping Report proposes to assess barrier effects from construction and decommissioning activities only. No justification has been provided for excluding an assessment in the operational stage and paragraph 741 acknowledges the potential for disturbance from underwater noises during operation and maintenance. In the absence of a suitable justification, the Inspectorate does not agree to scope out barrier effects from underwater noise during operation.
4.5.2	Paras 345 to 350 & Table 2-15	Barrier effects from physical presence of wind farm during construction, operation and decommissioning	The Scoping Report states that the DEP and SEP are not located on any known marine mammal migration routes and that data from operational wind farms show no evidence of exclusion of marine mammals. The Inspectorate agrees that barrier effects from the physical presence of the wind farm are unlikely to be significant and can therefore be scoped out of the ES.
4.5.3	Paras 351 to 355 & Table 2-15	EMF direct effects during construction, operation and decommissioning	The Inspectorate agrees that given the referenced literature in the Scoping Report, significant effects on marine mammals due to direct effects of EMF are unlikely. The Inspectorate is also content that indirect effects from changes to prey availability resulting from EMF during operation will be assessed, therefore, the Inspectorate agrees that direct effects from EMF can be scoped out of the ES.
4.5.4	Table 2-15	Underwater noise during unexploded ordnance (UXO)	The Inspectorate agrees that these matters are only relevant to the construction phase with no significant effects anticipated

ID	Ref	Applicant's proposed matters to scope out	Inspectorate's comments
		clearance and piling - operation and decommissioning	during operation and decommissioning and therefore can be scoped out of the assessment for operation and decommissioning.
4.5.5	Table 2-15	Underwater noise from wind turbines - operation	The Inspectorate agrees that this matter is only relevant to the operational phase with no significant effects anticipated during operation and decommissioning and therefore can be scoped out of the assessment for construction and decommissioning.
4.5.6	Table 2-15	Cumulative barrier effects during construction, operation and decommissioning	The Scoping Report does not scope out barrier effects during operation from the project alone. Therefore, the Inspectorate considers that likely significant cumulative effects may also occur and should be assessed in the ES.
4.5.7	Para 361	Cumulative assessment – commercial fisheries	The Scoping Report states that the impact from commercial fisheries will not be addressed directly in the cumulative assessment as these are ongoing activities that are factored into the baseline conditions. The Inspectorate is content that the assessment of cumulative impacts from commercial fisheries will be informed with reference to ongoing activities in the baseline conditions. The Applicant is advised to have regard to the advice contained in the Inspectorate' Advice Note Seventeen when preparing their assessment of cumulative impacts.

ID	Ref	Other points	Inspectorate's comments
4.5.8	Section 2.5.1	Existing environment	The ES should provide details of likely feeding areas; known birthing areas/haul out sites; nursery grounds; and known migration or commuting routes.

ID	Ref	Other points	Inspectorate's comments
4.5.9	Para 325	Potential area of effects	Paragraph 325 of the Scoping Report states that all of the potential impacts screened in for further assessment will be related to the potential area of effect. The ES should clearly explain and justify the potential area of effect.
4.5.10	Para 325	Reference populations	The Applicant should make efforts to agree with NE the relevant reference populations to be used in the assessment.
4.5.11	Para 327	Impacts from underwater noise	The Scoping Report identifies a number of potential impacts from underwater noise on marine mammals, including physical injury, death, permanent/temporary auditory injury, disturbance and behavioural effects and barrier effects. The Scoping Report provides limited detail regarding the extent to which these impacts are anticipated to affect the marine mammals. The assessment should explain and assess the consequences of the indirect effects that would result from these impacts, for example the inability to forage.
4.5.12	Para 328	Underwater noise from UXO clearance	Paragraph 138 of the Scoping Report explains that consent for UXO removal will be sought in a future Marine Licence application, when geophysical survey data of suitable spatial resolution is available to identify and quantify UXO risk. The Inspectorate welcomes that despite this, the Scoping Report proposes to assess the potential impacts of underwater noise that could result from UXO clearance.
4.5.13	Para 337	Water quality	Where significant effects are likely to occur, the ES should assess the extent to which changes in water quality, including increases in suspended sediment, may affect foraging for relevant marine mammal species.

ID	Ref	Other points	Inspectorate's comments
4.5.14	Para 372	Species density estimates	The methodology used to determine species density estimates should be clearly explained within the ES.
4.5.15	Para 375	Guidance	The Applicant should ensure that guidance relied upon in the assessment is sufficiently up to date and robust for its purpose. The Inspectorate is aware that the Chartered Institute of Ecology and Environmental Management: Guidelines for Ecological Impact Assessment in the UK and Ireland: Terrestrial, Freshwater and Coastal were updated in 2019. The ES should describe the guidance used and (where necessary) explain how it differs from more up to date guidance. This comment also applies to the Ecology and Ornithology aspect chapter.
4.5.16	n/a	European Protected Species (EPS) licences	The ES should set out in full the potential risk to EPS and confirm if any EPS licences will be required for example, for harbour porpoises and grey seals.

4.6 Offshore Ornithology

(Scoping Report section 2.6)

ID	Ref	Applicant's proposed matters to scope out	Inspectorate's comments
4.6.1	Table 2-18	Collision risk with, and barrier effects due to the presence of, turbines – construction and decommissioning	The Inspectorate has considered the advice on NE regarding this matter. During construction/decommissioning, turbines would be incrementally constructed/removed. As such, there is the potential for barrier effects to occur after the construction of the first turbines and until removal of the last. Based on the information provided at this stage, the Inspectorate is unable to rule out a significant effect and does not agree that this matter can be scoped out of the ES. For clarity, the Inspectorate agrees that effects of collision risk are unlikely to be significant during construction and decommissioning and can therefore be scoped out of the ES.

ID	Ref	Other points	Inspectorate's comments
4.6.2	Para 379	Species for assessment	The ES should identify the nature conservation value of each species to be considered in the assessment, for example with reference to the Birds of Conservation Concern (BoCC) list, the Birds Directive and/or the International Union for Conservation of Nature (IUCN) list.
4.6.3	Para 380	Migratory species	The Applicant should describe the potential for the Proposed Development to interact with migratory species. NE has recommended the work of the Strategic Ornithological Support Services (SOSS) programme to identify which bird species are

ID	Ref	Other points	Inspectorate's comments
			likely to have a migratory pathway that encompass the Proposed Development. Any likely significant effects to these species should be assessed in the ES.
4.6.4	Para 384	Potential impacts during operation	The Scoping Report has referred to both disturbance and displacement. The ES should make a clear distinction between these two potential impacts.
4.6.5	Section 2.6.3.1	Data gathering	It is unclear whether the aerial surveys referred to in Section 2.6.3.1 of the Scoping Report encompass the offshore cable corridors or just the turbine array areas. The ES should include a sufficiently robust baseline established for the offshore cable corridor in order to inform the assessment of disturbance, displacement and indirect effects that could arise in this area. NE has made some comments about discrepancies between the proposed survey methodology in the Scoping Report and a method statement it received separately. The Applicant is advised to make efforts to agree the approach to establishing the baseline with relevant consultation bodies.
4.6.6	Para 395	Assessment methodology	The Applicant should make efforts to agree the confidence intervals and the definitions of the biological seasons to be applied to the assessment with relevant consultation bodies, including NE.
4.6.7	Para 396	Sandwich tern	The Scoping Report acknowledges collision risk to Sandwich tern will be a key issue as this led to refusal of consent for Docking Shoal. It states that investigation are already underway to review the work underpinning the Appropriate Assessment undertaken for Docking Shoal project, "*with a view to updating it using as-*

ID	Ref	Other points	Inspectorate's comments
			built project parameters and more recent information collected from operational offshore wind farms and breeding colonies." The Inspectorate considers that any assessment of collision risk using 'as built' scenarios should also be accompanied with equivalent information for the 'as consented' and as 'as proposed' scenarios since there is no apparent legal mechanism in place which secures a reduction in turbine numbers from the consented, and proposed development. If such a mechanism is known or established, the ES should include a justification to support the approach taken in the assessment.
4.6.8	Para 398	Collision risk modelling	The Applicant is advised to make efforts to agree the collision risk model to be used and input parameters with relevant consultation bodies, including NE. The ES should clearly explain the relevant parameters, including avoidance rates.
4.6.9	n/a	Assessment methodology	Section 2.6.3.2 of the Scoping Report explains the methods that will be used to predict collision mortality. There is no detail as to how displacement would be predicted. The Inspectorate notes that normal practice is to present displacement matrices which consider a range of displacement and mortality rates. The Applicant should seek to agree the displacement and mortality rates that should be applied for individual species with relevant consultation bodies, including NE. The ES should assess the consequences of any mortality from collision risk or displacement, to a relevant population scale for example through population viability analysis.
4.6.10	n/a	Underwater noise from UXO clearance, piling, the presence of	Any likely significant effects to waterbirds that forage underwater should be assessed in the ES.

ID	Ref	Other points	Inspectorate's comments
		vessels and operational wind turbines	

4.7 Commercial Fisheries

(Scoping Report section 2.7)

ID	Ref	Applicant's proposed matters to scope out	Inspectorate's comments
4.7.1	Table 2-19	Increased collision risk	The Inspectorate is content that this matter can be scoped out from this aspect chapter on the basis that an assessment of collision risk will be included in the Shipping and Navigation aspect chapter.

ID	Ref	Other points	Inspectorate's comments
4.7.2	Table 2-19	Displacement of fishing activity	Exclusion of certain types of fishing may make an area more productive for other types of fishing. The ES should assess any likely significant effects on fish stocks of commercial interest that could result from the presence of the wind farm development and any safety or buffer zones.
4.7.3	Para 409	Safety zones	The ES should identify the size of safety zones to be implemented. Where the precise extents are unknown, a worst-case scenario should be assessed. This comment applies equally to Shipping and Navigation.
4.7.4	Para 416	Local fishing fleet	The Scoping Report does not define what will constitute the 'local fishing fleet'. The Applicant should ensure that the baseline covers a sufficiently broad spatial scope in order to identify any receptors that could be significantly affected by the Proposed Development.

4.8 Shipping and Navigation

(Scoping Report section 2.8)

ID	Ref	Applicant's proposed matters to scope out	Inspectorate's comments
4.8.1	n/a	n/a	No matters have been proposed to be scoped out of the assessment.

ID	Ref	Other points	Inspectorate's comments
4.8.2	Figure 2.8.1	Shipping and navigation activities	Figure 2.8.1 is entitled 'Shipping and Navigation activities', however the key does not appear to relate to this aspect and it is not possible to understand the baseline from the figure and the key provided. The ES should include a figure which clearly identifies the existing activities to inform the baseline assessment.
4.8.3	Section 2.8.2.2	Modelling of potential operational impacts	As the layout of the array will not be fixed at the point of the application, the ES should identify, justify and assess a worst case scenario in relation to impacts on navigation. The ES should set out how such a worst case scenario has been determined including any assumptions made. Paragraphs 431 and 434 of the Scoping Report state that the Navigational Risk Assessment modelling for operational collision and allision risk will assume a 10% increase in future traffic. The ES should provide justification in support of the use of the 10% future case increase.
4.8.4	Para 450	Significance of effects	The Inspectorate notes the proposal to determine the 'overall severity of consequence' within the ES. The Applicant is reminded of the need within the EIA Regulations 2017 to assess the

			significance of effects in the ES. The ES should therefore clearly identify whether or not an effect is considered to be significant.
4.8.5	n/a	Interference with marine navigational equipment	The ES should identify and assess any likely significant effects to existing marine navigational equipment that could arise from the Proposed Development, for example from impacts to radar or compass interference.
4.8.6	n/a	Impacts from changes to physical processes	Any likely significant effects to marine vessels and navigation channels arising from scour and sediment transport should be assessed in the ES.
4.8.7	n/a	Adverse weather conditions	Consideration should be given to routing during adverse weather conditions and any likely significant effects to navigation during these times.

4.9 Offshore Archaeology and Cultural Heritage

(Scoping Report section 2.9)

ID	Ref	Applicant's proposed matters to scope out	Inspectorate's comments
4.9.1	Section 2.9.22	Direct impacts - operation	Section 2.9.2.2 of the Scoping Report notes the potential for direct impacts to occur if archaeological material is present within the footprint of works required for routine maintenance activities which disturb the seabed. However, it notes that many areas would have been disturbed during construction therefore there would be limited scope for further impact. It is unclear whether the Applicant intends to assess this matter, particularly as Table 2-23 proposes to scope this in, however Table 6-1 proposes to scope this out. The Applicant should ensure that the ES assesses this matter where significant effects are likely.

ID	Ref	Other points	Inspectorate's comments
4.9.2	Section 2.9.2.1	Potential impacts during construction – unknown assets	The ES should describe how impacts to unknown assets that may be discovered during pre-construction or construction activity would be mitigated.
4.9.3	Table 2-25	Proposed baseline surveys	The Inspectorate recommends that the Applicant makes effort to agree the survey methodology with relevant consultation bodies including Historic England. The Applicant should produce a preliminary deposit model as part of the desk-based assessment to identify areas of archaeology potential and identify gaps in knowledge. The approach to developing this model should be discussed with Historic England

ID	Ref	Other points	Inspectorate's comments
			and other relevant consultation bodies in effort to agree the approach.
4.9.4	Figure 2.9.1	Seabed features	Figure 2.9.1 identifies four different seabed features, however does not provide an explanation as to what these are. The Applicant should ensure that any features identified on figures within the ES are clearly identifiable.
4.9.5	n/a	Archaeological Exclusions Zones	The ES should confirm whether any Archaeological Exclusion Zones would be required, and if so identify their anticipated location and explain the mechanism through which they would be secured.

4.10 Aviation and MoD

(Scoping Report section 2.10)

ID	Ref	Applicant's proposed matters to scope out	Inspectorate's comments
4.10.1	Para 485	Flight safety	The Scoping Report explains that Royal HaskoningDHV (2013) assessed that the distance to the nearest airfield to the Dudgeon Offshore Wind Farm was too great for an unacceptable hazard to flight safety to occur. It concludes that although the extension projects weren't assessed and are located closer to the airfield, it is reasonable to conclude that the same applies to the DEP and SEP sites. It explains that, aircraft taking-off and landing will be at an altitude significantly greater than the tallest infrastructure related to any phase of the Proposed Development. The Inspectorate agrees that significant effects to flight safety are unlikely and that this matter can be scoped out of the ES.
4.10.2	Para 509 & Table 2-26	Effects on military training areas – construction, operation and decommissioning	The Inspectorate agrees that effects on military training areas are only likely to be significant during the operational phase since they occur as a result of impacts to radar and therefore can be scoped out of the assessment for construction and decommissioning. With regards to the operational phase, paragraph 509 of the Scoping Report explains that potential effects are related to radar rather than physical obstruction as the training area flight level is between 5,000 and 17,500ft which is well above the proposed turbine height. The Inspectorate is content with this approach.

ID	Ref	Applicant's proposed matters to scope out	Inspectorate's comments
4.10.3	Para 514 & Table 2-26	Transboundary impacts - construction, operation and decommissioning	The Inspectorate agrees that given the distance of the Proposed Development from international boundaries, transboundary effects are unlikely to be significant and this matter can be scoped out of the ES.

ID	Ref	Other points	Inspectorate's comments
4.10.4	Para 516	Significance of effects	The Applicant is reminded of the need within the EIA Regulations 2017 to consider the significance of effects. The ES should therefore clearly identify whether or not an effect is considered to be significant.
4.10.5	n/a	Receptors	The ES should assess any significant effects associated with impacts to known Ministry of Defence (MOD) receptor locations. The Ministry of Defence (MOD) consultation response highlights that turbines on the western edge of the SEP would be detectable to the Primary Surveillance Radar at RAF Coningsby. It also note that part of the cable route corridor at the Weybourne landfall site occupies the eastern extent of the statutory technical safeguarding zone surrounding the RAF Weybourne transmitter site; and that the Bacton landfall site occupies the statutory safeguarding zone encompassing the Air Defence Radar at RRH Trimingham.

4.11 Offshore Designated Sites

(Scoping Report section 2.11)

ID	Ref	Applicant's proposed matters to scope out	Inspectorate's comments
4.11.1	Table 6-1	All potential impacts	Table 6-2 proposes to scope out all potential impacts to offshore designated sites. The Inspectorate assumes that this is a typographic error within the summary table. For the avoidance of doubt, all of the attributes listed within the Supplementary Advice on Conservation Objectives for each qualifying feature of each designated site (where available) which could be significantly affected should be assessed.

ID	Ref	Other points	Inspectorate's comments
4.11.2	Section 2.11.3	Approach to assessment	Section 2.11.3 of the Scoping Report explains that the impact assessment will be supported by a Water Framework Directive assessment, a Marine Conservation Zone assessment and the Habitats Regulations Assessment. The Inspectorate considers that this proposed chapter of the ES should provide a summary of these assessments.

4.12 Offshore Air Quality

(Scoping Report section 2.12)

ID	Ref	Applicant's proposed aspect to scope out	Inspectorate's comments
4.12.1	Section 2.12	Offshore air quality	The Scoping Report notes that marine exhaust emissions are limited in line with the provisions of International Convention for the Prevention of Pollution from Ships (MARPOL). It considers that the number of vessels and the associated atmospheric emissions would be small in comparison to the total shipping activity in this region of the North Sea, and that there are no offshore human receptors sensitive to air quality, and marine-based ecological designations are unlikely to be sensitive to air pollution impacts or are dominated by other sources of inputs. On this basis, the Inspectorate agrees that effects are unlikely to be significant and that this aspect can be scoped out of the ES.

4.13 Other Marine Users

(Scoping Report section 2.13)

ID	Ref	Applicant's proposed matters to scope out	Inspectorate's comments
4.13.1	Paras 548, 557 & Table 2-31	Telecommunication cables and interconnectors	Paragraph 548 of the Scoping Report notes that the Weybourne export cable corridor option may cross a disused Stratos telecommunications cable and that there are no other telecommunications cables or interconnectors in the vicinity of the Proposed Development. Paragraph 557 therefore proposes to scope this matter out of the ES. However, summary Table 2-31 proposes to scope in potential impacts on subsea cables and pipelines. Further consultation is proposed to identify potential sensitive receptors; therefore, the Inspectorate considers that the ES should assess potential impacts to telecommunication cables and interconnectors where significant effects are likely.
4.13.2	Para 554 & Table 2-31	Potential interference with other wind farms – construction, operation and decommissioning	Table 2-31 of the Scoping Report proposes to scope out potential interference with other wind farms. Paragraph 554 confirms that the extension areas do not overlap with any other wind farm infrastructure but explains that the proposed export cable corridor options are likely cross over the existing Dudgeon export cables and the Hornsea Project Three offshore wind farm (if consented). The Inspectorate welcomes that crossing agreements will be sought with cable owners and operators and appropriate installation and protection measures developed. However, the Scoping Report has not provided assurance that there would be no likely significant effects resulting from such crossings and as such the Inspectorate considers that any likely significant effects

ID	Ref	Applicant's proposed matters to scope out	Inspectorate's comments
			should be assessed in the ES.
4.13.3	Para 558 & Table 2-31	Impacts on aggregate dredging activities – construction, operation and decommissioning	On the basis that there is no overlap of known aggregate licence areas or disposal sites with the extension areas or export cable corridors, the Scoping Report scopes out an assessment of effects. However, section 2.13.3 of the Scoping Report proposes that the ES will identify aggregate sites and disposal sites in the baseline environment. It notes that further desk-based sources will be accessed to inform the characterisation of the existing environment, including Cefas disposal sites shapefiles and the Crown Estate marine minerals data. Should the desk based assessment identify any previously unknown disposal sites or aggregate sites, the ES should assess any likely significant effects to these receptors that could arise from the Proposed Development. The Inspectorate welcomes that any impacts from proposed dredger transit activities will be assessed as part of the Shipping and Navigation aspect.
4.13.4	Para 559 & Table 2-31	Impacts on disposal sites – construction, operation and decommissioning	
4.13.5	Para 560 & Table 2-31	Detonation of UXO – construction, operation and decommissioning	The Scoping Report states that detailed geophysical survey and investigations would identify any UXO and measures would be taken to mitigate risks of detonation. The Scoping Report considers this is a health and safety risk rather than being an environmental issue and notes that potential impacts to other receptors will be assessed where relevant (eg fish and marine mammal ecology). The EIA Regulations 2017 require an assessment of the likely significant effects to population and health, and resulting from the vulnerability of the Proposed Development to risks of major

ID	Ref	Applicant's proposed matters to scope out	Inspectorate's comments
			accidents and/or disasters. The Inspectorate considers that any likely significant effects from UXO detonation should therefore be assessed in the ES.
4.13.6	Para 566 & Table 2-31	Transboundary impacts – construction, operation and decommissioning	The Inspectorate considers that given the location of the Proposed Development, significant transboundary effects to other marine users are unlikely and that this matter can be scoped out of the ES. This is on the basis that transboundary impacts on commercial fishing and shipping and navigation are assessed in their respective aspect chapters.

5. ASPECT BASED SCOPING TABLES - ONSHORE

5.1 Onshore Ground Conditions and Contamination

(Scoping Report section 3.1)

ID	Ref	Applicant's proposed matters to scope out	Inspectorate's comments
5.1.1	Table 3-2 & Section 3.1.2.2	Impacts to human health - operation	Table 3-2 of the Scoping Report has scoped out all operational impacts on ground conditions and contamination, although the potential for operational impacts is identified in terms of resource extraction and Mineral Safeguarding Areas in section 3.1.2.2. Paragraph 585 explains that operation and maintenance activities would follow standard procedures to minimise potential impacts, although this does not identify what these procedures would be. Despite the limited justification provided, given the operational nature of the Proposed Development, the Inspectorate does not consider that significant effects to human health are likely during the operational stage and therefore agrees these matters can be scoped out of the ES.
5.1.2	Table 3-2 & Section 3.1.2.2	Impacts to controlled waters - operation	With regard to operational impacts to controlled waters, the Water Resources and Flood Risk chapter to the Scoping Report acknowledges the potential for supply of contaminants during the operational phase (paragraph 604). Accordingly, the Inspectorate does not agree that operational impacts to controlled waters from the alterations to exposure pathways and the introduction of new contaminant sources can be scoped out of this aspect chapter. The Inspectorate does, however, agree that impacts to controlled waters due to the disturbance and mobilisation of contaminants from existing sources are unlikely to result in significant effects

ID	Ref	Applicant's proposed matters to scope out	Inspectorate's comments
			and can be scoped out of the ES.
5.1.3	Table 3-2	Impacts to geologically significant areas and designated geological sites – operation	Paragraph 578 identifies geological Sites of Special Scientific Interest (SSSIs) at both landfall search areas and at the edge of the substation search area. No justification has been provided to demonstrate that there would be no significant effects to these sites during operation. As such, the Inspectorate is unable to agree that this matter can be scoped out at this stage. For the same reason, the Inspectorate also does not agree that cumulative impacts during operation can be scoped out.
5.1.4	Table 3-2	Impacts to human health - decommissioning	Paragraph 587 states that the decommissioning impacts would be similar in nature to those for construction, although the magnitude of effect is likely to be lower. There is no specific justification for not including impacts to human health or controlled waters during decommissioning within the scope of the assessment. As such, the Planning Inspectorate cannot agree to removing these matters from the scope of the assessment.
5.1.5	Table 3-2	Impacts to controlled waters - decommissioning	
5.1.6	Table 3-2	Transboundary impacts	Table 3-2 proposes to scope out transboundary impacts to ground conditions and contamination, although no justification is provided within the aspect chapter. Nevertheless, given the nature of the Proposed Development in this regard the Inspectorate agrees that significant transboundary effects are unlikely and therefore this matter can be scoped out of the ES.

ID	Ref	Other points	Inspectorate's comments
5.1.7	Para 574	Study Area	Paragraph 574 of the Scoping Report explains that the onshore ground conditions and contamination study area is the same as the onshore scoping area described in section 1.4 of the Scoping Report. The ES should justify the extent of the study areas used in the assessment in relation to the general 500m and 3km buffer zones around the cable corridor and onshore substation respectively used to define the onshore scoping area.
5.1.8	Paras 582 & 586	Mineral Safeguarding Areas	Paragraphs 582 and 586 of the Scoping Report identify potential construction and operational impacts on Mineral Safeguarding Areas; these areas are not identified in Section 3.1.1 'Existing Environment'. The Inspectorate expects these to be identified and mapped in the ES. Table 3-2 does not present any impacts to these receptors. For the avoidance of doubt, the Inspectorate considers that any likely significant effects occurring as a result of resource extraction including in Mineral Safeguarding Areas should be assessed within the ES.

5.2 Water Resources and Flood Risk

(Scoping Report section 3.2)

ID	Ref	Applicant's proposed matters to scope out	Inspectorate's comments
5.2.1	Table 3-4	Direct disturbance of surface water bodies - operation	The Scoping Report does not justify the decision to scope out direct disturbance to surface water bodies during operation. However, the Inspectorate considers that given the operational nature of the Proposed Development, there are unlikely to be any significant effects from potential direct in this regard disturbance to surface water bodies once construction is complete. The Inspectorate agrees that this matter can be scoped out of the assessment in the ES.
5.2.2	Table 3-4	Transboundary impacts	Table 3-4 proposes to scope out transboundary impacts water resources and flood risk, although no justification is provided within the aspect chapter. Nevertheless, given the nature of the Proposed Development in this regard the Inspectorate agrees that significant transboundary effects are unlikely and therefore this matter can be scoped out of the ES.
5.2.3	Table 3-4	Increased sediment supply – operation	Table 3-4 of the Scoping Report scopes in an assessment of increased sediment supply during operation, however this is not considered as a potential impact in Section 3.2.2.2. Despite this inconsistency, the Inspectorate has given consideration to the operational nature of the Proposed Development, and does not consider that significant effects are likely to occur and considers this matter does not need to be assessed in the ES.

ID	Ref	Other points	Inspectorate's comments
5.2.4	Para 615	Supporting assessments	The Inspectorate welcomes the proposal for a Flood Risk Assessment (FRA) and a Water Framework Directive (WFD) Compliance Assessment; these assessments should form an appendix to the ES. The Applicant should make effort to discuss and agree the scope of these assessments with relevant consultation bodies including the Environment Agency (EA), the relevant internal drainage boards and the lead local flood authorities.
5.2.5	Para 603 & 604	Flood risk	The Inspectorate welcomes that changes to surface water runoff and flood risk from construction and operation of the Proposed Development will be assessed. The ES should also assess any likely significant effects resulting from potential flood events to the Proposed Development. The ES should demonstrate that consideration has been given to all potential sources of flooding.
5.2.6	N/A	Permits and licences	The Applicant is advised to consider the necessary responsibilities in relation to working over or crossing of main rivers including any permits or licences that may be required (for example Flood Risk Activity Permits under the Environmental Permitting regulations). References to any water resources licensing that may be required should be outlined as part of the ES, particularly where the residual effects reported in the ES are wholly or partly reliant on the grant of such licenses.

5.3 Land Use and Agriculture

(Scoping Report section 3.3)

ID	Ref	Applicant's proposed matters to scope out	Inspectorate's comments
5.3.1	Table 3-7	Temporary closure/diversion of Public Rights of Way (PRoW)/cycle paths – operation Permanent closure/diversion of PROWs – construction and operation	The Inspectorate agrees with the Applicant's proposal to assess the impact of temporary closure/diversions of PRoW during construction and decommissioning and the impact of permanent closures/diversions during operation. The Planning Inspectorate recognises that this is scoped in as part of section 4.4 of the Scoping Report (tourism). Cross referencing should be made between these topics as appropriate.
5.3.2	Table 3-7	Impacts on existing utilities - operation	The Scoping Report does not justify the decision to scope out the impact on existing utilities during operation. However, the Inspectorate considers that given the operational nature of the Proposed Development, there are unlikely to be any significant effects on existing utilities once construction is complete. The Inspectorate agrees that this matter can be scoped out of the assessment.
5.3.3	Table 3-7	Permanent loss of land - construction and decommissioning	The Inspectorate is content that this matter is only relevant to the operational phase with no significant effects anticipated during construction and decommissioning and therefore can be scoped out of the assessment for construction and decommissioning.
5.3.4	Table 3-7	Soil heating - construction and decommissioning	The Inspectorate is content that this matter is only relevant to the operational phase with no significant effects anticipated during construction and decommissioning and therefore can be scoped out of the assessment for construction and decommissioning.

ID	Ref	Applicant's proposed matters to scope out	Inspectorate's comments
5.3.5	Table 3-7	Transboundary impacts	Table 3-7 proposes to scope out transboundary impacts to land use and agriculture, although no clear justification is provided within the aspect chapter. Nevertheless, given the nature of the Proposed Development the Inspectorate agrees that significant transboundary effects are unlikely and therefore this matter can be scoped out of the ES.

ID	Ref	Other points	Inspectorate's comments
5.3.6	Para 634	Permanent loss of land	The ES should confirm the worst case scenario for permanent land take from the presence of link boxes along the cable route. Any likely significant effects should be assessed in the ES.
5.3.7	Para 639	Drainage	The ES should explain how land drainage would be reinstated following the completion of construction activities.

5.4 Ecology and Ornithology

(Scoping Report section 3.4)

ID	Ref	Applicant's proposed matters to scope out	Inspectorate's comments
5.4.1	Para 664	Permanent loss or fragmentation of habitats - operation	Paragraph 664 of the Scoping Report states that *"Areas above the buried cable systems would return to their previous land use and would not represent permanent loss or fragment of habitats".* Although not specifically identified in Table 3-11, the Inspectorate assumes the Applicant intends to scope this matter out of the assessment. However, in the absence of survey results confirming the locations of species population and of details of any vegetation clearance which could impact upon sensitive receptors, the Inspectorate considers there is insufficient information to scope out this matter at this stage.
5.4.2	Table 3-11	Spread of invasive non-native species - operation	The Scoping Report does not justify the decision to scope out the effects from non-invasive species during operation. However, given that there will be minimal activities (such as groundworks or plant movement) that may spread invasive species during the operational phase of the Proposed Development, the Inspectorate considers that effects are unlikely to be significant and that this matter can be scoped out of the ES.

ID	Ref	Other points	Inspectorate's comments
5.4.3	N/A	Stakeholder engagement	The Applicant is strongly encouraged to agree the methods used to collect baseline data, the likely effects of the project and to determine significance of effect with NE, representatives of the

ID	Ref	Other points	Inspectorate's comments
			local authorities and any other relevant stakeholders.
5.4.4	Section 3.4.1	Study area	The Scoping Report states that European designated sites within 20km of the scoping area and nationally designated sites within 3km will be considered. However it is not clear why these distances have been used. The ES should make it clear how the zone of influence for the project has been defined and how this has been used to identify the ecological receptors likely to be affected by the proposals.
5.4.5	Table 3-9	Proximity of designated sites	Table 3-9 of the Scoping Report specifies the distances of designated sites from the study area. The ES should define the distance of designated sites from the application site itself and assess any likely significant effects to all designated sites, including County Wildlife Sites and local sites.
5.4.6	Table 3-9	North Norfolk Coast SPA and Ramsar site	Page 153 of the Scoping Report states that North Norfolk Coast SPA is located 1.6km from the study area, whereas page 154 states that it is 'within the study area'. Similarly, the Ramsar is stated to be located 0.7km from the study area although it has the same area and footprint as the SPA. The Applicant should take care to ensure that the ES is accurate and consistent.
5.4.7	Table 3-12	Data sources	The Applicant is advised to contact local wildlife groups for local records which could be used to inform the baseline.
5.4.8	Section 3.4.3.1	Potential impacts during construction	Any likely significant effects associated with the potential for breakout of bentonite drilling fluid should be assessed in the ES.
5.4.9	Section 3.4.3.2	Potential impacts during operation	The ES should assess any likely significant effects to non-seabird migrants from the construction and operation of the offshore

ID	Ref	Other points	Inspectorate's comments
			elements of the Proposed Development.
5.4.10	N/A	Mitigation	The Applicant should ensure that all mitigation measures proposed within the ES are secured. The Inspectorate welcomes the proposal to include drafts of the Landscape and Ecological Management Strategy with the DCO application. The methods to be used to reinstate habitats lost or harmed during the construction of the Proposed Development should be set out in the ES.
5.4.11	n/a	Aquatic species	Whilst aquatic invertebrate surveys have been proposed in Table 3-13, it is unclear whether consideration has been given to potential impacts on other aquatic species such as fish, for example from watercourse crossings. Any likely significant effects to protected species should be assessed in the ES.
5.4.12	n/a	Biosecurity	In addition to the potential risk of invasive species during construction, any likely significant effects from the spread of disease carried by invasive species that endanger protected species should be assessed, with appropriate control measures set out in the ES.
5.4.13	n/a	EMF	Soil heating is acknowledged to have a potential impact on land use and agriculture during operation in section 3.3 of the Scoping Report. The Applicant should also assess any likely significant effects to wildlife through altered thermal and EMF from buried cables.

5.5 Onshore Archaeology and Cultural Heritage

(Scoping Report section 3.5)

ID	Ref	Applicant's proposed matters to scope out	Inspectorate's comments
5.5.1	Para 693 & Table 3-14	Direct impacts to designated and non-designated heritage assets - operation	The Scoping Report explains that the buried cable would have limited potential to further impact the onshore archaeology and cultural heritage resource. The Inspectorate agrees that direct impacts from the onshore works (both the cable and the substation) would have occurred during the construction phase and that significant effects during operation are unlikely. Therefore, this matter can be scoped out of the assessment for operation impacts.

ID	Ref	Other points	Inspectorate's comments
5.5.2	Para 681	Study Area	Paragraph 681 of the Scoping Report explains that the onshore archaeological study area is the same as the onshore scoping area described in section 1.4 of the Scoping Report. The Inspectorate considers the defined areas to be relatively limited in terms of the archaeological assessment, particularly for potential consideration of indirect effects on setting. The Applicant should ensure that the study area around the cable route corridor and substation are sufficiently broad to give consideration to heritage assets that could be indirectly impacted.
5.5.3	Section 3.5.2.1	Potential impacts during construction	Any likely significant effects associated with the potential for breakout of bentonite drilling fluid should be assessed in the ES.

ID	Ref	Other points	Inspectorate's comments
5.5.4	Para 697	Cumulative effects	Paragraph 697 of the Scoping Report states there are potential cumulative impacts from the original Dudgeon and Sheringham Shoal Offshore Wind Farm Projects. The Inspectorate notes that these windfarms are operational and therefore considers that they should be considered in the environmental baseline, rather than the cumulative effects assessment.
5.5.5	Table 3-16	Proposed surveys	Table 3-16 of the Scoping Report states that proposed baseline surveys will be undertaken on targeted areas of the application site and that any targeted trial trenching would be dependent on landowner access permissions being agreed. The Applicant should ensure that the baseline survey coverage is sufficient to inform the assessment of effects. The ES should explain and justify how the 'targeted areas' are selected. The Inspectorate recommends that areas critical for the delivery of the Proposed Development are included within the surveys eg the landfall site. The Inspectorate recommends that the Applicant seeks to agree the scope of surveys with relevant consultation bodies including Historic England and the relevant local planning authorities.
5.5.6	Para 200	Written Scheme of Investigation (WSI)	The Inspectorate welcomes references to the preparation of an outline WSI to be submitted as part of the ES to outline mitigation commitments. The Inspectorate recommends the Applicant prepare the WSI in conjunction with Historic England and the relevant local planning authorities and that agreements as to spatial and temporal coverage (as well as it's delivery through DCO requirements) will be sought as part of the EPP.

ID	Ref	Other points	Inspectorate's comments
5.5.7	N/A	Cross-reference	Appropriate cross reference should be made to the Landscape and Visual Impact Assessment (LVIA) section of the ES particularly in terms of viewpoint selection within the LVIA which should incorporate views from cultural heritage assets.

5.6 Air Quality

(Scoping Report section 3.6)

ID	Ref	Applicant's proposed matters to scope out	Inspectorate's comments
5.6.1	Table 3-17	Operational impacts	The Scoping Report proposes to scope out operational air quality impacts. It states that operation of the proposed built infrastructure would not give rise to any emissions to air and that maintenance activities would not lead to a significant change in vehicle flows within the study area. However, no vehicle movement figures have been provided in the Scoping Report to support this assertion but the Inspectorate anticipates the numbers of movements are unlikely to lead to significant effects. Nevertheless, the Planning Inspectorate considers that given the nature of the development and as there are no designations for poor air quality within the scoping area (ie Air Quality Management Areas), significant effects to onshore operational air quality are unlikely and that this matter can be scoped out of the assessment.
5.6.2	Table 3-17	Transboundary impacts	Table 3-17 proposes to scope out transboundary impacts to air quality, although no justification is provided within the aspect chapter. Nevertheless, given the nature of the Proposed Development the Inspectorate agrees that significant transboundary effects are unlikely to occur and therefore this matter can be scoped out of the ES.

ID	Ref	Other points	Inspectorate's comments
5.6.3	Para 715	Study area	The Scoping Report states that designated ecological sites within 50m of construction works and 200m of the road network may be affected. The Inspectorate considers that a 200m buffer should also be applied to construction works.
5.6.4	Para 717	Construction phase emissions	The Scoping Report addresses the potential for increases in emissions from road vehicles generated during construction. The ES should also assess impacts from construction plant emissions, where significant effects are likely.
5.6.5	Para 724	No field surveys proposed to inform characterisation of existing environment	As no site specific air quality monitoring surveys are proposed, the ES should include a justification in support of the existing air quality monitoring data used to inform the assessment and its appropriateness to robustly inform the assessment.
5.6.6	Para 728	Air quality modelling	The ES should provide details of the dispersion modelling used to inform the assessment, including the relevant input parameters.
5.6.7	N/A	Stakeholder engagement	The Applicant should make effort to agree the methodology and choice of air quality receptors with relevant consultation bodies including the Environmental Health Officers of the local authorities and the EA as appropriate.
5.6.8	n/a	Statutory air quality limits	The Inspectorate considers that the ES should include an assessment of impacts associated with all relevant pollutants under the EU ambient air quality directive including increases in PM2.5 resulting from the Proposed Development where relevant. In determining significance, the assessment should take into account performance against relevant target/limit values.

5.7 Noise and Vibration

(Scoping Report section 3.7)

ID	Ref	Applicant's proposed matters to scope out	Inspectorate's comments
5.7.1	Paras 744, 745 & Table 3-19	Vibration affecting human and ecological receptors - operation	Paragraphs 744 and 745 of the Scoping Report state that there will be no significant sources of vibration associated with the operational substation due to use of vibration isolation pads/mounts to prevent transmission of ground borne vibration according to industry standards. The Scoping Report states that there will be negligible levels of ground-borne vibration, but no details of industry standards have been provided and at this stage the exact location of onshore infrastructure and proximity to receptors has not yet been determined. The Inspectorate therefore does not agree this can be scoped out at this stage.
5.7.2	Table 3-19	Transboundary impacts	Table 3-19 proposes to scope out transboundary impacts from increased noise and vibration, although no justification is provided within the aspect chapter. Nevertheless, given the nature of the Proposed Development the Inspectorate agrees that significant transboundary effects of this type are unlikely and therefore this matter can be scoped out of the ES.

ID	Ref	Applicant's proposed matters to scope out	Inspectorate's comments
5.7.3	Section 3.7.2.3	Offshore airborne noise – construction and decommissioning	The Inspectorate agrees that given the distance between the proposed offshore wind farm arrays and the coast, construction activities in the array area are unlikely to result in significant effects to onshore receptors and that this matter can be scoped out of the ES. With regards to the installation of the export cable, no evidence has been provided to back up the assertion that "*noise generated by cable laying vessels is generally low and is unlikely to be significantly elevated above background levels*". In the absence of a defined cable route, it is not possible to determine what receptors could be potentially affected from near-shore . The Inspectorate considers that any likely significant effects should be assessed.
5.7.4	Section 3.7.2.3	Offshore airborne noise – construction and operation	The Inspectorate agrees that given the distance between the proposed offshore wind farm arrays and the coast, operational turbine noise is unlikely to result in significant effects to onshore receptors and that this matter can be scoped out of the ES.

ID	Ref	Other points	Inspectorate's comments
5.7.5	N/A	Description of noise generation	The ES should provide a description of the noise generation aspects of the Proposed Development for both the construction and operation stage. Any distinctive tonal, impulsive or low frequency characteristics of the noise should be described.

ID	Ref	Other points	Inspectorate's comments
5.7.6	Para 739	Piling	The Scoping Report acknowledges the potential for piling of foundations for the substation and infrastructure (including National Grid infrastructure, drilling rigs at the landfall, and along the onshore cable route). The ES should identify the locations of any necessary piling and assess the impacts. Where uncertainty exists, the assessment should be undertaken on the basis of the worst case scenario for noise.
5.7.7	n/a	Noise modelling	The ES should provide details of any noise modelling undertaken to inform the assessment, including the relevant input parameters.

5.8 Traffic and Transport

(Scoping Report section 3.8)

ID	Ref	Applicant's proposed matters to scope out	Inspectorate's comments
5.8.1	Section 3.8.2.2 & Table 3-23	Operational impacts	Paragraphs 780 and 781 of the Scoping Report, state that there would be low vehicle demand for operation and maintenance of the substation and cable route. Although the Scoping Report does not provide anticipated operational vehicle movements, taking into account the nature of the Proposed Development, the Inspectorate agrees that significant operational effects from traffic and transport are unlikely and that this matter can be scoped out of the assessment.
5.8.2	Table 3-23	Onshore traffic associated with offshore construction – construction, operation and decommissioning	Paragraph 779 states that the base port (or ports) for offshore construction is unlikely to be known until post-consent. It explains that facilities at the base port for offshore construction would be brought into operation by means of one or more planning applications or as port operations with permitted development rights. As such the Applicant proposes that this matter is scoped out. However, onshore traffic associated with offshore construction is an impact arising from the Proposed Development and the Inspectorate considers that the likely significant effects of the whole scheme should be assessed. Therefore, the transport of elements for the Proposed Development should be assessed where significant effects could occur.

ID	Ref	Applicant's proposed matters to scope out	Inspectorate's comments
5.8.3	Table 3-23	Transboundary impacts	Table 3-23 proposes to scope out transboundary impacts to traffic and transport, although no justification is provided within the aspect chapter. Nevertheless, given the nature of the Proposed Development the Inspectorate agrees that significant transboundary effects from traffic and transport are unlikely and therefore this matter can be scoped out of the ES.

ID	Ref	Other points	Inspectorate's comments
5.8.4	Paras 794 & 799	Proposed traffic demand	The assumptions made in deriving the traffic demand should be clearly explained within the ES and the maximum parameters should be applied in terms of the Rochdale envelope approach to the assessment.
5.8.5	Para 787	Cumulative effects	The Inspectorate agrees with the proposed approach to consultation with Norfolk County Council and Highways England to identify relevant other developments for inclusion in the cumulative impact assessment. The Inspectorate consider that the assessment should assess cumulative impacts with Hornsea Project Three, Norfolk Vanguard and Norfolk Boreas in respect of Oulton airfield and Cawston village.
5.8.6	Table 3-24	Magnitude of effect	Table 3-24 of the Scoping Report provides clear definitions for establishing magnitude of effect for pedestrian amenity and severance (using the categories of very low, low, medium and high). However, it states that the magnitude of effect for highway safety will be informed by a review of existing personal injury collision records and the forecast increase in traffic. Similarly, for driver delay, effect magnitude would be informed by projected

			traffic increases through sensitive junctions. The Inspectorate expects clear definitions of magnitude of effect to be provided within the ES and applied to the assessment of significance of effects.

6. ASPECT BASED SCOPING TABLES – WIDER SCHEME ASPECTS

6.1 Seascape, Landscape and Visual

(Scoping Report section 4.1)

ID	Ref	Applicant's proposed matters to scope out	Inspectorate's comments
6.1.1	Para 809	Impacts of the offshore works on the landscape character of the Norfolk and Suffolk Broads National Park (the Broads) – construction, operation and decommissioning	The Broads is located approximately 34km from the SEP turbine array and 37km from the DEP turbine array it is closest point. Paragraph 809 of the Scoping Report proposes to scope out operational landscape impacts on the Broads on the basis of the distance of the turbine arrays and the low-lying landscape and screening from landforms and intervening vegetation. The largest turbines under consideration would have a tip height of 276m and section 4.4.2.2 of the Scoping Report states that these would be visible along a large stretch of the North Norfolk coast and inland. In the absence of a Zone of Theoretical Visibility (ZTV) to demonstrate that significant effects on the landscape character of the Broads is unlikely from construction, operation and decommissioning in the turbine areas, the Inspectorate cannot agree to scope this matter out. The Inspectorate also considers that the temporary effects to the Broads resulting from the presence of construction vessels close to the coast (ie from cable laying) should be assessed, where significant effects are likely.
6.1.2	Para 818	Onshore cables - operation	Paragraph 818 of the Scoping Report states that potential impacts during operation relate principally to the presence of the onshore substation, since the onshore cables will be buried. The Scoping

ID	Ref	Applicant's proposed matters to scope out	Inspectorate's comments
			Report has not explicitly requested to scope this matter out, however for the avoidance of doubt, the Inspectorate considers visual effects from the onshore cable route (including the landfall) during operation are unlikely to be significant and can be scoped out of the assessment. However, the ES should assess any likely significant long-term landscape effects that could persist from landfall and cable construction activities; for example as a result of any vegetation clearance. This should take into account the effectiveness of any proposed mitigation measures.

ID	Ref	Other points	Inspectorate's comments
6.1.3	Section 4.1.1.2	Visual receptors	The Scoping Report broadly categorises potential visual receptors for which a detailed assessment of effects will be undertaken. The Inspectorate recommends that the Applicant makes efforts to agree representative receptors with relevant consultation bodies, including the local planning authorities. The locations of representative receptors should be depicted on a figure within the ES.
6.1.4	Section 4.1.2.2	Potential impacts during operation	The ES should assess any significant effects of the apparent joining together of the DEP and SEP with existing offshore wind farms (Dudgeon, Sheringham Shoal and Race Bank) when viewed from onshore. The ES should explain and assess any significant effects resulting from the use of taller turbines when viewed in conjunction with shorter turbines of existing offshore wind farms.

ID	Ref	Other points	Inspectorate's comments
6.1.5	Para 825	Duration of effects	The ES should provide clear definitions of the terminology used in the assessment, for example 'short-term', 'long-term' and 'temporary'.
6.1.6	Table 4-2	Data sources	The Applicant's attention is drawn to the 'Seascape character area assessment: East Inshore and East Offshore marine plan areas' produced by the Marine Management Organisation, to inform the seascape element of the assessment.
6.1.7	n/a	ZTV	As with other aspect chapters, the Scoping Report does not identify a study area for the assessment. Whilst the Onshore Archaeology and Cultural Heritage aspect chapter of the Scoping Report refers to the production of a ZTV by the LVIA consultations (see para 702), the Seascape, Landscape and Visual aspect chapter does not. The Inspectorate recommends that a ZTV is developed in order to inform the study area(s). The study area should be sufficiently broad to allow long distance views to be assessed, taking into account the low-lying topography of the area which allows broad views across large expanses of landscape and seascape. The ES should define the spatial extent of effects close to the coast i.e. at what distance from the coast they become indiscernible. The study areas should be clearly explained and justified within the ES.
6.1.8	n/a	Photomontages	The Inspectorate recommends that the ES should make use of photomontages to illustrate the offshore turbines and substation(s), and the onshore substation. Views should be verified and visualisations should accord with industry standards.

ID	Ref	Other points	Inspectorate's comments
6.1.9	n/a	Vegetation clearance and subsequent planting/ reinstatement	The ES should identify any vegetation clearance that will be required for the Proposed Development. The assessment of effects should take into account the time taken for any proposed reinstatement or mitigation planting to establish and mature.
6.1.10	n/a	Lighting	The ES should describe any lighting that would be in place throughout the lifetime of the Proposed Development and assess any likely significant effects from light pollution, including on local amenity receptors.

6.2 Socio-Economics

(Scoping Report section 4.2)

ID	Ref	Applicant's proposed matters to scope out	Inspectorate's comments
6.2.1	Table 4-3	Change in demographics due to in-migration – construction and decommissioning	There is no text within the Scoping Report to support an assessment of a change in demographics due to in-migration for just the operational phase. The Inspectorate considers that the highest potential for a change in demographics would likely be during construction, when the highest number of workers would be anticipated. Section 4.2.2.1 of the Scoping Report states that offshore workers are likely to be non-UK residents and that some onshore/landfall construction contractors could come from anywhere within the UK. As such, the Inspectorate considers that this matter should be assessed for all phases of the Proposed Development where significant effects are likely to occur.

ID	Ref	Other points	Inspectorate's comments
6.2.2	Sections 4.2.2.1 & 4.2.2.2	Employment	The ES should quantify the anticipated number of onshore and offshore employment opportunities generated for all phases of the Proposed Development.
6.2.3	Para 850	Assessment methodology	The Scoping Report notes that there is no set of recognised standards for assessing socio-economic impacts and that the ES will present a qualitative assessment. The methodology should be set out within the ES.

6.3 Health

(Scoping Report section 4.3)

ID	Ref	Applicant's proposed matters to scope out	Inspectorate's comments
6.3.1	Table 4-4	Emissions to air (including dust) – operation	The Health aspect chapter of the Scoping Report has not provided justification to scope out these impacts from the operational phase. However, the Inspectorate has agreed to scope out these operational impacts from the relevant aspect assessments (see Tables 5.1 of this Opinion) and considers that these potential impacts are unlikely to result in significant effects. As such the Inspectorate agrees that their impact on health can also be scoped out of the ES.
6.3.2	Table 4-4	Exposure to contaminated soils – operation	
6.3.3	Table 4-4	Accidental/incidental chemical spills/leaks to surface/ground/coastal waters or soils – operation	The Health aspect chapter of the Scoping Report has not provided justification to scope out these impacts from the operational phase. However, paragraph 604 of the Water Resources and Flood Risk aspect chapter identifies the potential for accidental spillage or leakage of fuel oils or lubricants during operation, which could impact upon surface water quality and connected groundwaters. As such, the Inspectorate does not agree that subsequent impacts to health can be scoped out of the assessment.
6.3.4	Table 4-4	Transboundary impacts – construction, operation and decommissioning	The Scoping Report does not justify scoping out transboundary health impacts. However, given the nature of the Proposed Development, the Inspectorate does not consider that significant effects are likely; therefore it is agreed that this matter can be scoped out of the ES.

ID	Ref	Other points	Inspectorate's comments
6.3.5	Section 4.3.2.2 & Table 4-4	Operational impacts	The operational matters scoped in to summary Table 4-4 do not accord with those detailed in paragraph 864; Table 4-4 generally identifies more potential impacts, although omits impacts from the generation of electromagnetic fields (EMFs). For the avoidance of doubt, the Inspectorate agrees that the matters scoped in to Table 4-4 are relevant to the Proposed Development and should therefore be assessed in the ES, alongside potential impacts of EMF.
6.3.6	Section 4.4.3	Assessment methodology	The Scoping Report notes that there are no statutory guidelines for assessing health impacts. Public Health England's consultation response provides advice for assessing potential impacts and references a number of guides; the Inspectorate advises the Applicant to consider these comments in developing its methodology. The assessment methodology employed should be clearly described within the ES.

6.4 Tourism and Recreation

(Scoping Report section 4.4)

ID	Ref	Applicant's proposed matters to scope out	Inspectorate's comments
6.4.1	Table 4-7	Restricted beach access – operation	The Inspectorate notes that there would be no beach access restrictions proposed during the operational phase, therefore it considers significant effects are unlikely and agrees this matter can be scoped out of the assessment.
6.4.2	Table 4-7	Deterioration to Bathing water/ Blue flag beaches and resulting effect on tourism and recreation – operation	The Scoping Report has not provided a justification for scoping this matter out of the assessment. However, given the nature of the Proposed Development when operational, the Inspectorate agrees that effects are unlikely to be significant. As such, this matter can be scoped out of the assessment.
6.4.3	Table 4-7	Loss of and disturbance to local tourism and recreation assets (onshore) – operation	The Scoping Report has not provided a justification for scoping these matters out of the assessment. The Inspectorate considers that significant effects to any recreation/tourism assets along the onshore cable route are unlikely to be significant during the operational phase. However, the exact location of the onshore substation has not yet been determined and Figure 4.4.1 shows a number of tourist attractions within the search area for the substation. As such, the Inspectorate considers it would be premature to scope out the potential for loss of, disturbance to and visual impacts to tourism and recreation assets. However, the Inspectorate agrees that significant effects to these receptors from noise and dust during operation are unlikely and
6.4.4	Table 4-7	Disturbance to recreation/ tourism assets from noise, dust and visual impact (onshore) - operation	

ID	Ref	Applicant's proposed matters to scope out	Inspectorate's comments
			that these matters can be scoped out of the assessment.

ID	Ref	Other points	Inspectorate's comments
6.4.5	Para 881	Public Rights of Way (PRoW)	The ES should assess impacts to PRoW where significant effects are likely to occur this should include the several Country Trails and promoted circular walks that could be impacted during construction, in particular Marriott's Way. The Applicant should make effort to agree the approach to this assessment with relevant consultation bodies including Norfolk County Council.
6.4.6	Section 4.4.2.1	Restricted beach access	The potential for restricted beach access during construction has been scoped in to the Tourism and Recreation aspect chapter. The ES should also assess any likely significant effects that beach access restrictions could have on socio-economic matters, for example impacts to fishing and recreation.
6.4.7	Section 4.4.3	Assessment methodology	The Scoping Report notes that there is no statutory guidelines for assessing tourism and recreation impacts. The assessment methodology employed should be clearly described within the ES.
6.4.8	Section 4.4.3	Data gathering	Where there is a risk of a significant effect, the Applicant should undertake relevant site specific surveys to inform their tourism and recreation baseline, for example to inform the assessment of effects on beach users during the landfall works.

7. INFORMATION SOURCES

7.0.1 The Inspectorate's National Infrastructure Planning website includes links to a range of advice regarding the making of applications and environmental procedures, these include:

- Pre-application prospectus[3]
- Planning Inspectorate advice notes[4]:
  - Advice Note Three: EIA Notification and Consultation;
  - Advice Note Four: Section 52: Obtaining information about interests in land (Planning Act 2008);
  - Advice Note Five: Section 53: Rights of Entry (Planning Act 2008);
  - Advice Note Seven: Environmental Impact Assessment: Process, Preliminary Environmental Information and Environmental Statements;
  - Advice Note Nine: Using the 'Rochdale Envelope';
  - Advice Note Ten: Habitat Regulations Assessment relevant to nationally significant infrastructure projects (includes discussion of Evidence Plan process);
  - Advice Note Twelve: Transboundary Impacts;
  - Advice Note Seventeen: Cumulative Effects Assessment; and
  - Advice Note Eighteen: The Water Framework Directive.

7.0.2 Applicants are also advised to review the list of information required to be submitted within an application for Development as set out in The Infrastructure Planning (Applications: Prescribed Forms and Procedures) Regulations 2009.

[3] The Planning Inspectorate's pre-application services for applicants. Available from: https://infrastructure.planninginspectorate.gov.uk/application-process/pre-application-service-for-applicants/

[4] The Planning Inspectorate's series of advice notes in relation to the Planning Act 2008 process. Available from: https://infrastructure.planninginspectorate.gov.uk/legislation-and-advice/advice-notes/

APPENDIX 1: CONSULTATION BODIES FORMALLY CONSULTED

TABLE A1: PRESCRIBED CONSULTATION BODIES[5]

SCHEDULE 1 DESCRIPTION	ORGANISATION
The Health and Safety Executive	Health and Safety Executive
The National Health Service Commissioning Board	NHS England
The relevant Clinical Commissioning Group	NHS North Norfolk CCG
	NHS Norwich CCG
	NHS South Norfolk CCG
Natural England	Natural England
The Historic Buildings and Monuments Commission for England	Historic England – East of England
The relevant fire and rescue authority	Norfolk Fire and Rescue Service
The relevant police and crime commissioner	The Police and Crime Commissioner for Norfolk
The relevant parish council(s) or, where the application relates to land [in] Wales or Scotland, the relevant community council	Honingham Parish Council
	Weston Longville Parish Council
	Ringland Parish Council
	Morton on the Hill Parish Council
	Attlebridge Parish Council
	Wymondham Parish Council
	Marlingford and Colton Parish Council
	Shotesham Parish Council

[5] Schedule 1 of The Infrastructure Planning (Applications: Prescribed Forms and Procedure) Regulations 2009 (the 'APFP Regulations')

SCHEDULE 1 DESCRIPTION	ORGANISATION
	Easton Parish Council
	Barford & Wramplingham Parish Council
	East Carleton & Ketteringham Parish Council
	Newton Flotman Parish Council
	Swardeston Parish Council
	Keswick and Intwood Parish Council
	Stoke Holy Cross Parish Council
	Great Melton Parish Council
	Hethersett Parish Council
	Little Melton Parish Council
	Bawburgh Parish Council
	Caistor St. Edmund Parish Council
	Bixley Parish Council
	Mulbarton Parish Council
	Swainsthorpe Parish Council
	Skeyton Parish Council
	Little Barningham Parish Council
	Wickmere Parish Council
	Plumstead Parish Council
	Matlask Parish Council
	Baconsthorpe Parish Council
	Swanton Abbott Parish Council
	Westwick Parish Council
	Worstead Parish Council

SCHEDULE 1 DESCRIPTION	ORGANISATION
	Honing Parish Council
	Paston Parish Council
	Corpusty and Saxthorpe Parish Council
	Itteringham Parish Council
	North Walsham Town Council
	Witton Parish Council
	Bacton Parish Council
	Weybourne Parish Council
	Bodham Parish Council
	Beckham East & West Parish Council
	Upper Sheringham Parish Council
	Felthorpe Parish Council
	Marsham Parish Council
	Cawston Parish Council
	Heydon Parish Council
	Swannington with Alderford & Little Witchingham Parish Council
	Haveringland Parish Council
	Booton Parish Council
	Hevingham Parish Council
	Brampton Parish Council
	Oulton Parish Council
	Burgh and Tuttington Parish Council
	Brandiston Parish Council
The Environment Agency	The Environment Agency

SCHEDULE 1 DESCRIPTION	ORGANISATION
The Joint Nature Conservation Committee	Joint Nature Conservation Committee
The Maritime and Coastguard Agency	Maritime & Coastguard Agency
The Marine Management Organisation	Marine Management Organisation
The Civil Aviation Authority	Civil Aviation Authority
The Relevant Highways Authority	Norfolk County Council Highways Authority
The relevant strategic highways company	Highways England - East
The Coal Authority	The Coal Authority
The relevant internal drainage board	Norfolk Rivers Internal Drainage Board
	Waveney Lower Yare & Lothingland Internal Drainage Board
	Broads Internal Drainage Board
	East Hardling Internal Drainage Board
The Canal and River Trust	The Canal and River Trust
Trinity House	Trinity House
Public Health England, an executive agency of the Department of Health	Public Health England
The Crown Estate Commissioners	The Crown Estate
The Forestry Commission	Forestry Commission - East and East Midlands
The Secretary of State for Defence	Ministry of Defence

TABLE A2: RELEVANT STATUTORY UNDERTAKERS[6]

STATUTORY UNDERTAKER	ORGANISATION
The relevant Clinical Commissioning Group	NHS North Norfolk CCG
	NHS Norwich CCG
	NHS South Norfolk CCG
The National Health Service Commissioning Board	NHS England
The relevant NHS Trust	East of England Ambulance Service NHS Trust
Railways	Network Rail Infrastructure Ltd
	Highways England Historical Railways Estate
Canal Or Inland Navigation Authorities	The Canal and River Trust
Civil Aviation Authority	Civil Aviation Authority
Licence Holder (Chapter 1 Of Part 1 Of Transport Act 2000)	NATS En-Route Safeguarding
Universal Service Provider	Royal Mail Group
Homes and Communities Agency	Homes England
The relevant Environment Agency	The Environment Agency
The relevant water and sewage undertaker	Anglian Water
The relevant public gas transporter	Cadent Gas Limited
	Energetics Gas Limited
	Energy Assets Pipelines Limited
	ES Pipelines Ltd

[6] 'Statutory Undertaker' is defined in the APFP Regulations as having the same meaning as in Section 127 of the Planning Act 2008 (PA2008)

STATUTORY UNDERTAKER	ORGANISATION
	ESP Connections Ltd
	ESP Networks Ltd
	ESP Pipelines Ltd
	Fulcrum Pipelines Limited
	Harlaxton Gas Networks Limited
	GTC Pipelines Limited
	Independent Pipelines Limited
	Indigo Pipelines Limited
	Murphy Gas Networks limited
	Quadrant Pipelines Limited
	National Grid Gas Plc
	Scotland Gas Networks Plc
	Southern Gas Networks Plc
Electricity Generators With CPO Powers	Scira Offshore Energy Limited
	Dudgeon Offshore Wind Limited
	Vattenfall Wind Power Ltd
	DONG Energy Hornsea Project Three (UK) Limited
The relevant electricity distributor with CPO Powers	Eclipse Power Network Limited
	Energetics Electricity Limited
	Energy Assets Networks Limited
	Energy Assets Power Networks Limited
	ESP Electricity Limited
	Fulcrum Electricity Assets Limited
	Harlaxton Energy Networks Limited

STATUTORY UNDERTAKER	ORGANISATION
	Independent Power Networks Limited
	Leep Electricity Networks Limited
	Murphy Power Distribution Limited
	The Electricity Network Company Limited
	UK Power Distribution Limited
	Utility Assets Limited
	Vattenfall Networks Limited
	UK Power Networks Limited
The relevant electricity transmitter with CPO Powers	Blue Transmission Sheringham Shoal Limited
	National Grid Electricity Transmission Plc

TABLE A3: SECTION 43 CONSULTEES (FOR THE PURPOSES OF SECTION 42(1)(B))[7]

LOCAL AUTHORITY[8]
South Norfolk Council
Norwich City Council
Broadland District Council
North Norfolk District Council
Great Yarmouth Borough Council
King's Lynn and West Norfolk Borough Council
Breckland Council
Mid Suffolk District Council

[7] Sections 43 and 42(B) of the PA2008
[8] As defined in Section 43(3) of the PA2008

LOCAL AUTHORITY[8]
East Suffolk Council
The Broads Authority
Norfolk County Council
Lincolnshire County Council
Cambridgeshire County Council
Suffolk County Council

TABLE A4: NON-PRESCRIBED CONSULTATION BODIES

ORGANISATION
Royal National Lifeboat Institution

APPENDIX 2: RESPONDENTS TO CONSULTATION AND COPIES OF REPLIES

CONSULTATION BODIES WHO REPLIED BY THE STATUTORY DEADLINE:
Anglian Water
Baconsthorpe Parish Council
Barford and Wramplingham Parish Council
Blue Transmission Sheringham Shoal Limited
Borough Council of King's Lynn and West Norfolk
Brampton and Oxnead Parish Council
Brandiston Parish Council
Broadland District Council
The Canal & River Trust
Cawston Parish Council
The Coal Authority
Energy Assets
Environment Agency
ESP Utilities Group Limited
Great Melton Parish Council
Harlaxton Gas Networks Limited
Health and Safety Executive
Hethersett Parish Council
Historical Railways Estate (on behalf of Department for Transport)
Historic England
Itteringham Parish Council
Joint Nature Conservation Committee

Lincolnshire County Council
Marine Management Organisation
Maritime and Coastguard Agency
Ministry of Defence
Mulbarton Parish Council
NATS
Natural England
Norfolk County Council
North Norfolk District Council
Oulton Parish Council
Plumstead Parish Council
Public Health England
Ringland Parish Council
South Norfolk Council
Suffolk County Council
Swannington with Alderford & Little Witchingham Parish Council
Trinity House
Weybourne Parish Council

Strategic Growth and Public Policy
Anglian Water Services Ltd
Thorpe Wood House,
Thorpe Wood,
Peterborough
PE3 6WT

Tel [redacted]

Your ref EN010109-000007

Hannah Terry
Senior EIA and Land Rights Advisor
The Planning Inspectorate
Major Casework Directorate
Temple Quay House
2 The Square
Bristol, BS1 6PN

6 November 2019

Dear Ms Terry,

Dudgeon and Sheringham Shoal Offshore Windfarm extensions: Environmental Statement Scoping Report

Thank you for the opportunity to comment on the scoping report for the above project. Anglian Water is the water and sewerage undertaker for the above site. The following response is submitted on behalf of Anglian Water.

General comments

Anglian Water would welcome further discussions with Equinor New Energy Ltd prior to the submission of the Draft DCO for examination.

In particular it would be helpful if we could discuss the following issues:

- Wording of the Draft DCO including protective provisions specifically for the benefit of Anglian Water.
- Requirement for water and wastewater services.
- Impact of development on Anglian Water's assets including water source(s) and the need for mitigation.
- Pre-construction surveys.

THE QUEEN'S AWARDS FOR ENTERPRISE: SUSTAINABLE DEVELOPMENT 2015

Registered Office
Anglian Water Services Ltd
Lancaster House, Lancaster Way,
Ermine Business Park, Huntingdon,
Cambridgeshire. PE29 6YJ
Registered in England
No. 2366656.

an AWG Company

3.2 Water Resources and Flood Risk

Reference is made to principal risks of flooding from the above project being fluvial and surface water flooding during the construction and operational phases. Anglian Water is responsible for managing the risks of flooding from surface water, foul water or combined water sewer systems.

Consideration should be given to all potential sources of flooding including sewer flooding as part of the Environmental Statement and related Flood Risk Assessment (FRA). At this stage it is unclear whether there is a requirement for wastewater services for the above site. It is suggested that the Environmental Statement and related Flood Risk Assessment should include reference to the foul sewerage network and sewage treatment.

Reference is made to a number of groundwater Source Protection Zones within the onshore and substation study areas. Figure 3.2.4 of the Scoping report s illustrates the cable route and the SPZs in the area. However it is not clear to what extent SPZs 1 and 2 are affected due to the scale of this figure.

We would ask that the Environmental Statement consider all potable water sources which could potentially be affected by the development (including but not limited to Matlaske and Caistor St Edmund sources) and the extent to which mitigation is required.

It is important to ensure that adequate safeguards are put in place to ensure that the proposed onshore cable route and associated infrastructure do not adversely affect the continued operation of Anglian Water's existing assets. Anglian Water would welcome further discussion with Equinor New Energy Ltd in relation to groundwater prior to submission of the application to the planning inspectorate.

The Scoping Report refers to the presence of existing utilities within the study are which potentially could be affected by the development. However Figure 3.3.2 does not refer to Anglian Water's existing infrastructure.

It is therefore suggested that the Environmental Statement should include reference to existing water supply and sewerage networks as well as the potable water sources referenced in the report.

Maps of Anglian Water's assets are available to view at the following address:

[redacted]

.
Should you have any queries relating to this response please let me know.

Yours sincerely

[redacted]

Stewart Patience

Spatial Planning Manager

Terry, Hannah

From: Baconsthorpe Parish Council <baconsthorpeparishcounci[redacted]>
Sent: 06 November 2019 18:50
To: SADEP
Subject: Your Ref: EN010109-000007 Application by Equinor New Energy Ltd. for an Order granting development consent for the Dudgeon and Sheringham Shoal Offshore Wind Farm Extensions

Follow Up Flag: Follow up
Flag Status: Completed

Re: Scoping Report consultation

For the attention of Hannah Terry

Dear Ms. Terry

Please delete the last email I sent. I inadvertently named the incorrect parish council in my comment. I will repeat.

I am writing on behalf of Baconsthorpe Parish Council who are a consultee on the above application I would submit their comments as follows.

"Baconsthorpe Parish Council would prefer a ring main option to onshore cables to be investigated. They would prefer that an early proposal of the viability of this could be included in the Environmental Statement. They feel that although they may support wind generated energy, the disruption to the surrounding areas, heritage, wildlife and therefore tourism, of digging up the land for cables is disproportionate and the sensible way forward is for collaboration by all companies proposing further wind turbines, perhaps forming one company to fund investigation and work towards an off-shore ring main"

Apologies for previous error.
Yours sincerely
--
Sarah Hayden CiLCA
Parish Clerk
Baconsthorpe Parish Council
[redacted]

General Data Protection Regulation: Email contact Privacy Notice available on Parish Council website. Please be aware that the Parish Council may share your contact details as detailed in the policy
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Terry, Hannah

From: Barford Parish Council <barfordpc@[redacted]
Sent: 24 October 2019 13:02
To: SADEP
Cc: Barford Parish Council
Subject: EN010109 - Dudgeon and Sheringham Shoal Offshore Wind Farm Extensions - EIA Scoping Notification and Consultation

Follow Up Flag: Follow up
Flag Status: Flagged

Barford and Wramplingham Parish Council would like the following information to be provided within the Environmental Statement:

- The depth of the cabling routes, and impact on the subsoil and disruption this causes.
- Consideration to the environmental impact of potentially multiple cable lines on local agriculture and ancient woodlands
- Mitigation for ongoing drainage issues caused by disruption of river and valley beds
- Consideration and avoidance of the numerous archaeological sites within the area
- The Scoping Opinion circulated includes information about wildlife, however there is a lack of consideration about impact on people living in rural communities and isolated areas

The Council would request that no subsequent cables are planned until the first have been laid and environmental impact ascertained.

Kind regards -

Heidi Frary

--
Heidi Frary
Clerk to Barford & Wramplingham Parish Council
[redacted]
barfordpc@gmail.com

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Blue Transmission London Array Limited
The American Barns
Banbury Road
Lighthorne
Warwickshire
CV35 0AE

Hannah Terry
Senior EIA and Land Rights Advisor
Temple Quay House,
Temple Quay,
Bristol BS1 6PN.

David Lyon
Senior Asset Manager

[redacted]
Direct tel: [redacted]
Mobile: [redacted]

16 October 2019

Our Reference: BTLAL191016DL

Dear Hannah,

RE: EN010109 - Dudgeon and Sheringham Shoal Offshore Wind Farm Extensions - EIA Scoping Notification and Consultation.

Thank you for sending us a copy of the letter of 9 October 2019 regarding the application by Equinor New Energy Limited for an Order granting Development Consent for the Dudgeon and Sheringham Shoal Offshore Wind Farm Extensions.

Blue Transmission Sheringham Shoal Limited (BTSSL) is the Offshore Transmission Owner for the offshore and onshore electricity cables connecting the existing Sheringham Shoal Windfarm to the National Grid onshore network. The 'Dudgeon and Sheringham Shoal Offshore Wind Farm Extensions Scoping Report' prepared by Equinor identifies potential cable routes from the Dudgeon and Sheringham Shoal Offshore Wind Farm Extensions, some of which are close to the cables owned by BTSSL.

BTSSL is therefore an interested party in any aspect of the proposed development relating to the cable routes as any new cables may need to cross or be installed close to BTSS cables.

You request specifically in your letter of 9 October 2019 for us to inform the Planning Inspectorate of the information we consider should be provided in the Environmental Statement (ES). We are not familiar with the typical scope and contents of an ES but would be particularly interested in any comments on the cable route options that might inform us of the potential likelihood of different options being selected.

I hope that this is clear and look forward to further information on this application in due course.

Yours sincerely

[redacted]

David Lyon
Senior Asset Manager

Terry, Hannah

From: Helen Morris <helen.morris[redacted]
Sent: 16 October 2019 15:53
To: SADEP
Subject: EN010109-000007 - Dudgeon and Sheringham Shoal Offshore Wind Farm Extensions - EIA Scoping

Follow Up Flag: Follow up
Flag Status: Flagged

FAO: Hannah Terry

Dear Hannah

I can confirm we have no comments to make in relation to the request for a Scoping Opinion.

Kind regards

Helen

Helen Morris

Principal Planner (North Area)

Borough Council of King's Lynn and West Norfolk

[redacted]

[redacted]
E: helen.morris[redacted]
W: www.west-norfolk.gov.uk

View recent planning applications: http://online.west-norfolk.gov.uk/publicaccess

[redacted]

****
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https://www.west-norfolk.gov.uk/info/20147/about_our_website/470/disclaimer

Terry, Hannah

From: Brampton Oxnead PC <bopc@hotmail.co.uk>
Sent: 06 November 2019 19:16
To: SADEP
Cc: [redacted]
Subject: EN010109-000007 Dudgeon and Sheringham Shoal offshore Windfarm Extensions

Follow Up Flag: Follow up
Flag Status: Completed

Planning Act 2008 and The Infrastructure Planning (Environmental Impact Assessment) Regulations 2017 (the EIA Regulations) – Regulations 10 and 11

Application by Equinor New Energy Limited (the Applicant) for an Order granting Development Consent for the Dudgeon and Sheringham Shoal Offshore Wind Farm Extensions (the Proposed Development)

Scoping consultation and notification of the Applicant's contact details and duty to make available information to the Applicant if requested

Dear Sir

Thank you for your letter of 9th October regarding the above application by Equinor.
Having reviewed the papers and plans, it would appear that the villages of Brampton and Oxnead will be directly affected by the proposal and the Parish Council would like to raise the following concerns:

1. Our rural settlements have small, narrow, single track roads which are totally unsuitable for access to a large number of heavy works vehicles on a daily basis.
2. The constant digging up of productive arable land would cause severe disruption to local businesses, where the major income for our rural economy is from farming and tourism.
3. There has been a lack of consultation and information on the detail of the scheme such as the effect on public health of the Electro Magnetic Field from the underground cables.

On a more general note our concerns are as follows:

4. The current system of allocating onshore national grid connections ad hoc and piecemeal is no longer appropriate, and will lead to the unnecessary devastation of the very onshore environments we are trying to protect including AONB, SSSI, CWS and the Broads
5. One possible solution which we are exploring to minimise the onshore impact of infrastructure, is for several offshore wind farms to be connected offshore via a ring main
6. Upgrade the current infrastructure for Sheringham Shoal and Dudgeon which would require upgrading of capacity at substations.
7. There is an urgent need now for strategic central planning of the grid connection arrangements for this and all other wind farms in the North Sea.

We hope you take these concerns into consideration.

Kind regards

Margaret Claridge
Clerk for Brampton & Oxnead Parish Council

BRANDISTON PARISH MEETING
The Old School House
Brandiston
Norwich
Norfolk
NR10 4PJ

The Planning Inspectorate
Temple Quay House
Temple Quay
Bristol
BS1 6PN

1st November 2019

Dear Sirs

Sheringham and Dudgeon Extension Projects

We refer to your letter dated 9th October 2019 requesting that all Councils look at the scoping report for the above new project.

At a Parish meeting on 29th October the scoping report was discussed and apposed unanimously by all present.

One of the options in the scoping report is to dig the proposed cable trench through the village of Brandiston. If the proposal is put into effect the disruption and environmental impact on the village will be immense.

It should be borne in mind that the Hornsea Project Three currently in planning and up for decision in March 2020 envisages another trench in the adjacent Parish of Booton within half a mile of Brandiston. The Sheringham and Dudgeon extension projects promise more disruption than the village can be expected to absorb – were the Hornsea project to be added to the disruption the result in the locality would be intolerable.

It appears that the developers are taking no opportunity to communicate with each other with a view to combining installations within a single civil engineering exercise. More importantly the developers and the relevant authorities are not it would seem discussing alternatives to cable trenches such as an offshore ring main (ORM).

We hope you will factor our views – which coincide with the views of the surrounding Parishes and those along the proposed routes of the cable trenches – when it comes to a decision.

Yours faithfully

[redacted]

G C S Gates
Parish Meeting Chairman

Hansells
Solicitors & Financial Advisers

13 The Close
Norwich
NR1 4DS

Direct Dial: [redacted]
Main Switch: [redacted]
Fax: [redacted]

Hannah Terry
Senior EIA and Land Rights Advisor
Major Casework Directorate
Temple Quay House
2 The Square
Bristol
BS1 6PN

Your reference EN010109-000007
Our reference CPB/37515.002/CPB
Please ask for Chris Burgess
E-mail [redacted]
Date 5th November 2019

Dear Hannah

Re: Application by Equinor New Energy Limited (the Applicant) for an Order granting Development Consent for the Dudgeon and Sheringham Shoal Offshore Wind Farm Extensions (the Proposed Development): Scoping Consultation for ES

We act for the Brandiston Parish Meeting in connection with the above matter. We wish to formally request on behalf of our client that the following matters are covered in the Environmental Statement in connection with the above matter:

1. A comprehensive methodology for the criteria to be used to assess the significance of the effects and impacts of the proposed trenching works and routing of cables through our client's administrative area on the matters set out in points 2- 6 below;

2. The short-term and long term likely effects and impacts on the archaeological heritage of the land through which the trenching and cabling will be routed;

3. The short-term and long term likely effects and impacts on the bio-diversity ecology and habitats of the land through which the trenching and cabling will be routed;

4. The short-term and long term likely effects and impacts on the water table and ground water and drainage of the land through which the trenching and cabling will be routed;

5. The short-term and long terms likely effects and impacts of the construction traffic on the surrounding road net-work and air pollution, noise and dust;

6. Whether the proposed works are likely to result in any land contamination issues for the land concerned in our client's administrative area;

Managing Partner
Roger Holden

Senior Partner
Timothy Eagle
(Notary Public)

Partners
Kathryn Hirst
Sharon Lilley
(Non Lawyer)
Shelyna Mariscal
Rachel McGurk
Jane Stockings
(Notary Public)
Nick Sutherland

Consultants
Bryan Gillery
Philip Norton
Susan Seal-Coon
Neil Stubbs
Mari Vallgren

Associates
Chris Burgess
Jonathan Care
William Cason
Kealy Dougan
Gemma Helsdon
Samantha Loombe
(Chartered Legal Executive)
Gemma Murrell

Staff Solicitors
Felicity Elsmore
(Senior Solicitor)

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7. The proposals for the mitigation of the above issues.

Yours sincerely

[redacted]

Chris Burgess LARTPI
Hansells Solicitors

Terry, Hannah

From: Matthew Rooke <matthew.rooke@[redacted]
Sent: 01 November 2019 11:53
To: SADEP
Subject: Ref. EN010109 Scoping opinion - Dudgeon & Sheringham Shoal Offshore Windfarm DCO.

Your ref: EN010109 - 000007

FAO Hannah Terry

In response to the e-mail from PINS requesting a Scoping consultation reply in respect of the above matter that I received dated 10 October, on behalf of the District Council I would like to request that the Environmental Statement includes the impacts of the proposals on the following topics:

Historic environment (including cultural heritage, listed building and archaeology);
Landscape (including important views, trees, historic hedgerows) and have regard to the District Council's Landscape Character Assessment SPD;
Biodiversity;
Geology & Soils;
Noise, Vibration and Air Quality;
People and Communities.

Regards

Matthew

Matthew Rooke
Planning Manager (West)
[redacted]

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Terry, Hannah

From: Tessa Craig <Tessa.Craig@[redacted]
Sent: 23 October 2019 10:49
To: SADEP
Subject: RE: EN010109 - Dudgeon and Sheringham Shoal Offshore Wind Farm Extensions - EIA Scoping Notification and Consultation

Follow Up Flag: Follow up
Flag Status: Flagged

Dear Ifan,

Thank you for your consultation on the Dudgeon and Sheringham Shoal Offshore Wind Farm Extensions.

The Canal & River Trust (the Trust) is the guardian of 2000 miles of historic waterways across England and Wales. We are among the largest charities in the UK. Our vision is that "living waterways transform places and enrich lives". We are a prescribed consultee in the Nationally Significant Infrastructure Project (NSIP) process.

The Trust has reviewed the proposal, and on the basis that it appears unlikely to have any impact on our waterways, we have no comment to make at this time.

Kind regards,

Tessa Craig

Area Planner – Canal & River Trust

The Toll House, Little Venice, Delamere Terrace, London W2 6ND
[redacted]

Please visit [redacted] to find out more about the Canal & River Trust
Follow [redacted] from the Canal & River Trust on Twitter.

From: SADEP <sadep@planninginspectorate.gov.uk>
Sent: 09 October 2019 15:41
To: National Planning Function <NationalPlanning.Function@canalrivertrust.org.uk>
Cc: Heather Clarke <[redacted]
Subject: EN010109 - Dudgeon and Sheringham Shoal Offshore Wind Farm Extensions - EIA Scoping Notification and Consultation

Please see attached correspondence on the proposed Dudgeon and Sheringham Shoal Offshore Wind Farm Extensions.

Please note the deadline for consultation responses is **06 November 2019**, and is a statutory requirement that cannot be extended.

Kind regards,

Ifan Gwilym
Cynghorydd AEA a Hawliau Tîr | EIA and Land Rights Advisor
Cyfarwyddiaeth Gwaith Achos Mawr| Major Casework Directorate
Yr Arolygiaeth Gynllunio | The Planning Inspectorate

Temple Quay House, Temple Quay, Bristol BS1 6PN

0303 444 5491

Ifan.Gwilym@planninginspectorate.gov.uk

infrastructure.planninginspectorate.gov.uk/ (Cynllunio Seilwaith Cenedlaethol // National Infrastructure Planning)

www.gov.uk/government/organisations/planning-inspectorate (Yr Arolygiaeth Gynllunio // The Planning Inspectorate)

Twitter: @PINSgov



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Canal & River Trust is a charitable company limited by guarantee registered in England & Wales with company number 7807276 and charity number 1146792. Registered office address First Floor North, Station House, 500 Elder Gate, Milton Keynes MK9 1BB.

Cadw mewn cysylltiad
Cofrestrwch i dderbyn e-gylchlythyr Glandŵr Cymru https://canalrivertrust.org.uk/newsletter
Cefnogwch ni ar https://www.facebook.com/canalrivertrust
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Mae Glandŵr Cymru yn gwmni cyfyngedig drwy warant a gofrestrwyd yng Nghymru a Lloegr gyda rhif cwmni 7807276 a rhif elusen gofrestredig 1146792. Swyddfa gofrestredig: First Floor North, Station House, 500 Elder Gate, Milton Keynes MK9 1BB.

Cawston Parish Council

Tel: [redacted]
Email: cawstonpc[redacted]
Web: cawston-parish-council.norfolkparishes.gov.uk

CAWSTON PARISH COUNCIL RESPONSE TO DUDGEON AND SHERINGHAM SHOAL OFFSHORE WIND FARM EXTENSIONS – SCOPING REPORT

Thank you for your letter, ref EN10109-000007, dated 9th October regarding the Scoping Report on the proposed Dudgeon and Sheringham Shoal extensions.

Cawston Parish Council considers that the following information should be provided in the applicant's Environmental Statement:

A FULL ASSESSMENT OF ALTERNATIVE METHODS OF DELIVERY ONSHORE

Any application should include a full assessment of alternative methods of delivery onshore. In particular, an Offshore Ring Main would avoid the need for a series of cable corridors around Cawston. This has already been acknowledged by developer companies and National Grid; several local MPs have also taken it up with the Secretary of State.

This is the fourth such application currently in progress in North Norfolk, following Hornsea Three, Norfolk Vanguard and Norfolk Boreas. Their cable routes surround Cawston and, if approved, the effect of traffic and construction activities will have a severe impact on life in the village and surrounding area over many years.

FULL LONG TERM COSTINGS OF PUBLIC HEALTH AND WELFARE

We consider that any examination of issues around public health and welfare should be far more thorough than is set out in the Scoping Report and should include full long term costings.

A FULL ASSESSMENT OF THE CUMULATIVE IMPACT OF DUDGEON SHERINGHAM SHOAL EXTENSIONS WITH THE THREE OTHER WINDFARM CABLE ROUTE SCHEMES WHICH AFFECT NORTH NORFOLK INCLUDING THE CAWSTON AREA

All assessments of items affecting public health and well-being, including noise and vibration, air quality and traffic impacts, should include the cumulative impacts with the other schemes noted above.

A ROBUST PUBLIC CONSULTATION PROCESS

Cawston Parish Council would also like to emphasise the need for a robust public consultation process to be undertaken so the views and concerns of the local population are to be taken into consideration by the Planning Inspectorate.

So far, the degree and quality of public consultation by the Applicant has been deficient and should be carefully monitored throughout the process. For example, on 22nd October a Cawston Parish Councillors found out, quite by chance, that a "Public Consultation" meeting was to be held in Aylsham on 28th October.

As far as we can ascertain, the Applicant chose not to inform any of the Parish Councils in the affected area; we find this attitude extraordinary. This was the only such meeting offered before the PINS deadline.

Once challenged, an advertisement was placed in the local press a few days before the event. This was the only attempt at publicity. The estimated population of Norfolk is 898,400; the circulation of this newspaper is 24,308. **This is inadequate notice**; it does not give residents time to inform themselves and arrange to go to a meeting held on a working day just a few days later.

Cawston Parish Councillors tried to notify as many residents as we could, and a number were able to attend the meeting. Those who attended the meeting have passed on concerns at the lack of applicant's representatives available to consult, and misleading information.

A Cawston resident who managed to attend the public consultation expressed their concerns about the impact of deficiencies in the Scoping Report on the consultation process as follows :

> "*The maps in the Scoping Report are indistinct. Roads and properties are hard to identify. If you find a point of reference such as the edge of a village or town and estimate 500m from there, you could underestimate the width of the scoping corridor. This could lead people to misunderstand whether or not certain land or property is within the scoping corridor.*
>
> *An example of misleading information is the width of the scoping Cable Corridor is stated as 500m in the Scoping Report but was quoted as 1000m by Equinor representatives on site."*

Cawston Parish Council echoes the resident's concern that "*if the Scoping Report contains such a basic error, is it reliable in other respects?"*

Cawston Parish Council

30th October 2019

The Coal Authority
Resolving the impacts of mining

200 Lichfield Lane
Mansfield
Nottinghamshire
NG18 4RG
T: 01623 637 119
E: planningconsultation@coal.gov.uk
www.gov.uk/coalauthority

Hannah Terry – Senior EIA and Land Rights Advisor
on behalf of the Secretary of State

Your ref: EN010109-000007

[By email: sadep@planninginspectorate.gov.uk]

11 October 2019

Dear Ms Terry

Planning Act 2008 and The Infrastructure Planning (Environmental Impact Assessment) Regulations 2017 (the EIA Regulations) – Regulations 10 and 11

Application by Equinor New Energy Limited (the Applicant) for an Order granting Development Consent for the Dudgeon and Sheringham Shoal Offshore Wind Farm Extensions (the Proposed Development)

Scoping consultation and notification of the Applicant's contact details and duty to make available information to the Applicant if requested

Thank you for your notification dated 09 October 2019 regarding our views on the above project.

I have checked the site location plan (Figure 1.1.1) of the Scoping Report against our coal mining information. I can confirm that, whilst the proposed development site falls within the coalfield, it is located outside the defined Development High Risk Area; meaning that there are no recorded coal mining legacy hazards at shallow depth that could pose a risk to land stability.

Accordingly, there is no requirement for the applicant to consider coal mining legacy as part of their Environmental Impact Assessment.

Please do not hesitate to contact me should you require any further assistance with this matter.

Yours sincerely

D Roberts

Deb Roberts *M.Sc. MRTPI*
Planning Liaison Manager

Disclaimer

The above consultation response is provided by The Coal Authority as a Statutory Consultee and is based upon the latest available data on the date of the response, and electronic consultation records held by The Coal Authority since 1 April 2013. The comments made are also based upon only the information provided to The Coal Authority by the Local Planning Authority and/or has been published on the Council's website for consultation purposes in relation to this specific planning application. The views and conclusions contained in this response may be subject to review and amendment by The Coal Authority if additional or new data/information (such as a revised Coal Mining Risk Assessment) is provided by the Local Planning Authority or the Applicant for consultation purposes.

Terry, Hannah

From: Reece Wilson [redacted]
Sent: 11 October 2019 12:17
To: SADEP
Subject: Dudgeon & Sheringham Shoal Offshore Wind Farm Extension

Follow Up Flag: Follow up
Flag Status: Flagged

Good Afternoon,

We received a letter sent out by you on the 09/10/2019 & we received this today (11/10/2019), regarding the above development. At this moment in time we have no further comments to add.

Thanks
Reece

Reece Wilson
Apprentice Utility Network Technical Administrator

ENERGY assets

Web: [redacted]



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Ms Hannah Terry - Senior EIA and Land Rights Advisor
The Planning Inspectorate
Major Casework Directorate
Temple Quay House
2 The Square Temple Quay
Bristol
BS1 6PN

Our ref: AE/2019/912462/01-L01
Your ref: EN010109

Date: 6 November 2019

Dear Ms Terry

DUDGEON AND SHERINGHAM SHOAL OFFSHORE WIND FARM EXTENSIONS ENVIRONMENTAL IMPACT SCOPING

Thank you for your EIA Scoping consultation letter dated 9 October and received in this office by email on the same date.

We have reviewed the Environmental Impact Assessment Scoping Report submitted and whilst it appears to be thorough in most respects our response highlights areas that we think should be given more focus and consideration.

Assessment of Impacts

Sensitivity and the Water Framework Directive

The report confirms that the industry standard approach of using matrices applying magnitude and sensitivity to calculate a category for the impact significance. We agree that this approach provides transparency and welcome the approach outlined at section 1.6.4.1 paragraphs 173 to 177. We note that the report does not propose, at this stage, to use Water Framework Directive status as an indicator of receptor sensitivity; we consider that WFD status is not a reliable indicator of sensitivity. We welcome the undertaking at paragraph 614 to work jointly with stakeholders, including the Environment Agency, to determine methodology for assessment and data collection.

Private Water Supplies

There are many dwellings in Norfolk that are not served by a public water supply. We would expect unlicensed water supplies to be assigned high sensitivity if it is the sole source of drinking water supply.

Geology and Ground Conditions

We are pleased that impacts detailed in Table 3.2 are scoped into the Assessment. If an area of land contamination is identified within the cable corridor which may affect principal and secondary aquifers a Preliminary Risk Assessment will need to be undertaken. Sufficient information should be provided the EIA to provide assurance that

the risks to the water environment are fully understood and can be addressed through appropriate measures including the need for site investigation, risk assessment and remediation. If significant contamination is found within the Application area, any proposals to undertake piling on site should be accompanied by a piling risk assessment.
We recommend that the cable corridor does not pass through areas designated as Source Protection Zone 1.

Ecology

Biodiversity Net Gain
The Scoping Report mentions Biodiversity Net Gain at paragraph 183 stating that it will be sought through the mitigation hierarchy. By this we assume that it proposes the sequential process of: avoid, minimise remediate and compensate. We consider that although linked, Biodiversity Net Gain is not embedded in mitigation but sits above it. As such it should not be addressed as a mitigation process but should be informed by the mitigation required. Whilst Biodiversity Net Gain is not mentioned in National Policy Statements EN1 and EN3 the requirement to 'pursue opportunities for securing measurable net gains for biodiversity' is specifically mentioned in the more recently updated NPPF (para 174). Most recently, the Environment Bill 2019 –2020 proposed a requirement for 10% biodiversity net gain and confirmed a mechanism for measuring this using the metric developed by Defra. Although these proposals are not currently enshrined in law, we consider that the principles proposed reflect the spirit of the NPPF requirements and recommend that this methodology is adopted.

Biosecurity
We welcome that the potential risk of spreading invasive species is recognised as a potential impact at paragraph 663. However, the potential to spread disease that endangers protected species should also be addressed. For example, the invasive signal crayfish can carry crayfish plague which threatens the native white-clawed crayfish. It is therefore, important that the need for biosecurity is addressed and control measures adopted. We would expect that a check, clean, dry regime is adopted together with appropriate disinfection using VIRKON.

Habitats and protected species
Whilst the River Wensum SAC is referenced as a designated site, consideration of the potential to support protected species at other water crossing points should be made.

Table 3.11
The report does not identify the potential of buried cables to impact on wildlife. The altered thermal and EMF (Electro-Magnetic Fields) should be considered making the case for scoping in, or out of the assessment. This is especially important where the cable will cross watercourses

Use of HDD

The report correctly identifies the potential impacts of the use of HDD on the environment. In general we welcome the use of HDD to construct a cable run below sensitive receptors, this is because in these settings it usually has fewer potential impacts than other trench methods. However, in some instances the potential impacts of a breakout are severe, such as the potential to smother gravels in a chalk river and remediation can be as harmful as the impact itself. Therefore, we expect the Applicant to fully research the incidences of breakout occurring in similar projects and to apply that learning in developing the most robust construction methodology and processes

Cont/d..

possible.

I hope that you find this information useful.

Yours sincerely

[redacted]

Mrs Barbara Moss-Taylor
Planning Specialist

[redacted]

End

Terry, Hannah

From: ESP Utilities Group Ltd <donotreply@espug.com>
Sent: 29 October 2019 09:25
To: SADEP
Subject: Your Reference: EN010109 Our Reference: PE139861. Plant Not Affected Notice from ES Pipelines

Follow Up Flag: Follow up
Flag Status: Flagged

SADEP
The Planning Inspectorate

29 October 2019

Reference: EN010109

Dear Sir/Madam,

Thank you for your recent plant enquiry at: Dudgeon and Sheringham Shoal Offshore Wind Farm Extensions.

I can confirm that ESP Utilities Group Ltd has no gas or electricity apparatus in the vicinity of this site address and will not be affected by your proposed works.

ESP Utilities Group Ltd are continually laying new gas and electricity networks and this notification is valid for 90 days from the date of this letter. If your proposed works start after this period of time, please re-submit your enquiry.

Important Notice

Please be advised that any enquiries for ESP Connections Ltd, formerly known as British Gas Connections Ltd, should be sent directly to us at the address shown above or alternatively you can email us at: PlantResponses@espug.com

Yours faithfully,

Plant Protection Team
ESP Utilities Group Ltd



Bluebird House
Mole Business Park
Leatherhead
KT22 7BA
[redacted]

[redacted]

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From: Chris Lacey <chrisdavidlacey[redacted]
Sent: 23 October 2019 16:18
To: SADEP
Subject: EN010109 - Dudgeon and Sheringham Shoal Offshore Wind Farm Extensions - EIA Scoping Notification and Consultation

Follow Up Flag: Follow up
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Dear Sir/Madam,
Great Melton Parish Council strongly objects to the developer's potential proposal to route underground cabling through the village of Great Melton. The village has a small rural community with narrow roads and is completely unsuitable for construction traffic. Further, works will cause a disruption to the farms, agriculture and the livery yards.The Parish Council calls for an offshore ring main to be considered as an alternative.
Yours faithfully
Chris Lacey
Clerk to Great Melton Parish Council

Terry, Hannah

From: Karen Thorpe <karen@[redacted]
Sent: 18 October 2019 15:51
To: SADEP
Subject: Dudgeon and Sheringham Shoal Offshore Wind Farm Extensions

Follow Up Flag: Follow up
Flag Status: Flagged

Good afternoon,

Thank you for sending the relevant information and material regarding the Dudgeon and Sheringham Shoal Offshore Wind Farm Extensions – EN010109-000007.

Harlaxton Gas Networks Ltd. do have assets in the Norwich area and will gladly provide specific information when requested.

Kind Regards

Karen Thorpe

For any electricity power issues please call Harlaxton Energy Networks 0800 055 6288.
For any gas issues please call the National Gas Emergency Line 0800 111 999.

[redacted]
Toll Bar Road, Marston, Grantham, Lincs, NG32 2HT

Harlaxton

Visit our website [redacted] and explore at your leisure

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Health and Safety Executive

CEMHD Policy - Land Use Planning
NSIP Consultations
Building 1.2
Redgrave Court
Merton Road
Bootle, Merseyside
L20 7HS

FAO Ifan Gwilym
The Planning Inspectorate
Major Casework Directorate
Temple Quay House
2 The Square
Bristol
BS1 6PN

Your Ref: EN010109
Our Ref: 4.2.1.6653

HSE email: NSIP.applications@hse.gov.uk

05 November 2019

Dear Ifan

PROPOSED DUDGEON AND SHERINGHAM SHOAL OFFSHORE WIND FARM EXTENSIONS PROPOSAL BY EQUINOR NEW ENERGY LIMITED (the applicant) INFRASTRUCTURE PLANNING (ENVIRONMENTAL IMPACT ASSESSMENT) REGULATIONS 2017 (as amended) – Regulations 10 and 11

Thank you for your letter of 9 October 2019 regarding the information to be provided in an environmental statement relating to the above project. HSE does not comment on EIA Scoping Reports but the following information is likely to be useful to the applicant.

HSE's land use planning advice

Will the proposed development fall within any of HSE's consultation distances?

According to HSE's records there are 10 major accident hazard sites and 14 major accident hazard pipelines within the proposed DCO application boundary of the proposed Dudgeon and Sheringham Shoal Offshore Wind Farm Extensions for this Nationally Significant Infrastructure Project; and are listed below:

Major Accident Sites

1) HSE reference H0124 Bacton Gas Terminal; Prenco UK Ltd.
2) HSE reference H0176 Bacton Gas Terminal; National Grid PLC.
3) HSE reference H0467 Bacton Gas Terminal; Eni Hewett Ltd.
4) HSE reference H0501 Bacton Gas Terminal; Shell UK.
5) HSE reference H3535 Bacton Gas Terminal; Interconnector UK Ltd.
6) HSE reference H4432 Bacton Gas Terminal; Bacton Company Storage Ltd.
7) HSE reference H0230 British pipeline Agency North Walsham.
8) HSE reference H0776 The old airfield; Bernard Matthews Foods Ltd.
9) HSE reference H0648 Hook 2 sisters Ltd.
10) HSE reference H4003 Hook 2 sisters Ltd.

Major Accident Pipelines

1) HSE reference 7462; Transco Reference 1720; operated by National Grid PLC; 4 feeder Bacton / Great Ryburgh
2) HSE reference 7462; Transco Reference 1712; operated by Cadent Gas; Bacton / Trunch
3) HSE reference 7455; Transco Reference 1713; operated by Cadent Gas; Bacton / Walsham

4) HSE reference 7456; Transco Reference 1714; operated by Cadent Gas; Bacton / Hanworth
5) HSE reference 12238; Transco Reference 2739; operated by National Grid PLC; 27 feeder Bacton / Kings Lynn
6) HSE reference 8371; Transco Reference 2648; operated by National Grid PLC; 2 feeder Bacton / Kings Comp
7) HSE reference 7450; Transco Reference 1709; operated by National Grid PLC; 3 feeder Bacton / Rouldham Heath
8) HSE reference 7446; Transco Reference 1705; operated by National Grid PLC; 5 feeder Bacton / Yelverton
9) HSE reference 7584; operated by RWE n Power PLC; Bacton to Great Yarmouth Gas Pipeline
10) HSE reference 7447; Transco Reference 1706; operated by National Grid PLC; 5 feeder Yelverton / Diss Comp Tee
11) HSE reference 7427; Transco Reference 1686; operated by Cadent Gas; Bowthorpe Drayton
12) HSE reference 7425; Transco Reference 1684; operated by Cadent Gas; Bowthorpe supply
13) HSE reference 7385; Transco Reference 1644; operated by Cadent Gas; Yelverton / East Carleton
14) HSE reference 7447; Transco Reference 1676; operated by Cadent Gas; Norwich / Loddon

This is based on the current configuration as illustrated in the figures section of the Dudgeon and Sheringham Shoal Offshore Wind Farm Extensions Scoping Report October 2019, Drawing reference: PB8164-RHD-ZZ-XX-DR-Z-0003 Titled scoping study areas.

HSE's Land Use Planning advice would be dependent on the location of areas where people may be present. When we are consulted by the Applicant with further information under Section 42 of the Planning Act 2008, we can provide full advice.

Hazardous Substance Consent

The presence of hazardous substances on, over or under land at or above set threshold quantities (Controlled Quantities) may require Hazardous Substances Consent (HSC) under the Planning (Hazardous Substances) Act 1990 as amended. The substances, alone or when aggregated with others for which HSC is required, and the associated Controlled Quantities, are set out in The Planning (Hazardous Substances) Regulations 2015 as amended.

Hazardous Substances Consent would be required to store or use any of the Named Hazardous Substances or Categories of Substances at or above the controlled quantities set out in Schedule 1 of these Regulations; substances may be present in batteries.

Further information on HSC should be sought from the relevant Hazardous Substances Authority.

Consideration of risk assessments

Regulation 5(4) of the Infrastructure Planning (Environmental Impact Assessment) Regulations 2017 requires the assessment of significant effects to include, where relevant, the expected significant effects arising from the proposed development's vulnerability to major accidents. HSE's role on NSIPs is summarised in the following Advice Note 11 An Annex on the Planning Inspectorate's website - Annex G – The Health and Safety Executive . This document includes consideration of risk assessments on page 3.

Explosives sites

HSE has no comment to make as there are no licensed explosives sites in the vicinity.

Electrical Safety

No comment from a planning perspective.

Please note that any further electronic communication on this project can be sent directly to HSE's designated e-mail account for NSIP applications, the details of which can be found at the top of this letter, or hard copy correspondence should be sent to:

Mr Dave Adams (MHPD)
NSIP Consultations
1.2 Redgrave Court
Merton Road
Bootle
Merseyside
L20 7HS

Yours sincerely

[redacted]

Dave Adams
CEMHD4 Policy

Terry, Hannah

From: hethersettpc <hethersett.pc[redacted]
Sent: 06 November 2019 07:36
To: SADEP
Subject: Re: Your Reference EN010109-000007 - Equinor New Energy Limited

Follow Up Flag: Follow up
Flag Status: Flagged

Dear Sir/Madam

I refer to your letter of the 9th October 2019 which has been discussed by members of the Parish Council.

Hethersett Parish Council have the following comment to make on the likely impact of the planning proposals to the parish:

- The proposed project will see the Parish of Hethersett bordered by 2 massive trenches. The village has already undergone a period of rapid expansion over recent years with residents being subjected to severe disruption as a result of the housing development. The construction involved in the proposed extension project will have a further impact on residents due to the sheer density of HGV construction traffic and abnormal loads passing through the village together with road closures, night working etc.

Yours faithfully

Mrs Annette Palmer
Clerk to Hethersett Parish Council
Village Hall
Back Lane
Hethersett
Norwich
NR9 3JJ

Tel:[redacted]

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www.avg.com

Terry, Hannah

From: Davies, Robert <Robert.Davies@[redacted]
Sent: 10 October 2019 14:41
To: SADEP
Cc: [redacted]
Subject: RE: EN010109 - Dudgeon and Sheringham Shoal Offshore Wind Farm Extensions - EIA Scoping Notification and Consultation

Follow Up Flag: Follow up
Flag Status: Flagged

Dear SirMadam

I confirm that our only observation upon the above is to notify you of the existence of a former railway structure within the onshore scoping area.

The bridge in question is located at OS co-ordinates 612673,327987 (OS National Grid reference TG126279) and carries an unclassified public road over a former railway formation. The bridge is managed by our team on behalf of the Secretary of State for Transport and our reference for the structure is Bridge No. is PMY2/119.

Kind regards

Rob Davies

Robert Davies
Historical Railways Estate (on behalf of Department for Transport)
Highways England | 37 Tanner Row | York | Y01 6WP
General Office Tel : 01904 621924
Mobile [redacted]
If you would like to make a request under the Freedom of information Act, please contact info@highwaysengland.co.uk

Web: http://www.highwaysengland.co.uk

From: SADEP [mailto:sadep@planninginspectorate.gov.uk]
Sent: 09 October 2019 15:44
To: SADEP <sadep@planninginspectorate.gov.uk>
Subject: EN010109 - Dudgeon and Sheringham Shoal Offshore Wind Farm Extensions - EIA Scoping Notification and Consultation

Dear Sir/Madam

Please see attached correspondence on the proposed Dudgeon and Sheringham Shoal Offshore Wind Farm Extensions.

Please note the deadline for consultation responses is **06 November 2019**, and is a statutory requirement that cannot be extended.

Kind regards,

Ifan Gwilym

Cynghorydd AEA a Hawliau Tîr | EIA and Land Rights Advisor
Cyfarwyddiaeth Gwaith Achos Mawr| Major Casework Directorate
Yr Arolygiaeth Gynllunio | The Planning Inspectorate

Temple Quay House, Temple Quay, Bristol BS1 6PN

0303 444 5491

Ifan.Gwilym@planninginspectorate.gov.uk

infrastructure.planninginspectorate.gov.uk/ (Cynllunio Seilwaith Cenedlaethol // National Infrastructure Planning)

www.gov.uk/government/organisations/planning-inspectorate (Yr Arolygiaeth Gynllunio // The Planning Inspectorate)

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Historic England

East of England

Ms Hannah Terry
The Planning Inspectorate
Major Casework Directorate
Temple Quay House
2 The Square
BRISTOL
BS1 6PN

Direct Dial: [redacted]

Our ref: PL00625881

6 November 2019

Dear Ms Terry

Planning Act 2008 and The Infrastructure Planning (Environmental Impact Assessment) Regulations 2017 (the EIA Regulations) - Regulations 10 and 11

Application by Equinor New Energy Limited (the Applicant) for an Order granting Development Consent for the Dudgeon and Sheringham Shoal Offshore Wind Farm Extensions (the Proposed Development)

Scoping consultation and notification
Ref: EN010109-000007

Thank you for your letter of 09th October 2019 notifying Historic England that a scoping opinion is required for the above development. Your letter was accompanied by the applicants Scoping Report (ref: EQUINOR PB8164-RHD-ZZ-XX-RP-Z-0003).

The historic environment is a finite and non-renewable environmental resource which includes designated heritage assets, non-designated archaeology and built heritage, historic landscapes and unidentified sites of historic and/or archaeological interest. It is a rich and diverse part of England's cultural heritage and makes a valuable contribution to our cultural, social and economic life. Historic England is the government advisor on the historic environment and our remit includes both on and off-shore environments.

The proposal is for extensions to the Offshore Wind Farms of Sheringham (SEP) and Dudgeon (DEP), with a view to extending the capacity of the two developments and will require the erection of new offshore wind turbines, and new offshore and onshore infrastructure, such as export cables, new landfall sites and new substations. It is noted that the exact locations of the proposed infrastructure has not yet been decided, and that a number of routes and landfall sites are currently being considered. We note that a single application for a Development Consent Order will be submitted, but that separate Deemed Marine Licences will be sought for each of the new array areas.

Historic England Advice

We acknowledge and confirm our view is that the impact upon the historic environment is likely to be significant in EIA terms and agree that archaeology and cultural heritage (both on and offshore) would need to be included in the scope of the Environmental Statement. We broadly support the approach taken by the applicant at the scoping stage in relation to setting out an approach to determine the likely impact of the project upon the historic environment.

We note however under Section 1.6.2 (Stakeholder consultation) that the intention to establish an Evidence Plan Process (EPP) is discussed. Given our statutory remit in relation to the Historic Environment we consider that Historic England would need to be included in discussions regarding the formulation of any EPP and would need to be included as members of the Steering Group. We therefore note with concern that the Steering Group has already met (July 2019). We also note the mention made regarding 'key stakeholders' (paragraph 167) and consider it essential that as we are a statutory body that equal attention and effort is given to engaging with Historic England for both on and off-shore environments, and for both proposed extension projects. This would enable the applicant to fully and appropriately realise the programme of activities set out in Sections 1.6.3 (Characterisation of the existing environment), 1.6.4 (Assessment of impacts) and 1.6.4.7 (Cumulative impacts).

Please find specific comments below in relation to other aspects of the report

Section 1

We are pleased to see that the landfall sites are being considered in terms of their archaeological impacts at this stage (Section 1.4.3, paragraph 61), but it should be noted that there is a potential for internationally significant archaeological remains, associated with the Cromer Forest bed Formation (CF-bF), to be found along this coast such as the internationally significant archaeological finds and discoveries at Happisburgh and West Runton.

It is noted that some aspects of the development have not yet been decided upon, such as the type of turbine foundations that will be used (Section 1.5.4.5, paragraph 101). All the options suggested (see paragraph 101) have the potential to impact on the historic environment however, of all the possible foundation designs, gravity bases are the type that would require the most seabed preparation and most potential for adverse impact on seabed heritage

It is stated in Section 1.5.5.6 that cables will be installed either by open cut trenching or horizontal directional drilling (HDD). HDD requires the use of a drilling fluid (Section 1.5.6.5, paragraph 152), such as bentonite. It should be noted that there is the potential for the bentonite slurry used in the HDD process to 'breakout'. If this was to occur adjacent to areas of archaeology, the bentonite could spread into archaeological deposits, features and materials. The potential harm that this would cause to any archaeology deposits, including physical damage, changes to the burial and preservation environments needs to be considered as part of the impact

assessment.

Section 1.5.5.5 and 1.5.5.7 discuss the export cables that will be installed as part of the proposed developments. We note that cables can emit heat, which in turn can impact on certain archaeological deposits. For example, heat could dry out waterlogged organic deposits such as peat and any archaeological or palaeoenvironmental remains that may be preserved within the deposits. This impact also needs to be considered.

Some form of seabed preparation may be required as part of the construction programme, which may include seabed levelling, ground reinforcement, and the removal of debris (Section 1.5.6.2, paragraph 137). These activities may directly impact on buried or near-surface archaeological remains. In addition, the action of jackup legs or anchors of vessels used as part of the ground preparation works could impact on archaeological remains (Section 1.5.6.3, paragraph 143). Preparation works will also include survey work to identify and locate any unexploded ordnances (UXO) within the proposed development area. It is also important to note that detailed survey works carried out as part of the UXO survey work can also be used to identify and locate remains of archaeological interest, and results of the UXO survey would need to be considered in light of their archaeological and historical potential.

Section 2.1: Marine Geology, Oceanography and Physical Processes
This section discusses the assessments of the marine geology, oceanography and physical processes. We would recommend that this section includes references to how changes to these factors could impact on the historic environment by exposing or covering heritage assets. For example, it is stated in Section 2.1.2.2 that there is the potential for the development to increase sea bed scour in areas, which could result in the exposure, degradation or loss of vulnerable assets. We note that the impact of changes to the hydrodynamic and sedimentary process regimes on the historic environment are discussed in Section 2.9.2, however we would recommend that heritage is also referenced within this section of the ES.

Section 2.9: Offshore Archaeology and Cultural Heritage
Section 2.9.1 provides a summary of the existing knowledge including information from the Historic Seascape Character maps and previous developments. We are aware that the assessments carried out as part of the Dudgeon offshore wind farm identified significant sedimentary sequences that permitted partial palaeoenvironmental reconstruction of part of the North Sea Basin. This work was of considerable interest and significance and clearly demonstrated the value that this information has for increasing our understanding of how environments and climates have changed over long time periods. Similar sequences should be anticipated for this project.

Section 2.9.3 and Table 2-24 summarises the assessment and data gathering exercise that will be undertaken to establish baseline evidence listing the main sources that will be used. We would recommend that this table also includes

references to the Coastal and Intertidal Zone Archaeological Network (CITiZAN), which has developed a map for find spots in the coastal and intertidal zones. We would also recommend that the applicants refer to recent research projects that have investigated archaeology associated with the Cromer Forest bed Formation (CF-bF), such as the work carried out by the Ancient Humans of Britain (AHOB) project or the work to investigate the mammoth remains discovered at West Runton. It should also be noted that if Palaeolithic or Pleistocene age deposits are found, either during onshore or offshore works, the scientific dating of these deposits needs to be considered carefully. This is because the techniques that can be applied to deposits of this age often require very specific collection, storage and processing strategies (e.g. Optically Stimulated Luminescence) and will also require the involvement of specialists.

It is noted in Table 2-25 that a number of different survey options will be utilised as part of the evaluation work. We would recommend that the survey line spacings used are considered carefully, and reference is made to the Historic England '*Marine Geophysics Data Acquisition, Processing and Interpretation*' (2013) guidance.

Section 2.9.3 (paragraph 482) outlines the programme of marine geophysical data acquisition. Given the discovery of significant maritime remains and confirmation of known sites during the development of both Sheringham Shoal and Dudgeon Offshore Wind Farms (as illustrated in Figure 2.9.1), we encourage the Applicant to develop a strategic programme of data gathering to ensure that campaign effectiveness is optimised and high-resolution data capture occurs to support archaeological interpretation and analysis.

It is also stated in Section 2.9.3 (paragraph 482) that pre-consent geotechnical investigations are not currently planned, but instead will form a part of the pre-construction archaeological assessment should consent be granted. If the applicant is going to take this approach, then we recommend a preliminary deposit model is developed as part of the desk-based assessment work. This would need to be drawn together from existing information such as BGS borehole logs and information from previous projects and assessments (such as AHOB). It would however provide an assessment of archaeological potential, and would allow the characterisation and interpretation of sequences, and would help to identify gaps in the knowledge, where additional work may be required. We would therefore recommend that the applicants discuss the proposed project with a geoarchaeologist and include a deposit model within the desk-based assessment.

Section 3.5: Onshore Archaeology and Cultural Heritage

We are pleased to see that the applicants have acknowledged the rich and varied history of Norfolk. It should however be noted that if Palaeolithic or Pleistocene age deposits are found, either during onshore or offshore works, then as set out above the scientific dating of these deposits due to the specific needs of sample collection, storage and processing. We note that deposits models are not mentioned in the sections that discuss the baseline evidence that will be gathered (e.g. Table 3-16).

We recommend that a preliminary deposit model is produced as part of the baseline assessment stage and included in the Desk Based Assessment (paragraph 709) and also recommend that a reference is included in Table 3-15 to specific works such as those carried out at Happisburgh by the AHOB project team, or similar projects at West Runton and Weybourne.

We acknowledge that the applicants preferred approach would be to undertake the archaeological evaluation phase of work post-consent (see paragraph 706). We consider that this approach carries considerable risk and we recommend a more flexible and targeted approach to evaluation is taken. In particular, the applicant may wish to consider advanced work on locations that are critical for the delivery of the project, such as the cable landfall sites. Adequate time needs to be given within the programme to ensure all phases of archaeological work are completed, and allowing for any unexpected discoveries to be adequately mitigated.

A number of standards and guidance documents are referred to in paragraph 708, and we would recommend the inclusion of the Historic England '*Preservation of Archaeological Remains*' (2016) guidance, as this outlines the information needed when deciding if archaeological remains can and should be preserved: https://historicengland.org.uk/images-books/publications/preserving-archaeological-remains/

Section 4.1: Seascape, Landscape and Visual

We note (para 811) that the applicant proposes to address historic landscape and seascape character as part of the historic environment assessments. We would anticipate that further evidence by way of heritage specific viewpoints for images and photomontages would need to be produced and either integrated into the Landscape and Visual Effects or the heritage chapters in order to support the assessment. In particular we raised concerns about a number of heritage assets in relation to the location of the Hornsea Project Three on-shore substation with specific reference to the harm caused to the Grade II* listed buildings closest to the development (Gowthorpe Manor House and Barn, and Mangreen Hall), and the Grade II* registered park and garden and Grade II* listed church at Intwood. We have also raised concerns about the impact upon the Grade II listed Keswick Hall, the South Norfolk Conservation Area and the complex of scheduled monument associated with the Roman Town at Caistor St Edmund near Norwich. Any direct and cumulative effects on the significance of designated assets, including those to their setting would need to be clearly considered in the siting of the substation and we would wish to engage in early discussion about preferred locations and options appraisals.

On a more general point, where relevant, the cultural heritage should be cross-referenced to other chapters or technical appendices; for example LVIA, noise, light, traffic and landscape. We advise that all supporting technical information (desk-based assessments, geophysical surveys, evaluation and post-excavation reports etc.) are included as appendices.

We also strongly recommend that the applicant involve the County Archaeological Officers and the District Council Conservation Officers in the planning process. They are best placed to provide advice on local historic environment issues and design priorities; and give advice on how the proposal can be tailored to avoid and minimise potential adverse impacts on the historic environment; the nature and design of any required mitigation measures; and opportunities for securing wider benefits for the future conservation and management of heritage assets.

The assessment should be carried out in accordance with established policy and guidance, including the National Planning Policy Framework. The Planning Practice Guidance *contains* guidance on setting, amplified by the Historic England document Historic Environment Good Practice Advice in Planning Note 3, *The Setting of Heritage Assets*, which provides a thorough discussion of setting and methods for considering the impact of development on setting, such as the use of matrices. Whilst standardised EIA matrices or are useful tools, we consider the analysis of setting (and the impact upon it) as a matter of qualitative and expert judgement which cannot be achieved solely by use of systematic matrices or scoring systems. Historic England therefore recommends that these should be seen primarily as material supporting a clearly expressed and non-technical narrative argument within the cultural heritage chapter. The EIA should use the ideas of benefit, harm and loss (as described in NPPF) to set out 'what matters and why' in terms of the heritage assets' significance and setting, together with the effects of the development upon them.

Given the diversity of designated and non-designated heritage asset within the area, we would welcome further discussions with the applicant at the earliest opportunity in order to discuss options. We would also like to note that this response is based on the information provided in this consultation. To avoid any doubt, this does not affect our obligation to provide further advice and, potentially, object to specific proposals, which may subsequently arise, where we consider that these would have an adverse effect upon the historic environment.

If you have any queries about any of the above, or would like to discuss anything further, please contact me

Yours sincerely

[redacted]

Dr Will Fletcher
Inspector of Ancient Monuments
e-mail: will.fletcher@[redacted]

Positive About Disabled People
Stonewall Diversity Champion

Terry, Hannah

From: Sharon Brooks [redacted]
Sent: 06 November 2019 16:55
To: SADEP
Subject: Your Ref: EN010109-000007

Your Ref:
EN010109-000007

Dear Sir

Planning Act 2008 and The Infrastructure Planning (Environmental Impact Assessment) Regulations 2017 (the EIA Regulations) – Regulations 10 and 11
Application by Equinor New Energy Limited (the Applicant) for an Order granting Development Consent for the Dudgeon and Sheringham Shoal Offshore Wind Farm Extensions (the Proposed Development)
Scoping consultation and notification of the Applicant's contact details and duty to make available information to the Applicant if requested

The report is not clear as to the exact delineation of the area and on attending the information event on 28th October Parish Councillors were not able to obtain precise clarity. The observations and requirements below are based on the limited information available through the scoping report.

The `Parish Council has received the notification concerning proposals to site the above Offshore Wind Farm Extensions through the conservation area of Itteringham including neighbouring Saxthorpe and Corpusty, The Parish Council has grave reservations about these works and the severe impact it would have on this area of natural outstanding beauty.

The environmental and ecological damage needs to be clearly detailed together with the effect on the archeology of the landscape and the entire environment including waterways.

The parish council requires to know what the environmental benefit would be at the end of the process.

The parish council is also concerned by the devastation that will be caused by the density of HGV construction traffic, abnormal loads, road closures, night working etc.

A clear impact assessment of all the above needs to be included.

In summary the parish council requires full and complete disclosure on the impact on this unique piece of Norfolk countryside prior to any further applications.

Please keep me informed of any developments

Kind regards

Sharon Bedford-Payne
Itteringham Parish Council
[redacted]

Terry, Hannah

From: JNCC Offshore Industries Advice <OIA@jncc.gov.uk>
Sent: 10 October 2019 10:34
To: SADEP
Subject: RE: EN010109 - Dudgeon and Sheringham Shoal Offshore Wind Farm Extensions - EIA Scoping Notification and Consultation

Follow Up Flag: Follow up
Flag Status: Flagged

Good morning Ifan

Thank you for consulting JNCC with regard the above mentioned scoping report. Our duties in this matter have been deferred to Natural England, subsequently we will not be responding directly to this consultation.

Regards

Dr Sarah Canning

Marine Management Team
JNCC, Inverdee House, Baxter Street, Aberdeen, AB11 9QA
Tel: 01224 266 550
Direct Tel: [redacted]

jncc.gov.uk

From: SADEP <sadep@planninginspectorate.gov.uk>
Sent: 09 October 2019 15:44
To: SADEP <sadep@planninginspectorate.gov.uk>
Subject: EN010109 - Dudgeon and Sheringham Shoal Offshore Wind Farm Extensions - EIA Scoping Notification and Consultation

Dear Sir/Madam

Please see attached correspondence on the proposed Dudgeon and Sheringham Shoal Offshore Wind Farm Extensions.

Please note the deadline for consultation responses is **06 November 2019**, and is a statutory requirement that cannot be extended.

Kind regards,

Ifan Gwilym

Cynghorydd AEA a Hawliau Tîr | EIA and Land Rights Advisor
Cyfarwyddiaeth Gwaith Achos Mawr| Major Casework Directorate
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www.gov.uk/government/organisations/planning-inspectorate (Yr Arolygiaeth Gynllunio // The Planning Inspectorate)

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Terry, Hannah

From: Emily Anderson <Emily.Anderson[redacted]
Sent: 16 October 2019 08:52
To: SADEP
Subject: Lincolnshire County Council Representation

Importance: High

Follow Up Flag: Follow up
Flag Status: Flagged

Good morning,

I write on behalf of our Head of Planning. Lincolnshire County Council do not wish to make any comments on the scoping opinion.

Kind regards,

Lincolnshire COUNTY COUNCIL
Working for a better future

Emily Anderson
Planning
[redacted]
Lancaster House | 36 Orchard Street | Lincoln | LN1 1XX

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Marine Management Organisation

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Hannah Terry
The Planning Inspectorate
Temple Quay House
2 The Square
Bristol, BS1 6PN

Your reference: EN010109-000007
Our reference: DCO/2019/00004

By email only - sadep@planninginspectorate.gov.uk

06 November 2019

Dear Ms Terry,

RE: Application by Equinor New Energy Limited (the Applicant) for an Order granting Development Consent for the Dudgeon and Sheringham Shoal Offshore Wind Farm Extensions (the Proposed Development)

Scoping opinion consultation for Sheringham Shoal Offshore Wind Farm

Thank you for your letter dated 09 October 2019 requesting information in order that the Planning Inspectorate can adopt a scoping opinion for the Proposed Development.

Please find attached the scoping opinion of the Marine Management Organisation (MMO). In providing these comments, the MMO has sought the views of our technical advisors at the Centre for Environment, Fisheries and Aquaculture Science (Cefas) and have included issues raised in the recent Seabed Expert Topic Group held in London on 30 October 2019.

If you require any further information, please do not hesitate to contact me using the details provided below.

Yours sincerely,

[redacted]

Adam Suleiman
Marine Licensing Case Officer

D +44 [redacted]
E adam.suleiman[redacted]

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1. Comments on the Scoping Report

1.1 General Comments

1.1.1 In Section 1.4.3 the Applicant has outlined their rationale for the landfall site selection, identifying the geographical exclusion of locations within the North Norfolk Coast Special Area of Conservation (SAC). Exclusion is on the basis that the SAC's condition status is Unfavourable. As such, the Applicant's two proposed landfall options pass through the Cromer Shoal Marine Conservation Zone (MCZ).

1.1.2 Whilst it is acknowledged that proposals passing through any Marine Protected Area (MPA) may be challenging, the MMO strongly recommends the Applicant investigate landfall options within the North Norfolk Coast SAC as an alternative route outside of Cromer Shoal Chalk Reef MCZ to a landfall site at Weybourne. The condition status of Unfavourable does not preclude cabling through the SAC as an option and could warrant further exploration. Detailed investigation would be required to assess the potential impacts specific to those protected features within the site in consideration of the conservation status of those specific features. This would offer a broader assessment of all landfall choices and support the Applicant's overall evidence base and conclusions for the final cable route selection.

1.1.3 In that regard, the MMO advises the Applicant continue to engage with Natural England, and other stakeholders as appropriate, to undertake suitable investigations to provide the detail and clarity required for such a cable corridor option.

1.2 Underwater Noise

Major Comments

1.2.1 Regarding fish and shellfish ecology, paragraph 302 states that *"underwater noise generated by construction activities, particularly if pile driving or UXO clearance is required, may result in disturbance and displacement of acoustically sensitive fish species (e.g. herring) and affect spawning and nursery areas"*. Piling or UXO clearance may also result in temporary threshold shift (TTS), recoverable injury and mortality (Popper *et al*., 2014). Further, although UXO clearance is mentioned, it has not specifically been scoped in, whereas piling has. It is recommended that *'underwater noise impacts to acoustically sensitive species during UXO clearance'* are scoped in for further assessment.

1.2.2 It is proposed to scope out noise and vibration generated by operational wind turbines for benthic and intertidal ecology. The following justification in paragraph 275 has been provided: *"Noise and vibration generated by the operational wind turbines can be conducted through the tower and foundations into the water. Monitoring studies of underwater noise from operational turbines have shown the noise levels from North Hoyle, Scroby Sands, Kentish Flats and Barrow wind farms to be only marginally above ambient noise levels (Cheesman, 2015). There is no evidence to suggest this low level of noise and vibration has a significant impact on benthic ecology, it is therefore proposed that this impact is scoped out from further*

consideration within the EIA".

1.2.3 Previous measurement data can be applied more broadly to inform the likely significance of noise, if the relevant conditions (including turbines and foundations) are comparable (MMO, 2014). However, it is not clear whether the turbines and environmental conditions at Dudgeon Extension Project (DEP) and Sheringham Extension Project (SEP) are comparable to previous windfarms. The Applicant should provide further evidence to support their position and consider whether scoping out remains valid.

1.2.4 Furthermore, as stated in MMO (2014), "*whilst the broadband underwater noise resulting from the operation of an offshore wind farm (OWF) has been shown to be of a relatively low level, the level of seabed vibration resulting from an operational wind turbine is still unknown. Similarly, whilst there is understanding of the likely sound pressure level in the water resulting from operational wind turbines, the resulting particle motion in the water column as a function of depth and range is not known"*.

1.2.5 Marine invertebrates are primarily known to detect particle motion and seabed vibrations (more so than sound pressure). If assessment conclusions are to be based on previous measurement data, then it should be made clear in the report how the turbines and environmental conditions at DEP and SEP are comparable to previous wind farms.

1.3 Fish and Shellfish Ecology

Fish Ecology

Major Comments

Sandeel

1.3.1 The commercial and ecological importance of sandeel has not been discussed in any detail in the scoping report. The ecological and commercial importance of sandeel should be acknowledged in the ES and an appropriate species-specific impact assessment should be undertaken for sandeel.

1.3.2 Sandeel, as well as juvenile herring and sprat, are of ecological importance as a prey source for marine mammals and birds, some of which are protected and qualifying features of nearby Special Protection Areas (SPA) or SACs such as the Greater Wash SPA and The Wash & North Norfolk Coast SAC. Sandeel have a spatial dependency on a specific substrate and it is recognised that sandeel show site fidelity to defined areas of seabed, and do not tend to travel to other locations to spawn.

1.3.3 Otter and beam trawls are not considered suitable survey gears to adequately sample sandeel species. Catches of sandeel (e.g. from grabs, trawls) in the area can provide information on presence, however this method does not provide information about abundance and distribution. The most accurate method for assessing the DEP and SEP areas as a sandeel habitat would be through a sandeel dredge survey.

Surveys would need to be carried out either during night-time or during seasonal hibernation periods, using specific sandeel dredge gear. To provide a statistically robust study these surveys would have to be carried out over a number years pre- and post-construction. This may be disruptive for the population, and the study would be expensive so this is not recommended by the MMO. Instead, the EIA would be expected to characterise sandeel habitat following the method described in MarineSpace (2013b) which uses broadscale sediment data and site-specific Particle Size Analysis (PSA) data from the array and export cable corridor. As per the assessment of herring potential spawning habitat, PSA data collected during the proposed benthic sampling surveys can be used to inform the area's suitability as sandeel habitat. Any catches of sandeel observed in grabs will provide anecdotal evidence of their presence in the array and export cable route areas.

1.3.4 Whilst there are a number of broad areas of the Southern North Sea that are considered suitable as sandeel habitat, many areas are already subjected to anthropogenic activities such as windfarm construction, trawling and aggregate dredging. Additionally, many areas may not provide suitable habitat due to physical parameters such as incompatible substrate composition or water depth. The cumulative impact assessment should consider these factors when assessing the impacts of the windfarm development on sandeel.

Migratory fish

1.3.5 Migratory fish species should be included in the assessment and the various conservation statuses of these species should also be considered. Potential impacts from construction and operational activities should be adequately assessed in relation to migratory fish transiting the area e.g. to/from the Wash and river Humber. The Environment Agency carry out fisheries surveys to monitor coastal and transitional waters, including the river Humber and the Wash. Data can be downloaded via; https://data.gov.uk/dataset/41308817-191b-459d-aa39-788f74c76623/trac-fish-counts-for-all-species-for-all-estuaries-and-all-years

Minor Comments

1.3.6 Generally, the approach to the scoping assessment is appropriate in that it sets out the proposed methods to be used to inform and undertake the EIA. However, given that the scoping report is intended to support an application for the construction of up to two nationally significant infrastructure projects (NSIPs), more detailed descriptions of the potential impacts to fisheries and fish ecology as well as more detailed explanations of how the potential impacts to key sensitive species will be assessed would have been beneficial.

1.3.7 In order to ensure that a robust assessment of potential impacts to fish is undertaken during the EIA process, comments and recommendations are provided below concerning the use of appropriate data sources and data interpretation to inform an accurate characterisation for fisheries and fish ecology.

Recommendations on Proposed Data Sources and Approach to EIA

1.3.8 The table of data sources (Table 2-14) proposed for the characterisation of the existing environment for fish is generally appropriate. However, there are some concerns with the timeliness of data collected during the Dudgeon and Sheringham Shoal OWF EIA characterisation surveys and the Sheringham Shoal OWF Post-construction surveys for the reasons outlined below:

1.3.9 The Environmental Statement (ES) should recognise the limitation that the data collected for EIA fish characterisation surveys for Dudgeon OWF (2008) and Sheringham Shoal OWF (2005) are now in excess of 10 years old, and that the surveys were carried out prior to the placement and operation of OWF infrastructure. Factors such as loss of habitat, introduction of hard substrates, and temporal and natural variations in fish assemblages may have changed over this period. However, the MMO advise there is no requirement for new fish characterisation surveys to be undertaken, as the various sources of data proposed to inform the desk-based assessment will be adequate to provide a general description of the fish species typically found in the DEP and SEP areas.

1.3.10 Point 292 of the scoping report refers to the Sheringham Shoal post-cable installation elasmobranch survey which recorded a single starry smooth-hound (*Mustelus asterias*) in the export cable corridor just south of the wind farm array (Brown & May Marine, 2013). Conversely, starry smooth-hounds represented the greatest numbers caught in the pre-construction cable installation elasmobranch survey report (Brown & May Marine, 2010). The MMO recommend that if data from the Sheringham Shoal Post-cable Installation Elasmobranch Survey 2013 are to be used to inform the EIA, then so too should data from the Post-Cable Installation Elasmobranch Survey Reports from 2012 and 2015 and the Pre-construction Cable Installation Elasmobranch Survey Report (Brown & May Marine, 2010).

1.3.11 It should also be noted that there are no recent confirmed records of common smooth-hound (*Mustelus mustelus*) (listed in Table 2-11) being captured in UK waters. A genetic study (Farrell *et al*., 2009) confirmed that all specimens investigated were found to be starry smooth-hounds (*Mustelus asterias*). Therefore, it may be more appropriate to refer to *Mustelus spp.* in the ES.

1.3.12 When using any fisheries data collected from past surveys, it is important that the data are interpreted and presented appropriately and that all survey limitations are acknowledged within the ES, as per point 1.3.9. It is recommended that any trawl or longline catch data should be presented in standardised units e.g. Catch Per Unit Effort (CPUE). The survey methods, timings and limitations of survey and gear types as well as gear selectivity should be discussed or acknowledged within the ES, especially with regard to the influence on species and life stages captured by individual gear types/sampling methods. For example, a 2m epibenthic beam trawl will not adequately target large/adult fish, or pelagic fish; otter trawls and epibenthic beam trawls will not adequately target sandeels and the season in which a survey is undertaken may influence species abundance in that particular area.

Herring

1.3.13 The scoping report has correctly identified that herring are sensitive to activities that disturb the seabed and are sensitive to noise and vibration, making them vulnerable to the impacts of OWF construction and operation activities. Comments and recommendations are provided below on how the assessment of impacts for this species should be carried out.

1.3.14 The nearest herring spawning ground to the DEP and SEP sites, is that of the Banks/Dogger population off the coast of Flamborough Head. Some smaller, localised herring spawning grounds also exist at locations along the Norfolk and Lincolnshire coasts and outside the Wash, although due to a lack of recent larval data for these locations it is not known whether these sites are currently 'active'. The MMO recommend that an assessment of herring potential spawning habitat is undertaken to inform the EIA, using the method described in MarineSpace (2013). The assessment should be supported by 10 years of International Herring Larval Survey (IHLS) data (data up to 2018 are available). The applicant's intention to undertake a program of geophysical and benthic sampling across the proposed wind farm areas and export cable corridors in order to characterise the seabed is noted. PSA data from these surveys can be used to inform the potential herring spawning habitat assessment.

Underwater noise and vibration

1.3.15 Little information is presented on how the assessment of impacts of noise and vibration on fish will be carried out, or what resources will be used, or the proposed methods for modelling. An accurate description of the physiological and behavioural impacts to fish caused by noise and vibration should be presented in the ES, and fish species relevant to the development should be assigned into one of the four categories described in Popper *et al.* (2014).

1.3.16 We recommend that fish are treated as a stationary receptor in any modelling used to make predictions for noise propagation on fish spawning and nursery grounds. The MMO does not support the use of a fleeing animal model for fish for the reasons outlined below:

1.3.17 It is known that fish will respond to loud noise and vibration, through observed reactions including schooling more closely, moving to the bottom of the water column, swimming away and burying in the substrate (Popper *et al.* 2014). However, this is not the same as fleeing, which would require a fish to flee directly away from the source over the distance shown in the modelling. The MMO is not aware of scientific or empirical evidence to support the assumption that fish will flee in this manner.

1.3.18 The assumption that a fish will flee from the source of noise is overly simplistic as it overlooks factors such as fish size and mobility, biological drivers and philopatric behaviour which may cause an animal to remain/return to the area of impact. This is of particular relevance to herring, as they are benthic spawners which spawn in a specific location due to its substrate composition.

1.3.19 Eggs and larvae have little to no mobility, which makes them vulnerable to barotrauma and developmental effects. Accordingly, they should also be assessed and modelled as a stationary receptor, as per the Popper *et al.* (2014) guidelines.

1.3.20 The outputs of modelling should be presented in map-form depicting the predicted noise contours. 10 years of IHLS data (2008-2018) should be presented in the form of a 'heat map' which should be overlaid with the mapped noise contours. This will provide a better understanding of the likely extent of noise propagation into herring spawning grounds and allow for a more robust assessment of impacts to be made.

1.3.21 The applicant should clearly state in their ES (and PEIR if applicable) whether they propose to undertake simultaneous piling, i.e. the installation of more than one pile at a time, for the installation of WTGs or other offshore platform structures. If simultaneous piling is proposed, then underwater noise modelling for impacts to fish should be based on this scenario.

Recommendations

1.3.22 The applicant should also consider the use of embedded mitigation and good practice measures to remove or reduce impacts and effects on fish. Such measures might include;

1.3.23 The use of soft start procedures on commencement of piling. The MMO's technical advisers Cefas recommend a 20-minute soft-start in accordance with the Joint Nature Conservation Committee (JNCC) protocol for minimising the risk of injury to marine mammals and other fauna from piling noise (JNCC 2010). Should piling cease for a period greater than 10 minutes, then the soft-start procedure must be repeated.

1.3.24 Cable burial to a minimum depth of 1.5 m (subject to local geology and obstructions) to minimise the effects of EMF, as recommended in the Department of Energy and Climate Change report (2011).

1.3.25 The use of air bubble curtains to reduce or mitigate the impacts of noise and vibration from piling.

Shellfish Ecology

Major Comments

1.3.26 Potential impacts are categorised by development phase in the report. Whilst a number of potential impacts are identified these are not associated with specific species. Further detail and clarification should be provided as the application progresses. Generally, all relevant impacts to shellfish species and shell-fishers have been scoped in.

1.3.27 Permanent habitat loss to shellfish has been scoped in during the operation stage but scoped out for both construction and decommissioning. *"Permanent habitat loss"*

suggests that the habitat will never recover. The MMO advise changing this to "temporary habitat loss" and scoping the impact into both the construction and decommissioning phases as any interaction with the seabed may cause loss of habitat for some species and all phases of the project could result in temporary habitat loss for shellfish. It is notable from the report that *"permanent habitat loss"* is intended to complement *"Physical disturbance and temporary loss of seabed habitat, spawning or nursery grounds during intrusive works",* however, the two are not similar and should not be considered so.

1.4 Benthic Ecology

Major Comments

1.4.1 The potential impact of 'Invasive species' has been scoped out of the construction phase of the development. The MMO recommend that further justification is included, e.g., mitigation measures for vessels/platforms involved in the construction of the DEP and SEP to ensure they are free from non-native species.

1.4.2 Section 2.3 'Benthic Ecology', (line 256, page 69) incorrectly summarises the Dudgeon OWF post-construction monitoring report. The MMO recommend that the sentence "*The overall conclusion of the Dudgeon post-construction monitoring is that there are no significant differences in the benthic communities due to the construction of the wind farm*." is removed from the scoping report. Prior advice on the Dudgeon OWF post-construction monitoring report has highlighted significant differences between the pre- and post-construction benthic assemblage.

1.4.3 Not all protected features presented in the designation order of the Cromer Shoal Chalk Beds MCZ are included in the scoping report (line 265, page 70). Please amend the report accordingly.

Minor Comments

1.4.4 The potential impact of 'Permanent habitat loss' has been scoped in under the operation phase of the development in Table 2-8. While there is a recognition that the exact nature and design of turbine foundation remains unknown, all available types result in a degree of habitat loss during the construction phase. The MMO recommend including reference to the maximum area of seabed that may be affected (e.g. a total of 61 turbine with gravity base foundations), in relation to the DEP and SEP area for lease, to help justify the scoping decision.

1.4.5 The precise benthic survey design to aid site characterisation currently remains unknown. However, the approach presented in the scoping report states that habitat maps will be made following interpretation of geophysical data. The MMO recommend that acoustic data are first interpreted and used to inform the placement of sampling stations for ground truthing, using the methods proposed (sediment samples and seabed imagery), before any habitat maps are created to ensure a more accurate assessment.

1.4.6 Furthermore, it is recommended that the location of suitable reference areas is considered at this stage to aid with future monitoring requirements (for the both extension projects and the current Dudgeon and Sheringham OWFs).

Observations

1.4.7 Potential impacts from Electromagnetic Fields (EMF) on benthic invertebrates have also been scoped out with the justification that there is a lack of evidence to suggest impact. The MMO agree with this justification. Note that while Bochert & Zettler (2006) did conclude that the distributions of the brown shrimp *Crangon crangon*, common starfish *Asterias rubens* and polychaete worm *Hediste diversicolor* do not change when exposed to EMF, the experimental conditions were much lower salinity (10 *psu*) than is typically found in the North Sea (~35 *psu*).

1.4.8 The data sources presented in Table 2-9 are relevant and the characterisation surveys proposed in Table 2-10 are suitable. However, if the cable route is re-routed to avoid the MCZ, further data will need to be obtained as the area to the west of the MCZ is data poor.

1.5 Sedimentary and Coastal Processes

Major Comments

1.5.1 The applicant proposes that effects on the hydrodynamic regime should be scoped out (Chapter 2.1.2.1), despite noting that there is potential for the physical presence of construction plant and offshore infrastructure to have an impact on the hydrodynamic state. The MMO suggest that the applicant scope this in, as construction activities (such as any changes at the seabed during cable installation) could have an impact on flow and wave propagation.

1.5.2 It is clearly stated in the text that *"The Marine Geology, Oceanography and Physical Processes assessment is likely to have key inter-relationships with Marine Water and Sediment Quality, Benthic and Intertidal Ecology and Fish and Shellfish Ecology and these will be considered where relevant throughout the EIA process"* (Chapter 2.1.2), but there is no further information provided on how this assessment will be done. As the combination of activities within the development project could lead to significant impacts, further explanation should be given accordingly.

1.5.3 Impacts of climate change on wind, waves, and sea level rise have neither been assessed nor identified. The MMO expect these to be at least identified as potential stressors and that the applicant provides clarification.

Minor Comments

1.5.4 The applicant is advised to list in the text the receptors that will be included in the EIA (e.g. hydrodynamics (flow and waves), Sheringham Shoal sand bank etc.).

1.5.5 In the operational impacts section (Chapter 2.1.2.2), impacts from scour protection on current and wave action are not included (even though they are assessed for fish and shellfish but not for coastal processes and mentioned in NPS Requirement – EN-3 2.6.113). The applicant should justify why this has been scoped out from the Coastal Processes EIA process.

1.5.6 It is not clear from the text provided in Chapter 2.1.2.3 if the applicant is scoping in or out any potential impacts of decommissioning, even though impacts are expected from the removal of the foundations. The applicant should clarify this.

1.5.7 For the cumulative impact assessment, and especially for the nearshore zone (landfall), the MMO advises that the local Shoreline Management Plan should be included in the considerations of impacts, especially as the minimum expected operational life of the projects will be 30 years and that a full list of nearby developments/schemes should be provided and considered.

1.5.8 Regarding transboundary impacts, the applicant suggests that they are unlikely to occur or if they do, it's unlikely that they will be significant. No information is provided on how they have reached this conclusion. The text should be revised accordingly, and this conclusion should be further explained and better justified.

1.5.9 In the impacts on Marine Water and Sediment Quality, it is not clear if the applicant is scoping in or out the impact during construction of the release of sediment in the water column, even though they do clearly state the potential changes in water quality. This should be clarified.

1.5.10 The applicant intends to scope out the assessment of suspended sediment concentrations in the water column due to changes in tidal and wave characteristics. This should be clarified. An example of such a clarification would include a referenced desk based assessment.

1.5.11 It is not clear from the text provided in Chapter 2.1.2.3 if the applicant is scoping in or out any potential impacts on decommissioning, even though they are expecting impacts from removal of the foundations. The applicant should explain further and describe the EIA process that will be followed for coastal processes in more detail.

1.5.12 As the current application is for two projects but the timeline of construction has not yet been confirmed, the MMO would expect the projects to be included in the relevant cumulative impact assessment (CIA) at the time (i.e. if SEP construction is underway, how will the start of DEV construction impact the coastal processes and vice versa?).

1.5.13 The applicant has suggested that models from nearby or similar cases will be used to form the baseline for this application. The MMO strongly advise the applicant to support this suggestion by showing the validation of these models, present any uncertainties and discuss how the model results deviate (or not) from in-situ data.

1.5.14 In combination impact assessments on coastal processes (from within the project activities) should be conducted and the relevant evidence base to be used to support these assessments should be presented. As mentioned in 1.5.8 it is not clear why the applicant is not including transboundary impacts. Results from the in-combination assessments should be considered accordingly for the transboundary and the cumulative assessments.

Observations

1.5.15 The approach of the scoping assessment and data gathering is appropriate however the applicant is advised of the following:

1.5.16 At page 33, it is noted that wind and metocean data exist for the operational assets. An analysis of these datasets should be included in the baseline information in the PEIR.

1.5.17 The applicant is advised to include a full list (in a table) of the in-situ and modelled data that will form the baseline. Information from UKCP18 on waves, winds, storm surge and sea level rise, should be in the baseline. Bathymetric and sediment features maps should also be included in the baseline (as well as the analysis from the surveys to be completed in 2020).

1.5.18 Maximum of wave heights, propagating from the north east should be added in the text in 2.1.1.2.

Maritime & Coastguard Agency

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UK

Your ref: EN10109 - 000007
Our ref:

The Planning Inspectorate
3/18 Eagle Wing
Temple Quay House
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Bristol
BS1 6PN

By email to:
sadep@planninginspectorate.gov.uk

1 November 2019

Dear Sir/Madam,

Planning Act 2008 and The Infrastructure Planning (Environmental Impact Assessment) Regulations 2017 (the EIA Regulations) – Regulations 10 and 11

Application by Equinor New Energy Limited (the Applicant) for an Order granting Development Consent for the Dudgeon and Sheringham Shoal Offshore Wind Farm Extensions (the Proposed Development) - Scoping Consultation

The MCA has reviewed the scoping report provided by Equinor on the Dudgeon and Sheringham Shoal Offshore Wind Farm Extensions, as detailed in your letter of 9th October 2019 and would comment as follows:

The Environmental Statement should supply detail on the possible impact on navigational issues for both commercial and recreational craft, specifically:

- Collision Risk
- Navigational Safety
- Visual intrusion and noise
- Risk Management and Emergency response
- Marking and lighting of site and information to mariners
- Effect on small craft navigational and communication equipment
- The risk to drifting recreational craft in adverse weather or tidal conditions
- The likely squeeze of small craft into the routes of larger commercial vessels.

The development area carries a significant amount of through traffic to major ports, with a number of important shipping routes in close proximity, and attention needs to be paid to routing, particularly in heavy weather ensuring shipping can continue to make safe passage without large-scale deviations. The likely cumulative and in combination effects on shipping routes should also be considered, taking into account proximity to other windfarm developments, the impact on navigable sea

room and include an appropriate assessment of the distances between wind farm boundaries and shipping routes as per MGN 543.

A Navigational Risk Assessment will need to be submitted in accordance with MGN 543 (and MGN 372) and the MCA Methodology for Assessing the Marine Navigation Safety & Emergency Response Risks of Offshore Renewable Energy Installations (OREI). This NRA should be accompanied by a detailed MGN 543 Checklist which can be found at https://www.gov.uk/guidance/offshore-renewable-energy-installations-impact-on-shipping

We note that a vessel traffic survey will be undertaken to the standard of MGN 543. This must consist of at least 28 days and include seasonal data (two x 14-day surveys) collected from a vessel-based survey using AIS, radar and visual observations to capture all vessels navigating in the study area. The proximity to other offshore windfarms will need to be fully considered, with an appropriate assessment of the distances between OREI boundaries and shipping routes as per MGN 543.

The turbine layout design will require MCA approval prior to construction to minimise the risks to surface vessels, including rescue boats, and Search and Rescue aircraft operating within the site. As such, MCA will seek to ensure all structures are aligned with the current layout designs of Dudgeon and Sheringham Shoal wind farms, in straight rows and columns, and with at least two lines of orientation. Any additional navigation safety and/or Search and Rescue requirements, as per MGN 543 Annex 5, will be agreed at the approval stage.

Attention should be paid to cabling routes and where appropriate burial depth for which a Burial Protection Index study should be completed and, subject to the traffic volumes, an anchor penetration study may be necessary. If cable protection are required e.g. rock bags, concrete mattresses, the MCA would be willing to accept a 5% reduction in surrounding depths referenced to Chart Datum. This will be particularly relevant where depths are decreasing towards shore and potential impacts on navigable water increase.

Particular consideration will need to be given to the implications of the site size and location on SAR resources and Emergency Response Co-operation Plans (ERCoP). Attention should be paid to the level of radar surveillance, AIS and shore-based VHF radio coverage and give due consideration for appropriate mitigation such as radar, AIS receivers and in-field, Marine Band VHF radio communications aerial(s) (VHF voice with Digital Selective Calling (DSC)) that can cover the entire wind farm sites and their surrounding areas. A SAR checklist will also need to be completed in consultation with MCA.

MGN 543 Annex 2 requires that hydrographic surveys should fulfil the requirements of the International Hydrographic Organisation (IHO) Order 1a standard, with the final data supplied as a digital full density data set, and survey report to the MCA Hydrography Manager. Failure to report the survey or conduct it to Order 1a might invalidate the Navigational Risk Assessment if it was deemed not fit for purpose.

On the understanding that the Shipping and Navigation aspects are undertaken in accordance with MGN 543 and its annexes, along with a completed MGN checklist, MCA are likely to be content with the approach.

Yours faithfully,



Nick Salter
Navigation Safety Policy Advisor
Navigation Safety Branch

Ministry of Defence

Defence Infrastructure Organisation

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01 November 2019

Your Reference: EN010109-000007
Our reference: 10046594 & 10046595

Dear Sir/Madam,

Dudgeon and Sheringham Shoal Offshore Wind Farm Extensions

Application by Equinor New Energy Limited (the Applicant) for an Order granting Development Consent Order for the Dudgeon and Sheringham Shoal Offshore Wind Farm Extensions (the proposed development)

I write to confirm the safeguarding position of the Ministry of Defence (MOD) in relation to the request made by the applicant for a scoping opinion from the Secretary of State on the information that should be provided in the Environmental Statement to support the above application.

The applicant has prepared a Scoping Report. This recognises the principal defence issues that will be of relevance to the progression of the proposed development.

The use of airspace for defence purposes in the vicinity of the proposed development have been appropriately identified and considered. The Scoping Report considers aviation and radar systems that may be affected by the proposed wind farm extension areas. Section 2.1 of the report relates to aviation and MOD issues and specifically recognises the impact of both extension areas on Air Defence Radar (ADR).

The applicant has recognised the potential need for mitigation to address the impacts on air defence systems and states they will engage with the MOD on this. The ADR at Remote Radar Head (RRH) Trimingham has been identified as a relevant receptor. Both extension areas will be detectable to the ADR at RRH Trimingham and will impact upon the operation of the air defence system. The impact on the ADR will need to be mitigated and it will be for the applicant to provide appropriate technical mitigation(s).

Another consideration not covered in the Scoping Report is the impact of the turbines on the Primary Surveillance Radar (PSR) at RAF Coningsby. Turbines on the western edge of the Sheringham

Shoal extension area will be detectable to the PSR at RAF Coningsby. This will need to be addressed and an appropriate technical mitigation will need to be provided by the applicant.

The Scoping Report makes reference to the lighting of the Dudgeon Offshore Wind Farm and the MOD's Lighting Guidance is listed as a data source. In the interests of air safety, the Dudgeon and Sheringham Shoal extension areas should be fitted with MOD accredited aviation safety lighting in accordance with the Air Navigation Order 2016. The MOD would need to confirm the specification of the lighting to be used.

The proposed extension areas do not overlap with any military danger areas or Practice and Exercise Areas (PEXA). We therefore do not anticipate there to be any concerns relating to military maritime activities.

The potential for the offshore development area to contain historic disposal sites has been identified. In addition, the potential presence of unexploded ordnance (UXO) has also been identified as a relevant consideration. The potential presence of UXO and disposal sites is also a relevant consideration to the installation of cables and other intrusive works that may be undertaken in the maritime environment.

In relation to the onshore element of the proposed development, there are two proposed locations where the sea cables will come ashore; one at Weybourne and the other at Bacton. Part of the cable route corridor at the Weybourne landfall site occupies the eastern extent of the statutory technical safeguarding zone surrounding the RAF Weybourne transmitter site; in particular the any development height zone. The Bacton land fall site occupies the statutory safeguarding zone encompassing the Air Defence Radar at RRH Trimingham. Any structures whether permanent or temporary i.e. construction equipment which exceeds 15.2m at this location may cause a physical obstruction to the radar. Any development within these zones will need to be compatible with technical safeguarding requirements.

I trust this clarifies our position on this consultation. Please do not hesitate to contact me should you wish to consider these points further.

Yours sincerely



Laura Nokes
Senior Safeguarding Officer

Terry, Hannah

From: Mulbarton Parish <mulbartonparish@[redacted]>
Sent: 05 November 2019 17:52
To: SADEP
Subject: Re: EN010109 - Dudgeon and Sheringham Shoal Offshore Wind Farm Extensions - EIA Scoping Notification and Consultation

Follow Up Flag: Follow up
Flag Status: Flagged

Attention of Hannah Terry

Dear Hannah,

Dudgeon and Sheringham Shoal Extensions (Equinor)

As you will be aware, the village of Mulbarton is specifically identified within the Scoping Report as falling within the search area for the proposed onshore substation for this project, connecting into the grid at Norwich Main.

Our initial view is that there should be a co-ordinated approach to the onshore infrastructure for this and other similar projects. This may include the concept of an Offshore Ring Main (ORM), which would seem to minimise adverse impacts across the county of Norfolk and offer potential economies of scale.

The applicant has suggested, at the recent informal public consultation on 28th October 2019, that they are unable to consider any kind of co-ordinated approach unless required to do so by the relevant authorities. In our view, it would not be in the public interest, on either environmental or economic grounds, to proceed with a Scoping Opinion until this issue has been addressed.

We are also concerned that cumulative adverse impacts, which may include the effects of further projects still at an early stage, will not be properly addressed within the Scoping Opinion as currently proposed.

Mulbarton Parish Council is likely to register as an interested party to this enquiry in due course.

Whilst we appreciate that this is an early stage for this project, we would be grateful if you could please ensure that we are included on your contact list for any new information.

Kind regards,
Anne

Anne Phillips
Parish Clerk, Mulbarton Parish Council
Parish Office, The Common, Mulbarton, NR14 8AE
[redacted]
www.mulbartonpc.org.uk

From: SADEP <sadep@planninginspectorate.gov.uk>
Sent: 09 October 2019 15:44

To: SADEP <sadep@planninginspectorate.gov.uk>
Subject: EN010109 - Dudgeon and Sheringham Shoal Offshore Wind Farm Extensions - EIA Scoping Notification and Consultation

Dear Sir/Madam

Please see attached correspondence on the proposed Dudgeon and Sheringham Shoal Offshore Wind Farm Extensions.

Please note the deadline for consultation responses is **06 November 2019**, and is a statutory requirement that cannot be extended.

Kind regards,

Ifan Gwilym
Cynghorydd AEA a Hawliau Tîr | EIA and Land Rights Advisor
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Nid yw'r cyfartherbiad hwn yn gyfystyr â chyngor cyfreithiol // This communication does not constitute legal advice.
Edrychwch ar ein Hysbysiad Preifatrwydd cyn anfon gwybodaeth at yr Arolygiaeth Gynllunio // Please view our Privacy Notice before sending information to the Planning Inspectorate.

Terry, Hannah

From: NATS Safeguarding <NATSSafeguarding@nats.co.uk>
Sent: 04 November 2019 14:54
To: Gwilym, Ifan; NATS Safeguarding
Cc: SADEP
Subject: RE: Urgent - EN010109 - Dudgeon and Sheringham Shoal Offshore Wind Farm Extensions - EIA Scoping Notification and Consultation (SG28829)

Follow Up Flag: Follow up
Flag Status: Flagged

Hi Ifan

NATS are pleased to note (section 2.10) the developer's awareness of the risks that the proposal carries in relation to NATS air traffic operations in the Southern North Sea and their desire to engage in "consultation with NATS from an early stage".

It should be noted that both the existing Dudgeon and Sheringham Shoal wind farms lie within the Greater Wash Transponder Mandatory Zone, TMZ, and the entirely of the proposed extensions do not. This TMZ was created in 2012 to "negate the impact of increasing levels of wind turbine generated primary surveillance radar (PSR) clutter".

Best wishes

NATS

NATS Safeguarding

E: natssafeguarding@nats.co.uk

4000 Parkway, Whiteley,
Fareham, Hants PO15 7FL
[redacted]

From: Gwilym, Ifan <IFAN.GWILYM@planninginspectorate.gov.uk>
Sent: 04 November 2019 08:28
To: NATS Safeguarding <NATSSafeguarding@nats.co.uk>
Cc: SADEP <sadep@planninginspectorate.gov.uk>
Subject: RE: Urgent - EN010109 - Dudgeon and Sheringham Shoal Offshore Wind Farm Extensions - EIA Scoping Notification and Consultation (SG28829)

Hi Emily,

Apologies for not responding sooner. We have not got the OS grid references for the current turbine layout. We have suggested to others that they contact the Applicant directly.

Regards,

Ifan

From: NATS Safeguarding <NATSSafeguarding@nats.co.uk>
Sent: 04 November 2019 08:20
To: Gwilym, Ifan <IFAN.GWILYM@planninginspectorate.gov.uk>; SADEP <sadep@planninginspectorate.gov.uk>
Cc: NATS Safeguarding <NATSSafeguarding@nats.co.uk>

Subject: RE: Urgent - EN010109 - Dudgeon and Sheringham Shoal Offshore Wind Farm Extensions - EIA Scoping Notification and Consultation (SG28829)
Importance: High

Hi Ifan

Please can we have a response to the request below.

Many thanks
Emily

NATS Safeguarding

E: natssafeguarding@nats.co.uk

4000 Parkway, Whiteley,
Fareham, Hants PO15 7FL
[redacted]

From: NATS Safeguarding <NATSSafeguarding@nats.co.uk>
Sent: 15 October 2019 08:28
To: Ifan.Gwilym@planninginspectorate.gov.uk
Cc: NATS Safeguarding <NATSSafeguarding@nats.co.uk>
Subject: RE: EN010109 - Dudgeon and Sheringham Shoal Offshore Wind Farm Extensions - EIA Scoping Notification and Consultation (SG28829)

Good Morning Ifan

Thank you for sending us the details on the above planning application.

In order for us to assess and comment, could you please provide the additional information:

The OS Grid References in Eastings & Northings for the proposed development

Once we have this information, we will be able to assess and comment accordingly.

Yours faithfully

NATS Safeguarding

E: natssafeguarding@nats.co.uk

4000 Parkway, Whiteley,
Fareham, Hants PO15 7FL
[redacted]

From: SADEP <sadep@planninginspectorate.gov.uk>
Sent: 09 October 2019 15:44
To: SADEP <sadep@planninginspectorate.gov.uk>
Subject: EN010109 - Dudgeon and Sheringham Shoal Offshore Wind Farm Extensions - EIA Scoping Notification and Consultation

Mimecast Attachment Protection has deemed this file to be safe, but always exercise caution when opening files.

Dear Sir/Madam

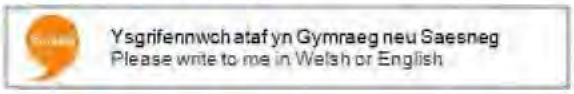
Please see attached correspondence on the proposed Dudgeon and Sheringham Shoal Offshore Wind Farm Extensions.

Please note the deadline for consultation responses is **06 November 2019**, and is a statutory requirement that cannot be extended.

Kind regards,

Ifan Gwilym
Cynghorydd AEA a Hawliau Tîr | EIA and Land Rights Advisor
Cyfarwyddiaeth Gwaith Achos Mawr| Major Casework Directorate
Yr Arolygiaeth Gynllunio | The Planning Inspectorate

Temple Quay House, Temple Quay, Bristol BS1 6PN
0303 444 5491
Ifan.Gwilym@planninginspectorate.gov.uk
infrastructure.planninginspectorate.gov.uk/ (Cynllunio Seilwaith Cenedlaethol // National Infrastructure Planning)
www.gov.uk/government/organisations/planning-inspectorate (Yr Arolygiaeth Gynllunio // The Planning Inspectorate)
Twitter: @PINSgov



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Date: 06 November 2019
Our ref: Case 13015: 297302
Your ref: EN010109-000007

FAO Hannah Terry
Senior EIA and Land Rights Adviser on behalf of the Secretary of State
Major Casework Directorate
Temple Quay House
2 The Square
Bristol, BS1 6PN

sadep@planninginspectorate.gov.uk

Customer Services
Hornbeam House
Crewe Business Park
Electra Way
Crewe
Cheshire
CW1 6GJ

T 0300 060 3900

BY EMAIL ONLY

Dear Hannah

Planning Act 2008 (as amended) and The Infrastructure Planning (Environmental Impact Assessment) Regulations 2017 (the EIA Regulations) - Regulations 10 and 11

Application by Equinor New Energy Limited (the Applicant) for an Order granting development Consent for the Dudgeon and Sheringham Shoal Offshore Wind Farm extensions (the Proposed Development)

Scoping consultation and notification of the Applicant's contact details and duty to make available information to the Applicant if requested

Thank you for seeking our advice on the scope of the Environmental Statement (ES) in your consultation dated 09 October 2019 which we received the same day.

Natural England is a non-departmental public body. Our statutory purpose is to ensure that the natural environment is conserved, enhanced, and managed for the benefit of present and future generations, thereby contributing to sustainable development.

Case law[1] and guidance[2] has stressed the need for a full set of environmental information to be available for consideration prior to a decision being taken on whether or not to grant planning permission. **Annex A** to this letter provides Natural England's advice on the scope of the Environmental Impact Assessment (EIA) for this development. More detailed comment on the content of the report entitled Dudgeon and Sheringham Shoal Offshore Wind Farm Extensions Scoping Report (Equinor, dated October 2019) is given in **Annex B** to this letter.

In keeping with the abbreviations used by the Applicant in the Scoping Report, throughout this response we refer to Dudgeon Extension Project as DEP and Sheringham Shoal Extension Project as SEP.

General Approach to EIA

It is relevant at this point to clarify the aims of EIA, in order to frame our advice on how it should be undertaken appropriately. EIA is a statutory process which should highlight the potential positive

[1] Harrison, J in *R. v. Cornwall County Council ex parte Hardy* (2001)
[2] *Note on Environmental Impact Assessment Directive for Local Planning* Authorities Office of the Deputy Prime Minister (April 2004) available from http://webarchive.nationalarchives.gov.uk/+/http://www.communities.gov.uk/planningandbuilding/planning/sustainabilityenvironmental/environmentalimpactassessment/noteenvironmental/

and negative impacts of a project, and identify how effects can be prevented, offset or reduced through mitigation, enabling the regulator to make a decision on whether to consent.
In respect of offshore wind farm development, it is important to highlight the much larger scale, and geographic spread of the most recent Round of projects compared with previous ones. Therefore, while lessons are being learned from those projects that are operational, under construction or in the pre-construction phase, there is the potential for a different range and/or a greater level of impacts to arise going forwards particularly in relation to cumulative impacts. Consequently, considering the levels of uncertainty that this introduces to the EIA process we advise that the EIA is undertaken in the context of risk management. We identify the need to consider what level of confidence in the data it will be realistically possible to achieve, and how this will be presented to enable conclusions to be reached. The applicant should, therefore, be able to communicate, in their ES, the confidence in their predictions on potential impacts.

Whilst we appreciate the Applicant's intention to identify appropriate mitigation for the impacts predicted to occur as a result of the Dudgeon and Sheringham Shoal Offshore Wind Farm extensions, we highlight that this development is still constrained by the fixed limits of the licence area and grid connection location and, therefore, mitigation is also restricted within this area i.e. the relocation of development away from sensitive areas is limited. We highlight that whilst appropriate mitigation measures may be identified in relation to project design, for some receptors more radical mitigation measures may require consideration and/or compensation. We would welcome the opportunity to discuss these options as the application progresses.

Pre-Application Consultation

Natural England recognises the importance of the pre-application stage of the PINS consenting regime and as such seeks to make this process as effective as possible. We are pleased to note that the Applicant has begun an Evidence Plan process and has engaged Natural England at both the Steering Group and Topic Group level.

Scoping Opinion

We recognise that it is a statutory requirement for developers to undertake consultation on a Scoping Report. On review of the report submitted by the Applicant pertaining to Dudgeon and Sheringham Shoal Offshore Wind Farm extensions, we note that the information and detail provided is limited and is focussed on the high-level of aims of the EIA. We would welcome further information pertaining to the specific survey methodologies to be adopted for assessment of impacts on each receptor and for a preliminary assessment of key potential impacts associated with the development and in-combination with other plans/projects. We anticipate discussing this level of detail during the preparation of Evidence Plans for the projects.

Section 42: Preliminary Environmental Information (PEI)

It is the view of Natural England that the most appropriate form for a PEI to adopt is that of a draft Environmental Statement (ES). This would reassure Natural England and other key stakeholders, that the Applicant's approach to EIA is appropriate and to allow time for areas of concern to be raised and resolved prior to submission of the final ES to PINS. It is, therefore, sensible to maximise the opportunities in pre-application for open and constructive dialogue, to reduce the risk of an application being rejected by PINS. It is also our experience that if too many issues are left unresolved at application then this causes increased pressure for all involved during the Examination process. As such we would expect emphasis on effective pre-application engagement between the developer and Natural England and the PEI to present sufficient detail such that an assessment of the Applicant's approach to EIA can be identified.

Timeframes post PEI should also allow sufficient time to resolve any issues raised during the process; noting that 6 months is proving to be insufficient where there are complex and contentious issues still to be resolved.

Habitats Regulations Assessment (HRA)

In accordance with the 2017 Habitats Regulations 63 (2) and 2017 Offshore Habitat Regulations (as amended) anyone applying for development consent for an NSIP must provide the competent authority with such information as may reasonably be required "for the purposes of the assessment" or "to enable them to determine whether an appropriate assessment is required". Natural England advises that this information should therefore be provided and appraised as part of the EIA process.

Further Liaison and Advice

DEP and SEP lie in relative proximity to Round 3 projects currently pursuing development consent for the phased development of large scale wind arrays, within the North Sea. These include: the Hornsea OWF projects, Vanguard and Boreas OWF and East Anglia OWF projects. We would strongly recommend that collaborative working is pursued with these other projects who are likely to be facing the same consenting risks. We recognise the value of collaborative working particularly in relation to cumulative impacts (including non-windfarm projects). We strongly support any initiatives to pursue collaborative working and are happy to engage in any such projects that the Applicant may progress.

In addition to this, the further development of offshore wind farms presents an opportunity to learn from previous development and to further refine survey and monitoring methods to ensure that the practicality and effectiveness of methods employed means that key data gaps are addressed. There is, therefore, a role for consenting authorities, developers and consultees to increase the understanding of the effects of offshore wind farms as well as securing best practice in further developments.

Key Environmental Issues

We provide our advice in relation to the scoping report in the Annexes A and B.

Our key concerns are as follows and we consider that these issues will need thorough consideration through EIA and close discussion between the Applicant, Natural England, Local Planning Authorities, Marine Management Organisation (MMO), key stakeholders and the where possible the regulators:

- The potential effects of this development proposal on offshore birds during all phases of development encompassing displacement, indirect effects (through impacts on prey species) and collision mortality – both at a project-level and cumulatively.

- Potential effects on marine mammals from noise during construction – both at a project-level and cumulatively.

- The potential for impacts on designated sites from offshore and onshore cable installation – both at a project level and cumulatively. But until the site selection process and surveys are completed we are unable to provide further advice on the significance of any impact and appropriate mitigation measures as part of this consultation.

- The potential for visual impacts to seascape, particularly in relation to the statutory purposes of the Norfolk Coast Area of Outstanding Natural Beauty.

Should the proposal be amended in a way which significantly affects its impact on the natural environment then, in accordance with Section 4 of the Natural Environment and Rural Communities Act 2006, Natural England should be consulted again.

Please note that while the Scoping consultation is required under the Environmental Impact Assessment Regulations (2008) many of the impacts also relate to interest features of designated sites both alone and in-combination. Therefore, our response also includes advice relating to

Habitat Regulation requirements and the Marine and Coastal Access Act (2009) to aid the drafting of the Environmental Statement.

For any queries relating to the specific advice in this letter only please contact me using the details below. For any new consultations, or to provide further information on this consultation please send your correspondences to consultations@naturalengland.org.uk.

Yours sincerely

Aoife Ní Neachtain
Marine Lead Adviser – Major Casework
E-mail: aoife.nineachtain@[redacted]
Telephone: [redacted]

Annex A – Natural England's general advice related to the EIA Scoping Requirements

1. General Principles

Schedule 4 of the Town & Country Planning (Environmental Impact Assessment) Regulations 2017 sets out the necessary information to assess impacts on the natural environment to be included in an Environmental Statement (ES), specifically:

- A description of the development – including physical characteristics and the full land/marine use requirements of the site during construction and operational phases.
- Expected residues and emissions (water, air and soil pollution, noise, vibration, light, heat, radiation, etc.) resulting from the operation of the proposed development.
- An assessment of alternatives and clear reasoning as to why the preferred option has been chosen.
- A description of the aspects of the environment likely to be significantly affected by the development, including, in particular, population, fauna, flora, soil, water, air, climatic factors, material assets, including the architectural and archaeological heritage, landscape/seascape and the interrelationship between the above factors.
- A description of the likely significant effects of the development on the environment – this should cover direct effects but also any indirect, secondary, cumulative, short, medium and long term, permanent and temporary, positive and negative effects. Effects should relate to the existence of the development, the use of natural resources and the emissions from pollutants. This should also include a description of the forecasting methods to predict the likely effects on the environment.
- A description of the measures envisaged to prevent, reduce and where possible offset any significant adverse effects on the environment.
- A non-technical summary of the information.
- An indication of any difficulties (technical deficiencies or lack of know-how) encountered by the applicant in compiling the required information.

It will be important for any assessment to consider the potential cumulative effects of this proposal, including all supporting infrastructure, with other similar proposals and a thorough assessment of the 'in combination' effects of the proposed development with any existing developments and current applications. A full consideration of the implications of the whole scheme should be included in the ES. All supporting infrastructure should be included within the assessment.

2. Biodiversity and Geology

2.1 Ecological Aspects of an Environmental Statement

Natural England advises that the potential impact of the proposal upon features of nature conservation interest and opportunities for habitat creation/enhancement should be included within this assessment in accordance with appropriate guidance on such matters. Guidelines for Ecological Impact Assessment (EcIA) have been developed by the Chartered Institute of Ecology and Environmental Management (CIEEM) and are available on their website.

EcIA is the process of identifying, quantifying and evaluating the potential impacts of defined actions on ecosystems or their components. EcIA may be carried out as part of the EIA process or to support other forms of environmental assessment or appraisal.

The National Planning Policy Framework sets out guidance in S.174-177 on how to take account of biodiversity interests in planning decisions and the framework that the responsible authority should provide to assist developers.

2.2 Internationally Designated Sites

The ES should thoroughly assess the potential for the proposal to affect designated sites.

Internationally designated sites (e.g. designated Special Areas of Conservation (SAC) and Special Protection Areas (SPA)) fall within the scope of the Conservation of Habitats and Species Regulations 2017 (as amended) and the Offshore Conservation of Habitats and Species Regulations 2017 (as amended). In addition paragraph 176 of the National Planning Policy Framework requires that potential Special Protection Areas, possible Special Areas of Conservation, listed or proposed Ramsar sites, and any site identified as being necessary to compensate for adverse impacts on classified, potential or possible SPAs, SACs and Ramsar sites be treated in the same way as classified sites.

Under Regulation 63 of the Conservation of Habitats and Species Regulations 2017 (as amended) and 28 of the Offshore Conservation of Habitats and Species Regulations 2017 (as amended), an appropriate assessment needs to be undertaken in respect of any plan or project which is (a) likely to have a significant effect on a European site (either alone or in combination with other plans or projects) and (b) not directly connected with or necessary to the management of the site.

The ES should include a full assessment of the direct and indirect effects of the development on the features of special interest within these sites, and should identify such mitigation measures as may be required in order to avoid, minimise or reduce any adverse significant effects.

Further information on the location of SPAs, SACS and Ramsar sites and their special interest features can be found at www.magic.gov.uk. Further information on the special interest features, their conservation objectives, and any relevant conservation advice packages for designated sites is available on our website https://designatedsites.naturalengland.org.uk/

2.3 Habitats Regulations Assessment

If the proposal outlined within the scoping document has the potential to significantly affect features of the internationally designated sites and the activity is not directly connected to the management of any designated site it should be assessed under Regulation 63 the Conservation of Species and Habitats Regulations (2017). Should a Likely Significant Effect on an Internationally designated site be identified or be uncertain, the competent authority (e.g. the Marine Management Organisation or Local Planning Authority or Government Department) may need to prepare an Appropriate Assessment, in addition to consideration of impacts through the EIA process.

If during the EIA process the potential for a Likely Significant Effect on the conservation objectives of the sites cannot be ruled out the competent authority should undertake an Appropriate Assessment of the implications for the site in view of its conservation objectives. Noting recent case law (People Over Wind[3]), measures intended to avoid and/or reduce the likely harmful effects on a European Site cannot be taken into account when determining whether or not a plan or project is likely to have a significant effect on a site, therefore consideration is required at Appropriate Assessment. Natural England wishes to be consulted on the scope of the Habitats Regulations Assessment and the information that will be produced to support it and should be formally consulted on any Appropriate Assessment provided for the proposal (Regulation 63).

2.4 Nationally Designated Sites, inc. Sites of Special Scientific Interest (SSSI) and Marine Conservation Zones (MCZ's)

Sites of Special Scientific Interest (SSSIs)- Further information on the location of SSSIs and their special interest features can be found at www.magic.gov.uk. The ES should include a full assessment of the direct and indirect effects of the development on the features of special interest within the SSSIs listed above, and should identify such mitigation measures as may be required in order to avoid, minimise or reduce any adverse significant effects, to ensure compliance with the Wildlife and Countryside Act 1981 (as amended). We recommend consideration of SSSI Impact Risk Zones (available on www.magic.gov.uk and as a downloadable [redacted] to aid the identification

[3] People Over Wind and Sweetman vs Coillte Teoranta (ref: C 323/17).

of any potential environmental risks to designated sites.

Marine Conservation Zones - Marine Conservation Zones are areas that protect a range of nationally important, rare or threatened habitats and species. You can see where MCZs are located and their special interest features on www.magic.gov.uk. Factsheets that establish the purpose of designation and conservation objectives for each of the MCZ's are available at https://www.gov.uk/government/collections/marine-conservation-zone-designations-in-england

The ES should consider including information on the impacts of this development on MCZ interest features, to inform the assessment of impacts on habitats and species of principle importance for this location. Further information on MCZs is available via the following link: http://publications.naturalengland.org.uk/category/1723382

Further information on the special interest features, the conservation objectives, and relevant conservation advice packages for designated sites is available on our website https://designatedsites.naturalengland.org.uk/.

2.5 Regionally and Locally Important Sites

The EIA will need to consider any impacts upon local wildlife and geological sites. Local Sites are identified by the local wildlife trust, geoconservation group or a local forum established for the purposes of identifying and selecting local sites. They are of county importance for wildlife or geodiversity. The ES should therefore include an assessment of the likely impacts on the wildlife and geodiversity interests of such sites. The assessment should include proposals for mitigation of any impacts and if appropriate, compensation measures.

2.6 Protected Species - Species protected by the Wildlife and Countryside Act 1981 (as amended) and by the Conservation of Habitats and Species Regulations 2017 (as amended)

The ES should assess the impact of all phases of the proposal on protected species (including, for example, pinnipeds (seals), cetaceans (including dolphins, porpoises whales), fish (including seahorses, sharks and skates), marine turtles, birds, marine and terrestrial invertebrates, bats, great crested newts, reptiles, water voles, and badgers etc.).

Natural England does not hold comprehensive information regarding the locations of species protected by law, but advises on the procedures and legislation relevant to such species. Records of protected species should be sought from appropriate local biological record centres, nature conservation organisations, NBN Atlas, groups and individuals; and consideration should be given to the wider context of the site for example in terms of habitat linkages and protected species populations in the wider area, to assist in the impact assessment.

The conservation of species protected by law is explained in Part IV and Annex A of Government Circular 06/2005 *Biodiversity and Geological Conservation: Statutory Obligations and their Impact within the Planning System*. The area likely to be affected by the proposal should be thoroughly surveyed by competent ecologists at appropriate times of year for relevant species and the survey results, impact assessments and appropriate accompanying mitigation strategies included as part of the ES.

In order to provide this information there may be a requirement for a survey at a particular time of year. Surveys should always be carried out in optimal survey time periods and to current guidance by suitably qualified and where necessary, licensed, consultants. Natural England has adopted standing advice for terrestrial protected species which includes links to guidance on survey and mitigation. Information on the relevant legislation protecting marine species can be reviewed on the following link https://www.gov.uk/government/publications/protected-marine-species.

The cable routes proposed will result in the loss, severance or potential degradation of various

habitats and severance between these. These impacts, together with potential pollution risks, have the potential to affect various protected species. An assessment of the impact of all phases of the proposal on protected species should be undertaken.

2.7 Habitats and Species of Principal Importance

The ES should thoroughly assess the impact of the proposals on habitats and/or species listed as 'Habitats and Species of Principal Importance' within the England Biodiversity List, published under the requirements of S41 of the Natural Environment and Rural Communities (NERC) Act 2006. Section 40 of the NERC Act 2006 places a general duty on all public authorities, including local planning authorities, to conserve and enhance biodiversity. Further information on this duty is available here https://www.gov.uk/guidance/biodiversity-duty-public-authority-duty-to-have-regard-to-conserving-biodiversity.

Government Circular 06/2005 states that Biodiversity Action Plan (BAP) species and habitats, 'are capable of being a material consideration…in the making of planning decisions'. Natural England therefore advises that survey, impact assessment and mitigation proposals for Habitats and Species of Principal Importance should be included in the ES. Consideration should also be given to those species and habitats included in the relevant Local BAP.

Natural England advises that a habitat survey (equivalent to Phase 2) is carried out on the site, in order to identify any important habitats present. In addition, ornithological, botanical and invertebrate surveys should be carried out at appropriate times in the year, to establish whether any scarce or priority species are present. The Environmental Statement should include details of:

- Any historical data for the site affected by the proposal (e.g. from previous surveys);
- Additional surveys carried out as part of this proposal;
- The habitats and species present;
- The status of these habitats and species (e.g. whether priority species or habitat);
- The direct and indirect effects of the development upon those habitats and species;
- Full details of any mitigation or compensation that might be required.

The development should seek if possible to avoid adverse impact on sensitive areas for wildlife within the site, and if possible provide opportunities for overall biodiversity (or wildlife) net gain.

The record centre for the relevant Local Authorities should be able to provide the relevant information on the location and type of priority habitat for the area under consideration.

2.8 Contacts for Local Records

Natural England does not hold local information on local sites, local landscape character and local or national biodiversity priority habitats and species. We recommend that you seek further information from the appropriate bodies (which may include the local records centre, the local wildlife trust, local geoconservation group or other recording society and a local landscape characterisation document).

For:

- Local Record Centre (LRC) in Norfolk please contact: [redacted]
- County Wildlife Sites in Norfolk please contact [redacted]
- County Geodiversity Sites in Norfolk please contact [redacted]

3. Designated Landscapes and Landscape/Seascape Character

3.1 Nationally Designated Landscapes

As the development site is within and around the Norfolk Coast Area of Outstanding Natural Beauty (AONB), consideration should be given to the direct and indirect effects upon this designated landscape and in particular the effect upon its purpose for designation within the environmental impact assessment, as well as the content of the relevant management plan for the AONB.

3.2 Landscape/Seascape and visual impacts

Natural England would wish to see details of local landscape character areas mapped at a scale appropriate to the development site as well as any relevant management plans or strategies pertaining to the area. The EIA should include assessments of visual effects on the surrounding area and landscape together with any physical effects of the development, such as changes in topography.

The EIA should include a full assessment of the potential impacts of the development on local landscape character using landscape/seascape assessment methodologies. We encourage the use of Landscape and Seascape Character Assessment (LCA/SCA), based on the good practice guidelines produced jointly by the Landscape Institute and Institute of Environmental Assessment in 2013. LCA/SCA provides a sound basis for guiding, informing and understanding the ability of any location to accommodate change and to make positive proposals for conserving, enhancing or regenerating character, as detailed proposals are developed.

Natural England supports the publication *Guidelines for Landscape and Visual Impact Assessment*, produced by the Landscape Institute and the Institute of Environmental Assessment and Management in 2013 (3rd edition). The methodology set out is almost universally used for landscape and visual impact assessment.

In order to foster high quality development that respects, maintains, or enhances, local landscape / seascape character and distinctiveness, Natural England encourages all new development to consider the character and distinctiveness of the area, with the siting and design of the proposed development reflecting local design characteristics and, wherever possible, using local materials. The Environmental Impact Assessment process should detail the measures to be taken to ensure the building design will be of a high standard, as well as detail of layout alternatives together with justification of the selected option in terms of landscape impact and benefit.

The assessment should also include the cumulative effect of the development with other relevant existing or proposed developments in the area. In this context Natural England advises that the cumulative impact assessment should include other proposals currently at Scoping stage. Due to the overlapping timescale of their progress through the planning system, cumulative impact of the proposed development with those proposals currently at Scoping stage would be likely to be a material consideration at the time of determination of the planning application.

The assessment should refer to the relevant National Character Areas which can be found on our website. Links for Landscape / Seascape Character Assessment at a local level are also available on the same page.
https://www.gov.uk/government/publications/seascape-assessments-for-north-east-north-west-south-east-south-west-marine-plan-areas-mmo1134

https://data.gov.uk/dataset/3fed3362-2279-4645-8aaf-c6b431c94485/mmo1037-marine-character-areas

3.3 Heritage Landscapes

You should consider whether there is land in the area affected by the development which qualifies for conditional exemption from capital taxes on the grounds of outstanding scenic, scientific or

historic interest. An up-to-date list may be obtained at www.hmrc.gov.uk/heritage/lbsearch.htm and further information can be found on Natural England's landscape pages here.

4. Access and Recreation

Natural England encourages any proposal to incorporate measures to help encourage people to access the countryside for quiet enjoyment. Measures such as reinstating existing footpaths together with the creation of new footpaths and bridleways are to be encouraged. Links to other green networks and, where appropriate, urban fringe areas should also be explored to help promote the creation of wider green/blue infrastructure. Relevant aspects of local authority green/blue infrastructure strategies should be incorporated where appropriate. Opportunities should be sought for provision for walkers, cyclists and horse riders and to meet the needs of the expanding population.

4.1 England Coast Path

The England Coast Path (ECP) is a new National Trail that will extend around all of England's coast with an associated margin of land predominantly seawards of this, for the public to access and enjoy. Natural England takes great care in considering the interests of both land owners/occupiers and users of the England Coast Path, aiming to strike a fair balance when working to open a new stretch. We follow an approach set out in the approved Coastal Access Scheme and all proposals have to be approved by the Secretary of State. We would encourage any proposed development to include appropriate provision for the England Coast Path to maximise the benefits this can bring to the area. We suggest that the development includes provision for a walking or multi-user route, where practicable and safe. This should not be to the detriment of nature conservation, historic environment, landscape character or affect natural coastal change. Consideration for how best this could be achieved should be made within the Environmental Statement.

As part of the development of the ECP a 'coastal margin' is being identified. The margin includes all land between the trail and the sea. It may also extend inland from the trail if:

- it's a type of coastal land identified in the Countryside and Rights of Way Act 2000 (CROW Act), such as beach, dune or cliff
- there are existing access rights under section 15 of the CROW Act
- Natural England and the landowner agree to follow a clear physical feature landward of the trail

Maps for sections of the ECP and further proposals for adoption are available here: https://www.gov.uk/government/collections/england-coast-path-improving-public-access-to-the-coast

4.2 Rights of Way, Access land, Coastal access and National Trails

The EIA should consider potential impacts on access land, public open land, rights of way and coastal access routes in the vicinity of the development. Consideration should also be given to the potential impacts on the adjacent/nearby Norfolk Coast Path National Trail. The National Trails website [redacted] provides information including contact details for the National Trail Officer. Appropriate mitigation measures should be incorporated for any adverse impacts. We also recommend reference to the relevant Right of Way Improvement Plans (ROWIP) to identify public rights of way within or adjacent to the proposed site that should be maintained or enhanced.

5. Water Quality

Increases in suspended sediment concentrations (SSC) during construction and operation (e.g. future dredging works) have the potential to smother sensitive habitats. The ES should include information on the sediment quality and potential for any effects on water quality through suspension of contaminated sediments. The EIA should also consider whether increased suspended sediment concentrations resulting are likely to impact upon the interest features and supporting habitats of the designated sites as listed above.

The ES should consider whether there will be an increase in the pollution risk as a result of the

construction or operation of the development.

For activities in the marine environment up to 1 nautical mile out at sea, a Water Framework Directive (WFD) assessment is required as part of any application. The ES should draw upon and report on the WFD assessment considering the impact the proposed activity may have on the immediate water body and any linked water bodies. Further guidance on WFD assessments is available here: https://www.gov.uk/guidance/water-framework-directive-assessment-estuarine-and-coastal-waters

6. Air Quality

Air quality in the UK has improved over recent decades, but air pollution remains a significant issue; for example over 97% of sensitive habitat area in England is predicted to exceed the critical loads for ecosystem protection from atmospheric nitrogen deposition (England Biodiversity Strategy, Defra 2011). A priority action in the England Biodiversity Strategy is to reduce air pollution impacts on biodiversity. The planning system plays a key role in determining the location of developments which may give rise to pollution, either directly or from traffic generation, and hence planning decisions can have a significant impact on the quality of air, water and land. The assessment should take account of the risks of air pollution and how these can be managed or reduced. Further information on air pollution impacts and the sensitivity of different habitats/designated sites can be found on the Air Pollution Information System ([redacted]). Further information on air pollution modelling and assessment can be found on the Environment Agency website.

7. Climate Change Adaptation

The England Biodiversity Strategy published by Defra establishes principles for the consideration of biodiversity and the effects of climate change. The ES should reflect these principles and identify how the development's effects on the natural environment will be influenced by climate change, and how ecological networks will be maintained. The NPPF requires that the planning system should contribute to the enhancement of the natural environment 'by establishing coherent ecological networks that are more resilient to current and future pressures' (NPPF Para 174), which should be demonstrated through the ES.

8. Contribution to local environmental initiatives and priorities

The Applicant should consider how this development can contribute to local initiatives and priorities such as any green infrastructure strategies, strategic nature conservation solutions and any environmental enhancement schemes proposed within the Norfolk Coast AONB.

9. Cumulative and in-combination effects

A full consideration of the implications of the whole scheme should be included in the ES. All supporting infrastructure should be included within the assessment.

The ES should include an impact assessment to identify, describe and evaluate the effects that are likely to result from the project in combination with other projects and activities that are being, have been or will be carried out. The following types of projects should be included in such an assessment, (subject to available information):

a. existing completed projects;
b. approved but uncompleted projects;
c. ongoing activities;
d. plans or projects for which an application has been made and which are under consideration by the consenting authorities; and
e. plans and projects which are reasonably foreseeable, i.e. projects for which an application has not yet been submitted, but which are likely to progress before completion of the development and for which sufficient information is available to assess the likelihood of cumulative and in-combination effects.

10. Wind Turbines

Specific guidance for wind developments has been developed by Natural England and should be used to inform the EIA.

A full consideration of the implications of the whole scheme should be included in the ES. This should include the consideration of the electrical connection within the site and between the proposed substation and the wider grid. All supporting infrastructure should be included within the assessment.

Annex B– Natural England's specific comments on the Dudgeon and Sheringham Shoal Offshore Wind Farm Extensions Scoping Report

Point No.	Topic	Section	Paragraph / Table	Comment
	Part 1: Introduction			
1.	Consenting strategy	1.1.2	10 - 13	Natural England welcomes the single application approach proposed by the Applicant. It saves both time and resources, allowing both projects to be reviewed simultaneously and allows comparisons between the projects to be easily made.
2.		1.1.2	14 - 16	The Applicant proposes an integrated approach to electrical infrastructure. This will result in one offshore substation, onshore cables within the same trench and single onshore substation. Natural England prefers this option to reduce the overall amount of infrastructure, in particular the impacts caused by two distinct cable routes.
3.	Habitats Regulation Assessment	1.3.4	43	Natural England notes the reference to the conclusions of The Crown Estate's Offshore Wind Extensions Plan HRA. Natural England advises the Applicant that in its advice to The Crown Estate on the revised RIAA (submitted to TCE by Natural England on 15th July 2019) that "Natural England is not able to agree with the overall conclusions of the RIAA in relation to bird features of SPA."
4.	Site Selection and Assessment of Alternatives	1.4	46	Natural England would welcome further detail on how environmental constraints have be considered in the site selection process.
5.	Offshore Array Site Selection	1.4.1	49	Can the Applicant confirm that the removal of Race Bank extension from the current leasing round will not open up the possibility that SEP might extend outside the scoping area as currently drawn (i.e. in the direction of the current Race Bank wind farm).
6.	Landfall Site Selection	1.4.3	57	Natural England notes the decision to avoid routing potential cable corridors through the Wash and North Norfolk Coast SAC in light of its status being changed to unfavourable condition. However, the unfavourable condition of some site features doesn't preclude the cable from going through the SAC. But, it does provide context in relation to any risk based judgements that may need to made in relation to the significance of any impacts and thus mitigation measures required. The Greater Wash SPA does not yet have an updated Conservation Advice package. The recently updated Conservation Advice package for the Outer Thames Estuary SPA has a "reduce" target for the attribute relating to the disturbance and displacement of red-throated divers. This species is also a feature of the Greater Wash SPA in which there is already known to be considerable disturbance/displacement of this species due to existing anthropogenic activities – notably operational offshore windfarms. It is

				therefore possible that before the Applicant applies for consent, a “reduce” target might also be set for the disturbance/displacement attribute within the conservation objectives for the red-throated divers in the Greater Wash SPA. This possibility should be borne in mind by the Applicant.
7.	Offshore Cable Corridor selection	1.4.3.1	65 / 68	In seeking to minimise the potential impacts of the installation of the offshore export cables, the density maps of the bird features of the Greater Wash SPA should have been considered – in particular the density map for red-throated divers (Natural England & JNCC 2016). The shortest route, while minimising the footprint within the SPA does not necessarily minimise the potential impact to this feature. Please also comments in the benthic ecology section in relation to the cable corridor.
8.	Proposed Development Description	1.5	85 / Table 1-3	Natural England understands that offshore turbine models are continuously evolving and therefore it would be difficult for the Applicant to determine the exact model that will be selected. However, is there not a predicted range in which the turbine models will be in size and wattage, at the least a worst case scenario? This information will be needed to determine the impacts upon sensitive receptors such as ornithology as early as possible.
9.				Natural England queries why floating turbines are not being considered as an alternative foundation option?
10.				Cable protection is mentioned once, for array cables only. Natural England would welcome further detail on potential cable protection across the array and export cable corridor. There is no indication or estimate given of the amount of cable protection that will be required.
11.	Wind Turbine Generators	1.5.4.3	99 / Table 1-5	While Natural England acknowledges the need to use a design envelope to maintain a degree of flexibility in wind turbine design, we consider that maintaining a lowest air gap above HAT of 22m is inadvisable and not in the Applicant’s interests. Recent examinations of offshore windfarm development consent applications by PINS (e.g. Hornsea project 2) have seen lowest air draughts increased to 35m above HAT specifically to reduce/mitigate predicted impacts arising from collision mortality of birds. If the design envelope for DEP and SEP included this as a lowest air gap, it is highly likely that the greatest number of collisions that might be predicted to occur for all bird species, and for Sandwich tern in particular, would be markedly reduced compared to an assumption of a lowest air gap of 22m above HAT. If a revised design envelope were adopted at this stage in the process, the likelihood of there being a significant or insurmountable risk to consent for DEP and/or SEP might be markedly reduced.
12.	Seabed preparation	1.5.6.2	137	Natural England would welcome more detailed information regarding what seabed preparation activities would be undertaken for both the turbine array area and cable corridors.

13.				Seabed preparation makes no reference to the need to dispose of any material. However, it is standard practice to designate a disposal site and to dispose of material dredged from the seabed. It should be included here as part of preparation and considered appropriately as an impact within any EIA. Or confirmation should be given that no disposal will be required along with justification as to why.
14.	Operation, maintenance and Decommissioning Phases	1.5.8		There is no mention of what O&M activities will be included in DCO application.
15.	Determining Receptor Sensitivity and Value	1.6.4.1	173 - 177	Natural England advises the Applicant to make use of the Advice on Operations within the Conservation Advice for all marine European designated sites and MCZs to inform this assessment. This advice identifies pressures associated with the most commonly occurring marine activities, and provides a detailed assessment of the feature/sub feature or supporting habitat sensitivity to these pressures. Advice on Operations should be used in conjunction with the specific details of a proposed plan or project (e.g. indirect and/or additive impacts, activity duration, time of year, scale etc.) and the site-specific Supplementary Advice on Conservation Objectives (SACO) in order to develop assessments of impacts to features within the site.
16.	Mitigation	1.6.4.4	182	Natural England welcomes the aspiration *"if possible, to enhance the environment".* But please note that as a Statutory undertaker Equinor has a duty to maintain and enhance designated sites
17.			183	Natural England welcomes the intention to " *seek 'biodiversity net gain' through the mitigation hierarchy…. So that it can be demonstrated that the Projects are improving biodiversity*".
18.	Cumulative Impacts	1.6.4.7.	188	Natural England notes that no mention is made in the cumulative impact assessment (CIA) section of existing developments. Para 1.4 of Planning Inspectorate Advice Note 17 states the following: For example, the Overarching NPS for Energy (EN-1)9 paragraph 4.2.5 states that "When considering cumulative effects, the ES should provide information on how the effects of the Applicant's proposal would combine and interact with the effects of other development (including projects for which consent has been sought or granted, as well as those already in existence)". Natural England notes the footnote to Table 2 in Advice Note 17 i.e.: *Where other projects are expected to be completed before construction of the*

				proposed NSIP ***and the effects of those projects are fully determined****, effects arising from them should be considered as part of the baseline and may be considered as part of both the construction and operational assessment. The ES should clearly distinguish between projects forming part of the dynamic baseline and those in the CEA.* Natural England does not consider that the effects of any existing OWF are yet fully determined (at least in terms of the level of additional mortality of birds due to either collision or displacement) or that any such effects have as yet been captured in up-to-date "baseline" estimates of the annual survival of any age group of any species of bird that might be subject to added impacts arising from DEP and/or SEP. Accordingly Natural England does not consider that any operational or consented OWF can be ascribed to being part of the dynamic baseline and so considers that all must therefore be included in CIA.
19.			193	Natural England notes that "*the full list of ongoing plans and projects to be included in the CIA will be developed as part of ongoing consultation with technical consultees*." However, Natural England also notes that Advice Note 17 proposes a four stage approach to CEA and that Stages 1 – 2 (establishing the long-list and short-list) should ideally be undertaken early in the pre-application phase and **ideally before requesting a Scoping Opinion**. While a list of **types** of plans or projects that might be included within the CIA is provided in paras 191 and 192 of the Scoping Report this falls far short of a long or short list of particular plans/projects that could have been generated if the Advice Note 17 recommendation to adopt a GIS approach to determining a Zone of Influence around a planned development **as part of Stage 1 of the CIA process** had been followed.
	Part 2: Offshore			
	2.1 Marine Geology, Oceanography and Physical Processes			
20.	Existing Environment: Bedload Sediment and Transport	2.1.1.3	204	The Applicant is considering a proposed cable route through the Cromer Shoal MCZ, which is predominantly designated for subtidal chalk habitat. As stated there is often a veneer of gravelly sand laid on top of the bedrock. In the case of Cromer Shoal Chalk Beds MCZ, this bedrock is chalk. Cabling through chalk could result in losing the unique 3D structures it creates in certain places. Therefore, understanding where these veneers persist and are a suitable thickness for cabling in, would allow the applicant to have greater confidence that the features of the MCZ will not be damaged.
21.	Potential Impacts During Construction	2.1.2.1	208	Natural England agrees that the greatest potential impacts from the array upon the hydrodynamic regime would be from the constructed windfarm during operation. Therefore, we are content it can be scoped out of further consideration in relation to

				the construction phase.
22.			209	Natural England disagrees that the wind farm extensions will not give rise to significant impacts on sea bed features. This is particularly relevant to the Cromer Shoal Chalk Beds MCZ and installing cables through it. The geological features that exist in this area are unique and cannot be reformed once damaged, unlike a mobile sediment dominated area. However, the effect on coastal morphology and sediment transport itself will probably be minimal.
23.			210	There is currently no reference to specific impacts of suspended sediment concentrations from disposal of dredged material at specific disposal grounds offshore. This needs to be considered further and scoped into the assessment.
24.	Potential Impacts During Operation	2.1.2.2	211	Will wake effects from the turbines be considered further in the assessment?
25.			212	For any proposed cable protection Natural England expects a reasonable estimate of the amount, area impacted and pressure exerted on any designated features within MPAs. Cable protection should be considered as a last resort.
	2.2 Marine Water and Sediment Quality			
26.			General	Overall the proposed approach seems appropriate. Please see the following two comments, and otherwise, Natural England defers to the expert advice at the Environment Agency and CEFAS with regards to the need for surveys or additional assessment work for water and sediment quality.
27.	Potential Impacts During Construction	2.2.2.1	237	There is currently no reference to specific impacts of suspended sediment concentrations from disposal of dredged material at specific disposal grounds offshore. This needs to be considered further and scoped into the assessment.
28.	Potential Impacts During Operation	2.2.2.2	239	Increased concentrations of suspended sediments and release of contaminants due to ongoing scour during operation should be scoped in. This has been recognised by the scoping in of increased suspended sediment concentrations during operation in regard to Benthic and intertidal ecology.
	2.3 Benthic and Intertidal Ecology			
29.			General	The northern part of DEP is known to be important for fisheries, in particular sand eel, an important prey species for Annex I Sandwich Tern. There will need to be clear consideration of how habitat change could affect prey availability (as well as potential increase in collision risk) for birds and other mobile species from SACs.
30.	Potential Impacts During Operation	2.3.2.2	273	Cable protection: Please be advised that a joint position paper between the MMO and Natural England is currently being drafted in relation to the place of cable protection. This position will clearly define the parameters for what is considered a construction impact, maintenance over the life time of the project, additional O&M placement and decommissioning. Currently the impacts from the use of cable protection are

				considered to be construction/installation and should be assessed as such recognising that this phase can last several years. In addition it is Natural England advice that cable protection is a permanent/long lasting impact not just during the lifetime of the project, but also beyond as there is currently no evidence to support the successful removal. Especially within designated sites where remove is likely to further impact on the interest feature of the site.
31.			274	Habitat Creation: Please be advised that any increase and/or change in biodiversity and species abundance as a result of the OWF and associated infrastructure may not be beneficial as not representative of seabed/designated site features.
32.			275	Underwater noise: Please be advised that the EIA will need to clearly demonstrate that data from previous R1 and 2 OWF remains fit for purpose for the larger turbines and electrical systems now used across industry. This has not been presented here in order for us to agree to it being scoped out.
33.			276	EMF should not be completely scoped out of the EIA, but Natural England agrees that it can be for benthic ecology.
34.	Potential Cumulative Impacts	2.3.2.4	278	Please be advised that fisheries management areas will need to be considered as a plan or project.
35.	Summary of Potential Impacts	2.3.2.6	280 Table 2-8	- Please see comment in relation to cable protection above. Therefore we do not believe that construction impacts can be scoped out. - Also see point on underwater noise above. - Colonisation of foundations and cable protection/invasive non-native species: there is no consideration of what happens if not decommissioned and left *in situ*. Therefore it is not appropriate to scope out. - Again please see above point on EMF.
36.	Approach to Assessment and Data Gathering	2.3.3	282	For designated site features please determine sensitivity using conservation advice packages and advice on operations.
37.			285	Please be advised that this paragraph is incorrect in relation to a full board scale habitat survey being undertaken. Nothing has been agreed or secured.
38.			286 Table 2-10	Please be advised that Natural England advises against undertaking benthic surveys during the winter months in this location due to prevailing weather conditions and ability to collect satisfactory data sets. Case example is the Sheringham Shoal pre-construction benthic survey. In addition, the use of sub-bottom profilers along the Bacton export cable route should be avoided in the winter months due to potential impacts to marine mammals within the Southern North Sea SAC. Natural England notes that no geotechnical investigations are included. We advise that

				as a minimum there would need to be some geotechnical investigations done pre-application to understand the feasibility of cable installation within the MCZ (see also comments on paragraph 204). These would need to be licenced through the MMO and would need to follow after the benthic surveys to demonstrate that there would be a significant impact to the features from the geotechnical surveys themselves. We would therefore expect a Preliminary Trenching Assessment (as done by Hornsea P3) or A cable installation assessment (Vanguard) to be provided as part of the project application.
	2.4 Fish and Shellfish Ecology			
39.			General	Overall the proposed approach seems appropriate. Please see the following two comments, and otherwise, Natural England defers to the expert advice at Cefas with regards to the need for surveys or additional assessment work for Fish and Shellfish.
40.	Potential Impacts During Construction	2.4.2.1	302	Potential impacts here should also include impacts from disposal activities, such as smothering of larvae or potential changes to habitat.
41.	Approach to Assessment and Data Gathering	2.4.3	Table 2-14	Data from the most recently published International Herring Larvae Survey 2019 report should also be included to confirm what spawning, if any, is occurring at the identified potential spawning area. September 2019 is the latest publication at time of writing. Table 2-14 suggests that only up to 2018 will be considered.
	2.5 Marine Mammal Ecology			
42.	Existing Environment	2.5.1	323	Natural England is satisfied with the species to be included in the marine mammal assessment, namely harbour porpoise, minke whale, white-beaked dolphin, grey seal and harbour seal.
43.	Potential Impacts During Operation	2.5.2.2	355	Natural England is content with the potential impacts to be included in the assessment and that direct impacts to marine mammals from EMF may be scoped out.
44.	Approach to Assessment and Data Gathering	2.5.3	369	Paragraph states digital aerial surveys for offshore ornithology and marine megafauna began in May 2018, but Table 2-16 says these surveys began in May 2019. Please can clarification be provided as to which date is correct.
45.			General	Consideration should also be given within the ES to the possible requirement for a European Protected Species licence.
	2.6 Offshore Ornithology			
46.	Existing Environment	2.6.1	380	Natural England welcomes the intention, in addition to the species/seasons identified in para 379, that other seabird and waterbird species recorded at various times of year and any other species not yet recorded which are found to be present in the study area during the second year of baseline surveys will be accounted for during the

				assessment. However, Natural England considers that in addition to those species recorded at some point within the survey area, account may also need to be taken of the possibility for DEP/SEP to interact with migratory species – which may not be recorded at all during snapshot surveys, even over two years. The work of the SOSS programme provides a means to identify which bird species are likely to have a migratory pathway that encompasses the DEP and SEP footprints (Wright et al 2012) and so merits inclusion in the assessment.
47.			381	Natural England agrees with the need to give consideration to sites designated for their ornithological interest, and that lie beyond the boundary of the study area as a proportion of the birds using the habitats within DEP and SEP may originate from (distant) SPAs. However, Natural England advises that the distant SPAs screened in should not be limited to those determined solely by the breeding season/foraging ranges of their ornithological features, but also account for the potential for DEP and SEP to interact with birds from much more distant SPAs during the migration and non-breeding seasons as a proportion of the birds using the DEP and SEP areas may originate from even more distant SPAs. Furness (2015) provides information for many species of seabird on the suite of colonies that may have connectivity with the southern North Sea outside the breeding season.
48.	Potential Impacts	2.6.2	382	Natural England acknowledges recognition of the need to consider interrelationships between ornithological assessments and other assessments e.g. fish and shellfish ecology etc. Natural England advises that full consideration needs to be given to all of the potential indirect pathways through which DEP and SEP may impact birds through impacts on their food (or other key) resources and/or supporting habitats. In respect of bird qualifying features of designated sites (SPAs), the Supplementary Advice on Conservation Objectives (SACO) that form part of the Conservation Advice packages should be consulted to obtain a full picture of all the attributes (and their targets) which could provide a pathway whereby DEP and SEP may impact on the conservation objectives of these sites.
49.	Potential Transboundary Impacts	2.6.2.5	387	Natural England welcomes acknowledgment of the scale of OFW development not just in UK waters but in those of other European countries. This does indeed create the potential for transboundary impacts – and therefore also the need for all such developments (regardless of location) to be included within CIA for populations of many species whose mobility results in their potential interaction with OFWs in a wide range of national waters. It does not, however, follow that as the magnitude of the spatial scale of developments included within transboundary assessments increases that the size of the seabird reference populations increases too. The scope for there to be transboundary effects of developments needs to be considered against each

				population scale that is relevant – and that will often need to include individual colony SPAs because individuals from any one colony may well interact with developments across various national waters.
50.	Summary of Potential Impacts	2.6.2.6	389 Table 2.18	Natural England does not agree that barrier effects due to the presence of turbines can be scoped out during the construction and decommissioning phases. Barrier effects may begin as soon as the first few turbines are erected (which may be well before the end of the construction period), and may not end until the last few turbines are decommissioned.
51.	Data Gathering	2.6.3.1	390	Natural England notes that the area of the "offshore scoping area" as depicted in Figure 1.1.1 does not correspond with the area covered by the survey design for the digital aerial surveys as depicted in Figure 2 of Dudgeon and Sheringham Shoal Extension Project – method statement for ornithological, and marine megafauna survey May 2018 – which is the latest information Natural England has regarding the area being surveyed. Clarity is needed on this issue. Natural England is not convinced that a 4km buffer around the survey area (as shown in Figure 2 of the method statement) is sufficient to ensure that characterisation data are going to be gathered across the full extent of the sea area over which the zone of influence of DEP and in particular SEP may extend – particularly in regard to the red-throated diver interest feature of the Greater Wash SPA. For this species there is increasing evidence of the zone of influence of operational windfarms exceeding 10km and perhaps reaching 20km. These distances would see the zone of influence around SEP overlapping with the Greater Wash SPA. Without survey information from these wider areas the ability to reach sound conclusions regarding the magnitude and significance of these developments on the Greater Wash SPA in particular may be compromised. Ideally, the survey design would have been informed by quantitative analyses of existing survey data from the general area of the DEP and SEP developments to arrive at a design that optimised the trade-off between increasing accuracy and precision of population abundance estimates and survey effort. But we acknowledge that there was a project requirement to start Ornithological surveys ahead of the evidence plan process.
52.			392	As far as Natural England is aware digital aerial imagery cannot be used to discriminate different sexes of seabirds. Also, as far as Natural England is aware, the robustness of all approaches to estimating flight heights from aerial survey platforms has yet to be satisfactorily validated. Natural England is not convinced that the area covered by digital aerial survey, even covering as it does a 4km buffer, will provide any real insight into the importance of "the site" relative to a wider area. The entire aerial

				survey area is small and will provide no real insights into the abundance and distribution of any species in the general area of the Greater Wash – this being the scale at which year to year variation is most likely to be manifest.
53.			393	Natural England is pleased to see that information from other surveys will be utilised during the assessment.
54.	Key Aspects of the Assessment	2.6.3.2	394	Rather than Natural England being involved in further liaison with the Applicant to agree the specific assessment methodology "following the identification of the preferred offshore development area", Natural England would welcome inclusion in the identification of the preferred offshore development area with the Applicant.
55.			396	Natural England's position on the issue of generating and using updated collision mortality estimates based on as-built project parameters has been most recently set out in our advice given in response to the PEIR submitted for Hornsea Project 4. This was as follows: Our position on as-built layouts is that for revised collision figures based on design or build changes to be accepted, it is necessary to: • Provide documentary proof that the design envelope used to calculate new collision figures is 1) legally secured with no further change possible (i.e. written confirmation from the appropriate Regulator provided); 2) the worst case scenario design envelope for collisions for each species considered for projects that are not yet built; • Agree with Natural England the updated CRM figures – including bird parameters used in the CRM, which CRM model/option to be used, etc.; • Re-run CRMs to generate updated collision figures against any agreed changes to turbine design layouts. Where this is not possible for a project because original bird density data cannot be obtained, we would need to agree whether correction ratios can be calculated (for example following an approach such as MacArthur Green (2017)) and see the full calculation details for these correction factors. This advice still holds.
56.			397	Natural England notes the reference to the conclusions of The Crown Estate's Offshore Wind Extensions Plan HRA. Natural England advises the Applicant that in its advice to The Crown Estate on the revised RIAA (submitted to TCE by Natural England on 15th July 2019) that "Natural England is not able to agree with the overall conclusions of the RIAA in relation to bird features of SPA."

57.			398	Natural England advises that, as far as it is aware, the errors associated with site-specific flight height data that may be gathered as part of the digital aerial survey programme will be greater than required for the purpose of Collision Risk Modelling (CRM). If, in the case of CRM for Sandwich tern, the intention is to explore the use of flight height data gathered during the Sheringham Shoal post-construction monitoring, these data must be satisfactorily validated in order for any confidence to be placed in conclusions based on their use.
58.			399	In assessing the sensitivity of each species, Natural England advises the Applicant of the value of consulting the information contained within its Advice on Operations for the features of each Marine Protected Area.
59.			400	In addition to the list of alternative sources of information provided regarding the distribution of seabirds at sea, Natural England advises the Applicant to make use of the information arising from the work on mapping the distributions of birds and marine mammals around the whole of the UK as part of the Marine Ecosystems Research Programme (MERP). MERP: top predators Natural England also advises that in the near future a review of breeding seabird foraging ranges is likely to be completed (part of The Crown Estate front-loading projects for Round 4) and of seabird behaviour at sea under different environmental conditions (ongoing project funded by Marine Scotland). There may be other ongoing projects whose findings may be relevant to the assessments made by the Applicant in due course.
	2.11 Offshore Designated Sites			
60.	Natura 2000 Sites	2.11.1.2	524 and Table 2-28	Natural England agrees that it is necessary to consider sites beyond the project boundary. Natural England further agrees that the list of sites provided in Table 2-28 is not an exhaustive list and that an HRA screening exercise should, as part of the application process to come, identify those sites on which the proposed developments would have likely significant effects alone or in combination. In particular, Natural England would advise the need to consider not just Natura 2000 sites in the vicinity of the proposed development (as listed in Table 2-28) but also far distant SPAs to/from which passage migrant birds may be travelling. We also advise consideration of the scope for DEP and SEP to interact during the breeding season with seabirds that are not part of the breeding pool of any given SPA, but are nonetheless part of the wider population on which the long-term viability of the breeding population depends (i.e. non-breeding adults, immatures and juveniles). DEP and SEP may also interact with seabirds outwith the breeding season and so far from the colony at which they may breed (much further than might be considered in scope purely on the basis of breeding season foraging radii).

<table>
<tr><td></td><td></td><td></td><td></td><td>Further comments on Table 2.28:<table><tr><th>Site name</th><th>Natural England comments</th></tr><tr><td>Greater Wash SPA</td><td>Does not support breeding or passage waterbirds</td></tr><tr><td>North Norfolk Coast SPA and Ramsar</td><td>Also supports breeding waterbirds and breeding raptors</td></tr><tr><td>Southern North Sea SAC</td><td>The proposed export cable making landfall at Bacon crosses this SAC therefore this should be considered to be within the footprint of the development.</td></tr><tr><td>Outer Thames Estuary SPA</td><td>Also supports non-breeding waterbirds but not non-breeding seabirds (red-throated diver is not a seabird)</td></tr><tr><td>Breydon Water SPA</td><td>This site is also a Ramsar site.</td></tr><tr><td>The Wash SPA and Ramsar</td><td>Does not support wintering and passage seabirds</td></tr><tr><td>Humber Estuary SPA and Ramsar</td><td>Also supports breeding seabirds and breeding and wintering raptors</td></tr><tr><td>Minsmere –Walberswick SPA and Ramsar</td><td>Also supports breeding and wintering raptors and breeding passerines</td></tr><tr><td>Alde-Ore Estuary SPA and Ramsar</td><td>Also supports breeding raptors</td></tr><tr><td>Debden Estuary SPA and Ramsar</td><td>Typo, should be Deben</td></tr><tr><td>Stour and Orwell Estuaries SPA and Ramsar</td><td>It is not clear why the habitat features of the Ramsar site are listed for this site but none of the other Ramsar sites listed in this table</td></tr></table></td></tr>
<tr><td></td><td>Part 3: Onshore</td><td></td><td></td><td></td></tr>
<tr><td>61.</td><td>Onshore Ground Conditions and Contamination</td><td>3.1</td><td>General</td><td>Soils: Impacts from the development should be considered in light of the Government's policy for the protection of the best and most versatile (BMV) agricultural land as set out in paragraph 170 of the NPPF. We also recommend that soils should be considered in the context of the sustainable use of land and the ecosystem services they provide as a natural resource, as also highlighted in paragraph 170 of the NPPF.

Guidance on soil protection is available in the Defra Construction Code of Practice for the Sustainable Use of Soils on Construction Sites, and we recommend its use in the design and construction of development. Should the development proceed, we advise that the developer uses an appropriately experienced soil specialist to advise on, and supervise soil handling, including identifying when soils are dry enough to be handled and how to make the best use of soils on site.</td></tr>
<tr><td>62.</td><td>Water quality</td><td>3.2</td><td>General</td><td>Impacts on the environment arising from pollution is likely unless appropriate</td></tr>
</table>

				avoidance or mitigation measures are in place. Measures will need to be put in place to ensure that no pollution enters any surface water or rivers. The applicant should consider the potential impacts of a breakout when using HDD to bore underneath any watercourse and assess potential environmental impacts. We recommend that a code of conduct is in place to prevent damage in the event of a breakout, this should include stopping works and a communication plan listing relevant bodies such as Natural England and the Environment Agency.
63.	Air quality	3.6	715	Para 715 states that designated ecological sites within 50m of construction works and 200m of the road network may be affected by changes in air quality. We recommend that construction works within 200m (as opposed to 50m) of a designated site is scoped into air quality assessment so the potential impacts of dust and particulate matter to sensitive features are fully considered. This is in line with Natural England's distance criteria (internal guidance).
	3.4 Ecology and Ornithology (including Sites of Nature Conservation Interest)			
64.	Existing Environment	3.4.2	Table 3-9	The North Norfolk Coast Ramsar and SPA have the same area and footprint, therefore they should have the same proximity to the study area – it is not clear why the SPA is considered to be within the study area, while the Ramsar is outside. Additionally, the North Norfolk Coast SPA is duplicated in the table with two different proximities given (within and 1.6km). We advise that the closest distance to any proposed development is used. The Broads is SAC only, while Broadland is an SPA as well as a Ramsar site. Mundesley Cliffs SSSI should be included in Table 3-9. Sand martins nest in the cliffs although they are not listed as a designated feature. Weybourne Town Pit SSSI should be included as it occurs within the onshore scoping area.
65.			General	Functional Linked Land: Functional habitat is an undesignated area beyond the boundary of a protected site which is used by designated bird populations. A typical bird requires a secure roost and / or nest site, and sufficient food, all encompassed within a home range. Where an essential ecological function, such as foraging, occurs beyond a site boundary, then the area within which this occurs is termed functionally

				linked land, or is known as functional habitat. As the presence of this land is essential in meeting a species' needs, damage or deterioration of this habitat could in turn impact upon the designated population. The development may result in the removal of functional habitat or the disturbance of interest features, the relevant surveys should be completed to ascertain if designated species utilise the site and if the proposal is likely to significantly affect those species.
66.			653	<u>County Wildlife Sites:</u> All routes that have the potential to impact County Wildlife Sites should be carefully considered to avoid impacts to these sites.
	Part 4: Wider Scheme Aspects			
	4.1 Seascape, Landscape and Visual			
67.			General	Natural England advises that visual impacts to seascape and in particular to the statutory purposes of the Norfolk Coast AONB from the operational phase of SEP and DEP should be considered. Natural England's concerns relate to the south western portion of the proposed SEP site, and the south eastern portion of the proposed DEP site. Natural England advises that the following potential impacts are scoped in: • 'Curtaining' effect when viewed from onshore, created by apparent joining together of the DEP and SEP OWFs with existing OWFs (Dudgeon, Sheringham Shoal and Race Bank); • Use of taller turbines when viewed in conjunction with shorter turbines of existing OWFs will create a visually confusing and incoherent aspect within the seascape; • Cumulative impacts with other projects and existing OWFs.
	6. Summary and Conclusions			
68.			902 Table 6-1	<u>Summary of impacts scoped in and out</u> Natural England advises that any potential impacts which are not listed in this table, but come to light subsequently, cannot be considered to have been scoped out at this stage purely by omission.

One general observation is that the section of this table devoted to marine mammals lists 18 different potential impacts listed whereas offshore ornithology lists just 6. The latter should be split into more specific impact pathways similar to the level of detail provided in regard to impacts on marine mammals. For example, for marine mammals there are 5 separate rows for differing cumulative effects but just one row for offshore ornithology. Also some potential impacts listed for marine mammals are currently omitted for offshore ornithology and these should be added – even if just to make clear they have been scoped out for offshore ornithology too – e.g. *Electromagnetic fields direct effects*.

Under marine mammals there is a row for *Changes to prey availability (including from habitat loss and EMF)* whereas under offshore ornithology this is embedded within the broader impact of *Indirect impacts through effects on habitats and prey species*. There needs to be greater consistency in the listing of the potential impacts across the different receptors.

It is not clear what is meant by the scoping out of all potential impacts for all development phases in relation to Offshore Designated Sites. In the case of Marine Protected Areas **all of the attributes** listed within the Supplementary Advice on Conservation Objectives for each qualifying feature of each designated site for which these are available, and through which impacts on the feature may arise indirectly e.g. air quality, food availability, water depth, water quality (DOC, nutrients and turbidity) etc., should be considered.

Further comments on Table 6-1:

Potential impacts	Natural England comment
Marine water & sediment quality	
Potential for increases in suspended sediment	This should not be scoped out during operation – the possibility of ongoing scour must be considered – and this is recognised by the scoping in of increased suspended sediment concentrations during operation in regard to Benthic and intertidal ecology.
Potential for the release of contamination	This should not be scoped out during operation – the possibility of ongoing scour must be considered.
Benthic and intertidal ecology	
Re-mobilisation of	With increased suspended sediment

				contaminated sediments	concentrations during operation being screened in, so too should this potential impact.
				Invasive species	This should not be scoped out during construction. The vessels used during construction may already be carrying invasive species in their ballast water or on their external surfaces.
				Fish & shellfish ecology	
				Introduction of wind turbine foundations, scour protection and hard substrate	This should not be scoped out during the construction phase as this is the phase when wind turbine foundations and scour protection will be installed (and will also remain until decommissioning is completed).
				Impacts on commercially exploited species associated with their displacement from the area of activity / works	Consideration must also be given to potential impacts on species which are not commercially exploited but may nonetheless be key prey resources of many seabirds and waterbirds.
				Marine mammal ecology	
				Underwater noise during UXO clearance	This potential impact should also be scoped in in respect of waterbirds that forage underwater – eg red throated divers, auks etc. Advice on Operations produced by Natural England scores underwater feeding species such as red-throated divers to be sensitive to underwater noise changes (albeit low sensitivity).
				Underwater noise during piling	This potential impact should also be scoped in in respect of waterbirds that forage underwater – eg red throated divers, auks etc.
				Underwater noise and presence of vessels	This potential impact should also be scoped in in respect of waterbirds that forage underwater – eg red throated divers, auks etc.
				Underwater noise from operational wind turbines	This potential impact is scoped in for marine mammals during the operation phase. In the absence of any evidence indicating that seabirds and waterbirds that forage underwater are not similarly sensitive, this should be scoped in for birds too during the operational phase. Advice on Operations

					produced by Natural England scores underwater feeding species such as red-throated divers to be sensitive to underwater noise changes (albeit low sensitivity).
				Barrier effects from underwater noise	It is not clear why this potential impact is scoped out during operation when three other potential impacts relating to underwater noise during operation are scoped in.
				Changes to prey availability (including from habitat loss and EMF)	This potential impact pathway should also be listed for birds and scoped in
				Cumulative barrier impacts	It is not clear why this impact is scoped out for construction and decommissioining while barrier effects due to eg underwater noise is scoped in for these phases. Is this on the assumption that construction and decommissioning of DEP and SEP will not overlap in time with that of any other development? Unless that can be guaranteed, these cumulative barrier impacts should be scoped in across all three phases.
				Offshore ornithology	
				Disturbance and displacement (work activity, vessel movements, presence of turbines and infrastructure, lighting)	This impact pathway should also consider the potential for impacts from displaced fishing vessel activity and other shipping activity (scoped in elsewhere in this table).
				Barrier effect due to presence of turbines	This impact should be scoped in for construction and decommissioning phases as barrier effects may start as soon as the first turbines are erected and continue until the last ones are decommissioned.
				Commercial fisheries	
				Impacts on commercially exploited species associated with their displacement from the area of activity / works	Consideration must also be given to potential impacts on species which are not commercially exploited but may nonetheless be key prey resources of many seabirds and waterbirds.
				Displacement of fishing activity leading to increased pressure on other areas	The potential for this impact to have knock-on impacts on birds must also be considered and scoped in for all phases

				outside the wind farm sites	
				Shipping and navigation	
				Displacement of vessel routeing activities	The potential for this impact to have knock-on consequences for offshore ornithology must also be considered and scoped in for all phases.
				Ecology and Ornithology	Natural England assumes that this section relates to onshore?
				Indirect impacts…..	Natural England agrees that this should be scoped in for all phases but notes that assessment of indirect impacts must take account of **all of the pathways** through which impacts on sites' qualifying features may arise.
	Additional comments				
69.		Appendix 2		It is not clear why density maps are provided for both grey seal (Fig 2.5.1) and harbour seal (Fig 2.5.2) but no equivalent density maps are provided for any bird species – using for example the outputs of: the JNCC's tern tracking and modelling work (Wilson et al 2014), the SeaMaST tool (Bradbury et al 2014), analysis of FAME tracking data (Cleasby et al 2018), analyses of Alde-Ore estuary gull tracking data by the BTO (Thaxter et al 2015) or the modelling work done as part of the Marine Ecosystem Research Programme (MERP).	
70.	Mitigation at a landscape scale and net gain			A wide range of mitigation and compensation measures will be required for the environmental impacts. At this early stage, we encourage the adoption of a landscape scale approach with a clear vision and coherent strategy of how measures can be delivered across a wider area beyond the compulsory purchase corridor of any route, cannot only provide mitigation and compensation but deliver a net gain for biodiversity and people. To achieve this will mean looking well beyond the footprint of any chosen route. Measures to create new, restore existing and link severed or isolated habitats across the wider area should be incorporated, with the focus on wetland and woodland habitats. This approach should also secure a net gain for biodiversity in line with government policy.	
71.	Research report			Natural England has produced a report *Generating more integrated biodiversity objectives – rationale, principles and practice (NERR071)* which it would be very useful to consider in the context of this development proposal and is available via http://publications.naturalengland.org.uk/publication/5891570502467584 The intention of the report is to help partners and stakeholders to understand our	

				rationale for more integrated biodiversity decision-making. It should be seen as critical detail for applying the 'ecosystem approach' which provides a wider framework for environmental decision-making.

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Norfolk County Council response to:
Dudgeon and Sheringham Shoal Offshore Wind Farm Extension
EIA Scoping Report

October 2019

1. Introduction

1.1. The County Council (CC) welcomes the opportunity to comment on the above Scoping Report. The comments below are made on a without prejudice basis and the County Council reserves the right to make further additional comments on the Development Consent Order (DCO) application during the statutory consultation periods and at the Public Examination stage.

1.2. The Environmental Impact Assessment (EIA) / Preliminary Environmental Information Report (PEIR) will need to assess the wider economic benefits arising from the above wind farm extension both in terms of the scheme coming forward on its own and in combination with the other wind farms.

1.3. The remainder of this note sets out more detailed comments in relation to the County Council's statutory roles and responsibilities:

2. Highways and Traffic Access

2.1. The construction phase will generate the greatest number of vehicle movements. The transportation of materials and removal of spoil for the trenches will cause the greatest impact.

2.2. With the above in mind, the applicants will need to submit a full Transport Assessment (TA). The TA will need to assess the effects of the anticipated traffic upon driver delay; severance; pedestrian delay; pedestrian amenity; accidents; road safety; and impact from abnormal loads. In order to assist with determining the content for the TA, the applicants need to provide details of the following:

(a) Vehicles

2.3. Define the nature of the traffic likely to be generated. In addition, for the largest vehicles proposed to use each access route(s) this must include: -

- minimum width (including unhindered horizontal space)
- vertical clearance
- axle weight restriction.

(b) Access and Access Route

2.4.
- The anticipated volume of construction traffic needs to be identified for each individual route
- detailed plans of site access/es incorporating sightline provision (with particular regard to the permanent access to the proposed substation)
- Details of any routes to be stopped up
- confirmation of any weight restrictions applicable on the route

- details of any street furniture along each route that may need to be temporarily removed/relocated
- Any roads to be crossed by open cut trench methods need to be agreed in advance with the Highway Authority. **NB – Norfolk County Council will seek to restrict open cut trenching on A and B routes at all times unless there is a technical reason why this is not possible.**

(c) Impact During Construction

2.5. Are any special requirements needed and if so provide details, for example:

2.6.
- Restrictions on the timing of construction works
- removal of parked vehicles along the route(s) – full details will need to be provided including whether or not alternative parking arrangements are being offered or bus services provided in lieu of potential loss of ability to use private cars.
- identification of the highway boundary along the construction traffic route (if required)
- any modifications required to the alignment of the carriageway or verges/over-runs
- identification of sensitive features along the route together with proposed mitigation measures
- confirmation of any extraordinary maintenance agreement/s required by the Highway Authority
- A Construction Traffic Management Plan
- Measures proposed to avoid Impacts upon traffic during the tourist season – to be incorporated within the proposed traffic management plan.
- Requirements for a Travel Plan (TP). If a TP is not going to be submitted, then justification needs to be provided.

(d) Specific Considerations

2.7.
- The cable route passes close to Oulton airfield which is intended to serve as a main compound for Hornsea 3; a mobilisation area for Norfolk Vanguard; and also a mobilisation area for Norfolk Boreas. The applicants need to identify any cumulative impacts arising from their proposals.
- The cable route passes close Cawston village which accommodates construction traffic for Hornsea 3; Norfolk Vanguard and also Norfolk Boreas. The applicants need to identify any cumulative impacts arising from their proposals.
- The traffic light junction at Harford has been identified as already being over capacity. It is anticipated this project will need to utilise this junction to for construction works to reach the substation. The applicants need to address this point. They also need to bear in mind Highways England have previously expressed concern with this junction due to potential for traffic to stack back to the A47(T) roundabout. Accordingly, the applicants also need to discuss this point at an early stage with Highways England.

2.8. Should you have any queries with the above highway comments please contact John Shaw email John.R.Shaw[redacted]

3. Environment

(a) Public Rights of Way

3.1. The installation of the on-shore cables has the potential to impact the Norfolk Coast Path, which follows the same route as the England Coast Path (ECP) in the locations where landfall is being considered. The Coast Path is managed by Norfolk County Council and is a heavily used recreational trail which brings significant benefits to the local economy. The County Council would wish to minimise impacts on this National trail during construction.

3.2. In addition to the Coast Path and the wider Public Rights of Way network, there are several County Trails and promoted circular walks that could be impacted during construction. Full details of County Council trails and promoted walks can be found on the County Council website https://www.norfolk.gov.uk/out-and-about-in-norfolk. We would particularly draw attention to the Marriott's Way which receives particularly heavy usage where it is crossed by the proposed cable corridor route in two separate locations. The Norfolk Trails team collect data on trail usage, and this can be provided for relevant locations in due course should it be required.

3.3. The Construction Code of Practice Document, and the Public Rights of Way Management Plan (presumably part of the former document), will be the method that will be used to agree potential impacts on the ECP, Norfolk Trails, the PRoW network and other promoted walks. The County Council agree with this approach and will work with the applicant in this regard.

(b) Ecology Comments

3.4. The EIA will be supported by an information to support a HRA and the applicant intents to undertake the Ecological Impact Assessment (EcIA) in accordance with guidelines published by the Chartered Institute of Ecology and Environmental Management (CIEEM) – Please note that EcIA guidelines were updated in 2019 and that the new guidelines should be followed.

3.5. Table 3.13 states that the applicant is proposing to undertake the following surveys:

- Extended Phase 1 Habitat Survey (including non-native Invasive Species);
- Badgers
- Water vole and otter
- Breeding birds
- Great crested newts
- Reptiles
- Dormice
- Bats: activity and emergence surveys
- Botanical surveys, and

- Wintering bird surveys

3.6. Ecological surveys will need to be undertaken at the appropriate time of year in accordance with best practice guidelines (outlined in paragraph 677) and by suitably qualified and experienced surveyors (please state surveyor name, licence numbers and experience where applicable);

We would encourage the applicant to undertake reptile surveys on all land that has potential to support this species rather than concentrating on '*on habitats that may support significant populations'* ;

The scope of ecological surveys, which will be refined following the Phase 1 survey, needs to consider species for which sites are designated e.g. the White clawed Crayfish;

Important hedgerows, as defined by the Hedgerows Act 1997 will need to be identified;

Complete baseline data should support the EIA to ensure certainty in the conclusions, beyond reasonable doubt, that no Adverse Effects will result from the proposed proposals alone, and in combination with other proposals;

We welcome the proposal for liaison with the applicant as to the approach and methodology for data collection. The survey methodology for the PEA, and any subsequent habitat or species-specific surveys should be agreed with Natural England, the EA and the county ecologist, as appropriate, in advance of the surveys being undertaken;

All ecological data (including that from pre-construction and post construction monitoring) should be submitted to the Local Records Centre, in a timely manner and in a form that is readily accessible;

Table 3.9 European designated sites within 20km - Paston Great Barn SAC is not the only known barbastelle maternity roost in Norfolk. It was when the site was designated. The Norfolk Barbastelle Study Group be approached for data.;

Specialist local wildlife groups could be approached for local records, including Norfolk Barbastelle Study Group;

When selecting the onshore cable route, significant impacts on statutory and non-statutory designated sites should be avoided wherever possible, and where impacts cannot be avoided, appropriate mitigation or compensation put in place;

Consideration should also be given to securing biodiversity net gain

(c) Landscape Comments

3.7. Suitable methodology has been proposed for the SLVIA (Seascape, Landscape ad Visual Impact Assessment) including best practise guidance from The Landscape Institute with the Institute of Environmental Management and Assessment (2013).

Guidelines for the Assessment of Landscape and Visual Impacts, Third Edition (GLVIA3) and Landscape and Seascape Character Assessments published by Natural England and the Department for Environment, Food and Rural Affairs (2014).

3.8. The study area has not currently been defined but should reflect best practise and ensure that where potential long distance views are possible, the study area is enlarged to reflect this. This will be particularly pertinent in areas of low-lying topography where the landscape will allow broad views across large expanses of landscape and seascape.

3.9. Suitable data sources have been identified to source Landscape Character Areas and information about smaller designated and important landscape. No mention is made of the 'Seascape character area assessment: East Inshore and East Offshore marine plan areas' produced by the Marine Management Organisation, this may be useful to refer to when undertaking the seascape element of this assessment. It should also be noted that the Norfolk Coast Area of Outstanding Natural Beauty does run south of Mundesley in a small separate section.

3.10. The identified visual receptors appear broadly correct for during construction, operation and decommissioning. Suitable mitigation should be proposed to minimise both the visual and landscape impacts, especially to residential and recreational uses, consideration should also be paid to the timing of construction work in relation to the tourism season when visual receptors will increase, giving rise to a much more significant impact.

3.11. Should you have any queries with the above environmental comments (a - c) please contact Emily Smith (Green Infrastructure and Landscape Officer) – email Emily Smith emily.smith2[redacted]

3.12. **(d) Historic Environment**

3.13. The Historic Environment team welcome the approach taken by the applicant's consultants Royal Haskoning in relation to archaeology and the historic environment more generally. We note that approach outlined in the EIA scoping report is similar to that taken for The Vanguard/Boreas scheme and values the inclusion of specialist historic environment survey work in addition to archaeological desk-based assessment and built heritage impact assessment at the EIA stage.

3.14. Our specific comments are as follows:

Paragraph 704, Table 3-15. Row 2, we welcome the recognition that a full NHER search will be required. Non-designated buildings with HER records do not necessarily equate with buildings regarded as local listed by North Norfolk District Council. An NHER record for an undesignated building is not an indicator of its significance;

Paragraph 704, Table 3-15, Row 4. The Existing archaeological studies and published sources should also include the archaeological assessment carried

out in relation to the Hornsea 3 onshore cable route;

Paragraph 705, Table 3-16, Row 3 and Paragraphs 706 and 707. We welcome the recognition that geophysical and trial trenching will be required at the pre-consent stage and recommend that Norfolk County Council Environment Service historic environment strategy and advice team are consulted at the earliest stage regarding the areas to be targeted;

Paragraph 708. Needs to include reference to *Standards for Development-led Archaeological Projects in Norfolk* (see below);

Paragraph 709. We would expect historic map regression to cover all of the onshore project boundary;

Paragraph 710. We assume that the Aerial Photographic and LiDAR assessment and the Geoarchaeological desk-based review will cover all of the onshore project boundary;

Paragraph 710. The Geoarchaeological desk-based review needs to also take into account NHER data relating to finds of Palaeolithic date and include an assessment of potential and impact assessment relating specifically to Palaeolithic archaeology.

3.15. Should you have any queries with the above historic environment comments please contact John Percival (Historic Environment – Senior Officer Strategy and Advice) - email John Percival john.percival@[redacted]

3.16. Norfolk County Council introduced *Standards for Development-led Archaeological Projects in Norfolk* and a new historic environment strategy and advice charging schedule on 1 May 2018. Please visit https://www.norfolk.gov.uk/libraries-local-history-and-archives/archaeology-and-historic-environment/planning-and-the-historic-environment for copies.

4. Economy and Skills

4.1. It would be helpful if the EIA/PEIR could provide accurate figures of those likely to be employed during construction of the wind scheme, both in terms of the onshore and offshore work force. There should also be a statement as to whether the labour would be sourced from local firms or from further afield as well as consideration of using local supply chains during the construction phase. There needs to be an indication of the likely numbers employed in the longer term once the extended wind farm is in operation i.e. how many jobs will there be in the operations and maintenance of the scheme.

4.2. While Norfolk County Council recognises the likely economic and environmental benefits arising from the proposed extended wind farms, it is felt that the EIA should consider the wider education, skills and employment opportunities during and after construction of the scheme. The County Council would therefore suggest that the

applicant develops an Education; Skills and Employment Strategy which will form part of the DCO application to address the above issues. Such strategies have been taken forward with other NSIPs covering, for example, the offshore wind energy sector developments.

4.3. Should you have any queries with the above comments please contact the Norfolk County Council's Economic Development Manager – David Dukes david.dukes[redacted] and/or the Employment and Skills Manager - Jan Feeney jan.feeney[redacted]

5. Lead Local Flood Authority (LLFA)

5.1. The LLFA strongly recommend that any EIA includes Flood Risk Assessments (FRA's) and surface water drainage strategies that address

- Local sources of flood risk, including those from ordinary watercourses, surface runoff and groundwater
- How surface water drainage will be managed on the substation sites and show compliance with the written Ministerial Statement HCWS 161 by ensuring that Sustainable Drainage Systems for the management of run-off are put in place.
- Post construction ground levels not disrupting current overland flow routes along and across the alignment of the proposed underground cables for land at risk of flooding.
- Temporary arrangements to maintain overland flow paths that cross the alignment of the proposed underground cables for land at risk of flooding.
- The requirement to seek consent from Norfolk County Council (NCC) for works that affect the flow in ordinary watercourses outside of the control of an IDB.

5.2. This supporting information would assess the potential for the development to increase the risk of flooding from the proposal or how surface water runoff through the addition of hard surfaces. It will show how this will be managed to ensure that the development does not increase flood risk on the site or elsewhere, in line with National Planning Policy Framework (paragraph 103).

In this particular case this would include appropriate information on:

- Sustainable Drainage Systems (SuDS) proposals in accordance with appropriate guidance including "Non-statutory technical standards for sustainable drainage systems" March 2015 by Department for Environment, Food and Rural Affairs.

5.3. With particular reference to Section 3.2 Water Resources and Flood Risk, the LLFA welcome that the Scoping report indicates that Flood Risk Assessments (FRA's) will be undertaken and we recommend these will be based on the requirements of the National Planning Policy Framework (NPPF) and in line with Planning Practice Guidance (PPG).

5.4. The LLFA also welcome that the applicant indicates that the FRA will inform the identification of any required mitigation measures. These should include drainage strategies and we recommend that appropriate SUDS features are included in the design assessment of the proposed development in accordance with policy guidelines.

5.5. Once the potential sites for the Substation and route location for the cables have been finalised we would expect a drainage strategy to assess and justify compliance with the SuDS hierarchy for surface water disposal location. This would include:

- Demonstration of infiltration testing completed to BRE365 requirements or equivalent (including 3 infiltration tests in quick succession at each location tested, each location would be representative across the site and be at depths anticipated to be used on site). A description of where any infiltration is anticipated to be used in full or partially drained SuDS components within a strategy.
- If site wide infiltration is not appropriate due to unfavourable rates, demonstration with evidence as to why there cannot be a connection made to the nearest watercourse.
- As a final option, demonstration with evidence that Anglian Water would accept a connection to a surface water sewer.

5.6. The drainage strategy should also contain a maintenance and management plan detailing the activities required and details of who will adopt and maintain the all the surface water drainage features for the lifetime of the development.

We note the following constraints from the scoping report and welcome these considerations that are applicable to Flood and Water Management issues:

- Proximity to residential properties,
- Proximity to Source Protection Zones (SPZ),
- Flood risk,
- Minimise requirement for complex crossing arrangements, e.g. road, river, rail and other pipeline crossings,
- Other infrastructure

5.7. Further to the criteria mentioned above the LLFA note the flowing settlements have historical flooding issues and are likely to be sensitive to disruptions to the wider drainage networks:

North Walsham – Drains to the North east (North Walsham and Dilham Canal) and South West (Skeyton Beck); and

Dereham – Drains to the East (via Dereham Stream to Wending Beck).

5.8. Generally, any proposed cable route will likely cross watercourses within the catchments of the River Yare, the River Bure and the River Wensum. There are significant lengths of potentially affected Watercourses in the search area that are controlled by the Norfolk Rivers IDB for which they will need to be consulted on separately.

5.9. Please note, if there are any works proposed as part of this application that are likely to affect flows in an ordinary watercourse outside of the IDB areas, then the applicant is likely to need the approval of the County Council. In line with good practice, the Council seeks to avoid culverting, and its consent for such works will not normally be granted except as a means of access. It should be noted that this approval is separate from planning. The LLFA would appreciate the applicant advising Norfolk County Council's Water Management team, as soon as practicable, the approximate number of crossings of Ordinary Watercourses and the required timeframes for approval. This will enable us to have adequate staffing resources in place to ensure approvals are not unduly delayed. Please be aware that it takes up to 8 weeks for a consent to be processed. The Flood and Water management team are happy to engage in this process prior to application, and now offer a chargeable Pre-App service.

5.10. The LLFA would advise the applicant that the CIRA SuDS Manual C697 (2007) has recently been updated, report C753 (2015) is now available free on the CIRIA website. We expect any information submitted after 12 March 2016 to use the 2015 SuDS Manual.

On the 19th February 2016, the Environment Agency updated the guidance on climate change allowances for peak river flow and rainfall intensity. The information for the Anglian Region and transitional arrangements for use within the planning process can be found at https://www.gov.uk/guidance/flood-risk-assessments-climate-change-allowances. We highlight that peak river flow climate change allowances should be considered for ordinary watercourses as well as main rivers.

Please also note that The LLFA guidance has been updated, and that the advice to use FSR rainfall information if the critical storm duration is less than 1 hour has been removed. Only up to date FEH data will be requested in the future.

5.11. Further guidance for developers can be found on our website at https://www.norfolk.gov.uk/rubbish-recycling-and-planning/flood-and-water-management/information-for-developers

5.12. If you have any further queries please contact Lucy Perry (Flood Risk Officer) email llfa@[redacted]

6. Minerals and Waste

6.1 Norfolk County Council in its capacity as the Mineral and Waste Planning Authority for Norfolk has the following comments to make on EIA scoping report for the Dudgeon and Sheringham Shoal Offshore Wind Farm Extensions.

6.2 **Local planning policies and designations** - The adopted Norfolk Minerals and Waste Core Strategy and Development Management Policies DPD and the Minerals and Waste Site Specific Allocations DPDs are relevant local planning policies and should be taken into account throughout the project.

6.3 **3.1.2.1 Potential impacts during construction**
Paragraph 582.
The recognition of the potential for direct impacts to Mineral Safeguarding Areas is welcomed.

6.4 **3.1.2.2 Potential impacts during operation**
Paragraph 586.
The recognition of the potential for direct impacts to Minerals Safeguarding Areas is welcomed.

6.5 **Table A1-14**
The inclusion of the NPS requirements EN-1-5.10.9 and EN-5.14.6 regarding mineral safeguarding and waste are welcomed.

6.6 To ensure mineral safeguarding is appropriately taken into account, the ES should consider how a methodology can be put in place for the reuse of suitable materials extracted as part of the cable construction phases.

6.6 Should you have any queries with the above comments please contact Richard Drake (Senior Planner Minerals and Waste Policy) on [redacted] or email on richard.drake@[redacted]

Terry, Hannah

From: Geoff Lyon <Geoff.Lyon@[redacted]
Sent: 06 November 2019 18:12
To: SADEP
Subject: EN010109 - Dudgeon and Sheringham Shoal Offshore Wind Farm Extensions - EIA Scoping Notification and Consultation

Dear Hannah Terry

RE: EN010109 - Dudgeon and Sheringham Shoal Offshore Wind Farm Extensions - EIA Scoping Notification and Consultation

Thank you for notifying North Norfolk District Council (NNDC) in respect of a scoping consultation for application by Equinor New Energy Limited (the Applicant) for an Order granting Development Consent for the Dudgeon and Sheringham Shoal Offshore Wind Farm Extensions (the Proposed Development).

Whilst NNDC would have liked to have been able to provide more detailed comments in respect of this scoping consultation, resource limitations and other work pressures and priorities have prevented us from doing so. However, NNDC has committed to taking an active part in NSIP examination process and has done so with previous offshore windfarm projects including Ørsted Hornsea Project Three and Vattenfall Vanguard as well as the upcoming Vattenfall Boreas Project.

North Norfolk District Council is fully supportive of the principle of renewable energy development in helping to tackle the challenges faced by climate change. NNDC recognises the national importance of having a balanced supply of electrical generation including increasing renewable energy supplies from offshore turbines in helping decarbonise the UK's energy sector. At a local level NNDC has made a significant contribution of its own through, amongst other things, the grant of planning permission for in excess of 150MW capacity of solar farms, with electrical output capable of powering over 40,000 homes, in North Norfolk.

Whilst recognising the national importance of Dudgeon and Sheringham Shoal Offshore Wind Farm Extensions, North Norfolk District Council believes it is essential to ensure that key design and construction decisions do not result in unacceptable or adverse impacts on residents or businesses within North Norfolk, acknowledging the important contribution that agriculture and tourism plays in the economic prosperity of the District underpinned by the nationally and internationally recognised coast, landscape and biodiversity interests as well as significant heritage assets that help define the unique character of the area.

In gathering the evidence needed to support the application for the Dudgeon and Sheringham Shoal Offshore Wind Farm Extensions, it is noted that reference is made to landscape data in the form of the North Norfolk Landscape Character Assessment at Table 4.2 (page 191 of 310). It is important that the applicant refers to the most up to date landscape evidence for North Norfolk and this should be the new North Norfolk Landscape Character Assessment and a new Landscape Sensitivity Assessment which provide the most up to date evidence in accordance with best practice. These documents will be adopted as SPD before the Dudgeon and Sheringham Shoal Offshore Wind Farm Extensions NSIP application is submitted. Copies of these documents are available on the Council's website here.

The applicant is due to meet with NNDC on 28 Nov 2019 where the project will be discussed in more detail.

Kind Regards

Geoff Lyon
Major Projects Manager

Geoff Lyon
Major Projects Manager
[redacted]



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North Norfolk District Council
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Think before you ink - do you really need to print this?

Sheringham Shoal & Dudgeon Extension project

Scoping Report response from **Oulton Parish Council**

Oulton Parish Council (OPC) has been active in responding to the **Orsted Hornsea Three** project and the **Vattenfall Norfolk Vanguard** project both during consultation and during the Examination process. OPC is also about to participate in the Examination for Vattenfall's **Norfolk Boreas**.

Oulton will be significantly adversely impacted by these projects for the following reasons:

Orsted Hornsea Three will have its **Main Construction Compound** on the former airfield in Oulton for the duration of the construction process (an 8-year window) and will see all construction materials and cable drums for the project delivered into and then out of the compound to the cable route by HGVs and abnormal loads.

Vattenfall Norfolk Vanguard and Boreas cable route will go through the southern part of the village and will incorporate a **Mobilisation Area (construction compound)** *and* the **Cable Logistic Area** for the whole project**.**

The cumulative impacts from these projects are many, but include the fact that both projects will be using the same access route **B1149/The Street** and at potentially the same time, thus the HGV/other vehicle impact will be huge.

Orsted 118 HGVs & 130 other vehicles daily
Vattenfall 96 HGVs & 80 other vehicles daily

Oulton Parish Council therefore have grave concerns about the addition of yet another project – **Sheringham Shoal and Dudgeon Extension** - routing their cable corridor through the village with the inevitability of further cumulative impacts, especially from traffic.

Oulton Parish Council wish to highlight these main concerns…

Traffic and transport (project in isolation and cumulative with other projects)
Noise from traffic and construction (project in isolation and cumulative with other projects)
Air quality (increased pollution from HGVs in isolation and cumulative with other projects)
The possibility of yet another construction compound in the village.
Impact on potential sensitive receptors (those exposed to increased traffic along access routes)
Cumulative impact with existing intensive farm traffic in the area, including oversized farm vehicles during harvest periods on rural roads meeting increased numbers f HGVs.
Night time working (Noise and light pollution)
Protracted period of construction traffic forced onto the local community yet again, currently 8-10 years with existing projects.
Residents' physical wellbeing and mental health from extended construction periods.
Road closures and/or diversions
Emergency vehicle response times.

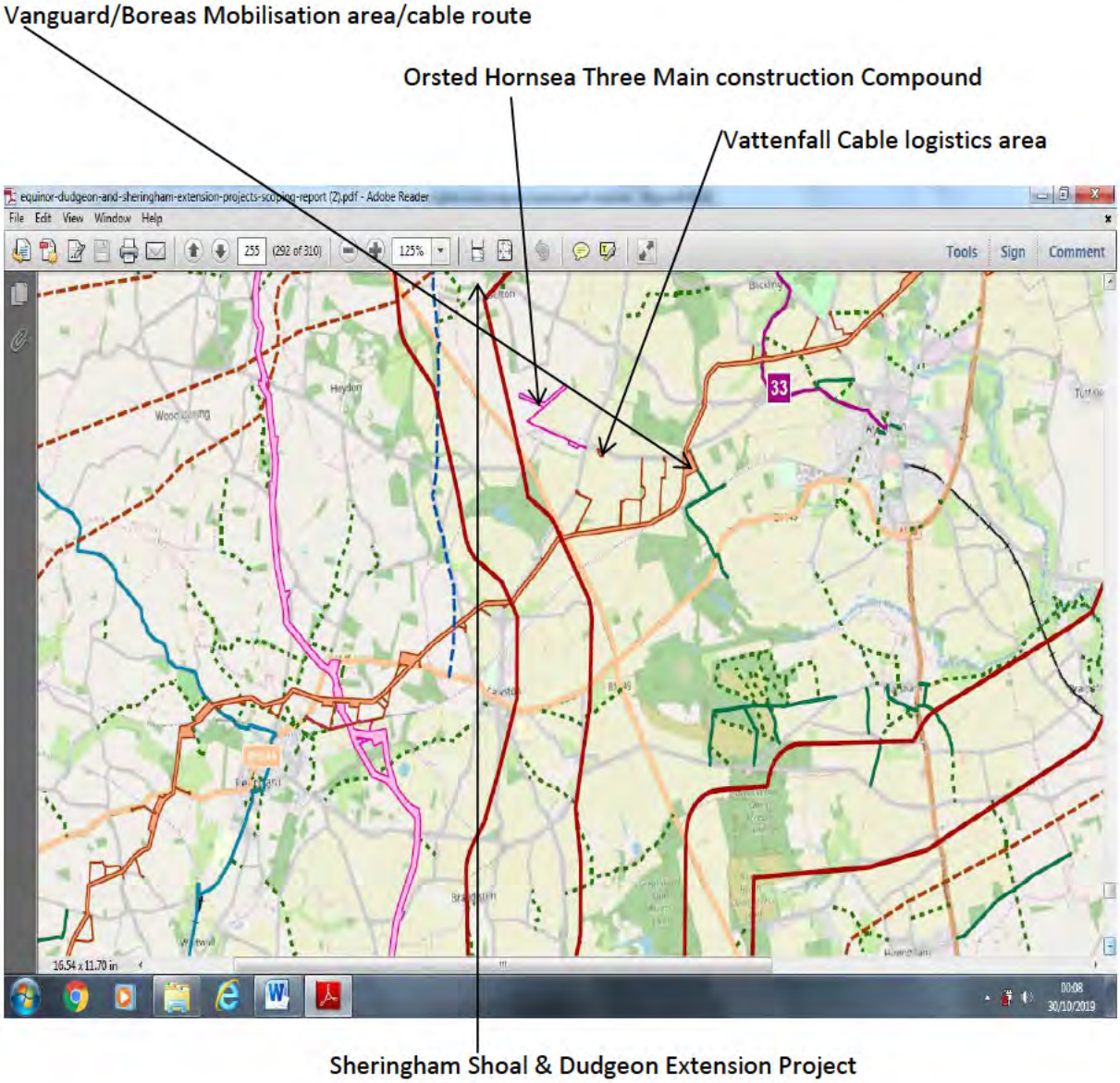
The Scoping Report states:
"The construction access strategy will seek to direct the majority of Heavy Goods Vehicle (HGV) movements via the 'A' road network."

However, the cable route proposed will clearly be accessed mostly by 'B' roads and unclassified roads.

Early consultation with NCC Highways and District Councils, as well as with Parish Councils, will be essential, as these are the bodies with local knowledge and specific concerns.

Please see cumulative impact map below.

Cumulative impact map Orsted Hornsea Three, Vattenfall Norfolk Vanguard/Boreas and Sheringham Shoal and Dudgeon Extension Project....OULTON



Terry, Hannah

From: clerkplumsteadparishcouncil@[redacted]
Sent: 05 November 2019 09:49
To: SADEP
Cc: clerkplumsteadparishcouncil@[redacted]
Subject: Re: EN010109 - Dudgeon and Sheringham Shoal Offshore Wind Farm Extensions - EIA Scoping Notification and Consultation

Follow Up Flag: Follow up
Flag Status: Flagged

Dear Sir/Madam,

Your Ref: EN010109-000007

Planning Act 2008 and The Infrastructure Planning (Environmental Impact Assessment) Regulations 2017 (the EIA Regulations) – Regulations 10 and 11

Application by Equinor New Energy Limited (the Applicant) for an Order granting Development Consent for the Dudgeon and Sheringham Shoal Offshore Wind Farm Extensions (the Proposed Development)

Scoping consultation and notification of the Applicant's contact details and duty to make available information to the Applicant if requested

Further to your email dated 9 October, Plumstead Parish Council wishes to make the following comments regarding the above Application.

1 Plumstead Parish Council is in favour of offshore wind farms as a source of renewable energy.

2 Councillors are concerned about the severe environmental impact of multiple operations to bury cables to link with the National Grid.

We already have Hornsea 3 Cables passing through Edgefield. Hence there is the likelihood of major disruption over a very long period. These projects should be combined with the National Grid taking the lead.

3 Councillors are in favour of the proposal to create a 'ring main' to which the various wind farms would connect and landfall would be confined to perhaps two sites. There should be sufficient capacity to allow for future expansion of the wind farms in the North Sea.

Councillors appreciate that there may be a financial cost but it would be consistent with the overall environmental aims.

Yours faithfully

Carolyn Price
Clerk
On behalf of Plumstead Parish Council

Carolyn Price
Clerk ~ Plumstead Parish Council
Tel: [redacted]

From: SADEP <sadep@planninginspectorate.gov.uk>
Sent: 09 October 2019 15:44
To: SADEP <sadep@planninginspectorate.gov.uk>
Subject: EN010109 - Dudgeon and Sheringham Shoal Offshore Wind Farm Extensions - EIA Scoping Notification and Consultation

Dear Sir/Madam

Please see attached correspondence on the proposed Dudgeon and Sheringham Shoal Offshore Wind Farm Extensions.

Please note the deadline for consultation responses is **06 November 2019**, and is a statutory requirement that cannot be extended.

Kind regards,

Ifan Gwilym
Cynghorydd AEA a Hawliau Tîr | EIA and Land Rights Advisor
Cyfarwyddiaeth Gwaith Achos Mawr| Major Casework Directorate
Yr Arolygiaeth Gynllunio | The Planning Inspectorate

Temple Quay House, Temple Quay, Bristol BS1 6PN
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www.gov.uk/government/organisations/planning-inspectorate (Yr Arolygiaeth Gynllunio // The Planning Inspectorate)
Twitter: @PINSgov



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Public Health England

Environmental Hazards and Emergencies Department
Centre for Radiation, Chemical and Environmental Hazards (CRCE)
Seaton House
City Link
London Road
Nottingham NG2 4LA

nsipconsultations@phe.gov.uk

www.gov.uk/phe

Your Ref: EN010109-000007
Our Ref: 52293CIRIS

Ms Hannah Terry
The Planning Inspectorate
Major Casework Directorate
Temple Quay House
2 The Square
Bristol BS1 6PN

1st November 2019

Dear Ms Terry

Nationally Significant Infrastructure Project
Dudgeon and Sheringham Shoal Offshore Wind Farm Extensions
Scoping Consultation Stage

Thank you for including Public Health England (PHE) in the scoping consultation phase of the above application. Advice offered by PHE is impartial and independent.

PHE exists to protect and improve the nation's health and wellbeing and reduce health inequalities; these two organisational aims are reflected in the way we review and respond to Nationally Significant Infrastructure Project (NSIP) applications.

The health of an individual or a population is the result of a complex interaction of a wide range of different determinants of health, from an individual's genetic make-up, to lifestyles and behaviours, and the communities, local economy, built and natural environments to global ecosystem trends. All developments will have some effect on the determinants of health, which in turn will influence the health and wellbeing of the general population, vulnerable groups and individual people. Although assessing impacts on health beyond direct effects from for example emissions to air or road traffic incidents is complex, there is a need to ensure a proportionate assessment focused on an application's significant effects.

Having considered the submitted scoping report we wish to make the following specific comments and recommendations:

Environmental Public Health
We understand that the promoter will wish to avoid unnecessary duplication and that many issues including air quality, emissions to water, waste, contaminated land etc. will be covered elsewhere in the Environmental Statement (ES). We believe the summation of relevant issues into a specific section of the report provides a focus which ensures that public health is given adequate consideration. The section should summarise key information, risk assessments, proposed mitigation measures, conclusions and residual impacts, relating to human health. Compliance with

the requirements of National Policy Statements and relevant guidance and standards should also be highlighted.

In terms of the level of detail to be included in an ES, we recognise that the differing nature of projects is such that their impacts will vary. The attached appendix summarises PHE's requirements and recommendations regarding the content of and methodology used in preparing the ES. Please note that where impacts relating to health and/or further assessments are scoped out, promoters should fully explain and justify this within the submitted documentation.

Recommendation
Our position is that pollutants associated with road traffic or combustion, particularly particulate matter and oxides of nitrogen are non-threshold; i.e., an exposed population is likely to be subject to potential harm at any level and that reducing public exposures of non-threshold pollutants (such as particulate matter and nitrogen dioxide) below air quality standards will have potential public health benefits. We support approaches which minimise or mitigate public exposure to non-threshold air pollutants, address inequalities (in exposure), maximise co-benefits (such as physical exercise). We encourage their consideration during development design, environmental and health impact assessment, and development consent.

Electro-magnetic Fields (EMF)
Given the nature of the development, we recommend that particular attention is paid to the EMF section in the Appendices below.

Yours sincerely

For and on behalf of Public Health England
nsipconsultations@phe.gov.uk

Please mark any correspondence for the attention of National Infrastructure Planning Administration.

Appendix: PHE recommendations regarding the scoping document

Introduction

The Planning Inspectorate's Advice Note 11: Working with Public Bodies covers many of the generic points of interaction relevant to the Planning Inspectorate and Public Health England (PHE). The purpose of this Annex is to help applicants understand the issues that PHE expect to see addressed by applicants preparing an Environmental Statement (ES) as part of their Nationally Significant Infrastructure Planning (NSIP) submission

We have included a comprehensive outline of the type of issues we would expect to be considered as part of an NSIP which falls under the Infrastructure Planning (Environmental Impact Assessment) Regulations 2017 (the EIA Regulations). PHE encourages applicants to contact us as early in the process as possible if they wish to discuss or clarify any matters relating to chemical, poison, radiation or wider public health.

General Information on Public Health England

PHE was established on 1 April 2013 to bring together public health specialists from more than 70 organisations into a single public health service. We are an executive agency of the Department of Health and are a distinct delivery organisation with operational autonomy to advise and support government, local authorities and the National Health Service (NHS) in a professionally independent manner.

We operate from 8 local centres, plus an integrated region and centre for London, and 4 regions (North of England, South of England, Midlands and East of England, and London). We work closely with public health professionals in Wales, Scotland and Northern Ireland, and internationally.[1] We have specialist teams advising on specific issues such as the potential impacts of chemicals, air quality, ionising and non-ionising radiation and other factors which may have an impact on public health, as well as on broader issues such as the wider determinants of health, health improvement and health inequalities.

PHE's NSIP related roles and responsibilities and geographical extent

PHE is a statutory consultee in the NSIP process for any *applications likely to involve chemicals, poisons or radiation which could potentially cause harm to people and are likely to affect significantly public health*.[2] PHE will consider the potential significant effects (direct and indirect) of a proposed development on population and human health and the impacts from chemicals, radiation and environmental hazards.

Under certain circumstances PHE may provide comments on ionising radiation to/on behalf of the Scottish Parliament. If a proposer is submitting a planning application in Scotland which may require advice on radiation you are recommended to contact the appropriate Scottish Planning Authority for advice on how to proceed.

In the case of applications in Wales, PHE remains a statutory consultee but the regime applies to a more limited range of development types. For NSIP applications likely to affect land in Wales, an applicant should still consult PHE but, additionally will be required to consult the Welsh Ministers.

Role of Public Health England and NSIP with respect to Environmental Impact Assessments

PHE has a statutory role as a consultation body under the EIA Regulations. Where an applicant has requested a scoping opinion from the Planning Inspectorate[3] in relation to a proposed NSIP, PHE will be consulted by the Planning Inspectorate about the scope, and level of detail, of the information to be provided in the ES and will be under a duty to make information available to the applicant. PHE's standard recommendations in response to EIA scoping consultations are below.

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[1] https://www.gov.uk/government/organisations/public-health-england/about#priorities

[2] The Infrastructure Planning (Interested Parties and Miscellaneous Prescribed Provisions) Regulations 2015

[3] The scoping process is administered and undertaken by the Planning Inspectorate on behalf of the Secretary of State

PHE also encourages applicants to discuss with them the scope of the ES at an early stage to explore, for example, whether careful site selection or other design issues could minimise or eliminate public health impacts or to outline the requirement for, scope and methodology of any assessments related to public health.

PHE's recommendations to applicants regarding Environmental Impact Assessments
General approach

Applicants are reminded that Section 5(2)(a) of the Infrastructure Planning (Environmental Impact Assessment) Regulations 2017 specifically includes a requirement that the EIA must identify, describe and assess in an appropriate manner, in light of each individual case, the direct and indirect significant effects of the proposed development on population and human health.

PHE is of the opinion that this requirement encompasses the wider determinants of public health, as well as chemicals, poisons and radiation. Further information on PHE's recommendations and requirements is included below.

It is the role of the applicant to prepare the ES. PHE provides advice relating to EIA within this document and during the NSIP consultation stages.

When preparing an ES the applicant should give consideration to best practice guidance such as the Government's Handbook for scoping projects: environmental impact assessment[4] , IEMA Guide to Delivering Quality Developments[5], and Guidance: on Environmental Impact Assessment[6]

The Planning Inspectorate's Advice Note Seven: Environmental Impact Assessment: Process, Preliminary Environmental Information and Environmental Statements also provide guidance to applicants and other persons with interest in the EIA process as it relates to NSIPs.
It is important that the submitted ES identifies and assesses the potential public health impacts of the activities at, and emissions from, the development.

PHE understands that there may be separate sections of the ES covering the assessment of impacts on air, land, water and so on, but expects an ES to include a specific section summarising potential impacts on population and health. This section should bring together and interpret the information from other assessments as necessary. The health and population impacts section should address the following steps.

1. Screening: Identify and significant effects.
    a. Summarise the methodologies used to identify health impacts, assess significance and sources of information
    b. Evaluate any reference standards used in carrying out the assessment and in evaluating health impacts (e.g., environmental quality standards)
    c. Where the applicant proposes the 'scoping out' of any effects a clear rationale and justification should be provided along with any supporting evidence.

2. Baseline Survey :
    a. Identify information needed and available, Evaluate quality and applicability of available information
    b. Undertake assessment

[4] https://www.gov.uk/government/publications/handbook-for-scoping-projects-environmental-impact-assessment
[5] [redacted]
[6] https://www.gov.uk/guidance/environmental-impact-assessment#the-purpose-of-environmental-impact-assessment

3. Alternatives:
    a. Identify and evaluate any realistic alternative locations, routes, technology etc.

4. Design and assess possible mitigation
    a. Consider and propose suitable corrective actions should mitigation measures not perform as effectively predicted.

5. Impact Prediction: Quantify and Assess Impacts:
    a. Evaluate and assess the extent of any positive and negative effects of the development. Effects should be assessed in terms of likely health outcomes, including those relating to the wider determinants of health such as socio-economic outcomes, in addition to health outcomes resulting from exposure to environmental hazards. Mental health effects should be included and given equivalent weighting to physical effects.
    b. Clearly identify any omissions, uncertainties and dependencies (e.g., air quality assessments being dependant on the accuracy of traffic predictions)
    c. Evaluate short-term impacts associated with the construction and development phase
    d. Evaluate long-term impacts associated with the operation of the development
    e. Evaluate any impacts associated with decommissioning
    f. Evaluate any potential cumulative impacts as a result of the development, currently approved developments which have yet to be constructed, and proposed developments which do not currently have development consent

6. Monitoring and Audit (not a statutory requirement)
    a. Identify key modelling predictions and mitigation impacts and consider implementing monitoring and audit to assess their accuracy / effectiveness.

Any assessments undertaken to inform the ES should be proportionate to the potential impacts of the proposal, therefore we accept that, in some circumstances particular assessments may not be relevant to an application, or that an assessment may be adequately completed using a qualitative rather than quantitative methodology. In cases where this decision is made, the applicant should fully explain and justify their rationale in the submitted documentation.

Consideration of alternatives (including alternative sites, choice of process, and the phasing of construction) is widely regarded as good practice. Ideally, the EIA process should start at the stage of site selection, so that the environmental merits of practicable alternatives can be properly considered. Where this is undertaken, the main alternatives considered should be outlined in the ES[7].

Human and Environmental Receptors

The applicant should clearly identify the development's location and the location and distance from the development of off-site human receptors that may be affected by emissions from, or activities at, the development. Off-site human receptors may include people living in residential premises; people working in commercial, and industrial premises and people using transport infrastructure (such as roads and railways), recreational areas, and publicly-accessible land.

Identify and consider impacts on residential areas and sensitive receptors (such as schools, nursing homes and healthcare facilities, as well as other vulnerable population groups such as those who are young, older, with disabilities or long-term conditions, or on low incomes) in the area(s) which may be affected by emissions, this should include consideration of any new receptors arising from future development.

[7] DCLG guidance, 1999 http://www.communities.gov.uk/documents/planningandbuilding/pdf/155958.pdf

Consideration should also be given to environmental receptors such as the surrounding land, watercourses, surface and groundwater, and drinking water supplies such as wells, boreholes and water abstraction points.

Impacts arising from Construction and Decommissioning

Any assessment of impacts arising from emissions or activities due to construction and decommissioning should consider potential impacts on all receptors and describe monitoring and mitigation during these phases. Construction and decommissioning will be associated with vehicle movements and cumulative impacts should be accounted for.

We would expect the applicant to follow best practice guidance during all phases from construction to decommissioning to ensure appropriate measures are in place to mitigate any potential negative impact on health from emissions (point source, fugitive and traffic-related) and activities. An effective Construction Environmental Management Plan (CEMP) (and Decommissioning Environmental Management Plan (DEMP)) will help provide reassurance that activities are well managed. The applicant should ensure that there are robust mechanisms in place to respond to any complaints made during construction, operation, and decommissioning of the facility.

Emissions to Air and Water

Significant impacts are unlikely to arise from industrial installations which employ Best Available Techniques (BAT) and which meet regulatory requirements concerning emission limits and design parameters. However, PHE has a number of comments regarding the assessment of emissions from any type of development in order that the ES provides a comprehensive assessment of potential impacts.

When considering a baseline (of existing environmental quality) and in the assessment and future monitoring of impacts these should:

- include appropriate screening assessments and detailed dispersion modelling where this is screened as necessary
- encompass the combined impacts of all pollutants which may be emitted by the development with all pollutants arising from associated development and transport, considered in a single holistic assessment (ie, of overall impacts)
- include Chemical Abstract Service (CAS) numbers alongside chemical names, where referenced in the ES
- consider the construction, operational, and decommissioning phases
- consider the typical operational emissions and emissions from start-up, shut-down, abnormal operation and accidents when assessing potential impacts and include an assessment of worst-case impacts
- fully account for fugitive emissions
- include appropriate estimates of background levels
    - when assessing the human health risk of a chemical emitted from a facility or operation, background exposure to the chemical from other sources should be taken into account
- identify cumulative and incremental impacts (ie, assess cumulative impacts from multiple sources), including those arising from associated development, other existing and proposed development in the local area, and new vehicle movements associated with the proposed development; associated transport emissions should include consideration of non-road impacts (ie, rail, sea, and air)
- include consideration of local authority, Environment Agency, Natural Resources Wales, Defra national network, and any other local site-specific sources of monitoring data
- compare predicted environmental concentrations to the applicable standard or guideline value for the affected medium. Where available, the most recent UK standards for the appropriate media (ie, air, water, and/or soil) and health-based guideline values should be used when quantifying the risk to human health from chemical pollutants
- where UK standards or guideline values are not available, use those recommended by the European Union or World Health Organization:

    - If no standard or guideline value exists, the predicted exposure to humans should be estimated and compared to an appropriate health-based value (eg, a Tolerable Daily Intake or equivalent)
    - This should consider all applicable routes of exposure (eg, include consideration of aspects such as the deposition of chemicals emitted to air and their uptake via ingestion)
- when quantitatively assessing the health risk of genotoxic and carcinogenic chemical pollutants, PHE does not favour the use of mathematical models to extrapolate from high dose levels used in animal carcinogenicity studies to well below the observed region of a dose-response relationship. When only animal data are available, we recommend that the 'Margin of Exposure' (MOE) approach[1] is used
- identify and consider impacts on residential areas and sensitive receptors (such as schools, nursing homes and healthcare facilities) in the area(s) which may be affected by emissions. This should include consideration of any new receptors arising from future development

Whilst screening of impacts using qualitative methodologies is common practice (eg, for impacts arising from fugitive emissions such as dust), where it is possible to undertake a quantitative assessment of impacts then this should be undertaken.

PHE's view is that the applicant should appraise and describe the measures that will be used to control both point source and fugitive emissions and demonstrate that standards, guideline values or health-based values will not be exceeded due to emissions from the installation, as described above. This should include consideration of any emitted pollutants for which there are no set emission limits. When assessing the potential impact of a proposed installation on environmental quality, predicted environmental concentrations should be compared to the permitted concentrations in the affected media; this should include both standards for short and long-term exposure. Further to assessments of compliance with limit values, for non-threshold pollutants (ie, those that have no threshold below which health effects do not occur) the **benefits** of development options which reduce population exposure should be evaluated.

Additional points specific to emissions to air
When considering baseline conditions (of existing air quality) and the assessment and future monitoring of impacts, these should include:
- consideration of impacts on existing areas of poor air quality e.g. existing or proposed local authority Air Quality Management Areas (AQMAs)
- modelling using appropriate meteorological data (i.e. come from the nearest suitable meteorological station and include a range of years and worst-case conditions)
- modelling taking into account local topography, congestion and acceleration
- evaluation of the public health **benefits** of development options which reduce air pollution – even below limit values – as pollutants such as nitrogen dioxide and particulate matter show no threshold below which health effects do not occur.

Additional points specific to emissions to water
When considering baseline conditions (of existing water quality) and the assessment and future monitoring of impacts, these should:
- include assessment of potential impacts on human health and not focus solely on ecological impacts
- identify and consider all routes by which emissions may lead to population exposure (e.g., surface watercourses, recreational waters, sewers, geological routes etc.)
- assess the potential off-site effects of emissions to groundwater (eg, on aquifers used for drinking water) and surface water (used for drinking water abstraction) in terms of the potential for population exposure
- include consideration of potential impacts on recreational users (eg, from fishing, canoeing etc.) alongside assessment of potential exposure via drinking water.

Land Quality

We would expect the applicant to provide details of any hazardous contamination present on site (including ground gas) as part of a site condition report.

Emissions to and from the ground should be considered in terms of the previous history of the site and the potential of the site, once operational, to give rise to issues. Public health impacts associated with ground contamination and/or the migration of material off-site should be assessed[8] and the potential impact on nearby receptors and control and mitigation measures should be outlined.

Relevant areas outlined in the Government's Good Practice Guide for EIA include:

- effects associated with ground contamination that may already exist
- effects associated with the potential for polluting substances that are used (during construction / operation) to cause new ground contamination issues on a site, for example introducing / changing the source of contamination
- impacts associated with re-use of soils and waste soils, for example, re-use of site-sourced materials on-site or offsite, disposal of site-sourced materials offsite, importation of materials to the site, etc.

Waste

The applicant should demonstrate compliance with the waste hierarchy (e.g. with respect to re-use, recycling or recovery and disposal).
For wastes arising from the development the ES should assess:

- the implications and wider environmental and public health impacts of different waste disposal options
- disposal route(s) and transport method(s) and how potential impacts on public health will be mitigated

If the development includes wastes delivered to the installation:

- Consider issues associated with waste delivery and acceptance procedures (including delivery of prohibited wastes) and should assess potential off-site impacts and describe their mitigation

Other aspects

Within the ES, PHE would expect to see information about how the applicant would respond to accidents with potential off-site emissions (e.g., flooding or fires, spills, leaks or releases off-site). Assessment of accidents should: identify all potential hazards in relation to construction, operation and decommissioning; include an assessment of the risks posed; and identify risk management measures and contingency actions that will be employed in the event of an accident in order to mitigate off-site effects.

PHE would expect the applicant to consider the COMAH Regulations (Control of Major Accident Hazards) and the Major Accident Off-Site Emergency Plan (Management of Waste from Extractive Industries) (England and Wales) Regulations: both in terms of their applicability to the development itself, and the development's potential to impact on, or be impacted by, any nearby installations themselves subject to these Regulations.

There is evidence that, in some cases, perception of risk may have a greater impact on health than the hazard itself. A 2009 report[9], jointly published by Liverpool John Moores University and the Health Protection Agency (HPA), examined health risk perception and environmental problems using a number of case studies. As a point to consider, the report suggested: "*Estimation of community anxiety and stress should be included as part of every risk or impact assessment of*

[8] Following the approach outlined in the section above dealing with emissions to air and water i.e. comparing predicted environmental concentrations to the applicable standard or guideline value for the affected medium (such as Soil Guideline Values)
[9] Available from: [redacted]

proposed plans that involve a potential environmental hazard. This is true even when the physical health risks may be negligible." PHE supports the inclusion of this information within ES' as good practice.

Electromagnetic Fields (EMF)

This advice relates to electrical installations such as substations and connecting underground cables or overhead lines. PHE advice on the health effects of power frequency electric and magnetic fields is available on the Gov.UK website.[10]

There is a potential health impact associated with the electric and magnetic fields around substations, overhead power lines and underground cables. The field strengths tend to reduce with distance from such equipment.

The following information provides a framework for considering the health impact associated with the electric and magnetic fields produced by the proposed development, including the direct and indirect effects of the electric and magnetic fields as indicated above.

Policy Measures for the Electricity Industry

A voluntary code of practice is published which sets out key principles for complying with the ICNIRP guidelines.[11]
Companion codes of practice dealing with optimum phasing of high voltage power lines and aspects of the guidelines that relate to indirect effects are also available.[12],[13]

Exposure Guidelines

PHE recommends the adoption in the UK of the EMF exposure guidelines published by the International Commission on Non-ionizing Radiation Protection (ICNIRP). Formal advice to this effect, based on an accompanying comprehensive review of the scientific evidence, was published in 2004 by the National Radiological Protection Board (NRPB), one of PHE's predecessor organisations[14]
Updates to the ICNIRP guidelines for static fields have been issued in 2009 and for low frequency fields in 2010. However, Government policy is that the ICNIRP guidelines are implemented as expressed in the 1999 EU Council Recommendation on limiting exposure of the general public (1999/519/EC):[15]

Static Magnetic Fields

For static magnetic fields, the ICNIRP guidelines published in 2009 recommend that acute exposure of the general public should not exceed 400 mT (millitesla), for any part of the body, although the previously recommended value of 40 mT is the value used in the Council Recommendation. However, because of potential indirect adverse effects, ICNIRP recognises that practical policies need to be implemented to prevent inadvertent harmful exposure of people with implanted electronic medical devices and implants containing ferromagnetic materials, and injuries due to flying ferromagnetic objects, and these considerations can lead to much lower restrictions, such as 0.5 mT.

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[10] https://www.gov.uk/government/collections/electromagnetic-fields#low-frequency-electric-and-magnetic-fields
[11] https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/37447/1256-code-practice-emf-public-exp-guidelines.pdf
[12] https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/48309/1255-code-practice-optimum-phasing-power-lines.pdf
[13] https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/224766/powerlines_vcop_microshocks.pdf
[14] http://webarchive.nationalarchives.gov.uk/20140629102627/http://www.hpa.org.uk/Publications/Radiation/NPRBArchive/DocumentsOfTheNRPB/Absd1502/
[15] http://webarchive.nationalarchives.gov.uk/+/www.dh.gov.uk/en/Publichealth/Healthprotection/DH_4089500

Power Frequency Electric and Magnetic Fields

At 50 Hz, the known direct effects include those of induced currents in the body on the central nervous system (CNS) and indirect effects include the risk of painful spark discharge on contact with metal objects exposed to electric fields. The ICNIRP guidelines published in 1998 give reference levels for public exposure to 50 Hz electric and magnetic fields, and these are respectively 5 kV m^{-1} (kilovolts per metre) and 100 μT (microtesla). The reference level for magnetic fields changes to 200 μT in the revised (ICNIRP 2010) guidelines because of new basic restrictions based on induced electric fields inside the body, rather than induced current density. If people are not exposed to field strengths above these levels, direct effects on the CNS should be avoided and indirect effects such as the risk of painful spark discharge will be small. The reference levels are not in themselves limits but provide guidance for assessing compliance with underlying basic restrictions and reducing the risk of indirect effects.

Long Term Effects

There is concern about the possible effects of long-term exposure to electromagnetic fields, including possible carcinogenic effects at levels much lower than those given in the ICNIRP guidelines. In the NRPB advice issued in 2004, it was concluded that the studies that suggest health effects, including those concerning childhood leukaemia, could not be used to derive quantitative guidance on restricting exposure. However, the results of these studies represented uncertainty in the underlying evidence base, and taken together with people's concerns, provided a basis for providing an additional recommendation for Government to consider the need for further precautionary measures, particularly with respect to the exposure of children to power frequency magnetic fields.

The Stakeholder Advisory Group on ELF EMFs (SAGE)

The Stakeholders Advisory Group on ELF EMF's (SAGE) was set up to explore the implications for a precautionary approach to extremely low frequency electric and magnetic fields (ELF EMFs), and to make practical recommendations to Government:[16]

Relevant here is SAGE's 2007 First Interim Assessment, which makes several recommendations concerning high voltage power lines. Government supported the implementation of low cost options such as optimal phasing to reduce exposure; however it did not support the option of creating corridors around power lines in which development would be restricted on health grounds, which was considered to be a disproportionate measure given the evidence base on the potential long term health risks arising from exposure. The Government response to SAGE's First Interim Assessment is available on the national archive website.[17]

The Government also supported calls for providing more information on power frequency electric and magnetic fields, which is available on the PHE web pages.

Ionising Radiation

Particular considerations apply when an application involves the possibility of exposure to ionising radiation. In such cases it is important that the basic principles of radiation protection recommended by the International Commission on Radiological Protection[18] (ICRP) are followed. PHE provides advice on the application of these recommendations in the UK. The ICRP recommendations are implemented in the Euratom Basic Safety Standards[19] (BSS) and these form the basis for UK legislation, including the Ionising Radiation Regulations 1999, the Radioactive Substances Act 1993, and the Environmental Permitting Regulations 2016.

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[16] [redacted]

[17] http://webarchive.nationalarchives.gov.uk/20130107105354/http://www.dh.gov.uk/en/Publicationsandstatistics/Publications/PublicationsPolicyAndGuidance/DH_107124

[18] These recommendations are given in publications of the ICRP notably publications 90 and 103 see the website at [redacted]

[19] Council Directive 96/29/EURATOM laying down basic safety standards for the protection of the health of workers and the general public against the dangers arising from ionising radiation.

As part of the EIA process PHE expects applicants to carry out the necessary radiological impact assessments to demonstrate compliance with UK legislation and the principles of radiation protection. This should be set out clearly in a separate section or report and should not require any further analysis by PHE. In particular, the important principles of justification, optimisation and radiation dose limitation should be addressed. In addition compliance with the Euratom BSS and UK legislation should be clear.

When considering the radiological impact of routine discharges of radionuclides to the environment PHE would, as part of the EIA process, expect to see a full radiation dose assessment considering both individual and collective (population) doses for the public and, where necessary, workers. For individual doses, consideration should be given to those members of the public who are likely to receive the highest exposures (referred to as the representative person, which is equivalent to the previous term, critical group).

Different age groups should be considered as appropriate and should normally include adults, 1 year old and 10 year old children. In particular situations doses to the fetus should also be calculated[20].

The estimated doses to the representative person should be compared to the appropriate radiation dose criteria (dose constraints and dose limits), taking account of other releases of radionuclides from nearby locations as appropriate. Collective doses should also be considered for the UK, European and world populations where appropriate.

The methods for assessing individual and collective radiation doses should follow the guidance given in 'Principles for the Assessment of Prospective Public Doses arising from Authorised Discharges of Radioactive Waste to the Environment August 2012 [21]

It is important that the methods used in any radiological dose assessment are clear and that key parameter values and assumptions are given (for example, the location of the representative persons, habit data and models used in the assessment).

Any radiological impact assessment, undertaken as part of the EIA, should also consider the possibility of short-term planned releases and the potential for accidental releases of radionuclides to the environment. This can be done by referring to compliance with the Ionising Radiation Regulations and other relevant legislation and guidance.

The radiological impact of any solid waste storage and disposal should also be addressed in the assessment to ensure that this complies with UK practice and legislation; information should be provided on the category of waste involved (e.g. very low level waste, VLLW). It is also important that the radiological impact associated with the decommissioning of the site is addressed.

Of relevance here is PHE advice on radiological criteria and assessments for land-based solid waste disposal facilities[22]. PHE advises that assessments of radiological impact during the operational phase should be performed in the same way as for any site authorised to discharge radioactive waste. PHE also advises that assessments of radiological impact during the post operational phase of the facility should consider long timescales (possibly in excess of 10,000 years) that are appropriate to the long-lived nature of the radionuclides in the waste, some of which may have half-lives of millions of years.

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[20] HPA (2008) Guidance on the application of dose coefficients for the embryo, fetus and breastfed infant in dose assessments for members of the public. Doc HPA, RCE-5, 1-78, available at https://www.gov.uk/government/publications/embryo-fetus-and-breastfed-infant-application-of-dose-coefficients

[21] The Environment Agency (EA), Scottish Environment Protection Agency (SEPA), Northern Ireland Environment Agency, Health Protection Agency and the Food Standards Agency (FSA).
Principles for the Assessment of Prospective Public Doses arising from Authorised Discharges of Radioactive Waste to the Environment August 2012.
https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/296390/geho1202bklh-e-e.pdf

[22] HPA RCE-8, Radiological Protection Objectives for the Land-based Disposal of Solid Radioactive Wastes, February 2009

The radiological assessment should consider exposure of members of hypothetical representative groups for a number of scenarios including the expected migration of radionuclides from the facility, and inadvertent intrusion into the facility once institutional control has ceased.

For scenarios where the probability of occurrence can be estimated, both doses and health risks should be presented, where the health risk is the product of the probability that the scenario occurs, the dose if the scenario occurs and the health risk corresponding to unit dose.

For inadvertent intrusion, the dose if the intrusion occurs should be presented. It is recommended that the post-closure phase be considered as a series of timescales, with the approach changing from more quantitative to more qualitative as times further in the future are considered.

The level of detail and sophistication in the modelling should also reflect the level of hazard presented by the waste. The uncertainty due to the long timescales means that the concept of collective dose has very limited use, although estimates of collective dose from the 'expected' migration scenario can be used to compare the relatively early impacts from some disposal options if required.

Wider Determinants of Health

World Health Organization (WHO's) defines health as "a state of complete physical, mental and social well-being and not merely an absence of disease or infirmity" (WHO, 1948).

The health of an individual or a population is the result of a complex interaction of a wide range of different determinants of health, from an individual's genetic make-up, to lifestyles and behaviours, and the communities, local economy, built and natural environments to global ecosystem trends. All developments will have some effect on the determinants of health, which in turn will influence the health and wellbeing of the general population, vulnerable groups and individual people.



Barton and Grant[23]

PHE recognises that evaluating an NSIP's impacts on health through the wider determinants is more complex than assessing a project's direct impacts against clearly defined regulatory protections (e.g. protected species). However, this does not mean that their assessment should be side-lined; with the 2017 EIA Regulations clarifying that the likely significant effects of a development proposal on human health must be assessed.

We accept that the relevance of these topics and associated impacts will vary depending on the nature of the proposed development and in order to assist applicants PHE has focused its approach on scoping determinants of health and wellbeing under four themes, which have been derived from an analysis of the wider determinants of health mentioned in the National Policy Statements. PHE

[23] Barton H, Grant M. A health map for the local human habitat. The Journal of the Royal Society for the Promotion of Health 2006; 126(6): 252-3.

has developed a list of 21 determinants of health and wellbeing under four broad themes, which have been derived from an analysis of the wider determinants of health mentioned in the National Policy Statements (NPS). If the applicant proposes to scope any areas out of the assessment, they should provide clear reasoning and justification.

The four themes are:
- Access
- Traffic and Transport
- Socioeconomic
- Land Use

Methodology

PHE will expect assessments to set out the methodology used to assess each determinant included in the scope of the assessment. In some instances, the methodologies described may be established and refer to existing standards and/or guidance. In other instances, there may be no pre-defined methodology, which can often be the case for the wider determinants of health; as such there should be an application of a logical impact assessment method that:

- identifies effected populations vulnerable to impacts from the relevant determinant
- establishes the current baseline situation
- identifies the NSIP's potential direct and indirect impacts on each population
- if impacts are identified, evaluates whether the potential impact is significant in relation to the affected population
- identifies appropriate mitigation to minimise impacts or the subsequent effects on health
- identifies opportunities to achieve benefits from the scheme
- identifies appropriate monitoring programmes

Currently there is no standard methodology for assessing the population and human health effects of infrastructure projects, but a number of guides exist, including:

- Institute of Environmental Management and Assessment, 2017: Health in Environmental Assessment, a primer for a proportionate approach;
- NHS London Healthy Urban Development Unit (HUDU), 2015. Healthy Urban Planning Checklist and Rapid Health Impact Assessment Tool;
- Wales Health Impact Assessment Unit, 2012: HIA a practical guide;
- National Mental Wellbeing Impact Assessment Development Unit 2011: Mental Wellbeing Impact Assessment Toolkit;

Determining Significant Effects

Neither the EIA regulations nor the National Policy Statements provide a definition of what constitutes a 'significant' effect, and so PHE have derived a list of factors which it will take into consideration in the assessment of significance of effects, as outlined below. these list of factors should be read in conjunction with guidance from the above guides.

1. Sensitivity:
Is the population exposed to the NSIP at particular risk from effects on this determinant due to pre-existing vulnerabilities or inequalities (for example, are there high numbers in the local population of people who are young, older, with disabilities or long-term conditions, or on a low income)? Will the NSIP widen existing inequalities or introduce new inequalities in relation to this determinant?

2. Magnitude:
How likely is the impact on this determinant to occur? If likely, will the impact affect a large number of people / Will the impact affect a large geographic extent? Will the effects be frequent or continuous? Will the effects be temporary or permanent and irreversible?

3. Cumulative effects:

Will the NSIP's impacts on this determinant combine with effects from other existing or proposed NSIPs or large-scale developments in the area, resulting in an overall cumulative effect different to that of the project alone?
What are the cumulative effects of the impacts of the scheme on communities or populations. Individual impacts individually may not be significant but in combination may produce an overall significant effect.

4. Importance:
Is there evidence for the NSIP's effect on this determinant on health? Is the impact on this determinant important in the context of national, regional or local policy?

5. Acceptability:
What is the local community's level of acceptance of the NSIP in relation to this determinant? Do the local community have confidence that the applicants will promote positive health impacts and mitigate against negative health effects?

6. Opportunity for mitigation:
If this determinant is included in the scope for the EIA is there an opportunity to enhance any positive health impacts and/or mitigate any negative health impacts?

Scoping

The scoping report may determine that some of the wider determinants considered under human and population health can be scoped out of the EIA. If that, should be the case, detailed rationale and supporting evidence for any such exclusions must be provided. PHE will expect an assessment to have considered all of the determinants listed in Table1 of Appendix 1 as a minimum.

Vulnerable Groups

Certain parts of the population may experience disproportionate negative health effects as a result of a development. Vulnerable populations can be identified through research literature, local population health data or from the identification of pre-existing health conditions that increase vulnerability.

The on health and wellbeing and health inequalities of the scheme will have particular effect on vulnerable or disadvantaged populations, including those that fall within the list of protected characteristics. Some protected groups are more likely to have elevated vulnerability associated with social and economic disadvantages. Consideration should be given to language or lifestyles that influence how certain populations are affected by impacts of the proposal, for example non-English speakers may face barriers to accessing information about the works or expressing their concerns.

Equality Impact Assessments (EqIA) are used to identify disproportionate effects on Protected Groups (defined by the Equality Act, 2010), including health effects. The assessments and findings of the Environmental Statement and the EqIA should be crossed reference between the two documents, particularly to ensure the assessment of potential impacts for health and inequalities and that resulting mitigation measures are mutually supportive.

The Wales Health Impact Assessment Support Unit (WHIASU), provides a suggested list of vulnerable groups

Age related groups
• Children and young people
• Older people
Income related groups
• People on low income
• Economically inactive

• Unemployed/workless
• People who are unable to work due to ill health

Groups who suffer discrimination or other social disadvantage
• People with physical or learning disabilities/difficulties
• Refugee groups
• People seeking asylum
• Travellers
• Single parent families
• Lesbian and gay and transgender people
• Black and minority ethnic groups
• Religious groups

Geographical groups
• People living in areas known to exhibit poor economic and/or health indicators
• People living in isolated/over-populated areas
• People unable to access services and facilities

Mental Health

PHE supports the use of the broad definition of health proposed by the World Health Organisation (WHO). Mental well-being is fundamental to achieving a healthy, resilient and thriving population. It und4erpins healthy lifestyles, physical health, educational attainment, employment and productivity, relationships, community safety and cohesion and quality of life. NSIP schemes can be of such scale and nature that will impact on the over-arching protective factors, which are:
• Enhancing control
• Increasing resilience and community assets
• Facilitating participation and promoting inclusion.

There should be parity between mental and physical health, and any assessment of health impact should include the appreciation of both. A systematic approach to the assessment of the impacts on mental health, including suicide, is required. The **Mental Well-being Impact Assessment (MWIA)** could be used as a methodology. The assessment should identify vulnerable populations and provide clear mitigation strategies that are adequately linked to any local services or assets

Perceptions about the proposed scheme may increase the risk of anxiety or health effects by perceived effects. “Estimation of community anxiety and stress should be included as part of every risk or impact assessment of proposed plans that involve a potential environmental hazard.

Evidence Base and Baseline Data

An assessment should be evidence based, using published literature to identify determinants and likely health effects. The strength of evidence identifying health effects can vary, but where the evidence for an association is weak it should not automatically be discounted.

There will be a range of publicly available health data including:

- National datasets such as those from the Office of National Statistics,
- Public Health England (PHE), including the fingertips data sets,
- Non-governmental organisations,
- Local public health reports, such as the Joint Strategic Needs Assessment, Health and Wellbeing Strategies;
- Consultation with local authorities, including local authority public health teams;
- Information received through public consultations

Mitigation

If the assessment has identified that significant negative effects are likely to occur with respect to the wider determinants of health, the assessment should include a description of planned mitigation measures the applicant will implement to avoid or prevent effects on the population.

Mitigation and/or monitoring proposals should be logical, feasible and have a clear governance and accountability framework indicating who will be responsible for implementation and how this will be secured during the construction and/or operation of the NSIP.

Positive Benefits from the Scheme

The scale of many NSIP developments will generate the potential for positive impacts on health and wellbeing; however, delivering such positive health outcomes often requires specific enabling or enhancement measures. For example, the construction of a new road network to access an NSIP site may provide an opportunity to improve the active transport infrastructure for the local community. PHE expects developments to consider and report on the opportunity and feasibility of positive impacts. These may be stand alone or be considered as part of the mitigation measures.

Monitoring

PHE expects an assessment to include consideration of the need for monitoring. It may be appropriate to undertake monitoring where:

- Critical assumptions have been made
- There is uncertainty about whether negative impacts are likely to occur as it may be appropriate to include planned monitoring measures to track whether impacts do occur.
- There is uncertainty about the potential success of mitigation measures
- It is necessary to track the nature of the impact and provide useful and timely feedback that would allow action to be taken should negative impacts occur

How to contact PHE

If you wish to contact us regarding an existing or potential NSIP application please email: nsipconsultations@phe.gov.uk

Appendix 1

Table 1 – Wider determinants of health and wellbeing

Health and wellbeing themes			
Access	Traffic and Transport	Socioeconomic	Land Use
Wider determinants of health and wellbeing			
Access to : • local public and key services and facilities. • Good quality affordable housing. • Healthy affordable food. • The natural environment. • The natural environment within the urban environment. • Leisure, recreation and physical activities within the urban and natural environments.	• Accessibility. • Access to/by public transport. • Opportunities for access by cycling and walking. • Links between communities. • Community severance. • Connections to jobs. • Connections to services, facilities and leisure opportunities.	• Employment opportunities, including training opportunities. • Local business activity. • Regeneration. • Tourism and leisure industries. • Community/social cohesions and access to social networks. • Community engagement.	• Land use in urban and/or /rural settings. • Quality of Urban and natural environments

1) Access

a. Access to local, public and key services and facilities

Access to local facilities can increase mobility and social participation. Body mass index is significantly associated with access to facilities, including factors such as the mix and density of facilities in the area. The distance to facilities has no or only a small effect on walking and other physical activities. Access to recreational facilities can increase physical activity, especially walking for recreation, reduce body weight, reduce the risk of high blood pressure, and reduce the number of vehicle trips, the distances travelled and greenhouse gas emissions.

Local services include health and social care, education, employment, and leisure and recreation. Local facilities include community centres, shops, banks/credit unions and Post Offices. Services and facilities can be operated by the public, private and/or voluntary sectors. Access to services and facilities is important to both physical and mental health and wellbeing. Access is affected by factors such as availability, proximity to people's place of residence, existence of transport services or active travel infrastructure to the location of services and facilities, and the quality of services and facilities.

The construction or operation of an NSIP can affect access adversely: it may increase demand and therefore reduce availability for the existing community; during construction, physical accessibility may be reduced due to increased traffic and/or the blockage of or changes to certain travel routes. It is also possible that some local services and facilities are lost due to the land-take needed for the NSIP.

Conversely if new routes are built or new services or facilities provided the NSIP may increase access. NSIPs relating to utilities such as energy and water can maintain, secure or increase access to those utilities, and thereby support health and wellbeing.

b. Access to good-quality affordable housing

Housing refurbishment can lead to an improvement in general health and reduce health inequalities. Housing improvements may also benefit mental health. The provision of diverse forms and types of housing is associated with increased physical activity. The provision of affordable housing is strongly associated with improved safety perceptions in the neighbourhood, particularly among people from low-income groups. For vulnerable groups, the provision of affordable housing can lead to improvements in social, behavioural and health related outcomes. For some people with long term conditions, the provision of secure and affordable housing can increase engagement with healthcare services, which can lead to improved health-related outcomes. The provision of secure and affordable housing can also reduce engagement in risky health-related behaviours. For people who are homeless, the provision of affordable housing increases engagement with healthcare services, improves quality of life and increases employment, and contributes to improving mental health.

Access to housing meets a basic human need, although housing of itself is not necessarily sufficient to support health and wellbeing: it is also important that the housing is of good quality and affordable. Factors affecting the quality of housing include energy efficiency (eg effective heating, insulation), sanitation and hygiene (eg toilet and bathroom), indoor air quality including ventilation and the presence of damp and/or mould, resilience to climate change, and overcrowding. The affordability of housing is important because for many people, especially people on a low income, housing will be the largest monthly expense; if the cost of housing is high, people may not be able to meet other needs such as the need for heating in winter or food. Some proposals for NSIPs include the provision of housing, which could be beneficial for the health and wellbeing of the local population. It is also possible that some housing will be subject to a compulsory purchase order due to the land-take needed for an NSIP.

c. Access to affordable healthy food

Access to healthy food is related to the provision of public and active transport infrastructure and the location and proximity of outlets selling healthier food such as fruit and vegetables. For the general population, increased access to healthy, affordable food through a variety of outlets (shops, supermarkets, farmers' markets and community gardens) is associated with improved dietary behaviours, including attitudes towards healthy eating and food purchasing behaviour, and improved adult weight. Increased access to unhealthier food retail outlets is associated with increased weight in the general population and increased obesity and unhealthy eating behaviours among children living in low-income areas. Urban agriculture can improve attitudes towards healthier food and increase fruit and vegetable consumption.

Factors affecting access to healthy affordable food include whether it is readily available from local shops, supermarkets, markets or delivery schemes and/or there are opportunities to grow food in local allotments or community gardens. People in

environments where there is a high proportion of fast food outlets may not have easy access to healthy affordable food.

d. Access to the natural environment

Availability of and access to safe open green space is associated with increased physical activity across a variety of behaviours, social connectedness, childhood development, reduced risk of overweight and obesity and improved physical and mental health outcomes. While the quantity of green space in a neighbourhood helps to promote physical activity and is beneficial to physical health, eg lower rates of mortality from cardiovascular disease and respiratory disease in men, the availability of green environments is likely to contribute more to mental health than to physical health: the prevalence of some disease clusters, particularly anxiety and depression, is lower in living environments which have more green space within a 1-km radius.

The proximity, size, type, quality, distribution, density and context of green space are also important factors. Quality of green space may be a better predictor of health than quantity, and any type of green space in a neighbourhood does not necessarily act as a venue for, or will encourage, physical activity. 'Walkable' green environments are important for better health, and streetscape greenery is as strongly related to self-reported health as green areas. Residents in deprived areas are more likely to perceive access to green space as difficult, to report poorer safety, to visit the green space less frequently and to have lower levels of physical activity. The benefits to health and wellbeing of blue space include lower psychological distress.

The natural environment includes the landscape, waterscape and seascape. Factors affecting access include the proximity of the natural environment to people's place of residence, the existence of public transport services or active travel infrastructure to the natural environment, the quality of the natural environment and feelings of safety in the natural environment. The construction of an NSIP may be an opportunity to provide green and/or blue infrastructure in the local area. It is also possible that green or blue infrastructure will be lost due to the land-take needed for the NSIP.

e. **Access to the natural environment within the urban environment**

Public open spaces are key elements of the built environment. Ecosystem services through the provision of green infrastructure are as important as other types of urban infrastructure, supporting physical, psychological and social health, although the quality and accessibility of green space affects its use, C19, ethnicity and perceptions of safety. Safe parks may be particularly important for promoting physical activity among urban adolescents. Proximity to urban green space and an increased proportion of green space are associated with decreased treatment of anxiety/mood disorders, the benefits deriving from both participation in usable green space near to home and observable green space in the neighbourhood. Urban agriculture may increase opportunities for physical activity and social connections.

A view of 'greenery' or of the sea moderates the annoyance response to noise. Water is associated with positive perceptive experiences in urban environments, with benefits for health such as enhanced contemplation, emotional bonding, participation and physical activity. Increasing biodiversity in urban environments, however, may promote the introduction of vector or host organisms for infectious pathogens, eg green connectivity may potentiate the role of rats and ticks in the spread of disease, and bodies of water may provide habitats for mosquitoes. Owing to economic growth, population size and urban and industrial expansion in the EU, to maintain ecosystem services at 2010 levels, for every additional percentage increase in the proportion of 'artificial' land, there needs to be a 2.2% increase in green infrastructure.

The natural environment within the urban environment includes the provision of green space and blue space in towns and cities. Factors involved in access include the

proximity of the green and/or blue space to people's place of residence, the existence of transport services or active travel infrastructure to the green and/or blue space, the quality of the green and/or blue space and feelings of safety when using the green and/or blue space. The construction of an NSIP may be an opportunity to provide green and/or blue infrastructure in the local urban environment. It is also possible that green or blue infrastructure in the urban environment will be lost due to the land-take needed for the NSIP.

f. Access to leisure, recreation and physical activity opportunities within the urban and natural environments.

Access to recreational opportunities, facilities and services is associated with risk factors for long-term disease; it can increase physical activity, especially walking for recreation, reduce body mass index and overweight and obesity, reduce the risk of high blood pressure, and reduce the number of vehicle trips, the distances travelled and greenhouse gas emissions. It can also enhance social connectedness. Children tend to play on light-traffic streets, whereas outdoor activities are less common on high-traffic streets. A perception of air pollution can be a barrier to participating in outdoor physical activity. There is a positive association between urban agriculture and increased opportunities for physical activity and social connectivity. Gardening in an allotment setting can result in many positive physical and mental health-related outcomes. Exercising in the natural environment can have a positive effect on mental wellbeing when compared with exercising indoors.

g. Leisure and recreation opportunities include opportunities that are both formal, such as belonging to a sports club, and informal, such as walking in the local park or wood. Physical activity opportunities include routine activity as part of daily life, such as walking or cycling to work, and activity as part of leisure or recreation, such as playing football. The construction of an NSIP may enhance the opportunities available for leisure and recreation and physical activity through the provision of new or improved travel routes, community infrastructure and/or green or blue space. Conversely, construction may reduce access through the disruption of travel routes to leisure, recreation and physical activity opportunities.

2) Traffic and Transport

a. Accessibility

Walkability, regional accessibility, pavements and bike facilities are positively associated with physical activity and negatively related to body weight and high blood pressure, and reduce the number of vehicle trips, the distances travelled and greenhouse gas emissions. Body mass index is associated with street network accessibility and slope variability.

Accessibility in relation to transport and travel has several aspects including whether potential users can gain physical access to the infrastructure and access to the services the infrastructure provides. The design and operation of transport infrastructure and the associated services should take account of the travel needs of all potential users including people with limited mobility. People whose specific needs should be considered include pregnant women, older people, children and young people and people with a disability. Other aspects of transport infrastructure affecting accessibility include safety and affordability, both of which will affect people's ability to travel to places of employment and/or key local services and facilities and/or access their social networks.

b. Access to / by public transport

Provision of high-quality public transport is associated with higher levels of active travel among children and among people commuting to work, with a decrease in the use of private cars. Combining public transport with other forms of active travel can

improve cardiovascular fitness. Innovative or new public transport interventions may need to be marketed and promoted differently to different groups of transport users, eg by emphasising novelty to car users while ensuring that the new system is seen by existing users as coherently integrated with existing services.

Transport facilitates access to other services, facilities and amenities important to health and wellbeing. Public transport is any transport open to members of the public including bus, rail and taxi services operated by the public, private or community sectors. For people who do not have access to private transport, access to public transport is important as the main agency of travel especially for journeys >1 mile. Access to public transport is not sufficient, however, and access by public transport needs to be taken into account: public transport services should link places where people live with the destinations they need or want to visit such as places of employment, education and healthcare, shops, banks and leisure facilities. Other aspects of access to public transport include affordability, safety, frequency and reliability of services.

c. Opportunities for / access by cycling & walking

Walking and cycling infrastructure can enhance street connectivity, helping to reduce perceptions of long-distance trips and providing alternative routes for active travel. Prioritising pedestrians and cyclists through changes in physical infrastructure can have positive behavioural and health outcomes, such as physical activity, mobility and cardiovascular outcomes. The provision and proximity of active transport infrastructure is also related to other long-term disease risk factors, such as access to healthy food, social connectedness and air quality. The perception of air pollution, however, appears to be a barrier to participating in active travel.

Perceived or objective danger may also have an adverse effect on cycling and walking, both of which activities decrease with increasing traffic volume and speed, and cycling for leisure decreases as local traffic density increases. Health gains from active travel policies outweigh the adverse effects of road traffic incidents. New infrastructure to promote cycling, walking and the use of public transport can increase the time spent cycling on the commute to work, and the overall time spent commuting among the least-active people. Active travel to work or school can be associated with body mass index and weight, and may reduce cardiovascular risk factors and improve cardiovascular outcomes. The distance of services from cycle paths can have an adverse effect on cycling behaviour, whereas mixed land use, higher densities and reduced distances to non-residential destinations promote transportation walking.

d. Links between communities

Social connectedness can be enhanced by the provision of public and active transport infrastructure and the location of employment, amenities, facilities and services.

e. **Community severance**

In neighbourhoods with high volumes of traffic, the likelihood of people knowing and trusting neighbours is reduced.

f. Connections to jobs

The location of employment opportunities and the provision of public and active transportation infrastructure are associated with risk factors for long-term disease such as physical activity. Good pedestrian and cycling infrastructure can promote commuting physical activity. Improved transport infrastructure has the potential to shift the population distribution of physical activity in relation to commuting, although a prerequisite may be a supportive social environment. Mixed land use, higher densities and reduced distances to non-residential destinations promote transportation walking.

The ease of access to employment, shops and services including the provision of

public and active transport are important considerations and schemes should take any opportunity to improve infrastructure to promote cycling, walking and the use of public transport

g. **Connections to services, facilities and leisure opportunities**
Mixed land use, higher densities and reduced distances to non-residential destinations promote transportation walking. Access to recreational opportunities and the location of shops and services are associated with risk factors for long-term disease such as physical activity, access to healthy food and social connectedness. Increased distance of services from cycle paths can have an adverse effect on cycling behaviour.

3) Socio Economic

a. Employment opportunities including training opportunities
Employment is generally good for physical and mental health and well-being, and worklessness is associated with poorer physical and mental health and well-being. Work can be therapeutic and can reverse the adverse health effects of unemployment for healthy people of working age, many disabled people, most people with common health problems and social security beneficiaries. Account must be taken of the nature and quality of work and its social context and jobs should be safe and accommodating. Overall, the beneficial effects of work outweigh the risks of work and are greater than the harmful effects of long-term unemployment or prolonged sickness absence. Employment has a protective effect on depression and general mental health.

Transitions from unemployment to paid employment can reduce the risk of distress and improve mental health, whereas transitions into unemployment are psychologically distressing and detrimental to mental health. The mental health benefits of becoming employed are also dependent on the psychosocial quality of the job, including level of control, demands, complexity, job insecurity and level of pay: transition from unemployment to a high-quality job is good for mental health, whereas transition from unemployment to a low-quality job is worse for mental health than being unemployed. For people receiving social benefits, entry into paid employment can improve quality of life and self-rated health (physical, mental, social) within a short time-frame. For people receiving disability benefits, transition into employment can improve mental and physical health. For people with mental health needs, entry into employment reduces the use of mental health services.

For vocational rehabilitation of people with severe mental illness (SMI), Supported Employment is more effective than Pre-vocational Training in helping clients obtain competitive employment; moreover, clients in Supported Employment earn more and work more hours per month than those in Pre-vocational Training.

b. Local Business Activity
It is important to demonstrate how a proposed development will contribute to ensuring the vitality of town centres. Schemes should consider the impact on local employment, promote beneficial competition within and between town centres, and create attractive, diverse places where people want to live, visit and work

In rural areas the applicant should assess the impact of the proposals on a prosperous rural economy, demonstrate how they will support the sustainable growth and expansion of all types of business and enterprise in rural areas, promoting the development and diversification of agricultural and other land based rural businesses.

c. **Regeneration**
Following rebuilding and housing improvements in deprived neighbourhoods, better housing conditions are associated with better health behaviours; allowing people to

remain in their neighbourhood during demolition and rebuilding is more likely to stimulate life-changing improvements in health behaviour than in people who are relocated. The partial demolition of neighbourhoods does not appear to affect residents' physical or mental health. Mega-events, such as the Olympic Games, often promoted on the basis of their potential legacy for regeneration, appear to have only a short-term impact on mental health.

d. Tourism and Leisure Industries

The applicant should assess the impact of the proposed development on retail, leisure, commercial, office, tourism, cultural, community and residential development needed in town centres. In rural locations assessment and evaluation of potential impacts on sustainable rural tourism and leisure developments that benefit businesses in rural areas, communities and visitors should be undertaken.

e. Community / social cohesion and access to social networks

The location of employment, shops and services, provision of public and active transport infrastructure and access to open space and recreational opportunities are associated with social connectedness. Access to local amenities can increase social participation. Neighbourhoods that are more walkable can increase social capital. Urban agriculture can increase opportunities for social connectivity. Infrastructure developments, however, can affect the quality of life of communities living in the vicinity, mediated by substantial community change, including feelings of threat and anxiety, which can lead to psychosocial stress and intra-community conflict.

f. Community engagement

Public participation can improve environmental impact assessments, thereby increasing the total welfare of different interest groups in the community. Infrastructure development may be more acceptable to communities if it involves substantial public participation.

4) Land Use

a. Land use in urban and / or rural settings

Land-use mix including infrastructure:

Land use affects health not only by shaping the built environment, but also through the balance of various types of infrastructure including transport. Vulnerable groups in the population are disproportionately affected by decisions about land use, transport and the built environment. Land use and transport policies can result in negative health impacts due to low physical activity levels, sedentary behaviours, road traffic incidents, social isolation, air pollution, noise and heat. Mixed land use can increase both active travel and physical activity. Transportation walking is related to land-use mix, density and distance to non-residential destinations; recreational walking is related to density and mixed use. Using modelling, if land-use density and diversity are increased, there is a shift from motorised transport to cycling, walking and the use of public transport with consequent health gain from a reduction in long-term conditions including diabetes, cardiovascular disease and respiratory disease.

Proximity to infrastructure:

Energy resource activities relating to oil, gas and coal production and nuclear power can have a range of negative effects on children and young people. Residing in proximity to motorway infrastructure can reduce physical activity. For residents in proximity to rail infrastructure, annoyance is mediated by concern about damage to their property and future levels of vibration. Rural communities have concerns about competing with unconventional gas mining for land and water for both the local population and their livestock."

b. Quality of urban and natural environments

Long-term conditions such as cardiovascular disease, diabetes, obesity, asthma and depression can be moderated by the built environment. People in neighbourhoods characterised by high ‘walkability’ walk more than people in neighbourhoods with low ‘walkability’ irrespective of the land-use mix. In neighbourhoods associated with high ‘walkability’ there is an increase in physical activity and social capital, a reduction in overweight and blood pressure, and fewer reports of depression and of alcohol abuse. The presence of walkable land uses, rather than their equal mixture, relates to a healthy weight. Transportation walking is at its highest levels in neighbourhoods where the land-use mix includes residential, retail, office, health, welfare and community, and entertainment, culture and recreation land uses; recreational walking is at its highest levels when the land-use mix includes public open space, sporting infrastructure and primary and rural land uses. Reduced levels of pollution and street connectivity increase participation in physical activity.

Good-quality street lighting and traffic calming can increase pedestrian activity, while traffic calming reduces the risk of pedestrian injury. 20-mph zones and limits are effective at reducing the incidence of road traffic incidents and injuries, while good-quality street lighting may prevent them. Public open spaces within neighbourhoods encourage physical activity, although the physical activity is dependent on different aspects of open space, such as proximity, size and quality. Improving the quality of urban green spaces and parks can increase visitation and physical activity levels.

Living in a neighbourhood overlooking public areas can improve mental health, and residential greenness can reduce the risk of cardiovascular mortality. Crime and safety issues in a neighbourhood affect both health status and mental health. Despite the complexity of the relationship, the presence of green space has a positive effect on crime, and general environmental improvements may reduce the fear of crime. Trees can have a cooling effect on the environment – an urban park is cooler than a non-green site. Linking road infrastructure planning and green infrastructure planning can produce improved outcomes for both, including meeting local communities' landscape sustainability objectives.

Terry, Hannah

From: Parish Clerk - Ringland PC <parishclerk@[redacted]
Sent: 05 November 2019 08:41
To: SADEP
Subject: Re: EN010109 - Dudgeon and Sheringham Shoal Offshore Wind Farm Extensions - EIA Scoping Notification and Consultation

In addition to the undernoted the council has questions as follows

1. They have omitted the preferred route for the NWL which runs across the proposed corridor near us and which will be classified as an A road.
2. There is a small disused village landfill site on the edge of the proposed corridor, approximate location grid reference H610300 V310400
3. How does this relate to the proposed cable routing for the Hornsea project? Is it the same thing under yet another name or a parallel operation. Surely the routes should be commonised where possible to minimise cost and environmental impact?
4. What is the proposed timescale for the work in this area and how is it integrated into the forthcoming work on the A47, the NWL and the Project Hornsea cable?

Kind regards
Mrs Patricia Kirby
Clerk to the Council
On 05/11/2019 08:33, Parish Clerk - Ringland PC wrote:

> To advise Ringland parish Council has no representations to the above consultation.
>
> Kind regards
> Mrs Patricia Kirby
> Clerk to the Council
> On 09/10/2019 15:44, SADEP wrote:
>
> > Dear Sir/Madam
> >
> > Please see attached correspondence on the proposed Dudgeon and Sheringham Shoal Offshore Wind Farm Extensions.
> >
> > Please note the deadline for consultation responses is **06 November 2019**, and is a statutory requirement that cannot be extended.
> >
> > Kind regards,
> >
> > Ifan Gwilym
> > Cynghorydd AEA a Hawliau Tîr | EIA and Land Rights Advisor
> > Cyfarwyddiaeth Gwaith Achos Mawr| Major Casework Directorate
> > Yr Arolygiaeth Gynllunio | The Planning Inspectorate
> >
> > Temple Quay House, Temple Quay, Bristol BS1 6PN
> > 0303 444 5491
> > Ifan.Gwilym@planninginspectorate.gov.uk
> > infrastructure.planninginspectorate.gov.uk/ (Cynllunio Seilwaith Cenedlaethol // National Infrastructure Planning)

www.gov.uk/government/organisations/planning-inspectorate (Yr Arolygiaeth Gynllunio // The Planning Inspectorate)

Twitter: @PINSgov



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Terry, Hannah

From: Claire Curtis <CCurtis@[redacted]
Sent: 04 November 2019 11:08
To: SADEP
Cc: [redacted]
Subject: EN010109-000007 EN010109 - Dudgeon and Sheringham Shoal Offshore Wind Farm Extensions - EIA Scoping Notification and Consultation

Follow Up Flag: Follow up
Flag Status: Flagged

Dear Sir/Madam

Planning Act 2008 and The Infrastructure Planning (Environmental Impact Assessment) Regulations 2017 (the EIA Regulations) – Regulations 10 and 11

Application by Equinor New Energy Limited (the Applicant) for an Order granting Development Consent for the Dudgeon and Sheringham Shoal Offshore Wind Farm Extensions (the Proposed Development)

Scoping consultation and notification of the Applicant's contact details and duty to make available information to the Applicant if requested.

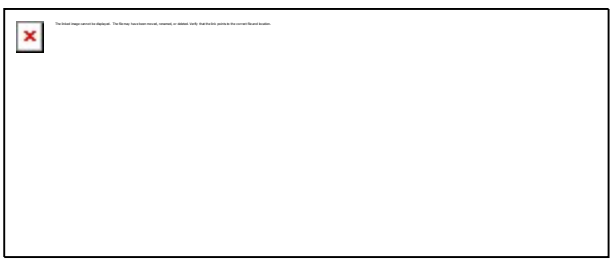
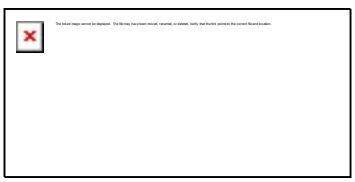
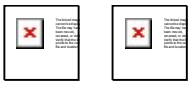
I refer to your consultation dated 9 October 2019 and your request to inform the Planning Inspectorate of the information we consider should be provided in the ES.

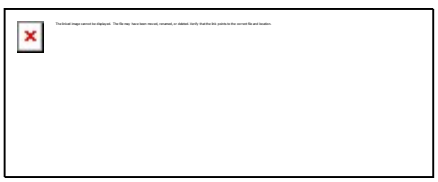
The Council would respectively request that the Environmental Impact Assessment includes a full tree survey and Arboricultural Impact Assessment of all trees effected by the proposal and an assessment of all hedgerows using the 'importance' criteria set by the Hedgerows Regulations 1997.

If possible could any further communications/consultations be sent directly to myself and planning.

Kind regards
Claire Curtis

Claire Curtis (Mrs)
Senior Planning Officer
t [redacted] e ccurtis@[redacted]





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Terry, Hannah

From: Isaac Nunn <Isaac.Nunn[redacted]>
Sent: 21 October 2019 13:50
To: SADEP
Subject: Sheringham and Dudgeon Extension Projects - EIA scoping response

Follow Up Flag: Follow up
Flag Status: Flagged

Dear Sir/Madam,

Thank you for consulting Suffolk County Council as a neighbouring authority in relation to this NSIP project. The proposed windfarms themselves, and any associated onshore cabling routes, will be quite geographically distant from Suffolk. It is unlikely that the proposal will give rise to cross-boundary environmental issues.

On this basis we will decline to provide comments on the scoping report. I should be grateful if you can continue to notify SCC at the relevant stages of this case.

Kind regards,

Isaac Nunn
Planning Officer
Growth, Highways & Infrastructure
Suffolk County Council
Endeavour House
8 Russell Road
Ipswich IP1 2BX

Tel: 01473 265248
Mob: [redacted]
[redacted]
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Terry, Hannah

From: Parish Clerk - Swannington with Alderford & Little Witchingham <salwparishcounci[redacted]>
Sent: 05 November 2019 08:21
To: SADEP
Subject: Re: EN010109 - Dudgeon and Sheringham Shoal Offshore Wind Farm Extensions - EIA Scoping Notification and Consultation

Swannington with Alderford & Little Witchingham Parish Council has no representations to the above consultation.

Kind regards
Mrs Patricia Kirby
Clerk
Swannington with Alderford & Little Witchingham Parish Council

On 09/10/2019 15:44, SADEP wrote:

> Dear Sir/Madam
>
> Please see attached correspondence on the proposed Dudgeon and Sheringham Shoal Offshore Wind Farm Extensions.
>
> Please note the deadline for consultation responses is **06 November 2019**, and is a statutory requirement that cannot be extended.
>
> Kind regards,
>
> Ifan Gwilym
> Cynghorydd AEA a Hawliau Tîr | EIA and Land Rights Advisor
> Cyfarwyddiaeth Gwaith Achos Mawr| Major Casework Directorate
> Yr Arolygiaeth Gynllunio | The Planning Inspectorate
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Terry, Hannah

From: Stephen Vanstone <Stephen.Vanstone[redacted]
Sent: 04 November 2019 13:23
To: SADEP
Cc: [redacted]
Subject: FW: EN010109 - Dudgeon and Sheringham Shoal Offshore Wind Farm Extensions - EIA Scoping Notification and Consultation
Attachments: EQNR_Letter to stat cons_Scoping & Reg 11 Notification_.pdf

Follow Up Flag: Follow up
Flag Status: Flagged

Good afternoon Hannah,

With reference to the attached letter, Trinity House would expect the following to form part of the Environmental Statement:

Navigation Risk Assessment

- Comprehensive vessel traffic analysis in accordance with MGN 543.
- The possible cumulative and in-combination effects on shipping routes and patterns should be fully assessed, with particular reference to the current operational Dudgeon, Sheringham Shoal and Race Bank offshore wind farms.
- Any proposed layouts should conform with MGN 543 and again consideration should be given to the layouts of the current Dudgeon and Sheringham Shoal OWFs. The Sheringham Shoal Extension layout should align with the current site, however, as the Dudgeon OWF site has a less uniform layout, early consideration surrounding the Dudgeon Extension layout and risk mitigation measures will be required.
- If any structures, such as met masts, offshore platforms, accommodation platforms or other transmission assets, lie outwith the actual wind farm turbine layout, then additional risk assessment should be undertaken.

Risk Mitigation Measures

- We consider that this development will need to be marked with marine aids to navigation by the developer/operator in accordance with the general principles outlined in IALA (International Association of Marine Aids to Navigation and Lighthouse Authorities) Recommendation O-139 on the Marking of Man-Made Offshore Structures as a risk mitigation measure. In addition to the marking of the structures themselves, it should be borne in mind that additional aids to navigation such as buoys may be necessary to mitigate the risk posed to the mariner, particularly during the construction phase. All marine navigational marking, which will be required to be provided and thereafter maintained by the developer, will need to be addressed and agreed with Trinity House. This will include the necessity for the aids to navigation to meet the internationally recognised standards of availability and the reporting thereof.
- Any monitoring equipment, including met masts and LIDAR or wave buoys must also be marked as required by Trinity House.
- A decommissioning plan, which includes a scenario where on decommissioning and on completion of removal operations an obstruction is left on site (attributable to the wind farm) which is considered to be a danger to navigation and which it has not proved possible to remove, should be considered. Such an obstruction may require to be marked until such time as it is either removed or no longer considered a danger to navigation, the continuing cost of which would need to be met by the developer/operator.
- The possible requirement for navigational marking of the export cables and the vessels laying them. If it is necessary for the cables to be protected by rock armour, concrete mattresses or similar protection which lies clear of the surrounding seabed, the impact on navigation and the requirement for appropriate risk mitigation measures needs to be assessed.

Kind regards,

Stephen Vanstone
Navigation Services Officer | Navigation Directorate | Trinity House

[redacted]

TRINITY HOUSE

From: SADEP <sadep@planninginspectorate.gov.uk>
Sent: 09 October 2019 15:42
To: Navigation <navigation@trinityhouse.co.uk>
Cc: Thomas Arculus <Thomas.Arculus[redacted]
Subject: EN010109 - Dudgeon and Sheringham Shoal Offshore Wind Farm Extensions - EIA Scoping Notification and Consultation

FAO Steve Vanstone, Navigation Services Officer

Please see attached correspondence on the proposed Dudgeon and Sheringham Shoal Offshore Wind Farm Extensions.

Please note the deadline for consultation responses is **06 November 2019**, and is a statutory requirement that cannot be extended.

Kind regards,

Ifan Gwilym
Cynghorydd AEA a Hawliau Tîr | EIA and Land Rights Advisor
Cyfarwyddiaeth Gwaith Achos Mawr| Major Casework Directorate
Yr Arolygiaeth Gynllunio | The Planning Inspectorate

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Please write to me in Welsh or English

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Response from Weybourne Parish Council, informing the Planning Inspectorate of the information the council consider should be provided in the Environmental Statement relating to the proposed extensions of the Dudgeon and Sheringham Shoal Windfarms

Weybourne Parish Council have a number of concerns regarding the proposed extensions of the Dudgeon and Sheringham Shoal Windfarms. These are outlined below. It is hoped that these will be considered in the Environmental Statement relating to the proposed extensions of the Dudgeon and Sheringham Shoal Windfarms.

Environmental and Ecological Impact

Weybourne Parish Council are deeply concerned about the impact these proposals would have on the ecology and biodiversity of the Weybourne area including, but not limited to:

- Impact on wildlife and biodiversity through the disruption and destruction of key habitats
- Impact on bird populations, including residential and wintering birds, but also migrating birds, an area that is not addressed in the scoping document
- The impact of light pollution on the dark skies
- The impact on the Chalk Reef
- The impact on the AONB
- The impact on the SSSI

Impact on Tourism

Tourism is the largest industry in Weybourne and as such is central to the local economy and the sustainability of village amenities such as the pub and village store. People are drawn to Weybourne for its wildlife, birdlife and tranquillity. The impact of this proposed development on the environment and ecology of Weybourne will also impact upon tourism to Weybourne. In addition to this there are a number of specific projects and locations that currently bring tourism to Weybourne that would be impacted by this proposal:

- The Pond Restoration project
- The Deep History Coast
- The beach
- It is also noted that the North Norfolk Railway Station, a significant tourist attraction for the village, is not identified in the Equinor Scoping document

Impact on Agriculture and Fishing

Agriculture and fishing are significant industries in Weybourne and stand to be impacted adversely by this proposal. These impacts include:

- The impact of beach closure on fishing businesses in Weybourne
- The disruption to agriculture and ongoing reduction in crop yield

The inadequacy of the infrastructure

There are no roads into Weybourne that are suitable for large or heavy construction traffic. Entering Weybourne along the A149 from Kings Lynn would require large vehicles to negotiate the twists and turns of villages such as Cley, while there is a height restriction on the A149 coming from Sheringham. The other roads into Weybourne are narrow, single track and bendy. Station Road crosses the North Norfolk Railway Line over a Victorian bridge built for horses and carts that would not withstand large or heavy construction vehicles.

With these concerns in mind, the Parish Council request that Equinor consider the use of barges and pontoons to bring construction machinery and materials to Weybourne.

Tidal Surges

The Parish Council are keen that Equinor consider the impact of tidal surges in their Environmental Statement. Tidal surges change the nature and character of the coast line and are predicted to increase in frequency and severity.

Offshore Ring Main

Weybourne Parish Council are keen that the possibility of an Offshore Ring Main be considered as an alternative to the repeated disruption and damage, caused by numerous cables making landfall at Weybourne.

Repeated disruption

The Parish Council are also concerned at the repeated disruption the village will be facing over the coming years. Two cables have already come ashore at Weybourne (Dudgeon and Sheringham Shoal) with the prospect of the Hornsea III cable coming through the village in the next few years and now the possibility of two further cables outlined in this proposal. This repeated disruption puts a significant burden on the village over a lengthy period of time. Steps need to be taken to mitigate the impact of this and to ensure the village does not suffer permanent damage to its wildlife and ecology, its economy, and as a result, its community, all of which stand to be impacted by this proposal.