LIONLINK

Environmental Impact Assessment Scoping Report
Volume 1 Main Text
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nationalgrid

Contents

Offshore:

Proposed Scheme Wide:

Glossary of Initialisations and Abbreviations

Term	Definition
AADT	Annual Average Daily Traffic
AC	Alternating Current
AEZs	Archaeological Exclusion Zones
AGI	Above Ground Installation
AIL	Abnormal Indivisible Load
AIS	Air-insulated switchgear
AIS	Automatic Identification System
ALARP	As Low As Reasonably Practicable
ALBST	Advances Licence Bat Survey Techniques
ALC	Agricultural Land Classification
AONB	Area of Outstanding Natural Beauty
AQAP	Air Quality Action Plan
AQO	Air Quality Objective
AQ	Air Quality
AQAL	Air Quality Assessment Level
AQMA	Air Quality Management Area
ARN	Affected Road Network
ARP	Adaptation Reporting Power
A&S	Agriculture and Soil
ASC	Adaptation Sub-Committee
ASR	Annual Status Report
ATC	Automatic Traffic Counts
ATT	Admiralty Total Tide
AURN	Automatic Urban and Rural Network
AVT	Ancient Veteran Trees
AW	Ancient Woodland

Term	Definition
AWB	Artificial Water Body
AWI	Ancient Woodland Inventory
BASC	British Sub-Aqua Club
BCT	Bat Conservation Trust
BEIS	Business, Energy and Industrial Strategy
BERR	Business Enterprise and Regulatory Reform
BGS	British Geological Survey
BMAPA	British Marine Aggregate Producers Association
BMV	Best and most versatile
BNG	Biodiversity Net Gain
BODC	British Oceanographic Data Centre
BP	Before Present
BPM	Best Practicable Means
BTO	British Trust for Ornithology
CA	Cruising Association
CBRA	Cable Burial Risk Assessment
CBS	Cement bound sand
CC	Climate Change
CCA	Coastal Character Areas
CCO	Channel Coastal Observatory
CCR	Climate Change Resilience
CCS	Carbon Capture and Storage
CCUS	Carbon Capture and Underground Storage
CD&E	Construction, Demolition and Excavation
CE	Circular Economy
CEA	Collaborative Environmental Advisors Ltd
CEA	Cumulative Effects Assessment

Term	Definition
Cefas	Centre for Environment, Fisheries and Aquaculture Science
CEMP	Construction Environmental Management Plan
CD&E	Construction, Demolition and Excavation
CFGM	Coastal and floodplain grazing marsh
CIEEM	Chartered Institute of Ecology and Environmental Management
CIGRE	International Council on Large Electric Systems
CIRIA	Construction Industry Research Information Association
CITES	Convention on International Trade in Endangered Species
CFSR	Climate System Forecast Reanalysis
CGS	County GeoSites
CIfA	Chartered Institute for Archaeologists'
CL:AIRE	Contaminated Land: Applications in Real Environments
CoCP	Code of Construction Practice
CODA	Cetaceans Offshore Distribution and Abundance in the European Atlantic
COLREGS	The International Regulations for Preventing Collisions at Sea
COMAH	Control of Major Accidents and Hazards
CPA	Coastal Protection Act
CPTu	Cone Penetrometer Testing
CRoW	Countryside and Rights of Way
CRTN	Calculation of Road Traffic Noise
CSEC	Cable Sealing End Compounds
CSEMP	Clean Safe Seas Environmental Monitoring Programme
CSV	Construction Support Vessel
CTMP	Construction Traffic Management Plan
CWS	County Wildlife Site
DAS	Discretionary advice service
DAERA	Department of Agriculture, Environment and Rural Affairs

Term	Definition
DATRAS	Database of Trawl Surveys
DBA	Desk-based assessment
DBT	Dibutyl
DC	Direct Current
DCO	Development Consent Order
DDC	Drop-Down Camera
DECC	Department of Energy & Climate Change
Defra	Department for Environment, Food and Rural Affairs
DESNZ	Department for Energy Security and Net Zero
DoE	Department of Environment
DLL	District level licensing
DM	Do-Minimum
DMO	Destination Management Organisation
DMR	Dedicated metallic return
DMRB	Design Manual for Roads and Bridges
DoW CoP	Definition of Waste Code of Practice
DP	Dynamic positioning
DTM	Digital terrain model
eDNA	Environmental DNA
EA	Environment Agency
EA1N	East Anglia One North
EA2	East Anglia Two
E&C	Ecology and Biodiversity
EEA	European Economic Area
EEAWP	East of England Aggregates Working Party
EEZ	Exclusive Economic Zone
EDR	Effective Deterrence Range

Term	Definition
EHO	Environmental Health Office
EIA	Environmental Impact Assessment
EIFCA	Eastern Inshore Fisheries and Conservation Authority
EMF	Electromagnetic Field
EMODnet	The European Marine Observation and Data Network
EN-1	Overarching National Policy Statement for Energy
ENTSO-E	Ofgem, European Network of Transmission System Operators
EPA 1990	Environmental Protection Act 1990
EPC	Engineering, procurement and construction
EPUK	Environmental Protection UK
EPS	European Protected Species
EQS	Environmental Quality Standard
ES	Environmental Statement
ESS	Ecology Survey Strategy
ESC	East Suffolk Council
ESCA	European Subsea Cables Association
ESO	Electricity System Operator
EU	European Union
EUNIS	European Union Nature Identification System
FCD	Field Capacity Days
FEPA	Food and Environment Protection Act
FLO	Fisheries Liaison Officer
FLOWW	Fishing Liaison with Offshore Wind and Wet Renewables Group
FRA	Flood Risk Assessment
FSA	Formal Safety Assessment
GB	Great Britain
GC	Ground Conditions

Term	Definition
GI	Ground Investigation
GIB	Gas Insulated Busbar
GIS	Gas Insulated Switchgear
GIS	Geographical Information System
GHG	Greenhouse Gas
GLTA	Ground Level Tree Assessment
GNSS	Global Navigation Satellite System
GPP	Guidance for Pollution Prevention
GQA	General Quality Assessment
GT	Gross Tonnage
GW	Gigawatts
GWDTE	Groundwater dependent terrestrial ecosystem
HAT	Highest Astronomical Tide
HCA	Homes and Community Agency
H&D	Hydrology and Drainage
HDD	Horizontal Direction Drilling
HE	Historic Environment
HEDBA	Historic Environment Desk-Based Assessment
HER	Historic Environment Record
HGV	Heavy Goods Vehicles
HIA	Hydrogeological Impact Assessment
HLC	Historic Landscape Characterisation
HMWB	Heavily Modified Water Body
hp	Horsepower
HRA	Habitat Regulation Assessment
HSC	Historic Seascape Characterisation
HVAC	High Voltage Alternating Current

Term	Definition
HVDC	High voltage direct current
HVO	Hydrogenated vegetable oil
H&W	Health and Wellbeing
HYCOM	Hybrid Coordinate Ocean Model
Hz	Hertz
IAIA	International Association for Impact Assessment
IAMMWG	Inter-Agency Marine Mammal Working Group
IAQM	Institute of Air Quality Management
IBTS	International Bottom Trawl Survey
ICCI	In-combination Climate Change Impact
ICE	Inventory of Carbon and Energy
ICES	International Council for the Exploration of the Sea
ICNIRP	International Commission on Non-Ionizing Radiation Protection
ICPC	International Cable Protection Committee
IDB	Internal Drainage Board
IDP	Initial Decommissioning Plan
IEMA	Institute of Environmental Management and Assessment
IFCA	Inshore Fisheries and Conservation Authority
IHBC	Institute of Historic Building Conservation
IHLS	International Herring Larvae Survey
IMD	Indices of Multiple Deprivation
IMO	International Maritime Organisation
INNS	Invasive non-native species
IRZ	Impact Risk Zones
IUCN	International Convention for the Conservation of Nature
JNCC	Joint Nature Conservation Committee
KEIFCA	Kent and Essex Inshore Fisheries and Conservation Authority

Term	Definition
KIS-ORCA	Kingfisher Information Service – Offshore Renewable Cable
KM	Kilometre
KP	Kilometre Point
kW	Kilowatt
LAA	Local Aggregates Assessment
LAQM	Local Air Quality Management
LAT	Lowest Astronomical Tide
LBAP	Suffolk's Local Biodiversity Action Plan
LCA	Landscape Character Areas
LC:RM	Land Contamination: Risk Management
LCT	Landscape Character Types
LEMP	Local Environmental Management Plan
LETI	Low Energy Transformation Initiative
LGV	Light Goods Vehicle
LiDAR	Light Detection and Ranging
LLCA	Local Landscape Character Areas
LLFA	Lead Local Flood Authority
LN	Leiston North
LNR	Local Nature Reserves
LNRS	Local Nature Recovery Strategy
LPA	Local Planning Authority
LS	Leiston South
LSOA	Lower Super Output Area
LT	Landscape Types
LUC	Land Use Consultants
L&V	Landscape and Visual
LVAC	Low-voltage alternating current

Term	Definition
LVIA	Landscape and Visual Impact Assessment
LWS	Local Wildlife Sites
m	Metre
MA&D	Major Accidents & Disasters
MAGIC	Multi Agency Geographic Information for the Countryside
MAIB	Marine Accident Investigation Branch
MarESA	Marine Evidence-based Sensitivity Assessment
MarLIN	Marine Life Information Network
MARPOL	International Convention for the Prevention of Pollution from Ships
MBES	Multi-beam Echosounder
MCA	Mineral Consultation Area
MCA	Maritime and Coastguard Agency
MCAA 2009	Marine and Coastal Access Act 2009
MCZ	Marine Conservation Zone
mg/l	Milligrams per Litre
MGN	Marine Guidance Note
MHWN	Mean High Water Neap
MHWS	Mean High Water Springs
MINNS	Marine Invasive Non-Native Species
mm	Millimetre
MMO	Marine Management Organisation
MMP	Materials Management Plan
MoD	Ministry of Defence
MoRPh	Modular River Physical
MPA	Marine Protected Area
MPCP	Marine Pollution Contingency Plan
MPI	Multi-purpose interconnector

Term	Definition
MPS	Marine Policy Statement
m/s	Metre per second
MSL	Mean Sea Level
Mt	Million tonnes
MU	Management Unit
M&W	Materials and Waste
NAVTEX	Navigational Telex
NBN	National Biodiversity Network
NCA	National Character Area
NCN	National Cycle Network
NE	Natural England
NERC	Natural Environment and Rural Communities
NETS SQSS	National Electricity Transmissions Systems Security and Quality of Supply Standard
NFFO	National Federation of Fishermen's Organisations
NGED	National Grid Electricity Distribution
NGESO	National Grid Electricity Operator
NGET	National Grid Electricity Transmission
NGLLL	National Grid LionLink Limited
NGV	National Grid Ventures
NGIH	National Grid Interconnector Holdings Limited
NHLE	National Heritage List for England
NIA	Noise Important Area
NL	Netherlands
NM	Nautical Mile
NMHR	National Marine Heritage Record
NMRL	Non-mobile Reference Level
NNR	National Nature Reserves

Term	Definition
NOx	Nitric oxide
NO_2	Nitrogen dioxide
NOAA	National Oceanic and Atmospheric Administration
NPPF	National Planning Policy Framework
NPPF 2021	National Planning Policy Framework 2021
NPPG	National Planning Policy Guidance
NPS	National Policy Statements
NRA	Navigational Risk Assessment
NRHE	National Record of the Historic Environment
NRMM	Non-Road Mobile Machinery
NSIP	Nationally Significant Infrastructure Project
NSN	National Site Network
NSTA	North Sea Transition Authority
NT	National Trust
NtM	Notice to Mariners
NTS	National Transmission System
NTS	Non-Technical Summary
NTSLF	National Tide and Sea Level Facility
N&V	Noise and Vibrations
OEUK	Offshore Energies UK
OHID	Office for Health Improvement and Disabilities
OHL	Overhead line
OLEMP	Outline Landscape and Ecology Management Plan
O&M	Operation & Maintenance
ONS	Office for National Statistics
OOS	Out of Service
OPRED	Offshore Petroleum Regulator for Environment and Decommissioning

Term	Definition
OREIs	Offshore Renewable Energy Installations
OS	Ordnance Survey
OSPAR	Oslo Paris Convention
OTE	Outer Thames Estuary
OWF	Offshore Wind Farm
OWSI	Overarching Written Scheme(s) of Investigation
PA2008	Planning Act 2008
PAD	Protocol for Archaeological Discoveries
PAHs	Polycyclic Aromatic Hydrocarbons
PAS	Publicly Available Specification
PCBs	Polychlorinated Biphenyls
PDV	Phocine distemper virus
PEA	Preliminary Ecological Assessment
PEI	Preliminary Environmental Information
PEIR	Preliminary Environmental Impact Report
PEXA	Practice and Exercise Area
PIA	Personal Injury Accident
PIC	Personal Injury Collision
PINS	Planning Inspectorate
PLGR	Pre-Lay Grapnel Run
PLONOR	Posing Little or No Risk
PM	Particulate Matter
PPE	Personal Protective Equipment
PPG	Planning Practice Guidance
PPV	Peak Particle Velocity
PRoW	Public Right of Way
PSA	Particle Size Analysis

Term	Definition
PTES	Peoples Trust for Endangered Species
pUXO	Potential Unexploded Ordnance
PWS	Private Water Source
RBMP	River basin management plan
RCA	River Condition Assessment
RCP	Representative Concentration Pathway
REC	Regional Environmental Characterisation
RFI	Request for information
RIB	Rigid inflatable boat
RICS	Royal Institute of Chartered Surveyors
RIGS	Regionally important geological sites
RNLI	Royal National Lifeboat Institution
ROV	Remotely Operated Vehicle
RPA	Root Protection Area
RSPB	Royal Society for the Protection of Birds
RTK	Real Time Kinematic
RYA	Royal Yachting Association
SAC	Special Areas of Conservation
SARG	Suffolk Amphibian and Reptile Group
SBG	Suffolk Bat Group
SBIS	Suffolk Biodiversity Information Service
SBP	Sub-bottom Profilers
SCANS III	Small Cetacean Abundance in the European Atlantic Waters III
SCBOP	Suffolk Community Barn Owl Proposed Scheme
SCC	Suffolk County Council
SCIs	Sites of Community Importance
S-E	Socio-economics

Term	Definition
SEA	Strategic Environmental Assessment
SHER	Suffolk Historic Environment Record
SMP	Shoreline Management Plan
SMRU	Sea Mammal Research Unit
SMWLP	Suffolk Minerals and Waste Local Plan
SNRHW	Stable Non Reactive Hazardous Wastes
SNCBs	Statutory Nature Conservation Bodies
SNH	Scottish Natural Heritage
SNS	Southern North Sea
SOCI	Species of Conservation Importance
SOLAS	International Convention for the Safety of Life at Sea
SOPEP	Shipboard Oil Pollution Emergency Plan
SoPI	Species of Principal Importance
SoS	Secretary of State
SPA	Special Protection Areas
SPD	Supplementary Planning Documents
SPG	Supplementary Planning Guidance
SPM	Suspended Particulate Matter
SPR	Scottish Power Renewables
SPZ	Source Protection Zone
SRMP	Soil Resources Management Plan
SSC	Suspended Sediment Concentrations
SSEP	Strategic Spatial Energy Plan
SSS	Side Scan Sonar
SSSI	Sites of Special Scientific Interest
SuDS	Sustainable Drainage System
SWMP	Site Waste Management Plan

Term	Definition
SWT	Suffolk Wildlife Trust
t	Tonnes
TA	Transport Assessment
TBT	Tributyl
TC	Thermal Conductivity
TCA	Trade and Cooperation Agreement
TCC	Temporary Construction Compounds
TCE	The Crown Estate
TEFA	Thames Estuary Fishermen's Association
TFA	Thanet Fisheries Association
TGN	Technical Guidance Note
THC	Total Hydrocarbons
TIN	Technical Information Note
TJB	Transition Joint Bay
TJP	Transition Joint Pit
TPO	Tree Preservation Order
TPXO	TOPEX/Poseidon Global Inverse Model
TraC	Transitional and Coastal Waters
TSHD	Trailing suction hopper dredger
TSS	Traffic Separation Schemes
T&T	Traffic and Transport
UAV	Unmanned Aerial Vehicle
UNESCO	United Nations Educational, Science and Cultural Organization
UK	United Kingdom
UKHab	UK Habitats Classification
UKHO	UK Hydrographic Office
UKCP	UK Climate Projections

Term	Definition
UKGBC	UK Green Building Council
UXO	unexploded ordnance
VC	Vibrocore
VHF	Very High Frequency
VMS	Vessel Monitoring System
VP	Vantage Point
WC	Wetness Class
WEEE	Waste Electrical and Electronic Equipment
WFD	Water Framework Directive
WMP	Waste Management Plan
WHO	World Health Organisation
WSI	Written Scheme of Investigation
WT	Woodland Trust
WW3	WaveWatch III
XLPE	Cross Linked Polyethylene
ZoI	Zone of Influence
ZTV	Zones of Theoretical Visibility

Contents

1. Introduction

1.1 Overview of the Project

1.1.1 This Environmental Impact Assessment (EIA) Scoping Report has been prepared by Ove Arup and Partners Ltd, on behalf of National Grid LionLink Limited (NGLLL), to support a request for a Scoping Opinion from the Secretary of State (SoS) for the Department for Energy Security and Net Zero (DESNZ), for the purposes of Regulation 10(1) of The Infrastructure Planning (Environmental Impact Assessment (EIA)) Regulations 2017 (the "EIA Regulations") for the LionLink Scheme ("the Project").

1.1.2 The Project comprises a new interconnector with a capacity of up to 1.8 gigawatts (GW) between the National Transmission Systems (NTSs) of Great Britain (GB) and the Netherlands, including a connection into a wind farm located in Dutch waters.

1.1.3 The Project is located partly in the territory of GB and partly in the territory of the Netherlands. This EIA Scoping Report has been prepared to support a request for a Scoping Opinion for the portion of the Project within the territory of GB only. However, the potential for transboundary effects arising from the interaction between the Project and European Economic Area (EEA) States will be assessed.

1.1.4 The Project will be the second interconnector between GB and the Netherlands, the first being the existing BritNed interconnector.

1.1.5 The GB portion of the Project comprises the following key components:

- Friston Substation[1];
- Proposed high voltage alternating current (HVAC) Underground Cables between the proposed Converter Station in Suffolk and Friston Substation;
- Proposed Converter Station in Suffolk, east of Saxmundham;
- Proposed high voltage direct current (HVDC) Underground Cables between the proposed Converter Station in Suffolk, and a proposed Landfall at either Southwold or Walberswick; and
- Submarine electricity cables from a proposed Landfall Site (at either Southwold or Walberswick) at the mean high-water mark at the UK coast to the edge of the UK Exclusive Economic Zone (EEZ).

1.2 The Applicant

1.2.1 There are four distinct electricity business entities under the umbrella of National Grid:

- National Grid Ventures (NGV);
- National Grid Electricity Transmission (NGET);

[1] At this time there is optionality in how Friston Substation may come forward in terms of consenting and construction. This EIA Scoping Report outlines the optionality in Chapter 2 The proposed Scheme Description.

- National Grid Electricity Operator (NGESO); and
- National Grid Electricity Distribution (NGED).

1.2.2 NGV is a separate entity to NGET, NGESO and NGED, which are subject to separate regulations. NGV operates and invests in energy projects, technologies, and partnerships to accelerate the development of a clean energy future.

1.2.3 NGLLL ("the Applicant") forms one aspect of the NGV portfolio.

1.3 Nationally Significant Infrastructure Projects

1.3.1 None of the components of the Project fall within the definition of a 'Nationally Significant Infrastructure Project' (NSIP) defined under Part 3 of the Planning Act 2008 (PA2008). The proposed Scheme therefore sought direction on 28th July 2022 under Section 35 of the PA2008 from the Secretary of State (SoS) for the proposed Scheme to be treated as a development for which development consent under the PA2008 is required.

1.3.2 On 23 August 2022 a Section 35 direction was granted by the SoS on the grounds that:

"The proposed project is of national significance, taking into account that it forms part of a high voltage direct current electricity link with capacity of up to 1.8GW between the national transmission systems of Great Britain and the Netherlands.

The proposed project will play an important role in enabling an energy system that meets the UK's commitment to reduce carbon emissions and the Government's objectives to create a secure, reliable and affordable energy supply for consumers.

By progressing the development through the Planning Act 2008 development consent process, it would provide the certainty of a single, unified consenting process and fixed timescales".

1.3.3 Following granting of the Section 35 Direction in 2022, an application for development consent under Section 37 of the PA2008 will be made to the Planning Inspectorate (PINS). The application will provide details of the Project and will be accompanied by an Environmental Statement (ES).

1.4 The need for the Project

1.4.1 Interconnectors are making energy more secure, affordable and sustainable for consumers. GB has experienced success from existing interconnectors which have connected energy between GB and Belgium, Denmark, France, Ireland and the Netherlands.

1.4.2 The Government has recognised the important role that international electricity interconnectors play in facilitating a secure, stable and clean energy system[2][3].

1.4.3 The objective of the Project is to connect the British and Dutch NTS and Dutch offshore wind generation by 2030, for the purpose of achieving the energy security and supply

[2] https://www.gov.uk/government/publications/british-energy-security-strategy/british-energy-security-strategy#renewables [accessed February 2024]

[3] Energy white paper: Powering our net zero future.2020. https://www.gov.uk/government/publications/energy-white-paper-powering-our-net-zero-future [accessed February 2024]

benefits that come with a project of this scale and contributing to the UK Government's target to realise at least 18GW of interconnector capacity by 2030.

1.4.4 By enabling the rapid transfer of electricity between markets, interconnectors enable energy to be imported and exported depending on the needs of the market and in line with market prices. Interconnectors are also an effective tool to support the intermittent nature of renewable energy and help to support the network when demand is high.

1.4.5 The Project therefore delivers on core aspects of the Government's energy strategy[4]: it addresses the issue of unreliability of renewable energy supply and it provides the security, stability and cost savings that are associated with interconnectors, contributing to the UK Government's interconnector capacity target, as set out in the 2020 Energy White Paper[5] and the Overarching National Policy Statement for Energy (EN-1), to realise at least 18GW of interconnector capacity by 2030[6]. It is a step towards a more coherent and therefore more efficient connection system.

1.5 The need for an Environmental Impact Assessment

1.5.1 EIA is a legally required process examining the likely significant effects of the construction and operation of a proposed development. The EIA process for NSIP projects is governed by the EIA Regulations.

1.5.2 There are two schedules of development included within the EIA Regulations. These comprise Schedule 1 development, for which EIA is mandatory, and Schedule 2 development, for which EIA is undertaken where a development is likely to have significant effects on the environment by virtue of its nature, size or location.

1.5.3 Schedules 1 and 2 of the EIA Regulations reference neither interconnectors nor any of the individual components of the Project. However, the fact that a particular type of development is not specifically identified in one of the Schedules does not necessarily mean that an EIA is not required.

1.5.4 The Applicant has considered the characteristics of the Project, including the GB and Dutch scheme components, the location of the Project and the type and characteristics of the likely significant effects of the Project. In light of these factors, and the status of the Project as requiring development consent following the Section 35 Direction, it is proposed that an EIA will be undertaken. This EIA Scoping Report provides formal notification to the SoS, under Regulation 8(1)(b) of the EIA Regulations, that the Applicant proposes to provide an ES in respect of the Project. Therefore, this development is EIA development through Regulation 6 (2) of the EIA Regulations.

[4] https://www.gov.uk/government/publications/british-energy-security-strategy/british-energy-security-strategy#renewables [accessed February 2024]

[5] https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/945899/201216_BEIS_EWP_Command_Paper_Accessible.pdf [accessed February 2024]

[6] Department for Energy Security and Net Zero, January 2024. Overarching National Policy Statement for Energy (EN-1). https://www.gov.uk/government/publications/overarching-national-policy-statement-for-energy-en-1. [accessed February 2024]

1.6 The Proposed Scheme

1.6.1 A description of the proposed Scheme is outlined in **Chapter 2** The proposed Scheme Description.

1.6.2 The following definitions are relevant to this EIA Scoping Report:

- "The Project" is the collective term used to refer to the proposal for a new interconnector between GB and the Netherlands;
- The term "proposed Scheme" will be used when referring to the GB scheme components as a whole as outlined in **paragraph 1.1.5,** not including Dutch components, this includes both the onshore and offshore scheme components;
- The "proposed Onshore Scheme" is the term used when referring to the onshore elements of the proposed Scheme;
- The "proposed Offshore Scheme" is the term used when referring to the offshore elements of the proposed Scheme;
- "Dutch Offshore Components" is the term used when referring to the offshore elements of the Project within Dutch waters;
- The "proposed Scheme Scoping Boundary" refers to the area of land illustrated in **Figure 1-1**, which is the subject of the EIA Scoping Report. This area comprises the land, offshore and onshore, which has been identified, at this stage of the Project development and design process, as potentially being required to construct and operate the proposed Scheme. The proposed Scheme Scoping Boundary will be refined as the design develops; and
- For clarity, the Scoping Boundary is broken down into the:
  - "proposed Onshore Scheme Scoping Boundary" see **Figure 1-2** and **Figure 1-3**, this comprises the onshore components all of which will be located in England;
  - "proposed Offshore Scheme Scoping Boundary" see **Figure 1-4**. This will encompass the offshore components between the Transition Joint Bay (TJB) within the proposed Landfall Site and the EEZ boundary at sea;
  - There are two options for the proposed Landfall Site and associated offshore and onshore cable corridors being considered at this stage of the EIA (as described in more detail in **Chapter 2** The proposed Scheme Description) and all of these options are included within the proposed Scheme Scoping Boundary; and
  - For the purposes of this EIA Scoping Report the offshore chapters will cover up to the Mean High Water Springs (MHWS) and onshore chapters will cover down to the Mean Low Water Springs (MLWS). The intertidal area will therefore be assessed as part of both the onshore and offshore EIA.

Proposed Onshore Scheme

1.6.3 The proposed Onshore Scheme Scoping Boundary, illustrated on **Figure 1-2** and **Figure 1-3**, is located entirely within the administrative boundary of Suffolk County Council and East Suffolk Council. A description of the proposed Onshore Scheme is outlined in **Chapter 2** The proposed Scheme Description.

1.6.4 The proposed Onshore Scheme Scoping Boundary is located in a predominantly rural setting. There are two proposed Landfall Sites and two associated cable corridor options being considered at this time. The settlements in proximity to the elements of the proposed Onshore Scheme include:

- Friston Substation and proposed Converter Station: Friston and Saxmundham;
- Proposed Underground Cable Corridor: Friston, Saxmundham, Middleton, Westleton and Blytheburgh. Then either Wenhaston, Uggeshall, Wangford, Reydon and Southwold or Walberswick (depending on the proposed Landfall selected); and
- Proposed Landfall: Southwold or Walberswick.

1.6.5 Existing infrastructure in the proposed Onshore Scheme Scoping Boundary includes: two existing 400kV overhead lines that connect the existing Sizewell substation to the Bramford substation, the railway line connecting Saxmundham to Leiston, the A12 which is largely to the east of the proposed Onshore Scheme Scoping Boundary but is crossed by the boundary up to twice, and the Sizewell Nuclear Site.

1.6.6 The proposed Onshore Scheme Scoping Boundary includes parts of the Heath Area of Outstanding Natural Beauty (AONB), Minsmere-Walberswick RAMSAR, Minsmere-Walberswick Heaths and Marshes Sites of Special Scientific Interest (SSSI), Minsmere to Walberswick Heaths & Marshes Special Areas of Conservation (SAC), Minsmere-Walberswick Special Protection Areas (SPA) and four areas of Ancient Woodland.

1.6.7 The following main rivers cross the proposed Onshore Scheme Scoping Boundary: The Hundred River, River Minsmere, River Blyth and River Wang.

1.6.8 The onshore elements of the Project will be considered within **Chapters 6** to **17** and **Chapters 27** to **29**.

Proposed Offshore Scheme

1.6.1 The proposed Offshore Scheme Scoping Boundary, illustrated on **Figure 1-4**, is located within the East Inshore and East Offshore Marine Plan areas. The proposed Offshore Scheme Scoping Boundary comprises the seabed and the adjacent water column which has been identified, at this stage of the Project development and design process and prior to any offshore characterisation surveys, as potentially being required to construct and operate the proposed Scheme. At this stage this includes a sufficient width of seabed to allow installation of two submarine HVDC cables, one metallic return cable and up to two fibre optic cables, the micro-routeing of those cables (should any challenging or sensitive marine features be identified by the offshore characterisation surveys), and any external cable protection that may be required. A description of the proposed Offshore Scheme is outlined in **Chapter 2** The proposed Scheme Description.

1.6.1 The proposed Offshore Scheme Boundary includes the proposed Landfall sites at Southwold and Walberswick, coastal Submarine Cable Corridors from each Landfall site to a convergence point, and then two proposed options for a HVDC Submarine Cable Corridor (Route B and Route C) which route in a north-easterly direction from GB across the Southern North Sea to the GB/Netherlands EEZ boundary.

1.6.1 The proposed Offshore Scheme Scoping Boundary crosses the Outer Thames Estuary SPA and Southern North Sea SAC.

1.7 The purpose of this report

1.7.1 This EIA Scoping Report establishes the proposed scope and methodology of the EIA and the content of the ES to accompany a Development Consent Order (DCO) application to be submitted to PINS in accordance with Regulation 10(1) of the EIA Regulations.

1.7.1 The EIA Scoping Report has been produced in line with the EIA Regulations and PINS Advice Note Seven[7].

1.7.1 The EIA Regulations set out the requirements for an applicant who proposes to request a Scoping Opinion from the SoS. 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."

1.7.1 **Table 1-1** identifies where the relevant information can be found within this EIA Scoping Report.

Table 1-1 EIA scoping requirements

Source of Requirement	Requirement	Location
Regulation 10(1) of the EIA Regulations	(a) a plan sufficient to identify the land;	See **Figure 1-1, Figure 1-2** and **Figure 1-4**
	(b) a description of the proposed development, including its location and technical capacity;	**Chapter 1** Introduction. **Chapter 2** The proposed Scheme Description.
	(c) an explanation of the likely significant effects of the development on the environment;	**Chapters 6 to 26,** onshore and offshore technical topic chapters. **Chapters 27 to 30,** project wide technical topic chapters.
	(d) such other information or representations as the person making the request may wish to provide or make,	**Chapters 6 to 29**, onshore and offshore technical topic chapters.
PINS Advice Note Seven.	An explanation of the approach to addressing uncertainty where it remains	**Chapter 5** EIA Approach and Method.

[7] Advice Note Seven: Environmental Impact Assessment: Process, Preliminary Environmental Information and Environmental Statements. Republished June 2020 (version 7).

Source of Requirement	Requirement	Location
	Referenced plans	See Volume 2 Figures.
	An outline of the reasonable alternatives	**Chapter 3** Assessment of Alternatives.
	Summary table depicting scoped out issues	**Chapter 30** Summary and Approach to Environmental Statement.
	Detailed description of the aspects and matters proposed to be scoped out	**Chapters 6 to 26** onshore and offshore technical topic chapters. **Chapters 27 to 30**, project wide technical topic chapters.
	Results of desktop and baseline studies	
	Aspects and matters to be scoped in, including details of the methods to be used to assess impacts and to determine significance of effect	
	Any avoidance or mitigation measures proposed	
	References to any guidance and best practice	**Chapters 6 to 29**, onshore and offshore technical topic chapters (Guidance).
	Evidence of agreements reached with consultation bodies	**Chapters 6 to 26**, include a section on consultation and engagement to date and outlines where this has been taken into account in the proposed scope.
	An outline of the structure of the proposed ES	A brief outline of the proposed structure of the ES is provided in **Chapter 5** EIA Approach and Method.
	Transboundary screening matrix	The transboundary screening matrix will be provided at a future stage of the process and is not included at this time.

1.8 Structure of this EIA Scoping Report

1.8.1 The structure of this EIA Scoping Report is set out within **Table 1-2**. For ease of presentation, technical topic chapters have been split into those relating to the Onshore and Offshore Schemes respectively.

Table 1-2 Structure of the EIA Scoping Report

Volume	Chapter	Content
Volume 1	***Introduction:***	
	1. Introduction	Introduces the Project and the purpose and structure of the EIA Scoping Report.
	2. The proposed Scheme Description	Provides a detailed description of the proposed Scheme and its main components.
	3. Assessment of Alternatives	Provides an overview of the alternatives considered and overview of how the proposed Scheme has been developed to date.
	4. Legislation and Policy Overview	Summarises the relevant national, regional and local legislative and policy context for the proposed Scheme.
	5. EIA Approach and Method	Details the requirements for scoping and the proposed approach to EIA, including mitigation and potential cumulative effects. This section also defines some of the key terms used within the EIA process.
	Onshore:	
	6. Air Quality	Describes aspects to be scoped in and scoped out of the EIA. For those scoped in proposed methodology and approach to the assessment is included. These chapters also include an explanation of likely significant effects associated with each topic, in accordance with Regulation 10 (3) of the EIA Regulations.
	7. Agriculture and Soils	
	8. Ecology and Biodiversity	
	9. Geology and Contamination	
	10. Health and Wellbeing	
	11. Historic Environment	
	12. Hydrology, Hydrogeology and Drainage	
	13. Landscape and Visual	
	14. Noise and Vibration	
	15. Traffic and Transport	
	16. Socio-Economics, Recreation and Tourism	
	17. Material Assets and Waste	
	Offshore:	

Volume	Chapter	Content
	18. Marine Physical Environment	Describes aspects to be scoped in and scoped out of the EIA. For those scoped in proposed methodology and approach to the assessment is included. The chapters also include an explanation of likely significant effects associated with each topic, in accordance with Regulation 10 (3) of the EIA Regulations.
	19. Intertidal and Subtidal Benthic Ecology	
	20. Fish and Shellfish	
	21. Intertidal and Offshore Ornithology	
	22. Marine Mammals and Marine Reptiles	
	23. Shipping and Navigation	
	24. Commercial Fisheries	
	25. Other Marine Users	
	26. Marine Archaeology	
	Proposed Scheme Wide:	
	27. Climate Change	Describes aspects to be scoped in and scoped out of the EIA. This chapter also includes an explanation of likely significant effects associated with Climate Change, in accordance with Regulation 10 (3) of the EIA Regulations.
	28. Major Accidents and Disasters	Describes aspects to be scoped in and scoped out of the EIA. This chapter also includes a screening matrix to identify potential risks of Major Accidents and Disasters, in accordance with Regulation 10 (3) of the EIA Regulations.
	29. Cumulative and Combined Effects of the Project	Combined onshore and offshore chapter that outlines the proposed methodology in respect of cumulative and combined effects in line with PINs Advice Note 17[8]. This chapter will identify a long list of developments to be considered in relation to the proposed Scheme.
	30. Summary and Approach to Environmental Statement	Presents a summary of the topics proposed to be scoped in and out of the EIA and the Approach to the Environmental Statement.
Volume 2	Figures	Figures to support Volume 1.
Volume 3	Appendices	Appendices to support Volume 1.

[8] Advice Note Seventeen: Cumulative effects assessment relevant to nationally significant infrastructure projects. Published August 2019 (version 2)

1.9 Competence

1.9.1 Regulation 14(4) of the EIA Regulations requires that an ES is prepared by 'competent experts' and that the ES is accompanied by a statement outlining the relevant expertise or qualifications of such experts.

1.9.2 Competent experts have prepared this EIA Scoping Report and will undertake the EIA and prepare the ES. The Applicant has commissioned Ove Arup and Partners Limited (Arup) to complete the EIA and produce the ES. Arup holds the Institute of Environmental Management and Assessment's (IEMA) EIA Quality Mark. This is an independently reviewed voluntary standard, requiring an organisation to commit to excellence in their EIA activities. The Offshore technical chapters have been produced by Collaborative Environmental Advisers Ltd (CEA). All specialists have demonstrable expertise in their fields. These credentials are demonstrated by 'Competent expert statement', as outlined in more detail in **Appendix 1-A**.

1.10 Other assessments

1.10.1 The EIA will take into account other relevant environmental assessments, with a view to avoiding duplication of assessment. The preparation of these other standalone assessments is needed to meet the requirements of other policy and legislation. Whilst the scope of these assessments will not be discussed within this EIA Scoping Report, the outcomes of these assessments may be referenced when carrying out the EIA (and vice versa).

Habitats Regulations Assessment

1.10.2 A Habitat Regulation Assessment (HRA) will be undertaken for all protected sites within the national site network, in accordance with the Conservation of Habitats and Species Regulations 2017 (as amended) and the Conservation of Offshore Marine Habitats and Species Regulations 2017 (as amended). The national site network includes existing SACs and SPAs. UK policy extends the requirements pertaining to European sites to include RAMSAR sites and potential SPAs. Further details on these sites are provided in **Chapter 8** Ecology and Biodiversity, **Chapter 18** Marine Physical Environment, **Chapter 19** Intertidal and Subtidal Benthic Ecology, **Chapter 21** Intertidal and Subtidal Ornithology and **Chapter 22** Marine Mammals and Marine Reptiles.

Marine Conservation Zone Assessment

1.10.3 A Marine Conservation Zone (MCZ) Assessment, under the Marine and Coastal Access Act 2009, will not be undertaken for the Project. The EIA Scoping Report (**Chapter 18** Marine Physical Environment, **Chapter 19** Intertidal and Subtidal Benthic Ecology and **Chapter 20** Fish and Shellfish) has not identified any relevant MCZs that intersect with the zone of influence (the spatial extent) over which direct and indirect impacts from the Project will likely be experienced.

Water Framework Directive Compliance Assessment

1.10.4 A Water Framework Directive (WFD) Compliance Assessment will be undertaken, in accordance with the Water Environment (Water Framework Directive) (England and Wales) Regulations 2017. The outcomes of the WFD Compliance Assessment will inform the EIA by determining the status of WFD waterbodies with the potential to be

impacted by the Project. The assessment will consider the extent to which the Project has the potential to impact upon the current and future target WFD status of water bodies and will follow the approach set out in National Infrastructure Planning Advice Note Eighteen: The Water Framework Directive[9]. Further information on WFD rivers and coastal waters with the potential to be impacted by the Project is provided in **Chapter 12** Hydrology, Hydrogeology and Drainage and **Chapter 18** Marine Physical Environment.

Flood Risk Assessment

1.10.5 A Flood Risk Assessment (FRA) will be undertaken in accordance with the National Planning Policy Framework, to consider flood risk both to and from the Proposed Scheme. The FRA will be included as an appendix within the ES and will consider flood risk both to and from the proposed Scheme, as well as outlining how this risk will be managed in the context of climate change. Further information on flood risk is provided in **Chapter 12** Hydrology, Hydrogeology and Drainage.

1.11 Stakeholder engagement

1.11.1 This section sets out the Applicant's approach to stakeholder engagement and consultation. It provides an overview of the general approach, the engagement and consultation that has taken place to date, and that is proposed in the future.

1.11.2 Engagement and consultation with technical stakeholders and the local community is a key element of the EIA process and will inform the design and assessment of the proposed Scheme. This process will be ongoing and will evolve and adapt through each stage of the optioneering and design process.

General approach

1.11.3 The Applicant will continue to ensure stakeholders are engaged and consulted in a useful and inclusive manner. The general approach to engagement and consultation includes:

- Engagement and consultation activities scheduled at key points of the design and assessment process;
- Proactive and effective engagement with statutory and non-statutory stakeholders, including local residents who are most likely to be impacted by the proposed Scheme;
- A focus on the matters of greatest importance and relevance to stakeholders to ensure efficient use of their time;
- Use of varied and accessible engagement techniques – including a mix of online and in person channels. One-way and two-way communications will be utilised;
- Opportunities for stakeholders to share their experience and knowledge to help identify potential effects, mitigations and enhancements at an early stage of the design process;

[9] Advice Note Eighteen: The Water Framework Directive. Published June 2017 (version 1)

- Addressing stakeholder queries and concerns in an efficient and effective manner; and
- Feedback which will be recorded, analysed and used to inform the EIA, optioneering and design of the proposed Scheme.

Summary of engagement and consultation undertaken

1.11.4 A summary of engagement undertaken since October 2022 is provided in **Table 1-3**.

Table 1-3 A summary of engagement undertaken to date

Date	Engagement and consultation activity	Stakeholders engaged/consulted
October 2022 to December 2022	Non-Statutory Consultation	Public consultation with communities and stakeholders. Feedback received from Statutory Environmental Bodies, non-statutory environmental groups, community members, parish councils and Members of Parliament.
August 2023 to October 2023	Local Authority Engagement	Engagement with local authority officers at Suffolk County Council and East Suffolk Council to discuss the following topics and EIA Scoping Report: • Ecology and biodiversity • Socioeconomics, recreation, and tourism • Health and wellbeing • Noise and vibration • Air quality • Hydrology, hydrogeology and drainage • Materials and waste • Geology and contaminated land • Landscape and visual • Historic environment and Archaeology • Transport
September 2023 to November 2023	Supplementary Non-Statutory Consultation	Supplementary public consultation with communities and stakeholders, this covered the original siting and routing options presented in 2022 non-statutory consultation, and additional options identified since the non-statutory consultation was held in 2022: • The Alternative Underground Cable Northern Search Area; and • Landfall G2, the alternative landfall site at Walberswick. Feedback received from Statutory Environmental Bodies, non-statutory environmental groups, community members and parish councils.
December 2022 to January 2024	Statutory Environmental Bodies / Technical Stakeholders	Engagement with the following Statutory Environmental Bodies / Technical Stakeholders to discuss the Project and EIA Scoping Report: • Historic England; • Environment Agency; • Natural England;

Date	Engagement and consultation activity	Stakeholders engaged/consulted
		• Royal Yachting Association; • Sunk Vessel Traffic Scheme User Group; • Joint Nature Conservation Committee (JNCC); • Maritime and Coastguard Agency (MCA); and • Trinity House.

1.11.5 The Applicant has had regard to Advice Note 7, and in particular Paragraph 5.8, in preparing this scoping request. The Applicant has undertaken two rounds of its own non-statutory consultation. This has allowed for refinement of options prior to making a formal scoping request. The Applicant has undertaken this non-statutory consultation in advance of the formal scoping process, which avoids any overlap with the Planning Inspectorate's statutory scoping consultation process.

1.11.6 Following the Non-Statutory Consultation undertaken in 2022 and Supplementary Non-Statutory Consultation in 2023, the Interim Non-Statutory Consultation Feedback Summary Report[10] and Non-Statutory Consultation Feedback Summary Report[11] were published respectively. The reports provide an overview of the feedback received during each consultation, and how this feedback is being used to refine the proposed Scheme.

Engagement and consultation with technical and specialist stakeholders

1.11.7 Engagement on the scope and methodology for the EIA Scoping Report has been undertaken with the following technical/specialist stakeholders:

- Environment Agency;
- Natural England;
- Historic England;
- Suffolk Coast & Heaths AONB Partnership;
- Highways Authority (Suffolk County Council);
- Joint Nature Conservation Committee; and
- Maritime & Coastguard Agency;

1.11.8 The Applicant has engaged with Landowners regarding the surveys that have been undertaken to support the assessment of the Project and design optioneering. These discussions will continue through the ongoing programme of surveys.

1.11.9 The Applicant will continue to engage with other developers in the area to consider opportunities for coordination, including Sea Link, Nautilus, Scottish Power Renewables and EDF Energy.

[10] Interim Non-Statutory Consultation Feedback Summary Report. August 2023. https://www.nationalgrid.com/national-grid-ventures/future-developments/lionlink [accessed February 2024]

[11] Non-Statutory Consultation Feedback Summary Report. March 2024. https://www.nationalgrid.com/national-grid-ventures/future-developments/lionlink

Future engagement and consultation

1.11.10 In line with the requirements of the PA2008, the Applicant will undertake further consultation and engagement with communities and stakeholders as the proposed Scheme continues to develop.

1.11.11 The programme of ongoing stakeholder engagement and consultation will be structured around key milestones in the design development and assessment process. This will provide the opportunity to update and consult stakeholders on the evolving design and decision-making process.

1.11.12 Engagement and consultation will continue throughout the stages of the Project, with the following stakeholders:

- Statutory bodies;
- Non-statutory bodies;
- Local authorities;
- Directly affected individuals and asset owners; and
- Local communities.

1.11.13 A Statutory Consultation will be held in 2025, and the Preliminary Environmental Information (PEI) Report will be issued as part of this. The PEI Report will enable consultees to understand the likely environmental effects of the proposed Scheme and help to inform their responses to the Statutory Consultation.

1.11.14 The Applicant will set up Technical Working Groups which will be themed to allow collaborative engagement across core environmental issues. The aim is to encourage attendees representing different environmental organisations to assist in reaching resolution with all parties, to inform the EIA.

1.11.15 Through the process of engagement and consultation the aim is to reach agreement, as far as possible, with stakeholders prior to the submission of the DCO. Statements of Common Ground will be developed between the Applicant and relevant stakeholders to document any remaining areas of disagreement which will be shared with the Planning Inspectorate at the point of submitting the application for Development Consent.

1.11.16 A summary of the engagement and consultation activities undertaken, and how feedback has been taken into account will be documented in the Consultation Report which will accompany the DCO application.

Contents

2. The proposed Scheme Description

2.1 Introduction

2.1.1 This chapter provides a description of the proposed Scheme and an outline of key activities that would be undertaken during construction, operation and decommissioning.

2.1.2 The area of land presented on **Figure 1-1** is the proposed Scheme Scoping Boundary which is the subject of the Environment Impact Assessment (EIA) Scoping Report. This comprises the land which has been identified, at this stage of the Project development and design process, as potentially being required to construct and operate the proposed Scheme, and which will be refined as scheme development progresses. The proposed Scheme Scoping Boundary includes more than one option in certain instances, but the Applicant expects that only one option will be taken forward in the Development Consent Order (DCO) application for each element of the proposed Scheme where there is optionality at this stage.

2.1.3 The cable routes and precise locations for infrastructure have not yet been defined. For the purposes of scoping, the proposed Scheme Scoping Boundary allows sufficient area for flexibility in design, and therefore allows for micro siting of the infrastructure incuding the underground and submarine cables within the corridor. The proposed Scheme Scoping Boundary will be developed through the design and assessment processes, to be refined down to Order limits presented in the DCO. A more detailed description of the proposed Scheme will be presented in the Preliminary Environmental Information (PEI) Report and subsequently the Environmental Statement (ES) (which will accompany the DCO application).

2.1.4 This chapter is supported by the following figures:

- **Figure 1-1**: Project Scheme Scoping Boundary;
- **Figure 1-2**: Proposed Onshore Scheme Scoping Boundary;
- **Figure 1-3**: Proposed Onshore Scheme Scoping Boundary and Scheme Components; and
- **Figure 1-4**: Proposed Offshore Scheme Scoping Boundary.

2.1.5 This chapter provides:

- A description of the proposed infrastructure onshore and offshore forming the proposed Scheme;
- The construction methods proposed for the proposed Scheme;
- Operation and maintenance requirements for the proposed Scheme; and
- Outline of decommissioning activities for the proposed Scheme.

2.2 Proposed Scheme overview

2.2.1 The LionLink Project (hereafter referred to as the 'Project') comprises a new interconnector with a capacity of up to 1.8 gigawatts (GW) between the National Electricity Transmission Systems (NETSs) of Great Britain (GB) and the Netherlands, including a connection into a wind farm located in Dutch waters.

2.2.2 The proposed Scheme, which this EIA Scoping Report covers, consists of the GB components (onshore and offshore) only. The proposed Scheme comprises:

- The Friston Substation[1];
- Proposed high voltage alternating current (HVAC) Underground Cables between the proposed Converter Station in Suffolk and Friston substation;
- The proposed Converter Station in Suffolk, east of Saxmundham;
- Proposed high voltage direct current (HVDC) Underground Cables between the proposed Converter Station in Suffolk, and a proposed Landfall Site at either Southwold or Walberswick; and
- Submarine electricity cables from a proposed Landfall Site (at either Southwold or Walberswick) at the UK coast to the edge of the UK Exclusive Economic Zone (EEZ).

2.2.3 Interconnectors comprise onshore and subsea electricity cables that connect the electricity transmission systems of at least two countries to each other, and in some instances may include a connection to offshore power generation such as wind farms. The route of the Submarine electricity cables is from a grid connection point in the vicinity of the Suffolk coast, UK, to the coast near Rotterdam in the Netherlands, and a connection to the Ijmuiden Ver and Nederwiek windfarm zones located in Dutch waters.

2.2.4 For the purposes of this EIA Scoping Report the offshore chapters will cover up to the Mean High Water Springs (MHWS) and onshore chapters will cover up to the Mean Low Water Springs (MLWS) (see **Figure 1-2, Figure 1-3 and Figure 1-4**).

2.2.5 The proposed Scheme has been split into the proposed Onshore Scheme (see **Chapters 6 to 17**), the proposed Offshore Scheme (see **Chapters 18 to 26**) and proposed Scheme wide factors (see **Chapters 27 to 30**) for the purpose of this EIA Scoping Report.

2.3 Proposed Onshore Scheme

Onshore Scheme description

2.3.1 The proposed Onshore Scheme illustrated on **Figure 1-2** and **Figure 1-3** comprises:

- The Friston Substation;
- Proposed HVAC Underground Cables between the proposed Converter Station in Suffolk and Friston substation;

[1] There are various scenarios for how development of Friston Substation would be brought forward, see section 2-3-4 for more details.

- The proposed Converter Station in Suffolk east of Saxmundham;
- Proposed HVDC Underground Cables between the proposed Converter Station in Suffolk; and
- A proposed Landfall Site at either Southwold or Walberswick.

Friston Substation

2.3.2 Friston Substation is the proposed connection point for the Project into the GB NETS. At this time there are different potential scenarios in relation to how Friston Substation would come forward, which project(s) would use it and which entity is responsible for consenting and construction.

2.3.3 The current position is that there could be up to five projects, including the Project, potentially connecting to the NETS at Friston Substation:

- East Anglia One North (EA1N) and East Anglia Two (EA2) Offshore Windfarm projects, being promoted by Scottish Power Renewables (SPR), which have been granted consent to develop and connect to Friston Substation as part of these projects;
- Sea Link electricity network reinforcement project, being promoted by National Grid Electricity Transmission (NGET) and is proposing to connect to Friston Substation;
- The Nautilus project, being promoted by National Grid Ventures (NGV) and proposed to connect to Friston Substation[2]; and
- The proposed Onshore Scheme as part of this Project.

2.3.4 There are various scenarios for how development of Friston Substation would be brought forward. This EIA Scoping Report presents two sets of parameters for Friston Substation:

- Amendments to Friston Substation – amendments to Friston Substation would be required if Friston Substation was built out by either EA1N/EA2 or Sea Link. The parameters for this scenario are presented in **Table 2-1**.
- Proposed Friston Substation – if the Project was brought forward first, then it would be responsible for consenting Friston Substation for the Project, EA1N/EA2, Sea Link and Nautilus. The parameters for this scenario are presented in **Table 2-2**.

2.3.5 The current assumption is that EA1N/EA2 would construct Friston Substation and the proposed Onshore Scheme would amend Friston Substation. However, as there is a scenario where the proposed Onshore Scheme could come forward first, the EIA will consider both scenarios within the assessments in order to ensure the EIA is robust in considering the worst-case scenario as well as the current assumption.

Amendments to Friston Substation

2.3.6 If Friston Substation is delivered by SPR, in accordance with the EA1N/EA2 consents, or by Sea Link, amendments to Friston Substation would be required in order to

[2] The inclusion of the Nautilus project would not change the parameters as set out for the Friston Substation in the SPR East Anglia ONE North and East Anglia TWO DCOs, no additional footprint is required.

accommodate the connection of the proposed Onshore Scheme. The works proposed to amend Friston Substation would comprise:

- Extension to the boundary of the site and installation of new boundary fencing and landscaping;
- Extension of the Gas Insulated Switchgear (GIS) Hall, including associated civil ground works and other mitigation such as drainage;
- Installation of up to two new GIS bays for the connection of the proposed HVAC Underground Cables, located within the extension of the GIS Hall building;
- Associated GIS equipment and busbars for the additional Series Reactor circuit bays and operational bays, such as Bus Sections, to be located within the extension of the GIS Hall; and
- Connection of a new 400kV Series Reactor static wound unit, located within the extended operational boundary of the substation.

2.3.7 The key parameters of the amended Friston Substation, as required to accommodate the proposed Onshore Scheme, are described in **Table 2-1**.

Table 2-1 Key characteristics of the amended Friston Substation

Key characteristic	Description**
Maximum no. of buildings	1 building to accommodate connection into the substation
Maximum height of additional building	Up to 5m
Permanent footprint (total)*	Up to 1ha
Access	Relocation of the permanent access road
Overhead line (OHL) modifications	None required

*this does not include land that may be determined to be required for potential mitigation following the assessment.
**the descriptions provided are for the additional components required to connect the Project, and are additional footprint / buildings to those required for EA1N/EA2 or Sea Link.

Proposed Friston Substation

2.3.8 Alternatively, if Friston Substation is not delivered by SPR pursuant to the EA1N/EA2 consents, or by the Sea Link or Nautilus Projects, Friston Substation would be delivered by the Applicant as part of the proposed Onshore Scheme.

2.3.9 In this scenario, the Project would seek consent for Friston Substation to allow connections for the proposed Onshore Scheme, as well as for EA1N/EA2, Sea Link and Nautilus. The works would comprise:

- Construction of a new GIS Substation to connect to the existing 400kV overhead lines (Bramford to Sizewell circuits 1 and 4) including associated civil ground works such as drainage;
- Removal of one overhead line (OHL) tower and installation of two new towers. During construction, temporary towers and/or masts would be used to facilitate the reconfiguration of the OHL connections. No OHL works are required for any other

part of the proposed Onshore Scheme, with this work limited to the vicinity of Friston Substation;

- Construction of a substation access road; and
- Associated mitigation and landscaping.

2.3.10 The key parameters of these works are described in **Table 2-2**.

Table 2-2 Key characteristics of the proposed Friston Substation

Key characteristic	Description
Maximum no. of buildings	1 main building (substation), with 8 associated buildings
Maximum height	Up to 16m (substation), up to 5m (associated buildings)
Permanent footprint*	Up to 3ha
Access	New permanent access road required
OHL modifications	Installation of two new terminal towers

*this does not include land that may be determined to be required for potential mitigation following the assessment

Proposed HVAC Underground Cables

2.3.11 The HVAC Underground Cable would connect the proposed Friston Substation to the proposed Converter Station. At this time there are different potential scenarios in relation to how the HVAC Underground Cables would come forward, with regards to which project(s) would install ducts and associated cables first. This is due to the potential opportunity to coordinate the proposed Onshore Scheme with Sea Link and Nautilus if all or some of the projects select adjacent converter station sites at the same location. Consequently, there may opportunity to coordinate the proposed HVAC Underground Cable Corridors to Friston Substation.

2.3.12 The current position is that there could be up to three projects potentially requiring the installation of HVAC underground cables from the proposed Converter Station into Friston Substation:

- Sea Link electricity network reinforcement project, which is being promoted by NGET;
- The Nautilus project, which is being promoted by NGV; and
- The proposed Onshore Scheme as part of this Project.

2.3.13 There are a number of scenarios for how the HVAC Underground Cable could be brought forward. This EIA Scoping Report presents two sets of parameters:

- The Project installing the HVAC underground cables for this Project only (the proposed Onshore Scheme); and
- The Project installing the ducting for up to two other projects (Sea Link and Nautilus), and the HVAC Underground Cables for this Project. This would allow for coordination or co-location of the proposed Onshore Scheme with up to two other projects.

2.3.14 The current assumption is that the proposed Onshore Scheme would consent and install HVAC underground cables for this Project only. However, as there is a scenario where the proposed Onshore Scheme could come forward first, the EIA will consider both scenarios within the assessments in order to ensure the EIA is robust in considering the worst-case scenario.

2.3.15 Whilst there is a possible scenario where Sea Link or Nautilus construct first and install ducting for this Project, this is not assessed here, as the potential effects associated with this scenario are expected to be no greater than the two scenarios presented.

Description of the proposed HVAC Underground cables

2.3.16 The proposed HVAC Underground Cable Corridor is from the proposed Converter Station east of Saxmundham, tracking in an eastern direction parallel to the Saxmundham Road (B1119) before turning south-westerly; north of Knodishall, and tracking the OHL to Friston Substation.

2.3.17 The proposed HVAC Underground Cables would have an operating voltage of 400kV and are likely to be manufactured using cross linked polyethylene (XLPE) as the primary insulation for the cable. The final size of the cables will be confirmed as the design develops.

2.3.18 Where the Project is installing the HVAC Underground Cables for this Project only, the cables would be installed in two trenches, each containing three HVAC power cables and one fibre optic cable, typically arranged in flat formation. The formation can vary depending on the requirements of the route and ground conditions, and would be determined as the design develops. The cables would connect from the terminations at the proposed Convertor Station alternate current (AC) compound to the proposed Friston Substation terminating via cable sealing ends in the substation.

2.3.19 The proposed HVAC Underground cables would be laid in sections up to 1km in length. These would be connected at joint bays with above ground earthing link pillars. The exact number of these will be confirmed as the design develops; it has been assumed up to eight could be required. The link pillars would be located within a small fenced off area. Approximately eight buried inspection boxes for the fibre optic cable would also be required, however, these would be flush to the ground or buried at the same depth as the cables.

2.3.20 **Table 2-3** provides an overview of the key characteristics of the proposed HVAC Underground Cables if constructing for the proposed Onshore Scheme only.

Table 2-3 key characteristics of the proposed HVAC Underground Cables if constructing for the proposed Onshore Scheme only

Key characteristic	Description
Working width	Up to 63m (typical)
Permanent easement*	Up to 30m
No. of trenches	2
No. of cables	6 power cables, up to 4 fibre optic cables
Trench width/depth	Up to 2.45m x 1.5m

Key characteristic	Description
Minimum depth of cover top of cable	Agricultural land – 1.05m (1050mm) Watercourses – 2.0m (2000mm) Roads – 0.75m (750mm) Railways – 5m (5000mm) Footpaths and non-agricultural verges – 0.6m (600mm)
Backfill material directly around cable ducts	Soil and cement bound sand (CBS) or other thermally suitable material
Cable section length	Up to 1km
Cable joint bays	Up to 8
Above ground infrastructure	At each joint bay location and dependent on ground conditions: either an above ground link Pillar or in ground link box is needed at each joint bay position. - Above ground link pillars would be used, sized at up to 1.3m (H) x 0.5m (D) plus a suitably sized concrete foundation and possibly fencing depending on step and touch potential. - Link box located below ground with manhole covers for access, no requirement for foundation, fencing, or additional earthing etc. - Up to 8 link pillar/boxes, based on assumed HVAC Underground Cable length of up to 5km. - Fibre optic inspection boxes; buried either flush to ground level or at depth of cable. Up to 8 required.

*This does not include land that may be determined to be required for potential mitigation following the assessment.

2.3.21 As set out in paragraph 2.3.12, there is the potential opportunity to coordinate the proposed Onshore Scheme with Sea Link and/or Nautilus if all three projects select adjacent converter station sites at the same location. Consequently, there may opportunity to coordinate the proposed HVAC Underground Cable Corridors.

2.3.22 Where the Project is installing the HVAC Underground Cables for this Project and the ducting for up to two other projects, the proposed Onshore Scheme would include an additional four trenches (six trenches in total) and additional 18 ducts (26 ducts in total) with associated temporary stockpiles of topsoil and subsoil. As a result, the working width[3] would increase as identified in **Table 2-4**. The additional trenches would be constructed and re-instated ready with empty ducts and the works to install the cables within these ducts would be subject to separate project consents obtained by the NGET and NGV projects.

2.3.23 **Table 2-4** provides an overview of the key characteristics of the proposed HVAC Underground Cables if providing the ducting for up to two other projects.

[3] The working width is the likely area required to construct the underground pipeline this would provide space for a haul road, construction working areas, storage areas, the pipeline trench and soil storage areas.

Table 2-4 key characteristics of the proposed HVAC Underground Cables if providing the ducting for up to two other projects.

Key characteristic	Description
Working width	Up to 112m
Permanent easement*	Up to 60m
No. of trenches	6
No. of cables	18 power cables, up to 12 fibre optic cables
Trench width/depth	Up to 2.45m x 1.5m
Minimum depth of cover top of cable	Agricultural land – 1.05m (1050mm) Watercourses – 2.0m (2000mm) Roads 0.75m (750mm) Railways – 5m (5000mm) Footpaths and non-agricultural verges – 0.6m (600mm)
Backfill material directly around cable ducts	CBS or other thermally suitable material
Cable section length	Up to 1km
Cable joint bays	Up to 24
Above ground infrastructure	At each joint bay locations and dependent on ground conditions: - Above ground link pillars would be used, sized at up to 1.3m (H) x 0.5m (D) plus a suitably sized concrete foundation and possibly fencing depending on step and touch potential. - Link box located below ground with manhole covers for access, no requirement for foundation, fencing, or additional earthing etc. - Up to 24 link pillar/boxes, based on assumed HVAC underground cable length of up to 5km. - Fibre optic inspection boxes; buried either flush to ground level or at depth of cable. Up to 24 required.

Proposed Converter Station

2.3.24 At this time there is the potential opportunity to coordinate the proposed Onshore Scheme with Sea Link who are proposing a converter station at the same location and Nautilus which has the potential to select the same converter station location. The coordination and co-location of projects in the area is being explored through the design and site selection process.

2.3.25 Co-location would involve coordination with the other projects so that up to three converter stations can be located on adjacent sites at the same location; however, the

additional converter station(s) would be subject to their own consent and would not form part of the proposed Onshore Scheme. Therefore the parameters provided below for the converter station are for this Project only.

Description of the proposed Converter Station

2.3.26 Converter stations are required to convert electricity from Alternating Current (AC) to Direct Current (DC) (or vice versa depending on the direction of power flow). Certain elements of this equipment must be situated within buildings.

2.3.27 The proposed Converter Station would comprise of the following general components:

- Five main buildings:
  - Two buildings, containing converter equipment, up to 26m in height;
  - One control building, containing control room, offices, welfare, meeting rooms, low-voltage alternating current (LVAC), telecoms etc, up to 15m in height; and
  - Two spare parts storage building, up to 15m in height.
- Converter Transformer compound (typically adjoining the converter hall);
- AC air insulated switchgear (AIS) switchgear yard, including AC AIS cable sealing ends;
- Permanent access road and internal access road;
- Site wide drainage;
- Emergency lighting (no permanent lighting); and
- Landscaping/landscape planting.

2.3.28 **Insert 2-1** shows a photograph of a typical converter station, taken from Viking Link during construction in May 2023

Insert 2-1 Image of a standard converter station, during construction

2.3.29 **Table 2-5** provides an overview of the key characteristics of the proposed Converter Station required for the proposed Onshore Scheme only.

Table 2-5 key characteristics of the proposed Converter Station

Key Characteristic	Description
Permanent footprint	260m x 260m
Permanent land take*	Up to 6 ha
Maximum no. of buildings	Up to 5
Maximum height of buildings	26m
Access	New permanent access road required

*this does not include land that may be determined to be required for potential mitigation following the assessment

Proposed HVDC Underground Cables

2.3.30 The HVDC Underground Cables would connect the proposed Converter Station to a proposed Landfall Site at either Southwold or Walberswick. At this time there are different potential scenarios in relation to how the HVDC Underground Cables would come forward, with regards to which project(s) would install ducts and associated cables first.

2.3.31 The current position is that there could be up to two projects, including the Project, potentially requiring the installation of HVDC Underground cables into the proposed Converter Station:

- The Nautilus project which is being promoted by NGV; and
- The Project, as discussed in this EIA Scoping Report.

2.3.32 At this time, Sea Link's preferred landfall site is further south than those preferred for this Project. As a result, there is no opportunity to co-ordinate or co-locate the proposed HVDC Underground Cables with Sea Link.

2.3.33 Nautilus has not yet confirmed its landfall site and as such there is the potential opportunity to co-ordinate or co-locate the proposed HVDC Underground Cables.

2.3.34 There are various scenarios for how the HVDC Underground Cables would be brought forward. This EIA Scoping Report presents two sets of parameters:

- The Project installing the HVDC underground cables for this Project only (the proposed Onshore Scheme); and
- The Project installing the ducting for Nautilus, and the HVDC underground cables for this Project only, allowing for coordination or co-location of the proposed Onshore Scheme with up to one other project.

2.3.35 The current assumption is that the Project would consent and install HVDC underground cables for proposed Onshore Scheme only. However, the EIA will consider both scenarios within the assessments in order to ensure the EIA is robust in considering the worst-case scenario.

2.3.36 Whilst there is a possible scenario where Nautilus construct first and install ducting for this Project, this is not assessed here, as the potential effects associated with this scenario are expected to be not greater than the two scenarios presented.

Description of the proposed HVDC Underground cables

2.3.37 At this time there are two potential landfall site locations for the proposed Onshore Scheme (see **Section 2.3.51 to 2.3.54** for further detail), with one location to be selected following further siting and routing design. These options share a common corridor for the proposed HVDC Underground Cable Corridor from the Proposed Converter Station east of Saxmundham, running north to reach an area just south of Blythburgh (See **Figure 1-3**). Following this, the proposed HVDC Underground Cable Corridor follows two potential options:

- The first continues north towards Uggeshall, before turning east past Wangford and on towards Southwold. The proposed Landfall Site is located on agricultural fields to the north of Southwold; and
- The second option, turns east before Blythburgh, running towards the village of Walberswick. The proposed Landfall Site is located on agricultural fields to the south of Walberswick.

2.3.38 The proposed HVDC Underground cables would have an operating voltage of 525kV and are likely to be manufactured using XLPE as the primary insulation for the cable. The final size of the cables will be confirmed as the design develops.

2.3.39 Where the Project is installing the HVDC Underground cables for this Project only, the cables would be installed in one trench, containing two power cables, one dedicated metallic return cable, up to two fibre optic cables. The formation can vary depending on the requirements of the route and ground conditions and would be determined as the design develops. The cables would connect from the transition joint bay at the proposed Landfall Site and terminate at the proposed Converter Station.

2.3.40 The proposed HVDC Underground cables would be laid in sections up to 1.3km in length. These would be connected at joint bays with no above ground structures. The exact number of these joint bays will be confirmed as the design develops; up to 50 could be required.

2.3.41 **Table 2-6** provides an overview of the key characteristics of the proposed HVDC Underground Cables (proposed Onshore Scheme only).

Table 2-6 Key characteristics of the proposed HVDC Underground Cables (proposed Onshore Scheme only)

Key Characteristic	Description
Working width	Up to 40m (typical)
Permanent easement*	Up to 18m
Trench width/depth	Up to 3.0m x 1.5m
Minimum depth of cover top of cable	Agricultural land – 1.05m (1050mm) Watercourses – 2.0m (2000mm) Roads – 0.75m (750 mm) Railways – 5m (5000 mm) Footpaths and non-agricultural verges – 0.6m (600 mm)

Key Characteristic	Description
Backfill material directly around cable ducts	CBS or other thermally suitable material
No. of trenches	1 trench
No. of cables	2 power cables, 1 dedicated metallic return cable, up to 2 fibre optic cables
Cable section length	Up to 1.3km
Cable Joint bays	Buried concrete base or pad. Up to 50 joint bays.

*this does not include land that may be determined to be required for potential mitigation following the assessment.

2.3.42 As set out in **Section 2.3.34** there is the potential opportunity to coordinate the proposed Onshore Scheme with Nautilus if both projects select the same converter station location as this provides an opportunity to potentially co-locate and coordinate the HVDC underground cables into the converter station.

2.3.43 Where the Project is installing the HVDC Underground Cables for this Project and the ducting for up to one other project (Nautilus), the proposed Onshore Scheme would include an additional trench (two trenches in total) and additional four ducts (eight ducts in total) alongside associated temporary stockpiles of topsoil and subsoil. As a result, the working width would increase. The additional trench would be constructed and re-instated ready with empty ducts and works to install the cables within these ducts would be subject to separate project consents obtained by the project.

2.3.44 **Table 2-7** provides an overview of the key characteristics of the proposed HVDC Underground Cables for the proposed Onshore Scheme with up to one other project.

Table 2-7 Key characteristics of the proposed HVDC Underground Cables (proposed Onshore Scheme with up to one other project)

Key Characteristic	Description
Working width	Up to 59m
Permanent easement*	Up to 30m
Trench width/depth	Up to 3.0m x 1.5m (per trench)
Minimum depth of cover top of cable	Agricultural land – 1.05m (1050mm) Watercourses – 2.0m (2000mm) Roads – 0.75m (750mm) Railways – 5m (5000mm) Footpaths and non-agricultural verges – 0.6m (600 mm)
Backfill material directly around cable ducts	CBS or other thermally suitable material
No. of trenches	2 trenches

Key Characteristic	Description
No. of cables	4 power cables, 2 dedicated metallic return cable, up to 4 fibre optic cables each circuit
Cable section length	Up to 1.3km
Cable Joint bays	Buried concrete base or pad. Up to 100 joint bays

Proposed Landfall

2.3.45 The landfall is the interface between the Onshore Scheme and Offshore Scheme. As described in **Section 2.2,** there are currently two locations under consideration for this Project for the proposed Landfall Site (see **Figure 1-2**). Only one landfall site would be required. The landfall infrastructure would remain the same regardless of which location is selected.

2.3.46 The current search areas for the proposed Landfall Site are shown on **Figure 1-2**, not all of the land within the search areas would be required, and the area will be reduced through optioneering and micro-siting.

2.3.47 Sea Link's preferred landfall site is further south than those preferred for this Project. As a result, there is no opportunity to co-ordinate or co-locate at the landfall.

2.3.48 The proposed Landfall Site is the location where the proposed HVDC Submarine Cables would transition onshore. The submarine cables would connect to onshore cables at a buried Transition Joint Bay (TJB) which would be located within the proposed Landfall Site and defined by horizontal directional drilling (HDD) assessment. The extent of area that the TJB would occupy would be confirmed as the design develops and would occupy an area of up to 100m^2 based on an indicative footprint of 20m x 5m, however a larger temporary area of up to 2ha would be required during installation to accommodate construction equipment and storage.

2.3.49 The proposed Landfall may require one optical fibre repeater box. This would be up to 1.5m high and would occupy an area of up to 6m^2 based on an indicative footprint of approximately 3m x 2m. These would be confirmed as the design develops in conjunction with the final layout and total area required. The repeater box could be located in an existing building or similar if available subject to agreement.

2.3.50 **Table 2-8** provides an overview of the key characteristics of the proposed Landfall.

Table 2-8 Key characteristics of the proposed landfall

Key Characteristic	Description
Permanent footprint*	Up to 6m^2
Installation approach	HDD
HDD Length	Up to 1.5km
Above ground infrastructure – subject to final design	Optical fibre repeater boxes: Box size: Up to 1.5m (H) x 0.5m (D)

*this does not include land that may be determined to be required for potential mitigation following the assessment

Landfall Optionality

2.3.51 Through detailed siting and routeing work the landfall site options have been refined down to two options, which are still being assessed. These landfall options have associated HVDC Underground Cable Corridors which connect to the proposed Converter Station, and which are partly common to both landfall options, see paragraph 2.3.37. The proposed Southwold Landfall is located on agricultural fields to the north of Southwold. The proposed Walberswick Landfall is located on agricultural fields to the south of Walberswick.

2.3.52 These options will be subject to further technical feasibility work and will be refined to one preferred option for inclusion in the PEI Report. The options outlined above would utilise the same infrastructure and scheme components (as per **Table 2-8**), although the location of this will vary depending on the option carried forward.

2.3.53 The Planning Inspectorate's (2020) Advice Note Seven: Environmental Impact Assessment: Process, Preliminary Environmental Information and Environmental Statements (Version 7) requires an EIA Scoping Report to explain the approach to addressing uncertainty (where it remains) in relation to components of a project. This EIA Scoping Report is based on the preliminary design of each of the two landfall options, which will be developed further to take into account the findings of ongoing environmental and technical assessment work, and to have regard to consultation responses. The uncertainty as to the preferred option is thereby addressed by ensuring that the preliminary design of both options, and the two alternative HVDC Underground Cable Corridors, are included in this EIA Scoping Report.

2.3.54 The 'Rochdale Envelope' or 'Design Envelope' approach, outlined in **Chapter 5** EIA Approach and Method of this EIA Scoping Report, will be employed to allow for detailed design to take place post-application for development consent. In the case of the proposed Scheme, this allows for two landfall options and two accompanying HVDC Underground Cable Corridors to be taken into the EIA scoping process. These options will be refined to a single landfall location and single HVDC Underground Cable Corridor by PEI stage following further assessment of the alternative landfall options and developing design information.

Onshore Scheme Construction

2.3.55 This section outlines the proposed construction of the proposed Onshore Scheme. Where relevant the technical chapters within **Chapters 6 to 29** have incorporated control and management measures when proposing their assessment scope.

Construction programme

2.3.56 The ES will be based on a construction programme identified by construction year rather than specific calendar year e.g. Year 1, Year 2 rather than 2026, 2027. The dates provided below are indicative only.

2.3.57 Following the confirmation of development consent, construction works would be expected to begin in 2026, with completion expected in 2030. Key construction works and relevant anticipated duration for each are as follows:

- Friston Substation: Amendments to Friston Substation would take up to 13 months. Construction of the proposed Friston Substation, if necessary, would take 18-24 months which is typical for a new build substation;

- Installation of the proposed HVAC Underground Cables: up to one year for this project, up to two years if constructing for up to two additional projects;
- Construction of the proposed Converter Station: construction is expected to take up to four years to complete from initial groundworks to erection of buildings and installation of specialist electrical equipment through to commissioning;
- Installation of the proposed HVDC Underground Cables: up to three years for this project, up to five years if constructing one additional project. This would run in parallel with the construction of the proposed Converter Station; and
- Installation of the proposed Landfall: the exact timing would be influenced by the installation approach of the proposed Offshore Scheme but it is expected that construction would occur over a period of up to 20 months. This could potentially be undertaken over two periods in different years.

Construction compounds

2.3.58 Temporary Construction Compounds (TCC) are typically larger areas utilised for the storage of plant and machinery and stockpiling materials, as well as the provision of site management offices, welfare facilities for staff (kitchen facilities, store rooms, toilet facilities), parking, and plant and material storage. There are two types of TCC proposed; primary and secondary. The function of the two is the same however there are minor variances in the size and potential duration of operation. Primary TCCs would be larger in size and would be in place for the duration of cable construction. Secondary TCCs would likely be in place for the majority of construction, but not the full duration. The number and location of the TCCs will be determined during the ongoing design development.

Site preparation works

2.3.59 In order to construct the proposed Onshore Scheme, enabling works are required. These are likely to be similar across components of the proposed Onshore Scheme. These temporary works may include:

- Installation of ‘bell mouths’ to enable access to existing or new roads;
- Creation of access tracks (location and routeing not currently known). On completion of construction the access tracks would be removed, and any aggregates used to surface the tracks would be taken to an appropriate facility for re-use or to be recycled;
- Fences erected around works and compound areas with suitable gated access;
- Groundwater and surface water controls may be required with the exact requirements to be confirmed as the design develops;
- Temporary drainage works and silt fencing. Sustainable drainage systems (SuDS) would be used where appropriate. Engagement with landowners will inform these works;
- Culvert installations may be required where there are temporary access tracks over ditches and watercourses. Should culverts not be suitable a temporary bridge would be installed; and
- Topsoil stripping and storage prior to the main works.

Friston Substation

2.3.60 Additional temporary land take of up to 3ha may be required to enable the construction. This does not include land that may be required for temporary access.

2.3.61 A typical sequence for the construction of works to amend the proposed Friston Substation, would involve:

- Preliminary works, consisting of site investigation and preconstruction surveys;
- Site establishment (including vegetation clearance and soil removal if required) and establishment of all temporary facilities including site offices, welfare facilities, utility supplies, lay down and storage areas, and site security fencing;
- Temporary access to the substation, including installation of bell mouths and creation of visibility splays (where required);
- Earthworks including land re-profiling in order to establish a level platform comprised of crushed rock for construction (if required);
- Civil engineering works including construction of building foundations, outdoor electrical equipment foundations, permanent drainage systems and internal roads and parking;
- Building works including construction of all building units, erection of steel frames and cladding;
- GIS extensions and bay installations (mechanical and electrical);
- Mechanical and electrical works of Series Reactor unit and associated Gas-Insulated Busbar (GIB) connections;
- Modifications to existing permanent services – water, foul drainage, low voltage electricity supplies and telecommunications, (if required);
- Outage works to connect to the existing substation;
- Commissioning - following completion of all construction works there would be a period of commissioning and testing;
- Energisation; and
- Site reinstatement and landscape works, including removal of site offices and temporary facilities, land reinstatement and landscape works.

2.3.62 Should the construction of the proposed Friston Substation be required by the Project, the construction sequence above would be the same up to the civil engineering works and would follow the following typical sequence thereafter:

- OHL reconfiguration works under outages including temporary towers/masts where required;
- Building works;
- GIS busbars and bay installation (Mechanical and Electrical);
- Outages to connect the new substation to the existing transmission network;
- Commissioning; and
- Energisation.

Proposed Converter Station

2.3.63 At this time there is the potential opportunity to coordinate the proposed Onshore Scheme with Sea Link and Nautilus, which are or may be proposing a Converter Station at the same location. This is being explored through the design and site selection process. However, the additional converter station(s) would be subject to their own consent and would not form part of the proposed Onshore Scheme therefore the information provided below for the converter station is for this Project only.

2.3.64 Additional temporary land take of up to 4ha may be required to enable the construction. This does not include land that may be required for temporary access.

2.3.65 A typical construction sequence for the construction of a converter station would include:

- Preliminary works, consisting of site investigation and preconstruction surveys;
- Access road construction, including installation of bell mouths and creation of visibility splays (where required);
- Site establishment, including vegetation clearance, soil removal and establishment of all temporary facilities including site offices, welfare facilities, utility supplies, lay down and storage areas, and site security fencing;
- Earthworks, including land re-profiling in order to establish a level platform comprised of crushed rock for construction of the converter station;
- Civil engineering works, including construction of building foundations, outdoor electrical equipment foundations, permanent drainage systems and internal roads and parking;
- Building works, including constructions of all building units, erection of steel frames and cladding;
- Cable installation; including underground installation of HVDC cables into the converter station, and HVAC cables between the converter station and the proposed Friston Substation;
- Provision/installation of permanent services – water, foul drainage, low voltage electricity supplies and telecommunications;
- Mechanical and electrical works, including installation of HVAC and HVDC electrical equipment and transformers;
- Commissioning - following completion of all construction works there would be a period of commissioning and testing; and
- Site reinstatement and landscape works, including removal of site offices and temporary facilities, land reinstatement and landscape works.

Proposed HVAC and HVDC Underground Cables

2.3.66 Whilst the number of cables and working width vary depending on whether the underground cable is HVAC or HVDC, the sequence and method of construction and installation is the same and has therefore been described together below.

2.3.67 The method of construction would not vary for co-location, however, there would be an increase in the number of trenches and working widths for multiple projects, this is

covered in **Section 2.3.11 to 2.3.25**. However, where there are engineering or environmental constraints, such as but not limited to, road, river or rail crossings these widths may vary. Where there are crossings of obstacles, a greater working width may be required to accommodate construction equipment to facilitate different crossing techniques.

2.3.68 TCC's would be required to support the cable installation:

- To enable the HVAC underground cable installation a primary temporary construction compound of up to 1.6ha may be required, and up to 0.3ha for a secondary temporary construction compound. This does not include land that may be required for temporary access; and
- To enable the HVDC underground cable installation additional temporary land take for temporary working areas would be required along the proposed HVDC underground cables. Each temporary area would be up to 0.5ha. This does not include land that may be required for temporary access.

2.3.69 There are multiple cable installation techniques available, the options under consideration for the proposed Onshore Scheme are:

- Open cut trench and ducting. This is the preferred method of cable installation due to enhanced physical protection of cables and ease of cable pulling;
- Open cut trench and direct burial. There may be areas where a direct buried solution may be more economical which will be explored as the design develops; and,
- Trenchless method: Typically pipe jacking (horizontal auger boring), HDD and Micro boring. Trenchless methods would be used in situations where open cut trench methods are not viable. The specific areas that require a trenchless cable installation would be further outlined as the design is refined.

2.3.70 The proposed underground HVDC and HVAC cables would be installed by a combination of open cut and trenchless methods. Open cut methods would be used in open agricultural land and trenchless methods typically used where the proposed cables cross obstacles; for example, roads, railway lines, buried utilities and watercourses or in areas where ground conditions or environmentally sensitivities are required to be avoided.

2.3.71 **Table 2-9** describes the installation methods for cable installation.

Table 2-9 Proposed HVAC and HVDC Likely Installation Methods

Method	Description
Open cut trench and direct burial	• Topsoil stripped from entire working width and stockpiled. There would be separation and storage of subsoil and topsoil to ensure no degradation in quality. • Trench dug utilising hydraulic excavators (or by hand in areas of known buried utilities). Excavated subsoil and topsoil would be stockpiled separately. • Install base layer of stabilised back fill such as CBS. Trench is left open for cable pulling.

Method	Description
	• Cables laid in trench by ‘pulling’ from cable drum, with the aid of rollers placed within the trench. • Cables are bedded in with stabilised back fill such as CBS. • Protective tiles are placed along the width of the trench. • Trench is back filled with excavated subsoil or thermally suitable material where required (to avoid the alteration of local environmental temperatures around the cables). • Warning tapes would be placed 100mm above the protective tiles vertically in line with the cable poles. • Joint bay locations are excavated along the route (up to 1.3km apart, and will be confirmed as the design develops), which would act as pulling locations for the cable. • Topsoil would be reinstated to the original soil profile and land re-seeded or released to the farmer for cultivation as it was found.
Open cut trench and ducting	• Preferred method of cable installation due to enhanced physical protection of cables and ease of cable pulling. • Topsoil stripped from entire working width and stockpiled. There would be separation and storage of subsoil and topsoil to ensure no degradation in quality. • Trench dug utilising hydraulic excavators (or by hand in areas of known buried utilities). Excavated subsoil and topsoil would be stockpiled separately. • Install base layer of stabilised back fill such as CBS. Trench is left open for duct laying. • Ducts are bedded in with stabilised back fill such as CBS. • Protective tiles are place along the width of the cable trench. • Trench is backfilled with excavated subsoil or thermally suitable material where required (to avoid the alteration of local environmental temperatures around the cables). • Warning tapes would be placed 100mm above the protective tiles vertically inline with the duct/cable poles. • Topsoil would be reinstated to original soil profile and land re-seeded or released to the farmer for cultivation as it was found. • Joint bay locations are excavated along the route (up to 1km apart, and will be confirmed as the design develops), which would act as pulling locations for the cable. • Cables are installed in the duct/trench by ‘pulling’ from cable drum between joint bays.

Method	Description
	• Small inspections/lubrication pits may be excavated between the joint bays to aid with the pulling activity.
Trenchless Method Pipe Jacking (horizontal auger boring)	• Topsoil would be stripped and separated from the sub soil. These would be stored separately to ensure no degradation in quality. • Excavate a launch and reception pit with a suitable concrete base and back wall to support the jacking equipment. • Hydraulic ram or jack and associated boring equipment located at launch pit. The size and depth of the launch pit is dependent upon the depth of the cable (deeper cable requires a deeper and larger pit). • Tunnel created by progressively inserting clay pipes behind the drill head (driven by the hydraulic jack), with material returned to the launch site (typically via a screw-shaped shaft). One tunnel is required for each cable. • Direction of the tunnel is determined by the set-up equipment in the launch pit and is continuously surveyed. • Drilling continues to the reception pit (also constructed prior to drilling, to a depth relative to the depth of cable). • Launch pit and reception pit may require sheet piling and further works to ensure a dry and stable working environment. • The launch pit and reception pit would be backfilled on completion of the crossing and the area reinstated. • Topsoil would be reinstated to the original soil profile and land re-seeded or released to the farmer for cultivation as it was found.
Trenchless Method HDD	• Topsoil would be stripped and separated from the sub soil. These would be stored separately to ensure no degradation in quality. • Excavate a launch and reception pit. • HDD rig and associated equipment set up at launch site. This includes electricity supply, drill mud filter, control unit and welfare facilities. Rig may need to be anchored in place. • Drilling utilises drill bit, drill head and drilling fluid. Drilling fluid (typically bentonite slurry) assists the drilling process, as well as lubricating and cooling the drill head. • A pilot hole is typically drilled first, followed by a series of increasingly sized bores until the final drill diameter is achieved. The final bore diameter would be able to accommodate a cable duct of approximately 254mm (internal diameter). • Location and direction of drilling can be monitored using the HDD locating system to ensure drilling follows the pre-planned path.

Method	Description
	• Ducting is pulled back through the drilled hole towards the HDD rig. • One cable duct is required for each cable. It is likely that spare ducts would be installed to allow for ease of replacement should any faults be identified in future. Ducts can be capped to ensure no attenuation of water or sediment or prevent use by animals if left prior to cable pulling. • The launch site would be reinstated on completion. Topsoil would be reinstated to the original soil profile and land re-seeded or released to the farmer for cultivation as it was found.

2.3.72 Cable installation would require temporary construction facilities and access. These temporary construction facilities would consist of haul roads, laybys and/or passing places to allow movement of construction traffic. As required, there may be the need for temporary dewatering and drainage.

2.3.73 Cable installation can occur at multiple sections of the route in parallel as it does not need to happen sequentially. This could limit the extent and duration of cable construction activities; however, it would depend on several factors including the underlying ground conditions and installation methods used.

2.3.74 In sections installed by open cut, the cables could be laid in one of two ways; they could either be laid directly into the trench or a duct could be laid into the trench after which the cables would then be pulled through the pre-laid duct. In sections installed using trenchless methods a duct or ducts would be installed through which cables would then be pulled.

2.3.75 The precise method of installation is subject to detailed design following the appointment of a contractor.

Access during Installation

2.3.76 An assessment will be carried out of the existing public road network to identify which roads are suitable for access by Heavy Goods Vehicles (HGVs) and cable delivery vehicles which would be classed as Abnormal Indivisible Loads (AILs). The assessment will take into account various factors including the size and condition of the roads, railway level crossings, bridges, traffic restrictions (vehicle weight, height, width or length), gradients, settlements (proximity of buildings, residential properties and community facilities) and other factors such as overhead lines (electricity and telecommunications); as well as accident records.

2.3.77 General access points will be identified directly from the public road network to the working width. Access points would be positioned to allow suitable visibility splays for safe access and egress and avoid the need for excessive manoeuvring within the highway. In some locations to avoid additional vegetation removal required for visibility splays temporary traffic management measures could be used to control access and egress.

2.3.78 In some locations new temporary access roads would be required to connect the proposed working width to the existing highway network. Visibility splays and temporary off-road accesses will be included as the design develops.

2.3.79 To minimise the use of local public roads as much as possible, it is proposed that a temporary haul road within the working width would be utilised by construction traffic (including AILs) as far as practicable. Allowance has been made within proposed Onshore Scheme Scoping Boundary for temporary haul roads, TCC's and temporary working areas.

2.3.80 Vehicle access along the working width may require the installation of temporary bridges across some watercourses and drains. Following consultation with the relevant bodies, single span bridges may be used in places which have limitations on the maximum span of bridges allowed to take construction and AIL traffic. It has therefore been assumed that watercourses that are navigable or that cannot be crossed with a single span bridge would not be crossed by temporary bridges (e.g., installation works would be undertaken from either side of the watercourse). As a result, additional temporary accesses are required either side of larger watercourse crossings.

2.3.81 The exact method of cable delivery would be outlined as the design develops and will be developed to accommodate the likely delivery methods based on similar projects. It is assumed that cable delivery vehicles would only use approved delivery routes and/or the temporary haul road within the working width. A Construction Traffic Management Plan (CTMP) will be prepared which identifies the proposed routeing of construction traffic.

2.3.82 Cable sections (typically up to 1.3km) are normally loaded onto drums delivered to the working width on a cable trailer. In sections where the working width is wider (for example at temporary working areas) the cable trailer can be manoeuvred so that it is perpendicular to the proposed cable route and cables pulled from the drum and laid directly into the trench or pulled through pre-laid ducts.

2.3.83 Cable sections could also be delivered in shorter lengths (typically less than 800m) on cable trailers pulled by a tractor unit. A cable drum would be loaded onto a trailer at a storage area (for example a temporary construction compound) and then transported along the public highway and then the temporary construction haul road before being pulled from the drum and laid directly into the trench or pulled through pre-laid ducts. The cable trailer would act as a delivery vehicle and a drum stand for installation.

2.3.84 There may also be instances where cable drums are transported by a low loader, however, these are likely to be rare due to the requirement to use cranes to unload cable drums.

Proposed Landfall

2.3.85 Additional temporary land take of up to 2ha may be required to enable the construction. This does not include land that may be required for temporary access.

2.3.86 The offshore HVDC Submarine Cable installation at the proposed Landfall would be via a trenchless technique at each of the landfall sites, due to the height difference between the areas proposed for the onshore compounds and the offshore exit point for the trenchless technique. The specific technique that would be utilised is subject to further detailed design taking into account the results of ground investigation both onshore and offshore.

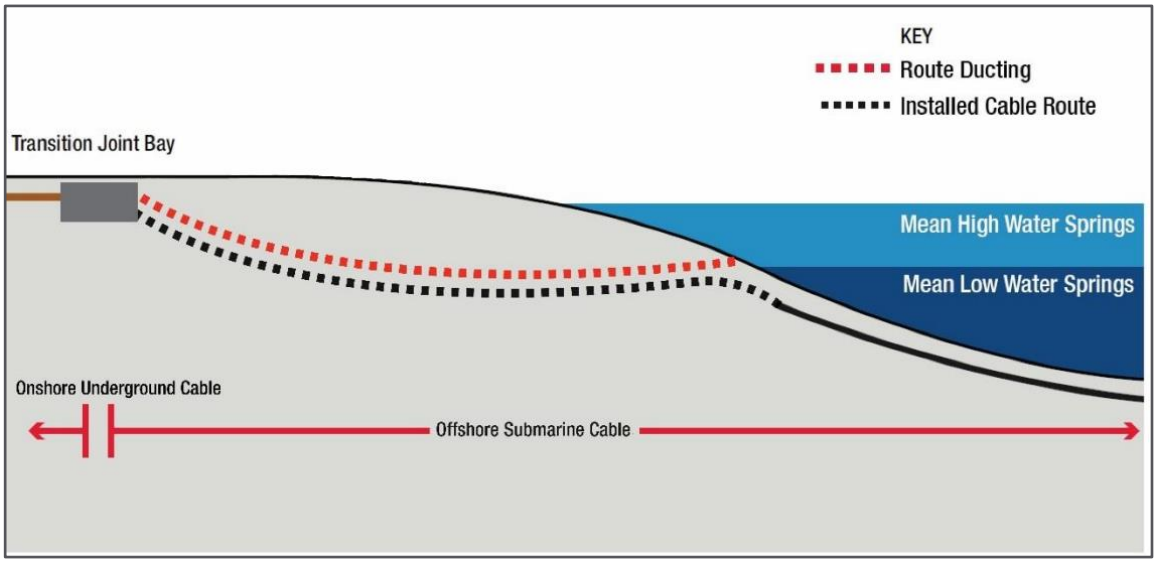
2.3.87 The HVDC Submarine Cables would come onshore into a TJB using a trenchless technique such as HDD, micro tunnel or direct pipe. Each landfall site has environmental constraints e.g., cliffs, seawalls, which mean open cut trenching is unlikely to be used. Trenchless techniques are used to create a hole/tunnel into which ducting is inserted. During installation, the cables would be pulled through the duct/tunnel providing the cables with protection as they transition from the offshore environment to the point where they join with the onshore cables. The TJB marks the point where the submarine cables are connected to the onshore cables. The TJB would be buried with the land reinstated over the top. Any ducts used for the installation of the cable would be sealed to prevent sea water transferring onto the land.

2.3.88 Design and position of the TJB and HDD would take into consideration predicted coastal erosion and beach draw down rates to ensure that the TJB is positioned sufficiently far back from the coast and that the ducts are sufficiently deep that if the coastline erodes the infrastructure would not become exposed.

2.3.89 The trenchless technique would be used to drill from land towards the sea and under any coastal constraints (as illustrated in **Insert 2-2**). The exit point for the trenchless technique will be subject to engineering design but is unlikely to lie more than 1km from the coastline. Where the trenchless technique exits the seabed, a temporary pit (dimensions in the region of 10m wide, by 30m long by 2m deep) may need to be excavated to support the push-in of the ducts. A jack-up/spud barge or multi-cat may be located close to the target exit point (to support excavation works and handling of duct pipes). Excavators may also be used to support the excavation works, which would either access the work site from the beach or be deployed from a vessel such as a jack-up/spud barge. Depending on the installation schedule the duct ends may be capped to prevent water ingress into the duct and lay exposed offshore for a period of time (up to 1-year). In this scenario, the duct ends may be ballasted using temporary deposits e.g., rock bags, concrete mattresses or similar.

2.3.90 A cofferdam may be considered as an option. This could be required at the exit point if excavation needs to be carried out in dry conditions. Sheet piles would be pushed into the ground using sheet vibratory type piling equipment, creating a barrier around the duct/tunnel exit pit.

2.3.91 Engineering studies and ground investigations will be undertaken to inform the detailed design of the landfall and to determine which construction options are feasible. A more detailed description of the proposed Scheme will be presented in the PEI Report and subsequent ES.



Insert 2-2 Schematic of horizontal directional drilling at landfall

2.3.92 Access to the landfall site will be encompassed as part of the plans for access during construction for the overall HVDC Underground cable route.

Onshore Scheme Operation and maintenance

Proposed Friston Substation

2.3.93 Once the proposed Onshore Scheme is operational Friston Substation would be operated as per NGET substation processes and procedures, with NGET responsible for the operation and maintenance of all assets, apart from those owned by NGV and SPR. Operational staff would generally be one to two persons per week. Heavy maintenance would be five to ten persons for approximately two months every five years. Replacement would be 20 - 30 persons onsite for six months every 25 years.

Proposed Converter station

2.3.94 Following a period of commissioning and testing, the proposed Converter Station would operate continuously throughout the year. Direction of power flows (converting DC to AC, or converting AC to DC) across the link would depend on supply and demand on the transmission system. Daily manned operational activities associated with the converter station are typically expected to occur from Monday to Friday within the hours of 08:00 and 16:00, with some weekend activity as required.

2.3.95 It is expected that the proposed Converter Station would be in operation 24 hours a day all year round. The only exception to this would be in the event of an unplanned outage or scheduled maintenance activities.

2.3.96 The proposed Converter Station would be operated by a small team of approximately 15 persons based on site. During periods of annual major maintenance, staff presence at the proposed Converter Station would increase to approximately 30 persons.

2.3.97 Maintenance at the site would be undertaken by site operatives as required by a maintenance schedule. The typical maintenance regime for the proposed Converter Station is anticipated to include daily and weekly equipment checks, in addition to

annual maintenance periods comprising a two week scheduled outage to refurbish and replenish assets as required.

Proposed HVAC and HVDC Underground Cables

2.3.98 During operation, the proposed HVDC and HVAC Underground Cables would transmit electricity to and from the National Grid, via the proposed Friston Substation, depending on the supply and demand between the UK and the Netherlands at any given point in time.

2.3.99 Onshore maintenance would involve cable route inspections from locations where the route is close to or intersects the existing road network, and/or non-intrusive surveys (typically drone surveys) scheduled at 12-18 month intervals to monitor the easements and any potential third party activities that could impact on the buried cables.

2.3.100 In the very unlikely event that an underground cable fault occurs (i.e., a cable strike), cable repairs may be required. The activities involved would be similar to installation, albeit typically limited to the location of the repair. Depending on the severity of the fault, repairs could range from use of specialised sheath repair similar in nature to a joint bay unit, to full replacement of the cable section.

2.3.101 As part of the maintenance regime specific to the proposed HVAC Underground Cable, sheath testing would be required at 18-24 month intervals. This testing can be phased to occur during periods that work best with landowners.

2.3.102 No new permanent access roads are currently required along the underground cable. Access to the cable repair area in fault situations would be via an agreed emergency access plan. Access would be covered under the heads of terms negotiated for the permanent easement or via access secured through the DCO.

Proposed Landfall

2.3.103 During operation, maintenance regimes at the proposed Landfall Site would be similar to that of the cable route inspections, in that they would occur in 12-18 month intervals and with operatives using the existing road network and parking provisions.

2.3.104 No new permanent access roads are currently required at the proposed Landfall Site. Access would be covered under the heads of terms negotiated for the permanent easement or via access secured through the DCO.

Onshore Decommissioning

2.3.105 As outlined in the following paragraphs, due to the life expectancy and expected decommissioning approach for each of the scheme components, decommissioning would be separately assessed at the time of that consent application.

Proposed Friston Substation

2.3.106 The lifespan of substation equipment is approximately 40 years. If it was determined that elements of the proposed Friston Substation were no longer required, they would be disconnected from the system before being dismantled and recycled or reused if possible. It is likely the decommissioning methods would be similar to those required to install the asset and decommissioning would be separately assessed at the time. As a result, it is not proposed to assess the impacts of decommissioning as part of the EIA.

In any event, it is not anticipated that impacts from decommissioning would present any greater environmental risk than any assessed impacts from the construction phase.

Proposed Converter Station

2.3.107 The anticipated operational life of the proposed Converter Station is approximately 40 years. It is likely that during this period refurbishment and plant replacement would extend the life of the proposed Converter Station. If decommissioning is required, the scale and nature of activities would use similar methods as those required to install the asset and decommissioning would be separately assessed at the time. The main components would be dismantled and removed for recycling wherever possible. As a result, it is not proposed to assess the impacts of decommissioning as part of the EIA. In any event, it is not anticipated that impacts from decommissioning would present any greater environmental risk than any assessed impacts from the construction phase.

Proposed HVAC and HVDC Underground Cables

2.3.108 If the Project ceases operation, dependent on the requirements at the time, the redundant cables could either be left in-situ, or all or parts of the cable could be removed for recycling. Where this is not possible, removed cables would be disposed of in accordance with the relevant waste disposal regulations at the time of decommissioning. If decommissioning is required, it is expected that it would use similar methods as those required to install the asset and decommissioning would be separately assessed at the time. As a result, it is not proposed to assess the impacts of decommissioning as part of the EIA. In any event, it is not anticipated that impacts from decommissioning would present any greater environmental risk than any assessed impacts from the construction phase.

Proposed Landfall

2.3.109 The expected minimum operational life of the proposed Landfall infrastructure is 40 years, with replacement only expected to occur upon the failing of specific assets.

2.3.110 Upon the decommissioning of the proposed Scheme, all above ground assets at the proposed Landfall would be removed to foundation level and foundations capped. The below ground transition joint bay providing onshore to offshore cable interface may be left in place. As a result, it is expected that there would be similar methods used as those required to install the asset and decommissioning would be separately assessed at the time. As a result, it is not proposed to assess the impacts of decommissioning as part of the EIA. In any event, it is not anticipated that impacts from decommissioning would present any greater environmental risk than any assessed impacts from the construction phase.

2.4 Proposed Offshore Scheme

Offshore Scheme description

2.4.1 The proposed Offshore Scheme comprises:

- Two HVDC Submarine Cables;
- One dedicated metallic return (DMR) cable;

- Up to two fibre optic cables; and
- Associated external cable protection (e.g., rock berm, concrete mattresses) necessary where the required burial into the seabed cannot be achieved.

2.4.2 The Offshore Scheme would route from the Landfall across the Southern North Sea to the boundary between the UK and Netherlands EEZ. Within Dutch waters the HVDC Submarine Cables would connect to a Dutch Offshore Wind Farm (OWF) chosen by TenneT, the Dutch transmission system owner and operator. In line with their 2030 carbon emissions reduction targets, TenneT are developing a network of offshore platforms to connect Dutch offshore windfarms in Dutch waters. The Submarine HVDC Cable would connect to a TenneT offshore platform in the Ijmuiden Ver and Nederwiek windfarm zones located in Dutch waters.

Proposed Offshore HVDC Submarine Cable Corridor

2.4.3 The Proposed Offshore Scheme Scoping Boundary is illustrated on **Figure 1-4**. It consists of several options which are the subject of further appraisal, and are described below. The Proposed Offshore Scoping Boundary is approximately 500m wide and comprises the necessary area of seabed required to construct the Offshore Scheme, whilst allowing flexibility to further refine the route throughout project development, as marine surveys and engineering activities are completed.

2.4.4 As there are currently two Landfall site options for the proposed Scheme (as described in **Section 2.2.2** and presented on **Figure 1-2** and **Figure 1-3**), there remains optionality within the nearshore area. The Proposed Offshore Scheme Scoping Boundary includes a Submarine Cable Corridor from each Landfall converging approximately 35km off the east coast of the UK. This ensures that the selection of the Landfall site is not reliant on the selection of the Proposed Offshore HVDC Submarine Cable Corridor or vice versa.

2.4.5 From the point of convergence, there are two potential Offshore HVDC Submarine Cable Corridors that cross the Southern North Sea to the UK/Netherlands EEZ boundary. The two options for the Offshore HVDC Submarine Cable Corridor are:

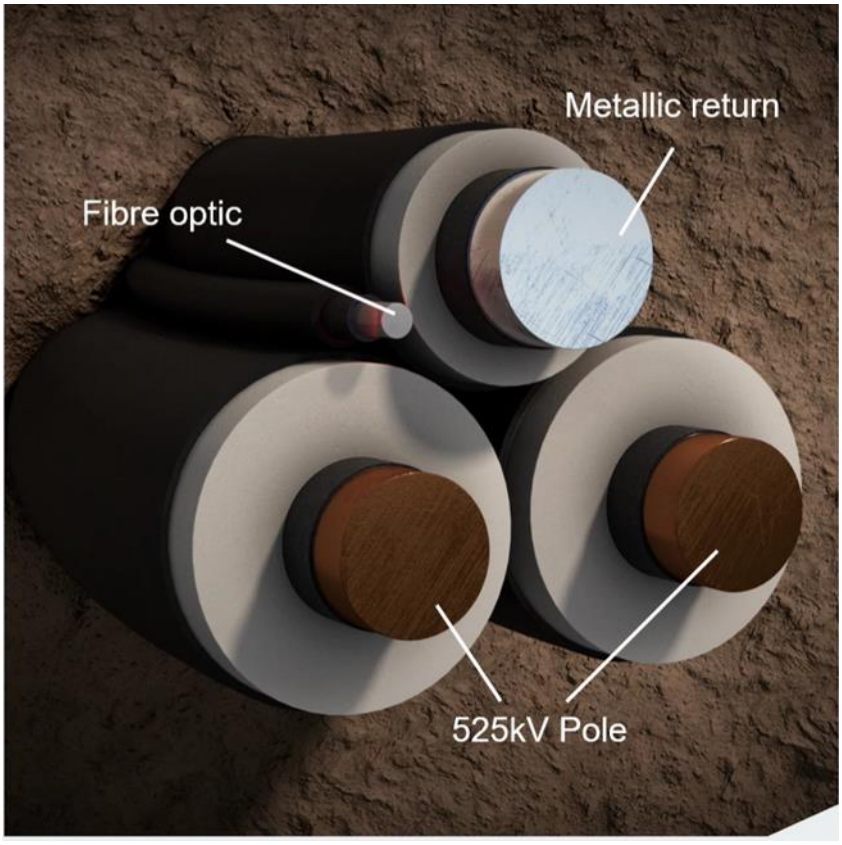
- Route B - crosses various telecommunication cables and the Lightbuoy Deep Water Channel before travelling north around the east side of proposed Norfolk Vanguard (west) OWF, between the OWF boundary and the West Friesland Deep Channel. It crosses the West Friesland Deep Channel at a perpendicular angle and runs around the northern edge of the proposed Norfolk Boreas OWF before crossing the EEZ; and,
- Route C - routes along the northern boundary of the consented East Anglia One North OWF and then runs alongside the boundary of the proposed Norfolk Vanguard East OWF parallel to the NeuConnect interconnector (in construction) and the West Friesland Deep Water Channel before reaching the UK/Netherlands EEZ boundary.

2.4.6 The selection of a preferred HVDC Submarine Cable Corridor is dependent on several factors including the Landfall site (to a certain degree), the location of the Dutch OWF chosen by TenneT for the Project to connect to, environmental and technical options appraisal, engineering studies and consultation with stakeholders. Only one of the options (Route B or Route C) will be selected as the Offshore HVDC Submarine Cable Corridor.

HVDC Submarine Cables

2.4.7 There are several configurations for HVDC systems, which govern how many cables are required offshore. The proposed Offshore Scheme would be a bipole configuration (one cable with positive polarity (Pole 1) and one cable with negative polarity (Pole 2)) with a DMR. The introduction of the DMR allows Pole 1 and Pole 2 to operate independently of each other. This means that if either of the Poles ceases operation, the remaining Pole can continue with the DMR and the transmission capacity is not lost. If for any reason the DMR is damaged, the two Poles can be switched to operate in a Rigid Bipole configuration, again allowing transmission capacity to continue. This configuration increases the overall robustness of the link and benefits consumers.

2.4.8 The cables would likely be manufactured using XLPE as primary insulation for the cable. These types of cables have been used in HVDC applications since 2000 and are proven to be reliable. As illustrated in **Insert 2-3** the cables have a central core (comprising of aluminium or copper), protected by insulation and a lead sheath. Heavy steel wire is wound in a helical form around the cable as armour to protect the cable from external damage during installation and operation.



Insert 2-3 Example submarine HVDC cable with dedicated metallic return and fibre optic cable

2.4.9 Cables would either be installed individually in the seabed or bundled together. As the proposed Offshore Scheme would consist of multiple cables it is likely that the two HVDC cables (Pole 1 and Pole 2) and conditional monitoring fibre optic cable would be bundled together in one trench, with the third cable DMR and fibre optic communication cable in a separate trench. The separation distance between the two trenches is typically determined by the water depth, seabed conditions, technical considerations, and other constraints e.g., presence of other infrastructure, proximity to restricted navigation channels etc. It is currently assumed that trench separation would be

between 50m-100m. Burial depth is typically 1-2m below chart datum, although this can increase to 3m in areas of soft clay or across shipping lanes. The final target burial depth would be determined by a cable burial risk assessment which would take into consideration location specific factors such as ground conditions and intensity of shipping and fishing activity. The results of the cable burial risk assessment would be used to inform the EIA.

2.4.10 The key characteristics are shown below in **Table 2-10**.

Table 2-10 HVDC Submarine cable key characteristics

key characteristic	Description
Cable installation	Buried
No. of trenches	1-2 dependant on installation capability of the chosen supplier
Separation distance between trenches	Up to 100m
Maximum burial depth	3m
Width of cable trench	1-5m dependant on installation technique and sediment type
Maximum width of installation tool footprint on seabed	Up to 15m
Maximum width of external cable protection	Up to 15m

2.4.11 The HVDC Submarine Cables would come onshore at the proposed Landfall Site as described in **Section 2.3.45**.

Offshore Scheme Construction

Proposed Offshore HVDC Submarine Cable

HVDC Submarine pre-installation activities

2.4.12 Prior to the installation of the submarine cables, certain activities would be undertaken to prepare the route.

Pre-installation survey

2.4.13 A marine survey campaign would be undertaken prior to cable lay and burial. The objective of the survey is to establish a reference seabed level against which the depth of burial of the cables can be compared. The survey is also used to determine the position of any potential unexploded ordnance (UXO) and support the micro-routeing of the cables by identifying features such as boulders, sand waves and environmentally sensitive features (e.g. geogenic or biogenic reef). Geophysical (acoustic and magnetometer) techniques would be used. Geotechnical and environmental sampling may also be carried out.

2.4.14 The activities described above are exempt from requiring a Marine Licence[4]. It is therefore, proposed that the pre-installation survey is scoped out of the EIA process.

UXO identification and clearance

2.4.15 The cable route must be clear of UXO to ensure a safe installation. A UXO desk-based assessment (DBA) will be undertaken to determine the potential UXO (age, type, size of explosive capability) that could be found in the Offshore HVDC Submarine Cable Corridor.

2.4.16 Data acquired by the pre-installation magnetometer survey would be analysed to identify potential UXO targets. Potential UXO targets would be ranked and investigated using remotely operated vehicles and divers. A decision would then be made as to whether the UXO can be avoided (e.g., by micro-routeing), cleared safely, or would need to be detonated in-situ.

2.4.17 The preference is to avoid in-situ detonation. However, it is recognised that several developments in the region have required UXO detonation pre-construction. The Marine Management Organisation (MMO) require that UXO detonation is the subject of a Wildlife Licence and a separate Marine Licence application. Assessment is required based on the exact location and size of the UXO to be detonated. As this information is not available prior to the pre-installation magnetometer survey being undertaken UXO detonation will not be considered by the EIA[5]. If the pre-installation magnetometer survey identifies UXO that can not be avoided or safely cleared the appropriate permits will be applied for by the engineering, procurement and construction (EPC) Contractor.

Seabed preparation/route clearance

2.4.18 Prior to the start of marine cable installation, it is essential to ensure the route is clear of obstructions that may hinder the installation works. These obstructions include boulders, out of service third party subsea assets and smaller debris such as fishnets, wires etc. Marine survey data will be used in route engineering and design studies to optimise the cable positions within the Submarine Cable Corridor and minimise seabed preparation activities e.g., avoidance of sand waves or boulder fields.

2.4.19 The types of seabed preparation activity that may be required are:

- Boulder clearance - For areas with large stones and/or boulders, there may be a requirement to move these out of the way. A plough would be towed across the seabed, pushing the boulders to both sides creating a cleared swathe 5-10m wide. Alternatively individual boulders may be moved to an alternative seabed position using a grab deployed from a vessel.
- Pre-lay grapnel run – A vessel tows a wire with a string of specially designed hooks, or grapnels, along the centreline of the cable route snagging debris on the seabed and within the top 0.5m – 1.0m of the seabed. Debris caught with the grapnel would be recovered to the vessel for appropriate licenced disposal ashore.

[4] In certain circumstances the Marine and Coastal Access Act 2009 provides for certain activities to be exempt from requiring a Marine Licence. The activities associated with the pre-installation survey would qualify as exempt activities provided that the geotechnical and environmental sample sizes are <1m^3 and it is demonstrated that the survey will not obstruct or present a danger to navigation and will not have a significant effect on a marine protected area. The survey(s) however, would still be subject to certain notifications and consent applications.

[5] Please note that if the marine survey identifies UXO that cannot be avoided, this will be discussed with the appropriate authorities and a decision taken on whether to include UXO detonation in the EIA.

- Pre-sweeping of sand waves - To avoid potential future cable exposure in areas with mobile sediments, the cables may need to be buried below the non-mobile reference level (NMRL), which is the depth below the sand waves at which stable seabed is present. To achieve burial to the required level below NMRL pre-sweeping (similar to dredging) of the sand waves is required, to reduce the height of the sand wave. Pre-sweeping is undertaken using either a controlled flow excavator[6] or a trailing suction hopper dredger[7]. Studies will be undertaken to identify where pre-sweeping may be required, calculate the volume of sand to be removed and identify suitable disposal locations. Advice from the MMO will be sought prior to finalising the EIA.
- Cutting Out of Service (OOS) Cables – Permission will be sought from asset owners to cut OOS cables crossed by the Offshore Scheme. The OOS cable would be snagged using a grapnel and then cut, with approximately a 100m section of cable being removed from the seabed. The cut ends would be tied to a weight and placed on to the seabed.

HVDC Submarine Cable construction activities

Cable lay and burial

2.4.20 The cables would need to be installed over a series of campaigns. Cable lay vessels can carry up to 100km of cable but due to the length of the route in UK waters and the requirement for three system cables (two HVDC cables and one DMR) and associated monitoring fibre optics it is likely that one or more cable joints would be needed. Cable barges may also be required for cable lay in shallow waters (<10m water depth).

2.4.21 Cable installation would be performed on a 24-hour basis with burial speeds ranging from 100m – 500m an hour depending on the equipment used and ground conditions. The speed of installation would depend on several factors including:

- Seabed (geology);
- Type of installation equipment used;
- Number of joints required along the cable route;
- Number of third-party crossings;
- Shipping and navigation and other sea user constraints;
- Environmental constraints; and
- Weather conditions.

2.4.22 The following burial tools may be used:

- Jet-trenching – method uses a powerful water jetting tool to fluidise the seabed allowing pre-laid cables to sink to the required burial depth. [Generally used for sand and mud soils].

[6] A technique that uses highly pressurised water directed at the seabed to push sediment to either side of a trench. Also commonly referred to as a mass flow excavator.

[7] A dredging vessel that uses a suction pipe (the trailing drag head) to suck up sediment off the seabed. The sediment is discharged into a compartment (the hopper) on the vessel.

- Conventional narrow share cable plough – as the plough is pulled through the seabed it cuts and lifts a wedge of soil, the cable is then fed into the plough and guided down through the share to the base of the trench and the wedge is placed back in.
- Advanced cable ploughs (vertical injectors) – deep burial ploughs using water jets fitted within the plough share to fluidise material at the leading edge of the share. Can achieve deeper burial depths (i.e., 3-6m).
- Cutting – used in hard or gravelly sediments such as clay and weak bedrock to pre-cut a trench.

External cable protection

2.4.23 External cable protection such as rock berms, concrete mattresses or rock/grout bags would be required where the cables cannot be buried into the seabed. There are two circumstances where external cable protection is required:

- Third-party asset crossings - The Offshore Scheme would cross numerous existing in-service cables and pipelines. The cables would cross over existing infrastructure on a 'bridge' comprised of either aggregate or concrete mattresses or by making use of a separator system put around the cable at installation. This section would subsequently be covered over with a protective layer of either aggregate (rock) or concrete mattresses.
- Remedial external cable protection - The intention would be to bury the cables to the required depth of lowering (as defined by a cable burial risk assessment). If ground conditions prevent the full cable burial i.e., only partial or no burial is achieved, then there may be the need to install external cable protection. This can take the form of concrete mattresses, rock berms or rock bags.

HVDC Submarine Cable installation vessels

2.4.24 A range of different vessels would be required during construction. These are likely to include:

- Pre-construction survey vessels – used to undertake the UXO survey and identification and clearance activities.
- Cable lay vessel/barge – used to undertake cable lay and burial. Could use dynamic positioning thrusters or anchors depending on water depth, physical seabed conditions, and navigational restrictions.
- Jack-up/spud barge/multi-cat – used at the HDD/tunnel exit point to support the trenchless technique and pull-in of the cables.
- Small work boats – used to support the main installation vessels. Examples include anchor handling vessels, tugs, rigid inflatable boats (RIB).
- Construction support vessels (CSV) – a variety of vessels would be used to support construction activities. This may include survey vessels, diver support vessels, and general construction support vessels. CSVs come in a variety of sizes and are adapted to undertake different roles. For example, archaeological or UXO inspection, pre-lay grapnel run, placement of concrete mattresses etc.
- Trailing suction hopper dredger (TSHD) – used for pre-sweeping of sand waves.

- Rock placement vessels – specialised vessels that feature a large hopper (tank) to transport rock and a mechanism for deploying rock on the seabed. Examples include side dumping where rock is pushed or tipped over the side of the vessel, split hopper where the hopper separates to allow the rock to fall through the hull of the vessel and flexible fall pipe vessels where a retractable chute is used to control the flow of rock to the seabed.
- Guard vessel – used to protect areas of exposed cables prior to burial or deposit of external cable protection, or in support of vessels with limited manoeuvrability.

Offshore Operation and Maintenance

Proposed HVDC Submarine Cable

2.4.25 During operation the HVDC link would transmit electricity from GB to the Netherlands and vice versa depending on the supply and demand at the time.

2.4.26 Following installation, routine maintenance of the HVDC Submarine Cables is not anticipated. The cables would be designed to minimise any maintenance requirements. Maintenance activities may include:

- Inspection surveys (using geophysical techniques) to monitor cable burial – timing of surveys would be dependent on seabed mobility; areas with higher risk of cable exposure may be subject to more frequent surveys;
- Re-burial if cable sections become exposed through natural hydrodynamic processes; and
- Maintenance and reinstatement of any degrading rock or other protection features.

2.4.27 The most common reason for repair of a submarine cable is damage caused by third parties, typically caused by vessel anchor strikes on a shallow or exposed cable segment. A repair requires insertion of additional cable and two additional cable joints. The additional cable length may be equal to or greater than approximately three times the depth of the water at the site, depending on how much damage the cable has sustained. The extra length of a repaired cable section means that the repaired cable cannot be returned to its exact previous position and alignment on the seabed. The excess cable would be laid on the seabed in a loop to one side of the original route to form an ‘omega’ loop. This is then buried into the seabed, or external cable protection is deposited if burial is not feasible due to ground conditions or position. Depending on the size of the repair and location, a construction vessel may be stationary at a location for one to two weeks.

2.4.28 The requirement for repair operations during the lifetime of the proposed Offshore Scheme would depend on the number of faults, location of the faults, and the burial/protection method used for the original installation. An estimate of the number of repair operations based on calculations and formulas provided by Ofgem, European Network of Transmission System Operators (ENTSO-E) and International Council on Large Electric Systems (CIGRE) would inform the EIA. When assessing the impacts of a repair operation feasible worst-case scenarios would be assessed. Information on seabed characteristics will be used to identify any locations along the route where burial might not be achievable, and external cable protection might be required for the repair.

Offshore Decommissioning

Proposed HVDC Submarine Cable

2.4.29 The life expectancy of the HVDC Submarine Cables is 40 years, although with repairs, some cable systems last upwards of 60 years. The proposed Offshore Scheme would be the subject of a Crown Estate Licence.

2.4.30 The environmental impact of decommissioning the Offshore Scheme would be assessed at the time of decommissioning and it is not proposed to assess the impacts of decommissioning as part of the EIA. Removal of the cable is a similar process to the installation of the cable but in reverse. The environmental impact can therefore not be fully assessed until the environmental conditions at the time of decommissioning are established. In any event, it is not anticipated that impacts from decommissioning would present any greater environmental risk than any assessed impacts from the construction phase.

2.4.31 An Initial Decommissioning Plan (IDP) would be written once the final route and installation methodology is chosen. This is a legal requirement necessary to secure the Crown Estate Licence. The IDP would form the basis of the Final Decommissioning Plan which would be developed in consultation with The Crown Estate in line with the following decommissioning principles:

- The measures and methods for any decommissioning would comply with any legal obligations which would apply to the decommissioning of the cable when it takes place;
- All sections of the cable would be removed except for any section or sections which are preferable to leave in situ having regard to the principles below;
  - that the measures and methods for any decommissioning are the best for, or minimise the risks to:
    - the safety of surface or subsurface navigation;
    - other uses of the sea;
    - the marine environment including living resources; and/or,
    - health and safety.
- The seabed would be restored, as reasonably as possible and to the extent reasonably practicable, to the condition that it was in before the cable was installed.

2.4.32 The IDP is periodically reviewed and updated in line with the applicable guidance and regulations at the time.

Contents

3. Assessment of Alternatives

3.1 Introduction

3.1.1 This chapter describes National Grid LionLink Limited's (NGLLL) (the Applicant's) approach to the options appraisal. It provides an overview of the strategic options that have been considered for the proposed Scheme and the subsequent routeing and siting process. A more detailed description of the siting and routeing process will be included in the Preliminary Environmental Information (PEI) Report and Environmental Statement (ES).

3.1.2 This chapter is supported by the following figures:

- **Figure 3-1**: Shortlisted Converter Station Sites;
- **Figure 3-2**: Shortlisted Landfall Sites; and
- **Figure 3-3**: Offshore Connection Points

3.2 Overview of the optioneering process

3.2.1 The design development of the proposed Scheme is an iterative process that commenced in 2017 when the opportunity to provide a new interconnector with the Netherlands was identified.

3.2.2 Environmental and technical considerations have informed the outcomes of the optioneering and design evolution process. The iterative design process will continue up to the application for development consent, in parallel with, and informed by, the EIA process and consultation with stakeholders.

3.2.3 The Project was previously known as EuroLink, with the name change announced on 24 April 2023 at the North Sea Summit in Belgium. The Project itself remains the same, and it is only the name that has changed. Historic studies and non-statutory consultation prior to April 2023 refer to the project as EuroLink and not LionLink but are all still relevant.

3.3 Strategic options

Connection point to the National Grid Electricity Transmission System

3.3.1 The Applicant applied for a connection point for the proposed Scheme to the UK National Grid Electricity System Operator (NGESO) in March 2017. As part of this application process NGESO conducted a site assessment of a number of the National Grid Electricity Transmission (NGET) sites across the south east coast of England, due to its geographical proximity to the Netherlands, and identified five options for a potential connection point to progress through to a more detailed assessment. These were:

- Grain 400kV Substation;
- Norwich Main 400kV Substation;

- Rayleigh Main 400kV Substation;
- Sizewell 400kV Substation; and
- Leiston 400kV Substation[1].

3.3.2 Following a detailed assessment process, the optimal connection point was identified as a connection in the Leiston area.

Connection point with TenneT

3.3.3 In parallel to securing a GB onshore connection agreement, National Grid Ventures opened discussions with TenneT (the Dutch Electricity System Operator) to identify a suitable offshore wind farm to connect to in Dutch waters. Discussions identified the Ijmuiden Ver or Nederwiek Wind Farm Zones, along the UK/Netherlands (NL) Exclusive Economic Zone (EEZ) boundary, as suitable locations for offshore connection, given the proposed construction timelines for all projects.

3.4 Outline of siting and routeing process

3.4.1 Following the confirmation of a grid connection point within the UK, the Applicant undertook preliminary siting and routeing studies to determine potential locations for converter stations, landfalls and offshore and onshore cable corridors. A staged approach was adopted which primarily focused on environmental and technical considerations, with later stages of the approach additionally considering local communities and planning policy. The aim of the process was to identify feasible options for converter station and landfall locations and cable corridors within which preliminary alignments could later be developed.

3.4.2 This staged approach is detailed below:

- Stage 1 – Identification of study area:

  This step sought to identify the extent of the study area within which converter station, landfall locations and cable corridors could be developed. The connection point to the proposed Friston Substation was used as the basis for defining the study area associated with the converter station and landfall locations.

- Stage 2 – Development and appraisal of a long list of options to identify short list:

  A long list of potential options was developed based on the defined study area. The environmental and technical benefits and disbenefits of each option were considered using desk-based information obtained from publicly available sources. Based on the outcome of the appraisal a short list of options was taken forward for further appraisal.

- Stage 3 – Appraisal of a short list of options to identify the preferred option(s):

The short list of options identified at Stage 2 was subject to further consideration. As required, additional desk-based information was collated, supported by site visits. Each option was appraised independently, accompanied by an end-to-end review which was also undertaken to identify an on-balance preferred end-to-end solution for the proposed

[1] A new substation close to the existing Sizewell 400kV substation, provisionally known as the Leiston 400kV substation, and now known as the proposed Friston Substation.

Scheme. Based on the outcome of the appraisal the preferred option(s) were taken forward for further design development.

3.5 Siting and routeing appraisal

3.5.1 The following sections describe Stage 1-3 for the proposed Converter Station and associated High Voltage Alternating Current (HVAC) Underground Cable Corridor, proposed High Voltage Direct Current (HVDC) Underground Cable Corridor, the proposed Landfall, UK/NL Connection Point and Submarine Cable Corridor.

Converter Station

Stage 1: Identification of study area

3.5.2 A study area within 5km of the proposed Friston Substation was used to determine potential locations for a converter station. Within the study area, a number of factors were identified to determine converter station locations, these included:

- A 5ha operational footprint with an additional 3ha for a temporary construction area;
- Opportunities to minimise the distance over which onshore HVAC cables would need to be laid between proposed Friston Substation and the proposed Converter Station and as a result minimising both energy loss and reducing the extent of land required as a result of the larger HVAC cable corridor;
- Proximity to built infrastructure including roads and natural infrastructure including water bodies and rivers;
- A high level consideration of impacts of environmental constraints such as settlements, ecological, historic environment or landscape designations, open space and public rights of way (PRoW); and
- Opportunities to collocate with other energy infrastructure projects.

3.5.3 The outcome of this resulted in the creation of a long list of potential converter station locations which were subject to further appraisal as detailed below.

Stage 2: Development and appraisal of long list

3.5.4 At Stage 1, a long list of 13 potential converter station locations were identified within the study area. This included converter station locations identified in a siting and routeing study for the Nautilus interconnector project which also had a grid connection point at the proposed Friston substation.

3.5.5 In undertaking the Stage 2 appraisal, desk-based publicly available information and aerial photography was used to inform environmental and technical considerations. The scale of the converter station and the proximity to, and potential impacts on, the Suffolk Coast and Heaths National Landscape was a key consideration. In addition, feasibility of crossing the onshore cables associated with other projects in the locality, including the East Anglia ONE North and East Anglia TWO Offshore Windfarms was also a key consideration.

3.5.6 As the long list of the converter station sites was developed to align with key technical requirements, the short listing of the converter station sites was focussed on the environmental considerations with these factors being:

- Suffolk Coast and Heaths National Landscape and Heritage Coast;
- Ecological designated sites and sensitive habitats;
- Heritage and archaeological assets;
- Flood risk and watercourse crossings;
- PRoW, byways and cycleways;
- Potential sources of current and historic contamination;
- Agricultural Land Classification (ALC);
- Residential properties, existing infrastructure strategic allocations and future developments (planning applications approved and under consideration); and
- National and Local Development Plan policies.

3.5.7 As a result, four converter station site areas were short listed and taken forward to non-statutory consultation, these are presented on **Figure 3-1**; Site 1, Site 3, Site 4 and Site 5.

Stage 3: Appraisal of a short list of options and preferred option identification

3.5.8 The four converter station sites were subject to consultation during the Non-Statutory Consultation undertaken at the end of 2022.

3.5.9 Following a review of the non-statutory consultation feedback, a series of option refinement workshops were undertaken. The workshops considered this feedback alongside previous information obtained from the desk-based assessments by the disciplines within the project team comprising Onshore Technical (including cost), Onshore Environmental, Consents/Planning, Land, Stakeholder/Engagement and Legal.

3.5.10 Site 1 is further south than the other three converter station sites and provided a connection to a Landfall at Thorpeness/Aldeburgh (Site E). A Landfall at Thorpeness/Aldeburgh (Site E) was discounted due to the constraints associated with the offshore cable corridor. As a result, Site 1 was discounted due to increased distance and constraints that would need to be crossed to reach this site for other landfalls.

3.5.11 The three remaining converter station sites all scored similarly with key differentiators being landscape, access, and the length of HVAC cable to the proposed Friston Substation.

3.5.12 To progress further refinement a landscape assessment, based on a site visit to the remaining three sites was undertaken to provide additional information to support the identification of a preferred site.

3.5.13 A workshop was subsequently held to identify a preferred converter station site and HVAC cable corridor to the proposed Friston Substation. The workshop identified Site 3 as the best performing, having the potential to be viewed as an extension to the existing settlement of Saxmundham, and benefiting from some existing screening from existing woodland and field boundaries.

3.5.14 Site 5 was viewed as the worst performing due to the setting of the historic village of Knodishall and potential heritage and archaeology impacts.

3.5.15 Site 4 has substantial planting which would provide screening, but the site location results in the greatest impact for views from within and to the Suffolk Coast and Heaths National Landscape (formerly known as Suffolk Coast and Heaths AONB). From a technical perspective, Site 4 was the least preferred as the site location would mean that the HVAC cable corridor would need to cross the existing mainline railway, alongside additional HVAC cable crossings, with HVAC construction requiring a larger area due to the increased number of cables and subsequently discounted.

3.5.16 In considering both the landscape and technical impacts, a preference was also identified for Site 3 due to the fact that this site may provide an opportunity for co-location with Sea Link.

Onshore proposed HVDC Underground Cable Corridor

Stage 1 Identification of study area

3.5.17 The study area for the underground HVDC cable corridor was identified by taking the potential landfall sites (between Aldeburgh and Pakefield/Lowestoft), proposed Friston Substation and the potential converter station sites, and extending the area approximately 15km inland for the purposes of identifying potential broad underground HVDC cable corridors. The 15km distance was considered appropriate to allow for a number of potential underground HVDC cable corridors to be identified from the proposed Landfall Sites to the converter station areas.

3.5.18 The development of the cable search area considered the following:

- Locations of the potential converter station and landfall sites;
- Key physical constraints; and
- Key environmental constraints.

Stage 2 Development and appraisal of long list

3.5.19 The long list of underground HVDC cable corridors was dictated by the long list of potential converter station and landfall sites.

3.5.20 A review of environmental features and known constraints in the study area, based on desk-based publicly available information and aerial photography, was used to inform environmental and technical considerations and to identify potential broad underground HVDC cable corridors (with a minimum width of 100m) to connect the potential landfall locations with the proposed Friston Substation area. Two stages were applied to the identification of potential route corridors:

- Initial identification of a cable route intersecting with the fewest environmental and physical constraints using ESRI ArcGIS software; and
- Using this initial route as a guide, there was a desk study review of environmental and physical features to identify a broad cable corridor and route options within the corridor.

3.5.21 Many of the potential cable route corridors shared a common section with the main differences in proximity to the potential converter station and landfall sites.

3.5.22 The key technical and engineering considerations were a 100m wide cable corridor to allow for flexibility with regards to constructability, the shortest and most efficient routes, and the avoidance of environmental considerations.

3.5.23 The key environmental considerations which informed the appraisal of potential route corridors included:

- Ecology;
- Landscape;
- Settlement, community and tourism; and
- Archaeology and heritage.

3.5.24 Following this a short list of cable corridors was developed following an evolution of the earlier desk-based assessment considering further assessment of the long list of routes against the following criteria:

- Available space and minimum widths;
- Constructability;
- Cable route accessibility;
- Crossings;
- Relative cabling cost;
- Soil thermal resistivity; and
- Construction noise and vibration.

Stage 3 Appraisal of a short list of options and preferred option(s) identification

3.5.25 The Landfall Sites F, G, G 2 and H shared a common section of the proposed HVDC Underground Cable Corridor and then each had an individual corridor to reach the individual landfall sites. The Landfall at Thorpeness/Aldeburgh (Site E) however, was in south east direction and did not share a common area.

3.5.26 The corridors sought to avoid designated sites or where they are unavoidable seek to reduce the area within these designations as much as possible.

3.5.27 Taking into account the findings of the technical and engineering, environmental appraisal of the short listed HVDC underground corridors and the preferred options for the proposed Landfall Sites it was concluded that:

- The proposed HVDC Underground Cable Corridor to Landfall at Walberswick (Site G 2) has been selected as one of the emerging preferences subject to further technical feasibility work. This shorter cable corridor provides greater opportunity to minimise impacts to ecologically designated sites via trenchless techniques and the opportunity to avoid construction access through Walberswick. Alongside this, the route avoids the crossing of a number of watercourses and provides a relatively direct route to the Converter Station area.
- The proposed HVDC Underground Cable Corridor to Landfall at Southwold (Site F) – revised northern corridor has been selected as a preferred option as it provides greater opportunity to avoid impacts to environmentally designated sites (specifically European designated sites).

Landfall

Stage 1 Identification of study area

3.5.28 A landfall study area between Aldeburgh and Pakefield/Lowestoft (approximately 36km) was identified as appropriate for consideration because of the grid connection point identified in the Leiston area, and the area of the UK/NL EEZ Connection Points.

3.5.29 Within the study area, a number of factors were identified to determine landfall locations, these included:

- A minimum footprint of 2ha, the majority of which would be required for a temporary construction area;
- A coastal location, with appropriate distance inland to not prohibit the use of horizontal directional drill (HDD) techniques;
- Suitability of ground conditions;
- Proximity to built infrastructure;
- Vehicular access to the landfall and vessel access and distance to 10m water depth contour;
- A high level consideration of environmental constraints such as settlements, ecological, historic environment or landscape designations, open space and PRoW; and
- Opportunities to co-ordinate or co-locate with other energy infrastructure projects.

Stage 2 Development and appraisal of long list

3.5.30 A long list of 14 landfall sites were identified within the study area. The locations were split between Leiston North (LN) (six locations) and Leiston South (LS) (eight locations) This included landfall locations identified by the Nautilus interconnector project (also with a grid connection point at the proposed Friston Substation) through a siting and routeing process undertaken for that project.

3.5.31 In undertaking the Stage 2 appraisal, desk-based publicly available information and aerial photography was used to inform environmental and technical considerations. In considering each landfall location, a smaller study area of approximately 1km onshore and 10km offshore from each location was used.

3.5.32 The long list of landfall sites was appraised to align with key technical requirements alongside environmental considerations with these factors being:

- A working area of 2ha;
- Location and topography;
- Landscape designations and character;
- Ecological designations;
- Historic environment;
- Recreation, tourism and settlement;
- Flood risk;

- Shoreline management (flood and coastal erosion);
- Planning policies and allocations; and
- Planning consents (including live applications) and DCOs.

3.5.33 Following the Stage 2 appraisal, a short list of four landfall sites were taken forward to Stage 3 for further appraisal, these are presented on **Figure 3-2**: Southwold (Site F), Walberswick (Site G), Dunwich (Site H), and Thorpeness/Aldeburgh (Site E).

Stage 3 Appraisal of a short list of options and preferred option(s) identification

3.5.34 The four landfall sites taken forward to Stage 3 were subject to consultation during the Non-Statutory Consultation undertaken at the end of 2022 and 2023.

3.5.35 Landfall sites were considered in conjunction with onshore cable corridors and submarine cable corridors, given the link between the scheme components.

3.5.36 The Landfall at Dunwich (Site H) was identified as the least preferred landfall and subsequently discounted. This was due to the likely adverse effects on heritage assets and technical constraints associated with construction via HDD due to the high offset of the cliff.

3.5.37 The Landfall at Thorpeness/Aldeburgh (Site E) was discounted. Both the offshore technical and environmental disciplines identified significant risks associated with the nearshore approach to the Thorpeness/Aldeburgh landfall, which from an offshore perspective is the longest offshore route, has a substantially greater number of marine cable crossings (which increases the requirement for works in the Outer Thames Estuary Special Protection Area, a European designated site), and assessed as having a likely adverse effect on the Outer Thames Estuary Special Area of Protection. Consideration was given as to whether the landfall approach could be moved further north to avoid some of these constraints, but space was limited by the existing Gabbard and Galloper offshore wind cables, the East Anglia TWO and East Anglia ONE North offshore wind planned export cables and the new intakes for the Sizewell nuclear power station. Concerns were also raised within several non-statutory consultation responses regarding the potential impacts on the Coralline Crag formation, and on fisheries drift netting grounds.

3.5.38 The Landfalls at Southwold (Site F) and Walberswick (Site G) were both considered to be feasible options. The landfall at Walberswick provided a shorter onshore HVDC cable route, however the route crosses the Minsmere to Walberswick Ramsar site which is a Special Area of Conservation and Special Protection Area, all European designated sites, with potential for direct impacts. Mitigation identified comprises a potential for a trenchless crossing through the designation, which would need to be considered with regards to technical feasibility and the associated indirect impacts that would result on the European designations during construction.

3.5.39 At Walberswick, a number of technical challenges regarding access to the proposed landfall and its associated construction were identified, however an alternative landfall site at Walberswick (Site G 2) was identified, and taken forward for subsequent assessment.

3.5.40 The Landfall at Southwold (Site F) would require the longest onshore cable route of the options taken to non-statutory consultation. As with Walberswick, the onshore HVDC cable route also crossed through the European designated sites, consequently an

alternative route avoiding these designations, routeing to the north of Southwold was identified and taken forward for further assessment.

3.5.41 Taking into account the findings of the technical and environmental assessments of the short-listed proposed landfalls and feedback reviewed from the non-statutory consultation, Southwold (Site F) and Walberswick (Site G 2) have been identified as emerging preferences and are the Proposed Scheme for the purposes of this Scoping Report.

3.5.42 Both Landfalls are subject to further technical and environmental work, including surveys, consultation with stakeholders and further studies, to inform the final selection of the Landfall.

UK/Netherland Connection Point

3.5.43 Four cross border connection points (A, B, C and D), as illustrated in **Figure 3-3**, were initially identified along the UK/NL EEZ border (based on the position of UK and Dutch consented or planned offshore wind farm sites), where submarine cable corridors from the UK and Netherlands can connect with each other. It was agreed by the Applicant and TenneT to discount Connection Point D during an optioneering workshop in October 2022. Initial analysis of preliminary routes in the UK and Netherlands identified that the route length and number of third-party infrastructure crossings in Dutch waters made this connection point unfavourable. An additional connection point X, was included which would allow connection to the Nederwiek 1 platform.

3.5.44 Connection points A, B, C and X are all still being considered, with Submarine Cable Corridors able to access all options.

Submarine cable corridor

Stage 1 Identification of study area

3.5.45 The Submarine Cable Corridor study area was determined by the Landfall search area (as described in **Section 3.5.28**) and the UK/Netherlands connection points (**Section 3.5.43**). The study area was cropped to exclude the East Coast licenced and proposed marine aggregate dredging areas as installing a cable through these areas would not be feasible.

3.5.46 Within the study area, a number of factors were identified to determine Submarine Cable Corridors, these included:

- A high-level consideration of potential for Unexploded Ordnance (UXO) contamination, with identification of primary avoidance areas, i.e., areas which it is anticipated would require mitigation above and beyond that associated with a typical cable installation project due to the potential presence of German non-ferrous mines;
- A high-level consideration of commercial fishing activity with the identification of areas with significant levels of static gear or bottom drift netting; and
- Consideration of publicly available and purchased mapped data showing environmental constraints such as existing and planned infrastructure, surface and sub-surface geological conditions, mobile sediments, other marine users (e.g., shipping and navigation, military areas, port authority limits etc.).

3.5.47 The outcome of this resulted in the creation of a constraints map which categorised available data according to whether it may be a potential planning, physical, environmental, or human activity constraint on the development of the proposed Scheme. This constraints map formed the basis for Stage 1 development and appraisal of long list of options.

Stage 2 Development and appraisal of long list of options

3.5.48 Submarine cable corridors were developed from the short-listed landfalls to the UK/NL Connection Points seeking to route through areas identified by the constraints mapping exercise as having the lowest constraints. Four nearshore/coastal routes were developed from the short-listed Landfalls to a common point offshore just before a crossing of the Ulysses telecommunications cable. The routes then split into three submarine cable corridors; A, B and C, with an option within Submarine Cable Corridor C depending on which side of the NeuConnect interconnector the Submarine Cable Corridor routes.

3.5.49 The selection of the preferred Submarine Cable Corridor will be influenced by factors such as the preferred Landfall and the preferred UK/NL connection point. However, an appraisal of Submarine Cable Corridors A to C was undertaken to understand the relative environmental and technical constraints, risks and opportunities. It should be noted that the appraisal of the four nearshore/coastal routes to the common point offshore was assessed as part of the landfall appraisal and informed the selection of the shortlisted landfalls.

3.5.50 Appraisal of the submarine cable corridor concluded that Submarine Corridor A was the least preferred of the three options given the additional interaction with a European site, that the other routes can avoid, the significantly increased route length and the significantly high number of third-party crossings, many of which will be within a European site. Submarine Cable Corridors B and C will result in lower environmental impact on European sites than Submarine Cable Corridor A and therefore it was not taken forward for short listing.

3.5.51 The appraisal process identified that at the end of Stage 2 the preference (on environmental grounds) was for Submarine Cable Corridor C to UK/NL Connection Point C; although it was noted that this might change if TenneT identified a different UK/NL Connection Point as preferred.

Stage 3 Appraisal of Short list of options to emerging options identification

3.5.52 Since the optioneering process reached an initial preference for Submarine Cable Corridor C, the submarine cable corridors have been refined to:

- Remove the optionality within Submarine Cable Corridor C. Discussions with East Anglia THREE OWF have allowed a decision to be made regarding the position of Submarine Cable Corridor C in relation to the OWF boundary and the NeuConnect interconnector, removing the optionality within Submarine Cable Corridor C; and
- Include additional ‘spurs’ on both Submarine Cable Corridor B and Submarine Cable Corridor C to re-introduce optionality at the UK/NL EEZ boundary. This decision followed a request from TenneT that the UK/NL Connection Point remain flexible (within the bounds of the area identified along the UK/NL EEZ boundary) to support route development in Dutch waters. This led to the introduction of spurs to Submarine Cable Corridor B and Submarine Cable Corridor C to allow either route to be used to access the different UK/NL Connection Points.

3.5.53 Whilst Submarine Cable Corridor C remains the preferred option on environmental grounds, the Project retains the option to consider Submarine Cable Corridor B as on balance this may provide the optimal route from an end-to-end perspective once the decision on the Dutch OWF connection point has been agreed with TenneT.

3.6 Opportunities for coordination and co-location

3.6.1 Coordination and colocation opportunities have been considered throughout the development of the proposed Scheme. The identification of the preferred options within Stage 3 firstly progressed on the basis of the Proposed Scheme being viewed as a standalone project, and this was followed by an additional workshop to consider the opportunities and benefits of co-ordination with other projects, including co-location with Sea Link which are both proposing grid connections to the proposed Friston Substation.

3.6.2 The workshop considered the preferred options from the appraisal process and focussed on the options which provide the opportunity for co-location (Landfall at Thorpeness/Aldeburgh (Site E) and Converter Station Site 3), with a focus on whether the opportunities and benefits of co-location would change the outcome of the preferred options.

Landfall

3.6.3 At the time of the workshop, a landfall at Thorpness/Aldeburgh had been identified as the emerging landfall preference for the Sea Link project, and the benefits of a co-located landfall focussed on the likely reduced impacts during construction. The Landfall at Thorpness/Aldeburgh (Site E) and the associated nearshore marine environment intersects with or is in close proximity (less than 1km) to designations and sites of ecological importance/interest including the Outer Thames Estuary (OTE) special protected area (SPA) (intersects), Southern North Sea special area of conservation (SAC), Sandlings SPA, Leiston to Aldeburgh Site of Special Scientific Interest (SSSI) (intersects), The Haven, Aldeburgh Local Nature Reserve (LNR) and North Warren Royal Society for the Protection of Birds (RSPB) Reserve (intersects). It is also located within the Suffolk Coast and Heaths National Landscape, the Suffolk Heritage Coast and intersects with Leiston-Aldeburgh SSSI.

3.6.4 The reasons for not identifying Landfall at Thorpness/Aldeburgh (Site E) as an emerging preference option are focussed on the offshore environmental impacts as a result of the offshore cable route coming into that landfall point, which crosses a number of subsea cables that make landfall in the locality, with a resultant potential for adverse effects offshore on the OTE SPA, with no mitigation identified that could address the risk of these adverse effects.

3.6.5 The emerging preference option of the Landfall at Southwold (Site F) and the revised northern onshore HVDC cable corridor has the benefit that it does not directly impact on any European sites and appears to be feasible from both a financial, legal and technical perspective. The emerging preference option of a Landfall at Walberswick (Site G 2) has the shorter onshore HDVC cable route and is considered feasible subject to further technical feasibility and environmental work.

3.6.6 Given the benefits of a coordinated landfall, the Project undertook work to consider further alternative offshore cable routes into Thorpness/Aldeburgh to consider the differing conclusions of the Sea Link and LionLink Project, and a focus on identifying routes with lesser environmental impacts and associated potential for adverse effects.

3.6.7 A number of alternative offshore cable routes were considered, however irrespective of the route the nearshore approach to Thorpness/Aldeburgh is located within the OTE SPA and will require a significant number of cable crossings and subsequent protection measures, which are considered to result in an adverse impact on the OTE SPA. As no alternative offshore cable route with lesser environmental impacts was identified, the Landfall at Thorpness/Aldeburgh (Site E) was confirmed as discounted.

Converter Station Site

3.6.8 Converter Station Site 3 has been identified as the preferred option and is the same location as the Sea Link project's emerging converter station site preference. As such a coordinated or co-located approach to both the development of the converter station site and the associated HVAC cable routes to the proposed Friston Substation will be explored. Initial discussions have commenced between the two projects to develop a strategy to support the delivery of both projects and ensure that this includes a robust consideration of the consenting impacts associated with separate applications for both projects.

3.7 Next Steps

Detailed routeing and siting

3.7.1 Following the identification of the preferred options, the next steps focus on the refinement of the emerging preferences through detailed routeing and siting work to identify the final proposed Scheme design to support the submission of the DCO application.

3.7.2 The detailed routeing and siting process continues and extends on the earlier approach, evolving from a desk-based baseline to site survey data as it becomes available, alongside input from statutory and local stakeholders. The process will also consider the feedback from future consultation activities to inform and review specific location and alignment options identified within the preferred cable corridors, landfall site and converter station site as well as opportunities for mitigation, including landscaping and biodiversity net gain.

3.7.3 A coordinated or co-located approach with Sea Link with regards to the development of the converter station site and the associated HVAC cable routes to the proposed Friston Substation will continue to be explored.

Contents

4. Legislation and Policy Overview

4.1 Introduction

4.1.1 This chapter provides an overview of the legislative and planning policy context that applies to the proposed Scheme. This includes national, regional, and local planning policy and marine policy, which has been considered across all environmental topic chapters in the preparation of this Environmental Impact Assessment (EIA) Scoping Report.

4.1.2 Legislation and policies relevant for different environmental topics are set out below with specific details included in **Appendix 4-A**, **Appendix 4-B** and **Appendix 4-C**.

4.2 Key Legislation

The Planning Act 2008

4.2.0 The statutory framework for deciding applications for a Development Consent Order (DCO) for nationally significant infrastructure is contained in the Planning Act 2008 ("PA2008"). The PA2008 sets out criteria that projects need to meet in order to be classed as Nationally Significant Infrastructure Projects (NSIPs). It requires that developers wishing to construct, operate and maintain NSIPs must obtain a DCO from the relevant Secretary of State (SoS) to authorise their project.

4.2.1 Section 14 of the PA2008 defines types of projects and works that can be classified as NSIPs, subject to the criteria and thresholds set out in Sections 15 to 30A for different types of infrastructure projects. The proposed Scheme, as described in **Chapter 2** The proposed Scheme does not fall within the existing definitions of a NSIP that are prescribed by the PA2008. However, Section 35 of the PA2008 allows the SoS to give a direction for development to be treated as development for which development consent is required if certain criteria prescribed under Section 35 (including type and location of the development) are met.

4.2.2 On 23 August 2022, the SoS for Business, Energy and Industrial Strategy (BEIS) (now the SoS for Energy Security and Net Zero1) issued a Direction under section 35 of the PA2008 that confirmed its view that the proposed Scheme is nationally significant and should be treated as a development for which a DCO under the PA2008 is required. In the Annex to the Direction, the SoS confirmed its opinion that:

"The proposed project is of national significance, taking into account that it forms part of a high voltage direct current electricity link with capacity of up to 1.8GW between the national transmission systems of Great Britain and the Netherlands.

The proposed project will play an important role in enabling an energy system that meets the UK's commitment to reduce carbon emissions and the Government's objectives to create a secure, reliable and affordable energy supply for consumers.

1 The Department for Energy security and Net Zero (DESNZ) was established on 2 February 2023 and took on the energy policy responsibilitiesof the former Department for Business, Energy and Industrial Strategy (BEIS).

By progressing the development through the Planning Act 2008 development consent process, it would provide the certainty of a single, unified consenting process and fixed timescales."

4.2.3 This EIA Scoping Report takes into consideration that the proposed Scheme is nationally significant and that the SoS has made a direction for it to be treated as development for which a DCO is required.

4.3 The Infrastructure Planning (Environmental Impact Assessment) Regulations 2017

4.3.0 The Infrastructure Planning (Environmental Impact Assessment) Regulations 2017[2] (the EIA Regulations) govern the EIA process relevant to NSIPs. Schedule 1 of the EIA Regulations lists those projects for which an EIA is required, and Schedule 2 provides descriptions of development for the purposes of defining EIA development, based on the selection criteria provided in Schedule 3 on characteristics of the development, its location and the types and characteristics of the potential impacts.

4.3.1 Schedules 1 and 2 of the EIA Regulations reference neither interconnectors nor any of the individual components of the proposed Scheme. However, the fact that a particular type of development is not specifically identified in one of the Schedules does not necessarily mean that an EIA is not required.

4.3.2 The Applicant has considered the characteristics of the proposed Scheme, including the GB and Dutch scheme components, the location of the proposed Scheme and the type and characteristics of the potential impacts of the proposed Scheme. In light of these factors, and the status of the proposed Scheme as requiring development consent following the Section 35 Direction, it is proposed that an EIA will be undertaken. This EIA Scoping Report provides formal notification to the SoS, under Regulation 8(1)(b) of the EIA Regulations, that the Applicant proposes to provide an Environmental Statement (ES) in respect of the proposed Scheme and requests a Scoping Opinion from the SoS under Regulation 10 of the EIA Regulations. Therefore, this development is EIA development through Regulation 6(2) of the EIA Regulations.

4.3.3 Regulation 5 of the EIA Regulations sets out the EIA process. Regulation 5(2) states 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..."

4.3.4 It states that the EIA must undertake these aforementioned assessments in relation to the following factors: population and human health, biodiversity, land, soil, water, air, climate, material assets, cultural heritage and landscape, and the interaction between these factors.

4.3.5 In addition, Regulation 5(4) requires the EIA to include, where relevant:

"the expected significant effects arising from the vulnerability of the proposed development to major accidents or disasters that are relevant to that development."

4.3.6 Schedule 4 of the EIA Regulations sets out the information for inclusion in the ES.

[2] The Infrastructure Planning (Environmental Impact Assessment) Regulations 2017 (legislation.gov.uk)

4.3.7 Regulation 32(1) of the EIA Regulations requires the SoS to consider transboundary effects, meaning, those effects that could affect receptors in other countries.

Marine and Coastal Access Act 2009

4.3.8 The Marine and Coastal Access Act 2009 (MCAA 2009) sets out a spatial planning system for the management of the marine environment, which includes a requirement to obtain a marine licence for works at sea from the appropriate marine licensing authority, the Marine Management Organisation (MMO). The MMO is responsible for determining applications in accordance with the Marine Policy Statement (MPS) and any applicable marine plans, unless relevant considerations indicate otherwise.

4.3.9 Licensable marine activities are defined under Section 66 of the MCCA 2009, and include activities related to construction or removal of any substance or object in UK territorial waters. As well as being responsible for administering marine licences, the MMO is required to regulate activities where they are undertaken outside of the UK territorial waters e.g. within the UK Exclusive Economic Zone (EEZ).

4.3.10 Applicants can apply for a 'Deemed Marine Licence' as part of the DCO process under Part 4 of the MCCA 2009 and by virtue of Section 149A of the PA2008 which was inserted by the MCCA 2009. The Applicant will include a Deemed Marine Licence within its draft DCO.

4.3.11 Section 126 of the MCCA 2009 outlines that where a public authority has the function of determining an application that is capable of affecting (other than insignificantly) the protected features of a Marine Conservation Zone (MCZ), or the processes on which those features depend, then they have a duty to consider MCZs during their decision making.

Electricity Act 1989

4.3.12 Section 38 and Schedule 9 of the Electricity Act 1989 require an electricity licence holder (including an interconnector licence holder) when formulating proposals for new lines and other works, to:

"have regard to the desirability of preserving natural beauty, of conserving flora, fauna and geological or physiographical features of special interest and of protecting sites, buildings and objects of architectural, historic or archaeological interest; and shall do what it reasonably can to mitigate any effect which the proposals would have on the natural beauty of the countryside or on any such flora, fauna, features, sites, buildings or objects."

4.3.13 Ofgem is currently consulting on the regulatory framework, including market arrangements, for offshore hybrid assets as new interconnector asset classes emerge. This includes multi-purpose interconnectors and non-standard interconnectors (with the proposed Scheme being a non-standard interconnector under the consultation definition). The current consultation closed on 15 July 2023. For assets such as the proposed Scheme, the consultation confirms that such assets will be licenced through the interconnector licence as opposed to a new form of licence which may be introduced through amendments to the Electricity Act 1989 via the Energy Bill.

4.3.14 The Applicant has obtained an Interconnector Licence and will be subject to the duties under the Electricity Act 1989 and within its interconnector licence.

Countryside and Rights of Way Act 2000

4.3.15 Areas of Outstanding Natural Beauty (AONB) are designated under the provisions of Part IV of the Countryside and Rights of Way (CRoW) Act 2000 for the purpose of conserving and enhancing the natural beauty of an area and securing its permanent protection against development that would damage its special qualities. NGV, as a statutory undertaker, has a duty under Section 85 of the Act which states "*In exercising or performing any functions in relation to, or so as to affect, land in an AONB, a relevant authority shall have regard to the purpose of conserving and enhancing the natural beauty of the AONB"*.

4.4 Related Assessments

4.4.0 In addition to the EIA, the proposed Scheme will be assessed in accordance with the other regulatory regimes, where they apply. Information on these is included in the environmental topic chapters of this EIA Scoping Report where applicable, see **Chapters 6 to 29**. These include the Conservation of Habitats and Species Regulations 2017, as amended by the Conservation of Habitats and Species (Amendment) (EU Exit) Regulations 2019 and the Conservation of Offshore Marine Habitats and Species Regulations 2017 (hereafter the Habitats Regulations).

Habitats Regulations

4.4.1 The Secretary of State is required by the Habitats Regulations to consider whether a plan or project has the potential to have a likely significant effect on the integrity and qualifying features of a site which is part of the National Site Network (NSN) or an internationally important site. 'European Sites' include Special Protection Areas (SPA) and Special Areas of Conservation (SAC). The UK Government policy states that proposed SACs, potential SPAs, areas secured as sites compensating for damage to a European Site and Wetlands of International Importance listed under the Ramsar Convention (known as Ramsar sites) are afforded the same protection as NSN sites in terms of the Habitat Regulations Assessment (HRA) required of any proposals that may affect them. The Habitats Regulations require an Appropriate Assessment if a project is likely to have a significant effect on a NSN site or a European Site, either alone or in combination, in order to determine whether that project will have adverse effects upon the integrity of a NSN site or a European Site in view of its Conservation Objectives. If that Appropriate Assessment concludes that a project will have an adverse effect on a NSN site or a European Site then a derogation case must be considered.

4.5 National Planning and Marine Policy

4.5.0 This section sets out the current national planning policy documents that are expected to be important to the SoS when it is determining the DCO application for the proposed Scheme. The following documents have been considered relevant in the context of the EIA and in the preparation of this EIA Scoping Report.

National Policy Statements for Energy

4.5.1 National Policy Statements (NPS) set out the government's objectives for the development of NSIPs in a particular sector.

4.5.2 The following NPSs are expected to be important and relevant to the SoS' determination of the DCO application for the proposed Scheme:

- Overarching National Policy Statement for Energy (EN-1) (NPS EN-1);
- National Policy Statement for Renewable Energy Infrastructure (EN-3) (NPS EN3); and
- National Policy Statement for Electricity Networks Infrastructure (EN-5) (NPS EN-5).

4.5.3 In January 2024, the Government published the updated energy NPSs to ensure they reflect the policies and broader strategic approach set out in the Energy White Paper (December 2020), and to ensure that the planning policy framework is suitably robust to support the infrastructure required for the transition to net zero carbon emissions.

4.5.4 The NPSs reinforce the Government's ambitions for high quality energy infrastructure set out in the British Energy Security Strategy (April 2022) and the Growth Plan (September 2022). The NPSs (EN-1 to EN-5) came into force on 17 January 2024.

4.5.5 A summary of the relevant NPS's is provided below, with specific details provided in **Appendix 4-A**.

Overarching National Policy Statement for Energy (EN-1) (NPS – EN1)

4.5.6 NPS EN-1 sets out the Government's overarching national policy with regards to the development of NSIPs in the energy sector. NPS-EN-1 is underpinned by the principle that there will be a need for significant amounts of new large-scale energy infrastructure to meet the Government's energy objectives. It states at paragraph 2.1.6 that large-scale energy infrastructure:

"*will be required to ensure the UK can provide a secure, reliable, and affordable supply of energy, while also meeting our decarbonisation targets*".

4.5.7 Paragraph 2.3.4 of NPS EN-1 acknowledges the significant amount of energy infrastructure is necessary to meet the Government's objectives, including "*the infrastructure needed to convert primary sources of energy (e.g. wind) into energy carriers (e.g. electricity or hydrogen), and to store and transport these energy carriers into and around the country"*.

4.5.8 Paragraph 1.3.10 states that EN-1, alongside with any relevant technology specific NPS, will be the primary policy for the SoS in the decision-making process on energy projects for which a Section 35 direction has been given. Paragraphs 3.2.11 and 3.2.12 reiterate that in circumstances where the SoS has given a Section 35 direction for a development to be treated as a NSIP:

"*any application for development consent would need to be considered in accordance with this NPS* [EN-1]". This includes *"…where the application is for electricity network infrastructure not covered by sections 15-21 of the Planning Act, including underground or offshore infrastructure*, *the Secretary of State should give substantial weight to the need established at paragraphs 3.3.65 to 3.3.83 of this NPS*".

4.5.9 The need for new nationally significant electricity infrastructure is emphasised in section 3.3 of the policy.

4.5.10 Paragraphs 3.3.32 to 3.3.33 focus on the role that interconnectors play in facilitating a secure, low carbon electricity system at low cost and recognises that there are benefits of increasing levels of interconnection. Paragraph 3.3.34 confirms that:

"Interconnection provides access to a diverse pool of generation, enabling the import of cheaper electricity, while also providing a route for electricity export. Interconnectors provide the system with additional flexibility, reducing the curtailment of renewable energy, and can also provide a range of ancillary services, such as voltage and black start services."

4.5.11 Paragraph 3.3.66 affirms that the delivery of this important infrastructure also needs to balance cost to consumers, accelerated timeframes for delivery and minimise community and environmental impacts.

4.5.12 The potential benefits specific to multi-purpose interconnector projects are recognised in paragraph 3.3.76 which states that combining offshore transmission with market- to-market interconnectors reduces curtailment of offshore wind, the quantity of landing points and capital expenditure. It goes to state that:

"*these benefits can be maximised if the planning of this infrastructure and the associated offshore wind farms are aligned, both domestically and with the connecting country's planning process*."

Whilst this paragraph specifically references muti-purpose interconnectors, this may also be applicable to non-standard interconnectors.

4.5.13 Paragraph 3.2.11 and 3.2.12 of EN-1 confirm that where a DCO application is for electricity network infrastructure not covered by sections 15-21 of the Planning Act, including underground or offshore infrastructure, the Secretary of State should give substantial weight to the need established in the NPS.

4.5.14 NPS EN-1 builds on the emphasis of need in its recognition that there is a Critical National Priority (CNP) for the provision of significant low carbon infrastructure, stating in paragraph 3.3.63:

4.5.15 "*Subject to any legal requirements, the urgent need for CNP Infrastructure to achieving our energy objectives, together with the national security, economic, commercial, and net zero benefits, will in general outweigh any other residual impacts not capable of being addressed by application of the mitigation hierarchy. Government strongly supports the delivery of CNP Infrastructure and it should be progressed as quickly as possible*."

4.5.16 Paragraph 4.1.7 states that this presumption, however, does not extend to residual impacts that pose an unacceptable threat to human health and public safety, defence, irreplaceable habitats, or the attainment of net zero goals. Similarly, this exception applies to residual impacts that pose an unacceptable risk to navigation offshore or to flood and coastal erosion risk onshore.

4.5.17 Section 4.2 states the energy generating technologies that are considered low carbon and therefore CNP infrastructure, confirming in paragraph 4.2.5 that this includes:

4.5.18 "*energy infrastructure which is directed into the NSIP regime under section 35 of the Planning Act 2008… such as interconnectors, Multi- Purpose Interconnectors, or 'boostraps' to support the onshore network which are routed offshore…"*

4.5.19 Part 4 of NPS EN-1 sets out the general policies for the submission and assessment of energy infrastructure applications. Section 4.3 of NPS EN-1 sets out that an applicant should identify the impacts of a proposal and these impacts, together with proposals for their avoidance or mitigation wherever possible, should be set out in an Environmental Statement (ES) that should accompany each project application. Further detailed policy on ESs is set out within section 4.3 of EN-1. Section 4.7 of NPS EN-1 also sets out the

importance of '*good design*' for energy projects, and that taking this approach can help meet many policy objectives, for example "*the impact sections show how good design, in terms of siting and use of appropriate technologies can help mitigate adverse impacts such as noise*" (paragraph 4.7.3).

4.5.20 Part 5 of NPS EN-1 considers generic impacts in respect of matters such as air quality and emissions, biodiversity, dust and odour, flood risk, historic environment, landscape, land use, noise and vibration, socio-economic, traffic and transport and waste management. These impacts have been considered in the preparation of this EIA Scoping Report.

National Policy Statement for Renewable Energy Infrastructure (EN-3) (NPS EN-3)

4.5.21 NPS EN-3 relates to renewable energy infrastructure and Part 2 provides general assessment principles and technology-specific policies relating to matters including climate change adaptation, consideration of good design, and offshore and onshore wind. EN-3 also establishes a co-ordinated approach to offshore – onshore transmission.

4.5.22 This co-ordinated approach is affirmed in section 1.6, which outlines the types of infrastructure covered by NPS EN-3, with paragraph 1.6.3 specifically stating that the policy applies to:

"*offshore transmission infrastructure projects in English waters which are directed into the NSIP regime under section 35 of the Planning Act 2008. This could include interconnectors, Multi-Purpose Interconnectors (MPIs) or 'bootstraps' to support the onshore network which are routed offshore*."

4.5.23 Paragraphs 2.8.24 to 2.8.33 places further emphasis on the use and benefits of co-ordinated transmission proposals, with paragraph 2.8.31 stating that:

"MPIs will enable direct power flow from wind farms to two or more countries. They will provide the electricity network with flexibility needed to integrate the increased deployment of intermittent offshore renewable generation into the system by:

Allowing market-to market trading when there is additional capacity on the table; and

Limiting the need to curtail offshore wind generation when domestic demand had been met by providing a direct route for export to neighbouring North Sea countries."

It is noted that multi-purpose interconnectors refer to GB interconnection combined with transmission of offshore generation within GB, whereas non-standard interconnector-led projects are "*projects where GB interconnection is combined with transmission of offshore generation outside of GB".* The proposed Scheme is a non-standard interconnector under this consultation definition[3].

4.5.24 These policies outlined in NPS EN-3 have been considered in the preparation of this EIA Scoping Report, ensuring alignment with national strategies and goals for renewable energy infrastructure.

National Policy Statement for Electricity Networks Infrastructure (EN-5) (NPS EN-5)

4.5.25 NPS EN-5 relates to electricity networks and Part 2 provides general assessment principles and technology-specific policies relating to matters including climate change

[3] Multi-purpose Interconnectors Pilot Regulatory Framework (Ofgem) (Multi-purpose Interconnectors Pilot Regulatory Framework | Ofgem) [accessed February 2024]

adaptation, consideration of good design, biodiversity and geological conservation, landscape and visual and noise and vibration. Section 2.12 of EN-5 establishes a co-ordinated approach to offshore-onshore transmission.

4.5.26 Paragraph 1.6.4 of NPS EN-5 confirms that infrastructure such as the proposed Scheme will be covered by the NPS if the Secretary of State has issued a section 35 direction. The proposed Scheme has the benefit of a section 35 direction.

4.5.27 Paragraph 2.1.5 of NPS EN-5 reinforces Section 4.2 of EN-1 which supports the urgent need for new low carbon infrastructure and confirms that "all power lines in scope of EN-5 including network reinforcement and upgrade works, and associated infrastructure… are considered to be CNP infrastructure."

4.5.28 Paragraph 2.2.10 of EN-5 reiterates the duties under Section 9 of the Electricity Act 1989, both in relation to developing and maintaining an economical and efficient network, and, in formulating proposals for new electricity network infrastructure.

4.5.29 These policies outlined in NPS EN-5 have been considered in the preparation of this EIA Scoping Report.

National Planning Policy Framework (NPPF)

4.5.30 The National Planning Policy Framework (NPPF) was most recently revised in December 2023. Paragraph 5 of the NPPF sets out that it does not contain specific policies for NSIPs and states that:

"*These are determined in accordance with the decision-making framework in the Planning Act 2008 (as amended) and relevant national policy statements for major infrastructure, as well as any other matters that are relevant (which may include the National Planning Policy Framework)*".

4.5.31 Since the NPPF has the potential to be considered important and relevant to the SoS's consideration of the proposed Scheme, a summary of whether there is any relevant guidance in the NPPF that differs from NPS and draft NPS policies is included in **Appendix 4-A**.

Marine Policy Statement

4.5.32 The framework for preparing Marine Plans and decisions affecting the marine environment is contained within the MPS, which was adopted in 2011. The MPS has been considered in the development of this EIA Scoping Report, particularly, within the chapters relating to Part 4, the Offshore Scheme.

4.5.33 'Guidance to the UK Marine Policy Statement from 1 January 2021' provides statutory guidance which explains how references to EU law in the UK MPS should be interpreted following the UK's withdrawal for the EU.

Marine Plans

4.5.34 The following Marine Plan has been considered in the development of this EIA Scoping Report:

- East Inshore and East Offshore Marine Plan, April 2014[4].

[4] East Inshore and East Offshore Marine Plans (publishing.service.gov.uk) [accessed February 2024]

4.5.35 A summary of marine policy that is relevant to each technical assessment is provided in **Appendix 4-A**.

British Energy Security Strategy

4.5.36 The British Energy Security Strategy was published by the UK Government in April 2022. It sets out the Government's ambition to improve energy efficiency, transition away from oil and gas, and build a self-sufficient and secure energy system.

4.5.37 The Strategy sets out the UK's ambition to deliver up to 50GW of offshore wind by 2030 and outlines a number of ways in which the time taken for development and deployment of offshore wind farms will be reduced. This includes through streamlining the consenting process and strengthening the Renewable NPSs.

4.5.38 The Strategy also prioritises the need for flexibility in matching supply and demand, so that minimal energy is wasted, thus creating a more efficient and locally-responsive energy system.

Accelerating electricity transmission network deployment: Electricity Networks Commissioner's recommendations

4.5.39 In August 2023 independent recommendations were provided by the UK's Electricity Networks Commissioner, Nick Winser, on how to accelerate the deployment of electricity transmission infrastructure. The key recommendations that are considered relevant to the proposed Scheme are:

- The production of a Strategic Spatial Energy Plan (SSEP), which would forecast supply and demand characteristics and their likely whereabouts. This Plan would bridge the gap between government policy and infrastructure delivery plans.
- A new document to be created, the Electricity Transmission Design Principles, which will provide a clear basis for communities and stakeholders to understand proposals and a clear foundation for the Planning Inspectorate's consideration.
- Implementation of reforms to the DCO process. In particular, having an updated suite of NPS which reference and are supported by a SSEP, associated network plans and Design Principles, will reduce the pre-application period and assist the Planning Inspectorate.

4.5.40 While these recommendations by the Electricity Networks Commissioner have been acknowledged in the preparation of this EIA Scoping Report, it is important to note that as of the time of writing, they have not yet been implemented. Their status will monitored, and should they be implemented during the EIA process, they will be duly considered.

Transmission Acceleration Action Plan

4.5.41 The Action Plan sets out the Government's response to the above recommendations from the Electricity Networks Commissioner and was published in November 2023. In summary, the Government accepts the Commissioner's recommendations in all areas, and in some cases seeks to go further. The Action Plan also seeks to halve the end-to-end build time of electricity transmission network infrastructure, from 14 to 7 years.

4.6 Local Planning Policy

4.6.0 Regional and local planning policies have also been considered in the development of this EIA Scoping Report. The proposed Onshore Scheme is based in an area with two tiers of local government, meaning that the Local Planning Authority (LPA) is a district council and county council to the extent appropriate to their responsibilities, including the preparation of Local Plans. The extensive area covered by the Onshore Scheme means that it spans across multiple town and parish councils where Neighbourhood Plans can be prepared. Collectively the Local Plans and Neighbourhood Plans documents form the Development Plan[5] for the area. In addition, other documents including Supplementary Planning Documents (SPD) and Supplementary Planning Guidance (SPG) add further detail to these policies.

4.6.1 **Table 4-1** details key planning policy documents within the LPA areas that are of relevance to the proposed Scheme. Some policy documents are already in the process of approval and should be considered as they will potentially be finalised before the proposed Scheme is submitted to the SoS.

4.6.2 A summary of all local planning policies relevant to each technical assessment is provided below, with specific policies detailed in **Appendix 4-C**.

Table 4-1 Key Regional and local planning policy documents

Development plan documents	SPDs/SPGs	Other relevant documents
	Adopted	
Suffolk Coastal Local Plan (2020)[6] Waveney Local Plan (2019)[7] Reydon Neighbourhood Plan (2021)[19] Wenhaston with Mells Hamlet Neighbourhood Plan (July 2018)[19]	Historic Environment SPD (2021)[10] Recreational Disturbance Avoidance and Mitigation Strategy SPD (2021)[11]	Suffolk Coast & Heaths Area of Outstanding Natural Beauty – 2023-2028 Management Plan[16] Southwold Conservation Area Appraisal (2008)[17]

[5] National Planning Policy Framework: Glossary - Development plan: Is defined in section 38 of the Planning and Compulsory Purchase Act 2004, and includes adopted local plans, neighbourhood plans that have been made and published spatial development strategies, together with any regional strategy policies that remain in force. Neighbourhood plans that have been approved at referendum are also part of the development plan, unless the local planning authority decides that the neighbourhood plan should not be made.

6 East-Suffolk-Council-Suffolk-Coastal-Local-Plan.pdf (eastsuffolk.gov.uk).

7 Adopted-Waveney-Local-Plan-including-Erratum.pdf (eastsuffolk.gov.uk)

10 https://www.eastsuffolk.gov.uk/assets/Planning/Planning-Policy-and-Local-Plans/Supplementary-documents/Historic-Environment-SPD/Historic-Environment-SPD-reduced.pdf [accessed February 2024]

11 https://www.eastsuffolk.gov.uk/assets/Planning/Planning-Policy-and-Local-Plans/Supplementary-documents/Recreational-Disturbance-Avoidance/Suffolk-Coast-RAMS-SPD-final-May-2021.pdf [accessed February 2024]

16 https://coastandheaths-nl.org.uk/wp-content/uploads/2023/12/2023-28-Management-Plan-1.pdf [accessed February 2024]

17 https://www.eastsuffolk.gov.uk/assets/Planning/Design-and-Conservation/Conservation-Area-Appraisals/Southwold-Conservation-Area-Character-Appraisal-with-Management-Plan.pdf [accessed February 2024]

Development plan documents	SPDs/SPGs	Other relevant documents
Southwold Neighbourhood Plan (February 2022)[19] Suffolk County Council – Minerals and Waste Plan (July 2020)[8] Saxmundham Neighbourhood Plan (July 2023)[9]	Development and Coastal change SPD (2013)[12] Sustainable Construction SPD (2022)[13] Nature Conservation SPG (1998)[14] Coastal Adaptation SPD (Summer 2023)[15]	Southwold Conservation Area Appraisal (2018)[18] Southwold Conservation Area Appraisal and Management Plan (2024)[19]
	Draft	
Walberswick Neighbourhood Plan (Consultation December 2022)[19]	Healthy Environments SPD (Winter 2023)[20] Rural Development (Autumn/Winter 2023)[21]	

8 Suffolk Minerals and Waste Plan - Suffolk County Council

9 https://www.eastsuffolk.gov.uk/planning/neighbourhood-planning/neighbourhood-plans-in-the-area/ [accessed February 2024]

12 https://www.eastsuffolk.gov.uk/assets/Planning/Waveney-Local-Plan/Supplementary-Planning-Documents/Development-and-Coastal-Change/01-Development-and-Coastal-Change-SPD.pdf [accessed February 2024]

13 https://www.eastsuffolk.gov.uk/assets/Planning/Planning-Policy-and-Local-Plans/Supplementary-documents/Sustainable-Construction-2022/FINAL-Sustainable-Construction-SPD.pdf [accessed February 2024]

14 https://www.eastsuffolk.gov.uk/assets/Planning/Suffolk-Coastal-Local-Plan/Supplementary-Planning-Guidance/SPG5-Nature-Conservation.pdf [accessed February 2024]

15 https://eastsuffolk.inconsult.uk/draftcoastaladaptationspd2023/view?objectID=13385972 [accessed February 2024]

18 https://eastsuffolk.inconsult.uk/gf2.ti/f/1289666/102293157.1/PDF/-/Southwold_NP_Character_Area_Appraisals_October_2019.pdf. [accessed February 2024] This document updates parts of, and should be read in conjunction with, the 2008 Appraisal.

19 https://www.eastsuffolk.gov.uk/assets/Planning/Design-and-Conservation/Conservation-Area-Appraisals/Southwold-Conservation-Area-Appraisal-and-Management-Plan-Article-4-Directions-apply.pdf [accessed February 2024]

20 https://eastsuffolk.inconsult.uk/healthyenvironmentsspd2022/consultationHome [accessed February 2024]

21 https://eastsuffolk.inconsult.uk/ruraldevelopment2023/ [accessed February 2024]

Contents

5. EIA Approach and Method

5.1 Introduction

5.1.1 This Chapter outlines the overall methodology that will be used to undertake the Environmental Impact Assessment (EIA). The EIA will follow the requirements of the Infrastructure Planning (Environmental Impact Assessment) Regulations 2017 (as amended) and other relevant guidance.

5.2 The EIA process

5.2.1 Key stages within the EIA include determination of the baseline, impact prediction, mitigation, and determination of the significance of effects.

5.2.2 Baseline studies comprise a combination of desk and site-based studies undertaken to establish the existing environmental conditions within the study area. Understanding the environmental baseline allows for an accurate assessment of the likely significant effects of the proposed Scheme. Environmental baseline can also be used to inform the design and supports the development of mitigation (if necessary) and future monitoring.

5.2.3 Both beneficial and adverse likely significant effects resulting from the proposed Scheme will be predicted and evaluated using appropriate specialist methods. The assessment will identify the likely significant effects of the proposed Scheme, considering integrated measures within the proposed Scheme design intended to prevent or reduce adverse effects. Additional mitigation measures will be considered where necessary and taken into account both when identifying residual effects and assessing their significance.

5.2.4 A detailed description of the general approach to determining the significance of potential effects is contained in this chapter. Approaches specific to individual environmental topics are outlined within the associated technical chapters of this EIA Scoping Report (**Chapters 6 to 29**). These approaches follow specific guidance and best practice.

5.3 The structure of the EIA

5.3.1 There are three main documents produced as part of the EIA process for an application for development consent. These comprise the EIA Scoping Report, the Preliminary Environmental Information (PEI) Report and the Environmental Statement (ES).

5.3.2 The EIA Scoping Report sets out the proposed scope of the EIA for the proposed Scheme, presenting the data collected so far, as well as any proposed further surveys or data collection. The EIA Scoping Report also outlines the assessment methodology and approach that will be used for the PEI Report and ES. The EIA Scoping Report is issued to consultees by Planning Inspectorate (PINS) on behalf of the Secretary of State (SoS), for the Department for Energy Security and Net Zero (DESNZ), for comment on the proposed scope and methodology.

5.3.3 The PEI Report sets out the information that 'is reasonably required for the consultation bodies to develop an informed view of the likely significant environmental effects of the development' ((Regulation 12(2)(b) of the EIA Regulations 2017) as set out in National Infrastructure Planning Advice Note Seventeen, Section 8.3).

5.3.4 The ES presents the results of the EIA undertaken, outlining the likely significant effects that would result from the proposed Scheme, and any proposed mitigation to reduce those likely significant effects. The ES is submitted as part of the application for development consent to be taken into account during decision making.

5.4 Determining the scope of the assessment

Technical scope

5.4.1 The technical scope of assessment for each environmental topic is detailed in **Chapters 6 to 29**. This covers the 'scoping in' and 'scoping out' of effects to be assessed as part of the EIA. The technical scope also details the approach taken to data collection to inform environmental baselines and assessment methodologies.

5.4.2 The EIA process utilises the 'source-pathway-receptor' model. Within this model, the source can be defined as the origin of the potential impact, the pathway refers to the means by which the effect of the activity could impact a receptor, and the receptor is the element of the receiving environment that is impacted.

5.4.3 If any of the source, pathway, or receptor is absent, there will be no linkage and therefore no potential for an impact to manifest. Whilst these impacts are typically scoped out from further assessment, the proposed Scheme design may not be sufficiently advanced at the scoping stage to allow for adequate evidence to be provided to scope out these impacts. There may therefore be a need to carry these forwards to the PEI Report and ES.

5.4.4 Further detail on key aspects of the assessment methodology that will be applied in the EIA are set out in the following section of this EIA Scoping Report. The methodology outlined below will apply to all assessments undertaken within technical chapters unless otherwise stated within the individual topic methodologies presented in this EIA Scoping Report.

5.4.5 As described in **Chapter 2** The Proposed Scheme Description (Section 2.3), there are different potential scenarios in relation to how Friston Substation will come forward. The current assumption is that either EA1N and EA2, Sea Link or Nautilus, being further progressed in their consenting would construct Friston Substation and the proposed Onshore Scheme would amend Friston Substation. However, as there is a scenario where the proposed Onshore Scheme could come forward in advance of the other Projects and build Friston Substation, the EIA will consider both scenarios within the assessments. Each technical chapter will base its assessment on the worst case for that particular topic as well as presenting a sensitivity test with the other scenario. **Chapters 6-29** set out which scenario will be assessed as the reasonable worst case for that topic.

Spatial scope

5.4.6 The proposed Scheme Scoping Boundary refers to the area of land shown in **Figure 1-1**. At the current stage of the design process, this land has been identified as potentially being required for temporary or permanent purposes for the construction or operation of the proposed Scheme.

5.4.7 The extent of the study areas will be determined by the environmental topic and specific receptors under consideration and described in each topic chapter. Each topic chapter will apply a buffer to the proposed Scheme Scoping Boundary, if required, to determine the extent of the study area. The study area proposed for each topic therefore comprises an area sufficient to encompass the spatial extent over which impacts relevant to that topic and the related receptors may operate. These study areas will be refined in relation to the Order Limits, once determined.

5.4.8 The following factors were taken into account when defining the study area for each topic assessment:

- The physical extent of the proposed Scheme;
- The nature of the baseline environment;
- The manner and extent to which environmental effects may occur; and
- Relevant guidance, best practice and/or legislation.

5.4.9 The spatial scope of assessment for each topic may be refined for subsequent stages of the EIA in response to consultation feedback or further assessment.

Temporal scope

Assessment years

5.4.10 The EIA will assess the environmental impacts of the proposed Scheme at key stages of both the construction (anticipated to commence in 2026) and the operational (anticipated to commence in 2030) phases. Where appropriate, these will be compared to pre-construction (i.e., current baseline) and to the situation that would be expected to prevail in the future (i.e., the projected future baseline).

5.4.11 The baseline year against which the potential effects of the proposed Scheme will be assessed against will be 2024 (unless specified in the technical chapters), when the majority of the baseline surveys and desk studies are to take place. Where relevant, a topic specific future baseline year will be defined within each technical chapter.

5.4.12 The future baseline will be affected by other projects in the area. Where the Project is the first to develop and construct the baseline would remain unchanged, however, if EA1N/EA2, Sea Link or Nautilus construct prior the Project they will be taken into account within the future baseline. This could affect Friston Substation, proposed High Voltage Alternating Current (HVAC) Underground Cable Corridors, proposed High Voltage Direct Current (HVDC) Underground Cable Corridors and the proposed Converter Station.

Construction effects

5.4.13 Construction effects are effects that are likely to occur during the construction phase of the proposed Scheme and are typically temporary or short-term. Construction is currently anticipated to commence in 2026 and take approximately 4 years to complete.

5.4.14 The detailed methodology for construction of the proposed Scheme is not yet known, however potential construction methods have been identified in **Chapter 2** The proposed Scheme Description. Where possible, information relating to potential locations of site compounds, haul roads, and offshore third-party infrastructure crossings will be provided to inform an assessment of the construction impacts in the PEIR and ES. As the details of construction are unlikely to be known until later stages, professional judgement and reasonable assumptions will be used – and clearly stated – to ensure that an assessment of the likely worst-case construction is presented.

Operational effects

5.4.15 Operational phase effects are effects that are likely to occur as a result of the presence, operation and maintenance of the proposed Scheme. Operation is anticipated to start following completion of construction in year 2030. It is assumed that the proposed Scheme would have a minimum life cycle of 40 years i.e., until 2070.

Decommissioning effects

5.4.16 Decommissioning effects are effects that will occur during the decommissioning phase of the proposed Scheme. This includes effects resulting from the activities associated with the dismantling and removal of the proposed Scheme once it has reached the end of its lifespan.

5.4.17 The proposed Scheme has a minimum design life of 40 years, however, it is anticipated that rather than be decommissioned, parts would be replaced to extend the proposed Scheme operational life.

5.4.18 The assumption is that the proposed Scheme would need to be removed if it cannot be re-purposed. Removal of the proposed Scheme is a similar process to construction but in reverse. The environmental impact of decommissioning can therefore not be fully assessed until the environmental conditions at the time of decommissioning are established. In any event, it is not anticipated that impacts from decommissioning would present any greater environmental risk than any assessed impacts from the construction phase. For the purposes of this EIA, it is proposed that decommissioning effects are not assessed at this stage. They will be assessed at the time of decommissioning in line with the applicable guidance and regulations at the time.

5.5 Assessment of effects and determining significance

Overview

5.5.1 The EIA process requires the identification of the likely significant effects of the proposed Scheme during both construction and operational phases.

5.5.2 Whilst the EIA Regulations require that the likely significant effects of a development are assessed they do not define what constitutes a ‘significant’ effect. This is typically taken

as a function of the importance or sensitivity of the feature being affected and the magnitude of the impact which is occurring. Therefore, the assessment of the significance of effects for the majority of topics will be based on a three-step process:

- Assigning value (or sensitivity) of receptors or resources;
- Assigning magnitude of impact; and
- Assigning significance.

5.5.3 In addition to the core steps above, the assessment of significant effects will also consider whether cumulative or residual effects will occur as a result of the LionLink proposed Scheme.

Receptor value and sensitivity

5.5.4 Receptors are environmental features that have the potential to be affected by the proposed Scheme, either beneficially or adversely. The sensitivity of a receptor is determined by assessing its ability to adapt to change and tolerate or recover from potential impacts. The value of a receptor takes into account whether, for example, the receptor or resource is rare, or has protected or threatened status. Where applicable, the value of a receptor will be prescribed by topic specific guidance.

5.5.5 Value or sensitivity is defined within each topic chapter or the topic chapter will reference this chapter as required. Value and sensitivity takes into account factors including the following:

- Vulnerability of the receptor to change;
- Recoverability of the receptor (e.g., is the change reversible or irreversible, permanent or temporary); and
- Importance of the receptor.

5.5.6 General criteria for defining the importance or sensitivity of receptors are set out in **Table 5-1**.

Table 5-1: Definitions of value and sensitivity for an example receptor

Receptor Value and Sensitivity	Description
Very High	Value: Very high importance and rarity, international scale (e.g. Internationally protected site). Sensitivity: The receptor has little or no capacity to absorb change without fundamentally altering its present character.
High	Value: High importance and rarity, national scale (e.g. Internationally or nationally protected site). Sensitivity: The receptor has a low capacity to absorb change without fundamentally altering its present character.
Medium	Value: Medium importance and rarity, regional scale (e.g. Regionally protected site).

Receptor Value and Sensitivity	Description
	Sensitivity: The receptor has some tolerance to change without detriment to its character.
Low	Value: Low importance and rarity, local scale. Sensitivity: The receptor has a moderate capacity to absorb change without fundamentally altering its present character.
Negligible	Value: Not considered to be important (e.g. Common or widespread). Sensitivity: The receptor is resistant to change and has capacity to accommodate the proposed changes.

Magnitude of impact

5.5.7 Impacts caused by a given effect can be either adverse or beneficial. The magnitude of the impact on receptors or resources shall be reported within the ES. Magnitude refers to the 'size' or 'amount' of an impact on a receptor and will be assessed by the below factors:

- Extent – the area over which an effect occurs;
- Duration – the time for which the effect occurs e.g., whether it is temporary or permanent;
- Frequency – how often the effect occurs;
- Severity – the degree of change relative to existing environmental conditions;
- Relevant policy or guidelines; and
- The reversibility of the effect.

5.5.8 **Table 5-2** sets out the guidelines of the assessment of the magnitude of impact. Where relevant, individual topic chapters set out variations in magnitude description requirements.

Table 5-2: Definitions of impact magnitude criteria

Impact Magnitude	Definition
High	Total loss or major alteration to key elements/features of the baseline conditions such that post development character/composition of baseline conditions would be fundamentally changed.
Medium	Loss or alteration to one or more key elements/features of the baseline conditions such that post development character/composition would be materially changed.

Impact Magnitude	Definition
Low	Some measurable change in attributes, quality or vulnerability; Minor shift away from baseline conditions. Changes arising from the alterations would be detectable but not material; the underlying character/composition of the baseline conditions would be similar to the pre-development situation.
Negligible	Very little change from baseline conditions. Change is barely distinguishable, approximating to a ‘no change’ situation.

Determination of significance

5.5.9 The significance of effect will be determined using quantitative or qualitative criteria, as well as professional judgment. Where appropriate, the matrix illustrated in **Table 5-3** will be applied to aid the assessment of effect significance based on expert judgement, latest guidance and input from consultation.

5.5.10 Where the methodology used to determine the significance of effect deviates from this standard approach, a description of the approach taken to the assessment and interpretation of significance levels will be provided within each technical chapter. This approach will ensure that the definition of significance of effect is transparent, and that the methodology is appropriate for each topic.

5.5.11 In order to provide a consistent approach to expressing the outcomes of the various studies undertaken as part of the EIA, and thereby enable comparison between effects upon different environmental components, the significance of effect will be described using the terms neutral, minor, moderate or major, except where required otherwise by guidance. Within the EIA process, ‘significant’ effects are considered to be those where the significance of the effect is assessed as being 'moderate' or greater. Minor or neutral effects are generally deemed to be ‘non-significant’.

5.5.12 **Table 5-3** illustrates the matrix applied as part of the standard approach to assessing the significance of effect.

Table 5-3: Assessment of significance

	Receptor Value or Sensitivity				
Magnitude of Impact	**Very High**	**High**	**Medium**	**Low**	**Negligible**
High	Major	Major	Moderate	Moderate	Minor
Medium	Major	Moderate	Moderate	Minor	Neutral
Low	Moderate	Moderate	Minor	Neutral	Neutral
Negligible	Minor	Minor	Neutral	Neutral	Neutral

5.6 Cumulative effects assessment

5.6.1 Schedule 4 paragraph 5(e) of the EIA Regulations requires that the EIA Scoping Report covers *"the cumulation of effects with other existing and/or approved projects".* Cumulative effects are the result of multiple actions on environmental receptors or resources over time and are generally additive or interactive in nature. It is therefore necessary to assess the significance of these effects. Two categories of cumulative effects will be considered:

- **Intra-project effects** are the combined effect of multiple aspects of the Project. For example, noise, dust and visual on one particular receptor; and
- **Inter-project effects** are where one receptor is affected by several developments with insignificant impacts individually, but which together represent a significant cumulative effect.

5.6.2 An overview of the approach to undertaking the Cumulative Effects Assessment for both onshore and offshore respectively is provided in **Chapter 29** Cumulative and Combined Effects of the Project, following the guidance set out in PINS Advice Note Seventeen: Cumulative Effects Assessment[1].

5.6.3 For a linear infrastructure project such as LionLink, there is the potential that combined effects could conceivably occur where there is a pathway between an onshore and an offshore impact with a shared receptor and between the proposed Offshore Scheme and the Project components within the Netherlands.

5.6.4 **Chapter 29** Cumulative and Combined Effects of the Project provides an overview of how the combined effects assessment will consider the potentially significant effects on shared receptors that may arise from the Onshore Scheme and Offshore Scheme construction, operation and maintenance.

5.6.5 At the UK/Netherlands Exclusive Economic Zone boundary the effects from construction will move with the installation spread and therefore there is no spatial or temporal overlap, it is a continuation of the effects along the linear scheme. The significance of effects is therefore considered in the EIA individual topic chapters rather than the cumulative effects assessment.

5.7 Transboundary effects

5.7.1 In accordance with Regulation 32 of the EIA regulations, and as set out in PINS Advice Note Twelve: Transboundary Impacts and Process[2], consideration has been given to the potential for transboundary effects on European Economic Area (EEA) States as a result of the Project. As a linear infrastructure project between the UK and Netherlands, it is acknowledged that during construction and operation (specifically maintenance) there will be a continuation of impacts from UK waters to Netherland waters and vice versa during certain works. Each of the offshore technical assessments presented in

[1] Advice Note Seventeen: Cumulative effects assessment relevant to nationally significant infrastructure projects. Published August 2019 (version 2)

[2] Advice Note Twelve: Transboundary Impacts and Process. Republished December 2020 (version 6)

this EIA Scoping Report consider the potential significant transboundary impacts, or where applicable, present the Applicant's position of whether these impacts should be scoped out from consideration. A screening matrix for transboundary impacts, in line with PINS Advice Note Twelve will be provided in the ES.

5.8 Approach to mitigation

5.8.1 The ES is required by the EIA Regulations to outline the measures envisaged to avoid, prevent reduce and, if possible, offset likely significant adverse effects on the environment.

5.8.2 Mitigation will be developed following a hierarchal approach, with the aim of 'designing out' adverse effects to the greatest extent possible. This includes avoiding, preventing or reducing effects.

5.8.3 The EIA will be undertaken in parallel with the development of the proposed Scheme design, providing the opportunity to incorporate mitigation into both the design and construction method.

5.8.4 The approach set out in **Table 5-4** will be used for developing and categorising mitigation.

Table 5-4: Mitigation Terminology

Mitigation Type	Description
Embedded mitigation measures (also referred to as Design or Primary Mitigation)	Mitigation that is embedded into the design of the proposed Scheme and prevents or reduces potential adverse effects. These include modifications to the location, design or operation of the proposed Scheme implemented prior to the application. This mitigation forms an intrinsic part of the proposed Scheme and is therefore taken into account within the initial assessment of likely significant effects as part of the EIA.
Additional mitigation measures (also referred to as Control measures or Tertiary Mitigation)	Measures implemented to reduce anticipated environmental impacts. These include actions that will be undertaken to meet existing legislative requirements, or actions that are considered to be standard best practice used to manage commonly occurring environmental effects. Each ES topic chapter will identify and describe measures to be adopted during construction to avoid and reduce environmental effects. Where it can be demonstrated that these measures can be secured e.g., through contractual arrangements or legal compliance, these measures will be taken into account in the initial assessment of likely significant effects.
Mitigation (also referred to as Secondary Mitigation)	Measures or actions required to reduce likely significant adverse environmental effects. For example, tree planting to screen receptors from visually intrusive aspects of the proposed Scheme, or the direct replacement of a feature that would be lost such as the creation of hedgerows to replace those that cannot be avoided.

Mitigation Type	Description
	These measures will be identified and described within the relevant topic chapters.

5.9 Residual effects

5.9.1 Residual effects are those that are predicted to remain after the proposed mitigation measures have been implemented, and will be included as part of the assessment. These will be described at the end of each topic chapter within the ES.

5.10 Monitoring

5.10.1 The ES will outline proportionate monitoring methods to be employed to ensure the effectiveness of mitigation. This will set out who will be responsible for monitoring, and the setting of clear objectives and parameters for monitoring. The ES will also identify the actions that will be undertaken should monitoring results fall below these set parameters.

5.11 Consultation and engagement

5.11.1 Consultation and stakeholder engagement is required as part of the DCO process and the progression of the Project. Feedback from both statutory consultees, as defined in PA2008, and the local community will be considered within the decision-making process, and will be carried out through a comprehensive programme of engagement and consultation. The EIA process will consider issues raised through this programme where they are relevant to the matters covered in the EIA.

5.11.2 The Applicant will seek to engage with consultees through a programme of both formal and informal consultation prior to submission of the application for development consent. A collaborative approach will be taken to consultation and engagement in order to provide confidence that all feedback has been analysed and taken into account.

5.11.3 The consultation and engagement will seek to:

- Inform statutory consultees, members of the public and other bodies with a particular interest in the environment or the proposed Scheme, and provide them with an opportunity to comment;
- Supplement baseline information for technical chapters;
- Obtain input to the identification of potential impacts and the development of appropriate mitigation;
- Inform the scope of the environmental assessments; and
- Provide consultee feedback on the design of the proposed Scheme.

5.11.4 The key stakeholders to be consulted as part of the pre-application process are outlined in Section 42 to 47 of the PA2008 and include (but are not limited to):

- Local authorities;
- Prescribed statutory bodies;
- Local communities; and
- Landowners/land interests.

5.11.5 The Applicant undertook Non-Statutory Consultation undertaken in 2022 and Supplementary Non-Statutory Consultation in 2023. This allowed stakeholders and local communities to gain a better understanding of the proposed Scheme and its potential effects.

5.11.6 Statutory consultation with the required consultees will be undertaken at subsequent stages of the EIA process, to allow engagement on both the design and mitigation measures, as well as through the provision of local knowledge and understanding.

5.11.7 The results of the statutory and non-statutory consultation will be utilised to inform the design of the proposed Scheme and the preparation of the EIA in support of the pre-application DCO process.

5.12 The Rochdale Envelope

5.12.1 The ‘Rochdale Envelope’ or ‘Design Envelope’ approach is employed where the nature of a proposed development means that some design details have not been confirmed when an application is submitted. This approach is commonly used within major infrastructure projects and allows the use of flexibility within clearly defined parameters to address any uncertainties.

5.12.2 The Rochdale Envelope approach will be used for Friston Substation, the Converter Station and the HVAC/HVDC cables. This allows for the maximum parameters to be adopted when determining likely significant effects, allowing the Project to be assessed on a realistic ‘worst case’ basis. This allows sufficient flexibility for detailed design to be undertaken within these parameters in accordance with PINS Advice Note 9: Rochdale Envelope[3].

[3] National Infrastructure Planning Advice Note Eighteen: The Water Framework Directive | National Infrastructure Planning (planninginspectorate.gov.uk)

Contents

6. Air Quality

6.1 Introduction

6.1.1 This chapter outlines the proposed scope and methodology for Air Quality. It will consider the potential for significant effects to air quality arising from the construction and operation of the LionLink Interconnector (hereafter referred to as 'the proposed Onshore Scheme'). A review of relevant guidance and policy has been undertaken together with a desk-based assessment, to inform the proposed scope and methodology.

6.1.2 This chapter is supported by the following appendices and figures:

- **Appendix 6-A**: Local authority monitoring results;
- **Appendix 6-B**: Construction Dust Assessment Methodology;
- **Figure 6-1**: Air Quality Study Area Map;
- **Figure 6-2**: Industrial processes Map; and
- **Figure 6-3**: Local Air Quality Monitoring Map.

6.1.3 There may be interrelationships with other disciplines. Therefore, this chapter should be read in conjunction with the following chapters:

- **Chapter 8** Ecology and Biodiversity assesses the potential for air quality effects on ecological receptors. However, this chapter sets out the study area and methodology for ecological receptors alongside human receptors as they draw on the same guidance documents; and
- **Chapter 10** Health and Wellbeing which covers air quality impacts on wellbeing and quality of life for communities close to areas of construction.

6.2 Consultation and engagement

6.2.1 Consideration has been given to responses received at Non-Statutory Consultations held in 2022 and 2023 in preparing this scoping chapter. Responses relating to Air Quality have been received from the following:

- East Suffolk Council (ESC)
- Environment Agency; and
- Parish and Town Councils: Friston Parish Council, Leiston-cum-Sizewell Town Council; and Aldringham cum Thorpe Parish Council.

6.2.2 The main themes reported as part of the Non-Statutory Consultations were:

- Pollution prevention, with focus on the construction phase;
- Cumulative impact with other projects in the area; and
- Consideration of designated ecological sites within the search area.

6.2.3 Engagement was undertaken with Suffolk County Council (SCC) and ESC in August 2023. The key points of discussion included:

- Request for construction dust impacts on human receptors to be scoped in;
- Request for Non-Road Mobile Machinery (NRMM) during the construction phase to be scoped in; and
- Discussed and agreed the proposed methodology and scope.

6.2.4 Further engagement will be undertaken with relevant stakeholders to obtain any information that they hold to supplement the assessment and to seek their views with regards to the evolving design.

6.2.5 The following statutory bodies will be consulted during the EIA process in relation to Air Quality:

- SCC Environmental Health Officer;
- ESC Environmental Health Officer; and
- The Environment Agency.

6.2.6 In addition, engagement will be undertaken with non-statutory stakeholders as required so that their specialist local views and expertise can be considered as part of the EIA process.

6.3 Baseline conditions

Study area

6.3.1 The proposed Onshore Scheme Scoping Boundary (hereafter referred to as 'the Onshore Scoping Boundary') is shown on **Figure 1-2**

6.3.2 The air quality study area is shown on **Figure 6-1** and is defined by the screening criteria from the Institute of Air Quality Management (IAQM) Construction Dust Guidance[1]:

- Relevant receptors within the Onshore Scoping Boundary plus a 350m area surrounding the Onshore Scoping Boundary, or within 50m of the proposed routes used by construction traffic on the public highway up to 500m from the site entrance.
- Any ecological designated site within the Onshore Scoping Boundary plus a 50m area surrounding the Onshore Scoping Boundary, or within 50m of the proposed routes used by construction traffic on the public highway up to 500m from the site entrance.
- The Onshore Scoping Boundary will be used until a boundary describing the area in which construction activities will take place is available.

6.3.3 Construction routes and site entrances are not known at this stage in the design therefore the study area for traffic emissions is yet to be defined. This will be considered as part of the assessment within the Preliminary Environmental Information (PEI)

[1] IAQM Dust Guidance, 2024 v2.2. Accessed Feb 2024. Available at: https://iaqm.co.uk/wp-content/uploads/2013/02/Construction-Dust-Guidance-Jan-2024.pdf

Report. Where an assessment of emissions from traffic on the public highway is required, the Affected Road Network (ARN) is defined according to the predicted changes in traffic volumes according to the Environmental Protection UK (EPUK) IAQM/ Planning Guidance[2]. Further details of this criteria are included in **Section 6.7.20**.In areas where the criteria are met, ecological and human receptors within 200m of the ARN will be scoped into the assessment.

6.3.4 The study area will be reviewed and, as appropriate, refined for the assessment in the PEI Report and Environmental Statement (ES) with only one Landfall and one High Voltage Direct Current (HVDC) Underground Cable Corridor being taken forward. The study area will be based on the proposed Order limits in the ES.

Baseline data sources

6.3.5 The baseline described in this chapter and associated appendices has been informed by the following data sources:

Table 6-1 Scoping baseline data sources

Baseline Data	Source
Background Air Quality Archive (2018-2030)	Department for Environment, Food and Rural (Defra)[3];
Air Quality Management Area (AQMA) dataset	Defra[4];
Environmental Permitting Regulations	Defra[5]
Local Air Quality Monitoring, covered in **Section 6.3.13**	ESC[6]
Local planning authority assessment reports, as stated in **Section 6.3.13**	Defra[7]
Ecological sites	Suffolk Biodiversity Information Services (SBIS) (Ancient Veteran Trees)[8] Multi Agency Geographic Information for the Countryside (MAGIC) Maps (statutory sites)[9]

[2] IAQM/EPUK Planning Guidance, 2017. Accessed Feb 2024. Available at: https://www.iaqm.co.uk/text/guidance/air-quality-planning-guidance.pdf

[3] Defra Background Mapping, 2023. Accessed Feb 2024. Available at: https://uk-air.defra.gov.uk/data/laqm-background-maps?year=2018

[4] Defra AQMA, 2023. Accessed Feb 2024. Available at: https://uk-air.defra.gov.uk/aqma/maps/

[5] Defra Environmental Permitting Regulations, 2016. Accessed Feb 2024. Available at: https://www.legislation.gov.uk/uksi/2016/1154/contents/made

[6] ESC Annual Status Report, 2022. Accessed Feb 2024. Available at: https://www.eastsuffolk.gov.uk/assets/Environment/Environmental-Protection/Air-Quality/East-Suffolk-ASR-2022.pdf

[7] Environment Act, 2021. Accessed Feb 2024. Available at: https://www.legislation.gov.uk/ukpga/2021/30/contents/enacted

[8] Woodland Trust, 2023. Accessed Feb 2024. Available at: https://ati.woodlandtrust.org.uk/

[9] MAGIC Maps, 2023. Accessed Feb 2024. Available at: https://magic.defra.gov.uk/

Baseline Data	Source
	SBIS (non-statutory sites)[10]

Baseline

6.3.6 Existing or baseline ambient air quality refers to the concentration of relevant substances that are already present in the environment. These are present from various sources, such as industrial processes, commercial and domestic activities, traffic and natural sources. See **Section 6.3.5** for data sources used in the baseline assessment.

6.3.7 A desk-based review has been undertaken using the approaches listed below. The review identified the main sources of air pollution within a radius of 2km around the onshore elements of the proposed Onshore Scheme, local air quality monitoring data for recent years, where available, and local background pollutant concentrations. The 2km buffer surrounding the Scoping Boundary is for the purpose of collecting baseline data. Baseline levels have been reviewed against the relevant air quality standards.

6.3.8 The following sections present the current baseline established at scoping. There are currently two options being considered for the proposed Landfall Site and associated HVDC Underground Cable Corridor, which are shown in **Figure 1-3**. Baseline information is presented for all options below.

Baseline - Sources of air pollution

Industrial processes

6.3.9 The Public Registers online, provided by the Environment Agency that licenses industry, businesses, and individuals to carry out activities that may pollute the environment[11]. The register shows there are five Part A processes, with release to the air within 2km of the Onshore Scoping Boundary. Location of the Part A processes are shown in **Figure 6-2**.

Road traffic

6.3.10 In recent decades, atmospheric emissions from transport on a national basis have grown to match or exceed other sources in respect of many pollutants, particularly in urban areas. Vehicle emissions are likely to be one of the more dominant sources of air pollutants in the vicinity of the proposed Onshore Scheme.

6.3.11 The main sources of traffic emissions surrounding the proposed Onshore Scheme are the A12, A146, and the A14. These major roads carry significant volumes of traffic. Local air quality monitoring discussed in **Section 6.3.18** has indicated roadside concentrations are likely to be below the Air Quality Objective (AQO) for annual mean nitrogen dioxide (NO_2) from 2017 onwards.

[10] Suffolk Biodiversity Information Services, 2023. Accessed Feb 2024. Available at: https://www.suffolkbis.org.uk/

[11] Environment Agency Industrial Processes, 2023. Accessed Feb 2024. Available at: https://environment.data.gov.uk/public-register/view/search-industrial-installations

Baseline - Local air quality

6.3.12 The Environment Act 2021[12] requires local authorities to report to Defra on local air quality and local air quality management within their local authority area. This also requires an assessment of compliance with the relevant limit or objective values.

6.3.13 Information on air quality in the UK can be obtained from a variety of sources including local authorities, national network monitoring sites and other published sources. For the purposes of this assessment, latest available data has been obtained from the local authority in the vicinity of the study area, ESC[13]. Data has also been obtained from Defra[14].

Local authority review and assessment

6.3.14 Where objectives are not predicted to be met, local authorities must declare the area as an AQMA. In addition, local authorities are required to produce an Air Quality Action Plan (AQAP) which includes measures to improve air quality in the AQMA. ESC have included their AQAP within the most recent Annual Status Report (ASR)[15].

6.3.15 ESC have declared one AQMA in the local authority, The Suffolk Coastal District Council AQMA No.3, but as the AQMA is located more than 2km from the Onshore Scoping Boundary, it is not of concern for this assessment**.**

6.3.16 ESC has previously declared two other AQMAs: Ferry Lane Felixstowe, AQMA and the Woodbridge Junction AQMA. These AQMAs have been revoked.

Local authority monitoring

6.3.17 There is both automatic and diffusion tube monitoring undertaken by ESC, monitoring only NO_2. There is one automatic monitoring location operated by ESC, located approximately 16km south west of the Onshore Scoping Boundary, so is not of concern for this assessment. ESC operate 83 diffusion tube monitoring sites. The closest non-automatic diffusion tube monitoring location, and the only monitoring site within 200m of the Onshore Scoping Boundary, MID 1, is located approximately 70m west from the Onshore Scoping Boundary.

6.3.18 **Figure 6-3** shows the location of the six monitoring sites within 2km of the Onshore Scoping Boundary. **Table 6-1A** in **Appendix 6-A** presents the non-automatic diffusion tube monitoring sites within 2km of the Onshore Scoping Boundary, and their results, from 2017 to 2021, within ESC.

6.3.19 Exceedances of the annual mean NO_2 AQO[16] (40µg/m^3) were recorded at one of 83 diffusion tube monitoring sites undertaken by ESC between 2017 and 2021. However,

[12] Environment Act, 2021. Accessed Feb 2024. Available at: https://www.legislation.gov.uk/ukpga/2021/30/contents/enacted

[13] ESC Annual Status Report, 2022. Accessed Feb 2024. Available at: https://www.eastsuffolk.gov.uk/assets/Environment/Environmental-Protection/Air-Quality/East-Suffolk-ASR-2022.pdf

[14] Defra Background Mapping, 2023. Accessed Feb 2024. Available at: https://uk-air.defra.gov.uk/data/laqm-background-maps?year=2018

[15] ESC Annual Status Report, 2022. Accessed Feb 2024. Available at: https://www.eastsuffolk.gov.uk/assets/Environment/Environmental-Protection/Air-Quality/East-Suffolk-ASR-2022.pdf

[16] Defra AQO, 2023. Accessed Feb 2024. Available at: https://uk-air.defra.gov.uk/air-pollution/uk-eu-limits

as this monitoring location is a considerable distance from the Onshore Scoping Boundary (approximately 25km), it will not be a concern for this assessment. In addition, all other diffusion tube monitoring sites, including MID 1 within 200m of the study area, were below the annual mean NO_2 AQO[17] of 40µg/m^3 in 2017 through to 2021. These are shown in **Figure 6-3.**

Baseline – Defra projected background concentrations

6.3.20 Background concentrations refer to the existing levels of pollution in the atmosphere, produced by a variety of stationary and non-stationary sources, such as roads and industrial processes. The Defra website[18] includes estimated background pollutant concentrations for nitric oxide (NOx), NO_2, Particulate Matter (PM) PM_{10} and $PM_{2.5}$ for each 1km by 1km OS Grid square in the UK.

6.3.21 The Defra background concentrations of NO_2 are found to be well below the AQO from 2018, 2023, and 2030 (between 5.1µg/m^3 and 7.7µg/m^3) within the study area, well below the limit value of 40µg/m^3.

6.3.22 The background concentrations of NOx (relevant to ecological receptors) are generally below critical level within the proposed Onshore Scheme. The highest background concentration of NOx is 9.9 µg/m^3, the minimum concentration is 6.4µg/m^3. Therefore, there are no exceedances across the study area.

6.3.23 The background concentrations of PM_{10} are not exceeding the objective (40µg/m^3). The highest concentration within proposed Onshore Scheme is 16.4µg/m^3 and the lowest is 11.6µg/m^3. Background concentrations of $PM_{2.5}$ are not exceeding the relevant site limit value, in this case 10µg/m^3, where the maximum concentration within the proposed Onshore Scheme is 9.4µg/m^3 and the minimum concentration is 7.4µg/m^3.

6.3.24 **Table 6-2** presents the maximum background concentrations for the area covered by the proposed Onshore Scheme for the years 2018, 2023, and 2030 which are well below the AQO.

Future baseline

6.3.25 The Air Quality chapter within the PEI Report and ES will consider changes which may affect the future air quality environment in the absence of the proposed Onshore Scheme. The future baseline will also take into account any developments that are likely to be present in the future baseline. The air quality assessment will use a future baseline of 2028 to align with the future baseline traffic year.

6.3.26 Background air pollutant concentrations are currently available using 2018 base year for projections, up to 2030[19]. Background air pollutants are predicted to improve over time due to reductions in emissions resulting from:

- Reductions in transport emissions resulting from improvements in fuel efficiency and uptake in low emission vehicles;

[17] Defra AQO, 2023. Accessed Feb 2024. Available at: https://uk-air.defra.gov.uk/air-pollution/uk-eu-limits

18 Defra Background Mapping, 2023. Accessed Feb 2024. Available at: https://uk-air.defra.gov.uk/data/laqm-background-maps?year=2018

19 Defra Background Mapping, 2023. Accessed Feb 2024. Available at: https://uk-air.defra.gov.uk/data/laqm-background-maps?year=2018

- General reduction in the use of fossil fuels;
- Reductions in pollutant emissions from agricultural sources due to improvements in management envisaged in the 2019 Clean Air Strategy[20]; and,
- Improved emission standards for NRMM and static generators.

[20] Clean Air Strategy, 2019. Accessed Feb 2024. Available at: https://www.gov.uk/government/publications/clean-air-strategy-2019

Table 6-2 Defra projected background concentrations for the proposed Onshore Scheme

1km grid square (OS grid reference)		NO_2 ($\mu g/m^3$)			NOx ($\mu g/m^3$)			PM_{10} ($\mu g/m^3$)			$PM_{2.5}$ ($\mu g/m^3$)		
X	Y	2018	2023	2030	2018	2023	2030	2018	2023	2030	2018	2023	2030
640500	263500	7.08	6.05	5.30	9.09	7.68	6.68	16.41	15.38	15.05	9.41	8.58	8.32

Note: The proposed Onshore Scheme covers multiple OS grid squares. Therefore, the result presented above is taken from the grid square which has the highest pollutant concentrations for 2018, 2023, and 2030 as this is consistent with the latest year of local authority monitoring.

Receptors

6.3.27 The presence of existing human and ecological have been identified for the baseline assessment through their proximity to the proposed Onshore Scheme, and professional judgment.

Human receptors

6.3.28 Human receptors include residential receptors; commercial receptors, e.g. places of work; and community receptors, e.g. churches, community centres.

6.3.29 Relevant receptors that may be affected by dust[1] during demolition/construction have also been considered.

6.3.30 Receptors that merit particular attention due to the relative vulnerability of people who may occupy them include medical institutions, hospices, residential care homes or sheltered accommodation and schools, nurseries, and other places of education where children or young people are present. Full details of human receptors would be provided in the PEI Report once the study area has been refined.

6.3.31 Due to the size of the Onshore Scoping Boundary, existing residential receptors are located across the proposed Onshore Scheme. The main residential areas surrounding the proposed Onshore Scheme include Leiston, 1.5km east of the Onshore Scoping Boundary, Saxmundham which is approximately 200m west of the Onshore Scoping Boundary, Middleton which is within the Onshore Scoping Boundary, Westleton which is within 100m of the Onshore Scoping Boundary to the east, Blackheath which borders the Onshore Scoping Boundary to the west, Walberswick and Southwold which also border the Onshore Scoping Boundary to the east on the coast, as well as smaller villages surrounding the proposed Onshore Scheme.

Ecological receptors

6.3.32 There are designated and non-designated ecological receptors within the Onshore Scoping Boundary as well as within 50m of the study area. This includes 23 Ancient Veteran Trees (AVT) within 50m of the Onshore Scoping Boundary, six Ancient Woodlands (AW), one National Nature Reserves (NNR), one Ramsar site, two Sites of Special Scientific Interest (SSSI), two Special Area of Conservation (SAC), and three Special Protections Areas (SPA).

Proposed Friston Substation

6.3.33 The proposed Friston Substation site located approximately 500m from the closest human receptors, the village of Friston.

6.3.34 The closest ecological receptor to the site is Grove Wood, an AW approximately 330m east of the proposed Friston Substation Site.

6.3.35 Residential and ecological receptors will be identified in line with baseline criteria listed in **Sections 6.3.28 to 6.3.32**.

Underground HVAC Cable Corridor

6.3.36 Residential and ecological receptors will be identified in line with baseline criteria listed in **Sections 6.3.28 to 6.3.32**.

Converter Station

6.3.37 The proposed Converter Station Site is located approximately 170m east of the closest human receptors, in the town of Saxmundham.

6.3.38 The closest ecological receptor to the proposed Converter Station Site is Grove Wood, an AW, located approximately 1.8km south east of the proposed Converter Station Site.

6.3.39 Residential and ecological receptors will be identified in line with baseline criteria listed in **Sections 6.3.28 to 6.3.32**.

Underground HVDC Cable Corridor

6.3.40 Residential receptors of nearby towns and villages including Friston, Coldfair Green, Saxmundham, and Uggeshall will be identified in line with baseline criteria listed in S**ection 6.3.28 to 6.3.32**. This applies to both cable corridor options of Southwold and Walberswick

Landfall Site

Southwold

6.3.41 The proposed Southwold Landfall Site is located toward the northern boundary of the Onshore Scoping Boundary, toward the coastline of East Suffolk. This is a well populated area, with the B1127 and A1095 running through the area.

6.3.42 The closest human receptors to the proposed Southwold Landfall Site are the village of Reydon, approximately 350m west of the proposed Southwold Landfall Site, and Southwold, approximately 210m south of the proposed Southwold Landfall Site.

6.3.43 The closest ecological receptor to the proposed Southwold Landfall Site is the site of Special Scientific Interest (SSSI) Pakefiled to Easton Bavants, less than 5m north from the proposed Southwold Landfall Site.

Walberswick

6.3.44 The proposed Walberswick Landfall Site, located on the north eastern arm of the Onshore Scoping Boundary, is within a populated area, with the B1387 running in close proximity to Walberswick.

6.3.45 The closest human receptors to the proposed Walberswick Landfall site are the village of Walberswick, less than 5m north of the Landfall Site, on the Onshore Scoping Boundary, and Southwold, approximately 1.6km north of the proposed Walberswick Landfall Site.

6.3.46 The closest ecological receptor to the proposed Walberswick Landfall Site is the Ramsar Minsmere-Walberswick and SSSI Minsmere Walberswick Heaths and Marshes site, approximately 65m south from the Landfall Site. In addition, the NNR Suffolk Coast is also approximately 65m south of the proposed Walberswick Landfall Site.

6.4 Potential impacts

6.4.1 This section identifies the potential impacts that could occur as a result of the proposed Onshore Scheme during the construction and operational phases.

Construction

Dust

6.4.2 The following impacts could occur during the construction phase:

- Dust deposition, resulting in soiling;
- Visible dust plumes, showing evidence of dust emissions;
- Elevated PM_{10} concentrations, as a result of dust generating activities on Site[21]; and
- These impacts may effect human and ecological receptors.

Traffic

6.4.3 The following impacts could occur during the construction phase:

- Increase in airborne particles and NO_2 due to exhaust emissions from diesel powered vehicles and equipment on site;
- Potential for particulate matter to be emitted by vehicle exhausts;
- The impact of emissions on receptors located close to the working area and along construction routes along the local network; and
- In areas where concentrations of traffic-based pollutants are already in exceedance of the limit of 40µg/m^3 for NO_2, the addition of construction traffic in this area could result in a further deterioration of pollutant concentrations[22].

Generators

6.4.4 The following impacts could occur during the construction phase from the use of generators and other Non-Road Mobile Machinery:

- Increase in pollutant emissions to air from the use of machinery and generators; and
- These impacts may effect human and ecological receptors.

Operation

Traffic

6.4.5 The following impacts could occur during the operational phase:

- Increase in airborne particles and NO_2 due to exhaust emissions from diesel powered vehicles and equipment on site[23];

[21] IAQM Dust Guidance, 2024 v2.2. Accessed January 2024. Available at: https://iaqm.co.uk/wp-content/uploads/2013/02/Construction-Dust-Guidance-Jan-2024.pdf

[22] EPUK/IAQM Planning Guidance, 2017. Accessed Feb 2024. Available at: https://www.iaqm.co.uk/text/guidance/air-quality-planning-guidance.pdf

[23] EPUK/AQM Planning Guidance, 2017. Accessed Feb 2024. Available at: https://www.iaqm.co.uk/text/guidance/air-quality-planning-guidance.pdf

- Potential for particulate matter to be emitted by vehicle exhausts; and
- These impacts may effect human and ecological receptors.

6.5 Design and control measures

6.5.1 As outlined in **Chapter 5** EIA Approach and Method, a standard hierarchical approach will be taken to mitigation.

6.5.2 The assessment of effects will take into account measures that are embedded into the proposed Onshore Scheme design, together with general good practice measures.

Design measures

6.5.3 The design of proposed Onshore Scheme will seek to avoid sensitive features such as larger residential areas and ecological designations.

Control measures

6.5.4 Measures to control and limit dust, air pollution, odour and exhaust emissions would be required during the construction phase. This includes the measures would be implemented to limit emissions from construction plant and vehicles, which would include the following:

- The site layout would be planned to locate machinery and dust-causing activities away from sensitive receptors, where reasonably practicable. Methods, such as the erection of hoardings or other barriers along the site boundary, would be used, where appropriate, to mitigate the spread of dust;
- Construction plant will be operated in accordance with the manufacturer's written recommendations;
- Vehicles and plant would not idle, and would be secured, when not in use;
- Construction vehicles to conform to the current emissions standards;
- Vehicle and construction plant exhausts to be directed away from the ground and positioned at a height to facilitate appropriate dispersal of exhaust emissions;
- The enclosure, shielding or provision of filters on plant likely to generate excessive quantities of dust beyond the site boundaries;
- Movement of construction traffic around the site would be kept to the minimum reasonable for the effective and efficient operation of the site during construction;
- Site access points would be designed to minimise queuing traffic adjacent to access points;
- The use of diesel or petrol-powered generators would be reduced by using mains electricity or battery-powered equipment where reasonably practicable;
- Use of mechanical road sweepers combined with water sprays to suppress dust and clean hard-standings and roads;

- Damping down of dust-generating equipment and vehicles within the site and the provision of dust suppression in all areas of the site that are likely to generate dust; and
- Covering materials, deliveries or loads entering and leaving the construction site for the purposes of preventing materials and dust spillage.

6.6 Scope of the assessment

6.6.1 This section identifies the potential for the proposed Onshore Scheme to give rise to likely significant effects, taking into account the design and control measures identified in **Section 6.5**

6.6.2 **Table 6-3** sets out the receptors identified within the study area, the potential impacts as a result of construction and/or operation activities associated with the proposed Onshore Scheme, whether these impacts are likely to give to rise to significant effects, and whether the receptor is scoped in or scoped out of the assessment.

6.6.3 The proposed Friston Substation, as described in **Chapter 2** proposed Scheme Description outlines the optionality that remains at the proposed Friston Substation. The scope of this EIA Scoping Chapter has been based on the worst case scenario that the proposed Onshore Scheme would construct Friston Substation.

6.6.4 All identified impacts are of relevance to both the Southwold and Walberswick options unless specified otherwise.

6.6.5 A precautionary approach has been taken and where there is no strong evidence base, insufficient baseline or the significance is uncertain at this stage the impact has been scoped into the EIA. Where there is a clear evidence base that the effect from the impact will not be significant, either alone or in combination with other plans and projects, the impact has been scoped out of the EIA.

6.6.6 The assessment will consider both human health and ecological receptors. Air quality effects associated with additional road traffic during the construction or operational phase will be assessed at receptors (both human and ecological) within 200m of roads that experience a change in traffic which meet criteria outlined in the EPUK/IAQM land-use planning guidance[24].

6.6.7 As a result of the number of nearby sensitive receptors, construction dust will be scoped into this assessment. A dust risk assessment will be appended to the Construction Environmental Management Plan (CEMP), to document the compliance assessment and to identify any further good practice measures. This will follow the approach set out in the IAQM Construction Dust Guidance[25].

[24] EPUK/IAQM Planning Guidance, 2017. Accessed Feb 2024. Available at: https://www.iaqm.co.uk/text/guidance/air-quality-planning-guidance.pdf
[25] IAQM Dust Guidance, 2024 v2.2. Accessed January 2024. Available at: https://iaqm.co.uk/wp-content/uploads/2013/02/Construction-Dust-Guidance-Jan-2024.pdf

Table 6-3 Proposed scope of the assessment

Project phase	Receptor	Impact	Potential for significant effect	Proposed to be scoped in/ out
Construction	Ecological and human receptors	Dust impacts from the increase in vehicle movement as well as construction activities such as earthworks has the potential to impact local air quality	Potential for significant effects at ecological and human receptors, from deterioration in local air quality (PM_{10} and $PM_{2.5}$), caused by dust, due to proximity of proposed construction activities to sensitive receptors	Scoped in
Construction	Ecological and Human receptors	Use of generators and NRMM can have the potential to temporarily deteriorate local air quality during this phase	Potential for temporary deterioration in local air quality (NO_2, NOx, PM_{10} and $PM_{2.5}$) at local human and ecological receptors, when the use of NRMM including generators occurs	Scoped in
Construction	Ecological and Human receptors	Increase in traffic from construction activity and the increase of vehicle movement in the area during this phase may impact receptors	Potential for deterioration in local air quality (NO_2, NOx, PM_{10} and $PM_{2.5}$) at local human and ecological receptors. This will be scoped out if criteria are not met	Scoped in
Operational	Ecological and Human receptors	Vehicle emission impacts on the Increase of vehicle movement in the area during this phase	No likely significant effects	Scoped out

6.6.8 Operational impacts to air quality have been scoped out of the EIA due to no likely significant effects expected as a result of low vehicle movements.

6.6.9 The assessment on the risk of impacts from construction dust on ecological and human receptors has been scoped into the EIA on the basis that there is potential for significant effects due to proximity of both ecological and human receptors to the proposed Onshore Scheme. However, the impacts will unlikely be significant with the implementation of suitable mitigation measures.

6.6.10 Assessment of emissions from construction generators and NRMM has been scoped in to the EIA due to the potential of temporary deterioration of local air quality. Best practice measures will be recommended to minimise the emissions from these sources and therefore the resulting impacts will unlikely be significant.

6.6.11 If the screening criteria are met or exceeded, then an assessment of the effects of the emissions of construction traffic using the public highway will be scoped into the PEI Report. Road links that do not meet the criteria, will not be subject to assessment and will be scoped out of the EIA. Assessment of emissions from diverted traffic has been scoped out due to low expected changes in traffic flows.

6.7 Assessment methodology

Receptors

6.7.1 Human receptors and ecological receptors will be identified using the following criteria and professional judgement:

- Proximity to the affected roads;
- Representativeness of maximum effects of the proposed Onshore Scheme in that region; and
- Whether they are at risk of exceeding the annual mean NO_2 AQO.

6.7.2 Receptors will also be identified and added to the air quality assessment using the following criteria for dust[26] and professional judgement:

- The activities being undertaken;
- Duration of these activities;
- The meteorological conditions;
- Proximity of receptors to the activities; and
- The sensitivity of the receptors to dust.

Data sources

6.7.3 The baseline will be informed by a desk study which draws on the information sources outlined in **Section 6.3.5**

[26] IAQM Dust Guidance, 2024 v2.2. Accessed January 2024. Available at: https://iaqm.co.uk/wp-content/uploads/2013/02/Construction-Dust-Guidance-Jan-2024.pdf

6.7.4 The construction traffic study area will be defined by screening the construction traffic data provided against the EPUK/IAQM screening criteria[27].

6.7.5 Should an assessment of construction and/ or operational traffic emissions be required, the ADMS-Roads (version 5.0.0.1) atmospheric dispersion model will be used to predict the change in air pollutant concentrations as a result of the construction and/or operational of the proposed Onshore Scheme.

6.7.6 Significance will be determined using the EPUK/IAQM guidance[28].

Legislation, policy and guidance

6.7.7 Legislation and policy relevant to the proposed Scheme and this chapter is outlined in **Chapter 4** Legislation and Policy Overview and **Appendix 4-A** National Policy, **Appendix 4-B** Environmental Legislation and **Appendix 4-C** Local Policy.

6.7.8 Relevant guidance and standards that have informed the scoping process are listed below (but not limited to) and will also be taken into account as part of the assessment:

- Local Air Quality Management Policy Guidance and Technical Guidance[29];
- Institute of Air Quality Management Dust Guidance[30];
- EPUK/IAQM Land-Use Planning & Development Control[31];
- Environment Act 2021[32];
- Air Quality Standards Regulations 2019[33]; and
- Environmental Protection Act (EPA) 1990[34].

Assessment method

6.7.9 **Chapter 5** EIA Approach and Method sets out the standard EIA methodology and matrices to be used for the assessment. This section provides a summary of the EIA methodology specifically relevant to this chapter.

6.7.10 Assessment of cumulative and combined effects are discussed in **Chapter 29** Cumulative and Combined effects of the Project.

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[27] EPUK/IAQM Planning Guidance, 2017. Accessed Feb 2024. Available at: https://www.iaqm.co.uk/text/guidance/air-quality-planning-guidance.pdf

[28] EPUK/IAQM Planning Guidance, 2017. Accessed Feb 2024. Accessed Feb 2024. Available at: https://www.iaqm.co.uk/text/guidance/air-quality-planning-guidance.pdf

[29] Local Air Quality Management Technical Guidance (TG22), 2022. Accessed Feb 2024. Available at: https://laqm.defra.gov.uk/wp-content/uploads/2022/08/LAQM-TG22-August-22-v1.0.pdf

[30] IAQM Dust Guidance, 2014. Accessed October 2023. Available at: https://iaqm.co.uk/text/guidance/construction-dust-2014.pdf

[31] EPUK/IAQM Planning Guidance, 2017. Accessed Feb 2024. Available at: https://www.iaqm.co.uk/text/guidance/air-quality-planning-guidance.pdf

[32] Environment Act 2021. Accessed Feb 2024. Available at: https://www.legislation.gov.uk/ukpga/2021/30/contents/enacted

[33] The Air Quality Regulations 2019. Accessed Feb 2024. Available at: https://www.legislation.gov.uk/uksi/2019/74/made

[34] Environmental Protection Act, 1990. Accessed Feb 2024. Available at: https://www.legislation.gov.uk/ukpga/1990/43/contents

Ascribing value/sensitivity

6.7.11 Sensitive receptors include locations where people are likely to be exposed to air pollutants for an averaging time commensurate with the AQO or limit value being assessed against. Sensitive receptors include:

- Residential receptors;
- Commercial receptors, e.g., places of work;
- Community receptors, e.g., community centres; and
- Ecological Receptors (statutory, non-statutory and locally designated sites).

6.7.12 Receptors that merit particular attention due to the relative vulnerability of people who may utilise them include:

- Medical facilities;
- Residential care homes or sheltered accommodation; and
- Schools, nurseries, and other places of education where children or young people are present.

6.7.13 While the legal limit and objective values for air pollutants are established in law, it is widely recognised that the air pollutants identified in the Air Quality Standards Regulations 2007[35] are considered to be non-threshold pollutants, i.e., there is no safe exposure limit below which there are no health impacts. Therefore, all receptors that are exposed to air pollutants for a time period relevant to the limit or objective value for a given pollutant are considered to be highly sensitive receptors.

6.7.14 The criteria used to determine the value and sensitivity of the receiving environment to air quality effects can be found in the tables in section 7 of the Dust Risk Assessment Guidance[36], presented in **Appendix 6-B**. These tables take account of the number of receptors within a given distance of construction works, the sensitivity of receptors and the background pollutant concentration through a semi-quantitative method to establish the sensitivity according to dust soiling impacts, human health impacts and ecological impacts.

Construction

Construction dust

6.7.15 The construction dust assessment will be undertaken following the risk-based approach outlined in the IAQM guidance[37] for the assessment of dust from demolition and construction.

[35] The Air Quality Standards, 2007. Accessed Feb 2024. Available at: https://www.legislation.gov.uk/uksi/2007/64/contents/made

[36] IAQM Dust Guidance, 2024 v2.2. Accessed January 2024. Available at: https://iaqm.co.uk/wp-content/uploads/2013/02/Construction-Dust-Guidance-Jan-2024.pdf

[37] IAQM Dust Guidance, 2024 v2.2. Accessed January 2024. Available at: https://iaqm.co.uk/wp-content/uploads/2013/02/Construction-Dust-Guidance-Jan-2024.pdf

6.7.16 The IAQM[38] guidance considers the potential for dust emissions from the following activities:

- Demolition;
- Earthworks i.e. soil stripping, ground levelling, excavation and land;
- Construction; and
- Trackout i.e. incidental movement of dust and dirt from the construction or demolition site onto the public road network.

6.7.17 For each of the above activities, the guidance considers three separate dust effects:

- Annoyance due to dust soiling;
- Harm to ecological receptors; and
- The risk of health effects due to a significant increase in PM_{10} exposure.

6.7.18 The methodology takes into account the scale to which the above effects are likely to be generated (classed as small, medium or large). The distance of the closest receptors and background PM_{10} concentrations are also taken into account in order to determine the sensitivity of the surrounding area.

6.7.19 This is then taken into consideration to derive an overall site risk and identify suitable mitigation measures. Receptors can be either human or ecological and are chosen based on their sensitivity to dust soiling and PM_{10} exposure.

Construction traffic

6.7.20 The proposed traffic flows using the public highway as a result of construction of the proposed Onshore Scheme could meet the assessment criteria from the IAQM guidance[39]. Where flows meet the criteria for assessment, detailed dispersion modelling will be undertaken on the relevant road links to assess the changes in concentrations of air pollutants. The screening criteria are:

- A change in Light Duty Vehicle flows of more than 100 annual average daily traffic (AADT) within or adjacent to an AQMA or more than 500 AADT elsewhere; and
- A change in HDV (>3.5 tonnes) flows of more than 25 AADT within or adjacent to an AQMA or more than 100 AADT elsewhere.

6.7.21 The screening criteria will identify the ARN. Road links that do not meet the criteria will not be subject to assessment.

6.7.22 Sensitive receptors within 200m of the ARN will be considered. Beyond this distance concentrations are expected to have dispersed to concentrations equivalent to background levels and will not be assessed.

6.7.23 If the screening criteria are met or exceeded, then calculation of emissions from traffic will be undertaken using the latest available version of the Defra Emissions Factor

[38] IAQM Dust Guidance, 2024 v2.2. Accessed January 2024. Available at: https://iaqm.co.uk/wp-content/uploads/2013/02/Construction-Dust-Guidance-Jan-2024.pdf

[39] IAQM Dust Guidance, 2024 v2.2. Accessed January 2024. Available at: https://iaqm.co.uk/wp-content/uploads/2013/02/Construction-Dust-Guidance-Jan-2024.pdf

Toolkit (currently v11.0). Dispersion modelling will be undertaken using the Air Dispersion Modelling System-Roads dispersion modelling program.

6.7.24 The conversion of road NO_x to NO_2 will be undertaken using the latest version of the Defra NO_x to NO_2 Calculator[40] (currently v8.1).

Operation

Operational traffic

6.7.25 A screening assessment will also be undertaken for operational traffic following the same approach as set out above. It is assumed that the only vehicle trips associated with the operational phase will be for maintenance and that these would be minimal across an annual period.

Impact magnitude

6.7.25 The magnitude of change for construction traffic emissions will be assigned based on the criteria from EPUK/IAQM Land-use Planning and Development Control[41] which is presented in **Table 6-4**.

Table 6-4 IAQM Impact Magnitude Criteria

Long-term Average Concentration at Receptor in Assessment Year	**% Change in Concentration Relative to the Air Quality Assessment Level (AQAL)**			
	1	**2-5**	**6-10**	**>10**
75% or less of AQAL	Negligible	Negligible	Slight	Moderate
76-94% of AQAL	Negligible	Slight	Moderate	Moderate
95-102% of AQAL	Slight	Moderate	Moderate	Substantial
103-109% of AQAL	Moderate	Moderate	Substantial	Substantial
110% or more of AQAL	Moderate	Substantial	Substantial	Substantial

Significance

6.7.26 Significance will be derived using the matrix set out in section 7 of the IAQM Land-use Planning criteria[42], presented in **Appendix 6-B**, in combination with **Table 6-4**. The air quality assessment may consider effects with a slight or negligible magnitude to be

[40] Defra NOx to NO_2 Calculator. Accessed Feb 2024. Available at: https://laqm.defra.gov.uk/air-quality/air-quality-assessment/nox-to-no2-calculator/

[41] EPUK/IAQM Planning Guidance, 2017. Accessed Feb 2024. Available at: https://www.iaqm.co.uk/text/guidance/air-quality-planning-guidance.pdf

[42] EPUK/IAQM Planning Guidance, 2017. Accessed Feb 2024. Available at: https://www.iaqm.co.uk/text/guidance/air-quality-planning-guidance.pdf

significant, where there is a risk that these could combine to create a cumulative effect on human health. This may be supplemented by technical judgement, which will be explained to give the rationale behind the values assigned.

6.8 Assumptions & limitations

6.8.1 This EIA Scoping Report has been collated based on a range of publicly available data and information only. It is assumed that the data collated is accurate. The data will be supplemented with additional data as part of the EIA process.

6.8.2 In the absence of data, a precautionary approach has been taken and professional judgement, based on experience of similar linear schemes, has been used where required to inform the scope of the assessment.

6.8.3 If air quality dispersion modelling is required there are limitations in the modelling process, these can include:

- The traffic data used in the model;
- The traffic emissions data;
- Simplifications in model algorithms and empirical relationships that are used to simulate complex physical and chemical processes in the atmosphere;
- The background concentrations; and
- The meteorological data.

6.8.4 To reduce uncertainty, air quality modelling undertaken for the PEI Report will be verified, if required, using the air quality measurements from any local authority data that is within the study area and has suitable data capture. The verification process will be undertaken in line with best practice guidance produced by Defra.

6.8.5 The most up to date emission factors and background concentrations will be used, if required, to calculate emissions and process results in the assessment.

6.8.6 The assessment will be carried out based on the best information available at the time of the assessment.

6.8.7 Background air pollutant concentrations are currently taken from the Defra archive maps[43] using the 2018 base year maps (pre-COVID-19 levels). It is anticipated new modelling will be undertaken by Defra on an annual or bi-annual bases according to previous data releases. The most recent available maps will be used in any eventual assessment.

6.8.8 Calculation of emissions from traffic is undertaken with the most recently available local air quality management tools and background air quality concentrations from Defra. These are periodically updated, and this may occur during the course of the project. Where this occurs, the tools and data used will be stipulated to maintain continuity where appropriate, throughout the proposed Scheme.

[43] Defra Background Mapping, 2023. Accessed Feb 2024. Available at: https://uk-air.defra.gov.uk/data/laqm-background-maps?year=2018

Contents

7. Agriculture and Soils

7.1 Introduction

7.1.1 This chapter outlines the proposed scope and methodology for Agriculture and Soils. It will consider the potential for significant effects arising from the construction and operation of the LionLink Interconnector (hereafter referred to as 'the proposed Onshore Scheme') on agricultural and soil receptors. A review of relevant guidance and policy has been undertaken together with a desk-based assessment, to inform the proposed scope and methodology.

7.1.2 This chapter is supported by the following figures:

- **Figure 1-2**: Proposed Onshore Scheme Scoping Boundary;
- **Figure 1-3:** Proposed Onshore Scheme Scoping Boundary and Scheme Components;
- **Figure 7-1**: Provisional Agricultural Land Classification Map; and
- **Figure 7-2**: Predicted Soil Types Map.

7.1.3 There may be interrelationships with other disciplines. Therefore, this chapter should be read in conjunction with the following chapters:

- **Chapter 9** Geology and Contamination – this chapter covers disturbance/release of contamination in soils; and
- **Chapter 12** Hydrology, Hydrogeology and Drainage – this chapter covers contaminants within the soil and groundwater from activities which disturb the ground.

7.2 Consultation and engagement

7.2.1 Consideration has been given to responses received at Non-Statutory Consultations held in 2022 and 2023 in preparing this scoping chapter. Responses relating to Agriculture and Soils have been received from the following:

- East Suffolk Council (ESC);
- Forestry Commission;
- National Trust; and
- Parish and Town Councils: Friston Parish Council; Aldeburgh Town Council; Walberswick Parish Council; Sudbourne Parish Council; Theberton and Eastbridge Parish Council and Middleton cum Fordley Parish Council SPR 2023.

7.2.2 The main themes reported as part of the Non-Statutory Consultations were:

- To ensure the impact and any loss of the best and most versatile (BMV) is appropriately assessed and reported; and
- Impacts to agricultural land, soil structures and drainage.

7.2.3 Engagement will be undertaken with relevant stakeholders in relation to the proposed Onshore Scheme to obtain any information that they hold to supplement the assessment and to seek their views with regards to the evolving design.

7.2.4 The following bodies will be consulted during the Environmental Impact Assessment (EIA) process in relation to Agriculture and Soils:

- Natural England; and
- Agricultural landowners and occupiers.

7.2.5 In addition, engagement will be undertaken with non-statutory stakeholders as required so that their specialist local views and expertise can be considered as part of the EIA process.

7.3 Baseline conditions

Study area

7.3.1 The study area for Agriculture and Soils includes all land within the proposed Onshore Scheme Scoping Boundary (hereafter referred to as 'the Onshore Scoping Boundary'), as shown on **Figure 1-2** and **Figure 1-3**.

7.3.2 The study area will be reviewed and, as appropriate, refined for the assessment in the Preliminary Environmental Information (PEI) Report and Environmental Statement (ES) with only one Landfall and one High Voltage Direct Current (HVDC) Underground Cable Corridor being taken forward. The study area will be based on the proposed Order limits in the ES.

Baseline data sources

7.3.3 The baseline described in this chapter has been informed by the following data sources:

Table 7-1 Baseline data sources

Baseline Data	Source
Provisional and Detailed Agricultural Land Classification This includes detailed ALC surveys that have been undertaken at the Henham Estate	Magic.defra.gov.uk/MagicMap
Climatological Data for Agricultural Land Classification	Meteorological Office; https://publications.naturalengland.org.uk/file/4830386468159488
Bedrock and superficial geology	British Geological Survey, https://geologyviewer.bgs.ac.uk/
Soil associations	Soils of Eastern England, Soil Survey of England and Wales, Sheet 4 and LandIS, https://www.landis.org.uk/soilsguide/

Baseline

7.3.4 The following sections present the existing baseline established at scoping. There are currently two options being considered for the proposed Landfall Site and associated HVDC Underground Cable Corridor, which are shown in **Figure 1-2** and **Figure 1-3**. Baseline information is presented for the two options below.

Baseline - agricultural land

7.3.5 The Agricultural Land Classification (ALC) system in England and Wales provides a method for assessing the quality of farmland to enable informed choices to be made about its future use within the planning system. The ALC system classifies land into five grades based on the potential productivity, cropping, flexibility and ease of management of an area. The grades are as follows:

- Grade 1 land is excellent quality agricultural land with no or very minor limitations to agricultural use.
- Grade 2 is very good quality agricultural land, with minor limitations which affect crop yield, cultivations or harvesting.
- Grade 3 land has moderate limitations which affect the choice of crops, timing and type of cultivation, harvesting or the level of yield. It is subdivided into Subgrade 3a (good quality land) and Subgrade 3b (moderate quality land).
- Grade 4 land is poor quality agricultural land with severe limitations which significantly restrict the range of crops and/or level of yields.
- Grade 5 is very poor quality land, with very severe limitations which restrict use to permanent pasture or rough grazing.

7.3.6 The BMV land is defined as Grades 1, 2 and 3a in Annex 2 of the National Planning Policy Framework (NPPF). Further details of the ALC system are provided in Natural England's Technical Information Note (TIN049)[1].

7.3.7 The agricultural land within the study area is primarily in arable use. The most frequent occurrences of grassland are in the valleys of the Minsmere River, River Blyth and River Wang.

7.3.8 The climatic regime across the whole study area is dry and moderately warm. Moisture deficits are very large. The number of Field Capacity Days (FCD) is small and is very favourable for agricultural land working.

7.3.9 The Provisional ALC map[2] classifies the land south of Middleton as a mix of Grades 2 and 3; land between Middleton and Blyford as a mix of Grades 3 and 4; and land at the northern end of the study area as a mix of Grades 2, 3 and 4 (see **Figure 7-1**).

7.3.10 Approximately 15% of the land in the Onshore Scoping Boundary is shown as Grade 2; 50% as undifferentiated Grade 3; 32% as Grade 4; and 3% as non-agricultural land.

[1] Natural England (2012). Agricultural Land Classification: Protecting the best and most versatile agricultural land, Technical Information Note (TIN049). Available at https://publications.naturalengland.org.uk/file/4424325

[2] Natural England (2010). Agricultural Land Classification map Eastern Region (ALC008). Available at https://publications.naturalengland.org.uk/publication/127056?category=5954148537204736

7.3.11 The Provisional ALC data cannot however be used to assess the quality of individual areas and should only be used at a strategic level (Natural England TIN049). The definitive classification needs to be established from field survey.

7.3.12 Detailed ALC surveys have been undertaken at the Henham Estate which have classified 141.7ha as Subgrade 3a and 74.2ha as Subgrade 3b[3] (see **Figure 7-1**). As the ALC is concerned with the long-term inherent characteristics of land and soil, rather than short-term use or management, the results of this survey are still valid and represent the definitive classification.

Baseline - soils

7.3.13 The underlying bedrock across the study area mapped by the British Geological Survey (BGS) belongs to the Crag Group and includes sands, gravels, silts and clays. The sands are dark green and weather to bright orange. At the very southern end of the study area, between Aldeburgh Road and Snape Road, the mapped geology comprises medium-grained, buff to pale brown quartz sand of the Chillesford Church Sand Member.

7.3.14 An extensive sheet of the Lowestoft Formation overlies the bedrock across much of the study area and comprises flinty, chalky till with outwash sands and gravels, silts and clays. There are superficial deposits of alluvium and peat in the valleys of the Minsmere River, River Blyth and River Wang[4].

7.3.15 The mapped soil information[5] shows six associations within the study area (reflected in **Figure 7-2**):

- Newport 3 – well drained, coarse loamy over sand;
- Newport 4 – well drained, coarse loamy over sand;
- Ragdale – imperfectly or poorly drained, fine loamy and clayey over clay;
- Hanslope – imperfectly drained, calcareous clayey;
- Mendham – very poorly drained or wet, peaty over clay or sand; and
- Beccles 1 – imperfectly or poorly drained, sandy clay loam over clay.

7.3.16 The coarse loamy and sandy soils of the Newport 3 and Newport 4 associations are mapped in the south of the study area at Friston and Coldfair, at Middleton, between Westleton and Blythburgh, around Thorrington, in the vicinity of the River Wang, and east of Uggeshall (see **Figure 7-2**). These soils will be most affected by droughtiness and are likely to be of Subgrade 3b quality but will potentially include some BMV land in Subgrade 3a. These soils occupy approximately 60% of agricultural land within the Onshore Scoping Boundary (see **Figure 7-2**).

7.3.17 The imperfectly or poorly drained fine loamy over clayey soils of the Ragdale and Beccles 1 associations are mapped between Knodishall and Theberton, between Darsham and Thorrington, in the vicinity of the River Blyth and east of Uggeshall. These soils will be limited most by wetness. Soils of Wetness Class (WC) III with medium clay

[3] ADAS (1993). Agricultural Land Classification Henham Estate, Stradbroke, Suffolk. Ref.: 33/93. Available at https://publications.naturalengland.org.uk/publication/5810670172372992

[4] British Geological Survey (2023). BGS Geology Viewer. Available at https://www.bgs.ac.uk/map-viewers/bgs-geology-viewer/

[5] Soil Survey of England and Wales (1984). Soils of Eastern England (1:250,000), Sheet 4.

loam or sandy clay loam topsoil will be of BMV quality in Subgrade 3a. Where poorly drained (WC IV), the soils will be of Subgrade 3b quality. These soils occupy approximately 28% of agricultural land within the Onshore Scoping Boundary (see **Figure 7-2**).

7.3.18 The Mendham association, mapped in the valleys of the Rivers Blyth and Wang, between Thorrington and Blythburgh, and east of Uggeshall, is typically very poorly drained (WC V-VI). With peaty topsoils, the profiles will be limited by wetness to Grade 4 or potentially Grade 5. This soil type occupies approximately 10% of agricultural land within the Onshore Scoping Boundary (see **Figure 7-2**).

7.3.19 The Hanslope association is mapped at Middleton. Imperfectly drained (WC III) clayey profiles with calcareous topsoil will be of BMV quality, limited by wetness to Subgrade 3a. This soil type occupies approximately 2% of agricultural land within the Onshore Scoping Boundary (see **Figure 7-2**).

Future baseline

7.3.20 The Agriculture and Soils chapter within the PEI Report and ES will consider changes which may affect the future agriculture and soils environment in the absence of the proposed Onshore Scheme. The future baseline will also take into account any developments that are likely to be present in the future baseline.

7.3.21 Defra and the Welsh Government commissioned a study to assess how future changes in climate could affect ALC grades[6]. The study used the time period 1961-1990 as a baseline and investigated the UKCP09 climate change scenarios for high, medium and low emissions for 2020 (2010-2039), 2030 (2020-2049), 2050 (2040-2069) and 2080 (2070-2099).

7.3.22 The study found that soil droughtiness is likely to the main determining factor of ALC under the various climate scenarios, with the potential for very large areas of England, particularly in the east and south-east of the country, to be downgraded to poor quality Grade 4 land.

7.3.23 Agricultural land quality within the Onshore Scoping Boundary is therefore expected to deteriorate with climate change due to increase droughtiness.

7.4 Potential impacts

7.4.1 This section identifies the potential impacts that could occur as a result of the proposed Onshore Scheme during the construction and operational phases.

Construction

7.4.2 The following impacts could occur during the construction phase:

- Temporary removal of land from agricultural production;
- Disruption and disturbance to agricultural operations (from construction related noise, severance due to fields or access disruption, and disruption to water supplies or land drainage);

[6] Keay CA et al (2013). SP1104 the Impact of climate change on the capability of land for agriculture as defined by the Agricultural Land Classification, DEFRA. https://sciencesearch.defra.gov.uk/ProjectDetails?ProjectId=16929

- Temporary disturbance to soils (this may lead to long-term changes to soil functions);
- Permanent removal of land from agricultural production; and
- Permanent loss of soils.

Operation

7.4.3 The following impacts could occur during the operation phase as a result of maintenance activities:

- Temporary removal of land from agricultural production during maintenance activities;
- Temporary disruption and disturbance to agricultural operations (from construction related noise, severance due to fields or access disruption, and disruption to water supplies or land drainage); and
- Temporary disturbance to soils (this may lead to long-term changes to soil functions).

7.4.4 Electro-Magnetic Fields (EMF) generated by electrical equipment such as underground cables and sub-stations are not expected to result in impacts to agricultural land and as such are not considered any further in this chapter. An EMR assessment would be undertaken as part of the proposed Scheme design.

7.5 Design and control measures

7.5.1 As outlined in **Chapter 5** EIA Approach and Method, a standard hierarchical approach will be taken to mitigation.

7.5.2 The assessment of effects will take into account measures that are embedded into the proposed Onshore Scheme design, together with general good practice measures.

Design measures

7.5.3 Mitigation by design primarily relates to the positioning of the proposed Underground Cable Corridors through specific field parcels, for example alongside field edges and existing tracks, and ensuring that severance of land is reduced and that access is available during and following construction to allow normal agricultural operations to continue alongside works to lay the cables.

7.5.4 Mitigation of the permanent effects on agricultural land can be achieved by micro-siting the substation and converter station according to agricultural land quality where there is a choice between sites and no conflicts with other interests.

Control measures

7.5.5 Controls would be implemented to mitigate potential avoidable impacts on soils, farms and farm-based businesses, including maintaining access, and for this purpose the Principal Contractor would:

- Identify the farms and farm types adjacent to the construction site;

- Identify watercourses, field drainage layouts and outfalls into watercourses or ditches, fixed irrigation pipes and sources of irrigation water and fixed water supplies for livestock;
- Maintain details of the landowners, occupiers, and agents for land adjacent to the construction site; and
- Maintain details of the farming associated with the areas of land adjacent to the construction site.

7.5.6 To mitigate the potential impacts on soil resources a Soil Resources Management Plan (SRMP) for both temporary and permanent works would be implemented. The SRMP would set out details on the soil resource present, as well as the proposed methods for the handling, storing, and replacing of soils according to best practice, with the aim of avoiding compaction and biodegradation.

7.5.7 The SRMP would form part of the Construction Environmental Management Plan (CEMP). Measures would include (note list is not exhaustive):

- Identification of soil type and resources present;
- Methods to how topsoil and subsoils would be stripped and stockpiled;
- How soil should be handled and what conditions soil should be handled in;
- Recommendations for soil storage locations (taking into account conditions of the site and type of soil);
- Specific measures for managing sensitive soils, such as peaty soils;
- Suitable protective surfacing where soil stripping can be avoided, based on sensitivity of the environment and construction works;
- Approaches and methods to reinstate compacted soil; and
- Measures and methods required for soil restoration.

7.5.8 Access to and from residential, community, commercial and agricultural land uses would be maintained throughout the construction period or as agreed through the landowner discussions (this is further discussed in **Chapter 15** Traffic and Transport). This may involve:

- Signposted diversions; and
- Temporary periods of restrictions to access.

7.5.9 Changes to means of access would be communicated to affected stakeholders prior to construction. Any changes to access during construction would be communicated to affected stakeholders in advance of the change being implemented.

7.5.10 Should animal bones be discovered during construction, which may indicate a potential burial site, works would cease. Advice would be sought from the Animal Health Regional Office on how to proceed, relevant to the characteristics of the materials found.

7.5.11 All movement of plant and vehicles between fields would cease in the event of a notification by the Department for Environment, Food and Rural Affairs (Defra) of a disease outbreak in the vicinity of the site that requires the cessation of activities. Advice would be sought from Defra in order to develop suitable working methods required to reduce the biosecurity risk associated with the continuation of works.

7.5.12 Where land would be returned to agricultural use, the appropriate soil conditions would be reinstated. This would be achieved to a depth of 1.2m (or the maximum natural soil depth if this is shallower), except over buried cables where the reinstated soil depth would be approximately 1.1m.

7.5.13 Before construction, existing water supplies for livestock would be identified. In cases where supplies would be lost or access compromised by construction activities, temporary alternative water supplies would be provided. Water supplies would be reinstated following construction.

7.5.14 Clay bungs or other vertical barriers would be constructed within trench excavations where deemed necessary by a suitably qualified and experienced person, to prevent the creation of preferential drainage pathways.

7.6 Scope of the assessment

7.6.1 The Agricultural and Soils assessment will consider the construction of the proposed Onshore Scheme. The assessment will consider the following receptors within the study area:

- Agricultural land and land use in terms of the loss of BMV land; and
- Soil resources in terms of potential damage and loss.

7.6.2 This section identifies the potential for the proposed Onshore Scheme to give rise to likely significant effects, taking into account the design and control measures identified in **Section 7.5**

7.6.3 **Table 7-2** sets out the receptors identified within the study area, the potential impacts as a result of construction and/or operation activities associated with the proposed Onshore Scheme, whether these impacts are likely to give to rise to significant effects, and whether the receptor is scoped in or scoped out of the assessment.

7.6.4 The proposed Friston Substation, as described in **Chapter 2** proposed Scheme Description outlines the optionality that remains at Friston Substation. The scope of this EIA Scoping Chapter has been based on the worst case scenario that the proposed Onshore Scheme would construct Friston Substation.

7.6.5 All identified impacts are of relevance to both the Southwold and Walberswick options unless specified otherwise.

7.6.6 A precautionary approach has been taken and where there is no strong evidence base, insufficient baseline or the significance is uncertain at this stage the impact has been scoped in to the EIA. Where there is a clear evidence base that the effect from the impact will not be significant, either alone or in combination with other plans and projects, the impact has been scoped out of the EIA.

Table 7-2 Proposed scope of the assessment

Project phase	Receptor	Impact	Potential for significant effect	Proposed to be scoped in/ out
Construction	Agricultural land	There will be a temporary land requirement along the proposed Underground Cable Corridor of agricultural land to range in quality from Grade 2 to Grade 4. There will be a permanent land requirement occurring during the construction phase for the proposed Converter Station and proposed Friston Substation. The quality and quantity of land required permanently will be determined by survey.	There is potential for significant effects on agricultural land to occur as a result of the permanent land requirement associated with the proposed Converter Station and the proposed Friston Substation.	Scoped in
Operation	Agricultural land	Impacts on agricultural land will occur during construction phase with no further impacts from the operation of the proposed Onshore Scheme.	The permanent loss of agricultural land associated with the proposed Converter Station and proposed Friston Substation will be considered as part the construction phase assessment. Maintenance activities are expected to be small and temporary in nature if required along the Proposed Underground Cable Corridor. As such, it is considered that there is no potential for significant effects on agricultural land during operation.	Scoped out
Construction	Soil resources	There will be temporary disturbance to soils to construct the proposed Onshore Scheme.	Whilst implementation of the SRMP will help manage the impact, there is still considered to be potential for significant effects on soils during construction.	Scoped in

Project phase	Receptor	Impact	Potential for significant effect	Proposed to be scoped in/ out
Operation	Soil resources	Impacts on soils will occur during construction phase with no further impacts from the operation of the proposed Onshore Scheme.	It is considered that there is no potential for significant effects on soil resources during the operation of the proposed Onshore Scheme. Maintenance activities are expected to small and temporary in nature if required along the Proposed Underground Cable Corridor.	Scoped out

7.7 Assessment methodology

Data sources

7.7.1 The assessments will be informed by both desk studies and field surveys.

7.7.2 The desk-based appraisal of agricultural land quality and soil resources will be based on the data sources identified in **Table 7-1**.

7.7.3 The field survey will be carried out in accordance with the ALC guidelines and will examine soil profiles at an observation density to be agreed with Natural England for the different elements of the proposed Onshore Scheme. It is anticipated that the permanent works will be surveyed at the normal observation density of one auger profile per hectare but that it may be appropriate to reduce the density of observations within the underground cable corridor. Each profile observed will be described in terms of soil depths, texture, colours, stone content and structures. Samples will also be taken for laboratory analysis of particle size distribution to check the hand-texturing in the field, soil pH, organic matter content and major nutrients.

7.7.4 An area of approximately 216 hectares (ha) within the Onshore Scoping Boundary has previously been surveyed[7] in detail and the data is still suitable for use. As such it is not proposed to re-survey this area. This area forms part of the baseline data.

7.7.5 The data will be used to describe the soil resources in terms of the characteristics of the different horizons and analysed to classify the quality of agricultural land in accordance with the ALC guidelines and criteria.

Legislation, policy and guidance

7.7.6 Legislation and policy relevant to the proposed Scheme and this chapter is outlined in **Chapter 4** Legislation and Policy Overview and **Appendix 4-A** National Policy, **Appendix 4-B** Environmental Legislation and **Appendix 4-C** Local Policy.

7.7.7 The assessment will have regard to established assessment criteria that have been applied to major infrastructure projects and are in line with the Design Manual for Roads and Bridges (DMRB)[8] and Institute of Environmental Management and Assessment's (IEMA) Land and Soil Guidance[9].

Assessment method

7.7.8 **Chapter 5** EIA Approach and Method will set out the standard EIA methodology and matrices to be used for the EIA. The methodology is based on the principle that the environmental effects will be determined by identifying potential receptors, assigning receptor value, assessing the magnitude of change on the receptor and then identifying the significance of the effect. This section provides a summary of the EIA methodology specifically relevant to this chapter.

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[7] ADAS (1993). Agricultural Land Classification Henham Estate, Stradbroke, Suffolk. Ref.: 33/93. Available at https://publications.naturalengland.org.uk/publication/5810670172372992

[8] Highways England (2019) Geology and Soils LA 109, Revision 0, available at: https://www.standardsforhighways.co.uk/dmrb/search/adca4c7d-4037-4907-b633-76eaed30b9c0

[9] Stapleton, C., Reed, E., Gemmell, L., Adams, K. (eds) (2021) IEMA Guide: A New Perspective on Land and Soil in Environmental Impact Assessment.

7.7.9 Assessment of cumulative and combined effects are discussed in **Chapter 29** Cumulative and Combined effects of the Project.

7.7.10 Desk-based assessment and surveys will be undertaken for the study area to consider the current and likely future baseline conditions for agricultural land and soils during the anticipated construction period.

7.7.11 The scope of the assessment to be undertaken in the ES will comprise:

- Impact on agriculture land, particularly the loss or reduction in quality of BMV land; and
- Impact on soil resources, particularly damage to the soil resource from construction activities such that the soils can no longer perform their ecosystem functions.

Agricultural land

7.7.12 The effect on agricultural land is assessed according to the quantity and quality of land that will be made temporarily or permanently unavailable as a result of the proposed Onshore Scheme. The sensitivity of agricultural land is assessed according to its grade within the ALC, as set out in **Table 7-3**.

Table 7-3 Sensitivity of receptors - agricultural land

Receptor Value and Sensitivity	Description
Very High	Not applicable
High	Grade 1
Medium	Grade 2 and Subgrade 3a
Low	Subgrade 3b and Grade 4
Negligible	Grade 5

7.7.13 There is no agreed methodology for prescribing the magnitude of impact on agricultural land but it is common practice to refer to the threshold of 20ha established by the statutory consultation procedures with Natural England for development involving BMV agricultural land in the Development Management Procedure Order[10]. This threshold has been used to determine the magnitude of change on agricultural land, as set out in **Table 7-4**.

Table 7-4 Magnitude of impact - agricultural land

Magnitude of Impact	Description
High	Development would directly lead to the loss of over 50ha of agricultural land
Medium	Development would directly lead to the loss of between 20ha and 50ha of agricultural land

[10] The Town and Country Planning (Development Management Procedure) (England) Order 2015, Schedule 4

Magnitude of Impact	Description
Low	Development would directly lead to the loss of between 5ha and 20ha of agricultural land
Negligible	Development would directly lead to the loss of less than 5ha of agricultural land

Soil resources

7.7.14 The effect on the soil resource is assessed according to the degree to which disturbed soil resources are re-used in a manner that enables the resource to fulfil one or more of the primary soil functions of:

- The production of food and biomass, and the provision of raw materials;
- The storage, filtration and cycling of water, carbon and nitrogen in the biosphere;
- The support of ecological habitats and biodiversity;
- Support for the landscape;
- The protection of cultural heritage; and
- The provision of a platform for human activities, such as construction and recreation.

7.7.15 The sensitivity of the soil resource reflects its textural characteristics and its susceptibility to the effects of handling during construction and the re-instatement of land as shown in **Table 7-5**.

Table 7-5 Sensitivity of receptors - soil resources

Receptor Value and Sensitivity	Description
Very High	Peaty soils
High	Soils with high clay and silt fractions (clays, silty clays, sandy clays, heavy silty clay loams and heavy clay loams)
Medium	Silty loams, medium silty clay loams, medium clay loams and sandy clay loams
Low	Soils with a high sand fraction (sands, loamy sands, sandy loams and sandy silt loams)
Negligible	Not applicable

7.7.16 The magnitude of change to soil resources considers the continued ability of soils to fulfil their primary functions. The criteria are set out in **Table 7-6**.

Table 7-6 Magnitude of impact - soil resources

Magnitude of Impact	Description
High	The soil displaced from development is unable to fulfil one or more of the primary soil functions
Medium	The soil displaced from development mostly fulfils the primary soil functions off-site or has a reduced capacity to fulfil the primary functions on-site
Low	The soil displaced from development mostly fulfils the primary soil functions on-site
Negligible	The soil retains its existing functions on-site

7.7.17 The significance of effect on agricultural land and soil resources is then determined according to the standard significance matrix, set out in **Chapter 5** EIA Approach and Method.

7.8 Assumptions & limitations

7.8.1 This EIA Scoping Report has been collated based on a range of publicly available data and information only. It is assumed that the data collated is accurate. The data will be supplemented with additional data as part of the EIA process.

7.8.2 In the absence of data, a precautionary approach has been taken and professional judgement, based on experience of similar linear schemes, has been used where required to inform the scope of the assessment.

7.8.3 Detailed survey data for Agriculture and Soils is yet to be collected other than for an area of 216ha at the Henham Estate, therefore this EIA Scoping Report has relied upon publicly available desk-based data.

Contents

8. Ecology and Biodiversity

8.1 Introduction

8.1.1 This chapter outlines the proposed scope and methodology for Ecology and Biodiversity. It will consider the potential for significant effects arising from the construction and operation of the LionLink Interconnector (hereafter referred to as 'the proposed Onshore Scheme') in respect of ecology and biodiversity. A review of relevant guidance and policy has been undertaken together with a desk-based assessment, to inform the proposed scope and methodology.

8.1.2 This chapter is supported by the following figures:

- **Figure 1-2**: Proposed Onshore Scheme Scoping Boundary;
- **Figure 1-3:** Proposed Onshore Scheme Scoping Boundary and Scheme Components;
- **Figure 8-1**: Statutory Designated Ecological Features Map (Onshore); and
- **Figure 8-2**: Non-statutory Designated Ecological Features Map (Onshore).

8.1.3 There may be interrelationships with other disciplines, including chapters relating to the proposed Offshore Scheme. Therefore, this chapter should be read in conjunction with the following chapters:

- **Chapter 6** Air Quality - considers the potential for impacts upon ecological receptors through changes in air quality;
- **Chapter 11** Historic Environment – considers ancient woodlands in the context of the historic environment;
- **Chapter 12** Hydrology, Hydrogeology and Drainage – considers the potential for impacts upon ecological receptors from the water environment;
- **Chapter 14** Noise and vibration – considers the potential for impacts upon ecological receptors through noise and vibration;
- **Chapter 19** Intertidal and Subtidal Benthic Ecology - considers the potential for impacts upon ecological receptors (intertidal and benthic habitats and their associates species), as a result of the proposed Offshore Scheme;
- **Chapter 20** Fish and Shellfish - considers the potential for impacts upon ecological receptors (fish and shellfish species and their associated habitats), as a result of the proposed Offshore Scheme;
- **Chapter 21** Intertidal and Offshore Ornithology – considers the potential impacts upon ecological receptors (bird species and their associated habitats), as a result of the proposed Offshore Scheme; and
- **Chapter 22** Marine Mammals and Marine Reptiles - considers the potential impacts upon ecological receptors (marine mammal and reptile species and their associated habitats), because of the proposed Offshore Scheme.

8.1.4 The proposed Onshore Scheme, considered within this Chapter, and the proposed Offshore Scheme could potentially result in effects upon the same ecological receptor. The proposed method for assessing such intra-project combined effects is presented in **Chapter 29** Cumulative and Combined Effects. This describes a proposed approach that will be used to assess whether the combination of effects upon an individual receptor is likely to lead to an overall effect of greater significance.

8.2 Consultation and engagement

8.2.1 Consideration has been given to responses received at Non-Statutory Consultations held in 2022 and 2023 in preparing this scoping chapter. Responses relating to Ecology and Biodiversity have been received which include those from the following:

- Royal Society for the Protection of Birds (RSPB);
- Suffolk Wildlife Trust (SWT);
- Suffolk Coast & Heaths National Landscape (formerly known as Area of Outstanding Natural Beauty (AONB)) Partnership;
- National Trust;
- Alde and Ore Association;
- Forestry Commission;
- Environment Agency;
- Suffolk County Council (SCC);
- East Suffolk Council (ESC);
- Southwold and Reydon Society;
- Suffolk Preservation Society; and
- Parish and Town Councils: Friston Parish Council, Aldringham-cum-Thorpe Parish Council, Dunwich Parish Council, Walberswick Parish Council, Kelsale-cum-Carlton Parish Council, Theberton and Eastbridge Parish Council, Southwold Town Council, Aldeburgh Town Council, Reydon Parish Council and Middleton-cum-Fordley Parish Council.

8.2.2 The main themes reported as part of the Non-Statutory Consultations were:

- Consideration of cable corridor options and landfall sites to reduce the environmental impact upon designated sites (including non-statutory and locally designated), irreplaceable habitats (including ancient woodland), priority habitats and species and species of conservation concern. The Project was requested to ensure impacts are clearly assessed, and avoided or mitigated, in particular to look to reduce the number and scale of river crossings as far as possible;
- Evidence required of alternative landfall sites and cable corridor options to ensure the least damaging options to reduce effects upon ecological receptors are carried forward;
- Clarity of construction methods and activities including horizontal directional drilling (HDD) required to avoid direct impacts upon ecological receptors, to include measures to protect the important wildlife habitats on either side of a given receptor (e.g., wetlands on either side of the Blyth Estuary);

- In addition to a full ecological impact assessment, it will be necessary to carry out a Habitats Regulations Assessment (HRA) demonstrating that the proposals would not result in adverse effects upon the integrity of sites of international importance;
- The mitigation hierarchy is required to be adhered to and detail on mitigation measures and, if necessary, compensatory measures are required;
- The HRA should include consideration of functionally linked land, in addition to assessment of the designations and an in combination assessment to include Sizewell C; and
- The assessment should consider the potential for HDD breakout and any related potential impacts upon designated sites including wetlands.

8.2.3 An application to Natural England's discretionary advice service (DAS) was made in March 2023, including a request for advice on potential impacts on designated sites and biological survey methodology. It is anticipated Natural England will provide detailed advice through the DAS in relation to surveys, assessment, and mitigation, including in relation to HRA. The following engagement has been held with Natural England to date:

- A meeting with Natural England was held on 06 June 2023 which covered key programme dates, a summary of the non-statutory consultation and an update on optioneering.
- A meeting with Natural England was held on 03 October 2023 which covered proposals for ground investigations, the scope for 2023/24 wintering bird surveys and offshore optioneering.
- A meeting with Natural England was held on 30 January 2024 which covered onshore and offshore optioneering and constraints.

8.2.4 An initial meeting has been held with the Suffolk Coast Electricity Cable Ecology Group on 31 March 2023 which comprises the SWT, RSPB, the National Trust, Natural England and the Suffolk & Essex Coast & Heaths National Landscape (formerly the Suffolk Coast & Heaths AONB). Further engagement will be undertaken which will include a request for existing survey data to influence the approach to ecological surveys and design, particularly in relation to designated sites.

8.2.5 Engagement was undertaken with SCC and ESC in August 2023. The key points of discussion included:

- Landfall optioneering;
- Ecological constraints and opportunities;
- Ecological Survey Strategy overview; and
- Overview of the approach to the Environmental Impact Assessment (EIA) Scoping Report.

8.2.6 Further engagement will be undertaken with relevant stakeholders in relation to the proposed Onshore Scheme to obtain any information that they hold to supplement the assessment and to seek their views with regards to the evolving design.

8.2.7 The following statutory bodies will be consulted during the EIA process in relation to Ecology and Biodiversity:

- Natural England;

- Environment Agency;
- Suffolk Coast & Heaths AONB Partnership;
- Forestry Commission;
- SCC; and
- ESC.

8.2.8 In addition, engagement will be undertaken with non-statutory stakeholders as required so that their specialist local views and expertise can be considered as part of the EIA process.

8.3 Baseline conditions

Study area

8.3.1 The study area for Ecology and Biodiversity includes all land within the proposed Onshore Scheme Scoping Boundary (hereafter referred to as 'the Onshore Scoping Boundary'), as shown on **Figure 8-1**.

8.3.2 For certain receptors the study area also includes land beyond the Onshore Scoping Boundary within an additional buffer, as described for individual receptors below. Buffer distances are based upon the characteristics and sensitivity of the receptor, informed by published industry guidance and professional judgement to determine an appropriate Zone of Influence.

8.3.3 The desk study included a search for the following receptors. The buffer distances applied to the Onshore Scoping Boundary for the respective receptors are set out:

- Statutory nature conservation designations of international importance (Special Areas of Conservation (SAC), possible SACs, candidate SACs, Special Protection Areas (SPA) potential SPAs and Ramsar sites) within 10km of the Onshore Scoping Boundary and within 30km for any SAC designated for bats;
- Statutory nature conservation designations of up to national importance (Sites of Special Scientific Interest (SSSI), National Nature Reserves (NNR) and Local Nature Reserves (LNR)) within 5km of the Onshore Scoping Boundary and any SSSI with an Impact Risk Zone (IRZ) that overlaps the Onshore Scoping Boundary;
- Non-statutory nature conservation designations (e.g., County Wildlife Sites (CWS)) within 2km of the Onshore Scoping Boundary;
- RSPB reserves within 2km of the Onshore Scoping Boundary;
- Records of protected and notable species within 2km of the Onshore Scoping Boundary;
- Ancient Woodland Inventory (AWI) sites within 1km; and
- Notable habitats (e.g., Habitats of Principal Importance Section 41 (41) of the Natural Environment and Rural Communities (NERC) Act and ancient, veteran and notable trees within 1km.

8.3.4 The study area will be reviewed and, as appropriate, refined for the assessment in the Preliminary Environmental Information (PEI) Report and Environmental Statement (ES) with only one Landfall and one High Voltage Direct Current (HVDC) Underground Cable

Corridor being taken forward. The study area will be based on the proposed Order limits in the ES.

Baseline data sources

8.3.5 The baseline described in this chapter has been informed by the data sources provided in **Table 8-1**.

Table 8-1 Scoping baseline data sources

Baseline Data	Source
Statutory designated sites Priority Habitats Granted European Protected Species (EPS) Licences	Identified using Multi Agency Geographic Information for the Countryside (MAGIC)[1] web database Descriptions and condition of sites obtained using Natural England Designated Sites view[2] Joint Nature Conservation Committee (JNCC) site descriptions[3].
Non-statutory designated sites Protected, locally scarce and rare species Invasive Non-Native Schedule 9 species Ancient, Veteran and Notable Trees	Suffolk Biodiversity Information Service (SBIS) (provided data records in January 2023 within a 2km buffer of the Onshore Scoping Boundary)
Protected species information	SWT website[4]
Amphibians and reptiles	Suffolk Amphibian and Reptile Group (SARG) website[5]
	The Suffolk Amphibian and Reptile Group Provisional Atlas[6];
RSPB reserve descriptions	RSPB[7];
Ordnance Survey (OS) Maps	Ordnance Survey (OS) Maps aerial imagery[8];

[1] DEFRA Magic Map. MAGIC (defra.gov.uk) (Accessed: 23/01/2024).

[2] Natural England. (n.d.). Designated Sites View. Available at: https://designatedsites.naturalengland.org.uk/. (Accessed: 23/01/2024).

[3] JNCC. (2023). https://jncc.gov.uk/ (Accessed 23/01/2024).

[4] Suffolk Wildlife Trust. Available at Welcome to Suffolk Wildlife Trust | Suffolk Wildlife Trust (Accessed: 23/01/2024).

[5] Suffolk Amphibian and Reptile Group: Suffolk Amphibian and Reptile Group (Suffolk ARG) (arguk.org) (Accessed: 23/01/2024).

[6] Sandford, M. & Baker, J. (2007). Suffolk Amphibian and Reptile Atlas Provisional (2007). Available at: https://www.arguk.org/info-advice/arg-herpetofauna-county-atlas/25-suffolk-amphibian-and-reptile-atlas-provisional/file. (Accessed: 23/01/2024).

[7] RSPB: Visit a nature reserve (rspb.org.uk) (Accessed: 23/01/2024).

[8] OS Maps: Detailed maps & routes to explore across the UK | OS Maps (Accessed: 23/01/2024).

Baseline Data	Source
Ancient Woodland data	Natural England AWI[9];
Ancient, veteran and notable trees data	Woodland Trust (WT) Ancient Tree Inventory[10]
Mapped priority river sites in England	The Natural England Priority River Habitats Map[11]
Aquatic ecological features (fish, white-clawed crayfish, macro-invertebrates and macrophytes)	Environment Agency (EA) monitoring data: Ecology and Fish Data Explorer[12]
Bats	Suffolk Bat Group (SBG) [13] The Bat Distribution Atlas 1983-2016[14]
Birds	The Suffolk Bird Atlas[15] National Bird Atlas 2007-2011[16]
Other proposed infrastructure schemes within the study area were reviewed to provide geographical context to habitats and species likely to be present in the comparative Suffolk coast landscape	National Grid Sea Link proposed Scheme EIA Scoping Report[17] Additional Ecology Baseline Survey Reports[18],[19] Sizewell C Proposed Scheme Terrestrial Ecology Monitoring and Mitigation Plan[20]

[9] Natural England. Ancient Woodland Inventory (England). Available at Ancient Woodland (England) (arcgis.com) (Accessed: 23/01/2024)

[10] Woodland Trust Ancient Tree Inventory (England). Available at Ancient Tree Inventory - Woodland Trust (Accessed: 23/01/2024).

[11] Natural England. Priority Rivers Map. Available at: Priority River Habitat - Rivers (England) | Priority River Habitat - Rivers (England) | Natural England Open Data Geoportal (arcgis.com) (Accessed: Feb 2024)

[12] Environment Agency. *Ecology & Fish Data Explorer.* Available at: EA Ecology & Fish Data Explorer (Accessed: 23/01/2024).

[13] Suffolk Bat Group. (2017). Bats in Suffolk. Distribution Atlas 1983-2016. Available at: Bat Atlas 1983_2016 final.pdf (live-twt-d8-suffolk.pantheonsite.io) (Accessed : 23/01/2024).

[14] Suffolk Bat Group. (2017). Bats in Suffolk. Distribution Atlas 1983-2016. Available at: Bat Atlas 1983_2016 final.pdf (live-twt-d8-suffolk.pantheonsite.io) (Accessed 23/01/2024).

[15] SBIS. Suffolk Bird Atlas. Available at: Suffolk Bird Atlas | Suffolk Biodiversity Information Service (suffolkbis.org.uk). (Accessed 23/01/2024).

[16] Balmer, D., Fuller, R., Caffrey, B., Swann, B., Downie, I. & Gillings, S. (2013). *Bird Atlas 2007-11: The distribution of breeding and wintering birds in Britain and Ireland.* 1st Ed, British Trust for Ornithology.

[17] National Grid. (2022). Sea Link: Environmental Impact Assessment Scoping Report.

[18] NNB. (2020). The Sizewell C Project. Additional Ecology Baseline Survey Reports. Part 1 of 2.

[19] NBB. (2021). The Sizewell C Proposed Scheme: Additional Ecology Survey Reports (September 2021) Part 2 of 2.

[20] NNB. (2021). The Sizewell C Project: Terrestrial Ecology Monitoring and Mitigation Plan – Clean Version.

Baseline

8.3.6 The following sections present the existing baseline established at scoping. There are currently two options being considered for the proposed Landfall Site and associated HVDC Underground Cable Corridor, which are shown in **Figure 1-2** and **Figure 1-3**. Baseline information is presented for the two options below.

Summary of ecological receptors

8.3.7 The known or predicted ecological baseline conditions are summarised in the following sections by each receptor in turn.

8.3.8 In 2023 the UK Government identified its Tentative List of places it is backing to win United Nations Educational, Scientific and Cultural Organisation (UNESCO) World Heritage Status. This included the East Atlantic Flyway – England East Coast Wetlands, a migratory bird route over western parts of Europe including Yorkshire, Lincolnshire, Norfolk, Suffolk, Essex and Kent[21]. Whilst the exact locations within Suffolk are not specified, it is expected that these would comprise areas included within existing designations along the Suffolk coast of relevance for migratory birds, as described within this section.

Statutory designated sites: international value

8.3.9 A total of 16 statutory designated sites of international value have been identified within the 10km study area. These sites are summarised in **Table 8-2**, which are ordered within the table in accordance with distance from the Onshore Scoping Boundary. All distances should be considered approximate. The sites are also shown on **Figure 8-1**. A further nine sites have been identified up to 30km from the Onshore Scoping Boundary, none of which are designated for bats and are therefore not discussed further. Sites that overlap, lie adjacent to it or fall within 2km of the Onshore Scoping Boundary are discussed in the following paragraphs, as they are considered of greatest relevance due to proximity.

8.3.10 Minsmere-Walberswick SPA and Minsmere-Walberswick Ramsar site cover the same extent, occurring within a common boundary. The Minsmere to Walberswick Heaths & Marshes SAC boundary overlaps this SPA and Ramsar site boundary but covers a smaller extent within it. All three sites are all partially located within the Onshore Scoping Boundary, including areas relevant to both the proposed Landfall sites at Southwold and Walberswick.

8.3.11 Benacre to Easton Bavents SPA occurs adjacent to the Onshore Scoping Boundary. The Benacre to Easton Bavents Lagoons SAC boundary overlaps the SPA boundary but covers a smaller extent within it and is a composite site with the closest component just over 200m. Both sites occur to the north of the Onshore Scoping Boundary and are of greatest relevance to the Southwold option.

8.3.12 Sandlings SPA, Alde-Ore Estuary SPA, Alde-Ore Estuary Ramsar site and Alde, Ore and Butley Estuaries SAC occur near Aldeburgh and within 2km of the Onshore Scoping Boundary at the closest points. The Alde-Ore Estuary SPA and the Ore and Butley Estuaries SAC boundaries overlap the SPA boundary but cover smaller extents within it, with the remining portion of the SPA boundary also comprising Orfordness-Shingle Street SAC. The relevance of these sites is common to both proposed Landfall

[21] Seven sites confirmed in the running for UNESCO World Heritage Status - GOV.UK (www.gov.uk) (Accessed: 23/01/2024).

Sites and associated proposed HVDC Underground Cable Corridors and are also of particular relevance to the proposed Friston Substation and the proposed Converter Station Site at Saxmundham.

Table 8-2 Internationally important statutory designated sites within the study area

Site name, [site code] and size (ha)	Designation	Qualifying features	Distance and direction from the closest point of the Onshore Scoping Boundary
Minsmere to Walberswick Heaths & Marshes [UK0012809] (1238.3)	SAC	Annex I habitats: • Annual vegetation of drift lines; • European dry heaths; and • Perennial vegetation of stony banks. (Coastal shingle vegetation outside the reach of waves).	Within the Walberswick Scoping Boundary and the common corridor
Minsmere-Walberswick [UK9009101] (1997.7)	SPA	Annex 1 and/or migratory species: • Avocet (*Recurvirostra avosetta*), breeding; • Bittern (*Botauris stellaris*), breeding; • Gadwall (*Anas strepera*), breeding & non-breeding; • Greater white-fronted geese (*Anser albifrons albifrons*), non-breeding; • Hen harrier (*Circus cyaneus*), non-breeding; • Little tern (*Sterna albifrons*), breeding; • Marsh harrier (*Circus aeruginosus*), breeding; • Nightjar (*Caprimulgus europaeus*), breeding; • Shoveler (*Spatula clypeata*), breeding and non-breeding; and • Teal (*Anas crecca*), breeding.	Within the Walberswick Scoping Boundary and the common corridor
Minsmere-Walberswick [UK11044] (1995.8)	Ramsar site	Criterion 1: Mosaic of marine, freshwater, marshland and associated habitats, complete with transition areas in between. Contains the largest continuous stand of reedbeds in England and Wales and	Within the Walberswick Scoping Boundary and the common corridor

Site name, [site code] and size (ha)	Designation	Qualifying features	Distance and direction from the closest point of the Onshore Scoping Boundary
		rare transition in grazing marsh ditch plants from brackish to fresh water. Criterion 2: Supports nine nationally scarce plants and at least 26 red data book invertebrates. Supports a population of the mollusc *Vertigo angustior*. An important assemblage of rare breeding birds associated with marshland and reedbeds including bittern, gadwall, teal, shoveler, marsh harrier, avocet and bearded tit (*Panurus biarmicus*).	
Benacre to Easton Bavents [UK9009291] (470.6)	SPA	Annex 1 and/or migratory species: • Bittern, breeding; • Marsh harrier, breeding; and • Little tern, breeding.	Less than 5m north of the Southwold corridor
Outer Thames Estuary	SPA	Annex 1 species: • Red-throated diver (*Gavia stellata*), non-breeding; • Common tern (*Sterna hirundo*), breeding; and • Little tern, breeding.	Within the Southwold and Walberswick corridors
Southern North Sea	SAC	Annex II species: • Harbour porpoise (*Phocoena phocoena*).	0m east of the Southwold and Walberswick corridors
Benacre to Easton Bavents Lagoons [UK0013104] (326.7)	SAC	Annex I habitats: • Coastal lagoons.	200m north of the Southwold corridor

Site name, [site code] and size (ha)	Designation	Qualifying features	Distance and direction from the closest point of the Onshore Scoping Boundary
Sandlings [UK9020286] (3408.4)	SPA	Annex 1 species: • Nightjar, breeding; and • Woodlark (*Lullula arborea),* breeding	1.4km south west of the common corridor
Alde, Ore & Butley Estuaries [UK0030076] (1632.7)	SAC	Annex I habitats: • Atlantic salt meadows (*Glauco-Puccinellietalia maritimae*); • Estuaries; and • Mudflats and sandflats not covered by seawater at low tide. (Intertidal mudflats and sandflats).	1.6km south of the common corridor
Alde-Ore Estuary [UK9009112] (2403.6)	SPA	Annex 1 and/or migratory species: • Avocet, breeding & non-breeding; • Lesser black-backed gull (*Larus fuscus graellsii),* breeding; • Little tern, breeding; • Marsh harrier, breeding; • Redshank (*Tringa totanus*), non-breeding; • Ruff (*Philomachus pugnax)*, non-breeding; and • Sandwich tern (*Thalasseus sandvicensis).*	1.6km south of the common corridor
Alde-Ore Estuary [UK11002] (2534.0)	Ramsar site	Criterion 2: The site supports a number of nationally scarce plant species and British Red Data Book invertebrates. Criterion 3: The site supports a notable assemblage of breeding and wintering wetland birds. Criterion 6 (qualifying species): • Lesser black-backed gull, breeding;	1.6km south of the common corridor

Site name, [site code] and size (ha)	Designation	Qualifying features	Distance and direction from the closest point of the Onshore Scoping Boundary
		• Avocet, non-breeding; and • Redshank.	
Dew's Ponds [UK0030133] (6.7)	SAC	Annex II species: • Great crested newt (*Triturus cristatus).*	3.5km west of the common corridor
Orfordness-Shingle Street [UK0014780] (888.0)	SAC	Annex I habitats: • Annual vegetation of drift lines; • Coastal lagoons; and • Perennial vegetation of stony banks. (Coastal shingle vegetation outside the reach of waves).	6.3km south of the common corridor
The Broads [UK0013577] (5885.3)	SAC	Annex I habitats: • Hard oligo-mesotrophic waters with benthic vegetation of *Chara spp;* • Natural eutrophic lakes with *Magnopotamion* or *Hydrocharition* type vegetation; • *Molinia meadows* on calcareous, peat or clay-silt soil; • Transition mires and quaking bogs; • Calcareous fens with Cladium mariscus and species of *Caricion davallianae;* • Alkaline fens; and • Alluvial forests with *Alnus glutinosa* and *Fraxinus excelsior* (*Alno-Padion, Alnion incanae, Salicion albae*). Annex II species: • Desmoulin's whorl snail (*Vertigo moulinsiana*); • Otter (*Lutra lutra*); • Fen orchid (*Liparis loeselii*); and	9.6km north of the Southwold corridor

Site name, [site code] and size (ha)	Designation	Qualifying features	Distance and direction from the closest point of the Onshore Scoping Boundary
		• Ram's-horn snail (*Anisus vorticulus*).	
Broadland [UK9009253] (5502.3)	SPA	Annex 1 and non-Annex 1 species: • Bittern, breeding; • Bewick's swan (*Cygnus columbianus bewickii*), non-breeding; • Whooper swan (*Cygnus cygnus*), non-breeding; • Marsh harrier, breeding; • Northern harrier (*Circus cyaneus*), non-breeding; • Ruff, non-breeding; • Wigeon (*Anas penelope*), non-breeding; • Gadwall, non-breeding; and • Shoveler, non-breeding.	9.6km north of the Southwold corridor
Broadland [UK11010] (5566.9)	Ramsar site	Criterion 2 (Annex I habitats): • Calcareous fens with *Cladium mariscus* and species of the *Caricion davallianae* Calcium-rich fen dominated by great fen sedge (saw sedge); • Alkaline fens; and • Alluvial forests with *Alnus glutinosa* and *Fraxinus excelsior* (*Alno-Padion, Alnion incanae, Salicion albae*). Criterion 2 (Annex II species): • Desmoulin`s whorl snail; • Otter; and • Fen orchid. The site supports outstanding assemblages of rare plants and invertebrates including nine British Red Data Book plants and 136 British Red Data Book invertebrates.	9.6km north of the Southwold corridor

Site name, [site code] and size (ha)	Designation	Qualifying features	Distance and direction from the closest point of the Onshore Scoping Boundary
		Criterion 6 (species/populations): • Tundra swan (Cygnus columbianus bewickii), non-breeding; • Wigeon, non-breeding; • Gadwall, non-breeding; • Shoveler, non-breeding; • Pink-footed goose (*Anser brachyrhynchus*), non-breeding; and • Greylag goose (*Anser anser answer*), non-breeding.	

Statutory designated sites: national value

8.3.13 A total of 18 statutory designated sites of national value have been identified within the 5km study area. These sites are summarised in **Table 8-3**, which are ordered within the table in accordance with distance from the Onshore Scoping Boundary. All distances should be considered approximate. The sites are also shown on **Figure 8-1**. No additional SSSI with an IRZ that overlaps the Onshore Scoping Boundary have been identified. Several sites overlap the Onshore Scoping Boundary and several sites have multiple overlapping designations, these sites are discussed in the following paragraphs to aid clarity.

8.3.14 Minsmere-Walberswick Heaths and Marshes SSSI overlaps with and extends beyond the boundaries of Minsmere-Walberswick Heaths and Marshes SAC, Minsmere-Walberswick SPA and Minsmere-Walberswick Ramsar site (see **8.3.10**). The area of the SSSI that overlaps with the Onshore Scoping Boundary is all designated as SPA and Ramsar site, and part of the overlapping area is designated as a SAC.

8.3.15 Pakefield to Easton Bavents SSSI overlaps with, and extends beyond, Benacre to Easton Bavents SPA and Benacre to Easton Bavents Lagoons SAC designations (see **8.3.11**) and is of greatest relevance to the proposed Southwold option. Benacre NNR is within the Pakefield to Easton Bavents SSSI, Benacre to Easton Bavents SPA and Benacre to Easton Bavents Lagoons SAC designations, also of greatest relevance to the proposed Southwold corridor option.

8.3.16 Suffolk Coast NNR is located partially within the Onshore Scoping Boundary of greatest relevance to the Walberswick proposed Onshore Scheme option. Other units of the NNR are adjacent to and of greatest relevance to the Southwold corridor option with others common to both corridor options.

8.3.17 Westleton Heath NNR, is within the Minsmere-Walberswick Heaths and Marshes SSSI, Minsmere-Walberswick Heaths and Marshes SAC, Minsmere-Walberswick SPA and Minsmere-Walberswick Ramsar site designations (see **8.3.10** and **8.3.14**) and is of relevance to both corridor options.

8.3.18 Alde-Ore Estuary SSSI shares much of its boundary with the Alde-Ore Estuary SPA, Ore and Butley Estuaries SAC and Alde-Ore Estuary Ramsar site designations (see **8.3.12**) and is of relevance to both corridor options.

Table 8-3 Nationally important statutory designated sites within the study area

Site name and size (ha)	Designation	Description	Distance and direction from the closest point of the Onshore Scoping Boundary
Minsmere-Walberswick Heaths and Marshes (2305.9)	SSSI	This composite site is situated on the coast of Suffolk between Southwold in the north and Sizewell in the south. It contains a complex series of habitats, notably mudflats, shingle beach, reedbeds, heathland and grazing marsh, which combine to create an area of exceptional scientific interest.	Within the Walberswick corridor
Pakefield to Easton Bavents (735.4)	SSSI	Nationally important for its vegetated shingle features, saline lagoons, flood-plain fens, an assemblage of nationally rare and nationally scarce vascular plants, scarce breeding birds, four breeding bird assemblages in four different habitats and wintering bittern and is also of national geological importance.	Within the Southwold corridor and the common corridor
Suffolk Coast (649.0)	NNR	Made up of three reserves: Walberswick, Hen Reedbed and Dingle Marshes with a rich beach flora, wetlands and heath. Fauna includes otter and five species of deer, natterjack toad (*Epidalea calamita*) has been re-introduced to the area and European eel (*Anguilla anguilla*) is noted as a designating feature and the site has a rich bird assemblage.	Within the Walberswick corridor
Benacre (372.2)	NNR	Includes the reedbeds and lagoons of Benacre, Covehithe and Easton Broads, together with the woodlands and heathlands on the higher ground between them with designated features noted as including coastal lagoons, saline coastal lagoons and a vascular plant assemblage and the site has a rich bird assemblage.	250m north of the Southwold corridor
Potton Hall Fields, Westleton (16.7)	SSSI	Of special interest for the populations of the nationally rare, Red-tipped Cudweed (*Filago lutescens*), several thousand of which have been recorded there. The plant occurs in only two other counties in Britain.	350m east of the common corridor

Site name and size (ha)	Designation	Description	Distance and direction from the closest point of the Onshore Scoping Boundary
Westleton Heath (47.6)	NNR	Part of the best remaining tract of heathland in Suffolk. Birds of open heath and light scrub are well represented here and include tree pipit (*Anthus trivialis*), Dartford warbler (*Sylvia undata*), stonechat (*Saxicola rubicola*) and nightjar. The woodlands support nightingale (*Luscinia megarhynchos*) and woodcock. Designating features noted include adder (*Vipera berus*), natterjack toad and the herptile assemblage, the invertebrate assemblage and the woodland breeding bird assemblage.	450m east of the common corridor
Snape Warren (47.6)	SSSI	An important remnant of the once extensive 'Sandlings' heaths situated on sandy soils sloping down to the Alde Estuary the site is a fine example of the lowland heathland of eastern England.	1.4km south of the common corridor
Alde-Ore Estuary (2534.0)	SSSI	The site contains several coastal formations and estuarine features including mudflats, saltmarsh, vegetated shingle and coastal lagoons which are of special botanical and ornithological value. In winter and during migration the site is visited by nationally important numbers of wildfowl and shore-birds.	1.6km south of the common corridor
Sizewell Marshes (105.4)	SSSI	Important for their large area of lowland, unimproved wet meadows which support outstanding assemblages of invertebrates and breeding birds. Several nationally scarce plants are also present.	1.8km east of the common corridor
Leiston – Aldeburgh (535.1)	SSSI	Contains a rich mosaic of habitats including acid grassland, heath, scrub, woodland, fen, open water and vegetated shingle. This mix of habitats in close juxtaposition and the associated transition communities between habitats is unusual in the Suffolk Coast and Heaths. The variety of habitats support a diverse and abundant community of breeding and overwintering birds, a high number of dragonfly species and many scarce plants.	2.1km east of the common corridor
Gromford Meadow (1.7)	SSSI	A good example of an unimproved base-rich marsh on an alluvial soil with a high organic content. It borders the River Alde and is fed by	2.6km south west of the common corridor

Site name and size (ha)	Designation	Description	Distance and direction from the closest point of the Onshore Scoping Boundary
		springs. It is species-rich and contains a variety of characteristic fen meadow and marshland plants.	
Titsal Wood, Shadingfield (14.7)	SSSI	An ancient woodland on boulder clay overlain by sand. The site is the most interesting example of the sloping type of East Suffolk hornbeam wood. It has a rich flora, including ancient woodland plants and one scarce species (thin-spiked wood Sedge (*Carex strigose)*).	3.0km north west of the Southwold corridor
Dew's Ponds (6.7)	SSSI	Supports one of the largest known breeding populations of great crested newt in the UK.	3.5km west of the common corridor
Sotterley Park (123.2)	SSSI	A previous medieval deer park, that now supports the richest epiphytic lichen flora in East Anglia. Many of the parkland trees are of huge size and great age.	3.5km north of the Southwold corridor
Iken Wood (5.3)	SSSI	Lies close to the banks of the River Alde and may well be the only ancient coppice wood on blown sand in Britain. It is the most interesting example of lowland coppice oakwood in Suffolk and has a distinctive flora typical of woods on light soils.	3.7km south of the common corridor
Sandlings Forest (2486.3)	SSSI	Notified for its coniferous woodland which supports internationally important populations of woodlark and nightjar.	3.8km south west of the common corridor
The Haven, Aldeburgh (20.2)	LNR	Was historically the entrance to active seaport that eventually became landlocked as the soft coastline changed shape and new shingle bars developed. Behind the shingle, shallow lagoons and large reedbeds can often be found, many protected as nature reserves in recognition of their special wildlife value.	4.2km south east of the common corridor
Blaxhall Heath (46.2)	SSSI	One of the few fragments of the once extensive 'Sandlings' heath of coastal Suffolk and is a good example of this type of dry lowland heath.	4.5km south west of the common corridor

Non-statutory designated sites

8.3.19 Fifty-seven non-statutory CWS designated for nature conservation have been identified within the study area (2km) in addition to three RSPB reserves (2km). These sites are summarised in **Table 8-4** and **Table 8-5** which are ordered within the table according to distance from the Onshore Scoping Boundary for each site type. All distances should be considered approximate. The sites are also shown on **Figure 8-2**.

Table 8-4 Non-statutory designated sites within the study area - CWS

Site name & size (ha)	Designation	Description	Distance from the closest point of the Onshore Scoping Boundary
Big, Common & Haw Woods (33.10)	CWS	Extensive area of ancient woodland, with some areas dominated by even aged oak and others supporting a species-rich ground flora.	Within the common corridor
Hinton Long Spring (2.0)	CWS	Ancient woodland mainly extremely old hornbeam coppice (now neglected) with oak and ash standards.	Within the common corridor
Bulcamp Meadow (7.96)	CWS	Characterised by priority habitat wet grazing meadows which are enclosed by dykes.	Within the Southwold corridor
Blythburgh Marshes (34.53)	CWS	Grazing marshes of ornithological importance and supporting a diverse plant community.	Within the Southwold corridor
Easton Marshes (21.1)	CWS	Mosaic of habitats including marshes, shingle and heathland of ornithological importance and good population of breeding amphibians.	Within the Southwold corridor
Wangford Marshes (60.29)	CWS	Semi-improved marshes. The site supports a large number of wintering wildfowl and waders, and the marshes are important for hunting raptors.	Within the Southwold corridor
Minsmere Valley Reckford Bridge to Beveriche Manor (91.03)	CWS	Extensive area of unimproved marsh supporting rare flora and a number of productive barn owl nest sites. The site is also frequented by otters.	Within the common corridor
Darsham Marshes (23.6)	CWS	Extensive area of marsh and fen and an important refuge for wetland wildlife.	Within the common corridor
Reydon Wood (17.13)	CWS	Semi-natural ancient woodland noted for a network of species-rich rides and a woodland pond, as well as providing valuable habitat for protected species such as bats and barn owl.	Within the Southwold corridor

Site name & size (ha)	Designation	Description	Distance from the closest point of the Onshore Scoping Boundary
Grove Wood (10.2)	CWS	Hazel, ash, field maple and elm coppice wood with oak and ash standards and ancient ditch and bank with a large mixed hedge.	Within the common corridor
Knodishall Common (11.5)	CWS	Supports a mosaic of valuable of lowland heathland habitat (Priority habitat) with species such as turtle dove and nightingale and invertebrate interest.	Within the common corridor
Buckle's Wood (4.6)	CWS	Good coppice with standards structure, several rides. The coppice stools are old, mainly hazel, with ash, field maple and hornbeam also present.	Within the common corridor
RNR 142 (0.01)	CWS	Of interest for orpine. This site is also a Roadside Nature Reserve.	Within the Southwold corridor
Leiston Airfield (0.5)	CWS	Mosaic of species-rich grassland and scrub.	Within the common corridor
Kiln Grove & Meadows (3.3)	CWS	Excellent example of a coppice-with-standards ancient woodland (Priority habitat).	Within the common corridor
Holly Hills Wood (9.9)	CWS	Complex wood with various distinct areas including a poplar plantation and sweet chestnut plantations, with several associates including birch and sycamore.	Within the common corridor
Wenhaston Church Common (2.4)	CWS	An area of remnant heathland, containing three typical plant communities. Several nationally rare plant species have been recorded on the site, and areas of gorse-dominated scrub are important for birds.	Within the Southwold corridor
Theberton Woods (33.2)	CWS	Important example of a semi-natural boulder clay woodland that supports a diverse woodland flora. Although the woodland is not included in the ancient woodland inventory, it is shown on the first OS maps and earthworks suggest may be ancient.	Within the common corridor

Site name & size (ha)	Designation	Description	Distance from the closest point of the Onshore Scoping Boundary
RNR 82 (0.02)	CWS	Supports the legally protected rare fungus, Sandy Stiltball. The site is also a Roadside Nature Reserve.	Less than 15m west of the Southwold corridor
Buss Creek (4.9)	CWS	Comprises a central section of the creek, important ornithological site and supports a variety of waders and wildfowl.	Less than 15m south of the Southwold corridor
Dunwich Forest (457.64)	CWS	Comprises mainly forestry plantation, supporting nationally important breeding populations of woodlark and nightjar. Other important habitats are present, including lowland heathland priority habitat.	Approximately 25m east of the common corridor
Knodishall Whin (1.6)	CWS	Mosaic of heathland habitats including Priority habitats acid grassland, lichen heath and gorse/bramble scrub.	Approximately 50m west of the common corridor
Tuttles Wood (20.25)	CWS	Woodland composed predominantly of planted ash and oak with a hazel coppice understory.	Approximately 100m south of the Southwold corridor
Church Farm Marshes (6.20)	CWS	An area of species-rich unimproved priority habitat grassland, supporting diverse plant communities.	Approximately 100m west of the common corridor
Blyford Wood (25.44)	CWS	An ancient woodland of historic importance. The ground flora contains several plants associated with ancient woodlands.	Approximately 100m west of the Southwold corridor
Walberswick Saltmarsh (12.1)	CWS	Small area of saltmarsh (Priority habitat) has developed on both sides of the mouth of the Dunwich River.	Approximately 125m north east of the Walberswick corridor
Old Henham Brickyard and Blomefield Wood (3.75)	CWS	A flooded disused brick pit which forms two small lakes, surrounded by dense woodland. Tall fen vegetation provides good habitat for nesting birds.	Approximately 135m north of the Southwold corridor
Blackheath (13.90)	CWS	Contains heathland which supports a number of rare and nationally scarce plant species. The site is also important for reptiles and rare butterflies.	Approximately 135m west of the common corridor

Site name & size (ha)	Designation	Description	Distance from the closest point of the Onshore Scoping Boundary
Bicker's Heath (3.70)	CWS	Remnant heathland containing an extensive area dominated by heather, including uncommon species bell heather. The site is of importance for reptile conservation.	Approximately 165m west of the Southwold corridor
Kelsale Morio Meadow (1.0)	CWS	Unimproved neutral meadow with one of the finest populations of green-winged orchids of any meadow in Suffolk.	Approximately 300m west of the common corridor
Clay Common Ponds (0.50)	CWS	Vegetation surrounding the ponds has good structural diversity, and the ponds support a variety of wetland plants.	Approximately 400m north of the Southwold corridor
Deep Hole (2.04)	CWS	Secondary woodland and a steep sided brick pit now used as a fishing lake. Also contains an ancient species-rich hedgerow associated with a dry ditch.	Approximately 400m north of the Southwold corridor
Benhall Green Meadows (1.43)	CWS	The site contains wet meadows with a rich wet grassland flora typical of priority habitat lowland grazing meadows, including notable colonies of Southern Marsh Orchids.	Approximately 450m west of the common corridor
Minsmere Valley Eastbridge to Reckford Bridge (24.80)	CWS	The entire valley likely forms the last unspoilt and least improved of Suffolk's marshland river valleys. The central marshes are botanically the richest marshes of the whole valley. The site is important for breeding birds, invertebrates, and otters.	Approximately 450m east of the common corridor
RNR 166 (0.18)	CWS	The site supports the legally protected rare fungus, Sandy Stiltball. The site is also a Roadside Nature Reserve.	Approximately 450m west of the Southwold corridor
Westleton Common and Adjacent Habitat (21.5)	CWS	Semi-natural vegetation present is a diverse mosaic of heathland in various stages; acid grassland, scrub, woodland, early successional/ruderal vegetation communities and bare ground.	0.5km east of the common corridor
Reydon Fishing Lakes (8.7)	CWS	Four disused gravel pits situated to the north west of Southwold and south of Reydon provide important habitat for a wide range of both plants and animals.	0.5km south of the Southwold corridor

Site name & size (ha)	Designation	Description	Distance from the closest point of the Onshore Scoping Boundary
Havenbeach Marshes (9.08)	CWS	Nationally important areas of wet grassland. The Buss Creek marshes are of ornithological importance for breeding, feeding and migratory birds. Rare species of beetle have been recorded here.	0.5km south of the Southwold corridor
Southwold Denes (10.78)	CWS	Comprises an area of vegetated shingle beach and mobile sand dunes, which are scarce habitats in Suffolk and support fragile plant communities including locally and nationally rare species.	0.6km south of the Southwold corridor
Mill Heath (3.43)	CWS	A small area of heathland which is of particular importance for reptiles.	0.7km west of the Southwold corridor
Henham Marshes (1.93)	CWS	Meadows separated by wide dykes and bordered in the north and south by alder carr. The meadows contain a good variety of wetland wild flowers and provide important habitats for overwintering birds such as snipe and short-eared owl.	0.7km east of the Southwold corridor
Dunwich Valley Woods & Grassland (50.13)	CWS	Comprises a complex of habitats including willow and alder carr, grazing marsh and reedbed. The site supports a diversity of flora, including abundant sedges, rushes and wetland plants.	0.8km east of the common corridor
St Felix School Grounds (15.3)	CWS	Part of what was once a large tract of heathland which bordered the Suffolk coast and provides good habitat for a wide range of wildlife.	0.8km south of the Southwold corridor
Great Wood (5.9)	CWS	Enclosed by a bank and ditch, a characteristic feature of ancient woodland. The presence of a number of very large coppice stools is another indication of medieval woodland.	0.8km east of the common corridor
Stoven Wood (31.77)	CWS	Listed in Natural England's Ancient Woodland Inventory. Contains a number of features of a medieval wood. Habitat	1.0km north of the Southwold corridor

Site name & size (ha)	Designation	Description	Distance from the closest point of the Onshore Scoping Boundary
		diversity is provided by rides, hornbeam/hazel coppice and abundant deadwood.	
Reydon Marshes (42.7)	CWS	Cattle-grazed pastures separated by a series of drainage dykes.	1.1km south of the Southwold corridor
Thorington Road Meadows (3.73)	CWS	Unimproved wet meadows which form a semi-natural corridor alongside a tributary of the River Blyth. Fields south of the stream support a good wet grassland flora. Otter have been recorded on site.	1.1km west of the common corridor
Hurricane Wood (1.48)	CWS	Secondary woodland composed mainly of alder, willow and planted poplar. The primary importance of the site is its provision of a valuable, undisturbed refuge for otters.	1.2km west of the Southwold corridor
Manor Farm Meadows (1.43)	CWS	Area of wet meadows which support a rich wet grassland flora typical of lowland grazing meadows priority habitat.	1.2km west of the common corridor
RNR 102 (0.32)	CWS	Supports sulphur clover and dyer's greenweed. Also, a Roadside Nature Reserve.	1.4km west of the common corridor
Sizewell Levels and Associated Areas (105.35)	CWS	Large area characterised by a diversity of habitats including woodland, wet meadow and osier beds. The area is of regional and national importance for wildlife conservation, supporting a number of uncommon plants and a diversity and abundance of birds.	1.5km east of the common corridor
RNR 216 (0.01)	CWS	Supports the legally protected rare fungus, Sandy Stiltball. The site is also a Roadside Nature Reserve.	1.5km west of the common corridor
RNR 197 (0.02)	CWS	Supports the legally protected rare fungus, Sandy Stiltball. The site is also a Roadside Nature Reserve.	1.7km west of the common corridor
Church Common (2.17)	CWS	Remnant heathland, containing three typical plant communities. Several nationally rare plant species have been	1.7km west of the common corridor

Site name & size (ha)	Designation	Description	Distance from the closest point of the Onshore Scoping Boundary
		recorded on the site, and areas of gorse-dominated scrub are important for birds.	
Holton Sandpits (7.30)	CWS	Excellent structural diversity, including mature trees, scrub, rough grassland and ponds. The acid grassland area contains notable and nationally scarce species. The scrub habitat supports a range of nesting birds.	1.8km west of the Southwold corridor
Tiggins Lane, RNR 209 (0.30)	CWS	The site is characterised by a boulder clay flora community and is also a Roadside Nature Reserve.	1.9km west of the common corridor
Bramfieldhall Wood (15.74)	CWS	An ancient woodland bordered by a sinuous ditch and bank. Contains a number of hornbeam stools up to 2 metres across. The site contains at least two ponds.	1.9km west of the common corridor

Table 8-5 Non-statutory designated sites within the study area – RSPB reserves

Site name & size (ha)	Designation	Description	Distance from the closest point of the Onshore Scoping Boundary
Minsmere	RSPB Reserve	Reedbeds, wet grasslands & heathlands of interest to a wide variety of birds including avocet, bearded tit and bittern.	25m east of the common corridor
Dingle Marshes	RSPB Reserve	Freshwater reedbed, shingle, grazing marsh and lagoons of interest for species such as bittern and marsh harrier.	100m east of the common corridor
North Warren	RSPB Reserve	Thousands of ducks, swans and geese use the marshes in winter with bittern,	1.9km east of the common corridor

Site name & size (ha)	Designation	Description	Distance from the closest point of the Onshore Scoping Boundary
		marsh harrier, woodlark and nightingale in spring.	

Irreplaceable habitats

8.3.20 Irreplaceable habitats are those which would be technically very difficult (or take a very significant time) to restore, recreate or replace if destroyed, taking into account their age, uniqueness, species diversity or rarity[22]. They include ancient woodland, ancient and veteran trees, blanket bog, limestone pavement, sand dunes, salt marsh and lowland fen. In addition to ancient woodland (AWI sites), ancient, veteran and notable trees, other irreplaceable habitats have been identified within the Onshore Scoping Boundary which include coastal saltmarsh, maritime cliffs and slopes, mudflats, coastal and floodplain grazing marsh (CFGM), purple moor grass and rush pasture, lowland dry acid grassland, lowland meadow, reedbeds, lowland fen, deciduous woodland, traditional orchards, wood pasture and parkland and hedgerows as described within the corresponding priority habitat types (see **8.3.28**).

Irreplaceable habitats: AWI sites

8.3.21 Ten AWI sites have been identified within the study area (1km). These sites are summarised in **Table 8-6** which are ordered within the table according to distance from the study area. All distances should be considered approximate.

8.3.22 Woodlands may qualify as ancient without being mapped on the AWI[23], often due to their restricted size (only woodlands over 2ha were originally included within the AWI). A desk-based review for potential unmapped ancient woodland will be undertaken by Historic Environment using historic maps to assess the likelihood that ancient woodland occurs, i.e., areas of land having been continuously wooded since 1600AD, to be included within the PEI Report. This exercise will also be informed by ecological review of Local Wildlife Site (LWS) citations which may identify potential ancient woodland.

Table 8-6 AWI sites within the study area

Site name	Site type	Distance from the closest point of the Onshore Scoping Boundary
Big/Common Woods	AWI	Within the common corridor
Buckles Wood	AWI	Within the common corridor
Grove Wood	AWI	Within the common corridor
Hinton Long Spring	AWI	Within the common corridor
Hollyhill Wood	AWI	Within the common corridor
Reydon Wood	AWI	Adjacent to the Southwold corridor
Tuttles Wood	AWI	100m south of the Southwold corridor

[22] Ministry of Housing Communities & Local Government (2021) National Planning Policy Framework. Available at: National Planning Policy Framework (publishing.service.gov.uk) (Accessed: 23/01/2024).

[23] Natural England. Ancient Woodland Inventory (England). Available at: Ancient Woodland (England) (arcgis.com) (Accessed: 23/01/2024).

Site name	Site type	Distance from the closest point of the Onshore Scoping Boundary
Blyford Wood	AWI	100m west of the Southwold corridor
Bloomfield Wood	AWI	150m north of the Southwold corridor
Unnamed Wood 1	AWI	230m west of the common corridor

Irreplaceable habitats: Ancient, veteran and notable trees

8.3.23 A total of 99 ancient, veteran or notable trees have been identified within the study area (1km), from information provided by SBIS and the Ancient Tree Inventory[24]. Those that fall within the Onshore Scoping Boundary (23 trees) and those within 50m (3 trees) are listed in **Table 8-7**, which are ordered within the table according to distance from the study area. All distances should be considered approximate.

8.3.24 There is also potential for unmapped ancient, veteran and/or notable trees to be present within the study area, particularly given the known prevalence of these trees associated with hedgerows throughout Suffolk[25]. Notably, Suffolk is known to constitute a significant stronghold of the remaining native black poplar (*Poplus nigra* spp. *betulifolia*) population in the UK, with a high number of the local population closely associated with Saxmundham to the immediate west of the Onshore Scoping Boundary[26]. Phase 2 surveys may be required to confirm identification of unmapped ancient and veteran trees.

Table 8-7 Ancient, veteran and notable trees within the study area

Tree species and (tree ID)	Grid reference	Type	Distance from the closest point of the Onshore Scoping Boundary
Sweet chestnut (35531)	TM48417419	Notable	Within the Walberswick corridor
Pedunculate oak (29569)	TM44937095	Veteran	Within the common corridor
Pedunculate oak (48915)	TM40716465	Veteran	Within the common corridor

[24] Woodland Trust Ancient Tree Inventory (England). Available at Ancient Woodland (England) (arcgis.com) (Accessed: 23/01/2024).

[25] Woodland Trust Ancient Tree Inventory (England). Available at Ancient Woodland (England) (arcgis.com) (Accessed: 23/01/2024).

[26] Suffolk Biodiversity Information Centre (2006) *Native Black Poplar Action Plan.* Available at: Microsoft Word - black poplar BAP FINALacceptchanges.doc (suffolkbis.org.uk) (Accessed: 23/01/2024).

Tree species and (tree ID)	Grid reference	Type	Distance from the closest point of the Onshore Scoping Boundary
Pedunculate oak (48914)	TM42556426	Veteran	Within the common corridor
Pedunculate oak (48499)	TM43867182	Veteran	Within the common corridor
Pedunculate oak (48500)	TM44507279	Veteran	Within the common corridor
Pedunculate oak (29570)	TM44977123	Veteran	Within the common corridor
Pedunculate oak (48960)	TM43187053	Veteran	Within the common corridor
Pedunculate oak (48961)	TM43367123	Veteran	Within the common corridor
Pedunculate oak (48784)	TM40576430	Veteran	Within the common corridor
Pedunculate oak (48783)	TM40576430	Veteran	Within the common corridor
Pedunculate oak (48782)	TM40576430	Veteran	Within the common corridor
Pedunculate oak (48786)	TM41926164	Veteran	Within the common corridor
Pedunculate oak (48785)	TM41926165	Veteran	Within the common corridor
Pedunculate oak (182886)	TM4845979616	Veteran	Within the Southwold corridor
Pedunculate oak (180115)	TM4848979605	Veteran	Within the Southwold corridor
Pedunculate oak (48962)	TM44847900	Veteran	Within the Southwold corridor
Pedunculate oak (48963)	TM45317920	Veteran	Within the Southwold corridor
Pedunculate oak (48889)	TM42907832	Veteran	Within the Southwold corridor
Pedunculate oak (48504)	TM42857763	Veteran	Within the Southwold corridor

Tree species and (tree ID)	Grid reference	Type	Distance from the closest point of the Onshore Scoping Boundary
Pedunculate oak (42131)	TM48257873	Veteran	Within the Southwold corridor
Pedunculate oak (42130)	TM48027875	Notable	Within the Southwold corridor
Pedunculate oak (11189)	TM42517653	Veteran	Within the Southwold corridor
Pedunculate oak (180329)	TM4498170971	Veteran	Less than 10m east of the common corridor
Pedunculate oak (29571)	TM45007116	Notable	Less than 15m east of the common corridor
Pedunculate oak (48792)	TM41966586	Veteran	25m west of the common corridor

Notable habitats

8.3.25 The study area for Preliminary Ecological Appraisal (PEA) surveys in 2023 comprised the vast majority of land within the Onshore Scoping Boundary, subject to land access being obtained for survey. The exceptions are residential land parcels comprising dwellings and gardens because it is likely that the majority of residential properties within the study area will be excluded as the design develops. Furthermore, given the scale of the Onshore Scoping Boundary at approximately 5700ha, it is considered proportionate to exclude very small land parcels (defined as areas of 0.2ha or less) from the 2023 surveys unless desk-based information indicates that they are likely to support valuable ecological features.

8.3.26 PEA surveys will identify habitats which will be classified using the UK Habitats Classification (UKHab) methodology[27]. The UKHab classification system provides the basis for habitat types within the Biodiversity Metric 4.0[28] to be utilised for Biodiversity Net Gain (BNG) assessment of the proposed Onshore Scheme.

8.3.27 The Onshore Scoping Boundary is bisected by a number of running watercourses, including both main and ordinary watercourses. All watercourses within the study area will be subject to watercourse condition scoring because detailed habitat baseline data is required as the basis for the BNG calculations in the Defra Biodiversity Metric, to include habitats retained or enhanced.

8.3.28 Numerous priority habitats have been identified within the study area (1km) and within and adjacent to the Onshore Scoping Boundary which are considered characteristic of the east Suffolk landscape. These priority habitats and their broad distribution are:

[27] B. Butcher, P. Carey, R. Edmonds, L. Norton and J. Treweek, (2020) *The UK Habitat Classification User Manual Version 1.1*. Available at: ukhab – UK Habitat Classification (Accessed: 23/01/2024).

[28] Natural England (2023) "*The Biodiversity Metric 4.0*,". Available at: The Biodiversity Metric Supporting Documents - JP039 (naturalengland.org.uk) (Accessed: 23/01/2024).

- Coastal saltmarsh – within and adjacent to both the Southwold and Walberswick corridors, along the Blyth estuary and River Blyth with an extensive area, running along the coastline to the south.
- Coastal sand dunes – present approximately 200m from the Walberswick corridor.
- Maritime cliffs and slopes – within and adjacent to the Walberswick corridor, running along the coastline to the south.
- Mudflats – present intermittently along the River Blyth estuary with a small area within the Southwold corridor.
- Saline lagoons – adjacent to the south of the Southwold corridor.
- Coastal and floodplain grazing marsh (CFGM) – within and adjacent to the Southwold corridor, associated with the River Blyth west of Southwold and the River Wang west of Wangford. A small section also present within the Onshore Scoping Boundary and of relevance to the Walberswick proposed Landfall Site. Also present in a patchy distribution in the central and southern areas common to both proposed Landfall Sites, associated with the Minsmere Old River.
- Coastal lagoons – present north of Southwold, adjacent to the Southwold corridor.
- Purple moor grass and rush pasture – present across the width of the common corridor north of Middleton, associated with the Minsmere Old River running west to east.
- Lowland dry acid grassland – present in several smaller scattered patches within the common corridor.
- Lowland meadow – mapped areas of limited to isolated patches of restricted extent within the common corridor around Middleton.
- Lowland heathland – patches within and adjacent to the Walberswick corridor.
- Reedbeds – extensive areas of reedbed are present adjacent with small sections within the Walberwsick corridor.
- Lowland fens – isolated patches are present within the common corridor north of Middleton, associated with the Minsmere Old River. A further extensive area is present adjacent to the Southwold corridor, north of the River Blyth.
- Deciduous woodland (encapsulating Lowland Mixed Deciduous Woodland and Wet Woodland) – frequently occurring as smaller, isolated stands throughout and adjacent to all corridors.
- Traditional orchards – present in highly isolated patches, particularly within the common corridor.
- Woodpasture & parkland – present in small, isolated patches within the common corridor, west of Theberton and Friston.
- Hedgerows – it is assumed that the majority of hedgerows present within the study area meet the criteria for the corresponding priority habitat type, with a composition of at least 80% native species[27]. A county-wide survey identified that over half the landscape hedgerows in the county are species-rich. Hedgerows are distributed widely and frequently throughout the study area. Hedgerows will be captured during the PEA surveys. These surveys will confirm whether hedgerows comprise priority habitat and identify those that are species-rich and those that have potential to

support protected/ notable fauna. Additional assessments to identify Important hedgerows will only be undertaken if permanent hedgerow loss cannot be avoided within the proposed Landfall Sites, proposed Converter Station or proposed Friston Substation.

8.3.29 Intertidal habitat adjacent to the proposed Landfall Sites falls within both the Proposed Onshore Scheme Scoping Boundary and Proposed Offshore Scheme Scoping Boundary, because these boundaries overlap. The baseline for the intertidal zone is described within **Chapter 19** Intertidal and Subtidal Benthic Ecology.

Bats

8.3.30 The Bat Distribution Atlas 1983-2016[29] produced by the SBG was consulted to determine the baseline distribution of bats within the study area. The following bat species were recorded as being present within the East of Suffolk, between 2012 and 2016:

- Barbastelle (*Barbastella barbastellus*);
- Serotine (*Eptesicus serotinus*);
- Daubenton's bat (*Myotis daubentonii*);
- Natterer's bat (*Myotis nattereri*);
- Leisler's bat (*Nyctalus leisleri*);
- Noctule (*Nyctalus noctula*);
- Common pipistrelle (*Pipistrellus pipistrellus*);
- Soprano pipistrelle (*Pipistrellus pygmaeus*);
- Nathusius' pipistrelle (*Pipistrellus nathusii*); and
- Brown long-eared bat (*Plecotus auritus*).

8.3.31 Other species recorded elsewhere within the county or pre-2012 are:

- Whiskered bat (*Myotis mystacinus*); and
- Brandt's bat (*Myotis brandtii*)

8.3.32 SBIS have provided records of barbastelle, serotine, Natterer's bat, Daubenton's bat, noctule, common pipistrelle, soprano pipistrelle, Nathusius' pipistrelle and brown long-eared bat from within the study area.

8.3.33 The EDF energy estate in Sizewell, approximately 3.8km from the study area, is known to support maternity colonies of barbastelle, Natterer's bat, brown long-eared bat, and soprano pipistrelle, in addition to non-breeding roosts of these species, noctule and common pipistrelle. Hibernation roosts are also present for the majority of these species[30].

8.3.34 Numerous granted EPS licences from within the study area (1km) have been identified which include:

[29] Suffolk Bat Group. (2017). Bats in Suffolk. Distribution Atlas 1983-2016. Available at: Bat Atlas 1983_2016 final.pdf (live-twt-d8-suffolk.pantheonsite.io) (Accessed: 23/01/2024).

[30] NNB. (2021). The Sizewell C Project: Terrestrial Ecology Monitoring and Mitigation Plan – Clean Version.

- Destruction of a brown long-eared bat and common pipistrelle breeding site north of Sotherton Corner;
- Destruction of a breeding site for Daubenton's bat in the town of Friston;
- Destruction of a breeding site for brown long-eared bat, common pipistrelle, Natterer's bat, serotine and soprano pipistrelle in the Carriage House, Friston;
- Destruction of a resting place for barbastelle in Westleton; and
- Destruction of a breeding site for common pipistrelle, soprano pipistrelle, whiskered bat, Brandt's bat, Daubenton's bat, brown long-eared bat and Natterer's bat north-east of Saxmundham.

8.3.35 Habitats present within the study area are likely to provide foraging resources and commuting routes for all bat populations that occur locally. The most valuable bat foraging areas are likely to comprise semi-natural habitats that are rich in insect prey such as woodlands, wetlands and species-rich grasslands. Mature hedgerows and tree-lined watercourses are likely to provide flight lines that bats use for orientation when commuting between foraging and roosting areas, with such features also offering foraging opportunities themselves. Trees with deadwood features are likely to provide roosting opportunities, in addition to a range of built structures including buildings and bridges.

8.3.36 PEA surveys will include initial identification of trees and built structures within the study area that could potentially provide bat roosting opportunities. This will include mapping of trees and built structures that could reasonably support a roost based on their age/ size/ condition. A combination of desk study data and habitat mapping from PEA surveys will be used to identify habitats that are likely to be of value to foraging and commuting to bats.

8.3.37 Sampling with static bat detectors will be undertaken within representative examples of suitable bat foraging and commuting habitat types within the Onshore Scoping Boundary. Where permanent habitat loss is proposed at the proposed Landfall Sites, proposed Converter Station Site and proposed Friston Substation Site, static detector data will be supplemented with bat transect surveys to provide additional qualitative data on bat activity to guide design.

8.3.38 Static detectors have been deployed each month between June to October 2023 to record bat echolocation calls. Bat activity transect surveys have been undertaken on a monthly basis within the same survey period. Monthly static and transect surveys at these locations will resume in April and May 2024 to provide data across the full bat activity period of April to October. The findings will be used to inform a preliminary assessment of bat assemblages and potential significant effects and to inform the planning of further surveys to be undertaken in 2024.

8.3.39 Further bat surveys in 2024 will include ground level tree assessments (GLTA) of trees identified from the PEA surveys as being potentially suitable for bats to roost in. GLTA will focus on cataloguing the available roost resource in trees at potential risk of impact within the study area.

8.3.40 Advanced licence bat survey techniques (ALBST) will be employed between May to September 2024 to find roosts of high conservation significance, as recommended as appropriate for Nationally Significant Infrastructure Projects (NSIP) within the Bat

Conservation Trust survey guidelines[31] published in September 2023. ALBST will comprise trapping bats and radio-tracking them under licence from Natural England to find tree and building roosts at a landscape level. Radio transmitters will be attached to breeding bats from species likely to depend upon features that could be potentially impacted by construction of the proposed Onshore Scheme. Such features primarily comprise trees used for roosting and linear habitat features used for commuting. The radio-tracking of breeding bats from these species is an effective approach for locating breeding colonies or bat populations of high conservation significance[31]. The identification of roost locations important to local bat colonies/ populations will provide information to guide avoidance of important commuting and roosting habitat as design evolves, and to identify any significant impacts upon bats.

8.3.41 It is anticipated that the loss of roosts identified through ALBST and loss of the majority of trees with significant bat roosting potential from GLTA (i.e. trees that exhibit suitability for multiple bats and may therefore be used by a maternity colony) will be avoided through design. If loss of trees with significant bat roosting potential cannot be avoided, further surveys to identify and characterise any roosts present will be undertaken in accordance with Bat Conservation Trust (BCT) guidelines[31].

8.3.42 It is anticipated that loss of any built structures with bat roosting potential within the study area, identified from PEA survey, will be avoided through the design process. Further bat survey of retained structures would not be undertaken as standard. In the unlikely event that structures with bat roosting potential cannot be avoided, further surveys to identify and characterise any roosts present will be undertaken in accordance with BCT guidelines[31].

Breeding birds

8.3.43 The proposed Onshore Scheme, considered within this chapter, and the proposed Offshore Scheme could potentially result in effects upon the same ornithological receptor. All survey data gathered for the assessment of the proposed Onshore Scheme will also be available to inform the assessment of the impacts of the proposed Offshore Scheme upon these ornithological receptors. The impacts of these elements of the proposed Scheme will be considered within their respective chapters, and the potential for combined effects of the Onshore and Offshore Scheme will be assessed as described in **Chapter 29** Cumulative and Combined Effects of the Project (Onshore and Offshore).

8.3.44 Numerous designated sites of international and national importance within the east Suffolk region are designated for breeding bird assemblages (see **Table 8-2** and **Table 8-3**). This includes the Minsmere-Walberswick SPA, which partially overlaps the Onshore Scoping Boundary in several locations in the central and northern extents. The SPA qualifies under Article 4.1 of the Birds Directive[32] and supports a diverse assemblage of breeding birds of marshland and reedbed habitats, including protected and/or notable species bittern, garganey (*Spatula querquedula*), marsh harrier, water rail (*Rallus aquaticus*), Cetti's warbler (*Cettia cetti*), and Savi's warbler (*Locustella luscinioides*). The Alde-Ore Estuary SPA is also designated for supporting nationally important Annex 1 breeding bird assemblages, including avocet and little tern. The site

[31] Collins, J. (ed.) (2023) Bat Surveys for Professional Ecologists: Good Practice Guidelines (4th edn). The Bat Conservation Trust, London.

[32] The Birds Directive (Directive 2009/147/EC). Available at EUR-Lex - 32009L0147 - EN - EUR-Lex (europa.eu). (Accessed: 23/01/2024).

also supports notable breeding wetland birds, including oystercatcher (*Haematopus ostralegus*), ringed plover (*Charadrius hiaticula*) and lapwing (*Vanellus vanellus).*

8.3.45 Further notable populations of protected and/or notable species breeding in the county include:

- Barn owl (*Tyto alba*): the Suffolk Community Barn Owl Proposed Onshore Scheme (SCBOP) has advised on the fixture of 2000 barn owl nest boxes throughout the county, and 1,774 nest boxes remain active[33]. The Suffolk Bird Atlas[34], a part of the national Bird Atlas 2007-2011[35], recorded barn owl as being proven to be breeding or probably breeding throughout much of the east of Suffolk, both along the coast and further inland, overlapping with the Onshore Scoping Boundary.
- Bittern: Bittern are typically associated with reedbeds, particularly along the east Suffolk coast, which constitutes one of the UK strongholds, particularly the Minsmere reserve[36].
- Dartford warbler: Dartford warbler are associated with lowland heathland habitats, including breeding at several RSPB reserves along the east Suffolk coast, including North Warren and Dunwich Heath, within the study area[37].
- Firecrest (*Regulus ignicapilla*): Firecrest have an increasing population within Suffolk, with habitats within and surrounding the Minsmere-Walberswick SPA known to support breeding populations[38].
- Grey partridge (*Perdix perdix*) is present throughout Suffolk and SBIS have provided numerous records of the species including within the study area originating from a number of locations including Darsham Marshes, Blythburgh, Knodishhall and Walberswick.
- Marsh harrier: Marsh harrier utilise the reedbed habitats in addition to other habitats such as arable fields within coastal Suffolk, recorded as proven breeding in much of coastal Suffolk, by the Suffolk Bird Atlas[39].
- Nightingale is present throughout Suffolk and SBIS have provided numerous records of the species including within the study area originating from a number of locations including Theberton Woods, Darsham Marshes and Walberswick.
- Nightjar*:* Nightjar are known to inhabit heathland and coniferous plantations in coastal Suffolk. The Suffolk Bird Atlas[40]recorded nightjar as being proven breeding

[33] Suffolk Bird Group. (n.d.). SCBOP Barn Owls. Available at: Barn Owl Support Suffolk | Suffolk Bird Group. (Accessed: 23/01/2024)

[34] Suffolk Bird Atlas. Available at: Suffolk Bird Atlas | Suffolk Biodiversity Information Service (suffolkbis.org.uk) (Accessed: 23/01/2024).

[35] Balmer, D., Fuller, R., Caffrey, B., Swann, B., Downie, I. & Gillings, S. (2013). Bird Atlas 2007-11: The distribution of breeding and wintering birds in Britain and Ireland. 1st Ed, British Trust for Ornithology.

[36] RSPB. Bittern. Available at: Bittern Bird Facts | Botaurus stellaris (rspb.org.uk). (Accessed: 23/01/2024).

[37] Suffolk Bird Atlas. Available at: Suffolk Bird Atlas | Suffolk Biodiversity Information Service (suffolkbis.org.uk). (Accessed: 23/01/2024).

[38] Suffolk Bird Atlas. Available at: Suffolk Bird Atlas | Suffolk Biodiversity Information Service (suffolkbis.org.uk). (Accessed: 23/01/2024).

[39] Suffolk Bird Atlas. Available at: Suffolk Bird Atlas | Suffolk Biodiversity Information Service (suffolkbis.org.uk) (Accessed: 23/01/2024).

[40] Suffolk Bird Atlas. Available at: Suffolk Bird Atlas | Suffolk Biodiversity Information Service (suffolkbis.org.uk). (Accessed: 23/01/2024).

and probably breeding at several locations along the Suffolk coast adjacent to the study area, largely between Southwold and Ipswich.

- Stone curlew (*Burhinus oedicnemus*): Stone curlew are known to breed in the RSPB Minsmere reserve and the Blythe estuary on the east Suffolk coast[41] and are present in the wider area in the Minsmere Estate.
- Turtle dove (*Streptopelia turtur*) is present throughout Suffolk and SBIS have provided numerous records of the species including within the study area originating from a number of locations including Minsmere, Walberswick, Darsham Marshes and Westleton and is also known to be present in Big/Common AWI site.
- Woodlark: Woodlark is a Suffolk Priority Species under Suffolk's Local Biodiversity Action Plan (LBAP). The population is cited as now largely breeding on open heathland and within forestry plantations[42] Breeding data between 2008 and 2011 from The Suffolk Bird Atlas[43] indicates woodlark have been proven breeding at several points near the coast of Suffolk.

8.3.46 Three RSPB reserves have been identified within the study area (see **Table 8-5**), comprising Minsmere, Dingle Marshes and North Warren.

8.3.47 In relation to survey effort for the proposed Onshore Scheme, breeding birds are considered in two categories:

- Notable breeding bird assemblages identifiable through generalised survey methodologies; and
- Species unlikely to be identifiable through generalised survey methodologies or demanding specific attention, hereby referred to as target species. Target species considered likely to fall within this category with the potential for breeding in east Suffolk include barn owl, bittern, Dartford warbler, firecrest, hobby (*Falco subbuteo*), kingfisher (*Alcedo atthis*) marsh harrier, nightjar, stone curlew and woodlark. Further species of potential local concern include turtle dove, nightingale and grey partridge.

8.3.48 Desk and field data from PEA surveys will be reviewed by an experienced ornithologist(s) to determine any areas of the study area with potential to support notable breeding bird assemblages and/or target species. The review will also consider habitats occurring beyond the study area, which could support notable breeding assemblages or specific target species in combination with habitat areas within the study area. Where such areas are identified, the extent will be mapped as 'potential important breeding bird areas'.

8.3.49 Surveys to identify breeding bird assemblages within potentially important breeding bird areas will be undertaken between March and June 2024, with surveys designed and carried out using *Bird Survey & Assessment Steering Group*[44] methodology. Transect routes will be developed to cover representative habitats within the 'potential important breeding bird areas'. Surveys for target species that are unlikely to be identifiable

[41] Suffolk Bird Atlas. Available at: Suffolk Bird Atlas | Suffolk Biodiversity Information Service (suffolkbis.org.uk). (Accessed: 23/01/2024).

[42] Suffolk Biodiversity Information Service. (2007). Woodlark (*Lullula arborea*). Available at: Microsoft Word - Woodlark BAP_final_1_11_2007.doc (suffolkbis.org.uk) (Accessed: 23/01/2024).

[43] Suffolk Bird Atlas. Available at: Suffolk Bird Atlas | Suffolk Biodiversity Information Service (suffolkbis.org.uk) (Accessed: 23/01/2024).

[44] Bird Survey & Assessment Steering Group. (2023) *Bird Survey Guidelines for assessing ecological impacts, v.0.1.6.* Available at: Bird Survey Guidelines | for ecological impact assessment (Accessed: 23/01/2024).

through generalised survey methodologies will be undertaken between March and August 2024. Surveys for target species will be undertaken where habitats likely to be used by these species are considered to be at risk of impacts from the proposed Onshore Scheme at this stage.

Wintering birds

8.3.50 The proposed Onshore Scheme, considered within this Chapter, and the proposed Offshore Scheme could potentially result in effects upon the same ornithological receptor. All survey data gathered for the assessment of the proposed Onshore Scheme will also be available to inform the assessment of the impacts of the proposed Offshore Scheme upon these ornithological receptors. The impacts of these elements of the proposed Scheme will be considered within their respective chapters, and the potential for combined effects of the Onshore and Offshore Scheme will be assessed as described in **Chapter 29** Cumulative and Combined Effects of the Project (Onshore and Offshore).

8.3.51 An internationally important designated site for wintering birds, Minsmere-Walberswick SPA, partially overlaps with the Onshore Scoping Boundary. The SPA qualifies under Article 4.2 of the Birds Directive[45] by supporting nationally important wintering populations of three migratory waterfowl (as identified in **Table 8-2**):

- European white-fronted geese, 2% of the British wintering population;
- gadwall, 1% of the British wintering population; and
- shoveler, 1% of the British wintering population.

8.3.52 The site also qualifies under Article 4.1[46] of the Birds Directive as it supports a nationally important wintering population of hen harrier, representing 2% of the British wintering population in 1991[47]. The RSPB Minsmere reserve also supports a number of other wintering birds of prey including peregrine (*Falco peregrinus*), barn owl and short-eared owl (*Asio flammeus*)[48] (as identified in **Table 8-5**).

8.3.53 Alde-Ore Estuary SPA, positioned to the south of the Onshore Scoping Boundary, sustains nationally important numbers of wintering avocet, ruff, and redshank (as identified in **Table 8-2**).

8.3.54 Given the potential importance of wintering bird assemblages associated with various designated sites and the interacting wider landscape associated with the study area, it was considered that wintering bird survey data would be required from more than one winter to inform the proposed Onshore Scheme design development. Wintering bird surveys commenced during winter 2022/23 relating to the options presented at Non-Statutory Consultation and as detailed within **Chapter 3** Assessment of Alternatives.

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[45]The Birds Directive (Directive 2009/147/EC). Available at EUR-Lex - 32009L0147 - EN - EUR-Lex (europa.eu). (Accessed: 23/01/2024).

[46] The Birds Directive (Directive 2009/147/EC). Available at EUR-Lex - 32009L0147 - EN - EUR-Lex (europa.eu). (Accessed: 23/01/2024).

[47] JNCC. (1991). Minsmere-Walberswick SPA Citation. Available at: https://publications.naturalengland.org.uk/file/5944954236960768 (Accessed: 23/01/2024). Hen harrier numbers have declined in England since this 1991 citation, and this published data may not be a true representation of the current representation of the population.

[48] RSPB. (2022). Minsmere. Available at: Minsmere Nature Reserve, Suffolk - The RSPB (Accessed: 23/01/2024).

8.3.55 The objective of the first year of winter bird surveys was to identify potential hotspots of activity and begin to quantify baseline numbers of birds using key habitats, particularly where the options boundaries overlap with designated sites, and where there are habitats within the options boundaries that are likely to be functionally linked to designated sites. The locations were selected by a high-level assessment of key areas likely to support significant species and/or aggregations of wintering birds, undertaken by experienced ornithologists. Criteria for key areas included:

- Each of the proposed Landfall Sites and proposed Converter Station Site and associated habitats;
- Crossing points of proposed Underground Cable Corridors through SPA/Ramsar/SSSI sites where wintering birds act as a designating feature; and
- Crossing points of proposed Underground Cable Corridors at key tidal, wetland or riparian habitats likely to act as supporting habitat for SPA/Ramsar/SSSI sites where wintering birds are a designating feature.

8.3.56 Survey locations of relevance to the Onshore Scoping Boundary are identified below, see **8.3.57**, and were surveyed on a monthly basis from November 2022 to March 2023 through diurnal surveys for wintering birds on publicly accessible land. Over this survey period, six surveys were undertaken of each location with extra survey effort in November/December 2022 to ensure three surveys were undertaken in the first half of the survey period. Target species were those associated with designated sites, including all waterbirds, wading birds, raptors, and significant aggregations of other species. Surveys comprised the following:

- Initial avian scoping visit to confirm sampling strategy;
- Through-the-tide surveys of identified coastal landfall locations, comprising counts at high and low tidal states; and
- 'Look see' sampling of remaining locations to include counting species site visits, where habitats were unlikely to experience variations in birds relating to tidal state.

8.3.57 Generally, bird interest was low across the survey locations from winter 2022/23 with no significant difference between the two proposed Landfall Sites. Survey findings from winter 2022/23 that are relevant to the Onshore Scoping Boundary are summarised below:

- The survey area at the proposed Southwold Landfall Site comprised grazing pasture with limited bird interest noted on the first visit in November 2022. During this visit species comprised small numbers of gadwall, black-headed gull (*Chrococephalus ridibundus*), mallard (*Anas platyrhynchos*), mute swan (*Cygnus olor*), water rail and herring gull (*Larus argentatus*). In December 2022 small numbers of gulls were noted with a single golden plover (*Pluvialis apricaria*) fly through. A flock of 200 starlings (*Sturnus vulgaris*) was noted at low tide in January, along with low numbers of herring and common gull (*Larus canus*) and at high tide in this month, higher number of herring gull, common gull and black-headed gull were seen. In February at low and high tide low numbers of herring gull were noted, along with a single common gull at high tide. In March low numbers of herring gull, graylag geese and mute swan were noted.
- The survey area at the crossing of the River Blyth is roughly equidistant between the Southwold and the Walberswick Landfall Site option corridors and comprises grazing pasture and marshes, pools and flashes either side of the river up to the Blyth

Estuary. This location is within the boundary of the proposed HVDC Underground Cable Corridor relevant to the proposed Southwold Landfall Site. This location, compared to other survey sites, was noted as having the most bird interest. Species noted in November and December 2022 included good numbers of greylag goose and small flocks of teal and waders, including curlew, dunlin (*Calidris alpina*) and redshank along the river, particularly at low tide. Most waders were noted on the estuary however small numbers of golden plover, curlew, redshank, snipe (*Gallinago gallinago*) and black-tailed godwit (*Limosa limosa*) were noted in pasture to the north and south. Similar results were noted in subsequent months with large numbers of barnacle goose (*Branta leucopsis*) (600) in January 2023 (having departed by February), greylag and Canada goose (*Branta canadensis*) and small numbers of white-fronted goose in addition to curlew, snipe, rook (*Corvus frugilegus*), lapwing, dunlin, marsh harrier, mute swan, grey heron (*Ardea cinerea*) and high numbers (113) wigeon also noted in February 2023 and some degree of difference noted in species in the north as compared to the south. By March 2023 good numbers of waders and wildfowl were noted, with the majority of feral geese having departed.

- The survey area at the proposed Walberswick Landfall Site comprised an arable field bordered by Walberswick to the north and hedgerows to the south and east with limited bird interest noted on the first visit in early December 2022, with a small flock of starling and low numbers of linnet (*Carduelis cannabina*). The visit in mid-December 2022 noted again small numbers of starling and linnet in addition to small numbers of redshank and house sparrow (*Passer domesticus*). In January a single lapwing was noted along with two marsh harriers flying through at high tide with higher numbers (64) teal and smaller numbers of dunlin, black-tailed godwit, redshank and various gull species. In February 2023 at low tide low numbers of black-headed gull, herring gull and snipe were noted on the site and black-headed gull and oystercatcher at high tide, with small numbers of gulls, redshank and teal in tidal creeks to the north noted at both low and high tide. In March 2023 no birds were noted on site with just small numbers of gulls and waders offsite in the tidal creeks to the north and the beach.
- The survey area located at the crossing of the Minsmere-Walberswick Ramsar site and SPA at Sallow Walk Covert falls within the Onshore Scoping Boundary relevant to the proposed Walberswick Landfall Site. It comprises an area of common land, arable land (with farm reservoir), pasture and mixed plantation woodland. This location is within the boundary of the proposed HVDC Underground Cable Corridor relevant to the proposed Walberswick Landfall Site. In November 2022 curlew and lapwing were noted on the arable land in the east with black-headed gull and a flock of starling (150) noted on pasture to the south. Elsewhere on the site low numbers of common species were noted including bullfinch (*Pyrrhula pyrrhula*), marsh tit and goldcrest (*Regulus regulus*). In December curlew were noted in a field to the west of the reservoir with a large number of loafing gulls. In the field to the east lapwing, woodlark, linnet and a flock of starling were noted. In January 2023 good numbers of lapwing and a single black-headed gull were noted in a field to the south of the reservoir and good numbers of black-headed gulls low numbers of gadwall and lapwing in fields to the west with similar species in the horse paddocks. In February 2023 good numbers of lapwing, two woodlark and gull species were noted in the fields with small numbers of lapwing and eight greylag goose flying over south in March 2023.
- The survey area located at the crossing of Minsmere River at Darsham Marshes is within the Onshore Scoping Boundary common to both Landfall Site options and includes a lake and pools to the east, and horse paddocks to the south. This location

is within the boundary of the proposed HVDC Underground Cable Corridor relevant to both proposed Landfall Sites. In November 2022 the survey noted cormorant (*Phalacrocorax carbo*), little egret, mallard and gadwall (300 combined) within the lake with very low numbers noted elsewhere in the survey area. In December 2022 small flocks of fieldfare (*Turdus pilaris*), golden plover and a single snipe were noted in the horse paddocks and in January 2023 teal, mallard and gadwall were noted in one of the eastern pools. In February 2023 again small numbers of teal, mallard and moorhen (*Gallinula chloropus*) were noted in the eastern pool and on drains in addition to three gadwall flying through and small numbers of gull species foraging in the horse paddocks. Small numbers of mallard and teal were noted in March 2023.

- The survey area located at the crossing of Minsmere River at Reckford is within the Onshore Scoping Boundary common to both Landfall Site options. It comprises habitats dominated by rough grazing marsh, carr woodlands and some mixed agriculture. This location is within the boundary of the proposed HVDC Underground Cable Corridor relevant to both proposed Landfall Sites. In early December the only bird species of note were a single teal and kingfisher with otherwise very low numbers of common species. In mid-December 2022 low numbers of gadwall, teal and kingfisher were noted on the river, with a single kingfisher and grey heron on the river in January 2023 and a flock of siskin in the trees. In February 2023 two kingfisher and two mute swan were noted on the river and in March 2023 two mallard in addition to two marsh harrier flying south.
- The survey area at the proposed Converter Station Site (site 3) comprises an arable field with limited bird interest. In November 2022 a flock (40) of golden plover were noted within the site, with higher numbers (1,000+) in an offsite field to the north west. Also noted on site were skylark (20), lapwing (30) and black-headed gull (20) with greater numbers of lapwing, black-headed gull and common gull noted offsite. In December 2022 a flock of golden plover (15) were noted along with low numbers of skylark. In January 2023 only a single common gull was noted and in February and March 2023 no bird interest was noted.
- The survey area located at Buss Creek to Reydon Marshes lies between the Southwold and Walberswick corridors and is likely to be supporting habitat for Minsmere-Walberswick SPA. Noted to be very limited to the east in relation to bird interest and low numbers of wildfowl and waders along Buss Creek with flashes holding good numbers of wildfowl and gulls including up to 200 widgeon during the initial survey and dropping in subsequent months.

8.3.58 Further surveys will be undertaken in winter 2023/24 with methods largely following those described for winter 2022/23. These surveys will focus upon the refined boundary for the Preferred Option with survey methods to be agreed in consultation with Natural England through the DAS process.

8.3.59 In line with the Bird Survey Guidelines[49], nocturnal surveys will be used in addition to provide greater contextual information on the use of areas by key wintering assemblages. The locations, timings, effort and length of nocturnal visits will largely be dictated by the results the results of the winter 2022/23 survey effort, desk study and stakeholder engagement. However, it is considered likely that nocturnal survey effort will be focussed on arable land where inland wintering waders have been recorded and key wetland locations as appropriate.

[49] Bird Survey Guidelines. *Nocturnal Bird Surveys.* Available at: Nocturnal bird surveys | Bird Survey Guidelines (Accessed: 23/01/2024).

Badgers

8.3.60 SBIS have provided numerous records of badger (*Meles meles*) including active setts. Given the known distribution of badger, the habitat requirement of the species and the land use, badger territories are likely to be ubiquitous throughout the study area.

8.3.61 During the PEA surveys, badger setts and other field signs will be recorded and spatially logged where encountered. The location of badger setts will be used to guide refinement of the route corridor with particular emphasis on the avoidance of any main badger sett wherever possible. Dedicated badger survey will be undertaken following during the autumn 2023 and winter 2023/24 to maximise visibility of field signs[50] and coincide with a peak territory marking period[51]. Surveys will focus on potentially impacted habitats within the proposed Onshore Scheme Boundary where PEA surveys have recorded badger setts, or habitats with potential to conceal main badger setts e.g., areas of dense scrub or woodland. Surveys will be extended to potentially sett-concealing habitats within a 30m buffer from the proposed Onshore Scheme Boundary where appropriate.

Otter

8.3.62 The proposed Onshore Scheme, considered within this Chapter, and the proposed Offshore Scheme could potentially result in effects upon the same otter receptor. All survey data gathered for the assessment of the proposed Onshore Scheme will also be available to inform the assessment of the impacts of the proposed Offshore Scheme upon otter. The impacts of these elements of the proposed Scheme will be considered within their respective chapters, and the potential for combined effects of the proposed Onshore and Offshore Scheme will be assessed as described in **Chapter 29** Cumulative and Combined Effects of the Project (Onshore and Offshore).

8.3.63 Otter is widespread within Suffolk, inhabiting the county's rivers, lakes, and occasionally estuaries and coast[52]. Suitable habitats within and surrounding the study area include reedbeds, fens, and woodland.

8.3.64 SBIS have not provided any records of otter from within the Onshore Scoping Boundary.

8.3.65 The closest granted EPS licences for otter from within the study area are located on the River Alde near Snape approximately 300m southwest of the Onshore Scoping Boundary and on the River Waveney near Beccles, over 10km north, both for destruction of a resting place.

8.3.66 Otter is a qualifying feature of the Broads SAC and Broadland Ramsar site, located 9.59km from the Onshore Scoping Boundary.

8.3.67 It is assumed that otter will use the majority of watercourses and lakes within the Onshore Scoping Boundary. During the PEA surveys, otter field signs and potential breeding sites and resting places will be recorded and spatially logged where encountered. Water samples to be tested for environmental DNA (eDNA) of a range of species, including otter, will be collected for the watercourses present during the

[50] The Mammal Society (1989). *Surveying badgers*. Available at: Surveying_Badgers_Mammal_Society.compressed.pdf (Accessed: 23/01/2024).

[51] Delahay, RJ., Brown, JA., Mallinson, PJ., Spyvee, PD., Handoll, D., Rogers, LM. & Cheeseman, CL. (2001). *The use of marked bait in studies of the territorial organization of the European Badger* (*Meles meles*). *Mammal Review,* 30(2), pp.73-87.

[52] Suffolk Wildlife Trust. (n.d.). European Otter. Available at: European otter | Suffolk Wildlife Trust. (Accessed: 23/01/2024).

summer of 2023 as described in **Section 8.3.102**. Targeted field survey of potential otter breeding sites and resting places within habitat that is likely to be impacted, will take place in the autumn and early winter months (approximately October to December 2023). Subsequent monitoring surveys to establish use of any identified potential breeding sites and resting places will take place during the late winter months (December 2023 to March 2024) and spring/early summer (April to June 2024).

Water vole

8.3.68 Water vole *(Arvicola amphibius)* are known to be present throughout Suffolk, with a wide range of habitats, including grazing marshes, fens, and reedbeds offering potential to support the species[53]. Surveys undertaken from 2003 to 2007 in every river catchment in the county indicated a steep decline in the species, thought due to habitat loss and predation by American mink (*Neovision vision).*

8.3.69 SBIS have provided numerous records of water vole including from within the study area including at SWT reserves at Darsham and Westleton and also in Leiston and Southwold.

8.3.70 Surveys undertaken within the EDF Energy estate in 2020 identified low populations of water vole in Leiston and Sizewell drains[54].

8.3.71 During the PEA surveys, where ordinary watercourses, reedbeds and drains are present within a land parcel, a suitability assessment for water vole will be undertaken. Water samples to be tested for eDNA of a range of species, including water vole, will be collected for the watercourses present during the summer of 2023 as described in **Section 8.3.102**. Targeted water vole surveys will take place in April-June 2024 of watercourses that are reasonably likely to support water vole and remain at risk of impacts from the proposed Onshore Scheme. A second later season assessment (July–September) will be undertaken in 2024 where necessary.

Hazel dormouse

8.3.72 Hazel dormouse *(Muscardinus avellanarius)* is present within Suffolk, both as native and reintroduced populations, but limited in distribution to a small number of woodlands, almost exclusively to the south of the county, over 30km from the proposed Onshore Scheme. SWT in 2020 reported that populations are now declining at most sites in Suffolk[55].

8.3.73 SBIS have provided a single record of hazel dormouse within the study area at Saxmundham, from 2017. This record was of a hazel dormouse nest in a tube, recorded by a Peoples Trust for Endangered Species (PTES) volunteer and verified by PTES. As a result of this record, the Sizewell C development undertook a dormouse survey of suitable habitat near Farnham in 2021, which returned no evidence of dormice[56].

8.3.74 The wider landscape within and surrounding the study area generally offers limited suitability to support dormice, given the large amount of land dedicated to agriculture, in

[53] Suffolk Wildlife Trust. (n.d.). Water vole. Available at: Water vole | Suffolk Wildlife Trust. (Accessed: 23/01/2024).

[54] NNB. (2020). The Sizewell C Project. Additional Ecology Baseline Survey Reports. Part 1 of 2.

[55] Looser, A. (2020). Dormouse Monitoring in Suffolk. Available at: Dormouse Monitoring in Suffolk | Suffolk Wildlife Trust. (Accessed: 23/01/2024).

[56] NBB. (2021). The Sizewell C Proposed Scheme: Additional Ecology Survey Reports (September 2021) Part 2 of 2.

addition to large areas of mudflat, saltmarsh, and heathland habitat. Where areas of scrub and ancient woodland are present, they are limited in extent and connectivity.

8.3.75 Given the scarcity of records for the wider landscape and limited suitability of habitats within the study area to support dormice, the presence of this species was considered unlikely. As a precaution, a targeted sampling approach to dormouse survey was utilised in 2023, focussing on establishing presence/ absence of dormouse populations in the most suitable habitats. Six survey sites were selected for 2023 surveys. Surveys comprised dormouse presence/ absence surveys using footprint tunnels for a duration of three months within July-October 2023, following SWT guidance[57].

8.3.76 The 2023 presence/absence across the six survey sites confirmed the absence of dormouse within a sample of the habitats with the greatest potential suitability for this species. It is considered that this survey information, in combination with the desk study findings, are sufficient to conclude that dormouse populations are absent from the study area and are unlikely to colonise prior to construction of the proposed Onshore Scheme. No further surveys for dormouse are therefore planned.

Amphibians

8.3.77 The SARG Provisional Atlas[58] was reviewed to determine historical distribution of amphibians within the county. Notable amphibians listed within the east region of the county since 1989 are as follows:

- Great crested newt;
- Common toad (*Bufo bufo*); and
- Natterjack toad.

8.3.78 Natterjack toads were reintroduced to a pond 50m from the Sizewell C development site boundary in 2005, and this population has successfully bred and persists[59].

8.3.79 SBIS have provided records of great crested newt, common toad and natterjack toad in addition to common species smooth newt (*Lissotriton vulgaris*) and common frog (*Rana temporaria*) from within the study area.

8.3.80 The closest granted EPS licences from within the study area originate from Clay Common approximately 550m north of the Onshore Scoping Boundary and from near Earth Holes Wood north of Darsham and approximately 700m west.

8.3.81 Great crested newt is noted in the citation for Minsmere to Walberswick Heaths & Marshes SAC, partially located within the Onshore Scoping Boundary and is a qualifying feature of Dew Ponds SAC, located 3.48km from the Onshore Scoping Boundary.

8.3.82 Natterjack toad is very rare, and colonies are only considered to occur in a few locations at Minsmere and Sizewell within warm shallow pools on sand dunes and sandy heaths. These habitats are not considered to occur within the Onshore Scoping Boundary.

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[57] Suffolk Wildlife Trust (2019) *Guidance for using Hazel Dormouse Footprint Tunnels.* Available at: Footprint Tunnel Guidance 1.pub (ptes.org) (Accessed: 23/01/2024).

[58] Sandford, M. & Baker, J. (2007). Suffolk Amphibian and Reptile Atlas Provisional (2007). Available at: Microsoft Word - Prov Herps Atlas.doc (arguk.org). (Accessed: 23/01/2024).

[59] NNB. (2021). The Sizewell C Project: Terrestrial Ecology Monitoring and Mitigation Plan – Clean Version.

8.3.83 Common toad is a priority species and waterbodies suitable for common toad breeding will be avoided. Any impacts to common toad through loss of terrestrial habitat are likely to be temporary and not significant. No dedicated surveys for common toad are therefore considered to be required to inform the PEI Report.

8.3.84 District level licensing (DLL) is an alternative type of strategic mitigation for great crested newt designed by Natural England to improve conservation outcomes. A DLL scheme for great crested newt is in place for Norfolk and Suffolk[60]. The proposed Scheme will join Natural England's DLL scheme to comply with the legal duty to protect great crested newt. A payment would be made for off-site compensation ponds instead of carrying out detailed surveys and applying for a mitigation licence. The approach to DLL will be agreed in principle with Natural England in spring 2024, in case the survey window for great crested newt (March-June) is needed for contingency should a satisfactory approach to DLL not be agreed.

Reptiles

8.3.85 The reptile species listed within SARG Provisional Atlas[61] for the east region of the county since 1989 are common lizard (*Zootoca vivipara*), slow-worm (*Anguis fragilis*), grass snake (*Natrix helvetica*) and adder.

8.3.86 SBIS have provided records of common lizard, slow-worm, grass snake and adder from within the study area. The study area and broader east Suffolk landscape falls outside of the known distributions of both sand lizard (*Lacerta agilis*)[62] and smooth snake (*Coronella austriaca*)[63], therefore these species are not considered further.

8.3.87 During the PEA surveys, suitable habitat for reptiles, incidental sightings of reptiles and potential hibernacula will be recorded and spatially mapped. The assumed presence of reptile populations associated with these habitat parcels will guide avoidance of these areas where possible. Targeted reptile surveys will take place in April-June 2024 of habitat with potential to support reptile populations that remains at risk of impacts from the proposed Onshore Scheme at this stage. The exception would be where the only reptile habitat to be impacted was a narrow corridor of field boundary habitat, connected to more extensive suitable habitat off-site. In this scenario an ecologist would assess whether mitigation in the form of habitat manipulation using phased and directional vegetation reduction to displace reptiles to adjacent retained habitat would be appropriate. Where this mitigation measure was suitable, the presence of reptiles would be assumed without the requirement for detailed survey.

Terrestrial invertebrates

8.3.88 Several rare and notable invertebrates are known to be present within the east Suffolk region. Suffolk Priority Species, listed in the LBAP, including the Brown-banded Carder Bee (*Bombus humilis*), Fen Mason-wasp (*Odynerus simillimus*), and the Poplar Leaf-

[60] How to join the great crested newt district level licensing scheme - GOV.UK (www.gov.uk) (Accessed: 23/01/2024).

[61] Sandford, M. & Baker, J. (2007). Suffolk Amphibian and Reptile Atlas Provisional (2007). Available at: Microsoft Word - Prov Herps Atlas.doc (arguk.org). (Accessed: 23/01/2024).

[62] Amphibian and Reptile Conservation Trust. *Sand Lizard.* Available at: Sand lizard | Amphibian and Reptile Conservation (arc-trust.org)(Accessed: 23/01/2024).

[63] Amphibian and Reptile Conservation Trust. *Smooth snake.* Available at: Smooth snake | Amphibian and Reptile Conservation (arc-trust.org) (Accessed: 23/01/2024).

rolling Weevil (*Byctiscus populi*). In addition, the nationally scarce hairy dragonfly (*Brachytron pratense*) is noted within the Leiston-Aldeburgh SSSI citation.

8.3.89 SBIS have provided numerous records of protected invertebrate species, notably silver-studded blue (*Plebejus argus*), Norfolk hawker (*Anaciaeschna isoceles*), large gorse mining bee (*Andrena bimaculata*) and narrow-mouthed whorl snail (*Vertigo angustior).*

8.3.90 Habitat requirements of different species of terrestrial invertebrates vary widely. Species of conservation concern are likely to be primarily associated with semi-natural habitats (largely represented as priority habitats) present throughout the Onshore Scoping Boundary.

8.3.91 During the PEA surveys, suitable habitat features for notable invertebrate assemblages will be recorded and mapped, such as habitats with high botanical and structural diversity, banks and slopes with bare or sparsely vegetated soil in sunny locations, and habitats with large volumes of standing and fallen deadwood.

8.3.92 Following the PEA surveys, a review of desk study records and habitat mapping will be undertaken by an experienced entomologist. This information will be utilised to determine habitat parcels likely to support notable invertebrate assemblages to guide avoidance of these areas where possible. Dedicated invertebrate surveys will be undertaken of suitable habitat within the Onshore Scoping Boundary that is likely to support notable assemblages, and which is at risk of impacts from the proposed Onshore Scheme.

Aquatic receptors

8.3.93 The proposed Onshore Scheme, considered within this chapter, and the proposed Offshore Scheme could potentially result in effects upon the same aquatic receptor (fish). All survey data gathered for the assessment of the proposed Onshore Scheme will also be available to inform the assessment of the impacts of the proposed Offshore Scheme upon fish. The impacts of these elements of the proposed Scheme will be considered within their respective chapters, and the potential for combined effects of the proposed Onshore and Offshore Scheme will be assessed as described in **Chapter 29** Cumulative and Combined Effects of the Project (Onshore and Offshore).

8.3.94 Several species of fish are included on Suffolk's Priority Species list[64], including the Annex II[65] species allis shad (*Alosa alosa*), twaite shad (*Alosa fallax*), river lamprey (*Lampetra fluviatilis*), sea lamprey (*Petromyzon marinus*) and spined loach (*Cobitis taenia*) in addition to European eel, ling (*Molva molva*), smelt (*Osmerus eperlanus*), sole (*Solea solea*), and whiting (*Merlanguis merlanus*).

8.3.95 SBIS have provided records of European eel, brook lamprey (*Lampetra planeri*), spined loach, ling, sea lamprey, smelt, sole, whiting and grayling.

8.3.96 The Sizewell C Monitoring and Mitigation Plan confirms the presence of European eel and bullhead (*Cottus gobio*) in the north-east area of Sizewell Marshes SSSI (directly adjacent to the provisional corridor to the south[66].

[64] SBIS. (n.d.). *Suffolk's Priority Species.* Available at: Suffolk's Priority Species | Suffolk Biodiversity Information Service (suffolkbis.org.uk) and Suffolk's Priority Species | Suffolk Biodiversity Information Service (suffolkbis.org.uk) (Accessed: 23/01/2024).

[65] Council Directive 92/43/EEC (*EC Habitats and Species Directive* 1992).

[66] NNB. (2021). The Sizewell C Project: Terrestrial Ecology Monitoring and Mitigation Plan – Clean Version.

8.3.97 Several rare or notable aquatic invertebrate species are supported by the variety of habitats present throughout and connected to the Onshore Scoping Boundary. Sizewell Marshes SSSI is considered of exceptional interest for invertebrate fauna[67], and surveys undertaken as part of the Sizewell C proposed Onshore Scheme identified the Nationally Endangered Norfolk Hawker Dragonfly *(Anaciaeschna isoceles)* to be breeding on the marshes[68]. Alde-Ore Estuary, which lies just south of the Onshore Scoping Boundary, contains lagoons notable for several brackish water species, including starlet sea anemone (*Nematostella vectensis*), for which further records were returned from the Onshore Scoping Boundary from the SBIS data search.

8.3.98 White clawed crayfish (*Austropotamobius pallipes*) were largely wiped out from watercourses and waterbodies in Suffolk by the late 1900s due to competition with signal (*Pacifastacus leniusculus*) and Turkish crayfish (*Pontastacus leptodactylus*), crayfish plague (*Aphanomyces astaci*), and changes in river management and quality. However, populations have since been reintroduced to selected sites within the county[69].

8.3.99 No records of white-clawed crayfish were returned by SBIS, and they are considered unlikely to occur within watercourses falling within the study area. However, given the known historic distribution of the species within the county, their presence cannot be fully discounted.

8.3.100 The SBIS data search returned numerous records of aquatic macrophyte species of conservation concern from the study area and wider landscape, notably greater water parsnip (*Sium latifolium*), tubular water-dropwort (*Oenathe fistulosa*) and grass-wrack pondweed (*Potamogeton compressus).*

8.3.101 A scoping exercise for aquatic receptors will be undertaken throughout summer 2023 (June-September), covering all watercourses falling within the Onshore Scoping Boundary. This will also include a sampling approach of substantial field drains (over 1m width and holding water for the majority of the year, largely associated with the watercourse networks), identified by the UKHab surveys.

8.3.102 The scoping exercise will comprise of eDNA sampling, conducted concurrently with the modular river physical (MoRPh) surveys, undertaken from June – September 2023. Sampling will cover fish, aquatic invertebrates (including white-clawed crayfish, and freshwater bivalves) as well as mammals and birds. eDNA will also provide information on any faunal invasive species present within watercourses, particularly zebra mussels (*Dreissena polymorpha*) and signal crayfish. Assessment during the summer months will ensure that detectability using eDNA will be at a peak for a range of faunal species, including crayfish, bivalve and fish species[70].

8.3.103 The combined results of eDNA sampling, the river condition assessment (RCA) and a desk-based review of data obtained from SBIS and the Environment Agency Ecology &

[67] Natural England. (1992). Sizewell Marshes SSSI Citation. Available at: https://designatedsites.naturalengland.org.uk/PDFsForWeb/Citation/1003416.pdf. (Accessed: 23/01/2024).

[68] Natural England (2014). *NCA Profile: 83 South Norfolk and High Suffolk Claylands (NE544).* Available at: NCA Profile: 83 South Norfolk and High Suffolk Claylands - NE544 (naturalengland.org.uk) (Accessed: 23/01/2024).

[69] Suffolk Biodiversity Information Service (2015) *White-clawed Crayfish Conservation Strategy Essex, Norfolk and Suffolk.* Available at White Clawed Crayfish Strategy Summary Feb 2015.pdf (suffolkbis.org.uk) (Accessed: 23/01/2024).

[70] Surescreen Scientifics. Available at: eDNA Analysis - SureScreen Scientifics (Accessed: 23/01/2024).

Fish Data Explorer[71] will inform the design of the proposed Onshore Scheme. Where watercourses support valuable ecological receptors, the use of trenchless techniques will be recommended.

8.3.104 If impacts to watercourses supporting valuable ecological receptors cannot be avoided through routeing or trenchless methods, then results of the RCA and eDNA surveys will be reviewed by an aquatic ecologist to assess whether these surveys provide sufficient baseline information to inform a precautionary mitigation approach. Further aquatic habitat assessment surveys and subsequent detailed surveys for specific aquatic receptors would only be undertaken where gathering the additional data would facilitate a better outcome for the receptor in question. Such surveys would be undertaken between March–September 2024.

Invasive non-native species

8.3.105 Invasive non-native species (INNS) in the UK are those species listed on Schedule 9 of the Wildlife and Countryside Act 1981 (as amended)[72], or Schedule 2 of the Invasive Alien Species (Enforcement and Permitting) Order 2019[73].

8.3.106 SBIS have provided records of a wide range of INNS species distributed through the study area including both terrestrial and aquatic species of both flora and fauna.

8.3.107 The PEA surveys will be undertaken by survey teams competent in botanical identification during the optimal flowering and active periods for the majority of INNS. Mapping of stands of observed terrestrial INNS will be undertaken as part of the PEA surveys. Details on the species and extent of stands of INNS will be utilised to guide appropriate avoidance and mitigation. Whilst the presence of aquatic INNS is likely to be more difficult to determine, detail regarding the presence of aquatic species in watercourses will be gathered through eDNA collection methods and through the results of RCA surveys and review of desk study records. No specific surveys for INNS are proposed prior to the application for development consent.

Other section 41 species

8.3.108 SBIS have provided records of hedgehog (*Erinaceus europaeus*), brown hare (*Lepus europaeus*), polecat (*Pustela putorius*), harvest mouse (*Micromys minutus*), water shrew (*Neomys fodiens*) and the habitats present are likely to include those suitable for these Species of Principal Importance (SoPI). No surveys for species other than those identified in the specific sections above are proposed prior to the application for development consent. The potential for S41 species to be present will be assessed during the PEA surveys and precautionary avoidance and mitigation measures will be implemented to minimise impacts upon these species.

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[71] Environment Agency. *Ecology & Fish Data Explorer.* Available at: EA Ecology & Fish Data Explorer (Accessed: 23/01/2024).

[72] *Wildlife and Countryside Act 1981 (as amended).* Available at: Wildlife and Countryside Act 1981 (legislation.gov.uk) (Accessed: 23/01/2024).

[73] Department of Environment, Food and Rural Affairs (2019) *The Invasive Alien Species (Enforcement and Permitting) Order 2019*. Available: The Invasive Alien Species (Enforcement and Permitting) Order 2019 (legislation.gov.uk). (Accessed: 23/01/2024).

Future baseline

8.3.109 The Ecology and Biodiversity chapter within the PEI Report and ES will consider changes which may affect the future ecological environment in the absence of the proposed Onshore Scheme. The future baseline will also take into account any developments that are likely to be present in the future baseline.

8.3.110 It is expected that the current land use would remain relatively consistent and that it would continue to be managed in a similar way, with the value of ecological features present not expected to change significantly by the end of the construction period. Any short-term effects from climate change would be unlikely to significantly alter the land use, and therefore the habitats, prior to construction of the proposed Onshore Scheme. Longer term impacts from climate change could alter the species composition and types of habitats in and around the site, and therefore types and diversity of fauna. Habitats that will be created as part of mitigation proposals would take consideration of climate change scenarios.

8.4 Potential sources and impacts

8.4.1 This section identifies the potential impacts that could occur as a result of the proposed Onshore Scheme during the construction and operational phases.

Construction

8.4.2 The following impacts could occur during the construction phase, with sources including (but not limited to) construction of the proposed Converter Station, laying of proposed Underground Cable Corridors, construction of any temporary works areas such as construction compounds, laydown areas, haul roads and the launch/reception pits for trenchless techniques, presence of construction traffic; and pollution originating from construction works:

- Permanent or temporary loss of terrestrial, aquatic or intertidal habitats; including designated sites and priority habitats; and habitats likely to support protected and notable species;
- Habitat degradation through changes in air quality from dust deposition and/or emissions from construction activities, including potential impacts to designated sites and priority habitats;
- Habitat degradation through changes in water quality or quantity, or pollution incidents to land/soils from construction activities, including potential impacts to designated sites and priority habitats;
- Loss of connectivity through habitat fragmentation or severance of linear features such as hedgerows, lines of trees, woodland edge or riparian corridors;
- Direct mortality of protected or notable species through construction activities; and
- Disturbance of protected or notable species through construction related noise/vibration, visual stimuli or light spill; and
- Creation or restoration of terrestrial, aquatic or intertidal habitats; including designated sites and priority habitats; and habitats likely to support protected and notable species.

Operation

8.4.3 The following impacts could occur during the operational phase, with sources including maintenance of the proposed Converter Station and proposed Underground Cable Corridors and vehicle/plant movements during maintenance works:

- Direct mortality of protected or notable species through maintenance activities; and
- disturbance to protected or notable species could arise through operation or maintenance related noise/vibration, visual stimuli or light spill.

8.5 Design and control measures

8.5.1 As outlined in **Chapter 5** EIA Approach and Method, a standard hierarchical approach will be taken to mitigation.

8.5.2 The assessment of effects will take into account measures that are embedded into the proposed Onshore Scheme design, together with general good practice measures.

Design measures

8.5.3 Measures embedded within the design to avoid or reduce potential impacts will include the use of trenchless techniques and/or routing of cable (with associated construction corridor) to avoid loss/ damage of:

- Main watercourses (as defined by the Environment Agency[74]) including a minimum 10m buffer;
- The majority of ponds (permanent or seasonal standing water bodies fed by rainwater or groundwater) including a minimum 5m buffer;
- Ancient woodland including a minimum 15m buffer (50m wherever possible); and
- Ancient or veteran trees including avoidance of the Root Protection Area (RPA) (determined based on individual tree diameter).

8.5.4 Due to the presence of a sea wall at the Southwold Landfall and cliffs at the Walberswick Landfall, the proposed Scheme will be required to use a trenchless technique to avoid these features. The trenchless technique will exit seaward of the low water mark and will therefore avoid disturbance of the intertidal area. Further information on trenchless techniques are provided in **Chapter 2** proposed Scheme Description.

Control measures

8.5.5 A summary of the key measures relevant to the control and management of impacts that could affect Ecology and Biodiversity are identified below:

- Permanent lighting at the proposed Converter Station would be restricted to use during an emergency (intruder or unplanned maintenance work);
- Best practice measures to manage dust, air pollution and exhaust emission would be implemented during construction, including appropriate dust suppression;

[74] Environment Agency (2019) *Main river map*. Available at: Statutory Main River Map (arcgis.com) (Accessed: 23/01/2024).

- Standard pollution prevention measures during construction and operation would include avoidance of pollution of the general water environment;
- Best practice biosecurity measures and measures would be implemented to control and prevent the spread of INNS during construction within terrestrial and aquatic environments;
- Best practice measures would be implemented to control construction noise, vibration and light pollution; and
- Sensitive timings of removal of vegetation that could support bird nesting to ensure that bird nests are not damaged or destroyed.

8.6 Scope of the assessment

8.6.1 This section identifies the potential for the proposed Onshore Scheme to give rise to likely significant effects, taking into account the design and control measures identified in **Section 8.5**.

8.6.2 **Table 8-8** sets out the receptors identified within the study area, the potential impacts as a result of construction and/or operation activities associated with the proposed Onshore Scheme, whether these impacts are likely to give to rise to significant effects, and whether the receptor is scoped in or scoped out of the assessment.

8.6.3 The proposed Friston Substation, as described in **Chapter 2** proposed Scheme Description outlines the optionality that remains at Friston Substation. The scope of this EIA Scoping Chapter has been based on the worst case scenario that the proposed Onshore Scheme would construct Friston Substation.

8.6.4 All identified impacts are of relevance to both the Southwold and Walberswick options unless specified otherwise.

8.6.5 A precautionary approach has been taken and where there is no strong evidence base, insufficient baseline or the significance is uncertain at this stage the impact has been scoped into the EIA. Where there is a clear evidence base that the effect from the impact will not be significant, either alone or in combination with other plans and projects, the impact has been scoped out of the EIA.

8.6.6 The potential for likely significant effects upon internationally important sites will be assessed separately within the HRA, following the details within an Evidence Plan to be agreed with Natural England.

Table 8-8 Proposed scope of the assessment

Proposed Onshore Scheme phase	Receptor	Impact	Potential for significant effect	Proposed to be scoped in/ out
Construction	Internationally important sites Nationally important sites Non-statutory sites Notable/priority habitats Protected or notable species	Permanent or temporary loss of terrestrial, aquatic or intertidal habitats	Design of the route would seek to avoid direct impacts upon designated sites and notable/priority habitats and trenchless techniques and/or routing of cable (with associated construction corridor) would be used (see **Section 8.5** above). These measures would avoid potential significant effects upon main watercourses, ponds, ancient/veteran trees and intertidal habitats. The risk of impacts of habitat loss upon other notable/priority habitats is identified, which have the potential to result in significant effects to these habitats and to the species they support.	Scoped in
Construction	RSPB sites AWI sites	Permanent or temporary loss of terrestrial, aquatic or intertidal habitats	The Onshore Scoping Boundary does not overlap with any RSPB sites and the potential for significant effects on such sites is not identified. Trenchless techniques and/or routing of cable (with associated construction corridor) would be used (see **Section 8.5** above) to avoid loss of ancient woodland and therefore the potential for significant effects is not identified.	Scoped out
Construction	Internationally important sites Nationally important sites Non-statutory sites RSPB sites AWI sites	Degradation of terrestrial, aquatic or intertidal habitats through changes in air quality	Construction activities have the potential to impact local air quality though emissions and dust deposition and the potential for significant effects upon designated sites and notable/priority habitats through degradation of habitats is identified.	Scoped in

Proposed Onshore Scheme phase	Receptor	Impact	Potential for significant effect	Proposed to be scoped in/ out
	Notable/priority habitats			
Construction	Internationally important sites Nationally important sites Non-statutory sites RSPB sites AWI sites Notable/priority habitats	Degradation of terrestrial, aquatic or intertidal habitats through changes in water quality or quantity	Hydrological connections exist between the proposed Onshore Scheme and a number of designated sites and notable/priority habitats and the potential for significant effects as a result of changes in water quality and/or quantity leading to degradation of habitats is identified. Trenchless techniques and/or routing of the cable (with associated construction corridor) would be used for main watercourse crossings (see **Section 8.5** above). It is anticipated that this would avoid potential significant effects to main watercourses. Until the detail is defined, the potential for significant effects upon designated sites and notable/priority habitats through degradation of habitats is identified.	Scoped in
Construction	Protected or notable species	Fragmentation or severance of habitats	Construction activities including the removal of habitat have the potential to fragment and sever habitats utilised by protected or notable species. This impact has the potential to result in significant effects upon populations and assemblages of protected or otherwise notable species.	Scoped in
Construction	Protected or notable species	Direct mortality	Construction activities including removal of habitat and construction vehicle movements have the potential to cause direct mortality to protected or notable species, which could potentially result in significant effects.	Scoped in
Construction	Protected or notable species	Disturbance	Disturbance of protected or notable species through construction related noise/vibration, visual stimuli or	Scoped in

Proposed Onshore Scheme phase	Receptor	Impact	Potential for significant effect	Proposed to be scoped in/ out
			light spill could occur and the potential for significant effects is identified.	
Operation	Protected or notable species	Direct mortality	Any maintenance works during operation of the proposed Onshore Scheme would be focussed upon infrastructure installed during construction and would be unlikely to require clearance of habitat likely to support protected or notable species. Vegetation management may be required in the form of cutting new hedgerows and trees. Sensitive timing of such works would avoid damage or destruction of bird nests. No potential significant effect upon protected or notable species is identified.	Scoped out
Operation	Protected or notable species	Disturbance	There would be no requirement for permanent lighting within the cable route and only emergency lighting at the proposed Converter Station (see **Section 8.5** above) therefore no potential significant effect from lighting. Noise from operation and unmitigated maintenance works could potentially cause disturbance to protected or notable bird species through noise/vibration or visual stimuli. The potential for significant effects is therefore identified.	Scoped in

8.7 Assessment methodology

Data sources

8.7.1 Statutory designated sites, Priority Habitats and granted EPS Licences will be identified using MAGIC[75] web database and descriptions and conditions of sites will be obtained using the Natural England Designated Sites view[76] and JNCC site descriptions[77].

8.7.2 The known or predicted current and future ecological baseline conditions will be informed by the following data sources:

- SWT website[78];
- SARG website[79];
- The SARG Provisional Atlas[80];
- RSPB reserve descriptions[81];
- OS Maps aerial imagery[82];
- Natural England Ancient Woodland Inventory[83];
- WT ATI for ancient, veteran and notable trees[84];
- The Natural England Priority River Habitats Map[85] – mapped priority river sites in England;
- The EA monitoring data :Ecology and Fish Data Explorer[86] for aquatic ecological features (fish, white-clawed crayfish, macro-invertebrates and macrophytes);

[75] DEFRA. (n.d.) MAGIC. Available at: MAGIC (defra.gov.uk). (Accessed: 23/01/2024).

[76] Natural England. (n.d.). Designated Sites View. Available at: Site Search (naturalengland.org.uk) (Accessed: 23/01/2024).

[77]JNCC. (2023). JNCC - Adviser to Government on Nature Conservation (Accessed: 23/01/2024).

[78] Suffolk Wildlife Trust. Available at: Welcome to Suffolk Wildlife Trust | Suffolk Wildlife Trust (Accessed: 23/01/2024).

[79] Suffolk Amphibian and Reptile Group: Suffolk Amphibian and Reptile Group (Suffolk ARG) (arguk.org) (Accessed: 23/01/2024).

[80] Sandford, M. & Baker, J. (2007). Suffolk Amphibian and Reptile Atlas Provisional (2007). Available at: Microsoft Word - Prov Herps Atlas.doc (arguk.org). (Accessed: 23/01/2024).

[81] RSPB: Visit a nature reserve (rspb.org.uk) (Accessed: 23/01/2024).

[82] OS Maps: Detailed maps & routes to explore across the UK | OS Maps (Accessed: 23/01/2024).

[83] Natural England. Ancient Woodland Inventory (England). Available at: Ancient Woodland (England) (arcgis.com) (Accessed: 23/01/2024)

[84] Woodland Trust Ancient Tree Inventory (England). Available at Ancient Woodland (England) (arcgis.com) (Accessed: 23/01/2024).

[85] Natural England. Priority Rivers Map. Available at: Priority River Habitat - Rivers (England) | Priority River Habitat - Rivers (England) | Natural England Open Data Geoportal (arcgis.com) (Accessed: 23/01/2024).

[86] Environment Agency. *Ecology & Fish Data Explorer.* Available at: EA Ecology & Fish Data Explorer (Accessed: 23/01/2024)

- The Bat Distribution Atlas 1983-2016[87] produced by the SBG; and
- The Suffolk Bird Atlas[88] a part of the national Bird Atlas 2007-2011[89].

8.7.3 In addition, the SBIS provided data records in January 2023 within a 2km buffer of the Onshore Scoping Boundary. The following data has been provided:

- Non-statutory designated sites;
- Protected, locally scarce and rare species;
- Invasive Non-Native Schedule 9 species; and
- Ancient, Veteran and Notable Trees.

8.7.4 Other proposed infrastructure schemes within the study area will be reviewed to provide geographical context to habitats and species likely to be present in the comparative Suffolk coast landscape, including the National Grid Sea Link proposed Scheme EIA Scoping Report[90], Additional Ecology Baseline Survey Reports[91],[92] and the Sizewell C Proposed Scheme Terrestrial Ecology Monitoring and Mitigation Plan[93] .

Expected survey requirements

8.7.5 In March 2023, an Ecology Survey Strategy (ESS) was produced, setting out the proposed approach for ecological survey to inform the baseline for the proposed Onshore Scheme. This ESS will be subject to review following engagement with Natural England through DAS and updated as required, with the aim of documenting an agreed position with Natural England on the approach to ecological surveys. Surveys will be undertaken in 2023/24 to inform the baseline and will be reported in the PEI Report and/or ES. The survey approach for 2023/24 includes land relevant to both Southwold and Walberswick Landfalls and their associated HVDC Underground Cable Corridors. The area to be potentially impacted by the proposed Onshore Scheme will substantially reduce as the design stages are progressed, including as the proposed Landfall and associated HVDC Underground Cable Corridors are refined to one Preferred Option. The spatial scope of subsequent ecological surveys in 2024 will respond to this evolving design, with further survey of ecological features becoming unnecessary where the avoidance of impacts to them can be established. This is likely to include the cessation of ecological surveys that would only be relevant to the non-selected Landfall and HVDC Underground Cable Corridor.

8.7.6 PEA surveys will be undertaken for land within the Onshore Scoping Boundary. The PEA field survey will include:

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[87] Suffolk Bat Group. (2017). Bats in Suffolk. Distribution Atlas 1983-2016. Available at: Bat Atlas 1983_2016 final.pdf (live-twt-d8-suffolk.pantheonsite.io) (Accessed: 23/01/2024).

[88] SBIS. Suffolk Bird Atlas. Available at: Suffolk Bird Atlas | Suffolk Biodiversity Information Service (suffolkbis.org.uk). (Accessed: 23/01/2024).

[89] Balmer, D., Fuller, R., Caffrey, B., Swann, B., Downie, I. & Gillings, S. (2013). *Bird Atlas 2007-11: The distribution of breeding and wintering birds in Britain and Ireland.* 1st Ed, British Trust for Ornithology.

[90] National Grid. (2022). Sea Link: Environmental Impact Assessment Scoping Report.

[91] NNB. (2020). The Sizewell C Project. Additional Ecology Baseline Survey Reports. Part 1 of 2.

[92] NBB. (2021). The Sizewell C Proposed Scheme: Additional Ecology Survey Reports (September 2021) Part 2 of 2.

[93] NNB. (2021). The Sizewell C Project: Terrestrial Ecology Monitoring and Mitigation Plan – Clean Version.

- Mapping of the habitat types present following UKHab methodology[94];
- Scoring the condition of habitat types present in accordance with Defra Metric criteria to inform the BNG assessment;
- An assessment of the possible presence of protected or priority species, and (where relevant) an assessment of the likely importance of habitat features present for such species;
- Mapping of any stands of non-native invasive plant species; and
- Recording of any incidental sightings of priority or protected species, or field signs of such species.

8.7.7 PEA surveys will include confirm the requirements for further surveys to support the Ecology and Biodiversity impact assessment. The surveys are likely to include the following survey types:

- Watercourse condition scoring;
- Phase 2 habitats;
- Ancient, veteran and notable trees;
- Hedgerow;
- Bat;
- Breeding bird;
- Wintering bird;
- Badger;
- Otter;
- Water vole;
- Amphibian;
- Reptile;
- Terrestrial invertebrate; and
- Aquatic receptors.

Legislation, policy and guidance

8.7.8 Legislation and policy relevant to the proposed Scheme and this chapter is outlined in **Chapter 4** Legislation and Policy Overview and **Appendix 4-A** National Policy, **Appendix 4-B** Environmental Legislation and **Appendix 4-C** Local Policy.

8.7.9 Legislative compliance may require obtaining relevant protected species licences prior to implementation.

[94] B. Butcher, P. Carey, R. Edmonds, L. Norton and J. Treweek, (2020) *The UK Habitat Classification User Manual Version 1.1*. Available at: ukhab – UK Habitat Classification (Accessed: 23/01/2024).

8.7.10 Relevant guidance and standards that have informed the scoping process are listed below (but not limited to) and will also be taken into account as part of the assessment (see **8.3.14**):

- Chartered Institute of Ecology and Environmental Management (CIEEM), "Guidelines For Ecological Impact Assessment In The UK And Ireland Terrestrial, Freshwater, Coastal And Marine," 2019.

Assessment method

8.7.11 **Chapter 5** EIA Approach and Method sets out the standard EIA methodology and matrices to be used for the assessment. The methodology is based on the principle that the environmental effects will be determined by identifying potential receptors, assigning receptor value, assessing the magnitude of change on the receptor and then identifying the significance of the effect. This section provides a summary of the EIA methodology specifically relevant to this chapter.

8.7.12 Assessment of cumulative and combined effects are discussed in **Chapter 29** Cumulative and Combined effects of the Project.

8.7.13 The approach used for the ecological impact assessment (EcIA) will be undertaken in accordance with best practice guidance as published in the CIEEM Guidelines[95] and is summarised below:

- Relevant ecological baseline conditions will be determined through a combination of desk study and field survey work, identifying ecological receptors;
- The importance of the of the ecological receptors identified will be valued within a geographic context, as shown **Table 8-9**;
- The potential impacts for each important ecological receptor will be identified including impacts associated with construction, operation and maintenance of the proposed Onshore Scheme;
- The likely effects (beneficial or adverse) on relevant ecological receptors will be assessed, and where possible, quantified;
- Established, good practice, legislative requirements or other incorporated design measures to avoid or minimise impacts will be described;
- Measures to avoid or reduce predicted significant effects, where possible, will be developed iteratively throughout the design stages. If necessary, measures to compensate will be included;
- Any residual effects of the proposed Onshore Scheme will be reported; and
- The scope for ecological enhancement will be considered.

[95] Chartered Institute of Ecology and Environmental Management (CIEEM), "Guidelines For Ecological Impact Assessment In The UK And Ireland Terrestrial, Freshwater, Coastal And Marine," 2019.

Table 8-9 Examples of criteria used to assess the importance of ecological receptors

Geographical level at which the feature is important	Example of criteria
International	An internationally important site: SPA, SAC or Ramsar site; a regularly occurring population of an internationally important species.
National	A nationally designated site, e.g., SSSI, or a site considered worthy of such designation; a large regularly occurring population of a nationally important species.
Regional	An ecological feature identified in the LBAP. A smaller area of LBAP habitat which are essential to maintain the viability of a larger whole; non-statutory designated sites; a regularly occurring, locally significant number of a nationally important species. An ecological feature identified as of priority within Section 41 of the NERC Act 2006.
District	An ecological feature that is scarce within the district or borough or which appreciably enriches the district or borough habitat resource.
Local	A good example of a common or widespread ecological feature in the local area.
Negligible	No or very limited ecological value.

8.7.14 When describing potential impacts (and where relevant the resultant effects) reference will be made to the following characteristics, in accordance with the CIEEM Guidelines[95]:

- Positive or negative – impacts and effects determined according to whether the change is in accordance with nature conservation objectives and policy;
  - Positive – a change that improves the quality of the environment e.g., by increasing species diversity, extending habitat or improving water quality. This may also include halting or slowing an existing decline in the quality of the environment; and
  - Negative - a change which reduces the quality of the environment e.g., destruction of habitat, removal of foraging habitat, habitat fragmentation, pollution.
- Extent - the spatial or geographical area over which the impact/effect may occur under a suitably representative range of conditions;
- Magnitude - refers to size, amount, intensity and volume. It should be quantified if possible and expressed in absolute or relative terms e.g., the amount of habitat lost, percentage change to habitat area, percentage decline in a species population;
- Duration - the time over which an impact is expected to last prior to recovery or replacement of the resource or feature. Consideration has been given to how this duration relates to relevant ecological characteristics such as a species' lifecycle. However, it is not always appropriate to report the duration of impacts in these

terms. The duration of an effect may be longer than the duration of an activity or impact;

- Frequency and timing - the number of times an activity occurs will influence the resulting effect. The timing of an activity or change may result in an impact if it coincides with critical life-stages or seasons e.g., bird nesting season; and
- Reversibility - an irreversible effect is one from which recovery is not possible within a reasonable timescale or there is no reasonable chance of action being taken to reverse it. A reversible effect is one from which spontaneous recovery is possible or which may be counteracted by mitigation.

Assessment significance

8.7.15 According to CIEEM, for the purpose of EcIA, a 'significant effect' is an effect that either supports or undermines biodiversity conservation objectives for 'important ecological features' or for biodiversity in general. Conservation objectives may be specific (e.g. for a designated site), broad (e.g. national/local nature conservation policy), or more wide-ranging (enhancement of biodiversity).

8.7.16 Effects can be considered significant at a wide range of scales from international to local. In broad terms, significant effects encompass impacts on structure and function of defined sites, habitats or ecosystems and the conservation status of habitats and species (including extent, abundance and distribution).

8.7.17 Significant effects will be qualified with reference to an appropriate geographic scale. For example, a significant effect on a SSSI is likely to be of national significance. However, the scale of significance of an effect may not be the same as the geographic context in which the feature is considered important. For example, an effect on a species which is on a national list of species of principal importance for biodiversity may not have a significant effect on its national population.

8.7.18 Significant effects will also be categorised in accordance with **Table 8-10**, to ensure consistency with other topics within the ES. The scale of 'Regional' is often poorly defined and subject to different interpretations and regional effects will therefore be categorised as Major or Moderate, to be determined on a case-by-case basis with appropriate justification.

Table 8-10 Categories of significant residual effects[96]

Geographical scale at which the residual effect is assessed as being significant following the CIEEM EcIA guidelines	Category of significant residual effect
International, National, Regional	Major
Regional, District	Moderate
Local	Minor

[96] Box, J (2017) *An alternative approach to the reporting of categories of significant residual effects in Environmental Impact Assessment.* CIEEM In Practice. Available at: (PDF) An alternative approach to the reporting of categories of significant residual ecological effects in Environmental Impact Assessment (researchgate.net) (Accessed: 23/01/2024).

Supporting assessments

8.7.19 The Ecology and Biodiversity Chapter of the PEI Report and ES will be supported by the following assessments. The scopes of these assessments will be agreed with the relevant stakeholders.

Habitat Regulations Assessment

8.7.20 A HRA, commencing with a Stage 1: Test of Likely Significant Effects and including a Stage 2: Statement to Inform Appropriate Assessment will also be produced in line with Planning Inspectorate Advice Note 10[97]. An Evidence Plan will be produced to document the evidence requirements for the Appropriate Assessment, to be agreed with Natural England under the DAS agreement.

Biodiversity Net Gain

8.7.21 A BNG assessment will be undertaken using the Statutory Biodiversity Metric[98] in accordance with the accompanying guidance and best practice principles. The UKHab classification and habitat condition scoring from PEA surveys, and the results of watercourse condition surveys, will inform the assessment of the BNG baseline within the Metric.

8.8 Assumptions & limitations

8.8.1 This EIA Scoping Report has been collated based on a range of publicly available data and information only. It is assumed that the data collated is accurate. The data will be supplemented with additional data as part of the EIA process.

8.8.2 In the absence of data, a precautionary approach has been taken and professional judgement, based on experience of similar linear schemes, has been used where required to inform the scope of the assessment.

8.8.3 Where possible, nationally recognised standard survey methodologies will be used to reduce limitations for ecological evaluation and impact assessment.

8.8.4 Land access for baseline surveys may be limited, in which case a precautionary approach will be taken to predicting the most likely habitats to be present and any protected/ notable species they support, on the basis of existing desk study data and aerial imagery. Specific limitations for each survey type will be detailed in the relevant baseline report.

[97] Advice Note 10 - Habitats Regulations Assessment relevant to Nationally Significant Infrastructure Projects, Version 9 (2022).

[98] Defra (2023) Statutory biodiversity metric calculation tool. Available at Statutory biodiversity metric tools and guides - GOV.UK (www.gov.uk) (Accessed: 27/02/2024).

Contents

9. Geology & Contamination

9.1 Introduction

9.1.1 This chapter outlines the proposed scope and methodology for Geology and Contamination. It will consider the potential for significant impacts arising from the construction and operation of the LionLink Interconnector (hereafter referred to as 'the proposed Onshore Scheme') in respect of geology and contamination. A review of relevant guidance and policy has been undertaken together with a desk-based assessment, to inform the proposed scope and methodology.

9.1.2 This chapter is supported by the following figures:

- **Figure 1-2**: Proposed Onshore Scheme Scoping Boundary;
- **Figure 1-3**: Proposed Onshore Scheme Scoping Boundary and Scheme Components;
- **Figure 9-1**: Contaminated Land Constraints Map;
- **Figure 9-2**: Superficial Geology Map; and
- **Figure 9-3**: Bedrock Geology Map.

9.1.3 There may be interrelationships with other disciplines. Therefore, this chapter should be read in conjunction with the following chapters:

- **Chapter 7** Agricultural and Soils – which covers the temporary and permanent loss of soil and soil functions;
- **Chapter 10** Health and Wellbeing – which covers disturbance or release of contamination in soil or groundwater as a result of construction activities and the potential to affect health;
- **Chapter 12** Hydrology, Hydrogeology and Drainage – which covers how contamination may impact on water, sources, pathways and receptors;
- **Chapter 17** Material Assets and Waste – which covers how contaminated materials will need to be managed as waste; and
- **Chapter 28** Major Accidents and Disasters – which covers risks associated with UXO, ground instability and pollution incidents.
- **Chapter 18** Marine Physical Environment – which covers the potential changes to coastal morphology and offshore coastal processes such as sediment transport pathways as a result of construction and operation.

9.2 Consultation and engagement

9.2.1 Consideration has been given to responses received at Non-Statutory Consultations held in 2022 and 2023 in preparing this scoping chapter. Responses relating Geology and Contamination have been received from the following:

- East Suffolk Council (ESC)

- Environment Agency (EA);
- Parish and Town Councils: Dunwich Parish Council and Friston Parish Council.

9.2.2 The main themes reported as part of the Non-Statutory Consultations were:

- The consideration of land contamination issues, as a minimum through the provision of a Preliminary Risk Assessment. This requirement is addressed in scoping ref. 9.6.4 which states that the approach will be in line with the EA's LCRM guidance.
- Recommendations that historical landfills are avoided. The consultation response provides details on the historical landfill site Hinton Lodge Pit.
- Recommendations to review the environmental information which has been provided as part of planning consultations within the proposed Scheme Scoping Boundary. This information will be reviewed as part of the Preliminary Environmental Information (PEI) Report and Environmental Statement (ES).
- To ensure groundwater levels are considered in as much detail as other forms of flooding.
- To consider the possible effects of onshore and offshore excavation on coastal erosion and the geological SSSI.

9.2.3 Engagement was undertaken with Suffolk County Council (SCC), and ESC in August 2023 and with the EA in July 2023. The key points of discussion included:

- Baseline data and sources; and
- The assessment of potential impacts and associated control measures.

9.2.4 Further engagement will be undertaken with relevant stakeholders to obtain any information that they hold to supplement the assessment and to seek their views with regards to the evolving design.

9.2.5 The following bodies will be consulted during the EIA process in relation to Geology and Contamination:

- SCC;
- ESC; and
- EA.

9.2.6 In addition to the above, engagement will be undertaken with GeoSuffolk to ensure there are no planned geodiversity sites within the study area, which could form part of the future baseline.

9.3 Baseline conditions

Study area

9.3.1 The study area for Geology and Contamination includes all land within the proposed Onshore Scheme Scoping Boundary (hereafter referred to as 'the Onshore Scoping Boundary') plus a 250m buffer either side, as shown on **Figure 9-1**.

9.3.2 This study area is based upon professional judgement of the location of contamination outside the Onshore Scoping Boundary that has the potential to migrate and affect

receptors within the proposed Onshore Scheme. It is in line with assessments for other major linear infrastructure schemes.

9.3.3 For sensitive groundwater receptors the study area also includes land beyond the Onshore Scoping Boundary within an additional buffer of 500m either side, as shown on **Figure 9-1**. This buffer distance is based upon the characteristics and sensitivity of the receptor, informed by published industry guidance and professional judgement to determine an appropriate Zone of Influence. This is consistent with the study area adopted for the **Chapter 12** Hydrology, Hydrogeology and Drainage assessment.

9.3.4 The increased buffer for groundwater allows for the capture of sensitive groundwater receptors and the assessment of potential impacts on groundwater quality from significant contamination sources, such as large historical landfill sites.

9.3.5 The study area will be reviewed and, as appropriate, refined for the assessment in the PEI Report and ES with only one Landfall and one Cable Corridor being taken forward. The study area will be based on the proposed Order limits in the ES.

Baseline data sources

9.3.6 The baseline described in this chapter has been informed by the following data sources:

Table 9-1 Scoping baseline data sources

Baseline Data	Source
Published geology (1:50,000 scale digital geology map)	British Geological Survey (BGS)[1]
Historical borehole records	BGS[1]
Lexicon of Named Rock Units	BGS[2];
Radon mapping	Public Health England[3]
Historical mapping	National Library of Scotland[4]
Environmental designations	Defra Multi-Agency Geographic Information for the Countryside (MAGIC) website[5];
Geodiverstiy sites, geological Sites of Special Scientific Interest (SSSI)	MAGIC, Suffolk County Council[6]

[1] British Geological Society, GeoIndex Onshore, Date accessed: Feb 2024, weblink: https://mapapps2.bgs.ac.uk/geoindex/home.html?_ga=2.64844399.1578069677.1653300064-786435129.1653300064

[2] UKRI, The BGS Lexicon of Named Rock Units, 2023, (Online) Available at: https://webapps.bgs.ac.uk/lexicon/home.cfm (Accessed Feb 2024)

[3] Public Health England, Radon Mapping, 2020. (Online) Available at: https://www.ukradon.org/information/ukmaps (Accessed Feb 2024)

[4] National Library of Scotland. Historical Ordnance Survey Mapping, 2020. (Online) Available at: https://maps.nls.uk/ (Accessed Feb 2024)

[5] DEFRA. (2023, May). Multi-Agency Geographic Information for the Countryside Interactive Map, Retrieved from https://magic.defra.gov.uk/MagicMap.aspx (Accessed Feb 2024)

[6] Suffolk County GeoSites List https://geosuffolk.co.uk/index.php/geology-and-sites

Baseline Data	Source
Authorised and historic landfill sites	Groundsure Enviro Data Viewer[7];
Information on any sites designated under Part IIA of the Environment Act 1995	ESC[8]
UXO risk mapping	Zetica[9];
Site-specific UXO desk studies	Zetica[10]
Mine workings	Coal Authority Interactive Map Viewer [11].

Baseline

9.3.7 The following sections present the existing baseline established at scoping. There are currently two options being considered for the proposed Landfall Site and associated High Voltage Direct Current (HVDC) Underground Cable Corridor, which are shown in **Figure 1-2** and **Figure 1-3**. Baseline information is presented for the two options below.

Proposed Friston Substation Site

9.3.8 The superficial geology within the proposed Friston Substation Site is of the Lowestoft Formation, comprising Diamicton over the majority of the site and sand and gravel in the southwest. The solid geology is of the Crag Group, which comprises sands, gravels, silts and clays. The sands are characteristically dark green from glauconite but weather bright orange with haematite 'iron pans'. The gravels in the lower part of the group have abundant flint and chalk nodules.

9.3.9 No geological SSSI or County GeoSites have been identified in the study area.

9.3.10 There are numerous small ponds and drainage ditches within the study area. The Crag Group bedrock is classified as a Principal aquifer and the superficial deposits are classed as a Secondary (undifferentiated) aquifer. The proposed Friston Substation Site is located within a Total Catchment (Zone 3) groundwater Source Protection Zone (SPZ).

9.3.11 The only current and historic land use within the proposed Friston Substation Site is farmland. Published mapping indicates less than 1% of homes around the proposed Friston Substation are likely to be at or above the Action Level for radon gas and there are no recorded active or historic landfill sites within, or within 250m of, the proposed Friston Substation.

[7] Groundsure. Enviro Data Viewer, 2023. (Online) Available at: https://groundsure.io/# (Accessed Feb 2024)

[8] East Suffolk Council Public Register of Contaminated Land. Available at: https://www.eastsuffolk.gov.uk/environment/environmental-protection/contaminated-land/

[9] Zetica UXO. Risk maps 2020. (Online) Available at: https://zeticauxo.com/downloads-and-resources/risk-maps/ (Accessed Feb 2024)

[10] Zetica (2023) Pre-Desk Study Assessment reports for Walberswick and Southwold Landfall Sites and Converter Station site. Prepared for BakerHicks, Feb 2024.

11 Coal Authority, 2020, Interactive Map Viewer, (Online) Available at: http://mapapps2.bgs.ac.uk/coalauthority/home.html

9.3.12 The risk of UXO within the proposed Friston Substation Site is low.

Underground HVAC Cable Corridor

9.3.13 The natural superficial geology is comprised of the Lowestoft Formation with Diamicton along a majority of the proposed High Voltage Alternating Current (HVAC) Underground Cable Corridor, and small areas of clay, silt, sand, and gravel in the west of the proposed HVAC Underground Cable Corridor. Solid geology is the same as for the proposed Friston Substation Site. The Lowestoft Formation is designated as a Secondary A aquifer (where mapped as sand and gravel deposits), a Secondary B aquifer (where mapped as clay and silt deposits) and a Secondary (Undifferentiated) aquifer were mapped as Diamicton.

9.3.14 Made ground is anticipated to be present within the proposed HVAC Underground Cable Corridor, associated with previous development. No geologically-designated SSSI or County GeoSites have been identified in the study area.

9.3.15 Current and historic potentially contaminative land uses within the proposed HVAC Underground Cable Corridor include farms and sand/gravel extraction pits.

9.3.16 The UXO risk is low and there are no recorded landfills within the study area.

Converter Station Site

9.3.17 The natural superficial geology solely comprised of Lowestoft Formation –Diamicton, while the solid geology remains the same as for the proposed Friston Substation Site. No geologically designated SSSIs or County GeoSites have been identified within the study area.

9.3.18 There is a reservoir located 100m to the southwest of the proposed Converter Station Site. Groundwater is the same as for the proposed Friston Substation Site and the proposed Converter Station is located within a Zone 3 SPZ.

9.3.19 Potential contamination sources include farms, sand and gravel extraction pits and an unspecified tank, which is located within 250m of the proposed Converter Station.

9.3.20 The UXO risk is low and there are no recorded landfills within the study area.

Underground HVDC Cable Corridor

Common Cable Corridor

9.3.21 The geology within the proposed HVDC Underground Common Cable Corridor (as shown on **Figure 1-3**) is the same as for the proposed Friston Substation site, namely Lowestoft Formation, with the addition of Alluvium, Peat and Head Deposits, which are associated with the course of rivers. Head deposits comprise poorly sorted and poorly stratified clay, silt, sand and gravel. Made ground is also anticipated to be present within the proposed HVDC Underground Common Cable Corridor, associated with previous development.

9.3.22 No geologically designated SSSI or County GeoSites have been identified within the study area.

9.3.23 The proposed HVDC Underground Common Cable Corridor is typically low-lying with numerous small ponds and drainage ditches. Major rivers within the study area include: the Dunwich River, Minsmere River and Hundred River. The bedrock is classified as

Principal aquifer and the superficial deposits are a Secondary A, Secondary B, Secondary (undifferentiated) and Unproductive (peat) aquifer. The proposed HVDC Underground Common Cable Corridor is located within a Zone 3 SPZ, while Zone 1 and 2 SPZs are located within 500m of the Study area around Coldfair Green.

9.3.24 Multiple irrigation abstraction licences exist within 500m of the proposed Underground HVDC Common Cable Corridor and two drinking water abstraction licences exist within 500m of the proposed HVDC Underground Common Cable Corridor:

- Licence number: 7/35/02/*G/0108, for general farming and domestic drinking water supply, located near Bulcamp; and
- Licence number: 7/35/02/*G/0133, for drinking water, cooking, sanitary, washing (irrigation) commercial/industrial/public service, located north east of Bulcamp.

9.3.25 Potential current and historic land uses within the proposed HVDC Underground Common Cable Corridor include farms, disused sand and gravel pits, brickworks and kilns, a former military airfield (RAF Leiston) and two railway lines (Southwold and Aldeburgh Branch).

9.3.26 Three historical landfill sites are located within, or within 250m of, the proposed HVDC Underground Common Cable Corridor:

- 54 Westward House, Leiston, Suffolk – accepted inert, industrial and commercial waste between 1987 and 1990;
- Haw Wood Lane, Darsham, Saxmundham, Suffolk – 1970, waste type not available; and
- Charity Farm, Westleton, Suffolk – accepted industrial waste between 1978 and 1987.

9.3.27 The majority of the proposed HVDC Underground Common Cable Corridor is indicated to be at low risk of UXO; however, a small section west of Leiston has a moderate risk of UXO. RAF Leiston, located within the proposed HVDC Underground Common Cable Corridor, could pose a higher UXO risk, from legacy munitions and ordnance and as a bombing target during World War II.

Cable Corridor to Southwold

9.3.28 The proposed HVDC Underground Southwold Cable Corridor (as shown on **Figure 1-3**) overlies a range of superficial deposits associated with the Lowestoft Formation, with occasional areas where no superficial deposits are mapped. Alluvium, Peat and Head deposits are present in association with surface watercourses. Marine Beach deposits and Tidal Flat deposits are mapped in the extreme east of the corridor. Made ground may be present associated with previous developments. Solid geology is of the Crag Group.

9.3.29 The superficial deposits are designated as Secondary A, Secondary B, Secondary (undifferentiated) and unproductive aquifers. The bedrock is a Principal aquifer.

9.3.30 A geologically-designated SSSI is present within the study area: Pakefield to Easton Bavents, which lies directly to the east of the proposed HVDC Underground Southwold Cable Corridor.

9.3.31 The proposed HVDC Underground Southwold Cable Corridor crosses the Wang, Blyth and Wenhaston watercourses. Several other small surface water bodies are present within the study area. A private surface water abstraction, licence number

7/35/02/*S/0106, used for spray irrigation is located within the study area. The proposed HVDC Underground Southwold Cable Corridor is located within Zones 2 and 3 groundwater SPZ.

9.3.32 Potential current and historic land uses within the study area include an active petrol station at Wangford Service Station, a former hospital for infectious diseases, a historical rifle range and disused sand and gravel extraction pits. There are no recorded active or historic landfill sites within the study area, however, a historic landfill site, that accepted inert waste, is located by Tuttles Wood bordering the proposed HVDC Underground Southwold Cable Corridor.

9.3.33 The risk of UXO within the proposed HVDC Underground Southwold Cable Corridor is low.

Cable Corridor to Walberswick

9.3.34 The superficial geology within the proposed HVDC Underground Walberswick Cable Corridor (as shown on **Figure 1-3**) is of the Lowestoft Formation, which is mapped either as Diamicton or sand and gravel. In the east of the corridor, Tidal Flat deposits are mapped in a small area in the vicinity of Sallow Walk Covert. Made ground may be present associated with previous development. Solid geology is of the Crag Group.

9.3.35 No geologically designated SSSI or County GeoSites have been identified in this section of the proposed HVDC Underground Walberswick Cable Corridor.

9.3.36 The proposed HVDC Underground Walberswick Cable Corridor crosses the Dunwich River and numerous smaller watercourses are also present, along with ponds and ditches. An irrigation reservoir is located on Lodge Road within the proposed HVDC Underground Walberswick Cable Corridor. Groundwater designations are Secondary A (sand and gravel of the Lowestoft Formation) or Secondary (undifferentiated) associated with diamicton of the Lowestoft Formation and Head deposits. This section of the proposed HVDC Underground Walberswick Cable Corridor is not located within a SPZ.

9.3.37 No current or historical potentially contaminative land uses have been identified within the study area and no recorded active or historical landfill sites.

9.3.38 The risk of UXO within the proposed HVDC Underground Walberswick Cable Corridor is low.

Landfall Site

Southwold

9.3.39 The north of the proposed Southwold Landfall Site has no superficial deposits mapped, with diamicton of the Lowestoft Formation mapped in the centre. The southern half of the site is predominantly Tidal Flat deposits of clay and silt. In addition to, Marine Beach deposits, comprising of sand and gravel with thin horizons of peat and clay, mapped in the southeast. Made ground, associated with previous developments, may be present at the proposed Southwold Landfall Site. The solid geology is of the Crag Group, which comprises sands, gravels, silts and clays.

9.3.40 The Pakefield to Easton Bavents Geological SSSI lies directly to the north of this proposed Southwold Landfall Site.

9.3.41 Small ponds are present within the proposed Southwold Landfall Site. The River Blyth and Buss Creek tributary are located to the south, together with a boating lake and other small ponds. There is a private surface water abstraction point, licence number 7/35/02/*S/0088, used for spray irrigation is located within 150m of the proposed Southwold Landfall Site.

9.3.42 The aquifer designations for the superficial deposits are Secondary (undifferentiated) associated with the Diamicton, Secondary A (Marine Beach deposits) and Unproductive (Tidal Flat deposits). The proposed Southwold Landfall Site is not located within a Zone 3 SPZ.

9.3.43 Historical and current land uses that may have resulted in contamination include pig farming, a historic rifle range and a disused sand pit. There are no recorded active or historic landfill sites within the study area.

9.3.44 The proposed Southwold Landfall Site is indicated to be at high risk of unexploded bombs as a result of World War II bombing.

Walberswick

9.3.45 The proposed Walberswick Landfall Site has no superficial deposits mapped in the east; although, sand and gravel of the Lowestoft Formation is mapped in the north west corner. Tidal Flat deposits are mapped south of the proposed Walberswick Landfall Site. Made ground is unlikely to be present, given absence of previous development. The solid geology is of the Crag Group – Sand.

9.3.46 No geologically-designated SSSI have been identified within the proposed Walberswick Landfall Site.

9.3.47 Dunwich River is located approximately 170m to the south east of the proposed Walberswick Landfall Site. The bedrock is classed as a Principal aquifer and the Lowestoft Formation is classed as a Secondary (A) aquifer. The study area is not located within a groundwater SPZ.

9.3.48 There are no current or historic potentially contaminative land uses identified within the study area and there are no recorded active or historic landfill sites.

9.3.49 The UXO risk at the proposed Walberswick Landfall Site is low.

Future baseline

9.3.50 The Geology and Contamination chapter within the PEI Report and ES will consider changes which may affect the future ground conditions in the absence of the proposed Onshore Scheme. The future baseline will also take into account any developments that are likely to be present in the future baseline.

9.3.51 It is expected that ground conditions will remain relatively consistent, and land will continue to be managed in a similar way i.e. predominantly agricultural use. The value of receptors is not expected to change significantly by the end of the construction period.

9.3.52 Any short-term effects from climate change would be unlikely to significantly affect the receptors prior to construction of the proposed Onshore Scheme. Longer term impacts from climate change could alter the behaviour of any pre-existing contamination, which may impact on the quality of water bodies. The impact of rising sea level and coastal erosion may impact on the geological SSSI designation at Pakefield to Easton Bavents. Any mitigation proposals would consider climate change scenarios.

9.4 Potential impacts

9.4.1 This section identifies the potential impacts that could occur as a result of the proposed Onshore Scheme during construction and operation based on the baseline information collected for EIA scoping.

Construction

9.4.2 The following impacts could occur during the construction phase:

- impacts on human health, surface water and groundwater quality associated with mobilisation of contaminants within the ground. The baseline assessment presented in this chapter has identified that contamination could be present on or in the vicinity of the proposed Onshore Scheme from current and past land uses. This could include petrol stations, areas of landfill and former mineral extraction sites, farms and defence uses. Contamination could potentially be mobilised by exposure of materials, generation of dust, increased leaching following disturbance, surface run-off, or creation of migration pathways through, for example, groundwater control measures;
- There is the potential that leaks or spills could occur from construction materials and equipment; and
- Although no geodiversity sites have been identified within the Onshore Scoping Boundary, the proposed Onshore Scheme borders the Pakefield to Easton Bavents geological SSSI at Southwold. Based on the baseline information reviewed for scoping, potential impacts on geodiversity resources may occur during construction if, for example, access to such sites was to be restricted through the closure of footpaths, although such impacts are unlikely. Other impacts on the geological SSSI may occur as a result of changes in coastal morphology (discussed in Chapter 18 Marine Physical Processes) or ground stability during construction. Excavation works as part of the proposed Onshore Scheme could potentially present opportunities for geodiversity enhancement, through creation of temporary exposures in areas of geological importance, or the provision of data from ground investigation. The potential for this will depend on the ground conditions, vertical alignment and proposed construction works.

Operation

9.4.3 The following impacts could occur during the operational phase:

- Unmitigated, there is the potential for contamination post-construction to locally have an impact on human health, surface water or groundwater quality, where pipeline trenches or piled foundations create new pathways for contamination to migrate laterally or into deep groundwater aquifers. Through the implementation of appropriate remediation works where necessary, the likelihood of any impact is reduced; and
- No potential operational impacts on geodiversity resources have been identified based on the existing baseline data.

9.5 Design and control measures

9.5.1 As outlined in **Chapter 5** EIA Approach and Method, a standard hierarchical approach will be taken to mitigation.

9.5.2 The assessment of effects will take into account measures that are embedded into the proposed Onshore Scheme design, together with general good practice measures.

Design measures

9.5.3 Where it is not possible to avoid sensitive receptors, a number of measures will be embedded into the design to limit any effects.

9.5.4 Potential embedded design measures include:

- An intrusive ground investigation is currently being designed to provide information for preliminary design at the proposed Landfall and Converter Station Sites. It is envisaged that this would inform the general understanding of baseline ground and contamination conditions for these locations in the environmental assessment. A further phase(s) of ground investigation is planned for the proposed Underground Cable Corridor as the proposed Onshore Scheme design progresses.
- The assessment of impacts on contaminated land will be primarily based on desk-based sources, which would enable reasonable worst-case contamination conditions to be assessed based upon known past and current potentially contaminative land uses. The desk-based information will be validated using the results of the intrusive ground investigations. Any areas of contamination encountered during the investigation that are additional to those expected from desk-based sources will be evaluated and, where appropriate, included within the assessment.
- Further phases of detailed ground investigation would be undertaken at later stages to inform detailed design. These would be used to provide information for contamination risk assessments on the potential risks to human health and water resources. Where the levels of contamination present unacceptable risks, the assessments would be used as a basis for developing an appropriate remediation strategy. Remediation approaches would be dependent on the form, distribution and levels of contaminants present and nature of works proposed, and would be determined through a remediation options appraisal. Possible approaches may include provision of a suitable surface barrier, treatment (in-situ or ex-situ), appropriate re-use of materials in less sensitive areas in line with the Contaminated Land: Applications in Real Environments (CL:AIRE) Definition of Waste Code of Practice , or removal of materials to an appropriate soil recycling or landfill facility.
- The requirements for any remediation would be integrated with the engineering and geotechnical design to ensure the most appropriate and sustainable solutions are adopted. Where there is the potential that groundworks could create contamination migration pathways, risk assessments would be undertaken to inform selection of the appropriate form and method of construction. Construction quality and environmental controls would be established to ensure that potential impacts are appropriately controlled and mitigated.
- A separate technical report will consider the potential impacts on ground stability at the proposed landfall sites. It is envisaged that the technical report will embed mitigation into the design to prevent any impacts on the stability of the coast and the geological SSSI.

Control measures

9.5.5 Prior to any construction compound areas being prepared, a baseline survey would be undertaken to determine the current land quality in these areas to ensure that land quality is not impacted by the construction works. The baseline survey would highlight any contamination present. If necessary, such areas would be remediated prior to, or as part of, soil stripping/enabling works.

The following are examples of additional mitigation measures:

- Use of appropriate occupational health and safety measures on site e.g. Personal Protective Equipment (PPE), and statutory health and safety to minimise the risks associated with anticipated and/or unexpected contamination.
- The earthworks could be monitored for evidence of unexpected contamination. If any such contamination is identified, this would be tested and assessed as appropriate to determine the scope of any further mitigation measures that may be needed.
- Specific areas within the construction site compounds would be designated for the storage of chemicals, waste oils and fuel and refuelling activities. These areas would be bunded and placed on hardstanding to prevent downward migration of contaminants. Reference would be made to the EA Guidance for Pollution Prevention (GPP)[12] when preparing detailed plans.
- An Emergency Response/Spill Response plan would be produced by the contractor. Clear protocols and communication channels would be provided to ensure that any spillages are dealt with immediately and adequately.
- A Materials Management Plan (MMP) could be prepared following the protocols within the CL:AIRE Definition of Waste Code of Practice to ensure that excavated materials are re-used appropriately and sustainably[13], see also **Chapter 17** Material Assets and Waste.

9.6 Scope of the assessment

9.6.1 This section identifies the potential for the proposed Onshore Scheme to give rise to likely significant effects, taking into account the design and control measures identified in **Section 9.5.**

9.6.2 The key potential receptors of contamination that will be assessed are human health, groundwater and surface water resources. Potential effects on water resources will be co-ordinated with the assessment presented in **Chapter 12** Hydrology and Drainage. The locations and vulnerability of these receptors will be established through current mapping, public data sets and baseline data acquired for the proposed Onshore Scheme. The contamination assessment will not specifically assess potential impacts of contamination on ecological receptors; however, the findings will be co-ordinated with the assessment presented in **Chapter 8** Ecology and Biodiversity to ensure that any potential impacts can be appropriately addressed. The assessment will not assess the potential impacts of the proposed Onshore Scheme on coastal stability or erosion;

[12] Environment Agency Guidance for Pollution Prevention (GPP), 2016. Available at: https://www.gov.uk/guidance/pollution-prevention-for-businesses

[13] Contaminated Land: Applications in Real Environments (2020) Definition of waste: Code of Practice, available at: https://www.claire.co.uk/projects-and-initiatives/dow-cop

however, these issues will be addressed in **Chapter 18** Marine Physical Processes and in a separate technical report on coastal stability.

9.6.3 **Table 9-2** sets out the receptors identified within the study area, the potential impacts as a result of construction and/or operation activities associated with the proposed Onshore Scheme, whether these impacts are likely to give to rise to significant effects, and whether the receptor is scoped in or scoped out of the assessment.

9.6.4 The proposed Friston Substation, as described in **Chapter 2** proposed Scheme Description outlines the optionality that remains at Friston Substation. The scope of this EIA Scoping Chapter has been based on the worst case scenario that the proposed Onshore Scheme would construct Friston Substation.

9.6.5 All identified impacts are of relevance to both the Southwold and Walberswick options unless specified otherwise.

9.6.6 A precautionary approach has been taken and where there is no strong evidence base, insufficient baseline or the significance is uncertain at this stage the impact has been scoped into the EIA. Where there is a clear evidence base that the effect from the impact will not be significant, either alone or in combination with other plans and projects, the impact has been scoped out of the EIA.

Table 9-2 Proposed scope of the assessment

Project phase	Receptor	Impact	Potential for significant effect	Proposed to be scoped in/ out
Construction	Human health	Disturbance/release of contamination in soil or groundwater as a result of ground disturbance/excavation. Contamination may be released as dust or into surface waters which could impact on the health of nearby land-users.	Potential for significant effect if unexpected contamination is identified. Ground investigation and assessment of known contamination sources should ensure that remediation is completed where contamination is present. Best practice control measures set out in a Construction Environmental Management Plan (CEMP) or Outline Code of Construction Plan (CoCP) will prevent uncontrolled releases of contamination. Scoped in for construction, as insufficient data available to confirm at scoping.	Scoped in
Construction	Surface water	Pollution of surface water bodies and existing abstractions as a result of uncontrolled release of contamination during construction e.g. contaminated soil runoff from stockpiles, earthworks or accidental release of fuel or other construction chemicals.	Potential for significant effect unlikely if best practice control measures set out in Outline CoCP are followed but scoped in as insufficient data available to confirm at scoping.	Scoped in
Construction	Groundwater	Pollution of groundwater bodies including Principal aquifer, abstractions and SPZ as a result of uncontrolled release of contamination during construction e.g. accidental	Potential for significant effect unlikely if control measures set out in Outline CoCP are followed, but scoped in as insufficient data available to confirm at scoping.	Scoped in

Project phase	Receptor	Impact	Potential for significant effect	Proposed to be scoped in/ out
		release of fuel or other construction chemicals.		
Construction	Groundwater	Temporary alteration of groundwater flows as a result of dewatering/construction activity, causing existing contaminated groundwater to migrate/spread to new areas.	Potential for significant effect if previously unidentified areas of contamination are encountered during construction. Where contamination is identified prior to construction e.g. through ground investigation, if control measures set out in Outline CoCP are followed e.g. remediation to prevent the spread of pollution, the potential for a significant effect is unlikely. Scoped in as insufficient data to confirm at scoping.	Scoped in
Construction	Geodiversity	Potential for the damage or impairment of geodiversity sites during construction e.g. resulting from footpath closure or access restrictions. Construction may present the opportunity for geodiversity enhancement, through the exposure of important geological formations or the collection of ground investigation data.	Potential for significant effect is possible where construction is required within geodiversity sites or sites of geological interest. However, given that no geodiversity sites have been identified within the Onshore Scoping Boundary, the potential for a significant effect is unlikely.	Scoped out
Operation	Human health	Disturbance/release of contamination in soil or groundwater as a result of ground disturbance/excavation. Contamination may be released as dust or into surface waters	Potential for significant effect if unexpected contamination is identified. Ground investigation and assessment of known contamination sources should ensure that remediation is completed where contamination is present. Best practice control measures set out in a CEMP or	Scoped out

Project phase	Receptor	Impact	Potential for significant effect	Proposed to be scoped in/ out
		which could impact on the health of nearby land-users.	Outline CoCP will prevent uncontrolled releases of contamination. Scoped out for operation, assuming contamination is remediated during construction.	
Operation	Surface water	Pollution of surface water bodies and existing abstractions as a result of accidental release of fuel or other construction chemicals.	Potential for significant effect unlikely during operation as storage of chemicals will be undertaken in accordance with best practice e.g. bunded tanks.	Scoped out
Operation	Groundwater	Pollution of groundwater bodies including Principal aquifer, abstractions and SPZ as a result of accidental release of fuel or other construction chemicals.	Potential for significant effect unlikely during operation as storage of chemicals will be undertaken in accordance with best practice e.g. bunded tanks.	Scoped out
Operation	Groundwater	Potential for the creation of new pathways for contamination to migrate and spread to new areas along pipeline trenches.	Potential for significant effect is unlikely as areas of contamination would be identified during the construction of open-cut trenches and remediation carried out in accordance with the requirements of the Outline CoCP.	Scoped out
Operation	Groundwater	Creation of new preferential pathways for contamination to migrate along piled foundations, allowing contamination to impact on the quality of deep groundwater aquifers.	Potential for significant effect is unlikely, as areas of contamination at the surface would be identified during ground investigation or the construction of the Converter Station or other structures, in accordance with the requirements of the Outline CoCP.	Scoped out
Operation	Geodiversity	Potential for the impairment of geodiversity sites e.g. resulting	No geodiversity sites have been identified within the Onshore Scoping Boundary,	Scoped out

Project phase	Receptor	Impact	Potential for significant effect	Proposed to be scoped in/ out
		from permanent damage or access restrictions.	therefore the potential for a significant effect during operation is unlikely.	

9.7 Assessment methodology

Data sources

9.7.1 The assessments will be informed by both desk-based studies, site reconnaissance visits and intrusive ground investigations.

9.7.2 The baseline desk studies will build upon the scoping baseline report by supplementing it with freely available online data, data purchased from specialist providers and requests for information (RFI) from local authorities and the EA.

9.7.3 Freely available online data includes:

- BGS Borehole records[14].
- Additional data that will be requested/purchased includes;
- historical Ordnance Survey (OS) mapping;
- technical reports for other projects in the area;
- pollution incidents, Environmental Permitting data (Envirocheck or Groundsure report); and
- site-specific UXO desk studies/risk assessments.

9.7.4 Intrusive ground investigation is currently being scoped within the proposed Landfall Sites and the proposed Converter Station Site. Additional intrusive ground investigation(s) will be carried out within the remainder of the Refined Scheme Boundary as design develops. The intrusive ground investigation will include the collection of data on ground contamination.

Legislation, policy and guidance

9.7.5 Legislation and policy relevant to the proposed Scheme and this chapter is outlined in **Chapter 4** Legislation and Policy Overview and **Appendix 4-A** National Policy, **Appendix 4-B** Environmental Legislation and **Appendix 4-C** Local Policy.

9.7.6 Relevant guidance and standards that have informed the scoping process are listed below (but not limited to) and will also be taken into account as part of the assessment:

- EA, Land Contamination: Risk Management (LC:RM)[15];
- EA (2009) Updated technical background to the CLEA model. Science Report SC050021;
- EA (2006) Remedial Targets Methodology: Hydrogeological Risk Assessment for Land Contamination;
- HSE (2012) The Control of Asbestos Regulations;
- CIRIA (2014) Asbestos in soil and made ground: a guide to understanding and managing risks. Publication C733;

[14] https://www.bgs.ac.uk/information-hub/borehole-records/

- CIRIA (2007) Assessing risks posed by hazardous ground gases to buildings, C665;
- British Standards Institute (2019) BS8485:2015+A1:2019: Code of practice for the design of protective measures for methane and carbon dioxide ground gases for new buildings (+A1:2019);
- Building Research Establishment (2005) Special Digest 1: Concrete in aggressive ground, third edition;
- Building Research Establishment (2004) Report 465: Cover systems for land regeneration: thickness of cover systems for contaminated land. Note that this guidance has been withdrawn but provides useful background information; and
- Building Research Establishment (2003) Report 456: Control of dust from construction and demolition activities.

Assessment method

9.7.7 The assessment of impacts on geology and contamination will be primarily based on desk-based sources, which will enable reasonable worst case contamination conditions to be assessed. It is anticipated that sufficient ground investigation data will be available to establish preliminary conceptual site models and identify likely significant effects within the ES. Detailed risk assessments and remediation strategy design will be undertaken at detailed design stage prior to construction.

9.7.8 The assessment of impact on geology and geodiversity will consider geological designations and sensitive or valuable non-designated features. This will include the locations of sites such as SSSI and County Geodiversity Sites. The locations of such sites have been established through public data sets but will be supplemented by engagement with stakeholders.

9.7.9 The potential for soil and groundwater contamination within the study area will be established through a review of the available historical maps, information on landfills and mineral extraction activities supplemented with additional desk-based information from public data sets and engagement with ESC and the EA.

9.7.10 With respect to existing land contamination, a source-pathway-receptor approach will be applied to examine how the proposed Onshore Scheme would influence baseline conditions. The general approach outlined within the EA Land Contamination: Risk Management (LCRM)[16] guidance will be adopted for assessing risks. Potential contaminants will be identified using the Department of Environment (DoE) Industry Profiles series of documents[17]. Conceptual models will be developed for each of the baseline, construction, and operation scenarios, with the risks arising from the identified pollutant linkages assessed qualitatively. These risks will be compared to identify any impacts arising from the construction or operation of the proposed Onshore Scheme

9.7.11 **Chapter 5** EIA Approach and Method sets out the standard EIA methodology and matrices to be used for the assessment. The methodology is based on the principle that the environmental effects will be determined by identifying potential receptors, assigning receptor value, assessing the magnitude of change on the receptor and then identifying

[16] Environment Agency (2020) Land contamination risk management, Available at: https://www.gov.uk/government/publications/land-contamination-risk-management-lcrm

[17] Department of Environment (1995) DoE Industry Profiles, available at: https://www.claire.co.uk/useful-government-legislation-and-guidance-by-country/198-doe-industry-profiles

the significance of the effect. This section provides a summary of the EIA methodology specifically relevant to this chapter.

9.7.12 Assessment of cumulative and combined effects are discussed in **Chapter 29** Cumulative and Combined effects of the Project.

- Impact on geology and superficial deposits, in particular associated with designated sites; and
- Impacts on human health, surface water and groundwater arising from the proposed Onshore Scheme interaction with contamination.

9.7.13 **Table 9-3** below describes the receptor value and sensitivity to be used in the assessment, in line with the definitions in Chapter 5 EIA Approach and Method, which have been adapted from existing guidance for linear infrastructure as set out in Highways England LA109: Geology and Soils[18].

Table 9-3 Receptor value and sensitivity

Receptor value and sensitivity	Geological receptors	Human receptors	Controlled waters receptors
Very high	UNESCO Global GeoParks Geological Conservation Review sites (international) Sites of international importance	Residential developments Allotment gardens Schools, nurseries	Surface water: Watercourse with Q95 >1.0 m^3/s Groundwater: Principal aquifer providing regionally important resource and/or supporting a site designated under legislation Source Protection Zone 1
High	Geological SSSI, Geological Conservation Review sites (national) Sites of national importance	Public open space areas e.g. parks, playing fields	Surface water: Watercourse with Q95 <1m^3/sec Groundwater: Principal aquifer providing locally important resource or supporting a river Source protection Zone 2
Medium	Regionally important geological sites (RIGS)	Commercial or industrial land uses	Surface water: Watercourses not having a Water Framework Directive (WFD) classification, Q95 >0.001m^3/sec Groundwater: Aquifer providing water for agricultural or industrial use

[18] DMRB LA 109 - Geology and soils. Issued: Oct 2019. Revision:0. https://www.standardsforhighways.co.uk/search/adca4c7d-4037-4907-b633-76eaed30b9c0 [Feb 2024]

Receptor value and sensitivity	Geological receptors	Human receptors	Controlled waters receptors
			with limited connection to surface water Source Protection Zone 3
Low	Locally important geological sites e.g. former quarries or mining sites	Highways, railway land	Surface water: Watercourses not having a WFD classification shown in a RBMP and Q95 <0.001m^3/sec Groundwater: Unproductive strata (low yield)
Negligible	No geological exposures	Undeveloped land Land with no sensitive uses proposed	Surface water: Watercourses with negligible/no flow during construction Groundwater: Unproductive strata (very low or no yield)

9.7.14 The magnitude of impact on receptors are described in **Table 9-4**Table 9-4 , based on the standard matrix in **Chapter 5** EIA Approach and Method.

Table 9-4 Magnitude of impact on receptors

Magnitude of Impact	Definition
High	**Geology** Loss of geological feature/designation of international importance, severe damage to key characteristics, features or elements. **Contamination** Human health: Significant contamination, significantly exceeding background levels and relevant screening criteria. Potential for significant harm to human health. Groundwater: Pollution of a principal aquifer within a SPZ or potable supply, characterised by a breach of drinking water standards. Surface water: Pollution of a surface watercourse characterised by a breach of an Environmental Quality Standard (EQS) at a statutory monitoring location or resulting in a change in General Quality Assessment (GQA) grade.
	Geology Creation of a new feature of international importance e.g. a new permanently accessible exposure. **Contamination** Human health: A considerable reduction in contamination risk to health e.g. remediation of significant contamination to levels below relevant screening criteria. Groundwater/surface water: Considerable local-scale/moderate to significant wide-scale improvement to the quality of groundwater or surface water.
Medium	**Geology** Partial loss of nationally important feature/designation, damage to key characteristics, features or elements. **Contamination** Human health: Contaminant concentrations exceed background levels and are in line with the limits of relevant screening criteria. Land requires remediation in order to make it suitable for development. Groundwater: Pollution of a principal aquifer outside a SPZ or a Secondary A aquifer characterised by a breach of drinking water standards. Pollution of an industrial groundwater abstraction or irrigation supply that impairs its function. Surface water: Substantial pollution but insufficient to result in a change in the GQA grade.

Magnitude of Impact	Definition
	Geology Creation of a new nationally important exposure/feature, or new geological understanding e.g. through ground investigation. **Contamination** Human health: A reduction in contamination risk e.g. through remediation to make land suitable for development. Groundwater/surface water: Local-scale, or moderate wide-scale improvement to the quality of groundwater or surface water resources.
Low	**Geology** Minor, measurable change in geological feature of local importance, or minor loss of key characteristics, features or elements. **Contamination** Human health: Contaminant concentrations are below relevant screening criteria. Significant contamination is unlikely with a low risk to health. Groundwater: Low levels of pollution of a principal aquifer outside a SPZ or an industrial abstraction, or pollution of a Secondary A or B aquifer. Surface water: Low levels of pollution insufficient to result in a change in the WFD classification.
	Geology Creation of a new feature/resource of local importance or a new short-term accessible geological exposure. **Contamination** Human health: A slight reduction in contamination risk e.g. land that has a low contamination risk in the baseline becomes very low risk through the use of best practice measures to minimise risks to human health. Groundwater: Slight improvement to water quality of a Principal aquifer outside a SPZ or an industrial abstraction, or moderate improvement to a Secondary A or B aquifer. Surface water: Slight improvement of water quality but insufficient to result in a change in WFD classification, slight improvement of water quality of a surface watercourse without a quality classification.
Negligible	**Geology** Very minor loss or detrimental impact on geological feature of local importance. **Contamination**

Magnitude of Impact	Definition
	Human health: Contaminant concentrations significantly less than relevant screening criteria. No requirement for remediation. Groundwater and Surface Water: No appreciable pollution, or pollution of a low sensitivity receptor such as a secondary (undifferentiated) aquifer or surface watercourse without a quality classification.
	Geology Very minor improvement to geological feature of local importance. **Contamination** Human health: Minor reduction in contaminant concentrations or exposure pathways. Groundwater and Surface Water: Very minor improvement in water quality of a low sensitivity receptor such as a secondary (undifferentiated) aquifer or surface watercourse without a quality classification.

9.7.15 Based on the sensitivity and magnitude, the significance of effect will be predicted. The standard matrix is to be used for the assessment, which is provided in **Chapter 5** EIA Approach and Method.

9.8 Assumptions & limitations

9.8.1 This EIA Scoping Report has been collated based on a range of publicly available data and information only. It is assumed that the data collated is accurate. The data will be supplemented with additional data as part of the EIA process.

9.8.2 In the absence of data, a precautionary approach has been taken and professional judgement, based on experience of similar linear schemes, has been used where required to inform the scope of the assessment.

9.8.3 The extent of the study area used for scoping the Geology and Contamination assessment is considered appropriate at scoping stage. The information presented in this EIA Scoping Report attempts to provide suitable coverage to enable the potential risks to be appropriately considered.

9.8.4 The Geology and Contamination assessment is to be undertaken on the basis of desk study data supplemented by data from the intrusive ground investigation which is to be completed during 2023/4. This will enable reasonable worst-case conditions to be assessed. Further phases of detailed ground investigation will be undertaken at later stages to inform detailed design.

9.8.5 The assessment presented in the ES will be predominantly qualitative in nature, but will take into account the findings of generic quantitative contamination risk assessments undertaken on the available ground investigation information.

Contents

10. Health and Wellbeing

10.1 Introduction

10.1.1 This chapter outlines the proposed scope and methodology for Health and Wellbeing. It will consider the potential for significant effects arising from the construction and operation of the LionLink Interconnector (hereafter referred to as 'the proposed Onshore Scheme') in respect of health and wellbeing. A review of relevant guidance and policy has been undertaken together with a desk-based assessment, to inform the proposed scope and methodology.

10.1.2 This chapter is supported by the following figures:

- **Figure 1-2**: Proposed Onshore Scheme Scoping Boundary;
- **Figure 1-3**: Proposed Onshore Scheme Scoping Boundary and Scheme Components; and
- **Figure 10-1**: Health and Wellbeing Study Area,

10.1.3 There may be interrelationships with other disciplines. Therefore, this chapter should be read in conjunction with the following chapters:

- **Chapter 6** Air Quality – which covers air quality effects following construction activities and traffic and their impact on human receptors;
- **Chapter 9** Geology and Contamination – which covers contamination sources and potential remediation effects following construction activities;
- **Chapter 14** Noise and Vibration - which covers noise and vibration effects following construction activities and traffic and their impact on human receptors;
- **Chapter 13** Landscape and Visual – which covers effects on recreational, tourism and community visual receptors and their impact on human receptors including the ability to access open space and recreational amenities;
- **Chapter 15** Traffic and Transport – which covers effects on accessibility, active travel, use of public rights of way as a result of construction traffic; and
- **Chapter 16** Socio-Economics, Recreation and Tourism - which covers impacts on community land and facilities, commercial property and land, and employment creation.

10.2 Consultation and engagement

10.2.1 Consideration has been given to responses received at Non-Statutory Consultations held in 2022 and 2023 in preparing this scoping chapter. Responses relating to Health and Wellbeing have been received from the following:

- Suffolk County Council (SCC);
- East Suffolk Council (ESC);
- UK Health and Safety Agency; and

- Parish and Town Councils: Friston Parish Council, Aldeburgh Town Council; Southwold Town Council, Kelsale-cum-Carlton Parish Council, and Leiston-cum-Sizewell Town Council.

10.2.2 The main themes reported as part of the Non-Statutory Consultations were:

- Community fatigue and stress from being subjected to a prolonged consultation on a number of projects in the area;
- Danger of sub-station catching fire;
- Use of SF6 gasses and their impact on climate change globally and community locally;
- Detail on mitigation aspects for residents 'enjoying' where they live, access to leisure amenities, and the impact this will have on their quality of life and therefore their mental and physical health; and
- The cumulative impact of this and associated projects on the air quality for our residents.

10.2.3 Engagement was undertaken with SCC and ESC in August 2023. The key points of discussion included:

- The proposed study area and methodology;
- Baseline Information and the inclusion of physical, mental health and wellbeing data;
- Identification of any potential vulnerable groups with mental health issues;
- Assessment of effects and inclusion of assessment of effects on potential vulnerable groups with mental health issues; and
- The cumulative impact on health and wellbeing as a result of multiple developments in the area taking place over the same or extended period of time.

10.2.4 Further engagement will be undertaken with relevant stakeholders to obtain any information that they hold to supplement the assessment and to seek their views with regards to the evolving design.

10.2.5 The following bodies will also be consulted during the EIA process in relation to Health and Wellbeing:

- SCC; and
- ESC.

10.2.6 In addition, engagement will be undertaken with non-statutory stakeholders as required so that their specialist local views and expertise can be considered as part of the EIA process.

10.3 Baseline conditions

Study area

10.3.1 The study area for Health and Wellbeing includes all land within the proposed Onshore Scheme Scoping Boundary (hereafter referred to as ‘the Onshore Scoping Boundary’), as shown on **Figure 1-3** and **Figure 1-3**. It is located within the administrative boundary of ESC and SCC local planning authority areas.

10.3.2 The Onshore Scoping Boundary is located in a predominantly rural area. The Onshore Scoping Boundary currently includes two options for the proposed Landfall Site and associated High Voltage Direct Current (HVDC) Underground Cable Corridor. The settlements in proximity to the proposed Onshore Scheme include:

- Proposed Friston Substation and proposed Converter Station: Friston and Saxmundham;
- Proposed Underground Cable Corridor: Friston, Saxmundham, Middleton, Westleton, Blytheburgh. Wenhaston, Uggeshall, Wangford, Reydon and Southwold. Or alternatively following Blytheburgh on to Walberswick; and
- Proposed Landfall Sites: Southwold and Walberswick.

10.3.3 The principal study area comprises all areas within the Onshore Scoping Boundary and residential, community and healthcare facilities which fall within 250m from Scoping Boundary. This area is considered to cover the likely extent of environmental effects from the construction of the proposed Onshore Scheme that are likely to give rise to health effects. There is a potential for construction traffic effects to impact on sensitive health receptors outside this study area; these will be scoped in on a case-by-case basis as required. Wider employment and economic effects will be considered at the local authority and/or regional level.

10.3.4 The study area will be reviewed and, as appropriate, refined for the assessment in the Preliminary Environmental Information (PEI) Report and Environmental Statement (ES) with only one Landfall and one HVDC Underground Cable Corridor being taken forward. The study area will be based on the proposed Order limits in the ES.

Baseline data sources

10.3.5 Demographic data published by the Office for National Statistics (Census 2021) has been obtained to describe the nature of the study area population, who could be affected during either the construction or operational phases. The baseline is presented at local level where possible, using Lower Super Output Area (LSOA) or Ward level data. Where data is not available at this level, local authority data is presented.

Baseline

10.3.6 The following sections present the existing baseline established at scoping. There are currently two options being considered for the proposed Landfall Site and associated HVDC Underground Cable Corridor, which are shown in **Figure 1-2** and **Figure 1-3**. Baseline information is presented for the two options below.

Proposed Friston Substation Site

10.3.7 The study area where the proposed Friston Substation is located consists of one LSOA - East Suffolk 018E. The population of this study area amounts to 1,981 people as per information supplied by Census 2021[1]. In terms of age profile, the study area has a higher percentage of people aged 65+ (37%) when compared with East Suffolk (28%), East of England (20%) and England (18%). The study area has a relatively low proportion of people aged under 19 years old – 14% when compared to 20% in East Suffolk, 23% the East of England region and nationally.

[1] ONS (2022) Census 2021.

10.3.8 In terms of general health, the population in the study area can be considered average, with 81% of the population self-reporting very good or good health status and 3% self-reporting bad or very bad status. This is generally in line with self-reported health status for East Suffolk, East of England and nationally.

10.3.9 In terms of disability,19% of the population within the study area are categorised as disabled under the Equality Act, in comparison to 21% in East Suffolk and 17% for both the region and nationally.

10.3.10 In terms of deprivation, the study area falls within the 50% least deprived neighbourhoods in the country under the English Indices of Multiple Deprivation (IMD)[24] Overall Deprivation domain and is within the 20% least deprived in terms of the Health Deprivation and Disability domain.

10.3.11 Data on life expectancy is recorded at local authority level. The female average life expectancy at birth is 83.7 years in East Suffolk, which is above the national average of 82.8 years. Male life expectancy at birth is also slightly above the national average (78.7 years) at 79.9 years in East Suffolk[2].

10.3.12 Data on deaths from respiratory diseases are recorded at the local authority level. The standardised mortality ratio from respiratory disease in East Suffolk is 83.2 per 100,000 people which is lower than the national rate of 100 (per 100,000).

Underground HVAC Cable Corridor

10.3.13 The study area where the proposed Underground High Voltage Alternating Current (HVAC) Cable Corridor is located consists of three LSOAs – East Suffolk 018E, 018A and 018C. The population of this study area amounts to 5,906 people as per information supplied by Census 2021[3]. In terms of age profile, the study area has a higher percentage of people aged 65+ (33%) when compared with East Suffolk (28%), East of England (20%) and England (18%). The study area has a relatively low proportion of people aged under 19 years old – 17% when compared to 20% in East Suffolk, 23% in East of England and nationally.

10.3.14 In terms of general health, the population in the study area can be considered average, with 79% of the population self-reporting very good or good health status and 5% self-reporting bad or very bad status. This is generally in line with self-reported health status for East Suffolk, East of England and nationally.

10.3.15 In terms of disability, 20% of the population within the study area are categorised as disabled under the Equality Act, in comparison to 21% in East Suffolk, and 17% for both the region and nationally.

10.3.16 In terms of deprivation, the study area falls within the 40% to 50% least deprived neighbourhoods in the country under the IMD Overall Deprivation domain and is within areas ranging from 20% to 50% least deprived in terms of the Health Deprivation and Disability domain.

10.3.17 Data on life expectancy is recorded at local authority level. The female average life expectancy at birth is 83.7 years in East Suffolk, which is above the national average of

[2] Office for Health Improvement and Disparities (2021) Public Health Profiles. Available online at: https://fingertips.phe.org.uk/ Accessed Feb 2024.

[3] ONS (2022) Census 2021.

82.8 years. Male life expectancy at birth is also slightly above the national average (78.7 years) at 79.9 years in East Suffolk[4].

10.3.18 Data on deaths from respiratory diseases are recorded at the local authority level. The standardised mortality ratio from respiratory disease in East Suffolk is 83.2 per 100,000 people, which is lower than the national rate of 100 (per 100,000).

Converter Station Site

10.3.19 The study area where the proposed Converter Station Site is located consists of two LSOAs – East Suffolk 018E and 018C. The population of this study area amounts to 4,255 people as per information supplied by Census 2021[5]. In terms of age profile, the study area has a higher percentage of people aged 65+ (36%) when compared with East Suffolk (28%), East of England (20%) and England (18%). The study area has a relatively low proportion of people aged under 19 years old – 17% when compared to 20% in East Suffolk, 23% in East of England and nationally.

10.3.20 In terms of general health, the population in the study area can be considered average, with 80% of the population self-reporting very good or good health status and 4% self-reporting bad or very bad status. This is generally in line with self-reported health status for East Suffolk, East of England and nationally.

10.3.21 In terms of disability, 20% of the population within the study area are categorised as disabled under the Equality Act, in comparison to 21% in East Suffolk, and 17% for both the region and nationally.

10.3.22 In terms of deprivation, the Study area falls within the 50% least deprived neighbourhoods in the country under the IMD Overall Deprivation domain and is within 40% to 50% least deprived in terms of the Health Deprivation and Disability domain.

10.3.23 Data on life expectancy is recorded at local authority level. The female average life expectancy at birth is 83.7 years in East Suffolk, which is above the national average of 82.8 years. Male life expectancy at birth is also slightly above the national average (78.7 years) at 79.9 years in East Suffolk[6].

10.3.24 Data on deaths from respiratory diseases are recorded at the local authority level. The standardised mortality ratio from respiratory disease in East Suffolk is 83.2 per 100,000 people, which is lower than the national rate of 100 (per 100,000).

Underground HVDC Cable Corridor

Common Cable Corridor

10.3.25 The study area where the Common Cable Corridor for the proposed HVDC Underground Cable Corridor is located consists of six LSOAs – East Suffolk 016C, 018A, 018B, 018C, 019C and 019E. The population of this study area amounts to 10,517 people as per information supplied by Census 2021[7]. In terms of age profile, the

[4] Office for Health Improvement and Disparities (2021) Public Health Profiles. Available online at: https://fingertips.phe.org.uk/ Accessed Feb 2024.

[5] ONS (2022) Census 2021.

[6] Office for Health Improvement and Disparities (2021) Public Health Profiles. Available online at: https://fingertips.phe.org.uk/ Accessed Feb 2024.

[7] ONS (2022) Census 2021.

study area has a higher percentage of people aged 65+ (32%) when compared with East Suffolk (28%), East of England (20%) and England (18%). The study area has a relatively low proportion of people aged under 19 years old – 18% when compared to 20% in East Suffolk, 23% in East of England and nationally.

10.3.26 In terms of general health, the population in the study area can be considered average, with 77% of the population self-reporting very good or good health status and 6% self-reporting bad or very bad status. This is generally in line with self-reported health status for East Suffolk, East of England and nationally.

10.3.27 In terms of disability, 22% of the population within the study area are categorised as disabled under the Equality Act, in comparison to 21% in East Suffolk, and 17% for both the region and nationally.

10.3.28 In terms of deprivation, the study area falls within neighbourhoods ranging from the 40% most to 50% least deprived in the country under the IMD Overall Deprivation domain and ranging from the 20% least deprived to 50% most deprived in terms of the Health Deprivation and Disability domain.

10.3.29 Data on life expectancy is recorded at local authority level. The female average life expectancy at birth is 83.7 years in East Suffolk, which is above the national average of 82.8 years. Male life expectancy at birth is also slightly above the national average (78.7 years) at 79.9 years in East Suffolk[8].

10.3.30 Data on deaths from respiratory diseases are recorded at the local authority level. The standardised mortality ratio from respiratory disease in East Suffolk is 83.2 per 100,000 people, which is lower than the national rate of 100 (per 100,000).

Cable Corridor to Southwold

10.3.31 The study area where the proposed HVDC Underground Cable Corridor to Southwold is located consists of three LSOAs – East Suffolk 014A, 014B and 015A. The population of this study area amounts to 5,800 people as per information supplied by Census 2021[9]. In terms of age profile, the study area has a higher percentage of people aged 65+ (30%) when compared with East Suffolk (28%), East of England (20%) and England (18%). The study area has a relatively low proportion of people aged under 19 years old – 19% when compared to 20% in East Suffolk, 23% in East of England and nationally.

10.3.32 In terms of general health, the population in the study area can be considered average, with 79% of the population self-reporting very good or good health status and 6% self-reporting bad or very bad status. This is generally in line with self-reported health status for East Suffolk, East of England and nationally.

10.3.33 In terms of disability, 21% of the population within the study area are categorised as disabled under the Equality Act, in comparison to 21% in East Suffolk, and 17% for both the region and nationally.

10.3.34 In terms of deprivation, the study area falls within neighbourhoods ranging from the 40% to 50% most deprived in the country under the IMD Overall Deprivation domain and

[8] Office for Health Improvement and Disparities (2021) Public Health Profiles. Available online at: https://fingertips.phe.org.uk/ Accessed Feb 2024.

[9] ONS (2022) Census 2021.

ranging from the 40% least deprived to 50% most deprived in terms of the Health Deprivation and Disability domain.

10.3.35 Data on life expectancy is recorded at local authority level. The female average life expectancy at birth is 83.7 years in East Suffolk, which is above the national average of 82.8 years. Male life expectancy at birth is also slightly above the national average (78.7 years) at 79.9 years in East Suffolk[10].

10.3.36 Data on deaths from respiratory diseases are recorded at the local authority level. The standardised mortality ratio from respiratory disease in East Suffolk is 83.2 per 100,000 people, which is lower than the national rate of 100 (per 100,000).

Cable Corridor to Walberswick

10.3.37 The study area where the proposed HVDC Underground Cable Corridor to Walberswick is located consists of one LSOA – East Suffolk 016B. The population of this study area amounts to 2,019 people as per information supplied by Census 2021[11]. In terms of age profile, the study area has a higher percentage of people aged 65+ (35%) when compared with East Suffolk (28%), East of England (20%) and England (18%). The study area has a relatively low proportion of people aged under 19 years old – 17% when compared to 20% in East Suffolk, 23% in East of England and nationally.

10.3.38 In terms of general health, the population in the study area can be considered average, with 82% of the population self-reporting very good or good health status and 5% self-reporting bad or very bad status. This is generally in line with self-reported health status for East Suffolk, East of England and nationally.

10.3.39 In terms of disability,19% of the population within the study area are categorised as disabled under the Equality Act, in comparison to 21% in East Suffolk, and 17% for both the region and nationally.

10.3.40 In terms of deprivation, the study area falls within an area which is categorised as being within the 40% most deprived neighbourhoods in the country under the IMD Overall Deprivation domain and is within the 20% least deprived in terms of the Health Deprivation and Disability domain.

10.3.41 Data on life expectancy is recorded at local authority level. The female average life expectancy at birth is 83.7 years in East Suffolk, which is above the national average of 82.8 years. Male life expectancy at birth is also slightly above the national average (78.7 years) at 79.9 years in East Suffolk[12].

10.3.42 Data on deaths from respiratory diseases are recorded at the local authority level. The standardised mortality ratio from respiratory disease in East Suffolk is 83.2 per 100,000 people which is lower than the national rate of 100 (per 100,000).

[10] Office for Health Improvement and Disparities (2021) Public Health Profiles. Available online at: https://fingertips.phe.org.uk/ Accessed Feb 2024.

[11] ONS (2022) Census 2021.

[12] Office for Health Improvement and Disparities (2021) Public Health Profiles. Available online at: https://fingertips.phe.org.uk/ Accessed Feb 2024.

Landfall Site

Southwold

10.3.43 The study area where the proposed Landfall Site at Southwold is located consists of two LSOAs – East Suffolk 014C and 014A. The population of this study area amounts to 3,496 people as per information supplied by Census 2021[13]. In terms of age profile, the study area has a higher percentage of people aged 65+ (42%) when compared with East Suffolk (28%), East of England (20%) and England (18%). The study area has a relatively low proportion of people aged under 19 years old – 15% when compared to 20% in East Suffolk, 23% in East of England and nationally.

10.3.44 In terms of general health, the population in the study area can be considered relatively healthy, with 78% of the population reporting a very good or good health status and 5% self-reported under bad or very bad status. This is generally in line with self-reported health status for East Suffolk, East of England and nationally.

10.3.45 In terms of disability, 23% of the population within the study area are categorised as disabled under the Equality Act, in comparison to 21% in East Suffolk, and 17% for both the region and nationally.

10.3.46 In terms of deprivation, the Study area falls within neighbourhoods which fall within the 10% least deprived and 50% most deprived neighbourhoods in the country under the IMD Overall Deprivation domain and the 40% least and 50% most deprived in terms of the Health Deprivation and Disability domain.

10.3.47 Data on life expectancy is recorded at local authority level. The female average life expectancy at birth is 83.7 years in East Suffolk, which is above the national average of 82.8 years. Male life expectancy at birth is also slightly above the national average (78.7 years) at 79.9 years in East Suffolk[14].

10.3.48 Data on deaths from respiratory diseases are recorded at the local authority level. The standardised mortality ratio from respiratory disease in East Suffolk is 83.2 per 100,000 people, which is lower than the national rate of 100 (per 100,000).

Walberswick

10.3.49 The study area where the proposed Landfall Site at Walberswick is located consists of one LSOA – East Suffolk 016B. The population of this study area amounts to 2,019 people as per information supplied by Census 2021[15]. In terms of age profile, the study area has a higher percentage of people aged 65+ (35%) when compared with East Suffolk (28%), East of England (20%) and England (18%). The study area has a relatively low proportion of people aged under 19 years old – 17% when compared to 20% in East Suffolk, 23% in East of England and nationally.

10.3.50 In terms of general health, the population in the study area can be considered relatively healthy, with 82% of the population self-reporting very good or good health status and 5% self-reporting bad or very bad status. This is generally in line with self-reported health status for East Suffolk, East of England and nationally.

[13] ONS (2022) Census 2021.

[14] Office for Health Improvement and Disparities (2021) Public Health Profiles. Available online at: https://fingertips.phe.org.uk/ Accessed Feb 2024.

[15] ONS (2022) Census 2021.

10.3.51 In terms of disability,19% of the population within the study area are categorised as disabled under the Equality Act, in comparison to 21% in East Suffolk, and 17% for both the region and nationally.

10.3.52 In terms of deprivation, the Study area falls within an area which is categorised as being within the 40% most deprived neighbourhoods in the country under the Overall Deprivation domain and is within the 20% least deprived in terms of the Health Deprivation and Disability domain.

10.3.53 Data on life expectancy is recorded at local authority level. The female average life expectancy at birth is 83.7 years in East Suffolk, which is above the national average of 82.8 years. Male life expectancy at birth is also slightly above the national average (78.7 years) at 79.9 years in East Suffolk[16].

10.3.54 Data on deaths from respiratory diseases are recorded at the local authority level. The standardised mortality ratio from respiratory disease in East Suffolk is 83.2 per 100,000 people, which is lower than the national rate of 100 (per 100,000).

Mental Health and Wellbeing in Suffolk

10.3.55 Suffolk Minds is an independent mental health charity which is gathering anonymous data from the local population in Suffolk in order to ascertain the emotional and mental health needs of the communities in Suffolk. The charity publishes an annual report[17] which considers how was the population's wellbeing based on twelve needs[18]: sleep, movement, food & drink, security, control, attention, status, community privacy, emotional connection, achievement, meaning & purpose. Data is gathered at Suffolk level, therefore no information is provided at Study Area level.

10.3.56 For 2022, the charity has received 203 responses from those within Suffolk between 1st June and 1st September 2022. Of all respondents, just 30.5% are meeting their overall needs.(i.e. having an overall average score of one or more across all Needs combined).

10.3.57 Community is the least well met emotional Need on average. It is also much lower than Emotional Connection and Close Relationships, which indicates that people are feeling less connected in larger groups. Three in five people in Suffolk didn't feel like they were part of a wider community during Summer 2022, compared with less than one in two for the previous two Summers.

10.3.58 Achievement is a less well met Need on average (falling below one), suggesting that people in Suffolk may not be feeling as stretched in their daily lives as they would like, and may not feel much internal achievement about their actions. Meaning & Purpose is another less well met Need on average, which indicates that people may not be feeling purposeful about their actions.

10.3.59 Both Value and Status are less well met Needs on average, although Value is better met than Status. This suggests that, on average, people are feeling that they are more appreciated for their actions than they are as individuals. Security and Control are also

[16] Office for Health Improvement and Disparities (2021) Public Health Profiles. Available online at: https://fingertips.phe.org.uk/ Accessed Feb 2024.

[17] Suffolk Minds (2023) Suffolk Mind Summer 2022 Wellbeing Report, Available online at: https://www.suffolkmind.org.uk/wp-content/uploads/2023/03/Suffolk-Mind-Summer-2022-Wellbeing-Report.pdf Accessed Feb 2024.

[18] They score each Need from -3 (not met at all) to +3 (very well met). A score below 1 means the Need is not well met and the person is susceptible to stress and therefore mental ill health.

less well met Needs, on average. External factors may be presenting barriers to Suffolk's ability to meet these Needs, as financial concerns have grown out of the pandemic and persisted with the cost-of living crisis. In comparison, Privacy is well met on average, being much higher than Security and Control (which are both sitting below zero). This demonstrates that, on average, people feel able to obtain privacy when they need to, and this is important as it allowed us to process our thoughts and emotions throughout the day. Unfortunately, all the physical Needs (of Sleep, Movement, and Food & Drink) are unmet on average, with Sleep being the least well met Need overall.

Future baseline

10.3.60 The health and wellbeing chapter within the PEI Report and ES will consider changes which may occur in the absence of the proposed Onshore Scheme. The future baseline will also take into account any developments that are likely to be present in the future baseline.

10.3.61 The Joint Strategic Needs Assessment[19] for Suffolk provides information on the physical and mental health and well-being of Suffolk's communities. This identifies future trends, including:

- Suffolk's total population is forecast to increase by nearly 7% over the next 20 years, with the proportion of older people within the population increasing by 34%;
- Suffolk's population is ageing and the number of people living with frailty is expected to double in the next 20 years. In 2037 there will be about 10 times the number of patients with 2 or more comorbidities than in 2017[20];
- Life expectancy gains in Suffolk are slowing and, in some cases, disappearing. In 2018-20, life expectancy for women did not increase compared to 2015-17, whilst life expectancy for men decreased by 0.2 years over the same period; and
- Average pay for residents and workers in Suffolk reduced in comparison to the Great Britain average between 2019 and 2021[21].

10.4 Potential impacts

10.4.1 This section identifies the potential impacts that could occur as a result of the proposed Onshore Scheme during construction and operation based on the baseline information collected for EIA scoping.

Construction

10.4.2 The following impacts on health determinants could occur during the construction phase.

[19] https://www.healthysuffolk.org.uk/JSNA. Accessed Feb 2024.

[20] Suffolk JSNA Healthy Ageing Needs Assessment Summary. July 2018

[21] Suffolk in 20 years – healthy, wealthy and wise? Summary. Suffolk Public Health & Communities, November 2022. chrome-extension://efaidnbmnnnibpcajpcglclefindmkaj/https://www.healthysuffolk.org.uk/asset-library/suffolk-in-20-years-2023.pdf

- Environmental impacts on air quality, noise, visual amenity and lighting have the potential to impact on wellbeing and quality of life for communities close to areas of construction;
- Temporary closure and diversion of public rights of way (PRoWs) within the Onshore Scoping Boundary may affect severance, opportunities for exercise and access to green space;
- Construction traffic may impact air quality, noise and neighbourhood amenity. Traffic may also cause temporary severance due increased journey times for motorists, and reduced access for pedestrians and cyclists;
- Loss of land, severance and amenity impacts may cause directly or indirectly impact local services and community facilities;
- The proposed Scheme has the potential to provide employment and training opportunities to local communities and benefit local businesses through the supply chain; and
- Disturbance or release of contamination in soil or groundwater as a result of construction activities.

Operation

10.4.3 The following impacts could occur during the operational phase:

- Low levels of disturbance of the local population during routine maintenance activities or regular operation of the proposed Onshore Scheme; and
- Electro-Magnetic Fields (EMF) generated by electrical equipment such as underground cables and sub-stations are potentially harmful to health.

10.5 Design and control measures

10.5.1 As outlined in **Chapter 5** EIA Approach and Method, a standard hierarchical approach will be taken to mitigation.

10.5.2 The assessment of effects will take into account measures that are embedded into the proposed Onshore Scheme design, together with general good practice measures.

Design measures

10.5.3 Where it is not possible to avoid sensitive receptors, a number of measures will be embedded into the design to limit any effects.

10.5.4 Potential embedded design measures include:

- Where possible, the proposed Onshore Scheme would be designed to avoid residential properties, community facilities and amenities as well as visitor attractions; and
- Where possible, there will be directional and informational signage erected to signpost where paths are closed.

Control measures

10.5.5 Potential control measures include:

- A Community Framework would be produced, which would set out the key measures to protect the community from adverse effects and provide a process for dealing with concerns or complaints. Appropriately experienced community relations personnel employed to implement the Framework and provide a point of contact for community issues.
- A qualified and experienced Environmental Clerk of Works would be appointed during the construction phase to advise, supervise and report on the delivery of the mitigation methods and controls.
- Those potentially affected by the proposed construction works (e.g. local residents, occupiers, businesses, local authorities and parish councils) would be informed in advance of works taking place in accordance with the Community Framework.
- Appropriate controls would be put in place to protect the health and wellbeing of local communities and residents on the site from the effects of construction activities where reasonably practicable. This would include the following measures:
  - control measures to minimise exposure to plant and vehicle emissions;
  - control measures to minimise exposure to construction;
  - use of appropriate hoarding and maintenance of vegetation buffer strips to screen the visual effects of construction activities from local residents and community assets;
  - use of appropriate lighting to prevent glare;
  - maintaining access to residential amenities, recreational and community facilities throughout the construction period, with appropriate diversions implemented where practicable;
  - managing access to designated PRoW crossing the working area, with closures limited as far as reasonably practicable. Any required temporary diversions would be clearly marked at both ends with signage explaining the diversion, the duration of the diversion and a contact number for any concerns; and
  - construction vehicles would be limited to designated routes and appropriate safety measures implemented including driver safety training, signage and appropriate traffic management measures at pedestrian and cycle crossing points.

10.5.6 Further details of measures relating to the management of community health, wellbeing and safety would be provided in the Construction Traffic Management Plan (CTMP) and relevant sections of the CoCP.

10.6 Scope of the assessment

10.6.1 This section identifies the potential for the proposed Onshore Scheme to give rise to likely significant effects, taking into account the design and control measures identified in **Section 10.5**.

10.6.2 **Table 10-1** sets out the receptors identified within the study area, the potential impacts as a result of construction and/or operation activities associated with the proposed Onshore Scheme, whether these impacts are likely to give to rise to significant effects, and whether the receptor is scoped in or scoped out of the assessment.

10.6.3 The proposed Friston Substation, as described in **Chapter 2** proposed Scheme Description outlines the optionality that remains at Friston Substation. The scope of this EIA Scoping Chapter has been based on the worst case scenario that the proposed Onshore Scheme would construct Friston Substation.

10.6.4 All identified impacts are of relevance to both the Southwold and Walberswick options unless specified otherwise.

10.6.5 A precautionary approach has been taken and where there is no strong evidence base, insufficient baseline or the significance is uncertain at this stage the impact has been scoped into the EIA. Where there is a clear evidence base that the effect from the impact will not be significant, either alone or in combination with other plans and projects, the impact has been scoped out of the EIA.

Table 10-1 Proposed scope of the assessment

Project phase	Receptor	Impact	Potential for significant effect	Proposed to be scoped in/ out
Construction	Residential Population within the study area	Construction activity including construction plant and vehicle traffic could lead to increase in air pollutants, noise, visual intrusion and the introduction of localised lighting.	Whilst short-term and temporary in nature, it is considered that there is potential for significant effects on quality of life and wellbeing for the residential population as a result of the proximity of construction to residential areas.	Scoped in
Construction	Residential Population within the study area	Temporary closure and diversion of public rights of way (PRoWs)	Whilst short-term and temporary in nature, it is considered there is potential for significant effects on ability to access green space and opportunities for exercise for the residential population as a result of temporary closure and diversion of PRoWs	Scoped in
Construction	Amenity and community facilities within the study area	Construction traffic, road closures and diversions could impact ability to access community amenity and facilities.	Whilst short-term and temporary in nature, it is considered that there is potential for significant effects on access to amenities and community facilities as a result of disruption to motorists, pedestrians and cyclists, resulting in potential adverse effects on wellbeing.	Scoped in
Construction	Amenity and community facilities	Loss of land, severance and amenity impacts may directly or indirectly impact local services and community facilities	Whilst short-term and temporary in nature, it is considered that there is potential for significant effects on loss of land, severance and amenity impacts resulting in reduced access to/quality of services for local communities.	Scoped In

Project phase	Receptor	Impact	Potential for significant effect	Proposed to be scoped in/ out
Construction	Residential Population within the study area	Employment and training opportunities to local communities and impact on local businesses	Whilst short-term and temporary in nature, it is considered there is potential for significant effects on employment and training opportunities to local communities and benefit local businesses through the supply chain. Improved incomes and employment prospects have a potentially positive effect on wellbeing.	Scoped In
Construction	Residential Population within the study area	Disturbance or release of contamination in soil or groundwater as a result of construction activities	Disturbance or release of contamination in soil or groundwater as a result of construction activities has the potential to affect health. Ground investigation and assessment of known contamination sources will ensure that remediation is completed where contamination is present. Best practice control measures set out in a CEMP or Outline Code of Construction Plan (CoCP) will prevent uncontrolled releases of contamination. With these measures in place, the risk of exposure to soil and groundwater contamination will be prevented and adverse health effects will be avoided.	Scoped Out
Operation	Study area Residential Population	Noise, air emissions and visual intrusion resulting from maintenance activities.	Once the proposed Onshore Scheme is operational, the potential for significant health and wellbeing effects on the residential population is likely to be low, due to the periodic nature and small scale of maintenance works.	Scoped out

Project phase	Receptor	Impact	Potential for significant effect	Proposed to be scoped in/ out
Operation	Study area Amenity and community facilities	Traffic generated by maintenance activities.	Once the proposed Onshore Scheme is operational, the potential for significant health and wellbeing effects due to disruption of motorists, pedestrians and cyclists is likely to be low, due to the low level of additional traffic movements.	Scoped out
Operation	Study area Residential Population	EMF generated by electrical equipment such as underground cables and sub-stations	EMF generated by electrical equipment such as underground cables and sub-stations are potentially harmful to health. National Grid's policy is only to design and install equipment that is compliant with the relevant exposure limits, including those set out in the International Commission on Non-Ionizing Radiation Protection (ICNIRP) guidance. To ensure this, a full EMF assessment will be undertaken during the detailed design phase on all equipment capable of producing EMFs and appropriate measures implemented to ensure compliance will all relevant standards and legislation. With these measures in place, the risk of exposure to harmful EMFs will be prevented.	Scoped Out

10.7 Assessment methodology

Data sources

10.7.1 The assessment will be informed by desk studies. The baseline desk studies will build upon the scoping baseline using publicly available data and literature.

10.7.2 Where possible, the data for the chapter will be obtained at the lowest level of granularity available, which is the LSOA level. Data will be obtained from the following publicly available online sources:

- Office for National Statistics (ONS) 2021 Census[22];
- 2019 Index of Multiple Deprivation (IMD)[23]; and
- Office for Health Improvement & Disparities – Local Health Profile[24].

Legislation, policy and guidance

10.7.3 Legislation and policy relevant to the proposed Scheme and this chapter is outlined in **Chapter 4** Legislation and Policy Overview and **Appendix 4-A** National Policy, **Appendix 4-B** Environmental Legislation and **Appendix 4-C** Local Policy.

10.7.4 Relevant guidance and standards that have informed the scoping process are listed below (but not limited to) and will also be taken into account as part of the assessment:

- Institute of Environmental Management and Assessment (IEMA) (2017) Health in Environmental Impact Assessment - A Primer for a Proportionate Approach[25];
- IEMA (2022) Determining Significance for Human Health in Environmental Impact Assessment[26];
- IEMA (2022) Effective Scoping of Human Health in Environmental Impact Assessment[27]; and
- International Association for Impact Assessment (IAIA) (2020) Human health: Ensuring a high level of protection. A reference paper on addressing Human Health in Environmental Impact Assessment[28].

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[22] Office for National Statistics (ONS). Census 2021. Available online at: www.nomisweb.co.uk. Accessed Feb 2024.

[23] English Index of Multiple Deprivation (IMD). Available online at: www.gov.uk/statistics/english-indices-of-deprivation-2019. Accessed Feb 2024.

[24] Office for Health Improvement & Disparities Local Health Profile. Available online at: https://fingertips.phe.org.uk/profile/health-profiles

[25] https://www.iema.net/resources/reading-room/2017/07/18/delivering-proportionate-eia Accessed Feb 2024.

[26] https://www.iema.net/resources/blog/2022/11/17/launch-of-the-eia-guidance-for-considering-impacts-on-human-health Accessed Feb 2024.

[27] https://www.iema.net/resources/blog/2022/11/17/launch-of-the-eia-guidance-for-considering-impacts-on-human-health Accessed Feb 2024.

[28] https://www.iaia.org/uploads/pdf/Human%20Health%20Ensuring%20Protection%20Main%20and%20Appendices_compressed.pdf Accessed Feb 2024.

Assessment method

10.7.5 **Chapter 5** EIA Approach and Method sets out the standard EIA methodology and matrices to be used for the assessment. The methodology is based on the principle that the environmental effects will be determined by identifying potential receptors, assigning receptor value, assessing the magnitude of change on the receptor and then identifying the significance of the effect. This section provides a summary of the EIA methodology specifically relevant to this chapter.

10.7.6 Assessment of cumulative and combined effects are discussed in **Chapter 29** Cumulative and Combined effects of the Project.

10.7.7 In line with best practice as set out in the guidance documents above, the proposed health assessment methodology will be based on the 'wider determinants of health" model[29]. The assessment will include:

- Policy review: a review of the relevant national and local health policy context;
- Baseline conditions: a profile of the local community will be compiled using publicly available baseline data, focusing on population demographics, socio-economic status and health indicators (including mental health and indicators, using data obtained from Suffolk Minds at Suffolk County level and Office for Health Improvement and Disabilities (OHID) data at East Suffolk level). Vulnerable groups within the population will be identified;
- Evidence review: a review of publicly available evidence will be undertaken to establish the links between the identified health determinants and potential health outcomes;
- Assessment of health effects: a qualitative assessment will be undertaken to identify impacts on the determinants of health, and potential health outcomes for the study population, including particular focus on vulnerable groups. The qualitative assessment of health outcomes will be based on magnitude, duration and exposure of impact taking account of the size and sensitivity of population exposed; and
- Mitigation and enhancement: subject to the outcome of the assessment, measures to mitigation significant adverse effects and improve health outcomes will be identified.

10.7.8 IEMA published guidance called "Effective Scoping of Human Health in Environmental Impact Assessment" in 2022, which provides detailed guidance on health in Scoping Reports and proportionality. This EIA Scoping Report has been written with consideration of this guidance to ensure relevant determinants of health are scoped in and out, based upon specific factors for the proposed Onshore Scheme.

10.7.9 The assessment of likely significant health effects will follow IEMA's guidance on "Determining Significance for Human Health in Environmental Impact Assessment" (2022). This guidance presents a framework that supports a proportionate approach to assessing significance, which can apply to all scales of EIA. Certain principles apply in all cases, including applying a population health approach (as opposed to health of individuals) and considering health inequalities.

[29] Public Health England (no date) Wider Determinants of Health. Available at: https://fingertips.phe.org.uk/profile/wider-determinants#:~:text=Wider%20determinants%2C%20also%20known%20as,the%20conditions%20of%20daily%20life Accessed Feb 2024.

10.7.10 The IEMA guidance provides indicative criteria to inform judgements of magnitude and sensitivity. It recommends that the use of these terms is supported by a narrative explaining the rationale for the assessment. IEMA recommends an approach based on magnitude and sensitivity levels, or categories, using a matrix. The guidance notes that the matrix is only a tool to assist with judgement and that there are no clear cut-off points between categories. The point at which an impact changes category is a professional judgement and should be supported by evidence and justification.

10.8 Assumptions & limitations

10.8.1 This EIA Scoping Report has been collated based on a range of publicly available data and information only. It is assumed that the data collated is accurate. The data will be supplemented with additional data as part of the EIA process.

10.8.2 In the absence of data, a precautionary approach has been taken and professional judgement, based on experience of similar linear schemes, has been used where required to inform the scope of the assessment.

10.8.3 This EIA Scoping Report considers health effects and data at the population level, rather than health data and effects relating to individuals. The aggregated data and statistics used to support this assessment cannot be used to make inferences about the health of individuals within the communities assessed.

10.8.4 The health evaluation is a qualitative process based on professional judgement. Conclusions about the likely health effects are based on experience and knowledge of the scientific evidence linking health determinants with health outcomes.

Contents

11. Historic Environment

11.1 Introduction

11.1.1 This chapter outlines the proposed scope and methodology for Historic Environment. It will consider the potential for significant effects arising from construction and operation of the LionLink Interconnector (hereafter referred to as 'the proposed Onshore Scheme') on historic environment receptors. A review of relevant guidance and policy has been undertaken together with a desk-based review of existing data, to inform the proposed scope and methodology.

11.1.2 This chapter is supported by the following appendices and figures:

- **Appendix 11-A**: Gazetteer of known Designated and Non-Designated Heritage assets;
- **Figure 1-2**: Proposed Onshore Scheme Scoping Boundary;
- **Figure 1-3:** Proposed Onshore Scheme Scoping Boundary and Scheme Components;
- **Figure 11-1**: Historic Environment Constraints Map; and
- **Figure 11-2**: Non-Designated Heritage Assets.

11.1.3 There may be interrelationships with other disciplines. Therefore, this chapter should be read in conjunction with the following chapters:

- **Chapter 8**: Ecology and Biodiversity – Historic mapping and professional judgement will contribute to the identification of areas of potential Ancient Woodland;
- **Chapter 9** Geology and Contamination - Land contamination may adversely impact the historic environment resource and interfere with survey methods;
- **Chapter 13** Landscape and Visual - Changes to the setting of heritage assets which do not result in impacts to their significance may still result in significant landscape/visual effects;
- **Chapter 14** Noise and Vibration - Changes to noise and vibration levels can result in effects on heritage assets; and
- **Chapter 26** Marine Archaeology - Impacts on marine archaeological receptors are considered separately within this chapter.

11.2 Consultation and engagement

11.2.1 Consideration has been given to responses received at Non-Statutory Consultations held in 2022 and 2023 in preparing this scoping chapter. Responses relating to Historic Environment have been received from the following:

- National Trust;
- Historic England;

- Suffolk County Council (SCC);
- East Suffolk Council (ESC);
- Suffolk Preservation Society;
- Parish and Town Councils: Friston Parish Council, Aldringham-cum-Thorpe Parish Council, Dunwich Parish Council, and Aldeburgh Town Council.

11.2.2 The main themes reported as part of the Non-Statutory Consultations were:

- The identification of specific heritage assets which contribute to the historic character of the landscape within the proposed Onshore Scheme Scoping Boundary, including work to identify heritage assets which do not form part of the existing record;
- The importance of maintaining the setting of heritage assets and Conservation Areas, where this contributes to their significance;
- The cumulative impact on heritage assets with other projects in the area; and
- The need for Heritage Impact Assessment to be undertaken, in compliance with Historic England's latest advice and guidance.

11.2.3 Engagement has been undertaken with SCC and ESC in August and October 2023, and Historic England in October 2023. The key points of discussion included:

- The importance of a transparent approach in the assessment of impact on potential sites of heritage sensitivity; and
- Areas of known heritage significance which could receive impacts from the proposed Onshore Scheme.

11.2.4 Historic England's discretionary advice service has been engaged on the project as of October 2023, which will allow feedback to be sought on potential impacts and survey methodology.

11.2.5 Further engagement will be undertaken with relevant stakeholders in relation to the proposed Onshore Scheme to obtain any information that they hold to supplement the assessment and to seek their views with regards to the evolving design.

11.2.6 The following bodies will be consulted during the EIA process in relation to Historic Environment:

- SCC;
- ESC; and
- Historic England.

11.2.7 In addition, engagement will be undertaken with non-statutory stakeholders as required so that their specialist local views and expertise can be considered as part of the EIA process.

11.3 Baseline conditions

Study area

11.3.1 The study area for Historic Environment includes all land within the proposed Onshore Scheme Scoping Boundary (hereafter referred to as 'the Onshore Scoping Boundary'), as shown on **Figure 11-1**.

11.3.2 For certain receptors the study area also includes land beyond the Onshore Scoping Boundary within an additional buffer. Buffer distances are based upon the characteristics and sensitivity of the receptor, informed by professional judgement to determine an appropriate Zone of Influence.

11.3.3 The study area for baseline data collection includes a buffer that extends 1km from Scoping Boundary for Designated Heritage Assets. For Non-Designated Heritage Assets, the study area comprises the Onshore Scoping Boundary. This is due to the fact that based on professional judgment, non-designated assets beyond the Onshore Scoping Boundary are highly unlikely to experience significant effects as a result of changes to their settings due to the presence of the proposed Onshore Scheme.

11.3.4 The study area will be reviewed and, as appropriate, refined for the assessment in the Preliminary Environmental Information (PEI) Report and Environmental Statement (ES) with only one Landfall and one High Voltage Direct Current (HVDC) Underground Cable Corridor being taken forward. The study area will be based on the proposed Order limits in the ES.

Baseline data sources

11.3.5 The baseline described in this chapter has been informed by the following data sources:

Table 11-1 Scoping baseline data sources

Baseline Data	Source
The National Heritage List for England (NHLE)	Historic England
Suffolk Historic Environment Record (SHER)	Suffolk County Council
Freely available historic Ordnance Survey mapping	National Library of Scotland

Baseline

11.3.6 The following sections present the existing baseline established at scoping. There are currently two options being considered for the proposed Landfall Site and associated HVDC Underground Cable Corridor, which are shown in **Figure 1-2** and **Figure 1-3**. Baseline information is presented for the two options below.

11.3.7 Where time periods are referred to in the text, they reference the date ranges set out in **Table 11-2** below.

Table 11-2 Definition of archaeological time periods

Period name	Date range	Additional periods, where needed
Palaeolithic	500,000 – 10,000BC	
Mesolithic	10,000 – 4,000BC	
Neolithic	4,000 – 2,200BC	
Bronze Age	2,200 – 700BC	
Iron Age	800BC – AD43	
Romano-British	AD43 - 410	
Early medieval	410 - 1066	
Medieval	1066 - 1540	
Post-medieval	1540 - 1901	Tudor - 1485 - 1603 Elizabethan - 1558 - 1603 Stuart - 1603 – 1714 (Jacobean 1603 – 1625) Hanoverian – 1714 –1837 (Georgian 1714– 1830) Victorian - 1837 - 1901
20th Century	1901 - 2000	
21st Century	2001 – present	

Designated Heritage Assets

11.3.8 Designated assets within the study area are presented in **Table 11-3**.

Table 11-3 Designated heritage assets.

Asset type and total quantity	Asset name	NHLE number
11 Grade I Listed Buildings	The Church of St Peter	1030612
	St Peter's Church	1030681
	Holy Trinity Church	1030710
	Church of St Peter and St Paul	1182389
	Church of All Saints	1182809
	Church of All Saints	1198791
	St Mary's Abbey	1215753
	Church of St Peter	1227756

Asset type and total quantity	Asset name	NHLE number
	St Andrew's Church	1283823
	Church of St Mary	1284129
	Church of St Edmund	1384321
23 Grade II* Listed Buildings	Holy Trinity Church	1030647
	Church of St Margaret	1032100
	Church of St Margaret	1032142
	Church Farmhouse	1183173
	Uggeshall Hall	1183331
	Darsham House	1198761
	Moor Farmhouse	1199307
	Friston Post Mill	1215741
	Church of St Lawrence	1215745
	Buxlow Manor	1215749
	Theberton House	1228378
	Church of St John Baptist	1268184
	Church of St Mary Magdalene	1278252
	St Peter's Church	1283793
	Leiston House Farmhouse	1287646
	Church of St Mary	1287864
	Church of St Andrew	1352590
	The Beeches including Stable Block	1365996
	White Hart Inn	1377198
	Sutherland House	1384369
	Manor House and Manor Gate Including Forecourt Walls	1384370
	Buckenham House	1384375
	Lloyds Bank	1384386
416 Grade II Listed Buildings	See **Appendix 11-A**	
	Blythburgh Priory	1005962

Asset type and total quantity	Asset name	NHLE number
Seven Scheduled Monuments	Moated site in Moatyard Covert	1005978
	Moated site at Lymball's Farm	1007682
	Bowl barrow west of Fen Covert, 305m south of Fen Cottage	1011381
	Bowl barrow on Tinker's Walks, 950m WSW of Eastwoodlodge Farm	1011382
	Bowl barrow on Tinker's Walks, 740m west of Eastwoodlodge Farm	1011385
	Leiston Abbey (second site) and moated site	1014520
One Registered Park or Garden	Henham	1000557
Eight Conservation Areas	Southwold	N/A
	Southwold Harbour and Walberswick Quay	N/A
	Westleton	N/A
	Darsham	N/A
	Walberswick	N/A
	Blythburgh	N/A
	Saxmundham	N/A
	Wangford	N/A

11.3.9 All designated heritage assets are considered to be of national significance and high value.

11.3.10 Within the Onshore Scoping Boundary there are the following designated assets (see **Figure 11-1**):

- Five Grade II* listed buildings:
  Church Farmhouse, Sotherton [1183173]; Moor Farmhouse, Middeton [1199307]; Buxlow Manor, Knodishall [1215749]; Church of St Mary, Friston [1287864] Church of St Andrew, Sotherton [1352590];
- 54 Grade II listed buildings (see **Appendix 11-A** for complete list);
- Two scheduled monuments:
  Moated site in Moatyard Covert, south of Uggeshall [1005978]; Bowl barrow on Tinker's Walks, 950m west-south-west of Eastwoodlodge Farm [1011382];

- One registered park or garden: Henham, within the proposed Underground HVDC Cable Corridor Southwold to the south of Uggshall [1000557]; and
- One conservation area: Blythburgh village, at the boundary between the proposed Southwold, Walberswick and common Underground HVDC Cable Corridors.

Non-designated Heritage Assets

11.3.11 The SHER contains 413 entries relating to heritage assets within the Onshore Scoping Boundary. These range in date from the early Palaeolithic period to the 20th century in date (see **Appendix 11-A** for complete list of Non-Designated Heritage Assets).

11.3.12 Evidence for the earliest prehistoric periods is rare within the within the Onshore Scoping Boundary. Two assets of Mesolithic date (MSF2345; MSF31170) are noted within the SHER with a number of Neolithic artefacts also recorded. No earthworks or other indications of settlement and agricultural activity are recorded within the Onshore Scoping Boundary however, these are recorded in the nearby landscape.

11.3.13 Later prehistoric features including Bronze Age mounds, barrows, burial sites and enclosure ditches, indicate widespread activity across a landscape increasingly shaped by human activity. The Iron Age is less well attested in the SHER, however there is a notable increase in the range of material culture recovered and a number of later prehistoric features and cropmarks which may date to this period. The SHER records 77 features of Unknown date within the Onshore Scoping Boundary, many of which are likely to be associated with early agricultural transformation of the landscape with a suggested later prehistoric date.

11.3.14 The later Iron Age and Romano-British Period are visible primarily through findspots of pottery and metalwork/coinage, however, the well-developed agricultural systems in place by this period, and the local communities which staffed them, are evidenced by records of field systems and rural settlement. Several burials and cemetery sites have also been identified, along with a potential villa near the village of Darsham, which lies just outside of the Onshore Scoping Boundary.

11.3.15 When compared to the Romano-British period, Early Medieval activity appears far less prominent in the archaeological record. This is most likely due to the continued settlement regeneration of historic village cores which date from this period leading to the destruction or obfuscation of earlier activity. Evidence of agricultural activity from this period may also have been overwritten by later medieval and post-medieval features, as cultivation techniques and equipment from later periods allowed for deeper breaking of the soil.

11.3.16 Substantial medieval activity survives across the Onshore Scoping Boundary in the form of historic settlement cores, fossilised field systems and associated features, and medieval elements of church buildings and graveyards. Numerous artefact scatters and findspots associated with medieval activity are also recorded, giving this period a high level of visibility in the archaeological record.

11.3.17 Post-medieval activity is similarly abundant, encompassing a broad date range of agricultural features, finds scatters and, latterly, industrial element related to the 18th/19th century industrial revolution. Whilst the area covered by the Onshore Scoping Boundary remained largely rural, industrial elements such as new railway infrastructure (MSF30698; MSF35003) attest to more dramatic changes and population centre expansion in the wider landscape during this time.

11.3.18 Assets associated with World War Two military defences comprise the majority of Modern period features recorded within the Onshore Scoping Boundary. Gun emplacements and air defences are recorded alongside anti-tank ditches and trenches dug in preparation for enemy beach landings. A number of pill-boxes survive across the landscape, both on the coast and further in land.

11.3.19 Ancient Woodland is an ecological designation and will be considered as part of **Chapter 8** Ecology and Biodiversity**.** Any Important Hedgerows will also be considered within that chapter.

Proposed Friston Substation Site

11.3.20 There are no heritage assets recorded on the SHER within the proposed Friston Substation Site.

11.3.21 Geophysical survey for the onshore component of the East Anglia TWO Offshore Windfarm[1] identified only broad linear trends in this area caused by agricultural activity (usually as a result of repeated ploughing or land drains).

Underground HVAC Cable Corridor

11.3.22 The proposed Underground High Voltage Alternating Current (HVAC) Cable Corridor includes the following Designated Heritage Assets:

- The Church of St Mary, Friston (Grade II* Listed, 1287864); and
- Nine Grade II Listed buildings

11.3.23 As outlined above (see **11.3.8-11.3.19**), there is broad potential across proposed HVAC Underground Cable Corridor for later prehistoric and Romano-British activity linked to early agricultural development and settlement of the area.

11.3.24 The dominant historic landscape character remains agricultural from the Early Medieval to the Modern periods, however fluctuations in settlement patterns over time mean there is potential for settlement remains and cemetery sites to exist outside of modern village and town boundaries. The Onshore Scoping Boundary was heavily impacted by defensive infrastructure associated with World War Two, not all of which may have been formally recorded.

Converter Station Site

11.3.25 The SHER notes a former area of woodland (MSF19469) as being located within the proposed Converter Station Site, however this has now been converted completely to large agricultural fields under arable cultivation. A number of post-medieval farmsteads are located nearby, with the Grade II listed Wood Farmhouse (NHLE1231179) to the immediate west. The historic settlement core (and Conservation Area) of Saxmundham is located 180m to the west.

[1] Scottish Power Renewables (2019) East Anglia TWO Offshore Windfarm. Environmental Statement: Appendix 24.4 Proposed Onshore Cable Corridor and Substation Sites: Geophysical Survey Report . Available online: https://infrastructure.planninginspectorate.gov.uk/wp-content/ipc/uploads/projects/EN010078/EN010078-001538-6.3.24.4%20EA2%20ES%20Appendix%2024.4%20Geophysical%20Survey%20Report%20Part%201%20of%202.pdf Accessed Feb 2024.

Underground HVDC Cable Corridor

11.3.26 The proposed Underground HVDC Cable Corridor (comprises the proposed Underground HVDC Common Cable Corridor and both the Southwold and Walberswick Underground HVDC Cable Corridor options, see **Figure 1-3**), includes the majority of the Designated and Non-Designated Heritage Assets discussed above, with the exclusion of those Designated Heritage Assets identified as within the HVAC corridor above (see **11.3.8-11.3.19**). There is broad potential across proposed Underground HVDC Cable Corridor for later prehistoric and Romano-British activity linked to early agricultural development and settlement of the area.

11.3.27 The dominant historic landscape character remains agricultural from the Early Medieval to the Modern periods, however fluctuations in settlement patterns over time mean there is potential for settlement remains and cemetery sites to exist outside of modern village and town boundaries. The Onshore Scoping Boundary was heavily impacted by defensive infrastructure associated with World War Two, not all of which may have been formally recorded.

Landfall Site

11.3.28 There are currently two potential options for the proposed landfall site.

11.3.29 Both proposed Landfall Site lies within the defined boundary of the Suffolk Heritage Coast. The heritage coast is designated for landscape characteristics and is covered in **Chapter 13** Landscape and Visual, therefore is not considered any further in this chapter.

11.3.30 In 2023 the UK Government identified its Tentative List of places it is backing to win United Nations Educational, Scientific and Cultural Organisation (UNESCO) World Heritage Status. This included the East Atlantic Flyway – England East Coast Wetlands, a migratory bird route over western parts of Europe including Yorkshire, Lincolnshire, Norfolk, Suffolk, Essex and Kent. This potential UNESCO site is not designated for heritage characteristics and is not considered any further in this chapter, refer to **Chapter 8** Ecology and Biodiversity.

Southwold

11.3.31 The SHER records four non-designated heritage assets which fall, at least in part, within the proposed Southwold Landfall Site. The proposed Southwold Landfall Site is located on the former site of Reydon Common, a former green and grazing area which is now partially submerged at its easter extent. Several examples of World War Two defence infrastructure are recorded as having intersected with the site boundary; two possible gun emplacements (MXS19259), anti-invasion defences (MXS19257) and tank trenches (MXS18836). The current condition of these features is unknown, however, archaeological evidence may remain of cut features into the landscape.

11.3.32 The proposed Southwold Landfall Site lies within the defined boundary of the Suffolk Heritage Coast.

Walberswick

11.3.33 The proposed Walberswick Landfall Site lies within an area of high archaeological potential associated with Saxon settlement during the Early Medieval and Medieval periods (Non-Designated SHER assets: MSF25241; MSF9131). Roman, medieval and post-medieval finds (Non-Designated SHER assets: MSF12476; MSF12475;

MSF14328) are also recorded from fieldwalking and metal detecting activities. The proposed Walberswick Landfall Site boundary runs adjacent to the Walberswick Conservation Area, which contains eight Grade II listed buildings, and one Grade I listed church (NHLE 1283823).

Future baseline

11.3.34 The Historic Environment chapter within the PEI Report and ES will consider changes which may affect the future historic environment in the absence of the proposed Onshore Scheme. The future baseline will also take into account any developments that are likely to be present in the future baseline.

11.3.35 No major changes in land use are anticipated which would result in any future significant change to the current Historic Environment baseline.

11.4 Potential impacts

11.4.1 This section identifies the potential impacts that could occur as a result of the proposed Onshore Scheme during construction and operation based on the baseline information collected for EIA scoping.

Construction

11.4.2 The following impacts could occur during the construction phase:

Permanent

11.4.3 Direct impacts from the excavation of cable trenches, landscaping and preparation works for construction compounds, access roads, construction of the proposed Landfall, proposed Converter Station and proposed Friston Substation, including impacts from vibration. These could lead to a change in the setting of heritage assets, which could impact their significance, or the partial or total loss of heritage assets.

Temporary

- Presence of security fencing, construction compounds, haul roads, and contractor welfare facilities with security lighting; and
- Increased light and noise as a result of construction activities resulting in a change to the setting of heritage assets and, potentially, loss of their significance.

Operation

11.4.4 The following impacts could occur during the operational phase:

- The presence of new above ground infrastructure including the proposed Converter Station and proposed Friston Substation; and
- The presence of potential new sources of light and noise resulting in a change to the setting of heritage assets and, potentially, loss of their significance.

11.5 Design and control measures

11.5.1 As outlined in **Chapter 5** EIA Approach and Method, a standard hierarchical approach will be taken to mitigation.

11.5.2 The assessment of effects will take into account measures that are embedded into the proposed Onshore Scheme design, together with general good practice measures.

Design measures

11.5.3 The design of the proposed Onshore Scheme would be informed by an understanding of the historic environment and areas of high archaeological potential, allowing mitigation by design.

11.5.4 If it is not possible to avoid impacts to heritage assets through design, mitigation measures would be applied (see below **11.5.5**-**11.5.7**).

Control measures

11.5.5 Assessment of archaeological potential and the need for further mitigation would be informed by targeted geophysical and topographic/landscape survey. Where appropriate this would be supplemented by a targeted scheme of trial trenching.

11.5.6 If avoidance is not possible detailed archaeological excavation of features that would be directly impacted by the proposed development would take place. The scope of these works would be agreed with the Suffolk County Council archaeological officer (and in the case of nationally significant assets, Historic England), and described in an Overarching Written Scheme(s) of Investigation (OWSI), and their implementation would be secured through Development Consent Order (DCO) Requirement.

11.5.7 The following control measures will be secured:

- The Applicant and Principal Contractor would manage the impact of construction works on cultural heritage assets, including:
  - designated assets: scheduled monuments; listed buildings, registered park sand gardens; conservation areas and registered historic battlefields; and
  - non-designated assets: archaeological and palaeo-environmental remains including geological deposits that may contain evidence of the human past, historic landscapes and historic buildings and the built environment and locally designated assets.
- The Principal Contractor would carry out construction works in such a way as to ensure that disturbance to all heritage assets is managed in accordance with accepted historic environment practice and, where disturbance cannot reasonably be avoided, is controlled and limited as far as reasonably practicable.
- The Applicant would develop a ‘burial grounds, human remains and monuments procedure to comply with legal obligations under current legislation. The lead contractor would comply with this procedure.
- Should human remains be discovered during construction, either during archaeological works or as part of construction activity, the Principal Contractor and its lead contractors would comply with all relevant legislative and project-specific requirements.

- During the course of construction, if artefacts are located that are deemed by their material content or context to be treasure, as defined by the Treasure Act 1996, then all necessary measures to comply with the requirements of the Act and any project specific requirements would be implemented.
- Locations of archaeological value and interest would be signposted and/or fenced off to avoid damage.
- Locations where archaeological work is planned would be signposted and/or fenced off to avoid damaged.
- Where a previously unknown heritage asset is discovered, or a known heritage asset proves to be more significant than previously thought, the proposed Scheme would inform the local planning authority and would agree a solution that protects the significance of the new discovery, so far as is practicable, within the proposed Scheme parameters.

11.6 Scope of the assessment

11.6.1 This section identifies the potential for the proposed Onshore Scheme to give rise to likely significant effects, taking into account the design and control measures identified in **Section 11.5**.

11.6.2 **Table 11-4** sets out the receptors identified within the study area, the potential impacts as a result of construction and/or operation activities associated with the proposed Onshore Scheme, whether these impacts are likely to give to rise to significant effects, and whether the receptor is scoped in or scoped out of the assessment.

11.6.3 The proposed Friston Substation, as described in **Chapter 2** proposed Scheme Description outlines the optionality that remains at Friston Substation. The scope of this EIA Scoping Chapter has been based on the worst case scenario that the proposed Onshore Scheme would construct Friston Substation.

11.6.4 All identified impacts are of relevance to both the Southwold and Walberswick options unless specified otherwise.

11.6.5 A precautionary approach has been taken and where there is no strong evidence base, insufficient baseline or the significance is uncertain at this stage the impact has been scoped into the EIA. Where there is a clear evidence base that the effect from the impact will not be significant, either alone or in combination with other plans and projects, the impact has been scoped out of the EIA.

Table 11-4 Proposed scope of the assessment

Project phase	Receptor	Impact	Potential for significant effect	Proposed to be scoped in/ out
Construction	Designated and Non-designated Heritage Assets	Physical impact as a result of construction across the proposed Onshore Scheme including vibration.	Yes. Numerous designated and non-designated heritage assets throughout study area.	Scoped in
Construction	Setting of Designated Heritage Assets and Non-designated Heritage Assets and historic landscape character	Temporary change in setting as a result of construction activities including light and noise.	Yes. Numerous designated, non-designated heritage assets and elements of historic landscape such as hedgerows and field patterns are still legible throughout study area.	Scoped in
Construction	Setting of Designated Heritage Assets and Non-designated Heritage Assets and historic landscape character	Permanent change in setting as a result of construction of the proposed Onshore Scheme including noise.	Yes. Numerous designated, non-designated heritage assets and elements of historic landscape such as hedgerows and field patterns are still legible throughout the Onshore Scoping Boundary and study area (designated only)	Scoped in
Operation	Setting of Designated Heritage Assets and Non-designated Heritage Assets and historic landscape character	Change in setting as a result of operation of the proposed Onshore Scheme such as lighting changes, noise	Yes – Potential changes in the setting of heritage assets as a result of increased noise and vibration, or increased	Scoped in

Project phase	Receptor	Impact	Potential for significant effect	Proposed to be scoped in/ out
		associated with operational activities	traffic due to maintenance access infrastructure. The village of Saxmundham and its environs are adjacent to proposed Converter Station Site. Several Grade II listed buildings are within 300m of the proposed Friston Substation Site. Walberswick village (and conservation area) is immediately adjacent to the proposed Walberswick Landfall Site.	

11.7 Assessment methodology

11.7.1 A Historic Environment Desk-Based Assessment (HEDBA) will be prepared in accordance with industry standards and best practice guidelines, namely the Standard and Guidance for Historic Environment Desk-Based Assessment[2], and Historic England's Good Practice Advice[3], and any responses received as part of the scoping phase and consultation on the proposed Scheme.

11.7.2 The HEDBA will form an appendix to the PEI Report and ES and will inform the chapter and its assessment. It will establish whether any additional survey or evaluation is required to better determine the nature, extent and significance of buried archaeological remains within the construction footprint of the proposed Onshore Scheme.

11.7.3 A study area of 1km from the Refined Scheme Boundary is proposed for the assessment of Designated Heritage Assets. For Non-Designated Heritage Assets the study area will comprise the Refined Scheme Boundary, as this represents a buffer area within which the proposed Onshore Scheme will be developed.

11.7.4 The study area will be reviewed and refined for the assessment in the PEI Report and ES. The final study areas will be agreed in consultation with the Suffolk County Council Archaeological Officer.

Data sources

11.7.5 The assessment will be informed by desk studies, site surveys and intrusive ground investigations.

11.7.6 The baseline desk studies will build upon the scoping baseline using publicly available data and literature, together with data requested local authorities and survey information.

11.7.7 Data will be gathered from the following sources as part of research for the assessment:

- Suffolk Historic Environment Records (SHER);
- The National Heritage List for England (NHLE), held by Historic England, for designated assets;
- Local authority conservation area appraisal and management documents and their mapping;
- Historic landscape characterisation (HLC) mapping undertaken by local planning authorities;
- Aerial photographs held by Historic England, local authorities and other appropriate repositories and other readily available remote sensing results such as LiDAR data;
- Geological mapping and borehole information as held by the British Geological Survey; and
- Documentary, cartographic and other resources as deposited within local studies libraries, county libraries and archives, including historic Ordnance Survey maps,

[2] the Chartered Institute for Archaeologists' Standard and Guidance for Historic Environment Desk-Based Assessment (2020),

[3] Historic England's Good Practice Advice in Planning Notes 2, 3 and 12 (2016; 2015; 2019),

tithe, estate and other maps, and other relevant primary sources held at Suffolk Archives, together with local studies library information. Where historic mapping indicates potential for ancient woodland this will be assessed in **Chapter 8** Ecology and Biodiversity

11.7.8 An archaeological walkover survey to assess known sites and to determine the potential for previously unrecorded heritage assets will also be undertaken. This will focus on the final alignment as well as any associated compounds, laydown areas, and above round Infrastructure.

11.7.9 Information collected from these sources will be used to describe the known historic environment of the study area.

11.7.10 Where desk-based sources are not sufficient to define the baseline and assess the impact of the proposed Onshore Scheme upon the historic environment, targeted survey would be undertaken. This could include:

- Geophysical survey; and
- Archaeological trial trenching

11.7.11 The scope of this survey would be discussed on a case by case basis with the Suffolk County Council archaeological officer, and would seek to achieve a sufficient understanding of baseline conditions for an assessment of impact to be made, and to enable a suitable programme of mitigation to be designed.

Legislation, policy and guidance

11.7.12 Legislation and policy relevant to the proposed Scheme and this chapter is outlined in **Chapter 4** Legislation and Policy Overview and **Appendix 4-A** National Policy, **Appendix 4-B** Environmental Legislation and **Appendix 4-C** Local Policy.

11.7.13 Relevant guidance and standards that have informed the scoping process are listed below (but not limited to) and will also be taken into account as part of the assessment:

- Planning Practice Guidance, Section 16: Conserving and enhancing the historic environment[4];
- Historic Environment Good Practice Advice in Planning Note 2. Managing Significance in Decision Taking in the Historic Environment. Historic England[5];
- Historic Environment Good Practice Advice in Planning Note 3. The Setting of Heritage Assets. Historic England (2nd edition, 2017)[6];

[4] Ministry of Housing, Communities & Local Government (2019). Planning Practice Guidance: Historic Environment. [online] Available at: https://www.gov.uk/guidance/conserving-and-enhancing-the-historic-environment#overview-historic-environment Accessed Feb 2024.

[5] Historic England (2015). Historic Environment Good Practice Advice in Planning: 2. Managing Significance in Decision – Taking in the Historic Environment. [online] available at: https://historicengland.org.uk/images-books/publications/gpa2-managing-significance-in-decisiontaking/gpa2/ Accessed Feb 2024.

[6]Historic England (2017). Historic Environment Good Practice Advice in Planning Note 3 (second edition). The Setting of Heritage Assets. [online] Available at: https://historicengland.org.uk/images-books/publications/gpa3-setting-of-heritage-assets/heag180-gpa3-setting-heritageassets/ Accessed Feb 2024.

- Historic Environment Statement of Heritage Significance: Analysing Significance in Heritage Assets. Historic England Advice Note 12. Historic England (2019)[7];
- Commercial Renewable Energy Development and the Historic Environment. Historic England Advice Note 15 (2021)[8];
- Chartered Institute for Archaeologists (CifA) Standard and Guidance for Historic Environment Desk-Based Assessment[9];
- CifA Code of Conduct[10]; and
- Institute of Environmental Management and Assessment (IEMA), the Institute of Historic Building Conservation (IHBC) and CIfA, Principles of Cultural Heritage Impact Assessment in the UK[11].

Assessment method

11.7.14 **Chapter 5** EIA Approach and Method sets out the standard EIA methodology and matrices to be used for the assessment. The methodology is based on the principle that the environmental effects will be determined by identifying potential receptors, assigning receptor value, assessing the magnitude of change on the receptor and then identifying the significance of the effect. This section provides a summary of the EIA methodology specifically relevant to this chapter.

11.7.15 Assessment of cumulative and combined effects are discussed in **Chapter 29** Cumulative and Combined effects of the Project.

11.7.16 The assessment methodology for both construction and operational impacts is based on that set out in DMRB[12] LA 104 Environmental assessment and monitoring and LA 106 Cultural heritage assessment. Whilst primarily intended for use in assessing the impacts of highways projects on the historic environment, the methodology is widely accepted as suitable for assessing the effects of other types of linear infrastructure.

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[7] Historic England (2019). Historic England Advice Note 12. Statements of Heritage Significance: Analysing Significance in Heritage Assets. [online] Available at: https://historicengland.org.uk/images-books/publications/statements-heritage-significance-advice-note-12/heag279-statements-heritage-significance/ Accessed Feb 2024.

[8] Historic England (2021). Historic Environment Good Practice Advice in Planning Note 15. Commercial Renewable Energy Development and the Historic Environment. [online] Available at: https://historicengland.org.uk/images-books/publications/commercial-renewable-energydevelopment-historic-environment-advice-note-15/heag302-commercial-renewable-energy-development-historic-environment/ Accessed Feb 2024.

[9] Chartered Institute for Archaeologists (2020). Standard and guidance for historic environment desk-based assessment. [online] Available at: https://www.archaeologists.net/sites/default/files/CIfAS%26GDBA_4.pdf#:~:text=STANDARD%20AND%20GUIDANCE%20for%20historic%20environment%20deskbased%20assessment,expand%20and%20explain%20general%20definitions%20in%20the%20Code. Accessed Feb 2024.

[10] Chartered Institute of Archaeology (2019). Code of Conduct: Professional Ethics in Archaeology. [online] Available at: https://www.archaeologists.net/sites/default/files/Code%20of%20conduct.pdf Accessed Feb 2024.

[11] Institute of Environmental Management & Assessment, in partnership with the Chartered Institute for Archaeologists and the Institute of Historic Building Conservation (2021). Principles of Cultural Heritage Impact Assessment in the UK.

[12] Highways England (2020). Design Manual for Roads and Bridges. Sustainability and the Environment [online]. Available at: https://www.standardsforhighways.co.uk/search?discipline=SUSTAINABILITY_AND_ENVIRONMENT&suite=DMRB

Assessment of Value

11.7.17 The value of a heritage asset (its heritage significance) is guided by its designated status but is derived also from its heritage interest which may be archaeological, architectural, artistic or historic (NPPF Annex 2, Glossary[13]).

11.7.18 The methodology for assessing effects is based on the principle that the environmental effects of the proposed Onshore Scheme, in relation to a single heritage asset should be determined by identifying the asset's value, assessing the magnitude of change the proposed Onshore Scheme would have on the asset's significance (where significance is defined as the attributes that give the asset its value) and then combining these two elements to identify the significance of effect. **Table 11-5**,**Table 11-6**, and **Table 11-7** provide further detail on the process for assessing effects.

11.7.19 The importance or value of each heritage asset within the study area was determined according to the criteria set out in **Table 11-5**.

Table 11-5 Importance/value criteria for heritage assets

Criteria for establishing importance/value of heritage assets	
Value	**Typical descriptors**
Very high	Very high importance and rarity, international scale and very limited potential for substitution. Includes some World Heritage Sites and nominated sites, where their Outstanding Universal Value is derived from Cultural Heritage value.
High	High importance and rarity, national scale, and limited potential for substitution. Includes scheduled monuments, listed buildings (all grades), Grade I registered parks and gardens, conservation areas containing very important buildings, undesignated structures of clear national importance, undesignated assets of schedulable quality and importance.
Medium	Medium or high importance and rarity, regional scale, limited potential for substitution. Includes conservation areas containing buildings that contribute significantly to historic character, Grade II registered parks and gardens, and non-designated archaeological remains.
Low	Low or medium importance and rarity, local scale.
Negligible	Very low importance and rarity, local scale.

Magnitude of Impacts

11.7.20 The approach used to assess magnitude of impacts on heritage assets considers the change upon the receptor. This takes into account the severity of impact of the proposed Onshore Scheme, together with the vulnerability of the receptor to change. The approach used is based on professional judgment and experience. It also reflects

13

Department for Levelling Up, Housing and Communities (December 2023) . National Planning Policy Framework (NPPF) Annex 2: Glossary. [online] Available at https://www.gov.uk/guidance/national-planning-policy-framework/annex-2-glossary Accessed Feb 2024.

guidance on ‘substantial harm’ and ‘less than substantial harm’ in the NPPF and established methodologies in the DMRB.

11.7.21 **Table 11-6** summarises the types of impact and magnitude used in the assessment.

Table 11-6 Magnitude of impact descriptions

Magnitude of impact (change)	Description and nature of change/impact
High	Loss of heritage asset and/or quality and integrity of heritage asset; severe damage to key characteristics, features or elements.
	Large scale or major improvement of heritage asset quality; extensive restoration; major improvement of attribute quality.
Medium	Loss of heritage asset, but not adversely affecting the integrity; partial loss of/damage to key characteristics, features or elements.
	Benefit to, or addition of, key characteristics, features or elements; improvement of attribute quality.
Low	Some measurable change in attributes, quality, or vulnerability; minor loss of, or alteration to, one (maybe more) key characteristics, features or elements.
	Minor benefit to, or addition of, one (maybe more) key characteristics, features or elements; some beneficial impact on attribute or a reduced risk of negative impact occurring.
Negligible	Very minor loss or detrimental alteration to one or more characteristics, features or elements.
	Very minor benefit to or positive addition of one or more characteristics, features or elements.
No change	No loss or alteration of characteristics, features or elements; no observable impact in either direction

Significance of effect

11.7.22 By combining the magnitude of impact (or change) and the importance of each heritage asset, an assessment has been made of the significance of effect, taking into account the possibility and nature of mitigation. The resultant effects may be either negative (adverse) or positive (beneficial) or neutral, depending on the nature of the impact.

11.7.23 The significance of effect upon the heritage asset is assessed using the matrix in **Chapter 5** EIA Method and Approach (Document Reference Table 5-3).

11.7.24 Where the matrix suggests more than one likely outcome, for instance slight or moderate, professional judgement has been used in conjunction with the descriptors in **Table 11-7** to arrive at a robust conclusion.

11.7.25 Effects, based on the methodology outlined in DMRB, are defined on a nine-point scale (very large beneficial, large beneficial, moderate beneficial, slight beneficial, neutral, slight adverse, moderate adverse, large adverse or very large adverse).

11.7.26 Adverse effects of moderate significance or above represent significant effects that require mitigation, and function as means for the decision maker to take account of the likely significant effects of the scheme.

Table 11-7 Significance of effect descriptions

Significance of effect	Descriptor
Very large adverse	Partial or total loss of an asset of very high importance. Effects at this level are material in the decision-making process.
Large adverse	Result in the total, or almost total, loss of heritage assets. Be highly intrusive and would seriously damage the setting of the heritage asset such that its significance is totally or almost totally degraded. Be in conflict with national policies for the protection of the heritage asset. Effects at this level are likely to be material in the decision-making process.
Moderate adverse	Be highly intrusive in the setting and as a result adversely affect the value of the heritage resource. Result in loss of features such that the integrity of the heritage resource is compromised, but not destroyed. Effects at this level can be considered to be material decision-making factors.
Slight adverse	Have a detrimental impact on the setting of a heritage asset such that its significance is diminished. Be in conflict with local policies for the protection of the local character of the heritage asset. Effects at this level are not material in the decision-making process.
Neutral	Maintain existing historic features in the townscape. Have no appreciable impacts either beneficial or adverse on any known or potential heritage assets. Result in a balance of beneficial and adverse impacts. Not result in severance or loss of integrity context or understanding within a historic landscape. Not be in conflict with and do not contribute to policies for the protection or enhancement of the heritage. No effects or those that are beneath levels of perception, within normal bounds of variation or within the margin of forecasting error.

Significance of effect	Descriptor
Slight beneficial	Restore or enhance the sense of place of a heritage feature through good design and mitigation. Remove or mitigate visual intrusion (or other indirect impacts) into the setting of heritage features such as that appreciation and understanding of them is improved. Marginally enhance the integrity understanding and sense of place of a site or group of sites. Effects at this level are not material in the decision-making process.
Moderate beneficial	Provide potential for significant restoration of characteristic features or their setting through the removal, relocation or mitigation of existing damaging or discordant impacts on the heritage asset. Contribute to regional or local policies for the protection or enhancement of the heritage asset. Enhance the integrity, understanding and sense of place of a site or group. Effects at this level can be considered to be material decision-making factors.
Large beneficial	Result in the removal, relocation or substantial mitigation of very damaging or discordant existing impacts (direct or indirect) on the heritage. Result in extensive restoration or enhancement of characteristic features or their setting. Form a major contribution to government policies for the protection or enhancement of the heritage asset. Remove or successfully mitigate existing visual intrusion such as that the integrity, understanding and sense of place of a site or group of sites is re-established. Effects at this level are likely to be material in the decision-making process.
Very large beneficial	As ‘large beneficial’ where the effect would be upon a site of very high importance, Effects at this level are material in the decision-making process.

11.8 Assumptions & limitations

11.8.1 This EIA Scoping Report has been collated based on a range of publicly available data and information only. It is assumed that the data collated is accurate. The data will be supplemented with additional data as part of the EIA process.

11.8.2 In the absence of data, a precautionary approach has been taken and professional judgement, based on experience of similar linear schemes, has been used where required to inform the scope of the assessment.

11.8.3 Locations of archaeological investigations may be subject to land access.

11.8.4 At this stage there is uncertainty over some details including:

- The extent and nature of construction activity and detailed scheme proposals. It is assumed that all archaeological remains within the footprint of each option and all associated construction areas would be removed. It is also assumed that there is the potential for adverse impacts arising from changes to the setting of heritage resources within the study area.
- There is an underlying assumption that publicly held archaeological data is reliable. The data itself may have limitations; for example, data held in the HER may be limited by an absence of fieldwork in the locality, or lack of certainty about the reporting of the data (inaccurate grid references) and of the date of sites (especially records of 18th, 19th and early 20th century discoveries). Professional judgement will be applied during the assessment to manage this potential limitation.

Contents

12. Hydrology, Hydrogeology and Drainage

12.1 Introduction

12.1.1 This chapter outlines the proposed scope and methodology for Hydrology, Hydrogeology and Drainage. It will consider the potential for significant effects arising from the construction and operation of the LionLink Interconnector (hereafter referred to as 'the proposed Onshore Scheme') in respect to hydrology, hydrogeology and drainage. A review of relevant guidance and policy has been undertaken together with a desk-based assessment, to inform the proposed scope and methodology.

12.1.2 This chapter is supported by the following appendices and figures:

- **Appendix 12-A**: Flood Risk Baseline Summary;
- **Figure 1-2**: Proposed Onshore Scheme Scoping Boundary;
- **Figure 1-3**: Proposed Onshore Scheme Scoping Boundary and Scheme Components;
- **Figure 12-1**: Surface Water Features Map;
- **Figure 12-2**: Groundwater Features Map; and
- **Figure 12-3**: Flood Risk Map.

12.1.3 There may be interrelationships with other disciplines. Therefore, this chapter should be read in conjunction with the following chapters:

- **Chapter 8** Ecology and Biodiversity – Designated protected sites that may be dependent on surface or groundwater, or could be impacted by changes to the water environment from the proposed Onshore Scheme;
- **Chapter 9** Geology and Contamination – Land contamination that may be mobilised by the proposed Onshore Scheme and subsequently impact the water environment;
- **Chapter 18** Marine Physical Environment – Potential impacts to coastal morphology and offshore coastal processes such as sediment transport pathways; and
- **Chapter 19** Intertidal and Subtidal Benthic Ecology – Potential impacts on intertidal habitats and species that may be in hydraulic continuity with the onshore works, together with impacts to the transitional and coastal water Water Framework Directive (WFD) catchments.

12.2 Consultation and engagement

12.2.1 Consideration has been given to responses received at Non-Statutory Consultations held in 2022 and 2023 in preparing this scoping chapter. Responses relating to Hydrology, Hydrogeology and Drainage have been received from a number of consultees including the following:

- Environment Agency;
- Suffolk County Council (SCC);

- East Suffolk Council (ESC);
- Alde and Ore Association;
- Suffolk Wildlife Trust; and
- Parish and Town Councils: Friston Parish Council, Aldeburgh Town Council, Walberswick Parish Council, and Middleton cum Fordley Parish Council.

12.2.2 The main themes reported as part of the Non-Statutory Consultations were:

- Impacts on designated sites (including main rivers and groundwater dependent terrestrial ecosystems);
- Impacts on surface water receptors (such as river crossings);
- Impacts on groundwater receptors (including licensed and private water supplies);
- Flood risk; and
- Construction risks such as breakout at Horizontal Directional Drilling (HDD) crossings.

12.2.3 Engagement was undertaken with Environment Agency in July 2023 and SCC and ESC in August 2023. The key points of discussion included:

- Impacts on designated sites, surface water and groundwater receptors;
- The surface water flood risks at Friston; and
- The coastal flood risk at the landfall (in particular the proposed Landfall Site (Southwold).

12.2.4 Further engagement will be undertaken with relevant stakeholders in relation to the proposed Onshore Scheme to obtain any information that they hold to supplement the assessment and to seek their views with regards to the evolving design.

12.2.5 The following bodies will be consulted during the EIA process in relation to Hydrology, Hydrogeology and Drainage:

- Environment Agency;
- Natural England;
- SCC (Lead Local Flood Authority(LLFA)); and
- ESC.

12.2.6 In addition, engagement will be undertaken with non-statutory stakeholders as required so that their specialist local views and expertise can be considered as part of the EIA process.

12.3 Baseline conditions

Study area

12.3.1 The study area for hydrology, hydrogeology and drainage includes all land within the proposed Onshore Scheme Scoping Boundary (hereafter referred to as ‘the Onshore Scoping Boundary’), as shown on **Figure 12-1** and **Figure 12-2**.

12.3.2 The study area falls within and crosses a number of key hydrological and hydrogeological features including: the River Wang, River Blyth, River Minsmere and Hundred River (designated Main Rivers); Crag Principal Aquifer; and the Minsmere-Walberswick Heaths and Marshes Groundwater Dependent Terrestrial Ecosystem.

12.3.3 For certain receptors, such as groundwater dependent abstractions and terrestrial ecosystems, the study area also includes land beyond the Onshore Scoping Boundary within an additional buffer. Buffer distances are based upon the characteristics and sensitivity of the receptor, informed by professional judgement to determine an appropriate Zone of Influence (ZoI).

12.3.4 For surface water and groundwater features, a 500m buffer from either side of the Onshore Scoping Boundary has been applied to identify key receptors that may be affected by the proposed Onshore Scheme. The buffer is considered appropriate at the scoping stage taking into account the nature of the proposed Onshore Scheme.

12.3.5 The study area will be reviewed and, as appropriate, refined for the assessment in the Preliminary Environmental Information (PEI) Report and Environmental Statement (ES) with only one Landfall and one High Voltage Direct Current (HVDC) Underground Cable Corridor being taken forward. The study area will ensure that all receptors that are potentially in hydraulic continuity with the proposed Onshore Scheme are included (such as downstream receptors). The study area will be based on the proposed Order limits in the ES.

Baseline data sources

12.3.6 The baseline described in this chapter and associated appendices has been informed by the following data sources:

Table 12-1 Scoping baseline data sources

Baseline Data	Source
WFD water body status objectives and classification data	Environment Agency Catchment Data Explorer[1]
Water quality data Groundwater levels River flows and levels Rainfall data	Environment Agency Hydrology Data Explorer (Beta)[2]
Groundwater Dependent Terrestrial Ecosystems (Environment Agency designated sites only)	Environment Agency[3] Groundwater Dependent Terrestrial Ecosystems

[1] Environment Agency. Catchment Data Explorer https://environment.data.gov.uk/catchment-planning/ Accessed: Feb 2024
[2] Environment Agency. Hydrlogy Data Explorer (Currently in Beta Testing) https://environment.data.gov.uk/hydrology/explore Accessed: Feb 2024
[3] Environment Agency. Groundwater Dependent Terrestrial Ecosystems https://www.data.gov.uk/dataset/72a149a2-1be7-441f-bc37-94a77f261e27/groundwater-dependent-terrestrial-ecosystems-england-only Accessed: Feb 2024

Baseline Data	Source
Source Protection Zones Aquifer designations Groundwater vulnerability Statutory and non-statutory designated sites	Defra Magic Map[4]
Geological Mapping (1:50,000 Scale) Hydrogeology Maps	British Geology Survey GeoIndex[5]
Flood Map for Planning (Rivers and Sea) – Flood Zone 2 and Flood Zone 3	Environment Agency[6] Flood Map for planning
Risk of flooding from surface water	Defra[7]

Baseline

12.3.7 The following sections present the existing baseline established at scoping. There are currently two options being considered for the proposed Landfall Site and associated HVDC Underground Cable Corridor, which are shown in **Figure 1-2** and **Figure 1-3**. Baseline information is presented for the two options below.

Water resources

12.3.8 Data on climate (Environment Agency climate stations), abstractions, discharges, groundwater-surface water interactions (such as springs, sinks and non-designated groundwater dependent terrestrial ecosystems) and groundwater flooding susceptibility has not been received at the time of scoping. This data will be obtained for the PEI Report and ES and will inform the design development.

12.3.9 At this time, no site-specific water quality or quantity data (such as groundwater levels) has been collated for the area. Site investigation and surveys will be undertaken in 2024 to further inform the geological and hydrogeological baseline.

12.3.10 The following sections are described in geographic locations relevant to the proposed Onshore Scheme components. Where the baseline is common to all proposed Onshore Scheme components this has been described under the Onshore Scoping Boundary.

Onshore Scoping Boundary

Surface water

12.3.11 The entire Onshore Scoping Boundary sits within the Suffolk Coastal Operational Catchment. Watercourses generally flow eastwards towards the East Anglian coastline.

[4] DEFRA. Multi-Agency Geographic Information for the Countryside Interactive Map, https://magic.defra.gov.uk/MagicMap.aspx Accessed: Feb 2024
[5] British Geological Society. GeoIndex Onshore https://mapapps2.bgs.ac.uk/geoindex/home.html?_ga=2.64844399.1578069677.1653300064-786435129.1653300064 Accessed: 26 May 2023
[6] Environment Agency. Flood Map for planning https://flood-map-for-planning.service.gov.uk/ Accessed: Feb 2024
[7] Defra. Risk of flooding from surface water https://environment.data.gov.uk/DefraDataDownload/?Mode=rofsw Accessed: Feb 2024

12.3.12 Average rainfall at a number of the closest Met Office climate stations to the Onshore Scoping Boundary are summarised below.

Table 12-2 Average rainfall at the closest climate stations to the Onshore Scoping Boundary

Average Rainfall (mm) [Climate Period 1991-2020]			
Month	**Lowestoft TM 55090 93606 15m above mean sea level (AMSL)**	**Scole TM 15224 78757 27m AMSL**	**Levington TM 24228 39855 22m AMSL**
January	51.05	52.26	47.12
February	43.71	44.47	42.05
March	39.97	44.59	37.29
April	34.70	37.90	34.78
May	49.99	38.02	39.21
June	49.48	57.14	50.51
July	57.58	45.25	49.26
August	63.90	58.07	47.93
September	55.70	46.10	48.68
October	68.84	66.35	59.87
November	65.12	78.24	55.45
December	59.91	57.80	56.75
Annual	**639.95**	**626.19**	**568.90**

Groundwater

12.3.13 The entire Scoping Boundary sits within the Waveney and Suffolk East Chalk and Crag Operational Catchment.

12.3.14 Underlying the Onshore Scoping Boundary, the bedrock is composed of the Crag Group which is considered a Principal Aquifer[8]. The Crag is a locally important aquifer, up to approximately 80m thick. It generally consists of unconsolidated marine sands, which can be locally hard and consolidated. The yield of the aquifer is typically moderate to low. Seasonal water table fluctuations are generally limited in the Crag due to its high storage coefficient. Water quality can be poor, iron-rich and hard, particularly in areas overlain by glacial clay deposits, whilst saline intrusion may occur towards the coast[9].

[8] Principal Aquifers have high permeability, meaning they usually provide a high level of water storage and transmission; supporting water supply and river base flow on a strategic scale.

[9] Ander EL, Shand P and Wood S (2006) Baseline Report Series: 21. The Chalk and Crag of north Norfolk and the Waveney Catchment. British Geological Survey Commissioned Report No. CR/06/043N

12.3.15 Recharge to groundwater is anticipated to be predominantly in areas of more permeable deposits where infiltration rates would be greater. The lower permeability deposits and urbanisation that underlie sections of the proposed HVDC Underground Cable Corridor are anticipated to reduce groundwater infiltration rates in these areas.

Proposed Friston Substation Site

Surface water

12.3.16 The proposed Friston Substation Site is not located within a delineated river or transitional water body catchment. It is approximately 400m from the nearest water body catchment, which is the Hundred River water body catchment.

12.3.17 No surface water courses are present within 750m of the proposed Friston Substation Site. Minor surface water features such as ponds, ditches and drainage may be present.

Groundwater

12.3.18 The proposed Friston Substation Site overlies superficial deposits comprising the Lowestoft Formation. Over most of the area this is made up of diamicton, while the southwest of the proposed Friston Substation Site sand and gravel deposits are more likely to be present.

12.3.19 In this area, the superficial deposits are designated a Secondary (undifferentiated) Aquifer[10].

12.3.20 The proposed Friston Substation Site falls within a Zone 3 (Total Catchment) Source Protection Zone associated with public water supply abstractions within the region (outside the Onshore Scoping Boundary).

Underground HVAC Cable Corridor

Surface water

12.3.21 The proposed Underground High Voltage Alternating Current (HVAC) Cable Corridor from the proposed Converter Station Site to the proposed Friston Substation Site is partly located within the Fromus catchment. The Hundred River catchment is located to the northeast of the proposed Underground HVAC Cable Corridor.

12.3.22 No main rivers are present between the proposed Friston Substation Site and the proposed Converter Station Site. The proposed Underground HVAC Cable Corridor is likely to cross a tributary of the River Fromus. Minor surface water features such as ponds, ditches and drainage may also be present.

Groundwater

12.3.23 The proposed Underground HVAC Cable Corridor overlies superficial deposits comprising predominantly the Lowestoft Formation. It is mostly made up of diamicton. Sand and gravel deposits which are mapped along the valley associated with the tributary of the River Fromus and to the southwest of the proposed Friston Substation

[10] Secondary (undifferentiated) Aquifers. This designated indicates that ‘it is not possible to apply either a Secondary A or B definition because of the variable characteristics of the rock type. These have only a minor value.’

Site. At the periphery of the sand and gravel deposits, clays and silts are sometimes mapped.

12.3.24 Further downstream on the tributary of the River Fromus (towards Sternfield), the superficial deposits are mapped as Alluvium or Head deposits, or not present.

12.3.25 In this area, the Lowestoft Formation is designated as:

- Secondary A[11] aquifer where mapped as sand and gravel deposits;
- Secondary B[12] aquifer where mapped as clay and silt deposits;
- Secondary (undifferentiated) aquifer where mapped as diamicton.

12.3.26 The Alluvium deposits are designated as Secondary A, whilst the Head is mapped as Secondary (undifferentiated)

12.3.27 The proposed Underground HVAC Cable Corridor falls within a Zone 3 (Total Catchment) Source Protection Zone associated with public water supply abstractions within the region (outside the Onshore Scoping Boundary).

Converter Station Site

Surface water

12.3.28 The proposed Converter Station Site is located fully within the Fromus river water body catchment.

12.3.29 No main or ordinary rivers are present within the proposed Converter Station Site. The Fromus main river is located to the west of the proposed Converter Station Site at approximately 400m distance. Surface water features such as ponds, ditches and drainage may be present within the proposed Converter Station Site.

Groundwater

12.3.30 The proposed Converter Station Site overlies superficial deposits comprising the Lowestoft Formation. Over the full proposed Converter Station Site, this is mapped as diamicton.

12.3.31 The superficial deposits are designated a Secondary (undifferentiated) Aquifer.

12.3.32 The proposed Converter Station Site falls within a Zone 3 (Total Catchment) Source Protection Zone associated with public water supply abstractions within the region (outside the Onshore Scoping Boundary).

Underground HVDC Cable Corridor - Common Cable Corridor

Surface water

12.3.33 The proposed Underground HVDC Common Cable Corridor crosses a number of water body catchments including Blyth (d/s Halesworth), Wenhaston watercourse, Minsmere,

[11] Secondary A aquifers comprise permeable layers that can support local water supplies, and may form an important source of base flow to rivers

[12] Secondary B aquifers comprise mainly lower permeability layers that may store and yield limited amounts of groundwater through characteristics like thin cracks (called fissures) and openings or eroded layers

Leiston Beck, Hundred River and Fromus. The Blyth (S) transitional water body is to the north and north-east of the proposed Underground HVDC Common Cable Corridor.

12.3.34 The proposed Underground HVDC Common Cable Corridor includes a number of main rivers including (from north to south) Dunwich River, Minsmere River and Hundred River. Wenhaston River and the River Blyth are to the north of the proposed Underground HVDC Common Cable Corridor (see proposed Underground HVDC Southwold Cable Corridor), whilst the River Fromus is to the west of the proposed Underground HVDC Common Cable Corridor further south.

12.3.35 Numerous ordinary watercourses are also present within the proposed Underground HVDC Common Cable Corridor that may be crossed, whilst minor surface water features such as ponds, ditches and drainage may also be present.

Groundwater

12.3.36 The proposed Underground HVDC Common Cable Corridor overlies a range of superficial deposits, with occasional areas where no superficial deposits are mapped.

12.3.37 Between the main rivers, the superficial deposits comprise predominantly the Lowestoft Formation. This ranges from predominantly diamicton, to discrete areas of sand and gravel deposits and clay and silt deposits (generally in valleys associated with water courses).

12.3.38 Alluvium, Peat and Head deposits are mapped along the proposed Underground HVDC Common Cable Corridor, in association with water courses. The peat is predominantly mapped in association with the Minsmere.

12.3.39 The superficial deposits are designated as:

- Secondary A – Sand and gravel deposits of the Lowestoft Formation, and Alluvium;
- Secondary B – Clay and silt deposits of the Lowestoft Formation;
- Secondary (undifferentiated) – Diamicton of the Lowestoft Formation, and Head deposits; and
- Unproductive – Peat.

12.3.40 The south of the proposed Underground HVDC Common Cable Corridor falls within a Zone 3 (Total Catchment) Source Protection Zone associated with public water supply abstractions within the region (outside the Onshore Scoping Boundary).

Underground HVDC Cable Corridor - Cable Corridor to Southwold

Surface water

12.3.41 The proposed Underground HVDC Southwold Cable Corridor crosses a number of river and transitional water body catchments including Easton Broad, Wang, Blyth (d/s Halesworth), Blyth (S) and Wenhaston watercourse.

12.3.42 The proposed Underground HVDC Southwold Cable Corridor crosses the Wang, Blyth and Wenhaston main rivers. Easton Broad is to the north of the proposed Underground HVDC Southwold Cable Corridor, in the eastern extent.

12.3.43 Numerous ordinary watercourses are also present within the proposed Underground HVDC Southwold Cable Corridor that may be crossed, whilst minor surface water features such as ponds, ditches and drainage may also be present.

Groundwater

12.3.44 The proposed Underground HVDC Southwold Cable Corridor overlies a range of superficial deposits, with occasional areas where no superficial deposits are mapped.

12.3.45 Between the main rivers, the superficial deposits comprise predominantly the Lowestoft Formation. This is mapped as either diamicton or sand and gravel deposits.

12.3.46 Alluvium, Peat and Head deposits are mapped along the proposed Underground HVDC Southwold Cable Corridor, predominantly in association with watercourses. Marine Beach deposits and Tidal Flat deposits are mapped in the eastern extreme of the proposed Underground HVDC Southwold Cable Corridor (in the area of the Landfall).

12.3.47 The superficial deposits are designated as:

- Secondary A – Sand and gravel deposits of the Lowestoft Formation, Marine Beach deposits and Alluvium;
- Secondary B – Clay and silt deposits of the Lowestoft Formation;
- Secondary (undifferentiated) – Diamicton of the Lowestoft Formation, and Head deposits; and
- Unproductive – Peat and Tidal Flat Deposits.

12.3.48 The west of the proposed Underground HVDC Southwold Cable Corridor partly falls within a Zone 3 (Total Catchment) Source Protection Zone associated with public water supply abstractions within the region (outside the Onshore Scoping Boundary).

12.3.49 The proposed Underground HVDC Southwold Cable Corridor also crosses a Zone 3 (Total Catchment) and Zone 2 (Outer) Source Protection Zone associated with public water supply abstractions to the south.

Underground HVDC Cable Corridor - Cable Corridor to Walberswick

Surface water

12.3.50 The proposed Underground HVDC Walberswick Cable Corridor crosses a number of water body catchments in the west Blyth (d/s Halewsorth) and Wenhaston watercourse. The east of the proposed Underground HVDC Walberswick Cable Corridor is not designated as a river or transitional water body.

12.3.51 The proposed Underground HVDC Walberswick Cable Corridor crosses the Dunwich River, which is designated a main river, in the east (in the area of the landfall).

12.3.52 Numerous ordinary watercourses are also present within the proposed Underground HVDC Walberswick Cable Corridor that may be crossed, whilst minor surface water features such as ponds, ditches and drainage may also be present.

Groundwater

12.3.53 The proposed Underground HVDC Walberswick Cable Corridor overlies a range of superficial deposits, with occasional areas where no superficial deposits are mapped.

12.3.54 The proposed Underground HVDC Walberswick Cable Corridor overlies superficial deposits comprising predominantly the Lowestoft Formation. Over most of the proposed Underground HVDC Walberswick Cable Corridor these are mapped as either diamicton or sand and gravels deposits. In the east of the proposed Underground HVDC

Walberswick Cable Corridor, Tidal Flat deposits are mapped. Head deposits are mapped in a small area in the vicinity of Sallow Walk Covert.

12.3.55 The superficial deposits are designated as follows:

- Secondary (undifferentiated) Aquifer – Diamicton of the Lowestoft Formation, and Head despotis;
- Secondary (A) – Sands and gravels of the Lowestoft Formation; and
- Unproductive (not designated) – Tidal Flat Deposits (clays and silts).

Landfall Site - Southwold

Surface water

12.3.56 The proposed Southwold Landfall Site is not located within a delineated river or transitional water body catchment. It is approximately 500m from the nearest water body catchment, which is the Easton Broad River water body catchment.

12.3.57 No main rivers are present at the proposed Southwold Landfall Site, with the Buss Creek main river located approximately 50m to the south.

12.3.58 Minor surface water features such as ponds, ditches and drainage may be present within the proposed Southwold Landfall Site or immediately adjacent.

Groundwater

12.3.59 The north of the proposed Southwold Landfall Site has no superficial deposits mapped, with diamicton of the Lowestoft Formation mapped in the middle. The majority of the southern half of the proposed Southwold Landfall Site is mapped predominantly as Tidal Flat deposits (clays and silts) with Marine Beach deposits (sands and gravels) in the southeast.

12.3.60 The superficial deposits are designated as follows:

- Secondary (undifferentiated) Aquifer – Diamicton of the Lowestoft Formation;
- Secondary (A) – Marine Beach Deposits (sands and gravels); and
- Unproductive (not designated) – Tidal Flat Deposits (clays and silts).

Landfall Site - Walberswick

Surface water

12.3.61 The proposed Walberswick Landfall Site is not located within a delineated river or transitional water body catchment. It is approximately 500m from the nearest water body catchment, which is the Blyth (S) transitional water body catchment to the northeast.

12.3.62 No main rivers are present at the proposed Walberswick Landfall Site, with the Dunwich main river located approximately 150m south east.

12.3.63 Minor surface water features such as ponds, ditches and drainage may be present within the proposed Walberswick Landfall Site or immediately adjacent.

Groundwater

12.3.64 The majority of the proposed Walberswick Landfall Site has no superficial deposits mapped, with sand and gravel deposits of the Lowestoft Formation mapped in the northwest corner. Tidal Flat Deposits (clays and silts) are mapped to the south of the proposed Walberswick Landfall Site.

12.3.65 The sand and gravel deposits of the Lowestoft Formation are designated as a Secondary (A) aquifer.

Water Framework Directive

Overview

Surface water bodies and watercourses

12.3.66 The Onshore Scoping Boundary extends into the catchment areas of the Wang, Blyth (d/s Halesworth), Wenhaston Watercourse, Minsmere, Hundred River, Fromus and Easton Broad WFD river water bodies and Blyth (S) and Alde & Ore transitional (estuarine) water bodies noted previously. Baseline information regarding the type, current status, and status objectives of these surface water bodies is provided **in Table 12-3** (Cycle 3, 2022 data).

Table 12-3 WFD surface water bodies present within the Onshore Scoping Boundary

Water body name and ID	Water body type	Water body designation	Overall Status	Ecological Status / Potential	Chemical Status	Ecological Status objective
Wang - GB105035046300	River	Heavily Modified Water Body (HMWB)	Moderate	Moderate	Does not require assessment	Moderate (2015)
Blyth (d/s Halesworth) - GB105035046290	River	HMWB	Moderate	Moderate	Does not require assessment	Good (2027)
Wenhaston Watercourse - GB105035046010	River	Not HMWB/AWB (Artificial Water Body)	Moderate	Moderate	Does not require assessment	Good (2027)
Minsmere - GB105035046270	River	HMWB	Moderate	Moderate	Does not require assessment	Good (2027)
Hundred River - GB105035046260	River	HMWB	Bad	Bad	Does not require assessment	Moderate (2027)
Fromus - GB105035045980	River	Not HMWB/AWB	Poor	Poor	Does not require assessment	Good (2027)

Water body name and ID	Water body type	Water body designation	Overall Status	Ecological Status / Potential	Chemical Status	Ecological Status objective
Easton Broad - GB105035046220	River	Not HMWB/AWB	Moderate	Moderate	Does not require assessment	Moderate (2015)
Blythe (S) - GB510503503700	Transitional (TraC)	HMWB	Moderate	Moderate	Does not require assessment	Moderate (2015)
Alde and Ore - GB105035046060	Transitional (TraC)	HMWB	Moderate	Moderate	Does not require assessment	Good (2063)

12.3.67 The individual watercourses identified within the Onshore Scoping Boundary are summarised in **Table 12-4**. The table outlines which parent WFD surface water body catchment the watercourses fall within and provides a preliminary receptor valuation to inform scoping which will be reviewed as further data and surveys become available.

Table 12-4 Watercourses present within the Onshore Scoping Boundary

WFD water body	Watercourse name	Designation	Upstream extent (NGR)	Downstream extent (NGR)	Preliminary Receptor value
Wang - GB105035046300	River Wang	Main River	TM 43483 79903	TM 46377 79100	High
	Unnamed Tributary of River Wang 1	Ordinary Watercourse	TM 46588 80487	TM 46100 79426	Medium
	Unnamed Tributary of River Wang 2	Ordinary Watercourse	TM 45659 80361	TM 45333 79566	Medium
	Unnamed Tributary of River Wang 3	Ordinary Watercourse	TM 44614 80858	TM 44660 79756	Medium
	Unnamed Tributary of River Wang 4	Ordinary Watercourse	TM 44232 79032	TM 44605 79747	Medium
	Unnamed Tributary of River Wang 5	Ordinary Watercourse	TM 43246 79566	TM 43645 79799	Medium
	Unnamed Tributary of River Wang 6	Ordinary Watercourse	TM 42907 78313	TM 44495 77897	Medium
	Unnamed Tributary of River Wang 7	Ordinary Watercourse	TM 43911 77076	TM 44591 76961	Medium
	Minor drains/watercourses	Ordinary Watercourse	N/A	N/A	Low

WFD water body	Watercourse name	Designation	Upstream extent (NGR)	Downstream extent (NGR)	Preliminary Receptor value
Blyth (d/s Halesworth) - GB105035046290	River Blyth	Main River	TM 42482 76449	TM 45008 75398	Very High
	Buss Creek	Ordinary Watercourse	TM 50558 76910	TM 50720 77253 and TM 50993 76995 (Splits into 2)	Medium
	Minor drains/watercourses	Ordinary Watercourse	N/A	N/A	Low
Wenhaston Watercourse - GB105035046010	Wenhaston Watercourse	Main River	TM 42895 74450	TM 44113 75303	High
	Unnamed tributary of Wenhaston Watercourse	Ordinary Watercourse	TM 42997 73026	TM 42989 73995	Medium
	Minor drains/watercourses	Ordinary Watercourse	N/A	N/A	Low
Not within a WFD water body	Dunwich River	Main River	TM 43006 71480	TM 45010 71178	High
	Tributaries of Dunwich River	Ordinary Watercourses	N/A	N/A	Medium
	Minor drains/watercourses	Ordinary Watercourse	N/A	N/A	Low
Minsmere - GB105035046270	Minsmere River	Main River	TM 42098 68559	TM 42877 68272	High
	Unnamed tributary of Minsmere River 1	Ordinary Watercourse	TM 41744 67382	TM 43035 67995	Medium
	Unnamed tributary of Minsmere River 2	Ordinary Watercourse	TM 42004 69051	TM 42200 68633	Medium
	Unnamed tributary of Minsmere River 3	Ordinary Watercourse	TM 42176 66465	TM 43240 66877	Medium
	Unnamed tributary of Minsmere River 4	Ordinary Watercourse	TM 42486 65891	TM 43226 66546	Medium
	Unnamed tributary of Minsmere River 5	Ordinary Watercourse	TM 42668 65592	TM 43458 65765	Medium
	Unnamed tributary of Minsmere River 6	Ordinary Watercourse	TM 42925 64841	TM 43879 65078	Medium

WFD water body	Watercourse name	Designation	Upstream extent (NGR)	Downstream extent (NGR)	Preliminary Receptor value
	Unnamed tributary of Minsmere #7	Ordinary Watercourse	TM 43571 69926	TM 43677 69447	Medium
	Minor drains/watercourses	Ordinary Watercourse	N/A	N/A	Low
Hundred River - GB105035046260	Hundred River	Main River	TM 42351 64450	TM 42777 61239	High
	Unnamed tributary of Hundred River 1	Ordinary Watercourse	TM 40572 64297	TM 42136 63132	Medium
	Unnamed tributary of Hundred River 2	Ordinary Watercourse	TM 41475 64827	TM 42280 63736	Medium
	Minor drains/watercourses	Ordinary Watercourse	N/A	N/A	Low
Fromus - GB105035045980	Unnamed tributary of River Fromus 1	Ordinary Watercourse	TM 40317 63398	TM 39415 61549	Medium
	Minor drains/watercourses	Ordinary Watercourse	N/A	N/A	Low
Easton Broad - GB105035046220	Easton Broad	Main River	TM 49610 78983	TM 51513 79244	High
	Minor drains/watercourses	Ordinary Watercourse	N/A	N/A	Low
Blythe (S) - GB510503503700	River Blyth (Estuary)	Main River	TM 41582 60474	TM 41270 60235	Very High
Alde and Ore - GB105035046060	Unnamed Tributary of River Alde 1	Ordinary Watercourse	N/A	N/A	Medium

Groundwater bodies and Groundwater Dependant Terrestrial Ecosystems

12.3.68 The Onshore Scoping Boundary falls within a single WFD groundwater body. Baseline information for this groundwater body is provided in **Table 12-5** (Cycle 3, 2019 data).

Table 12-5 WFD groundwater body present within the Onshore Scoping Boundary

Water body name and ID	Overall Status	Quantitative Status	Chemical Status	Overall Status objective
Waveney and East Suffolk Chalk & Crag - GB40501G400600	Poor	Poor	Poor	Poor (By 2015)

12.3.69 A total of two designated Groundwater Dependant Terrestrial Ecosystems have been identified within 1km of the Onshore Scoping Boundary. These are summarised in **Table 12-6.**

Table 12-6 Groundwater Dependant Terrestrial Ecosystems present within the Onshore Scoping Boundary

Name	Location (NGR)	Description
Pakefield to Easton Bavents (Site of Special Scientific Interest (SSSI))	TM 51905 81842	'Pakefield to Easton Bavents is nationally important for the geological exposures of the Lower Pleistocene Norwich Crag Formations and associated vertebrate assemblages and coastal geomorphology of Benacre Ness. It is also important for its vegetated shingle features, saline lagoons, flood-plain fens, vascular plants, breeding birds etc.'
Minsmere-Walberswick Heaths & Marshes (SSSI)	TM 46904 71225	'This composite site is situated on the coast of Suffolk between Southwold in the north and Sizewell in the south. It contains a complex series of habitats, notably mudflats, shingle beach, reedbirds, heathland and grazing marsh, which combine to make an area of exceptional scientific interest.'

Flood risk

12.3.70 The Onshore Scoping Boundary intercepts a number of fluvial flood zones (Flood Zones 2 and 3) related to the main surface water bodies that cross through the region towards the East Anglian coastline.

12.3.71 Risk of pluvial (surface water) flooding is also identified in a number of areas within the Onshore Scoping Boundary. Friston has a long anecdotal history of surface water flooding, with locally significant surface water flooding in 2019. The surface water flooding issues at Friston are not considered to impact the feasibility of using the proposed location for the substation, but this will be considered in more detail in the proposed Flood Risk Assessment (FRA).

12.3.72 A summary of the flood risk baseline information for the various components of the proposed Onshore Scheme are included in **Appendix 12-A**: Flood Risk Baseline Summary, which summarises the pluvial and fluvial flood risk within the study area. Data on groundwater flood risk is limited at this stage.

Future baseline

12.3.73 The hydrology, hydrogeology and drainage chapter within the PEI Report and ES will consider changes which may affect the future water environment in the absence of the proposed Onshore Scheme. The future baseline will also take into account any developments that are likely to be present in the future baseline.

12.3.74 It is expected that the current water environment would remain relatively consistent and that it would continue to be managed in a similar way, with the value of receptors present not expected to change significantly by the end of the construction period.

12.3.75 Any short-term effects from climate change would be unlikely to significantly alter the receptors prior to construction of the proposed Onshore Scheme. Longer term impacts from climate change could alter the quantity and quality of the water bodies and dependent receptors. Any mitigation proposals would take consideration of climate change scenarios.

12.3.76 Assessment of cumulative and combined effects are discussed in **Chapter 29** Cumulative and Combined effects of the Project.

12.4 Potential impacts

12.4.1 This section identifies the potential impacts that could occur as a result of the proposed Onshore Scheme during construction and operation based on the baseline information collected for EIA scoping.

Construction

12.4.2 The following impacts could occur during the construction phase:

- Direct physical disturbance of surface water or groundwater features through construction activities (such as temporary crossings of water bodies or realignment of channels);
- Direct impacts on the biological, chemical, physicochemical and hydromorphological WFD quality elements for surface water bodies, together with hydraulically linked features;
- Increased sediment supply to surface waters (associated with earthworks, soil stripping and erosion of soils by plant and machinery). Potential for increased turbidity within the water column, resulting in greater sediment deposition on the channel bed. Higher sediment loads could adversely affect stream biota, through reduced light penetration, smothering of bed habitats and altering of the groundwater chemistry;
- Release of pollutants to surface water and groundwater. Accidental release of pollutants, such as lubricants, fuels and oils, to surface water and groundwater bodies. Mobilisation of contaminants within the soil and groundwater from activities which disturb the ground. Potential for direct and indirect impacts on water environment through deterioration of water quality. Existing contamination is considered within **Chapter 9** Geology and Contamination;
- Changes to surface water flows and flood risk. Increased surface water runoff due to alterations in surface drainage patterns and reduced infiltration rates. Potential for direct and indirect impacts on geomorphology of surface watercourse through scour. Increased or altered fluvial flood risk (particularly areas designated Flood Zone 2 or 3); and
- Changes to groundwater flows and flood risk. Groundwater flows and levels may be impacted by temporary physical modifications (e.g. excavations, trenchless crossings) or groundwater control operations which could interrupt natural groundwater flow pathways and groundwater levels. Flows and levels could also be

impacted by permanent above or below ground installations. This could impact groundwater dependent receptors.

Operation

12.4.3 The following impacts could occur during the operational phase:

- Release of pollutants to surface water and groundwater during planned/unplanned maintenance. Accidental release of pollutants (such as lubricants, fuels and oils) to surface water and groundwater bodies during maintenance works. Mobilisation of contaminants within the soil and groundwater from activities which disturb the ground. Potential for adverse impacts on water environment through deterioration of water quality.

12.5 Design and control measures

12.5.1 As outlined in **Chapter 5** EIA Approach and Method, a standard hierarchical approach will be taken to mitigation.

12.5.2 The assessment of effects will take into account measures that are embedded into the proposed Onshore Scheme design, together with general good practice measures.

Design measures

12.5.3 Where it is not possible to avoid sensitive receptors, a number of measures will be embedded into the design to limit any effects.

12.5.4 Potential embedded design measures include:

- Water course crossings would utilise appropriate construction techniques which would be selected based on water course dimensions, flow conditions and environmental sensitivity. To prevent potential deterioration, all main rivers would be crossed by trenchless techniques, where practicable, to avoid physical changes and impacts on flow and sediment transport regimes and hydromorphology. Where possible, all trenchless crossings would utilise methodologies which exclude groundwater;
- Where a main river is crossed by a trenchless crossing, cables are to be laid with sufficient cover to minimise the risks of future erosion exposing the cables or fluid loss during construction;
- Permanent watercourse realignments/diversions and in-channel structures would be avoided where practicable (unless providing betterment);
- Any abstractions required for the works would be temporary in nature (e.g. construction dewatering) with no permanent abstractions proposed or required;
- Locations of site compounds associated with the construction phase, together with permanent above ground infrastructure to avoid Flood Zone 2 or 3 and water dependent habitats wherever reasonably practicable, or have appropriate measures in place to manage risk (such as compensation flood storage);
- Temporary haul routes within Flood Zone 2 or 3 and areas of high and medium risk of flooding from surface water would be removed at the end of the construction phase and the ground surface will be reinstated to pre-project levels;

- Where new or additional surfacing is required within access tracks and compound areas, it would be permeable surfaces where ground conditions allow;
- Sustainable Drainage System (SuDS) techniques will be utilised at permanent above ground installations to manage rainfall runoff in terms of both quality and quantity. Surface water management will achieve sufficient attenuation and treatment of surface water runoff to avoid increases in flood risk and pollution of the water environment; and
- All land drainage would be reinstated on completion of works.

Control measures

12.5.5 Potential control measures include:

- All works within or in close proximity to main rivers or ordinary watercourses are to be undertaken in accordance with a method approved by the relevant authority (Environment Agency for works in or adjacent to main rivers, local council or internal drainage board for ordinary watercourses), or the protective provisions of the Development Consent Order (DCO). Appropriate flood risk activity environmental permits or land drainage consents are to be obtained.
- Where practicable, riverbank and in-channel vegetation would be retained.
- The Principal Contractor would require its contractors to manage their site activities and working methods to protect the quality of surface water and groundwater resources from other adverse effects, including significant changes to the hydrological regime through controls to manage the rate and volume of runoff. Where required, the contractor would include arrangements to obtain appropriate approval for works from the relevant regulatory body or statutory undertaker that could affect any surface water or groundwater resource.
- The contractor(s) would subscribe to the Environment Agency's Floodline service, the Met Office's Weather Warnings email alerts system and any other relevant flood warning information. The contractor(s) would implement a suitable flood risk action plan, which would include appropriate evacuation procedures should a flood occur or be forecast.
- Active licensed abstractions and private water supplies will be identified with landowners and appropriate measures would be considered during construction. In the event of a landowner or tenant reporting that installation activities have affected their water supplies, an initial response would be provided within 24 hours. Where the installation works have affected a private water supply, an alternative water supply would be provided, as appropriate.
- In the event of a significant spill during construction, all relevant landowners/tenants, that could be impacted by the spill, would be contacted within 24 hours. It would be determined if any licensed abstractions or private water supplies might be affected. An assessment of the likelihood of groundwater contamination reaching identified private water supplies would be undertaken, and where a private water supply is likely to have been affected, an alternative water supply would be provided, as appropriate.
- For open cut watercourse crossings and installation of vehicle crossing points, good practice measures would be implemented, including:

  - reducing the working width for open cut crossings of a watercourse whilst still providing safe working;
  - installation of a pollution boom downstream of open cut works;
  - the use and maintenance of temporary lagoons, tanks, bunds, silt fences or silt screens as required;
  - have spill kits and straw bales readily available at all crossing points for downstream emergency use in the event of a pollution incident. Staff will be trained on their use;
  - the use of all static plant such as pumps in appropriately sized spill trays;
  - Stationary plant would be used with secondary containment measures such as plant nappies to retain any leakage of oil or fuel, which would be emptied at regular intervals to prevent overflow;
  - prevent refuelling of any plant or vehicle within 15m of a watercourse;
  - prevent storing of soil stockpiles within 15m of a main river;
  - inspect all plant prior to work adjacent to watercourses for leaks of fuel or hydraulic fluids; and
  - reinstating the riparian vegetation and natural bed of the watercourse, using the material removed when appropriate, on completion of the works and compacting as necessary. If additional material is required, appropriately sized material of similar composition will be used.
- Marker posts will be positioned on each bank of the river to indicate the location of any trenchless crossings and the nature of the works.
- SuDS techniques would be utilised along the route during construction, where appropriate. Techniques would be selected based on the ground conditions, and with reference to the hierarchy outlined in the national planning policy guidance (NPPG). Surface water management will achieve sufficient attenuation and treatment of surface water runoff to avoid increases in flood risk and pollution of the water environment.
- All land drainage would be reinstated on completion of works.
- Any abstractions required for the works would be temporary in nature (e.g. construction dewatering) with no permanent abstractions proposed or required. Any temporary dewatering activities during construction would be undertaken in accordance with EA guidance and, if required, relevant Abstraction Licence and Environmental Permits obtained. Activities would be limited to the depth and time required to facilitate construction activities.
- Where new or additional surfacing is required within access tracks and compound areas, it would be permeable surfaces where ground conditions allow.
- No construction materials should be stored within Flood Zone 2 or 3 and areas of high and medium risk of flooding from surface water.
- Appropriate construction methods would be employed to minimise the risk of mixing aquifer bodies.

12.6 Scope of the assessment

12.6.1 This section identifies the potential for the proposed Onshore Scheme to give rise to likely significant effects, taking into account the design and control measures identified in **Section 12.5**.

12.6.2 **Table 12-7** sets out the receptors identified within the study area, the potential impacts as a result of construction and/or operation activities associated with the proposed Onshore Scheme, whether these impacts are likely to give to rise to significant effects, and whether the receptor is scoped in or scoped out of the assessment.

12.6.3 The proposed Friston Substation, as described in **Chapter 2** proposed Scheme Description outlines the optionality that remains at Friston Substation. The scope of this EIA Scoping Chapter has been based on the worst case scenario that the proposed Onshore Scheme would construct Friston Substation.

12.6.4 All identified impacts are of relevance to both the Southwold and Walberswick options unless specified otherwise.

12.6.5 A precautionary approach has been taken and where there is no strong evidence base, insufficient baseline or the significance is uncertain at this stage the impact has been scoped into the EIA. Where there is a clear evidence base that the effect from the impact will not be significant, either alone or in combination with other plans and projects, the impact has been scoped out of the EIA.

Table 12-7 Proposed scope of assessment

Phase	Receptor	Potential Impacts	Potential for significant effects	Proposed to be scoped in/ out
Construction	Main Rivers including: - River Wang; - River Blyth; - Wenhaston Watercourse; - Dunwich River; - Minsmere Old River; - Hundred River; and - Easton Broad, Buss Creek and Fromus (outside Scoping Boundary but within study area)	Direct physical disturbance of surface water features. Direct impacts on WFD quality elements. Increased sediment supply to surface waters. Release of pollutants to surface water. Changes to surface water flows and flood risk	Proposed Underground HVDC Common Cable Corridor, proposed Underground HVDC Southwold Cable Corridor, proposed Underground HVDC Walberswick Cable Corridor: Yes - potential for direct and indirect impacts to high value receptors. Proposed Friston Substation, proposed Underground HVAC Cable Corridor, proposed Converter Station: No – no receptors within the study area that are susceptible to impact.	Scoped In (where potential for significant effect identified)
Construction	Larger ordinary watercourses	Direct physical disturbance of surface water features. Direct impacts on WFD quality elements. Increased sediment supply to surface waters. Release of pollutants to surface water. Changes to surface water flows and flood risk	Proposed Underground HVDC Common Cable Corridor, proposed Underground HVDC Southwold Cable Corridor, proposed Underground HVDC Walberswick Cable Corridor, proposed Underground HVAC Cable Corridor: Yes - potential for direct and indirect impacts to high value receptors. Proposed Friston Substation and proposed Converter Station: No - no receptors within the study area that are susceptible to impact.	Scoped In where potential for significant effect identified)

Phase	Receptor	Potential Impacts	Potential for significant effects	Proposed to be scoped in/ out
Construction	Minor ordinary watercourses and land drainage	Direct physical disturbance of surface water features. Direct impacts on WFD quality elements. Increased sediment supply to surface waters. Release of pollutants to surface water. Changes to surface water flows and flood risk	No – control measures to manage direct and indirect impacts on these low value watercourses (such as pollution control measures and reinstatement) will prevent significant effects	Scoped Out
Construction	Superficial Deposits (Various)	Direct physical disturbance of groundwater features. Release of pollutants to groundwater. Changes to groundwater flows and flood risk.	Yes - potential for direct and indirect impacts to aquifers from construction activities such as trenchless crossings and construction dewatering.	Scoped In
Construction	Crag Group Bedrock (Principal Aquifer)	Direct physical disturbance of groundwater features. Release of pollutants to groundwater. Changes to groundwater flows and flood risk.	Yes - potential for direct and indirect impacts to the principal aquifer from construction activities such as trenchless crossings and construction dewatering.	Scoped In
Construction	Source Protection Zones 1 to 3 (SPZ2 and SPZ3 within Scoping Boundary. SPZ1 within study area.)	Direct physical disturbance of groundwater features. Release of pollutants to groundwater. Changes to groundwater flows and flood risk.	Yes – potential for quality and quantity impacts from construction activities such as trenchless crossings and construction dewatering.	Scoped In
Construction	Licensed and Private Abstractions (from surface water and groundwater)	Direct physical disturbance of features. Release of pollutants to surface water or groundwater. Changes to surface water or	Yes- potential for direct impacts to abstractions within the scoping area. Potential for direct or indirect quality and quantity impacts from construction activities such as	Scoped In

Phase	Receptor	Potential Impacts	Potential for significant effects	Proposed to be scoped in/ out
		groundwater flows and flood risk.	trenchless crossings and construction dewatering.	
Construction	Consented Discharges (to surface water and to land)	Direct physical disturbance of features. Release of pollutants to surface water or groundwater. Changes to surface water or groundwater flows and flood risk.	Yes - potential for direct impacts to discharges within the scoping area. Potential for indirect quality impacts from construction activities such as trenchless crossings.	Scoped In
Construction	Groundwater-surface water interactions (e.g. springs/sinks)	Direct physical disturbance of features. Release of pollutants to surface water or groundwater. Changes to surface water or groundwater flows and flood risk.	Yes – potential for direct impacts to groundwater-surface water interactions within the scoping area. Potential for quality and quantity impacts from construction activities such as trenchless crossings and construction dewatering.	Scoped In
Construction	Groundwater Dependent Terrestrial Ecosystems	Direct physical disturbance of groundwater features. Release of pollutants to groundwater. Changes to groundwater flows and flood risk.	Yes – potential for direct impacts to Groundwater Dependent Terrestrial Ecosystems within the scoping area. Potential for quality and quantity impacts from construction activities such as trenchless crossings and construction dewatering.	Scoped In (Designated sites reported in **Chapter 8** Ecology and Biodiversity)
Construction	Floodplains (Flood risk to proposed Onshore Scheme)	Changes to surface water flows and flood risk. Changes to groundwater flows and flood risk.	Yes – Potential for the proposed Onshore Scheme to be impacted by flooding as a result of areas of the route being located within fluvial and pluvial flood zones	Scoped In

Phase	Receptor	Potential Impacts	Potential for significant effects	Proposed to be scoped in/ out
		[see **Appendix 12A** for further details]		
Construction	Sensitive receptors and critical infrastructure (Flood risk from the proposed Onshore Scheme to surrounding area)	Changes to surface water flows and flood risk. Changes to groundwater flows and flood risk. [see **Appendix 12A** for further details]	Yes – Potential for increased flood risk as a result of construction activities within fluvial and pluvial flood zones	Scoped In
Operation	Main Rivers including: - River Wang; - River Blyth; - Wenhaston Watercourse; - Dunwich River; - Minsmere Old River ; - Hundred River ; and - Easton Broad, Buss Creek and Fromus (outside Scoping Boundary but within study area)	Release of pollutants to surface water. Changes to surface water flows and flood risk	No – Land within cable corridor to be reinstated following completion of construction works with no permanent physical disturbance of water features. Code of Construction Practice (CoCP) measures such as implementation of an appropriate SuDS system will limit any potential permanent impacts from above ground installation (AGI) drainage on the water environment. Maintenance activities are considered to be as described for construction, albeit on a more localised scale.	Scoped Out
Operation	Larger ordinary watercourses	Release of pollutants to surface water. Changes to surface water flows and flood risk	No – Land within cable corridor to be reinstated following completion of construction works with no permanent physical disturbance of water features. CoCP measures such as implementation of an appropriate SuDS system will limit	Scoped Out

Phase	Receptor	Potential Impacts	Potential for significant effects	Proposed to be scoped in/ out
			any potential permanent impacts from AGI drainage on the water environment. Maintenance activities are considered to be as described for construction, albeit on a more localised scale.	
Operation	Superficial Deposits (Various)	Release of pollutants to groundwater. Changes to groundwater flows and flood risk.	No – potential for permanent impacts to groundwater flow paths from permanent below ground structures (such as piles and retaining walls) considered in construction impacts. Release of pollutants to groundwater not considered to result in a significant effect, as maintenance activities are considered to be as described for construction, albeit on a more localised scale	Scoped Out
Operation	Crag Group Bedrock (Principal Aquifer)	Release of pollutants to groundwater. Changes to groundwater flows and flood risk.	No – potential for permanent impacts to groundwater flow paths from permanent below ground structures (such as piles and retaining walls) considered in construction impacts. Release of pollutants to groundwater not considered to result in a significant effect, as maintenance activities are considered to be as described for	Scoped Out

Phase	Receptor	Potential Impacts	Potential for significant effects	Proposed to be scoped in/ out
			construction, albeit on a more localised scale	
Operation	Source Protection Zones 1 to 3	Release of pollutants to groundwater. Changes to groundwater flows and flood risk.	No – potential for permanent impacts to groundwater flow paths from permanent below ground structures (such as piles and retaining walls) considered in construction impacts. Release of pollutants to groundwater not considered to result in a significant effect, as maintenance activities are considered to be as described for construction, albeit on a more localised scale	Scoped Out
Operation	Licensed and Private Abstractions (from surface water and groundwater)	Release of pollutants to surface water or groundwater. Changes to surface water or groundwater flows and flood risk.	No – potential for permanent impacts to groundwater flow paths from permanent below ground structures (such as piles and retaining walls) considered in construction impacts. Release of pollutants to groundwater not considered to result in a significant effect, as maintenance activities are considered to be as described for construction, albeit on a more localised scale	Scoped Out
Operation	Consented Discharges (to surface water or land)	Release of pollutants to surface water or groundwater.	No – potential for permanent impacts to consented discharges	Scoped Out

Phase	Receptor	Potential Impacts	Potential for significant effects	Proposed to be scoped in/ out
		Changes to surface water or groundwater flows and flood risk.	from altered groundwater flow paths considered in construction impacts. Release of pollutants to groundwater not considered to result in a significant effect, as maintenance activities are considered to be as described for construction, albeit on a more localised scale.	
Operation	Groundwater-surface water interactions (e.g. springs/sinks)	Release of pollutants to surface water or groundwater. Changes to surface water or groundwater flows and flood risk.	No – potential for permanent impacts to groundwater flow paths from permanent below ground structures (such as piles and retaining walls) considered in construction impacts. Release of pollutants to groundwater not considered to result in a significant effect, as maintenance activities are considered to be as described for construction, albeit on a more localised scale	Scoped Out
Operation	Groundwater Dependent Terrestrial Ecosystems	Release of pollutants to groundwater. Changes to groundwater flows and flood risk.	No – potential for permanent impacts to groundwater flow paths from permanent below ground structures (such as piles and retaining walls) considered in construction impacts. Release of pollutants to groundwater not considered to result in a significant effect, as	Scoped Out (Note designated sites reported in **Chapter 8** Ecology and Biodiversity)

Phase	Receptor	Potential Impacts	Potential for significant effects	Proposed to be scoped in/ out
			maintenance activities are considered to be as described for construction, albeit on a more localised scale	
Operation	Floodplains (Flood risk to proposed Onshore Scheme)	Changes to surface water flows and flood risk. Changes to groundwater flows and flood risk. [see **Appendix 12A** for further details]	No – Permanent infrastructure potentially located within fluvial and/or pluvial flood zones. Impacts considered within construction impacts.	Scoped Out
Operation	Sensitive receptors and critical infrastructure (Flood risk from the proposed Onshore Scheme to surrounding area)	Changes to surface water flows and flood risk. Changes to groundwater flows and flood risk. [see **Appendix 12A** for further details]	No – Permanent infrastructure potentially located within fluvial and/or pluvial flood zones which may increase flood risk on surrounding sensitive receptors. Impacts considered within construction impacts.	Scoped Out

12.7 Assessment methodology

Data sources

12.7.1 The assessment will be informed by desk studies, site surveys and intrusive ground investigations.

12.7.2 The baseline desk studies will build upon the scoping baseline using publicly available data and literature, together with data requested from the Environment Agency and local authorities.

12.7.3 Additional data that will be collated includes:

- Groundwater-surface water interactions such as springs (Ordnance Survey and historical mapping);
- Environment Agency Groundwater and Flood model(s) and associated reporting;
- Environment Agency Licensed Abstractions;
- Environment Agency Consented Discharges; and
- Private Water Supplies.

12.7.4 Surveys will be undertaken to acquire primary data on the watercourse and water bodies crossed by the proposed Onshore Scheme, and ground truth identified receptors. These surveys will be undertaken in accordance with best practice methodologies. Statutory stakeholders will be engaged in advance of undertaking the surveys on the proposed method and scope of the surveys. Surveys undertaken by associated disciplines (such as UK Habitats Classification surveys undertaken by **Chapter 8** Ecology and Biodiversity) will also be reviewed, to inform the baseline and survey requirements.

12.7.5 An intrusive ground investigation is currently being designed to provide information for preliminary design at the proposed Landfall Sites and Converter Station Site. A further phase(s) of ground investigation is planned for the Refined Scheme Boundary as the design progresses. Data obtained from the ground investigation, such as groundwater levels and aquifer properties, will inform the assessment.

Legislation, policy and guidance

12.7.6 Legislation and policy relevant to the proposed Scheme and this chapter is outlined in **Chapter 4** Legislation and Policy Overview and **Appendix 4-A** National Policy, **Appendix 4-B** Environmental Legislation and **Appendix 4-C** Local Policy.

12.7.7 Relevant guidance and standards that have informed the scoping process are listed below (but not limited to) and will also be taken into account as part of the assessment:

- CIRIA (2001) Control of Water Pollution from Construction Sites – Guidance for Consultants and Contractors (C532);
- CIRIA (2006) Control of Water Pollution from Linear Construction Projects – Technical Guidance (C648);
- CIRIA (2015) Environmental good practice on site (4th Edition) (C741);
- CIRIA (2016) Groundwater control: design and practice (second edition) (C750);

- Department for Levelling Up, Communities and Housing (2022) Guidance: Flood risk and coastal change;
- Department for Transport (2022) Transport Analysis Guidance Unit A3: Environmental Impact Appraisal (Section 10);
- Highways England (2020) Design Manual for Roads and Bridges LA 113 – Road Drainage and the Water Environment;
- Environment Agency (2007) Hydrogeological impact appraisal for groundwater abstractions. Science Report – SC040020/SR2;
- Environment Agency (2007) Hydrogeological impact appraisal for dewatering abstractions. Science Report – SC040020/SR1;
- Gov.uk (2017) Water Framework Directive assessment: estuarine and coastal waters https://www.gov.uk/guidance/water-framework-directive-assessment-estuarine-and-coastal-waters;
- Gov.uk (2017) Protect groundwater and prevent groundwater pollution https://www.gov.uk/government/publications/protect-groundwater-and-prevent-groundwater-pollution/protect-groundwater-and-prevent-groundwater-pollution;
- Gov.uk (2017). Groundwater protection technical guidance https://www.gov.uk/government/publications/groundwater-protection-technical-guidance/groundwater-protection-technical-guidance;
- Gov.uk (2022) Flood risk assessments: climate change allowances https://www.gov.uk/guidance/flood-risk-assessments-climate-change-allowances;
- Gov.uk (2023) Pollution prevention for businesses https://www.gov.uk/guidance/pollution-prevention-for-businesses;
- Gov.uk (undated) Check if you need permission to do work on a river, flood defence or sea defence https://www.gov.uk/permission-work-on-river-flood-sea-defence;
- Planning Inspectorate (2017) Advice Note 18: The Water Framework Directive;
- Suffolk County Council (2018) Construction Surface Water Management Plan;
- Suffolk County Council (2020) Friston Surface Water Management Plan;
- Suffolk County Council (2017) Leiston Surface Water Management Plan;
- Suffolk County Council (2011) Preliminary Flood Risk Assessment Report and Addendum (2017); and
- Water Framework Directive UK TAG (2009) Risk assessment of groundwater dependent terrestrial ecosystems.

Assessment method

12.7.8 **Chapter 5** EIA Approach and Method sets out the standard EIA methodology and matrices to be used for the assessment. The methodology is based on the principle that the environmental effects will be determined by identifying potential receptors, assigning receptor value, assessing the magnitude of change on the receptor and then identifying the significance of the effect. This section provides a summary of the EIA methodology specifically relevant to this chapter.

12.7.9 Assessment of cumulative and combined effects are discussed in **Chapter 29** Cumulative and Combined effects of the Project.

12.7.10 Four key types of receptors will be assessed as part of the EIA, based on WFD and NPPF requirements:

- Surface water features (including rivers, canal, lake and reservoirs)
  - WFD, hydrology, geomorphology and quality of surface waters;
- Groundwater features
  - WFD, flow, quantity (levels) and quality of groundwater resources and groundwater-dependent habitats;
- Surface and groundwater resources
  - Water resources (including abstractions and associated designations such as Source Protection Zones, discharges and water supply/drainage infrastructure); and
- Flood risk to and from the proposed Onshore Scheme
  - Flood risk to the proposed Onshore Scheme from pluvial, fluvial, reservoir, coastal, sewer and groundwater flooding, together with changes in flood risk from all sources as a result of the proposed Onshore Scheme.

12.7.11 Water-dependent habitats will be assessed to determine if and how the proposed Onshore Scheme might impact upon them. Designated sites (such as groundwater dependent SSSI's) remain Ecology receptors and to avoid double-counting, the overall impacts and assessment of effects on designated sites will be found in the **Chapter 8** Ecology and Biodiversity.

Sensitivity

12.7.12 Definitions of sensitivity for the purposes of water resources and flood risk are described in **Table 12-8**, based on the standard matrix set out in **Chapter 5** EIA Approach and Method. These have been developed based on professional judgement and adopt the definition (where applicable) provided in the DMRB standard for assessment of effects on water environment from road schemes[13,14].

12.7.13 The sensitivity of a receptor is dependent on its capacity to tolerate changes to hydrology, hydrogeology, geomorphology, water quality or flood risk and its potential for substitution. It also takes into account water resources which support human health and/or economic activity, water dependent ecosystems and vulnerability of receptors to flooding.

Table 12-8 Sensitivity or value of receptors

Receptor Value and Sensitivity	Summary
Very High	WFD and Water Resources WFD watercourse with Q95 > 1.0m^3/s

[13] Highways England (2020) Design Manual for Roads and Bridges LA 113 – Road Drainage and the Water Environment

[14] Although not a road scheme, the DMRB standard is a well established framework for environmental impact assessment approved by regulators, and widely applied by the industry with respect to linear construction projects.

Receptor Value and Sensitivity	Summary
	Principal aquifer providing regionally important resource and/or supporting a site designated under legislation. Groundwater locally supports a designated groundwater dependent terrestrial ecosystem (GWDTE) Source Protection Zone 1 Flood Risk Essential Infrastructure or highly vulnerable development
High	WFD and Water Resources WFD watercourse with Q95 <1.0m^3/d Principal aquifer providing locally important resource or supporting river ecosystem. Groundwater supports a non-designated GWDTE Source Protection Zone 2 Flood Risk More vulnerable development
Medium	WFD and Water Resources Watercourse not having a WFD classification shown in a river basin management plan (RBMP), but an obvious tributary of the main watercourse on the base map with flood risk extents associated with it. Aquifer providing water for agricultural/industrial use. Source Protection Zone 3 Flood Risk Less vulnerable development
Low	WFD and Water Resources Unnamed minor drains and watercourses. Unproductive strata (low yield) Flood Risk Water compatible development
Negligible	WFD and Water Resources Watercourses with negligible/no flow during construction Unproductive strata (very low or no yield)

Magnitude

12.7.14 Definitions of magnitude for the purposes of water resources and flood risk are describe in **Table 12-9**, based on the standard matrix set out in **Chapter 5** EIA Approach and Method.

Table 12-9 Magnitude of impact

Magnitude	Definition
High	WFD and Water Resources Change in WFD Classification. Loss or extensive impact of Public Water Supply Loss or extensive impact to a designated site or GWDTE Loss or extensive impact to major infrastructure through subsidence or similar Flood Risk In the absence of modelling this will be assigned based on engineering judgement, applying a precautionary principle
Medium	WFD and Water Resources Contribution to change in WFD Classification. Degradation of private water source (PWS) or loss of significant industrial/agricultural abstraction Impact to designated site or GWDTE Damage to major infrastructure through subsidence or similar. Flood Risk In the absence of modelling this will be assigned based on engineering judgement, applying a precautionary principle.
Low	WFD and Water Resources Minor impacts on water supplies, watercourses and groundwater dependent features. Flood Risk In the absence of modelling this will be assigned based on engineering judgement, applying a precautionary principle.
Negligible	WFD and Water Resources No measurable impacts Flood Risk Negligible impact to peak flood levels

Significance

12.7.15 Based on the sensitivity and magnitude, the significance of effect will be predicted. **Chapter 5** EIA Method and Approach identifies the standard matrix to be used for the assessment.

Supporting assessments

12.7.16 The Hydrology, Hydrogeology and Drainage Chapter of the PEI Report and ES will be supported by the following assessments. The scopes of these assessments will be agreed with the relevant stakeholders.

Hydrogeological Impact Assessment

12.7.17 A Hydrogeological Impact Assessment (HIA) will be undertaken to assess the potential hydrogeological impacts to the surrounding area from the proposed Onshore Scheme.

12.7.18 The assessment will adopt the methodology set out in DMRB standard LA 113[13]. This standard sets out a well-established methodology approved by regulators, which is widely applied to linear infrastructure projects. Being a linear infrastructure project, the nature and scale of impacts with respect to construction activities and principles of assessment are similar.

12.7.19 The assessment will follow the procedures set out in Appendix A of DMRB LA 113:

- Step 1: Establish regional groundwater body status;
- Step 2: Develop a conceptual model for the surrounding area; and
- Step 3: Base on the conceptual model, identify all potential features which are susceptible to groundwater level and flow impacts.

12.7.20 The assessment will also consider the EA guidance for dewatering abstractions and groundwater abstractions.

12.7.21 The source-pathway-receptor model will be applied to water features sensitive to groundwater level and flow changes. In this context, sources will include activities such as dewatering abstractions or discharge/recharge points, which may artificially alter groundwater levels and flows. The pathway is the hydraulic connection between the source and receptor, such as the aquifer that connects the two. The receptors are groundwater bodies and groundwater dependent features (public water supplies, springs, GWDTE etc).

Water Dependent Ecosystems

12.7.22 An assessment of potential impacts will be undertaken following the procedures set out in Appendix B of DMRB LA113, which follows a stepped, risk-based approach to understanding potential impacts on GWDTEs.

12.7.23 Other water dependent habitats will follow a similar stepped, risk-based approach.

12.7.24 These assessments will be informed by the conceptualisation identified in the EIA and HIA, and undertaken in co-ordination with the ecology team.

WFD Compliance Assessment

12.7.25 The WFD compliance assessment will assess the impact the proposed activities may have on the immediate water bodies and any linked water bodies, and if the activities comply with the RBMP.

12.7.26 The WFD compliance assessment comprises three main stages; screening, scoping and impact assessment.

12.7.27 Should the assessment identify the potential deterioration in the status of one or more quality elements from the proposed Onshore Scheme (taking into consideration all mitigation), the proposed Onshore Scheme is considered non-compliant requiring an exemption under Regulation 19 (Article 4.7) of the WFD to proceed.

Flood Risk Assessment

12.7.28 Given the extent of the proposed Onshore Scheme and potential interaction with areas of flood risk, a FRA[15] will be undertaken in accordance with the NPS, NPPF and associated Flood Risk and Coastal Change guidance. This is both to ensure the proposed Onshore Scheme itself is designed to be safe and resilient to flood risk, as well as ensuring that the proposed Onshore Scheme does not increase flood risk to neighbouring receptors.

12.7.29 The information and data required for the FRA is dependent on the location with respect to sources of flooding and the type of development. It is possible that a quantitative assessment using hydraulic modelling may be required in order to assess the magnitude of any impacts on receptors in some locations for the EIA.

12.7.30 This FRA will also need to demonstrate the application of the Sequential Test, which steers development into areas of lowest flood risk. It is assumed at this stage that the proposed Onshore Scheme would be classed as 'essential infrastructure' under the vulnerability classification, and given this scoping assessment has identified possible interaction of the proposed Onshore Scheme in flood zone 3, it is expected that the FRA will also need to satisfy the Exception Test.

12.7.31 The FRA scope will be agreed with key stakeholders (such as the EA and LLFA) as the flood risk from pluvial, fluvial and groundwater sources, together with the infrastructure design of the proposed Onshore Scheme components, is further developed and better understood. This will include particular areas of concern such as Friston from pluvial flooding and the landfalls from fluvial and/or coastal flooding.

12.7.32 A drainage strategy may also be required that demonstrates the appropriate management of runoff from the proposed Onshore Scheme.

12.8 Assumptions & limitations

12.8.1 This EIA Scoping Report has been collated based on a range of publicly available data and information only. It is assumed that the data collated is accurate. The data will be supplemented with additional data as part of the EIA process.

12.8.2 In the absence of data, a precautionary approach has been taken and professional judgement, based on experience of similar linear schemes, has been used where required to inform the scope of the assessment.

12.8.3 It is assumed that there will be gaps in data where the information has not been available at the scoping stage, such as the location of springs and abstractions. At this stage, a precautionary approach has been taken assuming that these receptors could be present and impacted.

12.8.4 It is assumed that there will be no permanent surface water feature realignments/diversions or in-channel structures. Should this not be the case then operational impacts on surface water features will need to be scoped back in.

[15] It is assumed that a single FRA will be produced for the proposed Underground Cable Corridor and associated infrastructure.

Contents

13. Landscape and visual amenity

13.1 Introduction

13.1.1 This chapter outlines the proposed scope and methodology for the Landscape and Visual Impact Assessment (LVIA). It will consider the potential for significant effects arising from the construction and operation of the LionLink Interconnector (hereafter referred to as 'the proposed Onshore Scheme') on landscape and visual receptors. A review of relevant guidance and policy has been undertaken together with a desk-based assessment, to inform the proposed scope and methodology.

13.1.2 This chapter considers the differences between landscape effects and visual effects, which will be assessed accordingly:

- **Landscape effects** relate to changes to the landscape as a resource, including physical changes to the fabric or individual elements of the landscape, its aesthetic or perceptual qualities, and landscape character; and
- **Visual effects** relate to changes to existing views of identified visual receptors ('people'), from the loss or addition of landscape features within their view due to the proposed Onshore Scheme.

13.1.3 This chapter is supported by the following figures:

- **Figure 1-2**: Proposed Onshore Scheme Scoping Boundary;
- **Figure 1-3**: Proposed Onshore Scheme Scoping Boundary and Scheme Components;
- **Figure 13-1**: Landscape and Visual Study Area; and
- **Figure 13-2**: Landscape Designations.

13.1.4 There may be interrelationships with other disciplines. Therefore, this chapter should be read in conjunction with the following chapters:

- **Chapter 8**: Ecology and Biodiversity - changes to vegetation and land cover patterns such as vegetation removal or new planting which could impact on landscape character and visual amenity and on the biodiversity and ecological condition and connectivity of the landscape;
- **Chapter 10:** Health and Wellbeing - will consider the impacts to visual amenity that have the potential to impact on wellbeing and quality of life for communities close to areas of construction; and
- **Chapter 11**: Historic Environment – changes to the historic built environment and landscapes, such as demolition or alterations to listed buildings or registered parks and gardens that could impact on the landscape character and visual amenity and the on statutory and non-statutory heritage assets and their setting.

13.2 Consultation and engagement

13.2.1 Consideration has been given to responses received at Non-Statutory Consultations held in 2022 and 2023 in preparing this scoping chapter. Responses relating to Landscape and Visual have been received from the following:

- Suffolk Coast and Heaths National Landscape (formerly referred to as Area of Outstanding Natural Beauty or AONB) Partnership;
- Suffolk County Council (SCC);
- East Suffolk Council (ESC);
- Natural England;
- Historic England;
- RSPB Suffolk;
- Alde and Ore Association; and
- Parish and Town Councils: Aldringham-cum-Thorpe Parish Council, Dunwich Parish Council, Kelsale-cum-Carlton Parish Council, Leiston-cum-Sizewell Town Council, Middleton cum Fordley Parish Council, Reydon Parish Council, Southwold Town Council, Theberton and Eastbridge Parish Council, and Walberswick Parish Council.

13.2.2 The main themes reported as part of the Non-Statutory Consultations were:

- Justification should be provided for why all the proposed landfall sites fall within the Suffolk Coast and Heaths National Landscape, with reference to alternatives outside the National Landscape;
- Cumulative impacts should assess the proposed Onshore Scheme in combination with other energy projects in the area, and a collaborative design approach should be taken to minimise adverse impacts;
- Adverse impacts on the defined qualities of the National Landscape should follow the mitigation hierarchy;
- Impacts on recreational users of the coast path and the Suffolk Heritage Coast should be assessed;
- Justification should be provided for why the proposed route passes through valued areas of countryside identified in the Reydon Neighbourhood Plan;
- A clear methodology should be provided for identifying valuable landscape elements and the scope for mitigation; and
- The design should demonstrate how it has evolved in response to inputs from technical disciplines.

13.2.3 Engagement was undertaken with SCC, ESC and the Suffolk Coast and Heaths National Landscape Partnership in August 2023. The key points of discussion included:

- The proposed methodology;
- The results of initial fieldwork carried out in March and May 2023; and
- The nature of consultation in advance of winter fieldwork.

13.2.4 Further engagement will be undertaken with relevant stakeholders in relation to the proposed Onshore Scheme to obtain any information that they hold to supplement the assessment and to seek their views with regards to the evolving design.

13.2.5 The following bodies will be consulted during the EIA process in relation Landscape and Visual:

- Natural England;
- SCC;
- Suffolk Coasts and Heaths National Landscape; and
- ESC.

13.2.6 In addition, engagement will be undertaken with non-statutory stakeholders as required so that their specialist local views and expertise can be considered as part of the EIA process.

13.3 Baseline conditions

13.3.1 This section summarises the landscape and visual baseline, with reference to maps, aerial photography, published studies and fieldwork.

Study area

13.3.2 The study area for the LVIA includes all land within the Proposed Onshore Scheme Scoping Boundary (hereafter referred to as 'the Onshore Scoping Boundary'), plus a 3km buffer measured from the Onshore Scoping Boundary, as illustrated on **Figure 13-1**.

13.3.3 Desk study and fieldwork has determined that intervening landform, buildings and vegetation generally limit the extent of views to within 3km from the Onshore Scoping Boundary. Beyond this distance, significant landscape and visual effects are not considered likely to occur. This is the area within which construction and operational effects could arise and is based on an understanding of the local landscape and experience of working on similar projects.

13.3.4 Other information sources referred to included 1:25,000, 1:10,000 and 1:1,250 scale Ordnance Survey mapping, 3D topographical data and aerial photography. Two days of fieldwork was subsequently undertaken in May 2023 to verify the findings of the desk-study.

13.3.5 The study area will be reviewed and, as appropriate, refined for the assessment in the Preliminary Environmental Information (PEI) Report and Environmental Statement (ES) with only one Landfall and one High Voltage Direct Current (HVDC) Underground Cable Corridor being taken forward. The study area will be based on the proposed Order limits in the ES.

Baseline data sources

13.3.6 The baseline described in this chapter and associated appendices has been informed by the following data sources:

Table 13-1 Scoping baseline data sources

Baseline Data	Source
Ordnance Survey Mapping and Aerial Imagery	Ordnance Survey
National Character Area 82: Suffolk Coasts and Heaths	Natural England (2015)
East of England Landscape Framework	Landscape East (2010)
Suffolk Landscape Character Assessment	SCC (2010)
Historic Landscape Characterisation map of Suffolk,	SCC (1999, updated 2008)
Waveney District Landscape Character Assessment	Land Use Consultants (2008)
Suffolk Coastal Landscape Character Assessment	Alison Farmer Associates (2018)
Touching the Tide Landscape Character Assessment	Alison Farmer Associates (2012)
Natural Beauty and Special Qualities Indicators	LDA Design (2016)
Suffolk Coast and Heaths National Landscape Management Plan 2018-2023	Suffolk Coast and Heaths National Landscape Partnership
Suffolk Coast and Heaths National Landscape Management Plan 2023-28 – Consultation Draft	Suffolk Coast and Heaths National Landscape Partnership
Tranquillity Map: England	CPRE: The Countryside Charity
England's Light Pollution and Dark Skies	CPRE: The Countryside Charity

Baseline

13.3.7 The following sections present the existing baseline established at scoping. There are currently two options being considered for the proposed Landfall Site and associated HVDC Underground Cable Corridor, which are shown in **Figure 1-2** and **Figure 1-3**. Baseline information is presented for the two options below.

Topography and hydrology

13.3.8 The topography of the study area varies between the flat marshes which line parts of the coast and river valleys and the gently rolling hinterland. The land is relatively low-lying and has been shaped by the underlying Crag geology, which is most evident along the coastline in the form of shingle beaches and receding sandy cliffs.

13.3.9 A series of small rivers including the Blyth, Minsmere and Dunwich run eastwards along the bottom of broad, shallow valleys which divide the study area. Intertidal mudflats and salt marshes within the Blyth estuary are extensive.

Landcover and vegetation patterns

13.3.10 Landcover within the study area mostly comprises arable farmland with an irregular pattern of reedbeds and grazing marsh along river valleys, lowland heathland on sandy soils and woodland on the estuary slopes. The scale of arable fields varies dramatically across the study area based on the extent of agricultural intensification and level of tree cover. Small scale fields are commonly found around the village fringes and within the floodplains where the hydrology pattern remains largely intact.

13.3.11 The lowland heath known as the Sandlings and the coastal levels are strong defining features of the eastern part of the study area and have multiple ecological designations recognising their ecological and wildlife importance.

13.3.12 Although less common, parkland landscapes containing ancient woodland are found in the western part of the area and coniferous plantations such as the extensive Dunwich Forest in the east.

Land use and settlement

13.3.13 Settlement is generally sparse, and typically comprises small, remote villages which have undergone little modern expansion and isolated farmsteads. Larger settlements within the study area are limited to Southwold and Reydon in the north and Saxmundham and Leiston in the south.

13.3.14 Tourism exerts an influence on land use across the study area, particularly along the Suffolk Heritage Coast in the north associated with Southwold and Walberswick. Painted beach huts lining the seafront and the lighthouse at Southwold are iconic features.

13.3.15 Many buildings throughout the study area display a traditional vernacular with soft-hued red bricks with thatch, pantiles or peg tiles and some others in ‘Suffolk Pink’ painted render. Local flint is also common in boundary walls and church buildings.

13.3.16 Beyond the settlements, agricultural use has a large influence on the character of the study area and varies between high quality vegetable production to outdoor pig farms.

Movement and connectivity

13.3.17 The A12 trunk road and the railway line connecting Halesworth to the west with Saxmundham and Leiston in the south form the primary movement corridors through the study area. These routes provide wider connections with larger settlements in Suffolk including Ipswich and Lowestoft. A network of rural lanes, some of which are designated as ‘quiet lanes’, connect smaller towns and villages within the study area, but the landscape is otherwise free of major transport infrastructure.

13.3.18 Pedestrian connectivity is extensive in the study area, particularly in the east and near to the Suffolk Heritage Coast. The study area is crossed by a dense network of public rights of way (PRoW) including Sandlings Walk the Suffolk Coast Path and part of the proposed King Charles III England Coast Path (approved in part but not yet open), which are all promoted, long distance walking routes, as well as National Cycle Routes 31 and 42. Relatively large areas of open common land such as Dunwich Forest also facilitate access to the countryside within the study area.

Landscape designations

13.3.19 As presented on **Figure 13-2**, a large part of the study area falls within the wider Suffolk Coast and Heaths National Landscape and its setting, and therefore share similar characteristics.

13.3.20 The National Landscape extends along the coastline between Kessingland near Lowestoft in the north to the River Stour in the south. It is characterised by farmland interspersed with picturesque villages and occasional seaside towns. The area was once dominated by extensive heathland known as The Sandlings but is today found together with plantation woodland and freshwater marshes. Five river estuaries including the Blyth also form unifying features of the National Landscape, containing intertidal mudflats and saltmarsh. The National Landscape also has strong and long-standing cultural associations particularly with artists and musicians in places like Aldburgh. Further information on the character and special qualities of the Suffolk Coast and Heaths National Landscape is set out within the associated Management Plan[1] and Natural Beauty and Special Qualities document[2].

13.3.21 Other landscape-related designations include the Grade II registered park and garden at Henham Park, and scattered swathes of ancient woodland throughout.

13.3.22 Henham Park covers approximately 330 hectares of C18 park and C19 pleasure grounds extending between Wangford and Blythburgh. The core of the park contains a concentration of ancient field oaks within large pasture fields and with plantations common around the park boundaries. The garden and pleasure grounds are less intact and survive as a remnant ha-ha and an old brick loggia. The Park also contains buildings of early C18 origins including Henham House, which is Grade II listed. Further information of the history and character of the Henham can be found under the Official List Entry on Historic England's website[3].

Published landscape character assessments

13.3.23 Published landscape character assessments which cover all or parts of the study area at the national, regional and local level have been reviewed to identify the relevant Landscape Character Types (LCT) and Landscape Character Areas (LCA).

13.3.24 **Table 13-2** lists the character areas that fall within the study area from the relevant published landscape character assessments. These will be mapped and described in detailed within the PEI Report and ES.

Table 13-2 Published landscape character assessment and relevant character areas

Landscape character assessment	Relevant character areas
National – Natural England National Character Area (NCA) profiles	NCA 82: Suffolk Coasts and Heaths
	NCA 83: South Norfolk and High Suffolk

[1] Suffolk Coast and Heaths Area of Outstanding Natural Beauty Management 2018-2023, Suffolk Coast and Heaths AONB Partnership

[2] Suffolk Coast and Heaths Area of Outstanding Natural Beauty (AONB): Natural Beauty and Special Qualities Indicators V1.8, LDA Design (21 November 2016)

[3] Henham, Blythburgh https://historicengland.org.uk/listing/the-list/list-entry/1000557?section=official-list-entry (Accessed Feb 2024)

Landscape character assessment	Relevant character areas
Regional – East of England Landscape Framework, 2010	Forested Estate Sandlands
	Wooded Plateau Claylands
	Valley Settled Farmlands
	Coastal Levels
	Valley Meadowlands
	Saltmarsh/Intertidal Flats
	Urban
County – Suffolk Landscape Character Assessment, 2010	LT 01: Ancient estate claylands
	LT 05: Coastal dunes and shingle ridges
	LT 06: Coastal levels
	LT 07: Estate sandlands
	LT 08: Open coastal fens
	LT 14: Rolling estate claylands
	LT 16: Rolling estate sandlands
	LT 20: Saltmarsh and intertidal flats
	LT 27: Valley meadowland and fens
	LT 29: Wooded fens
District - Waveney District Landscape Character Assessment, 2008	LCA B2: Blyth Valley
	LCA F2: Southwold Coast
	LCA H7: Blyth and Wang Tributary Valley Farmland
	LCA I3: Sotterley and Benacre Plateau
	LCA J3: Blyth Estuary
	LCA K1: Gisleham Plateau
District - Suffolk Coastal Landscape Character Assessment, 2018	LCA B2: Blyth Valley
	LCA B3: Yox Valley
	LCA B4: Fromus Valley
	LCA D2: Westwood and Dingle Marshes
	LCA J3: Blyth Estuary
	LCA K2: Dunwich and Westleton Sandlands

Landscape character assessment	Relevant character areas
	LCA K3: Aldringham and Freston Sandlands
	LCA L1: Heveningham and Knodishall Estate Claylands
Suffolk Coast and Heaths National Landscape - Touching the Tide Landscape Character Assessment, 2012	Covehithe to Southwold Coast
	River Blyth Estuary and Marshes
	Dunwich to Sizewell Coast.

Visual Baseline

13.3.25 Initial visual receptor groups likely to experience views of the proposed Onshore Scheme have been identified through interrogation of base mapping and fieldwork. The Study Area is large and will be refined during the design development. As such, these visual receptor groups are also likely to reduce.

13.3.26 The initial visual receptor groups are set out in the following section and have been separated by the component parts of the proposed Onshore Scheme.

Proposed Friston Substation Site

13.3.27 Initial visual receptor groups with potential to experience views of the proposed Friston Substation Site include:

- Residents within nearby settlements including Friston, Knodishall and Coldfair Green;
- Recreational users of PRoWs including the promoted Sandlings Walk and National Cycle Network Route 42;
- Recreational users of nearby public open spaces including Knodishall Common; and
- Users of nearby roads including Snape Road, Aldeburgh Road and Grove Road.

Underground HVAC Cable Corridor

13.3.28 Initial visual receptor groups with potential to experience views of the proposed Underground High Voltage Alternating Current (HVAC) Cable Corridor:

- Residents within nearby settlements including Saxmundham, Sternfield, Friston, Knodishall and Coldfair Green;
- Residents of more remote dwellings and farmsteads between Saxmundham and Leiston;
- Recreational users of PRoWs including the promoted Sandlings Walk and National Cycle Network Route 42;
- Recreational users of nearby public open spaces including Knodishall Common; and
- Users of nearby roads including the B1119, Snape Road, Aldeburgh Road and Grove Road.

Converter Station Site

13.3.29 Initial visual receptor groups with potential to experience views of the proposed Converter Station Site:

- Residents within Saxmundham and Sternfield;
- Residents of more remote dwellings and farmsteads between Saxmundham and Leiston;
- Recreational users of PRoWs to the east of Saxmundham; and,
- Users of nearby roads including the B1119.

Underground HVDC Cable Corridor

Common Cable Corridor

13.3.30 Initial visual receptor groups with potential to experience views of the proposed Underground HVDC Common Cable Corridor:

- Residents of nearby settlements including Friston, Coldfair Green, Knodishall, Saxmundham, East Green, Theberton, Middleton, Westleton, Darsham, Blythburgh, Wenhaston, Sotherton Corner, and Uggeshall;
- Residents of more remote dwellings and farmsteads between Friston and Uggeshall;
- Recreational users of PRoWs including the promoted Sandlings Walk and National Cycle Network Route 42;
- Recreational users of nearby public open spaces including Dunwich Forest, Westleton Heath and other areas of common land;
- Users of nearby roads including the B1121, B1069, B1119, B1122, B1125, A12, A145, and B1123; and
- Users of rural lanes and quiet lanes between Friston and Uggeshall.

Cable Corridor to Southwold

13.3.31 Initial visual receptor groups with potential to experience views of the proposed Underground HVDC Southwold Cable Corridor:

- Residents within nearby settlements including Southwold, Reydon, Frostenden Corner, Barnaby Green, Wangford and Uggeshall;
- Residents of more remote dwellings and farmsteads between Southwold and Uggeshall;
- Recreational users of PRoWs including the promoted Suffolk Coast Path and National Cycle Network Route 31;
- Recreational users of nearby public open spaces including Reydon Recreation Ground;
- Users of nearby roads including the A1095, B1127, B1126, and the A12; and
- Visitors to Southwold Pier, boating lakes and associated tourist facilities.

Cable Corridor to Walberswick

13.3.32 Initial visual receptor groups with potential to experience views of the proposed Underground HVDC Walberswick Cable Corridor:

- Residents within Walberswick and Blythburgh;
- Residents of more remote dwellings and farmsteads between Walberswick and Blythburgh;
- Recreational users of PRoWs including the promoted Suffolk Coast Path and Sandlings Walk;
- Recreational users of nearby public open spaces including Westwood Marshes, Walberswick Common and other areas of common land; and
- Users of nearby roads including the B1387 and B1125.

Landfall Site

Southwold

13.3.33 Initial visual receptor groups with potential to experience views of the proposed Southwold Landfall Site:

- Residents on the northern edge of Southwold and northern and eastern edges of Reydon;
- Recreational users of PRoWs including the promoted Suffolk Coast Path;
- Recreational users of nearby public open spaces including Reydon Recreation Ground;
- Users of roads including the A1095, B1127 and nearby residential streets; and
- Visitors to Southwold Pier, boating lakes and associated tourist facilities.

Walberswick

13.3.34 Initial visual receptor groups with potential to experience views of the proposed Walberswick Landfall Site:

- Residents on the southern edge of Walberswick;
- Recreational users of PRoWs including the promoted Suffolk Coast Path and Sandlings Walk;
- Recreational users of nearby public open spaces including Westwood Marshes, Walberswick Common and other areas of common land; and
- Users of roads including the B1387 and B1125 and nearby residential streets.

Future baseline

13.3.35 The LVIA chapter within the PEI Report and the ES will consider changes which may affect the future landscape and visual amenity in the absence of the proposed Onshore Scheme. This includes the development which will be occupied during the construction or between year 1 and year 15 of operation, which would introduce new visual receptors with views of the proposed Onshore Scheme.

13.4 Potential impacts

13.4.1 This section identifies the potential impacts that could occur as a result of the proposed Onshore Scheme during construction and operation.

Construction

13.4.2 Temporary impacts on the landscape character and visual amenity could occur during the construction phase as a result of the following:

- Presence and views of security fencing, construction compounds, haul roads, and contractor welfare facilities with security lighting;
- Removal of existing vegetation and demolition of existing structures where unavoidable;
- Excavation and storage of topsoil, and other associated earthworks;
- Presence and movement of construction barges, floating rigs, and other specialised vessels off the coastline;
- Presence and movement of heavy goods vehicles (HGVs), deliveries and transportation of materials, and other construction traffic around the site and surrounding area; and
- Laying of the cables and construction of associated joint bays, buildings and sub-station extension including the use of drilling equipment, excavators and cranes.

Operation

13.4.3 Impacts on the landscape character and visual amenity could occur during the operation phase as a result of the following:

- The permanent change of land use from agricultural land to energy infrastructure associated with the proposed Landfall Site and proposed Converter Station Site;
- The permanent loss of vegetation above the proposed Underground Cable Corridor;
- The existence and operation of new built development associated with the proposed Converter Station and proposed Friston Substation, including impacts on tranquillity and night time lighting effects;
- The maintenance of cable infrastructure, existing vegetation and new planting; and
- The introduction of landscape features including planting and habitat enhancements as part of landscape mitigation proposals.

13.5 Design and control measures

13.5.1 As outlined in **Chapter 5** EIA Approach and Method, a standard hierarchical approach will be taken to mitigation.

13.5.2 The assessment of effects will take into account measures that are embedded into the proposed Onshore Scheme design, together with general good practice measures.

Design measures

13.5.3 The LVIA will be a key tool in informing the design of the proposed Onshore Scheme, to minimise harm to the landscape and to provide reasonable mitigation where possible and appropriate.

13.5.4 Potential embedded design measures include:

- The above ground buildings and structures would be designed to integrate with the surrounding landscape, minimising impacts on existing landscape features and people's views as far as practicable, including at night. This will include consideration of the siting of infrastructure within the site and other design principles including, scale, form, colours and materials;
- New planting would be designed to respond to the local landscape character, reinforce the existing Green Infrastructure framework and provide environmental enhancements where possible;
- All planting proposed would be designed considering opportunities to deliver environmental net gain with multiple benefits including natural capital and biodiversity enhancements, habitat connectivity, carbon sequestration, flood mitigation and amenity;
- Landfall structures within the Suffolk Coast and Heaths National Landscape would be faced in appropriate colours and finishes taking reference from the Suffolk Coast and Heaths Partnership's 'Guidance on the selection and use of colour in development'[4]; and
- The working width of the proposed Onshore Scheme would seek to avoid sensitive landscape features and would be set back at least 15m from any ancient woodland boundary, and at least 15 times the diameter of ancient or veteran tree canopies.

Control measures

13.5.5 With regard to effects during the construction phase, standard construction management controls would be outlined in the Code of Construction Practice and in accordance with National Grid's 'Construction best practice for underground cable installation'[5]. This would include measures to protect retained landscape features, sensitive siting of construction compounds, appropriate handling and storage of soil, and sensitive design and use of lighting after dark.

13.5.6 An Arboricultural Impact Assessment including a Tree Constraints Plan and a Tree Protection Plan, produced in accordance with the British Standard 5837:2012 'Trees in Relation to Design, Demolition and Construction' would set out protective measures such as fencing and construction exclusion zones within tree root protections areas.

13.5.7 In sensitive locations, drilling methods would be utilised where possible but otherwise strategic placement of excavated material besides trenches would be designed accordingly.

13.5.8 As part of the Local Nature Recovery Strategy (LNRS), an Outline Landscape and Ecology Management Plan (OLEMP) would set out the design vision, objectives, principles and prescriptions for the detailed design and management of proposed Green

[4] Guidance on the selection and use of colour in development, Suffolk Coast and Heaths AONB Partnership (2018)

[5] Construction best practice for underground cable installation, National Grid (November 2021)

Infrastructure relating to the operational phase. This would be supported by an Environmental Masterplan, which will illustrate the extent and functions of proposed mitigation and how this would integrate with the wider landscape.

13.6 Scope of the assessment

13.6.1 This section identifies the potential for the proposed Onshore Scheme to give rise to likely significant effects, taking into account the design and control measures identified in **Section 13.5**.

13.6.2 It is considered likely that the proposed Underground Cable Corridor will have the greatest impacts on the landscape and views during construction. However, the assessment will also consider the longer-term impacts on the landscape and views following completion of construction of the proposed Underground Cable Corridor due to changes in land cover. This will include consideration of the residual effects of effectiveness of the proposed landscape and visual mitigation.

13.6.3 There is potential for visual impacts relating to offshore construction activity from coastal areas. Such activities would be viewed in the context of large ships which are a common feature of the seascape. It is not anticipated that these construction activities would change the seascape character within the study area and these effects are therefore scoped out of further assessment.

13.6.4 The proposed Converter Station and proposed Friston Substation are likely to introduce built elements of substantial scale so their impacts on the landscape and views are likely to be greatest during existence and operation.

13.6.5 **Table 13-3** sets out the receptors identified within the study area, the potential impacts as a result of construction and/or operation activities associated with the proposed Onshore Scheme, whether these impacts are likely to give to rise to significant effects, and whether the receptor is scoped in or scoped out of the assessment.

13.6.6 The proposed Friston Substation, as described in **Chapter 2** proposed Scheme Description outlines the optionality that remains at Friston Substation. The scope of this EIA Scoping Chapter has been based on the worst case scenario that the proposed Onshore Scheme would construct Friston Substation.

13.6.7 All identified impacts are of relevance to both the Southwold and Walberswick options unless specified otherwise.

13.6.8 A precautionary approach has been taken and where there is no strong evidence base, insufficient baseline or the significance is uncertain at this stage the impact has been scoped in to the EIA. Where there is a clear evidence base that the effect from the impact will not be significant, either alone or in combination with other plans and projects, the impact has been scoped out of the EIA.

Table 13-3 Proposed scope of the assessment

Project phase	Receptor	Impact	Potential for significant effect	Proposed to be scoped in/ out
Construction	National LCAs, County LCAs, District LCAs and Local LCAs	Presence and views of security fencing, construction compounds, haul roads, and contractor welfare facilities with security lighting; Removal of existing vegetation and demolition of existing structures where unavoidable; Excavation and storage of topsoil, and other associated earthworks; Presence and movement of HGVs, deliveries and transportation of materials, and other construction traffic around the site and surrounding area; and Laying of the cables and construction of associated joint bays, buildings and sub-station extension including the use of drilling equipment, excavators and cranes.	Potential for large scale, short to medium term changes to landscape character, albeit temporary	Scoped in
Construction	Suffolk Coast and Heaths National Landscape	Presence and views of security fencing, construction compounds, haul roads, and contractor welfare facilities with security lighting; Removal of existing vegetation and demolition of existing structures where unavoidable; Excavation and storage of topsoil, and other associated earthworks; Presence and movement of heavy goods vehicles (HGVs), deliveries and transportation of materials, and other construction traffic around the site and surrounding area; and Laying of the cables and construction of associated joint bays, buildings and sub-station extension including the use of drilling equipment, excavators and cranes.	Potential for large scale, short to medium term changes to Special Qualities, albeit temporary	Scoped in

Project phase	Receptor	Impact	Potential for significant effect	Proposed to be scoped in/ out
Construction	Residents of nearby settlements Residents of more remote dwellings and farmsteads Recreational users of PRoW Recreational users of nearby Public Open Spaces Users of nearby roads Users of rural and quiet lanes Visitors to Southwold Pier, boating lakes and associated tourist facilities.	Views of security fencing, construction compounds, haul roads, and contractor welfare facilities with security lighting; Views of vegetation removal and demolition of existing structures where unavoidable; Views of excavation and storage of topsoil, and other associated earthworks; Views of HGVs, deliveries and transportation of materials, and other construction traffic around the site and surrounding area; and Views of cable laying and construction of associated joint bays, buildings and sub-station extension including the use of drilling equipment, excavators and cranes.	Potential for large scale, short to medium term changes to visual amenity, albeit temporary	Scoped in
Operation	National LCAs, County LCAs, District LCAs and Local LCA	The permanent change of land use from agricultural land to energy infrastructure associated with the proposed Landfall Site and proposed Converter Station Site; The permanent loss of vegetation above the proposed Underground Cable Corridor; The presence of new built development associated with the proposed Converter Station and proposed Friston Substation; and The introduction of landscape features including planting and habitat enhancements as part of landscape mitigation proposals.	Potential for medium scale, permanent, long-term changes to landscape character	Scoped in
Operation	Suffolk Coast and Heaths National Landscape	The permanent change of land use from agricultural land to energy infrastructure associated with the proposed Landfall Site and proposed Converter Station Site;	Potential for medium scale, permanent, long-term	Scoped in

Project phase	Receptor	Impact	Potential for significant effect	Proposed to be scoped in/ out
		The permanent loss of vegetation above the proposed Underground Cable Corridor; The presence of new built development associated with the proposed Converter Station and proposed Friston Substation; The introduction of landscape features including planting and habitat enhancements as part of landscape mitigation proposals.	changes to Special Qualities	
Operation	Residents of nearby settlements Residents of more remote dwellings and farmsteads Recreational users of PRoW Recreational users of nearby Public Open Spaces Users of nearby roads Users of rural and quiet lanes Visitors to Southwold Pier, boating lakes and associated tourist facilities.	The loss of visual screening and views of ground disturbance above the proposed Underground Cable Corridor; Views of new built development associated with the proposed Converter Station and proposed Friston Substation; and Views of new landscape features as part of landscape mitigation proposals.	Potential for medium scale, permanent, long-term changes to visual amenity	Scoped in

13.7 Assessment methodology

Data sources

13.7.1 The assessment will be informed by desk studies and site surveys.

13.7.2 The baseline desk studies will build upon the scoping baseline using publicly available data and literature, together with data requested from the local authorities.

Legislation, policy and guidance

13.7.3 Legislation and policy relevant to the proposed Scheme and this chapter is outlined in **Chapter 4** Legislation and Policy Overview and **Appendix 4-A** National Policy, **Appendix 4-B** Environmental Legislation and **Appendix 4-C** Local Policy.

13.7.4 Relevant guidance and standards that have informed the scoping process are listed below (but not limited to) and will also be taken into account as part of the assessment:

- Guidelines for Landscape and Visual Impact Assessment, 3rd Edition (GLVIA3) (Landscape Institute and Institute of Environmental Assessment and Management, 2013) (Landscape Institute and Institute of Environmental Management and Assessment, 2013) is the primary source of guidance for the assessment of landscape and visual effects;
- An Approach to Landscape Character Assessment, (Natural England, 2014);
- The Landscape Institute's Technical Guidance Note (TGN) 02/21: Assessing landscape value outside national designations, (Landscape Institute, 2021), which was used to inform the criteria against which the value attached to the landscape outside of landscapes with statutory status was assessed;
- Visual Representation of Development Proposals, Technical Guidance Note (TGN) 06/19 (Landscape Institute, 2019), which informed the preparation of photographs and photomontages which support the assessment;
- An Approach to Seascape Character Assessment, (Natural England, 2012);
- An Approach to Seascape Sensitivity Assessment, (Marine Management Organisation, 2020);
- Townscape Character Assessment, Technical Information Note 05/17 (Landscape Institute, 2017);
- Infrastructure, Technical Guidance Note 04/20 (Landscape Institute, 2020);
- Design Principles for National Infrastructure, National Infrastructure Commission, 2020;
- A Sense of Place: design guidelines for development near high voltage overhead lines, (National Grid, 2016); and
- Substations and the Environment: Guidelines on Siting and Design (National Grid Company plc, 1989).

Assessment method

13.7.5 **Chapter 5** EIA Approach and Method sets out the standard EIA methodology and matrices to be used for the assessment. The methodology is based on the principle that the environmental effects will be determined by identifying potential receptors, assigning receptor value, assessing the magnitude of change on the receptor and then identifying the significance of the effect. This section provides a summary of the EIA methodology specifically relevant to this chapter.

13.7.6 Assessment of cumulative and combined effects are discussed in **Chapter 29** Cumulative and Combined effects of the Project.

Assessment of landscape effects

Landscape baseline

13.7.7 Landscape is defined by the European Landscape Convention as "an area, as perceived by people, whose character is the result of the action and interaction of natural and/or human factors"[6].

13.7.8 GLVIA3 defines landscape receptors as "aspects of the landscape resource that have the potential to be affected by a proposal"[7]. Landscape receptors will be identified via a review of published landscape character assessments, maps and aerial photography, relevant planning policy and fieldwork surveys.

13.7.9 Landscape character is defined by GLVIA3 as "a distinct, recognisable and consistent pattern of elements in the landscape that makes one landscape different from another, rather than better or worse".

13.7.10 Published landscape character assessments at the national, regional and local level will be reviewed to identify LCT and LCA.

13.7.11 To provide a finer level of detail of landscape assessment Local Landscape Character Areas (LLCA) will also be classified by the Applicant based on desk study and fieldwork surveys, and in consultation with the relevant planning authorities.

Sensitivity of landscape receptors

13.7.12 Paragraph 5.39 of GLVIA3 states that "landscape receptors need to be assessed firstly in terms of their sensitivity, combining judgements of their susceptibility to the type of change or development proposed and the value attached to the landscape".

13.7.13 Judging landscape sensitivity is thus a two-part process of:

- **Value attached to the landscape** – relates to the existing landscape and has been determined at the baseline stage in line with paragraph 5.19 of GLVIA3, which states that "as part of the baseline description the value of the potentially affected landscape should be established"; and
- **Susceptibility to change** – which is considered in relation to the proposed Onshore Scheme.

[6] European Landscape Convention, Council of Europe (2000)

[7] Guidelines for Landscape and Visual Impact Assessment, 3rd Edition, Landscape Instituite and the Institute of Environmental Management and Assessment (2013)

Value attached to the landscape

13.7.14 Landscape Institute Technical Guidance Note (TGN) 02/21: Assessing landscape value outside national designations (Landscape Institute, 2021) defines landscape value as "the relative value or importance attached to different landscapes by society on account of their landscape qualities".

13.7.15 As set out in paragraph 5.10.7 of NPS EN-1, "National Parks, the Broads and AONBs have been confirmed by the Government as having the highest status of protection in relation to landscape and scenic beauty" and will therefore be attributed with very high value. For assessing landscape value outside national designations, Landscape Institute Technical Guidance Note 02/21 is now the primary source of guidance. The approach to assessing the value attached to the landscape will follow a three-stage process:

- **Stage 1** identify if the landscape is covered by any landscape designations;
- **Stage 2** consider each of the factors listed in **Table 13-4** below which have been developed with reference to Table 1 of TGN 02/21 and are pertinent and most important to understanding its value; and
- **Stage 3** make an assessment the value attached to the landscape and assign value based on a five-point scale, clearly articulating the reasons for these judgements.

Table 13-4 Establishing landscape value criteria

Stage 1 – Landscape designations	Stage 2 - Define landscape value factors with reference to TGN 02/21	Criteria	Description
Landscape with statutory status or national policy protection: National Park, National Landscape, or World Heritage Sites Local landscape designation, such as Special Landscape Area or Area of Great Landscape Value, supported by policy and a detailed evidence base. No relevant designations	**Natural heritage** - Landscape with clear evidence of ecological, geological, geomorphological or physiographic interest which contribute positively to the landscape. **Cultural heritage** - Landscape with clear evidence of archaeological, historical or cultural interest which contribute positively to the landscape. **Landscape condition** - Landscape which is in a good physical state both with regard to individual elements and overall landscape structure. **Associations** - Landscape which is connected with notable people, events and the arts. **Distinctiveness** - Landscape that has a strong sense of identity. **Recreational** - Landscape offering recreational opportunities where experience of landscape is important. **Perceptual (scenic)** - Landscape that appeals to the senses, primarily the visual sense.	Very high	A designated landscape with statutory status (National Park or National Landscape). Valued landscape in the context of NPPF paragraph 180 (a)
		High	A locally designated landscape supported by a detailed evidence base or with other strong indicators of value, which may include other relevant designations such as ancient woodland or conservation areas, with identified quality in the development plan or evidence base. May be considered valued landscape in the context of NPPF paragraph 180 (a) with strong supporting evidence.
		Medium	Unlikely to be a designated for landscape quality but may exhibit some indicators of value which are identified in the development plan or evidence base and are important at the community level.
		Low	Not designated for landscape quality and likely to exhibit few indicators of value which are identified in the development plan or evidence base.
		Very low	A landscape dominated by industry or infrastructure or which is damaged or degraded landscape, not designated for landscape quality and not likely to

Stage 1 – Landscape designations	Stage 2 - Define landscape value factors with reference to TGN 02/21	Criteria	Description
	Perceptual (wildness and tranquillity) - Landscape with a strong perceptual value notably wildness, tranquillity and/or dark skies **Functional** - Landscape which performs a clearly identifiable and valuable function, particularly in the healthy functioning of the landscape.		exhibit indicators of value which are identified in the development plan or evidence base.

Valued landscape

13.7.16 The principle of "valued landscape" in England is supported by the NPPF 2023 (Chapter 15). Paragraph 180 requires that planning policies and decisions should contribute to and enhance the natural and local environment by, inter alia, (a) "protecting and enhancing valued landscapes, sites of biodiversity or geological value and soils (in a manner commensurate with their statutory status or identified quality in the development plan)".

13.7.17 According to paragraph A4.2.11 of TGN 02/21, a 'valued landscape' is an area identified as having sufficient landscape qualities to elevate it above other more everyday landscapes. There is therefore a high bar for an area to be considered valued landscape in the context of the NPPF.

13.7.18 Paragraph A4.2.5 of TGN 02/21 states that, "where a landscape has a statutory status, such as a National Park or AONB, it is self-evident that it is a valued landscape". Therefore, where such landscapes are present within the study area, these will be recognised as valued landscapes in the context of the NPPF.

13.7.19 A different approach has been taken to determine whether landscapes outside of nationally designated landscapes can be considered valued landscape in the context of the NPPF. Paragraph A4.2.6 of TGN 02/21 states that the interpretation of 'identified quality in the development plan' is not clear and that there are two fundamentally different interpretations that have been adopted by inspectors, which are considered below in more detail:

- 1. It means non-statutory, locally designated landscapes; and
- 2. It means any landscape where there is evidence to justify the identification of a 'valued landscape'. Local designation alone may not be sufficient evidence.

13.7.20 For a landscape without statutory status to be considered valued landscape in the context of the NPPF it must be supported by strong evidence. The LVIA will therefore consider each of the criteria set out in **Table 13-5** references in Local Plan policy and evidence base, including whether there are existing local landscape designations in forming an overall judgement. Landscapes with high value may also be considered valued landscape.

Susceptibility of landscape receptors to change

13.7.21 GLVIA3 paragraph 5.40 defines the susceptibility to change of landscape receptors as:

"the ability of the landscape receptor (whether it be overall character or condition of a particular landscape type or area, or an individual element and/or features, or a particular aesthetic and perceptual aspect) to accommodate the proposed Scheme without undue consequences for the maintenance of the baseline situation and/or the achievement of landscape planning policies and strategies" (paragraph 5.40)."

13.7.22 The features and characteristics which are more or less susceptible to the type of changes proposed will be set out for each LCA. The supporting narrative will provide a clear explanation based upon analysis of the landscape receptor and the extent to which it is able to accommodate the type of change arising from the specific proposal. The susceptibility to change will then be categorised with reference to the criteria in **Table 13-5** below.

Table 13-5 Susceptibility of landscape receptors to change

Criteria	Description
Very high	The type of change arising from the specific proposal are very likely to lead to undue consequences for the maintenance of the baseline situation and/or the achievement of landscape planning policies and strategies.
High	The type of change arising from the specific proposal are likely to lead to undue consequences for the maintenance of the baseline situation and/or the achievement of landscape planning policies and strategies.
Medium	The type of change arising from the specific proposal may lead to undue consequences for the maintenance of the baseline situation and/or the achievement of landscape planning policies and strategies.
Low	The type of change arising from the specific proposal are unlikely to lead to undue consequences for the maintenance of the baseline situation and/or the achievement of landscape planning policies and strategies.
Very low	The type of change arising from the specific proposal are very unlikely to lead to undue consequences for the maintenance of the baseline situation and/or the achievement of landscape planning policies and strategies.

Combining judgements to define the sensitivity of landscape receptors

13.7.23 The sensitivity of each LCA will be defined by combining professional judgements on the value attached to the landscape and its susceptibility to change and will be supported by a clear narrative. Reference will be made to the criteria set out in **Table 13-6 below**.

Table 13-6 Sensitivity of landscape receptors criteria

Criteria	Description
Very high	Landscapes with statutory status or national policy protection with very limited ability to accommodate the type of change without undue consequences for the maintenance of the baseline situation and/or the achievement of landscape planning policies and strategies.
High	Landscapes which may be locally designated or otherwise supported by a detailed evidence base or landscape with other strong indicators of value with limited ability to accommodate the type of change without undue consequences for the maintenance of the baseline situation and/or the achievement of landscape planning policies and strategies.
Medium	Landscapes which are unlikely to be a designated for landscape quality but may exhibit some indicators of value and which may have some ability to accommodate the type of change without undue consequences for the maintenance of the baseline situation and/or the achievement of landscape planning policies and strategies.
Low	Not designated for landscape quality and likely to exhibit few indicators of value and likely to accommodate the type of change no or limited undue

	consequences for the maintenance of the baseline situation and/or the achievement of landscape planning policies and strategies.
Very low	Landscapes of very low value able to accommodate the type of change without undue consequences for the maintenance of the baseline situation and/or the achievement of landscape planning policies and strategies.

Magnitude of landscape impacts

13.7.24 Paragraph 3.28 of GLVIA3 notes that the magnitude is informed by combining considerations relating to the "*scale, extent and duration*" of impacts. This includes the geographical extent of influence, the spatial extent of the impact, the level of integration of new features with existing elements, its duration and degree to which the impact is reversible.

13.7.25 In summarising the magnitude of landscape impacts, reference will be made to the following:

- **Size and scale** – the degree to which key characteristics or features identified in the baseline would change;
- **Geographical extent** – the area over the change would occur; and
- **Duration and reversibility** – the time over which the change would occur and if these changes are reversible, set out on the following scale: short (weeks); medium (months); and long (years).

13.7.26 The criteria set out in **Table 13-7** will be referred to in determining the magnitude of landscape impacts.

Table 13-7 Magnitude of landscape impacts criteria

Criteria	Description
Very high	Substantial changes to key characteristics across most of the area or to unique and distinctive features at a local level. May be longer term impacts, permanent or reversible.
High	Changes to the character of the landscape across large parts of the area or to distinctive features at a local level. May be longer term impacts, permanent or reversible.
Medium	Changes to the character of the landscape across parts of the area or to some existing features at a local level. May be medium term impacts, permanent or reversible.
Low	Slight change to landscape character or landscape features across a small area. May be short to medium term impacts, permanent or reversible.
Very low	Barely perceptible change to the landscape receptor or may impact a limited area or no key characteristics. May be short term impacts, permanent or reversible.

13.7.27 There may be cases where there will be no impacts on a receptor, for example where the design has been changed to avoid such impacts. In such cases this will be recorded as no change.

Assessment of visual effects

Visual baseline

13.7.28 Computer-generated zones of theoretical visibility (ZTV) will be prepared for the construction and operational phases of the proposed Onshore Scheme, including separate ZTVs for the proposed Converter Station and Friston Substation Extension. GLVIA3 defines as ZTV as "*a map, usually digitally produced, showing areas of land within which a development is theoretically visible*."

13.7.29 ZTVs do not indicate how much of the proposed Onshore Scheme will be visible. The purpose of the ZTV will be to:

- Identify the theoretical extents of visibility of the proposed Onshore Scheme i.e., areas from which it would not be visible and areas from which it could potentially appear in existing views;
- Assist in the iterative process of design and the refinement of the study area;
- Identify visual receptors likely to be affected by the proposed Onshore Scheme;
- Identify locations that are representative of the views experienced by visual receptors at different locations within the study area (representative viewpoints); and
- Inform the design, including the extent and type of proposed mitigation.

13.7.30 They will be modelled using the 'Viewshed' tool in ESRI ArcMap Geographical Information System (GIS) Software.

13.7.31 Bare earth ZTVs will be prepared using digital terrain model (DTM) data. These ZTVs will represent a worst-case scenario as they will not include features such as existing buildings or vegetation which would screen or filter views. They will be particularly helpful in identifying areas which can be scoped out of the assessment where views are not theoretically possible.

13.7.32 Further ZTVs will be prepared that include models of existing buildings and woodland. These ZTVs will provide some understanding of potential screening or filtering of views of the proposed Onshore Scheme, which will be further verified through fieldwork.

13.7.33 For all of ZTVs an assumed viewing height of 1.6m above ground level will be used to simulate the eye level of a person at the top of the range set out in paragraph 6.11 of GLVIA3 to represent the worst-case scenario.

Visual receptors and representative viewpoints

13.7.34 Visual receptors are defined in GLVIA3 as "*individuals and/or defined groups of people who have the potential to be affected by a proposa*l". This includes, for example, residents, users of PRoWs and motorists.

13.7.35 Visual receptors with potential to experience views of the proposed Onshore Scheme will be identified through interrogation of the ZTV, desktop analysis of maps, aerial and Google Street View photography, and fieldwork surveys. They will subsequently be categorised into the following types:

- Residents;
- People travelling through the area on PRoWs;
- People travelling through the area on promoted recreational routes and quiet lanes;
- People travelling through the area on local roads;
- People travelling through the area on major routes and public transport;
- Tourists;
- People using parks and open spaces;
- People working outdoors; and
- People working indoors.

13.7.36 Where a collection of visual receptors in the same category are likely to experience similar views, they will be grouped.

13.7.37 Representative viewpoints will be identified within the ZTV to assist in describing the baseline view and the effects likely to be experienced by visual receptor groups. These representative viewpoints will be selected on the basis that they cover a range of viewing distances, elevations and orientations from locations with different viewing experiences of the proposed Onshore Scheme. They will be agreed with SCC, Suffolk Coast and Heaths National Landscape Partnership, and ESC. The selection of representative viewpoints will be informed by the following criteria:

- Accessibility to the public;
- Number and sensitivity of people whose can be affected;
- Viewing direction, distance, openness and elevation; and
- Nature of the viewing experience.

13.7.38 Photographs taken at each viewpoint during fieldwork surveys in winter and summer will be used to help demonstrate the nature of baseline views including the extent of existing screening. All photographs and photomontages will be prepared in accordance with Landscape Institute TGN 06/19 (Landscape Institute, 2019). Baseline photographs will be presented as Type 1 annotated photographs. Type 4 photomontages will also be prepared for selected viewpoints at year 1 of operation (winter) and year 15 of operation (summer) to illustrate the likely extent and nature of changes in baseline views over time. Further detail on the methodology for the preparation of photomontages will be provided in the PEI Report and ES.

Sensitivity of visual receptors

13.7.39 Paragraph 6.31 of GLVIA3 states that "*each visual receptor, meaning the particular person or group of people likely to be affected at a specific viewpoint, should be assessed in terms of both their susceptibility to change in views and visual amenity and also the value attached to particular views*." The sensitivity of visual receptors results from a combination of parameters, such as:

- The activity/occupation/ pastime of the receptors at particular locations;
- The extent to which their attention or interest may be focused on the views; and
- The visual amenity they experience.

13.7.40 Consideration will also be given to the:

- Location, focus and orientation;
- Features or characteristics of value within the view;
- Principal or secondary interests;
- Static or kinetic nature of views; and
- Duration of the view.

Value attached to views

13.7.41 A three-stage process will be used to determine the value attached to views. This relates to the features and characteristics of the baseline landscape within the view and other indicators of value, including reference in policy, guide books, literature or art.

- **Stage 1**: identify if the view or the landscape within the view is covered by any relevant policy or designations and note features and characteristics of value with reference to the landscape baseline;
- **Stage 2**: identify if the view is identified on maps, is likely to be from a popular visitor location or has historical or cultural importance or associations; and
- **Stage 3**: Determine the value attached to the view with reference to the criteria provided in **Table 13-8** using the evidence from stages 1 and 2.

Table 13-8 Value attached to views criteria

Criteria	Description
Very high	Views within or across a nationally or internationally designated landscapes and/or specific views designated in national or regional policy. Views are likely to have few or no detracting features and which may also have strong cultural associations supported by evidence, which could include links to historical events or people, representation in art or literature, for example.
High	Views within or across regionally or locally designated landscapes, other or landscapes with strong indicators of value, or views identified in the development plan or evidence base. Views are likely to have few or no detracting features and may also have some cultural associations supported by strong evidence.
Medium	Views across landscapes which are unlikely to be designated but may exhibit some indicators of value which are identified in the development plan or evidence base and are important at the community level. Views may have some detracting features and cultural associations supported by evidence.
Low	Views across landscapes which are not designated for landscape quality and likely to exhibit few indicators of value which are identified in the development plan or evidence base. Views are likely to have some detracting features and lack cultural associations supported by evidence.

Criteria	Description
Very low	View across landscapes which are neither designated, nor identified in the development plan or evidence base, and without cultural associations. The landscape in the view is in poor condition or notably detracts from the experience of the view.

Susceptibility of visual receptors to change

13.7.42 The sensitivity of visual receptors is also dependent upon their susceptibility to changes in views and the visual amenity they experience at particular locations.

13.7.43 Paragraph 6.32 of GLVIA3 explains that "*the susceptibility of different visual receptors to changes in views and visual amenity is mainly a function of:*

- *The occupation or activity of people experiencing the view at particular locations; and*
- *The extent to which their attention or interest may therefore be focussed on the views and the visual amenity they experience at particular locations.*"

13.7.44 GLVIA3 notes that visual receptors "most susceptible to change", include residents and visitors engaged in outdoor recreation "whose attention or interest is likely to be focused on the landscape and on particular views" (para 6.33).

13.7.45 **Table 13-9** sets out the criteria which will be referred to in determining the susceptibility of visual receptors to the proposed Onshore Scheme.

Table 13-9 Susceptibility of visual receptors to change

Criteria	Description
Very high	Visitors to nationally or internationally designated landscapes, particularly at specific viewpoints or viewing places, where views of the landscape are fundamental to the experience. People engaged in specific activities for enjoyment of dark skies.
High	Residents at home. Visitors to tourist hotspots, heritage assets or other attractions outside of nationally or internationally designated landscapes, particularly at specific viewpoints or viewing places, where views of the landscape are important to the experience. People engaged in outdoor recreation whose attention or interest is likely to be focussed on the landscape and on particular views, for example those using promoted walking and cycling routes. People travelling along promoted scenic routes.
Medium	People engaged in outdoor recreation or travelling along PRoW or local roads, which are not promoted routes but where an appreciation of the surrounding landscape are relevant to the experience. People working outdoors.
Low	People engaged in outdoor sport or recreation which does not involve or depend upon appreciation of views of the landscape.

Criteria	Description
	People travelling on major road, rail or other transport routes which are not recognised as scenic routes.
Very low	People working indoors and in industrial areas.

Summarising the sensitivity of visual receptors

13.7.46 The sensitivity of visual receptors is based on professional judgement and will be informed by the criteria in **Table 13-10**, considering the value attached to views and susceptibility of visual receptors to the changes proposed.

Table 13-10 Sensitivity of visual receptors criteria

Criteria	Description
Very high	Activity where views are fundamental to the experience and are related to landscapes with national or international designation and with few or no detracting features and which may also have strong cultural associations supported by evidence.
High	Activity resulting in a particular interest or appreciation of the view and/or views within or across regionally or locally designated landscapes, other or landscapes with strong indicators of value, or views identified in the development plan or evidence base with few or no detracting features and may also have some cultural associations supported by strong evidence.
Medium	Activity resulting in a general interest or appreciation of the and/or a view, likely to exhibit some indicators of value which are identified in the development plan or evidence base and are important at the community level.
Low	Activity where interest or appreciation of the view is secondary to the activity or the period of exposure to the view is limited, and/or views across landscapes which are not designated for landscape quality and likely to exhibit few indicators of value and likely to have some detracting features and lack cultural associations supported by evidence.
Very low	Activity where interest or appreciation of the view is inconsequential to their activity, and/or across landscapes which are neither designated, nor recognised in policy, and without cultural associations or is in poor condition or notably detracts from the experience of the view.

Magnitude of visual impacts

13.7.47 The magnitude of visual impacts relates to the extent to which the baseline view would change as a result of the proposed Onshore Scheme. This assessment will be made with reference to the photographs and photomontages from the representative viewpoints.

13.7.48 Paragraph 3.28 of GLVIA3 notes that magnitude is informed by combining considerations relating to the “scale, extent and duration” of impacts. This includes the geographical extent of influence, the spatial extent of the impact, the level of integration

of new features with existing elements, its duration and degree to which the impact is reversible.

13.7.49 Reference will be made to the following in summarising the magnitude of visual impacts:

- **Size and scale** – loss of existing features or addition of new features.
- **Geographical extent** – where the proposed changes would be visible and to what extent.
- **Duration and reversibility** – the time over which the change would occur and if these changes are reversible, set out on the following scale: short (weeks); medium (months); and long (years).

13.7.50 The criteria set out in **Table 13-11** will be referred to in determining the magnitude of visual impacts.

Table 13-11 Magnitude of visual impacts criteria

Criteria	Description
Very high	The proposed Onshore Scheme will result in extensive changes to the character and composition and will become the dominant feature of the landscape within the view. There may be longer term impacts, permanent or reversible.
High	The proposed Onshore Scheme will change the character and composition of large parts of the landscape within the view. There may be longer term impacts, permanent or reversible.
Medium	The proposed Onshore Scheme will change the character and composition of discrete parts of the landscape within the view. There may be medium term impacts, permanent or reversible.
Low	The proposed Onshore Scheme will cause small changes to the character and composition of the landscape within the view. There may be short to medium term impacts, permanent or reversible.
Very low	The development will cause barely perceptible changes in the character and composition of the landscape within view. May be short term impacts, permanent or reversible.

13.7.51 There may be cases where there will be no impacts on a receptor, for example where the design has been changed to avoid such impacts. In such cases this will be recorded as no change.

Significance of landscape and visual effects

13.7.52 Judgements on the sensitivity of each receptor and the magnitude of impact will be combined to establish the significance of effect and whether effects are considered significant in EIA terms. There are important distinctions between these two terms:

- Significance of effect relates to the level recorded for any effect, with reference to the matrix set out in **Table 13-12** below; and

- Significant effects are those which are considered most important in the decision-making process. An effect in this LVIA will be considered significant in EIA terms if it is of major or moderate significance. All other effects will be categorised as not significant.

13.7.53 **Table 13-12** will be used to guide judgements on the relationship between the sensitivity of a visual receptor, the magnitude of impact and the resulting significance of effect. Where conclusions differ from this guide, a reasoned explanation will be provided in the assessment text.

Table 13-12 Determining the significance of landscape and visual effects

		Magnitude of impact				
		Very high	High	Medium	Low	Very low
Sensitivity	Very high	Major	Major	Major or Moderate	Moderate	Moderate or Minor
	High	Major	Major or Moderate	Moderate	Moderate or Minor	Minor
	Medium	Major or Moderate	Moderate	Moderate or Minor	Minor	Minor or Negligible
	Low	Moderate	Moderate or Minor	Minor	Minor or Negligible	Negligible
	Very low	Moderate or Minor	Minor	Minor or Negligible	Negligible	Negligible

13.7.54 The identification of the likely significant effects on landscape and visual receptors will be supported by detailed analysis and the professional judgement of competent experts, and consultation with stakeholders. **Table 13-13** defines what the significance of effect terms mean.

Table 13-13 Descriptions for significant effects

Significance of effect	Landscape effects	Visual effects
Major beneficial	Effects that result in a considerable improvement of the existing landscape resource. Valued characteristic features would be restored or reintroduced as part of the development.	Effects that result in a substantial improvement in the existing view.
Moderate beneficial	Effects that result in a partial improvement of the existing landscape resource. Valued characteristic features would be largely restored or reintroduced.	Effects that result in a noticeable improvement in the existing view.

Significance of effect	Landscape effects	Visual effects
Minor beneficial	Effects that result in a slight improvement of the existing landscape resource. Characteristic features would be partially restored.	Effects that result in a limited improvement in the existing view.
Negligible beneficial	Effects that result in a very slight improvement to the existing landscape resource, not uncharacteristic within the receiving landscape.	Effects that result in a barely perceptible improvement in the existing view.
Neutral	Effects which are a balance between adverse and beneficial effects and are neutral in their consequences for the landscape.	Effects that are a balance between adverse and beneficial effects and are neutral in their consequences for the view of visual receptors.
Negligible adverse	Effects that result in a very slight deterioration to the existing landscape resource, not uncharacteristic within the receiving landscape.	Effects that result in a barely perceptible deterioration in the existing view.
Minor adverse	Effects that result in a slight deterioration of the existing landscape resource. Characteristic features would be partially lost.	Effects that result in a limited deterioration in the existing view.
Moderate adverse	Effects that result in a partial deterioration of the existing landscape resource. Valued characteristic features would be largely lost.	Effects that result in a noticeable deterioration in the existing view.
Major adverse	Effects that result in a considerable deterioration of the existing landscape resource. Valued characteristic features would be wholly lost.	Effects that result in a substantial deterioration in the existing view.

13.7.55 Whether effects are adverse, beneficial, or neutral will be determined by considering the way in which the changes are likely to affect the baseline.

13.7.56 Adverse effects are likely to occur where the proposed Onshore Scheme introduces new elements or changes which are discordant or intrusive resulting in a deterioration to existing character or valued features of the landscape or of views and visual amenity.

13.7.57 Beneficial effects are likely to occur where the proposed Onshore Scheme enhances the character of the landscape or existing views.

13.7.58 Paragraphs 5.37 and 6.29 of GLVIA3 state that is possible for effects to be neutral in their consequences for landscape and for visual receptors. Where a judgement of

neutral effects is reached, reference will be made to the contribution of the proposed Onshore Scheme to the baseline and acknowledging the positive and negative aspects which have been considered.

13.7.59 Where the assessment concludes that there will be no impacts on a receptor, this will be reported as no effect. This may, for example, be a consequence of changes to the design which has avoided impacts on receptors identified at the scoping stage.

13.8 Assumptions and limitations

13.8.1 This EIA Scoping Report has been collated based on a range of publicly available data and information only. It is assumed that the data collated is accurate. The data will be supplemented with additional data as part of the EIA process.

13.8.2 In the absence of data, a precautionary approach has been taken and professional judgement, based on experience of similar linear schemes, has been used where required to inform the scope of the assessment.

13.8.3 The definition of the study area and initial scoping of visual receptors is based on experience of working on similar projects, a review of baseline mapping and field work during May 2023. A ZTV map will be prepared once more precise parameters are known and so the scope is subject to change. Any changes will be agreed with the Local Planning Authority.

13.8.4 The scope of assessment has assumed there are restrictions on planting of new trees and hedgerows within 3m of the cable trench in accordance with National Grid's technical note on 'Undergrounding high voltage electricity transmission lines'[8]

[8] Undergrounding high voltage electricity transmission lines: The technical issues, National Grid (Issue 4: January 2015)

Contents

14. Noise and Vibration

14.1 Introduction

14.1.1 This chapter outlines the proposed scope and methodology for Noise and Vibration. It will consider the potential for significant effects on noise and vibration receptors arising from the construction and operation of the LionLink Interconnector (hereafter referred to as 'the proposed Onshore Scheme'). A review of relevant guidance and policy has been undertaken, together with a desk-based assessment, to inform the proposed scope and methodology.

14.1.2 This chapter is supported by the following figures:

- **Figure 1-2**: Proposed Onshore Scheme Scoping Boundary;
- **Figure 1-3**: Proposed Onshore Scheme Scoping Boundary and Scheme Components; and
- **Figure 14-1**: Noise and Vibration Constraints Map.

14.1.3 There may be interrelationships with other disciplines. Therefore, this chapter should be read in conjunction with the following chapters:

- **Chapter 8** Ecology and Biodiversity which covers ecological receptors that may be impacted by noise and vibration; and
- **Chapter 10** Health and Wellbeing which covers the potential impacts from noise on wellbeing and quality of life for communities close to areas of construction.

14.2 Consultation and engagement

14.2.1 Consideration has been given to responses received at Non-Statutory Consultations held in 2022 and 2023 in preparing this scoping chapter. Responses relating to Noise and Vibration have been received from the following:

- East Suffolk Council (ESC);
- Suffolk County Council (SCC);
- Historic England;
- Parish and Town Councils: Alderburgh Town Council, Southwold Town Council, Aldringham-cum-Thorpe Parish Council, Dunwich Parish Council, Reydon Parish Council, Walberswick Parish Council; and Friston Parish Council.

14.2.2 The main themes reported as part of the Non-Statutory Consultations were:

- Noise and vibration impacts associated with the construction of the proposed Onshore Scheme including construction of the proposed Landfall, proposed High Voltage Direct Current (HVDC) Underground Cable Corridors, and the proposed Converter Station;
- Noise operational impacts associated with substations and switchgear;

- Noise and vibration impacts associated with construction and operation of the proposed Onshore Scheme upon quiet areas of the country; and
- Noise and vibration impacts associated with construction traffic and congestion due to construction works.

14.2.3 Engagement was undertaken with SCC and ESC in August 2023. The key points of discussion included:

- The proposed methodology for the EIA, including the methodology to determine existing baseline and extent of study areas;
- The potential impacts associated with construction and operation of the scheme; and
- Potential mitigation measures.

14.2.4 Further engagement will be undertaken with relevant stakeholders in relation to the proposed Onshore Scheme to obtain any information that they hold to supplement the assessment and to seek their views with regards to the evolving design.

14.2.5 The following bodies will be consulted during the EIA process in relation to Noise and Vibration:

- ESC; and
- SCC.

14.2.6 In addition, engagement will be undertaken with non-statutory stakeholders as required so that their specialist local views and expertise can be considered as part of the EIA process.

14.2.7 A meeting has was held with the ESC and SCC in August 2023, to discuss the proposed methodology for the EIA, including methodology to determine existing baseline, potential impacts associated with construction and operation of the scheme, mitigation measures and general assessment considerations.

14.3 Baseline conditions

Study area

14.3.1 The study area for Noise and Vibration includes all land within the proposed Onshore Scheme Scoping Boundary (hereafter referred to as 'the Onshore Scoping Boundary'), as shown on **Figure 14-1** alongside the proposed construction noise study area. The operational study area will be defined when detailed locations of operational sources becomes available.

14.3.2 For certain receptors the study area also includes land beyond the Onshore Scoping Boundary within an additional buffer. Buffer distances are based upon the characteristics and sensitivity of the receptor, informed by published industry guidance and professional judgement, to determine an appropriate Zone of Influence.

14.3.3 A study area of 300m around the Onshore Scoping Boundary is considered to be sufficient to assess construction noise impacts based on precedent from other projects and the limitations of prediction methods beyond this distance as noted in the British Standard BS5228-1 'Code of practice for noise and vibration control on construction and open sites'. For potential construction vibration impacts, an area of 100m is considered to be sufficient to assess potential construction vibration impacts. It is unlikely that

significant effects from vibration would occur at distances greater than 100m from the construction activity.

14.3.4 Construction traffic study area will be informed by **Chapter 15** Traffic and Transport assessment and will be defined in line with the guidance presented in the Design Manual for Roads and Bridges (DMRB) LA 111 – Noise and vibration.

14.3.5 The study area will be reviewed and, as appropriate, refined for the assessment in the Preliminary Environmental Information (PEI) Report and Environmental Statement (ES) with only one Landfall and one HVDC Underground Cable Corridor being taken forward. The study area will be based on the proposed Order limits in the ES.

Baseline data sources

14.3.6 The baseline described in this chapter and associated appendices has been informed by the following data sources:

Table 14-1 Scoping baseline data sources

Baseline Data	Source
Strategic noise mapping on Extrium England Noise and Air Quality Viewer website[1]	Department for Environment, Food and Rural Affairs (Defra)
Ordnance Survey datasets including Mastermap Topographic layer	Ordnance Survey
Google Maps website	Google

Baseline

14.3.7 The following sections present the existing baseline established at scoping. There are currently two options being considered for the proposed Landfall Site and associated HVDC Underground Cable Corridor, which are shown in **Figure 1-2** and **Figure 1-3**. Baseline information is presented for the two options below.

14.3.8 The sound environment around the proposed Onshore Scheme is of a rural nature and it is likely that ambient sound levels are generally low. Noise sensitive receptors include residential properties, sensitive commercial and community uses (including educational premises, medical facilities, places of worship etc.) and public open spaces (including Public Rights of Way (PRoW)).

14.3.9 The main existing sources of noise are likely to be main transport routes including the A12, A145 and A1094. There is likely to be a lesser contribution from road traffic on local roads. A railway line runs between Saxmundham in the west to Leiston in the east.

14.3.10 There are various community areas within or near the study area including:

- Southwold;
- Saxmundham;

[1]England Noise and Air Quality Viewer. Accessed via: http://www.extrium.co.uk/noiseviewer.html [Accessed Feb 2024]

- Reydon;
- Leiston;
- Wangford;
- Uggeshall;
- Wenhaston;
- Blythburgh;
- Walberswick;
- Westleton;
- Middleton;
- Knodishall; and
- Friston.

14.3.11 In addition to those identified above, there is a relatively large number of isolated noise sensitive receptors and small settlements within the study area.

14.3.12 Defra strategic noise mapping indicates that noise levels are moderate to high along some sections of the A12 and A1094, reducing with distance from the road alignments to relatively low levels beyond approximately 300m. Strategic noise mapping is undertaken by Defra, under the terms of the Environmental Noise (England) Regulations 2006.

14.3.13 Defra strategic noise mapping identifies a Noise Important Area (NIA) at Blythburgh (NIA 11286) within the study area. NIAs are locations in England where the top one per cent of the population that are affected by the highest noise levels are located. The NIAs are an indication that the receptors are exposed to high levels of noise and are therefore more sensitive to any increases in noise. Further details are published on the Strategic Noise Mapping website[2].

Future baseline

14.3.14 The Noise and Vibration chapter within the PEI Report and ES will consider changes in the sound environment due to the proposed scheme which may affect the future sound environment that would exist in the absence of the proposed Onshore Scheme. The future baseline will also take into account any developments that are likely to be present in the future baseline.

14.3.15 The future baseline of the proposed Onshore Scheme has the potential to change as a result of the construction and operation of nearby local developments with significant sources of noise. Furthermore, the future baseline may also be subject to change due to increase in road and railway traffic resulting from other local developments. The noise and vibration assessment will use a future baseline of 2028 to align with the future baseline traffic year.

[2] Strategic noise mapping. Round 3. Department for Environment, Food & Rural Affairs. Accessed via: https://www.gov.uk/government/publications/strategic-noise-mapping-2019 [Accessed Feb 2024]

14.4 Potential impacts

14.4.1 This section identifies the potential impacts that could occur as a result of the proposed Onshore Scheme during construction and operation based on the baseline information collected for EIA scoping.

Construction

14.4.2 The following impacts could occur during the construction phase:

- Temporary noise impacts due to construction equipment and activities, in particular potentially noisy activities e.g. directional drilling at watercourse or road crossings, which need to take place close to sensitive receptors and/or during the night time;
- Temporary vibration impacts due to construction equipment and activities with the potential to generate substantial levels of vibration such as piling, excavation, compaction or demolition; and
- Temporary noise impacts from additional vehicle movements such as heavy goods vehicles (HGV), mobile machinery, construction related vehicles accessing construction compounds from the surrounding road network and vehicles on haul roads within the construction site.

Operation

14.4.3 The following impacts could occur during the operational phase upon sensitive receptors such as dwellings and communities:

- Permanent noise impacts associated with the operation of electrical and mechanical plant of the proposed Converter Station;
- Permanent noise impacts associated with the operation of electrical and mechanical plant of the proposed Friston Substation;
- Permanent noise impacts associated with maintenance activities for the proposed Converter Station and the proposed Friston Substation;
- Permanent noise impacts within the nearby road network associated with an increase in road traffic flows as a result of the operation of the proposed Onshore Scheme; and
- Vibration associated with the operation of the proposed Converter Station, the proposed Friston Substation and the proposed Underground Cables.

14.5 Design and control measures

14.5.1 As outlined in **Chapter 5** EIA Approach and Method, a standard hierarchical approach will be taken to mitigation.

14.5.2 The assessment of effects will take into account measures that are embedded into the proposed Onshore Scheme design, together with general good practice measures.

Design measures

14.5.3 The design of the proposed Onshore Scheme would aim to minimise any noise impacts associated with its construction and operation. This includes the following:

- Where possible, selection of sites to minimise the number of potentially impacted receptors and the selection of cable corridor to avoid sensitive receptors;
- Design of building layouts to minimise operational noise emissions to nearby sensitive receptors;
- Using intervening structures as noise screening barriers; and
- Allowing acoustic buffer zones between sources and receivers.

Control measures

14.5.4 Mitigation would consider the predicted impacts of the proposed Onshore Scheme and aim to avoid significant adverse noise and vibration effects. This would include the use of best practicable means as outlined in in Section 72 of the Control of Pollution Act 1974 and Section 79 of the Environmental Protection Act 1990 such as:

- The selection of quiet and low vibration equipment;
- Construction plant would be operated and maintained appropriately, having regard to the manufacturer's written recommendations or using other appropriate operation and maintenance programmes which reduce noise and vibration emissions;
- All vehicles and plant would be switched off when not in use;
- Review of construction programme and methodology to consider quieter methods;
- Consideration of location of equipment on site;
- Control of working hours;
- The provision of acoustic enclosures and the use of less intrusive alarms (e.g. broadband vehicle reversing warnings);
- Screening of equipment, perimeter hoarding and/or temporary use of stockpiles; and
- Noise control toolbox talks for site operatives.

14.6 Scope of the assessment

14.6.1 The Noise and Vibration assessment will consider the construction and operation of the proposed Onshore Scheme.

14.6.2 This section identifies the potential for the proposed Onshore Scheme to give rise to likely significant effects, taking into account the design and control measures identified in **Section 14.5.**

14.6.3 **Table 14-2** sets out the receptors identified within the study area, the potential impacts as a result of construction and/or operation activities associated with the proposed Onshore Scheme, whether these impacts are likely to give to rise to significant effects, and whether the receptor is scoped in or scoped out of the assessment.

14.6.4 The proposed Friston Substation, as described in **Chapter 2** proposed Scheme Description outlines the options that remain at Friston Substation. The scope of this EIA

Scoping Chapter has been based on the worst case scenario that the proposed Onshore Scheme would construct Friston Substation.

14.6.5 All identified impacts are of relevance to both the Southwold and Walberswick options unless specified otherwise.

14.6.6 A precautionary approach has been taken and where there is no strong evidence base, insufficient baseline or the significance is uncertain at this stage, the impact has been scoped in to the EIA. Where there is a clear evidence base that the effect from the impact will not be significant, either alone or in combination with other plans and projects, the impact has been scoped out of the EIA.

Table 14-2 Proposed scope of the assessment

Project phase	Receptor	Impact	Potential for significant effect	Proposed to be scoped in/ out
Construction	All potentially noise sensitive receptors	Noise - Construction activity related to construction compounds, temporary access tracks, construction plant and vehicle movement, topsoil stripping and earthworks, cable laying, and construction of the proposed Converter Station, the proposed Friston Substation and the proposed Underground Cables.	Whilst short-term and temporary in nature, it is considered that there is potential for significant effects on noise sensitive receptors as a result of their proximity of construction and the likely construction activities.	Scoped in
Construction	All potentially vibration sensitive receptors	Vibration - Construction activity related to construction compounds, temporary access tracks, construction plant and vehicle movement, e.g. piling, horizontal directional drilling and vibratory rollers. Also construction of the proposed Converter Station, the proposed Friston Substation and the proposed Underground Cables.	Whilst short-term and temporary in nature, it is considered that there is potential for significant effects on vibration sensitive receptors as a result of their proximity of construction and the likely construction activities.	Scoped in
Construction	All potentially noise sensitive receptors	Noise - Construction traffic operating on the public highway network	Whilst short-term and temporary in nature, it is considered that there is potential for significant effects on the noise and vibration sensitive receptors as a result of the proximity of construction traffic routes.	Scoped in

Project phase	Receptor	Impact	Potential for significant effect	Proposed to be scoped in/ out
Construction	All potentially vibration sensitive receptors	Vibration - Construction traffic operating on the public highway network	Whilst short-term and temporary in nature, it is considered that there is potential for significant effects on the noise and vibration sensitive receptors as a result of the proximity of construction traffic routes.	Scoped in
Operation	All noise sensitive receptors	Noise from operation of the proposed Converter Station and proposed Friston Substation	The proposed Converter Station and proposed Friston Substation have the potential to result in permanent impacts with potential for significant effects at sensitive receptors.	Scoped in
Operation	All noise and vibration sensitive receptors	Operational noise and vibration associated with the proposed Underground Cables, including maintenance activities	Operational noise and vibration from proposed Underground Cables is unlikely to result in significant effects as the type of equipment is unlikely to give rise to vibration levels that would cause annoyance or disturbance.	Scoped out
Operation	All noise and vibration sensitive receptors	Operational traffic noise and vibration	Operational traffic movements are likely to be infrequent and unlikely to result in significant effects.	Scoped out
Operation	All vibration sensitive receptors	Vibration from operation of the proposed Converter Station and proposed Friston Substation	Vibration arising from the operation of the proposed Converter Station and proposed Friston Substation is unlikely to result in significant effects.	Scoped out

14.7 Assessment methodology

Data sources

14.7.1 The assessment will be informed by desk studies and surveys.

14.7.2 The baseline desk studies will build upon the scoping baseline using publicly available data and literature, together with data requested from the design team.

14.7.3 The following data sources will be used to inform the assessment:

- Environmental sound level survey data;
- Construction methods obtained from Scheme designers;
- Operational sound source data obtained from Scheme designers;
- Traffic data obtained from traffic and transport disciplines;
- Terrain data obtained from Ordnance Survey (OS) and the topographic survey; and
- OS Address data.

Legislation, policy and guidance

14.7.4 Legislation and policy relevant to the proposed Scheme and this chapter is outlined in **Chapter 4** Legislation and Policy Overview and **Appendix 4-A** National Policy, **Appendix 4-B** Environmental Legislation and **Appendix 4-C** Local Policy.

14.7.5 Relevant guidance and standards that have informed the scoping process are listed below (but not limited to) and will also be taken into account as part of the assessment:

- BS 5228 Parts 1 and 2, Code of practice for noise and vibration control on construction and open sites – Part 1: Noise and Part 2: Vibration, 2014;
- BS 7445-1 Description and measurement of environmental noise – Part 1; Guide to quantities and procedures, 2003;
- BS 4142 Methods for rating and assessing industrial and commercial sound, 2019;
- Guidelines for community noise. World Health Organization (WHO), 1999;
- Night noise guidelines for Europe, WHO, 2009;
- Environmental noise guidelines for the European Region, WHO 2019;
- BS 8233 Guidance on sound insulation and noise reduction for buildings, 2014;
- Calculation of Road Traffic Noise, 1988;
- Design Manual for Road and Bridges (DMRB) LA 111 – Noise and Vibration; and
- Proposed criteria for the assessment of low frequency noise disturbance, DEFRA NANR45, 2005.

Assessment method

14.7.6 **Chapter 5** EIA Approach and Method sets out the standard EIA methodology and matrices to be used for the assessment. The methodology is based on the principle that the environmental effects will be determined by identifying potential receptors, assessing receptor sensitivity, assessing the magnitude of change on the receptor and then identifying the significance of the effect. This section provides a summary of the EIA methodology specifically relevant to this chapter.

14.7.7 Assessment of cumulative and combined effects are discussed in **Chapter 29** Cumulative and Combined effects of the Project. The assessment of cumulative effects will consider noise emissions from nearby existing and committed developments to minimise the risk of background noise creep.

Baseline surveying

14.7.8 Environmental sound level surveying will be undertaken in the vicinity of noise sensitive receptors near the proposed Friston Substation Site, proposed Underground Cable Corridor, proposed Converter Station Site and proposed Landfall Site to establish baseline sound levels.

14.7.9 Surveys would be undertaken in accordance with BS 7445-1:2003. Surveys will focus on areas where significant works may be required for any special crossings (roads, drains etc.) and in the event that 24-hour construction activity may be required for techniques such as horizontal directional drilling (HDD). Meteorological measurements will be taken in parallel with noise measurements, to verify that appropriate conditions prevail during the surveys.

14.7.10 Consultation will be undertaken with the Local Authority Environmental Health Officer (EHO) prior to undertaking the surveys to confirm measurement locations and methodology.

Construction Noise

14.7.11 The ‘ABC’ assessment method described in Annex E of BS 5228-1 will be used to establish the threshold of potential significant effect for construction noise at residential receptors.

14.7.12 Under this approach, the potential significant effect threshold is determined from the existing ambient noise level, rounded to the nearest 5dB. This is then used to determine the assessment category: A, B or C, which then defines the potential significance threshold, as described in **Table 14-3**. The predicted construction noise level is then compared to the appropriate potential significance threshold.

14.7.13 If the L_{Aeq} construction noise level exceeds the appropriate threshold level, then a potential significant effect is identified.

14.7.14 Having established if there is a potentially significant effect using the ABC method, the final assessment of significance is made using professional judgement. This is evaluated by considering various other factors, as discussed under “Determining significance of effect” at the end of this section.

Table 14-3 Threshold of potential significant effect at dwellings according to the ABC method in BS 5228-1

Assessment category and threshold value period	Threshold value, dB		
	Category A	Category B	Category C
Night-time (23:00-07:00)	45	50	55
Daytime (07:00-19:00) and Saturdays (07:00-13:00)	65	70	75
Other: Weekday evenings (19:00-23:00) Saturdays (13:00-23:00) Sundays (07:00-23:00)	55	60	65

Category A: threshold value to use when ambient sound levels (rounded to the nearest 5dB) are less than these values.

Category B: threshold value to use when ambient noise levels (rounded to the nearest 5dB) are the same as Category A values.

Category C: threshold value to use when ambient noise levels (rounded to the nearest 5dB) are higher than Category A values.

Construction – Vibration

14.7.15 Vibration from construction activities will be predicted according to established empirical calculation methods described in British Standard 5228-2:2009+A1:2014 Code of practice for noise and vibration on construction and open sites - vibration. An initial assessment of likely significance of vibration is based on Table B.1 of this standard and is presented in **Table 14-4** as follows:

Table 14-4 Guidance on the effect of vibration levels

Vibration level	Effect
0.3mm/s	Vibration might be just perceptible in residential environments
1.0mm/s	It is likely that vibration of this level in residential environments will cause complaint but can be tolerated if prior warning and explanation has been given to residents.
10mm/s	Vibration is likely to be intolerable for any more than a very brief exposure to this level in most building environments.

14.7.16 Where potential significant effects are identified, further assessment will be undertaken using British Standard 6472-1:2008 for potential disturbance of people and British Standard 7385-2:1993 to assess risk of building damage.

14.7.17 BS7385-2 differentiates between transient and continuous vibration. For transient vibration, the standard notes that the risk of cosmetic damage to residential buildings starts at a peak particle velocity (PPV) of 15mm/s at 4Hz (as noted in **Table 14-5**

below). The standard also notes that below 12.5mm/s PPV, the risk of damage diminishes towards zero. When considering continuous vibration, the standard recommends that the guide values are reduced by 50%.

14.7.18 BS7385-2 highlights that the criteria for very old buildings may need to be lowered if the buildings are structurally unsound. However, the standard also notes that criteria should not be set lower simply because a building is important or historic.

Table 14-5 Transient vibration guide values for cosmetic damage (BS 5228-2[3])

Type of building	Peak component particle velocity in frequency range of predominant pulse	
	4 Hz to 15Hz	15 Hz and above
Reinforced or framed structures Industrial and heavy commercial buildings	50mm/s at 4 Hz and above	50mm/s at 4 Hz and above
Unreinforced or light framed structures Residential or light commercial buildings	15mm/s at 4Hz increasing to 20mm/s at 15Hz	20mm/s at 15Hz increasing to 50mm/s at 40Hz and above
For underground services, conservative criteria are recommended as follows: • Maximum PPV for intermittent or transient vibration of 30mm/s. • Maximum PPV for continuous vibration of 15mm/s. For older and/or dilapidated brickwork sewers, these values should be halved.		

Construction Traffic Noise

14.7.19 Construction traffic noise will be calculated using the procedure specified in Calculation of Road Traffic Noise, (CRTN) 1988. The assessment will consider the change in road traffic noise between the current situation and the increase of vehicles due to the introduction of construction traffic. The results of the prediction will be used as a screening exercise to determine whether changes in traffic flow are likely to give rise to a noise level change of more than 1dB(A). This is the lowest perceptible change in road traffic noise.

14.7.20 A potential impact is taken as an increase of 1dB or more in the $L_{A10,18hr}$ predicted between 06:00 and 00:00 hours, as per guidance established in the Design Manual for Roads and Bridges LA 111.

Operational noise

14.7.21 For operational noise, an assessment will be undertaken at sensitive receptors within 1km of the proposed onshore stationary sources, which include the proposed Friston Substation and the proposed Converter Station. This study area should be sufficient to incorporate all receptors at risk of a significant effect of noise, however, if any factors

[3] British Standards Institution. BS 5228-2:2009+A1:2014 Code of practice for noise and vibration control on construction and open sites – Part 2: Vibration. London: BSI, 2014

are identified that suggest this study area might be insufficient (e.g. the source noise characteristics include significant levels of low frequency sound or there is uninterrupted line of sight to the receptor) this may be extended to include more distant receptors.

14.7.22 Where residential receptors are identified within 1000m of any new noise sources, an assessment will be undertaken in line with BS 4142:2019[4]. This methodology takes into account the existing background sound levels at dwellings and the character of the new sound source in assessing potential significance of effects. Assessment will consider the normal operation of the proposed Onshore Scheme and any short term effects due to maintenance.

14.7.23 BS 4142 also requires that the context of the sound in terms of its absolute level and its character in relation to the existing sound environment are considered in determining the overall significance of an adverse impact. Consideration will also be given to the potential impacts and effects of low frequency sound which may be associated with the converter station.

14.7.24 Consideration will be given to the tranquil areas within the study area, as outlined in the Tranquillity Map: England presented in the Campaign to Protect Rural England CPRE[5].

14.7.25 For other noise sensitive receptors within 1000m of the proposed Converter Station, an assessment of the absolute sound levels produced by the converter station will be made at the receptor locations and compared with the guideline values in WHO guidance and BS 8223:2014[6] for outdoor areas and the appropriate indoor spaces respectively.

14.7.26 Where appropriate, reference will be made to NANR45[7] for the assessment of low frequency noise.

Determining significance of effect

14.7.27 The identified sources of noise and vibration will be evaluated to determine if there would be impacts with the potential to cause significant effects according to the criteria described above for construction and operational impacts. Further details of the assessment of effects and determining significance are presented in **Chapter 5** EIA Method and Approach.

14.7.28 If a potentially significant effect is identified, the overall assessment of significance will be evaluated using professional judgement based on the various factors which include the following.

Residential

- The magnitude of the impact and effect identified (based on overall noise or vibration level and/or noise change);
- The level and character of the existing sound environment;

[4] British Standards Institution. BS 4142:2014+A1:2019 Methods for rating and assessing industrial and commercial sound. London: BSI, 2019.

[5] Campaign to Protect Rural England (CPRE), Tranquilly map accessed via: https://www.cpre.org.uk/wp-content/uploads/2019/11/tranquillity_map_england_regional_boundaries_1.pdf . [Accessed Feb 2024]

[6] British Standards Institution. BS 8233:2014 Guidance on sound insulation and noise reduction for buildings. London: BSI, 2014.

[7] Procedure for the assessment of low frequency noise disturbance. University of Salford, Manchester, 2005 (revision December 2011).

- Any unique features of the source or receiving environment in the local area;
- Combined exposure to noise and vibration;
- Duration of impact and effect (for construction); and
- The effectiveness of mitigation measures that could avoid or reduce the adverse effects.

Non-Residential

- The generic use (e.g. educational, healthcare, religious buildings or community uses);
- The times of use in relation to the impacts;
- The design of the receptor (especially windows, doors and ventilation systems) and hence ability of receptor to experience changes in external noise environment without significant change in internal noise conditions;
- The layout - whether the most sensitive parts of the building are closest to and face the proposed Onshore Scheme or are located further from the proposed Onshore Scheme and/or are on the opposite side of a building;
- Duration of impact and effect (for construction); and
- The effectiveness of mitigation measures that could avoid or reduce the adverse effects.

14.8 Assumptions and limitations

14.8.1 This EIA Scoping Report has been collated based on a range of publicly available data and information only. It is assumed that the data collated is accurate. The data will be supplemented with additional data as part of the EIA process.

14.8.2 In the absence of data, a precautionary approach has been taken and professional judgement, based on experience of similar linear schemes, has been used where required to inform the scope of the assessment.

14.8.3 The predicted level of noise from construction depends on the particular items of plant used. At this stage in the programme, a fully detailed schedule of construction equipment is not available. Therefore, a typical schedule would be assumed for the proposed Onshore Scheme construction of this type and scale, based on the experience of the engineering specialists developing the design. To represent the period of highest noise levels, the works would be assumed to be at the closest location to each receptor, e.g. the period when the moving cable laying works would be alongside the receptor.

Contents

15. Traffic and Transport

15.1 Introduction

15.1.1 This chapter outlines the proposed scope and methodology for Traffic and Transport. It will consider the potential for significant effects arising from the construction and operation of the LionLink Interconnector (hereafter referred to as 'the proposed Onshore Scheme') on traffic and transport receptors. A review of relevant guidance and policy has been undertaken together with a desk-based assessment, to inform the proposed scope and methodology.

15.1.2 This chapter is supported by the following figure:

- **Figure 1-2**: Proposed Onshore Scheme Scoping Boundary;
- **Figure 1-3**: Proposed Onshore Scheme Scoping Boundary and Scheme Components; and
- **Figure 15-1**: Baseline Transport Network.

15.1.3 There may be interrelationships with other disciplines. Therefore, this chapter should be read in conjunction with the following chapters:

- **Chapter 10**: Health and Wellbeing – which covers public rights of way in relation to severance, opportunities for exercise and access to green space and construction traffic in relation to temporary severance due increased journey times for motorists, and reduced access for pedestrians and cyclists;
- **Chapter 6** Air Quality - which covers the air quality impacts associated with traffic as a result of the proposed Scheme; and
- **Chapter 14** Noise and Vibration - which covers the noise and vibration impacts associated with traffic as a result of the proposed Scheme.

15.2 Consultation and engagement

15.2.1 Consideration has been given to responses received at Non-Statutory Consultations held in 2022 and 2023 in preparing this scoping chapter. Responses relating to Traffic and Transport, have been received from the following:

- Suffolk County Council (SCC);
- East Suffolk Council (ESC); and
- Parish and Town Councils: Dunwich Parish Council, Aldringham Parish Council, Walberswick Parish Council, Benhall and Sternfield Parish Council, Friston Parish Council, Leiston-cum-Sizewell Town Council, Sudbourne Parish Council, and Theberton, Middleton cum Fordley Parish Council and Eastbridge Parish Council.

15.2.2 The main themes reported as part of the Non-Statutory Consultations were:

- The cumulative traffic impact from concurrent construction projects;
- Use of potentially unsuitable roads and accesses;

- Traffic congestion caused by construction traffic;
- The potential opportunity to use Sizewell Link Road; and
- Impacts on vulnerable road users and impacts on Public Rights of Way (PRoW)/footpaths.

15.2.3 Engagement has been undertaken with SCC and ESC in November 2023. The key points of discussion included:

- Baseline data;
- Extent of transport study area;
- Construction assessment including cumulative impact with other construction projects and working shift patterns;
- Suitability of some classified roads for construction routes and details of site accesses;
- Treatment of PRoWs during construction;
- Outline Construction Management Plan;
- Monitoring/control of construction traffic;
- Construction Workers Travel Plan; and
- Impact on the B1121/B1119 junction in Saxmundham.

15.2.4 Further engagement will be undertaken with relevant stakeholders in relation to the proposed Onshore Scheme to obtain any information that they hold to supplement the assessment and to seek their views with regards to the evolving design.

15.2.5 The following bodies will be consulted during the EIA process in relation to Traffic and Transport:

- SCC Highways.

15.2.6 In addition, engagement will be undertaken with non-statutory stakeholders as required so that their specialist local views and expertise can be considered as part of the EIA process.

15.3 Baseline conditions

Study area

15.3.1 The proposed Onshore Scheme Scoping Boundary (hereafter referred to as 'the Onshore Scoping Boundary') is shown on **Figure 1-2**.

15.3.2 The extent of the study area for the assessment of transport impacts has not been defined in detail at this stage. However, it is likely to include areas of the transport network that are beyond the Onshore Scoping Boundary, and the extent of the study area will be discussed with SCC as the local highway authority.

15.3.3 To inform this EIA Scoping Report the baseline transport network in the vicinity of the Onshore Scoping Boundary has been used, as shown on **Figure 15-1**. This highlights the key highways, bus routes and pedestrian/cycle network including PRoW that are in and around the Onshore Scoping Boundary and which may be impacted by the

proposed Onshore Scheme depending on the evolving design. These road links, junctions, walking routes and walking and cycle routes are identified in **Section 15.3.7**.

15.3.4 The study area will be reviewed and, as appropriate, refined for the assessment in the Preliminary Environmental Information (PEI) Report and Environmental Statement (ES) with only one Landfall and one High Voltage Direct Current (HVDC) Underground Cable Corridor being taken forward. The study area will be based on the proposed Order limits in the ES.

Baseline date sources

15.3.5 The baseline described in this chapter and associated appendices has been informed by the following data sources:

Table 15.1 Scoping baseline data sources

Baseline Data	Source
Road network	OS OpenMap, Google Earth Pro and FindMyStreet
Bus route information	Suffolk on Board
Rail information	National Rail
Designated non-motorised user routes	Sustrans/SCC/National Trails
Public Rights of Way	SCC

Baseline

15.3.6 The following sections present the existing baseline established at scoping. There are currently two options being considered for the proposed Landfall Site and associated HVDC Underground Cable Corridor, which are shown in **Figure 1-2** and **Figure 1-3**. Baseline information is presented for the two options below.

15.3.7 The following road links, key junctions and walking and cycling routes are within or within the vicinity of the Onshore Scoping Boundary. Inclusion of transport infrastructure within the vicinity is because transport impacts have the potential to go beyond the Onshore Scoping Boundary:

Road links

- A12 between B1127 Chapel Road and A1094;
- A145 London Road between Halesworth Road and A12;
- A1095 Halesworth Road between A12 and Bridge Road;
- B1127 Southwold Road between A12 and A1095 Halesworth Road;
- B1123 between King's Lane and A145;
- B1387 The Street between A12 and Adam's Lane;

- B1125 Angel Lane/Dunwich Road/Heath View between A12 and Gorse View;
- B1122 Middleton Road/Yoxford Road/Leiston Road/Abbey Road between A12 and Abbey Lane;
- B1119 Church Hill/Saxmundham Road between B1121 Main Road and Clay Hills;
- B1121 Main Road between A12 and B1119 Church Hill and between B1121 Main Road and Church Road;
- All unclassified roads north of B1126 Wangford Road/Norfolk Road, between Reydon Smear and Wangford/Barnaby Green;
- All unclassified roads between A12 near Wangford and A145 including roads to Uggeshall;
- All unclassified roads to the west of A145 towards Sotherton and King's Lane;
- All unclassified roads between A12 and Blackheath;
- Lodge Road near Walberswick;
- Unclassified roads between B1125, A12 and north of B1122 including around Hinton, Darsham, Westleton, Middleton and Middleton Moor;
- Unclassified roads between B1122 Leiston Road/Abbey Road (Theberton and Leiston) and the area around East Green, Knodishall Green; and
- Grove Road between Knodishall Green and Friston.

Junctions

- Junction of A12 with B1127 Southwold Road;
- Junction of A12 with A1095;
- Junction of A12 with A145;
- Junction of A12 with B1387;
- Junction of A12 with B1122 Middleton Road;
- Junction of A12 with B1121 Main Road;
- Junction of A1095 with B1127 Lowestoft Road;
- Junction of A145 with B1123;
- Junction of B1387 with B1125 Dunwich Road;
- Junction of B1121 Main Road/B1119 Church Hill; and
- Junction of B1121 Main Road with B1121 Church Hill.

Walking and cycling routes

- National Cycle Network (NCN) Routes 31 and 42. NCN Route 31 runs through Barnaby Green to Southwold in the north of the Study Area and NCN Route 42 passes through Blackheath and Dunwich before approaching Leiston;
- A significant number of PRoW as set out in the SCC definitive map. The PRoW are located within the parishes of Southwold, Reydon, Wangford, Uggeshall, Sotherton,

Wenhaston, Brampton, Walberswick, Blythburgh, Thorington, Westleton, Middleton, Theberton, Knodishall, Sternfield and Friston.

- It is understood that the King Charles III England Coast Path is in the planning and implementation stages.

15.3.8 The following section provides details of the baseline transport network within and around the Onshore Scoping Boundary for the individual components of the proposed Onshore Scheme which are shown on **Figure 1-3**. At this time there are two potential Landfall locations. These options share a common corridor for the proposed HVDC Underground Cable Corridor from the Proposed Converter Station east of Saxmundham, running north to reach an area just south of Blythburgh. Following this, the proposed HVDC Underground Cable Corridor follows two potential options:

- The first continues north towards Uggeshall, before turning east past Wangford and on towards Southwold. The proposed Landfall is located on agricultural fields to the north of Southwold; and
- The second option, turns east before Blythburgh, running towards the village of Walberswick. The proposed Landfall is located on agricultural fields to the south of Walberswick.

Proposed Friston Substation Site

Highway network

15.3.9 The proposed Friston Substation Site is not crossed by any local highways. The nearest highway is Grove Road which is a narrow two way single carriageway. Grove Road connects to the B1121 Saxmundham Road in Friston to the south and intersects with the B1119 to the north. Grove Road is subject to a 30mph speed limit between the B1121 Saxmundham Road and Church Road in Friston, and the national speed limit to the north. Church Road is a narrow single carriageway providing access to residential dwellings. Grove Road and Church Road provide access (via PRoW) to farms and cottages close to the proposed Friston Substation Site area.

15.3.10 The B1121 Saxmundham Road/Aldeburgh Road is a two-lane single carriageway which runs between the A12 to the west and the A1094 Aldeburgh Road to the east.

Public transport

15.3.11 The nearest bus stops to the proposed Friston Substation Site are on the B1121 Saxmundham Road. The bus route that operates along the B1121 Saxmundham Road is the 521. The 521 service operates between Halesworth and Aldeburgh, with five services per day in each direction.

15.3.12 The are no railway lines close to the proposed Friston substation site. The nearest rail station is at Saxmundham, approximately 4km to the north west. The rail station operates services between Lowestoft and Ipswich at one service per hour in each direction.

Walking and cycling

15.3.13 There is one PRoW that crosses the proposed Friston Substation Site.

15.3.14 There are no designated cycle tracks that cross the proposed Friston Substation Site.

Underground HVAC Cable Corridor

Highway network

15.3.15 The proposed Underground High Voltage Alternating Current (HVAC) Cable Corridor includes the B1119 Church Hill which is on the north side. The B1119 is a two-lane single carriageway and provides a route between Saxmundham to the west and Leiston to the east. The national speed limit generally applies along the route.

15.3.16 The B1121 Church Hill/The Street/Saxmundham Road runs along the southern edge of the Onshore Scoping Boundary in a north west-south east orientation and is a two-lane single carriageway which generally operates with the national speed limit.

15.3.17 The B1121 and B1119 provide access to a number of farms and cottages within the area. Some of the accesses are PRoW.

Public transport

15.3.18 There are bus stops in both directions on the B1119 Church Hill just beyond the western edge of the Onshore Scoping Boundary. The bus routes that operate along B1119 are the 64, 522 and 522A.

15.3.19 The 64 service runs from Aldeburgh to Ipswich via Leiston between 06:00 and 20:00 at a frequency of one service per hour in each direction.

15.3.20 The 522 service runs from Halesworth to Aldeburgh via Saxmundham and Leiston, with services operating from 07:15 and 18:10, at a frequency of two services per hour in each direction in the morning and one or two services per hour tin each direction in the afternoon.

15.3.21 The 522A service runs from Peasenhall to Leiston and Aldeburgh to Peasenhall with one service in each direction.

15.3.22 There are bus stops in both directions on the B1121 The Street/Saxmundham Road at Sternfield and Friston. These bus stops serve the 521 route.

15.3.23 The are no railway lines within the proposed Underground HVAC Cable Corridor. The nearest rail station is at Saxmundham, approximately 1km to the west.

Walking and cycling

15.3.24 There are 11 PRoW that cross the proposed Underground HVAC Cable Corridor.

15.3.25 There are no designated cycle tracks that cross the proposed Underground HVAC Cable Corridor.

Converter Station Site

Highway network

15.3.26 The proposed Converter Station Site is not crossed directly by any local highways, however the B1119 Church Hill is adjacent to the northern edge of the Onshore Scoping Boundary, which connects Saxmundham to Leiston.

Public transport

15.3.27 There are bus stops in both directions on the B1119 Church Hill just beyond the western edge of Onshore Scoping Boundary of the area, and these serve the 64, 522 and 522A.

15.3.28 There are no railway lines within the proposed Converter Station Site. The nearest rail station is at Saxmundham, approximately 1km to the west.

Walking and cycling

15.3.29 There are two PRoW that cross the proposed Converter Station Site.

15.3.30 There are no designated cycle tracks that cross the proposed Converter Station Site.

Underground HVDC Cable Corridor

Common Cable Corridor

Highway network

15.3.31 The proposed Underground HVDC Common Cable Corridor crosses a number of local highways. The A12 crosses the northern part between Hinton and Blythburgh. The A12 generally runs in a north south direction to the west of the proposed Underground HVDC Common Cable Corridor and is the main route between the A14 at Ipswich to the south and Lowestoft to the north. The A12 is generally a two-lane single carriageway providing access to the B1119 at Saxmundham, B1122 at Yoxford, Westleton Road (to Westleton) and the B1387 near Blythburgh, all of which cross the proposed Underground HVDC Common Cable Corridor. The A12 operates with a range of speed limits, generally 30mph in built up areas and the national speed limit in other areas.

15.3.32 The B1119 Church Hill/Saxmundham Road marks the southern extent of the proposed Underground HVDC Common Cable Corridor and provides an east-west route between Saxmundham and Leiston. The national speed limit generally applies along the route within the study area.

15.3.33 The B1122 Yoxford Road/Leiston Road crosses the proposed Underground HVDC Common Cable Corridor between Middleton Moor and Theberton. The B1122 is a two-lane single carriageway and generally operates with a 40mph speed limit reducing to 30mph in areas.

15.3.34 The B1387 is an east-west route connecting the A12 to Walberswick. Within the proposed Underground HVDC Common Cable Corridor, the B1387 is a two-way road that connects to the B1125 Dunwich Road. The B1387 operates with the national speed limit.

15.3.35 There are a significant number of unclassified roads that cross the proposed Underground HVDC Common Cable Corridor. This includes Westleton Road/Yoxford Road which is a two-way road to Westleton that lies just beyond the eastern edge of the Onshore Scoping Boundary. The national speed limit applies within the proposed Underground HVDC Common Cable Corridor. The remaining unclassified roads are generally reasonably narrow rural roads providing access to homes and farms in some cases via private access tracks or PRoW. Some of these roads link into Darsham and Theberton and Middleton.

Public transport

15.3.36 There are bus stops in both directions on the B1119 Church Hill on the southern edge of the Onshore Scoping Boundary of the proposed Underground HVDC Common Cable Corridor. The bus routes that operate along the B1119 are the 64, 522 and 522A.

15.3.37 There is a branch railway line between Saxmundham and Leiston for service access to Sizewell power station which crosses proposed Underground HVDC Common Cable Corridor. The nearest rail stations are at Saxmundham and Darsham to the west of the proposed Underground HVDC Common Cable Corridor.

Walking and cycling

15.3.38 There are 37 PRoW that cross the proposed Underground HVDC Common Cable Corridor.

15.3.39 NCN Route 42 runs from south east to north west across the proposed Underground HVDC Common Cable Corridor between Blackheath and Dunwich.

Cable Corridor to Southwold

Highway network

15.3.40 The proposed Underground HVDC Southwold Cable Corridor crosses a number of local highways including the A12 and A145.

15.3.41 The A12 crosses the proposed Underground HVDC Southwold Cable Corridor in the Barnaby Green area as well as near Blythburgh. The A12 also runs alongside Wangford and Blythburgh. The A12 runs in a south west-north east direction across the proposed Underground HVDC Southwold Cable Corridor and is generally a two-lane single carriageway but has a section of dual two-lane carriageway around Wangford. The A12 provides access to the A145 and B1126 Norfolk Road at Wangford and various unclassified roads. The A12 operates with a 50mph speed limit in this location.

15.3.42 The A145 crosses the proposed Underground HVDC Southwold Cable Corridor between the Henham and Brampton areas and runs along the boundary between Blythburgh and Henham. The A145 has a north south orientation, is a two-lane single carriageway and provides access to the B1123 to Blyford and various unclassified roads. The national speed limit generally applies along the A145.

15.3.43 The B1123 is a two-lane single carriageway that provides an east-west route across the study area between the A145 and Blyford. The national speed limit applies in this location.

15.3.44 The B1127 Lowestoft Road is a two-lane single carriageway that crosses the study area in a south west-north east orientation near Mount Pleasant, Southwold. The B1127 links Southwold and Wrentham and has a 30mph speed limit in the built-up area of Southwold, before the national speed limit applies in this location.

15.3.45 The B1126 Wangford Road is an east west route that runs along the edge of the Onshore Scoping Boundary connecting Southwold and Wangford. The B1126 is a two-lane single carriageway and operates with a 30mph speed limit.

15.3.46 There are a number of unclassified roads that cross the Cable Corridor to Southwold area. This includes Wangford Road which is a two-way road between Wangford and Uggeshall, and Wenhaston Lane which is a two-way road between the A12 and

Blackheath. The national speed limit applies to both roads in this location. The remaining unclassified roads are generally reasonably narrow rural roads providing access to areas including Reydon Smear, Barnaby Green and Uggeshall along with homes and farms, some of which are accessed via private access tracks or PRoW.

Public transport

15.3.47 There are bus stops in both directions on Wenhaston Lane, which serve the 99A route. The 99A service runs from Southwold to Bungay at a general frequency of one service every two hours in each direction.

15.3.48 There are bus stops in both directions on Wangford Road, which serve the 524 route. The 524 service runs from Southwold to Beccles/Bungay/Halesworth at a frequency of three to four buses per day in each direction.

15.3.49 There is a 99 and 146 bus service that operates along the A12 corridor. The 99 service runs between Lowestoft and Southwold at a frequency of two services per hour in each direction. The 146 service operates between Southwold and Norwich generally at a frequency of two services per hour in both directions. The bus services do not stop within the study area.

15.3.50 There are bus stops in both directions on the B1127 in Reydon. The bus stops are served by the 99 service.

15.3.51 There are no railway lines that cross the proposed Underground HVDC Southwold Cable Corridor.

Walking and cycling

15.3.52 There are 27 ProW that cross the proposed Underground HVDC Southwold Cable Corridor.

15.3.53 NCN Route 31 runs between Clay Common and Southwold, across the northern section of the proposed Underground HVDC Southwold Cable Corridor.

Cable Corridor to Walberswick

Highway network

15.3.54 The proposed Underground HVDC Walberswick Cable Corridor crosses two local highways.

15.3.55 The B1387 The Street provides an east-west route between the B1125 Dunwich Road and Walberswick. It crosses the western end of the proposed Underground HVDC Walberswick Cable Corridor before running along the northern Onshore Scoping Boundary. The B1387 is a two-lane single carriageway and the national speed limit applies until it enters the built up area of Walberswick.

15.3.56 Lodge Road is accessed from Walberswick at its eastern end, where it connects with the B1387. To the west, Lodge Road leads to a business access and a PROW where the highway ends. Lodge Road is a two-way road but a single lane width in places. The national speed limit applies at this location.

Public transport

15.3.57 There are no bus routes that cross the proposed Underground HVDC Walberswick Cable Corridor.

Walking and cycling

15.3.58 There are 19 ProW that cross the proposed Underground HVDC Walberswick Cable Corridor.

15.3.59 There are no designated cycle tracks that cross the proposed Underground HVDC Walberswick Cable Corridor.

Landfall Site

Southwold

Highway network

15.3.60 There are no local highways that cross the proposed Southwold Landfall Site. The nearest local highways are the A1095 Mights Road and the B1127 Lowestoft Road. The A1095 which is a two-lane single carriageway connects Southwold to the A12 to the west, and the B1127 connects Southwold to the A12 at Wrentham to the north.

15.3.61 Easton Lane and The Warren provide a narrow road connection from the B1127 to the northern Onshore Scoping Boundary of the proposed Southwold Landfall Site.

15.3.62 A small area of a car parking crosses the south east corner of the proposed Southwold Landfall Site.

Public transport

15.3.63 There are no bus routes that cross the proposed Southwold Landfall Site. The nearest bus routes are on A1095 and B1127.

15.3.64 There are no railway lines that cross the proposed Southwold Landfall Site.

Walking and cycling

15.3.65 There are two ProW that cross the proposed Southwold Landfall Site.

15.3.66 There are no designated cycle tracks that cross the proposed Southwold Landfall Site.

Walberswick

Highway network

15.3.67 There are no local highways that cross the proposed Walberswick Landfall Site. The nearest local highway is the B1387 The Street which is a two-lane single carriageway connecting the A12 and B1125 Dunwich Road to Walberswick.

Public transport

15.3.68 There are no bus routes that cross the proposed Walberswick Landfall Site and no nearby bus routes.

15.3.69 There are no railway lines that cross the proposed Walberswick Landfall Site.

Walking and cycling

15.3.70 There are no ProW or designated cycle tracks that cross the proposed Walberswick Landfall Site.

Future Baseline

15.3.71 The Traffic and Transport chapter within the PEI Report and ES will consider changes which may affect the future environment in the absence of the proposed Onshore Scheme. The future baseline would take account of committed developments and transport schemes, along with background growth.

15.3.72 The 2023 Institute of Environmental Management and Assessment (IEMA) guidelines[1] suggest that future baseline and cumulative assessment are two different considerations within the environmental assessment process. The IEMA guidelines state that "Derived forecast traffic growth (e.g. TEMPro) should be utilised to derive future year baseline traffic conditions. However, discrete projects within the agreed study area that are existing, approved or likely to come forward (where sufficient certainty and relevant information about the project exists) should not be added to the baseline scenario and should be considered in the cumulative scenario." The inference is that this avoids double counting of growth from forecast growth factors and committed developments.

15.3.73 For the proposed Onshore Scheme, it is proposed to use a single scenario that combines forecast growth and committed developments whilst minimizing double counting. The future baseline will be produced by factoring the baseline traffic flows using TEMPro, and then adding any extra trips generated by committed developments where they exceed the TEMPro growth i.e. the difference between the committed development trip generation and the TEMPro growth would be added to the future baseline.

15.3.74 The future baseline traffic volumes will be established for a single year during the construction period, which for the proposed Onshore Scheme, is anticipated to take place between 2026 and 2030. It is proposed to use 2028 as the future baseline assessment year.

15.3.75 The construction assessment will consider the single year future baseline, in conjunction with the peak construction activities from the overall construction programme (whenever these may occur). The peak construction period(s) will be identified within the PEI Report and ES when more detailed construction information is available.

15.3.76 It is difficult to forecast how public transport services may change in the future; therefore, unless information on future services is available, it would be assumed that public transport services for the future year of assessment would be the same as those currently operating. Similarly, pedestrian and cycle demand and facilities would be assumed to remain unchanged from the base year.

[1] Institute of Environmental Management and Assessment (IEMA) Guidelines Environmental Assessment of Traffic and Movement (2023)

15.4 Potential impacts

15.4.1 This section identifies the potential impacts that could occur as a result of the proposed Onshore Scheme during construction and operation based on the baseline information collected for EIA scoping.

Construction

15.4.2 The following impacts could occur during the construction phase, resulting from construction activities and traffic:

- Increased traffic volumes and congestion due to construction traffic;
- Increased number of Heavy Goods Vehicles (HGVs);
- Abnormal load deliveries;
- Temporary diversion of traffic due to road closures/diversions;
- Temporary diversion of bus routes due to road closures/diversions;
- Temporary diversion of ProW or designated cycle routes due to closures/diversions; and
- Transportation of hazardous loads.

Operation

15.4.3 The following impacts could occur during the operational phase, resulting from operation and maintenance activities:

- Increased traffic volumes and congestion due to staff trips; and
- Permanent diversion of PRoW or promoted cycle routes due to closures/diversions.

15.5 Design and control measures

15.5.1 As outlined in **Chapter 5** EIA Approach and Method, a standard hierarchical approach will be taken to mitigation.

15.5.2 The assessment of effects will take into account measures that are embedded into the proposed Onshore Scheme design, together with general good practice measures.

Design measures

15.5.3 The proposed Underground Cable Corridors will typically be installed using open cut trench techniques. Where the proposed Underground Cable Corridor is required to cross obstacles such as major roads, railway lines and watercourses, a trenchless technique (such as horizontal directional drilling) would be used to minimize disruption to transport users.

15.5.4 Where road closures are required, the period of the closure would be kept to a minimum and diversions would be via the most appropriate alternative route. Access to properties would be maintained at all times.

15.5.5 Where PRoW closures are required, the period of the closure would be kept to a minimum, and a diversion provided where necessary and practicable.

15.5.6 Construction traffic would be routed along classified roads as far as possible, and haul roads would be used to minimize construction vehicle movements on less appropriate roads.

Control measures

15.5.7 A number of control and management measures will be implemented. This will include the preparation of a Framework Construction Traffic Management Plan (CTMP).

15.5.8 The following control measures will be incorporated including a list of relevant good practice measures, including the following key commitments relating to traffic and transport:

- A CTMP will be produced prior to construction.
- Appropriate site layout and housekeeping measures will be implemented by the contractor(s) at all construction sites. This will include but not be limited to:
  - Managing staff/vehicles entering or leaving site, especially at the beginning and end of the working day; and
  - Managing potential off-site contractor and visitor parking.
- Vehicles will be correctly maintained and operated in accordance with the manufacturers recommendations and in a responsible manner. All plant and vehicles will be required to switch off their engines when not in use and when it is safe to do so. In addition, plant and vehicles will conform to relevant applicable standards for the vehicle type.
- The CTMP will set out measures to reduce route and journey mileage to and from, as well as around site, and prevent nuisance to the residents, businesses and the wider community caused by parking, vehicle movements and access restrictions. It will also provide suitable control for the means of access and egress to the public highway and set out measures for the maintenance and upkeep of the public highway. The plan will also identify access for emergency vehicles. It will also set out measures to reduce safety risks through construction vehicle and driver quality standards.
- The contractor(s) will implement a monitoring and reporting system to check compliance with the measures set out within the CTMP. This will include the need for a GPS tracking system to be fitted to HGVs to check for compliance with authorised construction routes. The contractor(s) will also be expected to monitor the number of construction vehicles between the site and the strategic road network. Deviations from the authorised routes or changes to traffic levels that are higher than the CTMP assumptions will require discussion of the need for additional mitigation measures with highways authorities.
- Any potential temporary road closures will be applied for/detailed in the Development Consent Order (DCO). Any required temporary diversions will be clearly signposted and would include the duration of the diversion and a contact number for any concerns.
- All designated PRoW will be identified, and any potential temporary closures applied for/detailed in the DCO. All designated PRoW crossing the working area will be

managed with access only closed for short periods while construction activities occur. Any required temporary diversions will be clearly marked at both ends with signage explaining the diversion, the duration of the diversion and a contact number for any concerns.

15.5.9 In addition to the above, construction vehicles will be managed at any road/rail/pedestrian/cycle crossing points and further details will be provided within the Framework CTMP.

15.6 Scope of the assessment

15.6.1 This section identifies the potential for the proposed Onshore Scheme to give rise to likely significant effects, taking into account the design and control measures identified in **Section 15.5**.

15.6.2 **Table 15.2** sets out the receptors identified within the study area, the potential impacts as a result of construction and/or operation activities associated with the proposed Onshore Scheme, whether these impacts are likely to give to rise to significant effects, and whether the receptor is scoped in or scoped out of the assessment.

15.6.3 The proposed Friston Substation, as described in **Chapter 2** proposed Scheme Description outlines the optionality that remains at Friston Substation. The scope of this EIA Scoping Chapter has been based on the worst case scenario that the proposed Onshore Scheme would construct Friston Substation.

15.6.4 All identified impacts are of relevance to both the Southwold and Walberswick options unless specified otherwise.

15.6.5 A precautionary approach has been taken and where there is no strong evidence base, insufficient baseline or the significance is uncertain at this stage the impact has been scoped in to the EIA. Where there is a clear evidence base that the effect from the impact will not be significant, either alone or in combination with other plans and projects, the impact has been scoped out of the EIA.

Table 15.2 Proposed scope of the assessment

Project phase	Receptor	Impact	Potential for significant effect	Proposed to be scoped in/ out
Construction	Road users	Increased traffic or HGV volumes and congestion due to construction traffic and increased journey times/distance due to road closures/diversions.	Whilst short-term and temporary in nature, it is considered that there is still potential for significant effects on road users as a result of construction traffic and road closures/diversions leading to potential Driver Delay and Highway Safety effects.	Scoped in
Construction	Road users	Increased congestion and increased journey times/distance due to road closures/diversions for abnormal load access.	Abnormal loads would be planned for off peak times when the road network is less busy and there is not therefore expected to be significant effects on road users.	Scoped out
Construction	Public transport users (bus)	Increased traffic volumes and congestion due to construction traffic and increased journey times/distance due to road closures/diversions.	Whilst short-term and temporary in nature, it is considered that there is still potential for significant effects on public transport users as a result of construction traffic and road closures/diversions leading to potential Public Transport Delays.	Scoped in
Construction	Pedestrians and cyclists	Increased traffic volumes due to construction traffic, increased journey times/distance due to PRoW closures/diversions and construction works in general.	Whilst short-term and temporary in nature, it is considered that there is still potential for significant effects on pedestrians and cyclists as a result of construction traffic leading to Traffic Severance and Pedestrian Delay, PRoW closures/ diversions leading to Severance and/or Increased Journey Time, and general construction works leading to a decline in Pedestrian and Cycle Amenity and additional Fear and Intimidation.	Scoped in

Project phase	Receptor	Impact	Potential for significant effect	Proposed to be scoped in/ out
Construction	General public	Increased number of vehicles transporting hazardous loads as a result of construction.	Whilst short-term and temporary in nature, it is considered that there is still potential for significant effects on the general public as a result of a road traffic accident leading to a Hazardous Load spill.	Scoped in
Construction	Railway users	Closure of the railway line to enable construction of the cable corridor.	Trenchless methods will be employed when installing cables to avoid any potential impacts on the railway.	Scoped out
Operation	Road users	Increased traffic volumes and congestion due to operational staff trips.	The number of operational staff and maintenance trips would be low and there is not therefore expected to be significant effects on Driver Delay and Highway Safety as a result of travelling to the site.	Scoped out
Operation	Public transport users (bus)	Increased traffic volumes and congestion due to operational staff trips.	The number of operational staff and maintenance trips would be low and there is not therefore expected to be significant effects on Public Transport Delay as a result of travelling to the site.	Scoped out
Operation	Pedestrians and cyclists	Increased traffic volumes due to operational staff trips.	The number of operational staff and maintenance trips would be low and there is not therefore expected to be significant effects on Traffic Severance and Pedestrian Delay as a result of travelling to the site.	Scoped out

Project phase	Receptor	Impact	Potential for significant effect	Proposed to be scoped in/ out
Operation	Pedestrians and cyclists	Increased journey times/distance due to permanent PRoW closures/diversions associated with the Converter Station	There is potential for significant effects on pedestrians and cyclists as a result of permanent PRoW closures/diversions leading to potential Increased Journey Time, and a decline in Pedestrian and Cycle Amenity.	Scoped In
Operation	Railway users	Vehicle crossing points (if required)	The number of vehicle maintenance trips crossing the railway would be low (if any) and there is not expected to be significant effects on rail passenger delay as a result. Any vehicle crossing points of the railway would be managed to ensure operational rail safety. It is also notable that the only extents of railway within the study area are part of a branch line that provides service access to Sizewell and does not admit passengers.	Scoped out

15.7 Assessment methodology

Data sources

15.7.1 The assessment will be informed by desk studies and site surveys.

15.7.2 The baseline desk studies will build upon the scoping baseline using publicly available data and literature, together with survey data and data requested from local authorities.

15.7.3 To inform the assessment of the proposed Onshore Scheme, information will be obtained from the following sources:

- Local transport network information from various sources including SCC and local rail and bus operators;
- Personal Injury Collision data from SCC;
- OS Base Mapping to ascertain an accurate geographical representation of the areas in the vicinity of the proposed Onshore Scheme;
- Highway boundary information from SCC;
- Non-motorised user counts; and
- Traffic data where required.

15.7.4 Traffic flows will be identified from historic data if available, or traffic counts will be undertaken at locations in the vicinity of the proposed Onshore Scheme to determine the baseline traffic conditions on the surrounding highway network. The extent of the traffic data and scope for any traffic surveys that may be required will be discussed with SCC as Highway Authority.

15.7.5 To determine the impact of the proposed Onshore Scheme, the following scenarios would be assessed.

- 2028 Future Baseline ('Without Development') – AM, PM and daily flows; and
- 2028 Future Baseline plus Construction ('With Development') – AM, PM and daily flows.

15.7.6 A Baseline scenario (2023) would be used from which to develop the future baseline (2028) traffic flows, taking account of committed developments and transport schemes, along with background traffic growth. The future baseline traffic flows would form the basis for assessing the proposed Scheme impacts and effects.

15.7.7 The 'With Development' scenario would consider the 2028 background traffic flows (future baseline), in conjunction with the peak construction activities from the overall construction programme (whenever these may occur).

15.7.8 The peak construction traffic flows will be derived by analysing construction traffic data and the construction programme, along with consideration of any proposed road closures and associated diversions. Construction HGVs would be assigned to designated routes. A simple gravity model would be used to assign worker trips to and from the proposed construction compounds. The result of the assignment of construction traffic to the highway network and any road diversions will be used to calculate the resultant percentage increase on each link.

15.7.9 A Transport Assessment (TA) Scoping Report has been prepared to seek to agree the scope of the TA with the Highway Authority. In the event that junction capacity analysis is required, this will be discussed and agreed with SCC where necessary.

Legislation, policy and guidance

15.7.10 Legislation and policy relevant to the proposed Scheme and this chapter is outlined in **Chapter 4** Legislation and Policy Overview and **Appendix 4-A** National Policy, **Appendix 4-B** Environmental Legislation and **Appendix 4-C** Local Policy.

15.7.11 Relevant guidance and standards that have informed the scoping process are listed below (but not limited to) and will also be taken into account as part of the assessment:

- IEMA Guidelines Environmental Assessment of Traffic and Movement (2023).

15.7.12 In accordance with the 2023 IEMA Guidelines, the following criteria will be considered in this assessment.

- Severance of communities;
- Road vehicle driver and passenger delay;
- Non-motorised user delay;
- Non-motorised amenity;
- Fear and intimidation on and by road users;
- Road user and pedestrian safety; and
- Hazardous/large loads.

15.7.13 The IEMA guidelines set out two broad rules for identifying potential highway links for analysis:

- Rule 1: include highway links where traffic flows will increase by more than 30% (or the number of HGVs will increase by more than 30%); and
- Rule 2: include highway links of high sensitivity where traffic flows have increased by 10% or more.

15.7.14 Highway links would therefore be assessed where traffic flows are expected to increase by 30% or more, and where there are increases of 10% or more in an area identified as sensitive.

15.7.15 The IEMA guidelines suggest that the rules may not be appropriate for road safety and driver delay.

15.7.16 In addition to the above, potential traffic-related effects will also be considered by other topics.

Assessment method

15.7.17 **Chapter 5** EIA Approach and Method sets out the standard EIA methodology and matrices to be used for the assessment. The methodology is based on the principle that the environmental effects will be determined by identifying potential receptors, assigning receptor value, assessing the magnitude of change on the receptor and then identifying the significance of the effect. This section provides a summary of the EIA methodology specifically relevant to this chapter.

15.7.18 Assessment of cumulative and combined effects are discussed in **Chapter 29** Cumulative and Combined effects of the Project.

15.7.19 The type of traffic which is anticipated to be generated by the proposed Onshore Scheme will comprise general traffic, light good vehicles (LGVs), HGVs and Abnormal Indivisible Loads (AILs). It is intended that the proposed routing and movement of construction traffic would be discussed with SCC as the Highway Authority.

15.7.20 Once the routeing and estimated volumes of construction traffic have been established, these will be compared to the future baseline flow (Without Development) to establish whether the increase in traffic would meet either of IEMA rules 1 and 2. For those locations where there is an increase in traffic of at least 10%, the receptors that would be impacted by the increase in vehicle movements will be identified. Historic data or Automatic Traffic Counts (ATCs) would be used to derive 24 hour Annual Average Daily Traffic (AADT) for individual links, subdivided for total traffic and HGVs.

15.7.21 Typically, when assessing the impacts of traffic effects, there are a range of particular groups and locations which may be sensitive to changes in traffic conditions compliant with the criteria previously outlined. The IEMA identifies the following list of 'special interests' that should be considered when defining sensitive receptor locations:

- People at home;
- People in work;
- Sensitive and/or vulnerable groups (including young age; older age; income; health status; social disadvantage; and access and geographic factors);
- Locations with concentrations of vulnerable users (e.g. hospitals, places of worship, schools);
- Retail areas;
- Recreational areas;
- Tourist attractions;
- Collision clusters and routes with road safety concerns; and
- Junctions and highway links at (or over) capacity.

15.7.22 The IEMA guidance states that this list of affected parties is not exhaustive. One affected party that is not on the list but will nevertheless be considered in this assessment is 'other road users'. All of the affected parties have one thing in common which is that their potential exposure to changes in traffic volumes comes about through their proximity to a construction traffic route. It is important to note that the IEMA methodology does not consider the duration of effect, especially whether it is temporary (construction) or permanent (operational traffic). As such, effects that, using this methodology, may appear to be significant, may be considered not significant if the effect is temporary or infrequent (occurring only occasionally during construction for example).

Transport assessment

15.7.23 The ability of the highway network to accommodate the development traffic will be assessed and reported in a TA which will form a technical annex to the ES Chapter. The TA will include information on:

- Relevant national, regional and local policies;
- The existing baseline conditions including a description of the roads, bus routes, railway lines, footpaths, bridleways and cycle paths crossed by the route and/or impacted by the works;
- Personal Injury Collision data for the most recent five-year period within the proposed study area;
- The proposed Onshore Scheme including a description of the proposed route, the construction programme, typical working width, compound locations, access routes to compounds, potential road or ProW closures/diversions and construction methods for individual railway and road crossings (where appropriate);
- Future baseline including committed developments and transport schemes;
- Trip generation during construction including worker trips and HGV traffic to/from compounds. Trip generation associated with the operation of the proposed Onshore Scheme;
- The distribution and assignment of construction trips on the road network;
- The impacts of the construction works and operation of the proposed Onshore Scheme (where applicable) on the transport network;
- Mitigation measures; and
- Summary and conclusions.

Defining significance

15.7.24 This section outlines the approach that would be used to determine the sensitivity of the receptors and magnitude of impact.

Sensitivity, value, or importance

15.7.25 The general criteria for defining the importance or sensitivity of receptors for Traffic and Transport are set out in **Table 15.3**. Key factors influencing this include:

- The value of the receptor or resource based upon empirical and/or intrinsic factors, for example, considering any legal or policy protection afforded which is indicative of the receptor or resources' value internationally, nationally or locally; and
- The sensitivity of the receptor or resource to change, for example is the receptor likely to acclimatise to the change. This will consider legal and policy thresholds which are indicative of the ability of the resources to absorb change.

Table 15.3 Sensitivity of receptors

Receptor Value and Sensitivity	Description/ Receptor examples
Very High	Highway Links and Junctions: More than two sensitive users present (e.g. schools, play areas, care/retirement homes, hospitals, places of worship, historic buildings) Walk/Cycle Links including ProW: Heavily trafficked highway with on-road pedestrian/cycle route

Receptor Value and Sensitivity	Description/ Receptor examples
High	Highway Links and Junctions: Two sensitive users present (e.g. schools, play areas, care/retirement homes, hospitals, places of worship, historic buildings) Walk/Cycle Links including ProW: Lightly trafficked highway with on-road pedestrian/cycle route
Medium	Highway Links and Junctions (at least one of the following): • One sensitive user present (e.g. schools, play areas, care/retirement homes, hospitals, places of worship, historic buildings); • Many residential properties with direct frontage to highway link being used as construction route; • Pedestrians using footways, ProW and/or crossings on highway link; and • Cyclists using on-road designated cycle routes along highway link. Walk/Cycle Links including ProW: Heavily trafficked highway with off-road pedestrian/cycle route
Low	Highway Links and Junctions (at least one of the following): • Few residential properties with direct frontage to the highway link being used as a construction traffic route; • Workplaces with direct frontage to highway link being used as construction route; and • Cyclists using off-road designated cycle routes along highway link Walk/Cycle Links including ProW: Lightly trafficked highway with off-road pedestrian/cycle route
Negligible	Highway Links and Junctions: No receptors along link Walk/Cycle Links including ProW: Pedestrian/cycle route not running alongside highway

Magnitude

15.7.26 The 2023 IEMA guidelines[2] state that the environmental assessment should consider the forecast changes to baseline (magnitude of change/impact).

15.7.27 Severance is defined in the IEMA guidelines as the "perceived division that can occur within a community when it becomes separated by major transport infrastructure". The term is used to describe a complex series of factors that separate people from places and other people. Severance may result from the difficulty of crossing a heavily trafficked road or a physical barrier created by infrastructure. It can also relate to quite minor traffic flows if they impede pedestrian access to essential facilities. The assessment will consider both total traffic and the proportion of HGVs. The guidance for thresholds of magnitude is taken from DMRB Volume 11, Section 3, Part 8.

15.7.28 Pedestrian Delay is considered to be affected by the changes in volume, composition or speed of traffic, in terms of their respective impacts on the ability of pedestrians to cross roads. In general, increases in traffic levels and/or traffic speeds are likely to lead to greater increases in pedestrian delay. The 2023 IEMA guidance does not suggest a magnitude of impact for pedestrian delay, and it has been assumed that effects are only likely to be realised when the total two-way traffic on the carriageway exceeds 1,400 vehicles per hour, which was suggested in the 1993 IEMA guidance[3].

15.7.29 Pedestrian and Cyclist Amenity is broadly defined as *"the relative pleasantness of a journey and is considered to be affected by traffic flow, traffic composition and pavement width/separation from traffic*". The guidance suggests that a tentative threshold for judging the significance of changes in pedestrian and cycle amenity would be where the traffic flow (or HGV component) is halved or doubled.

15.7.30 Fear and Intimidation occurs through a combination of the total traffic flow, vehicle speed, proportion of HGVs and the proximity of the above to people or receptors on highway links. These indicators are often heightened by a perceived lack of protection or buffers from the highway or through narrow or non-existent footways. The 2023 IEMA guidelines suggest the degree of hazard is assessed with reference to established thresholds, and a score provided for each combination on a highway link to provide a level of fear and intimidation. It is proposed to use the IEMA suggested scoring approach which is shown in **Table 15.4** Fear and intimidation degree of hazardand **Table 15.5**.

Table 15.4 Fear and intimidation degree of hazard

Average traffic flow over 18-hour day – all vehicles/hour 2-way (a)	Total 18-hour heavy vehicle flow (b)	Average vehicle speed (c)	Degree of hazard score
>1,800	>3,000	>40	30
1,200–1,800	2,000–3,000	30–40	20

[2] Institute of Environmental Management and Assessment (IEMA) Guidelines Environmental Assessment of Traffic and Movement (2023)

[3] Institute of Environmental Management and Assessment (IEMA) Guidelines for the Environmental Assessment of Road Traffic (1993)

Average traffic flow over 18-hour day – all vehicles/hour 2-way (a)	Total 18-hour heavy vehicle flow (b)	Average vehicle speed (c)	Degree of hazard score
600–1,200	1,000–2,000	20–30	10
<600	<1,000	<20	0

Table 15.5 Levels of fear and intimidation

Level of fear and intimidation	Total hazard score (a) + (b) + (c)
Extreme	71+
Great	41-70
Moderate	21-40
Small	0-20

15.7.31 The fear and intimidation assessment will consider each road on a case by case basis and the magnitude of impact thresholds are presented in **Table 15.6**.

15.7.32 Driver Delay is an effect cited in the IEMA guidance and relates to incremental increases in traffic (as outlined in **Table 15.6** below). As a further consideration, where any temporary road closures or traffic management is likely to be in place to enable the construction of the Onshore Scheme, any additional potential delay caused by these resultant diversion routes will be reported.

15.7.33 Public transport delay occurs due to a temporary closure or diversion of a highway. The effect would depend on whether a temporary closure or diversion is proposed, any increases in bus journey length as a result and how long any potential disruption would last. The assessment will consider the indicative thresholds presented in **Table 15.6** below which have been derived based on professional judgement.

15.7.34 Highway Safety considers Personal Injury Collision data obtained for the most recent five-year period available at junctions and links along the proposed construction traffic routes. These will be used to assess whether the additional traffic during construction of the Onshore Scheme would be likely to have a detrimental effect on road safety.

15.7.35 PRoW Diversions and/or Closures will be considered on the basis of the type of impact i.e. whether a temporary PRoW closure or diversion is proposed, as well as any increases in pedestrian journey length following a closure/diversion and how long any potential disruption to an existing route would occur for. The assessment will consider the indicative thresholds presented in **Table 15.7** below which have been derived based on professional judgement.

15.7.36 With regard to Hazardous and Dangerous Loads, the 2023 IEMA guidance states that "*The traffic and movement assessment needs to clearly outline the estimated number and composition of such loads. Where the number of movements is considered to be significant, the assessment should include a risk or catastrophe analysis to illustrate the potential for an accident to happen and the likely effect of such an event."* Analysis of the road network within the proposed study area indicates that there are no particular features, such as a significant vertical drop immediately beyond the carriageway, which would suggest that the transfer of materials poses a particular risk beyond that which would be expected on the general highway network. However, there will be a requirement to transport gas and oil as part of the proposed Scheme during construction which are categorised as Hazardous and Dangerous Loads (see **Section 15.4**).

15.7.37 In view of the above, the impacts of Hazardous and Dangerous Loads will be considered within the PEI Report and ES, in the form of a qualitative risk assessment to establish the likelihood and extent of such effects. The Framework CTMP and the ES will include details of measures that will be employed to ensure the safe vehicular transport of components to and from the Onshore Scheme.

15.7.38 **Table 15.6** and **Table 15.7** summarise the criteria that will be used to assign the magnitude of impacts, along with the thresholds that will be used to determine whether impacts are considered high, medium, low and negligible. The various thresholds identified for the proportional increases in traffic flow relate to peak hour flows and daily flows (whichever is highest). Within these tables the duration of effects is not taken into consideration. These tables are formed using IEMA Guidelines and professional judgement.

Table 15.6 Categorising the overall magnitude of impact of a highway link or junction

Impact	Negligible	Low	Medium	High
Traffic Severance	Increase in total traffic flows of less than 30% or increase in HGV flows under 10%, where the increase is greater than 10 vehicles per day.	Increase in total traffic flows of 30-59% or increase in HGV flows of between 20%-39%, where the increase is greater than 10 vehicles per day.	Increase in total traffic flows of 60%-89% or increase in HGV flows between 40%- 89%, where the increase is greater than 10 vehicles per day.	Increase in total traffic flows or HGV flows of 90% or above, where the increase is greater than 10 vehicles per day.
Pedestrian Delay	Total two-way traffic flows under 1,400 per hour.	Where traffic flows exceed a two-way flow of 1,400 vehicles per hour the severity of the impact will be determined based on the thresholds identified above for severance.		
Pedestrian and Cycle Amenity	Increase in total traffic flows of less than 50%.	Increase in total traffic flows of 50-69%.	Increase in total traffic flows of 70%-99%.	Increase in total traffic flows of 100% or above.
Fear and Intimidation	No change in step changes	One step change in level, with	One step change in level, but with	Two step changes in level

Impact	Negligible	Low	Medium	High
		• <400 vehicle increase in average 18hr two-way total vehicle flow; and/or • <500 increase in total 18hr HGV flow	• >400 vehicle increase in average 18hr two-way total vehicle flow; and/or • >500 increase in total 18hr HGV flow	
Driver Delay (Congestion)	Increase in total traffic of less than 30%.	Increase in total traffic of 30%-59%.	Increase in total traffic of 60%-89%.	Increase in total traffic of 90% or above.
Driver Delay (Diversion)	Increase in distance of less than 1km	Increase in distance of 1-2km	Increase in distance of 2-4km	Increase in distance of 4km or more
Public Transport Delay (Diversion)	Percentage change in total bus journey distance less than 10%	Percentage change in total bus journey distance between 10% and 20%	Percentage change in total bus journey distance between 20% and 40%	Percentage change in total bus journey distance 40% or more
Highway Safety	Increase in total traffic flows of less than 30% or increase in HGVs of less than 10%,	All links estimated to experience increases in total traffic flows of above 30% or increases in HGV flows above 10% and which have an average of more than 3 accidents per year in the most recent five year period would be analysed on a case-by-case basis.		
Hazardous Loads	Based on the probability of a personal injury collision, categorised as fatal or serious, involving a hazardous load occurring.			

15.7.39 An assessment of walking and cycling routes, as well as PRoW will be carried out where these are directly affected by construction works or intersected by a construction route (for example), including in terms of severance, pedestrian delay, pedestrian and cycle amenity and for fear and intimidation, by reviewing the thresholds as identified in **Table 15.6** where relevant. In terms of PRoW diversions and/or closures, the following thresholds are proposed to identify magnitude of effect based on professional judgement.

Table 15.7 Categorising the overall magnitude of impact of a PRoW diversion and/or closure

Impact	Negligible	Low	Medium	High
PRoW Diversions and/or Closures	Change in journey length of less than 100m or	Change in journey length of 100m-250m or an	Change in journey length of 250m-500m or an	Change in journey length of 500m or more or

Impact	Negligible	Low	Medium	High
(Severance)	an increase in journey length for less than 7 days.	increase in journey length for 1-4 weeks.	increase in journey length for 4-8 weeks.	an increase in journey length for 8 weeks or more.

15.7.40 **Table 15.6** and **Table 15.7** above set out the proposed magnitude thresholds for the respective environmental effects that will be considered in the ES. With the exception of PRoW Diversion and Closure effects, all effects have a proposed magnitude that does not, initially, consider the duration over which an effect is likely to be experienced.

15.7.41 Duration is considered when assessing the overall significance of residual effects, noting that the DMRB Volume 11 Section 2 Part 5 states in Paragraph 1.47:

"Recognition should be made that permanent impacts will be more significant than those of a temporary nature. For example, the impact may only occur during a single phase of the project construction and may be temporary. Alternatively, the impact may be long-term or irreversible and hence permanent. It is, therefore, important that the assessment distinguishes between permanent and temporary impacts".

15.7.42 All of the Traffic and Transport effects associated with the construction of the proposed Onshore Scheme would be temporary effects. Some temporary effects would be likely to last longer than others, and these will be clearly reported in the PEI Report and ES. Following the quantified assessment, residual effects will be reported taking into account professional judgement on the duration over which effects are likely to be experienced.

Significance

15.7.43 In order to determine the effect on specific receptors, both the sensitivity of receptors and the magnitude of impact, as outlined above, are considered. **Chapter 5** EIA Approach and Method, **Table 5-3** shows the matrix that will be used to determine the effect category.

15.8 Assumptions & limitations

15.8.1 This EIA Scoping Report has been collated based on a range of publicly available data and information only. It is assumed that the data collated is accurate. The data will be supplemented with additional data as part of the EIA process.

15.8.2 In the absence of data, a precautionary approach has been taken and professional judgement, based on experience of similar linear schemes, has been used where required to inform the scope of the assessment.

15.8.3 Additional assumptions and limitations relating to Traffic and Transport would be set out in the TA.

Contents

16. Socioeconomics, Recreation and Tourism

16.1 Introduction

16.1.1 This chapter outlines the proposed scope of assessment and methodology for socioeconomics, recreation and tourism. It will consider the potential for significant effects on socioeconomics, recreation and tourism receptors arising from the construction and operation of the LionLink Interconnector (hereafter referred to as 'the proposed Onshore Scheme'). A review of relevant guidance and policy has been undertaken together with a desk-based assessment, to inform the proposed scope and methodology.

16.1.2 This chapter is supported by the figure:

- **Figure 1-2**: Proposed Onshore Scheme Scoping Boundary;
- **Figure 1-3**: Onshore Scheme Scoping Boundary and Scheme Components;
- **Figure 16.1**: Socioeconomic Study Area Map; and
- **Figure 16.2**: Recreational and Community Receptors Map

16.1.3 There may be interrelationships with other disciplines. Therefore, this chapter should be read in conjunction with the following chapters:

- **Chapter 7** Agricultural and Soils – which covers land and land use in terms of the loss of best and most versatile (BMV) land; and soil resources in terms of potential damage and loss;
- **Chapter 10** Health and Wellbeing – which covers population health and wellbeing;
- **Chapter 13** Landscape and Visual – which covers recreational, tourism and community visual receptors;
- **Chapter 14** Noise and Vibration – which covers noise effects for residential and community receptors; and
- **Chapter 15** Traffic and Transport – which covers Public Rights of Way (ProW) and severance effects.

16.2 Consultation and engagement

16.2.1 Consideration has been given to responses received at Non-Statutory Consultations held in 2022 and 2023 in preparing this scoping chapter. Responses relating to Socio-Economics, Recreation and Tourism, have been received from the following:

- East Suffolk Council (ESC);
- Suffolk County Council (SCC);
- Suffolk Coast Destination Management Organisation (DMO);

- Suffolk Coast and Heaths Area of Outstanding Natural Beauty (AONB) (now known as Suffolk and Essex Coast and Heaths National Landscape);
- Southwold and Reydon Society;
- Suffolk Preservation Society;
- Suffolk Wildlife Trust;
- National Trust; and
- Parish and Town Councils: Aldringham-cum-Thorpe Parish Council, Aldeburgh Town Council, Benhall and Sternfield Parish Council, Dunwich Parish Council, Friston Parish Council, Kelsale-cum-Carlton Parish Council, Leiston-cum-Sizewell Town Council, Middleton cum Fordley Parish Council, Reydon Parish Council, Southwold Town Council, and Walberswick Parish Council.

16.2.2 The main themes reported as part of the Non-Statutory Consultations were:

- Potential impact of the proposed Onshore Scheme on the visitor economy in East Suffolk and the Suffolk Coast and Heaths National Landscapes, and on perceptions of the area for visitors, including in relation to its landscape, tranquillity and cultural heritage;
- Potential impacts on other businesses, including farm-based businesses;
- Potential impacts on users of the Suffolk Coast Path, Suffolk Heritage Coast, and of other PRoW and national trails;
- Potential impacts on public and residential amenity and residents' quality of life, including in relation to increased traffic and congestion;
- Potential impacts on access to local amenities and disruption to local road networks from construction traffic;
- Construction employment, including work and apprenticeship opportunities and the potential impact of an incoming construction workforce that may require accommodation in the area; and
- Potential in-combination effect of the proposed Onshore Scheme and other Nationally Significant Infrastructure Projects in the Suffolk area, including on the visitor economy.

16.2.3 Engagement has been undertaken with SCC and ESC in August 2023. The key points of discussion included:

- The extent of the study area;
- Local businesses identified as receptors; and
- The assessment of the potential impacts on tourism.

16.2.4 Further engagement will be undertaken with relevant stakeholders to obtain any information that they hold to supplement the assessment and to seek their views with regards to the evolving design.

16.2.5 The following additional bodies will be consulted during the EIA process in relation Socio-Economics, Recreation and Tourism:

- Local business groups in relation to job creation and supply chain opportunities;

- Local authorities in relation to tourism impacts; and
- Local interest groups in relation to recreational, community and tourism facilities that could be impacted by the proposed Onshore Scheme.

16.2.6 In addition, engagement will be undertaken with non-statutory stakeholders as required so that their specialist local views and expertise can be considered as part of the EIA process.

16.3 Baseline conditions

16.3.1 The baseline is structured around the following aspects which have been considered as part of the scoping assessment for Socioeconomics, Recreation and Tourism:

- Employment and economic activity, including local labour market conditions;
- Local business, focusing at this stage on business parks and business centres;
- Promoted recreational routes which provide recreational value for local residents and visitors;
- Community facilities and open space, including schools, places of worship, community centres, health care facilities, play space, leisure facilities and other types of open space;
- Visitor attractions, including visitor accommodation and tourism-related businesses and facilities; and
- Development land, focusing at this stage on sites allocated for housing, employment or mixed use development in the Suffolk Coastal Local Plan[1] and Waveney Local Plan[2].

Study area

16.3.2 The scoping assessment for socioeconomics, recreation and tourism has considered the potential for effects to arise across two study areas (See **Figure 16-1**): a labour market study area and a local study area:

- Potential employment, training and supply chain effects would be assessed at the level of the labour market study area, which looks across East Suffolk, Suffolk and the East of England as shown on **Figure 16-1**[3];
- Potential effects on individual receptors including businesses, open space, community facilities, visitor attractions and development land, would be assessed at the level of the local study area, comprising all land within the proposed Onshore Scheme Scoping Boundary (hereafter referred to as 'the Onshore Scoping Boundary') plus a 500m buffer, as shown on **Figure 1-2**.

[1] Suffolk Coastal Local Plan. September 2020. https://www.eastsuffolk.gov.uk/assets/Planning/Planning-Policy-and-Local-Plans/Suffolk-Coastal-Local-Plan/Adopted-Suffolk-Coastal-Local-Plan/East-Suffolk-Council-Suffolk-Coastal-Local-Plan.pdf [Accessed Feb 2024]

[2] Waveney Local Plan. March 2019. https://www.eastsuffolk.gov.uk/assets/Planning/Waveney-Local-Plan/Adopted-Waveney-Local-Plan-including-Erratum.pdf [Accessed Feb 2024]

[3] A more defined labour market study area will be developed for the PEI Report, taking into account factors such as travel to work data and data on local skills, businesses and supply chains.

16.3.3 The 500m buffer has been informed by published industry guidance and professional judgement, and takes into account the characteristics and sensitivity of relevant receptors. It is considered that the majority of direct and indirect effects on individual receptors would occur within this area. Baseline data is presented for wards that intersect with the 500m buffer from the Onshore Scoping Boundary.

16.3.4 As noted by the Planning Inspectorate (PINS) in its Scoping Opinion on National Grid Electricity Transmissions' proposed Sea Link project (4.10.3), however, it is acknowledged that there may be circumstances where it would be appropriate to consider a wider study area, for example where there may be the potential for impacts on the road network to affect access to relevant receptors outside of the 500m buffer. Any such receptors identified through assessment work or consultation with key stakeholders will be included in the baseline for the Preliminary Environmental Information (PEI) Report and Environmental Statement (ES).

16.3.5 The study areas will be reviewed and, as appropriate, refined for the assessment in the PEI Report and ES with only one Landfall and one High Voltage Direct Current (HVDC) Underground Cable Corridor being taken forward. The study area will be based on the proposed Order limits in the ES.

Baseline data sources

16.3.6 The baseline described in this chapter and associated appendices has been informed by the following data sources:

Table 16-1 Scoping baseline data sources

Baseline Data	Source
Review of mapping of the proposed Onshore Scheme and surrounding areas	OS Map
key receptors such as businesses and community facilities	Internet based searches
Site allocations	Suffolk Coastal Local Plan[4] and Waveney Local Plan[5]
Census data	Office for National Statistics (ONS) Census 2021[6]

16.3.7 At this stage, the baseline has identified local business parks and business centres within the local study area. Further information, including individual businesses that may experience effects as a result of the construction and/or operation of the proposed Onshore Scheme, will be provided in the baseline for the PEI Report and ES.

[4] Suffolk Coastal Local Plan. September 2020. https://www.eastsuffolk.gov.uk/assets/Planning/Planning-Policy-and-Local-Plans/Suffolk-Coastal-Local-Plan/Adopted-Suffolk-Coastal-Local-Plan/East-Suffolk-Council-Suffolk-Coastal-Local-Plan.pdf [Accessed Feb 2024]

[5] Waveney Local Plan. March 2019. https://www.eastsuffolk.gov.uk/assets/Planning/Waveney-Local-Plan/Adopted-Waveney-Local-Plan-including-Erratum.pdf [Accessed Feb 2024]

[6] https://www.ons.gov.uk/census [Accessed Feb 2024]

16.3.8 The baseline for the PEI Report and ES will also include details of planning applications for development on unallocated sites, as well as sites allocated in the Local Plans for housing, employment or mixed use development.

16.3.9 The following sections present the existing baseline established at scoping. There are currently two options being considered for the proposed Landfall Site and associated HVDC Underground Cable Corridor, which are shown on **Figure 1-2** and **Figure 1-3**. Baseline information is presented for the two options below.

Baseline

16.3.10 Census information for employment, economic activity and the local labour market is provided for the local authority of East Suffolk, the county of Suffolk, the East of England, and the wards that intersect with the local study area. These are:

- Aldeburgh and Leiston;
- Halesworth and Blything;
- Kelsale and Yoxford;
- Saxmundham;
- Southwold; and
- Wrentham, Wangford and Westleton.

16.3.11 Baseline information for individual receptors is provided for the local study area, comprising the Onshore Scoping Boundary plus a 500m buffer. Where individual receptors such as businesses, community facilities or visitor attractions are identified, their location is given with reference to the nearest settlement. Key settlements within the local study area include Friston, Knodishall, Saxmundham and Southwold. To reduce duplication, baseline data is provided for the local study area as a whole and is not broken down by scheme component. 16.1.3

Employment, economic activity and the labour market

16.3.12 At the time of the 2021 Census, the population of East Suffolk was 246,058. Of this, 56.3% was of working age (aged between 16 and 64), considerably lower than the national average of 63%. The proportion of children aged under 16 was slightly below average, at 16% compared with 18.6% for England, and the proportion of residents aged 65 and over was considerably higher than average, at 27.8% compared with 18.4%.

16.3.13 Suffolk as a whole had a population of 760,689. The county also lower than average proportions of children and working age residents, and a higher than average proportion of residents aged 65 and over. However, the differences with the national average in terms of age profile were less pronounced than in East Suffolk. Across the East of England, the total population was 6,335,075, and the age profile was broadly in line with the national average.

16.3.14 **Table 16-2** provides data on the age profile of the wards that intersect with the local study area. While the proportion of residents who are of working age varies between wards, in every ward it is lower than the national average, and in most cases it is also below the average for East Sussex. The proportion of working age residents is lowest in Southwold, where 41.9% of residents are aged 65 and over, more than twice the national average.

Table 16-2 Age profile of the population[7]

Area	Under 16	16-64	65 and over
Aldeburgh and Leiston	13.2%	52.7%	34.1%
Halesworth and Blything	14.3%	50.9%	34.8%
Kelsale and Yoxford	13%	54.4%	32.6%
Saxmundham	20.3%	56.8%	22.9%
Southwold	12.2%	45.9%	41.9%
Wrentham, Wangford and Westleton	12.9%	53.5%	33.7%
East Suffolk	16%	56.3%	27.8%
Suffolk	17.1%	59.3%	23.6%
East of England	18.7%	61.6%	19.6%
England	18.6%	63%	18.4%

16.3.15 The age profile of the population is reflected in economic activity rates, shown in **Table 16-3**, which are generally lower across East Suffolk and the local study area than the average for England. In East Suffolk as a whole, 51.5% of the population aged 16 and over is economically active and in employment, and 45.9% is economically inactive. This compares with 57.4% and 39.1% respectively for England.

16.3.16 Again, the pattern for Suffolk as a whole is similar to East Suffolk, with lower than average employment and unemployment and higher than average economic inactivity, but with less pronounced differences with national averages. Across the East of England, employment is above the national average at 58.8%, and both unemployment and economic activity are slightly below average.

16.3.17 At ward level, Aldeburgh and Leiston, Halesworth and Blything and Southwold all have at least 50% of the adult population recorded as economically inactive. Both employment and unemployment rates are lower than the national and regional averages in every ward. In Saxmundham, the rate of employment is below the regional and national average, but above the average for East Suffolk at 52.7%.

Table 16-3 Employment and economic activity[8]

Area	Employed	Unemployed	Economically inactive
Aldeburgh and Leiston	47.8%	2.3%	49.9%
Halesworth and Blything	47%	2.1%	50.9%

[7] ONS, Census 2021, RM121 – Sex by age.

[8] ONS, Census 2021, TS066 – Economic activity status.

Area	Employed	Unemployed	Economically inactive
Kelsale and Yoxford	50%	2.1%	47.9%
Saxmundham	52.7%	2.5%	44.8%
Southwold	40.1%	2.3%	57.6%
Wrentham, Wangford and Westleton	49.1%	2.1%	48.8%
East Suffolk	51.5%	2.6%	45.9%
Suffolk	56.5%	2.7%	40.9%
East of England	58.8%	3%	38.2%
England	57.4%	3.5%	39.1%

16.3.18 **Table 16-4** sets out data on industry of employment, for East Suffolk, Suffolk, the East of England and England. Across East Suffolk, the profile is broadly similar to the national average, although there are slightly higher than average proportions of residents employed in agriculture, energy and water; construction; distribution, hotels and restaurants; and transport and communication. Suffolk and the East of England have broadly similar industrial profiles, although both areas also have higher proportions of residents employed in construction than either East Suffolk or the national average.

16.3.19 Similar trends emerge from the ward level data, not presented here, which shows concentrations of employment in agriculture, energy and water particularly in Kelsale and Yoxford (9.5%); construction in Halesworth and Blything (11.3%) and Aldeburgh and Leiston (11.2%); and distribution, hotels and restaurants particularly in Aldeburgh and Leiston (24.1%) and Southwold (23.4%), indicating the importance of the tourism sector in these locations.

16.3.20 Employment in transport and communication is generally lower than or in line with the national average at ward level, as it is likely that the high proportion of employment in this sector recorded for East Suffolk as a whole reflects the importance of the ports of Felixstowe and Lowestoft, neither of which is within the local study area.

Table 16-4 Industry of employment[9]

Area	East Suffolk	Suffolk	East of England	England
Agriculture, energy and water	4.7%	3.7%	2.3%	2.3%
Manufacturing	7.3%	7.6%	7%	7.3%
Construction	9%	9.5%	10%	8.7%

[9] ONS, Census 2021, RM062 – Industry by age

Area	East Suffolk	Suffolk	East of England	England
Distribution, hotels and restaurants	20.7%	19.8%	19.4%	19.9%
Transport and communication	10.5%	9.4%	9.8%	9.8%
Financial, real estate, professional and administrative activities	14.1%	15.4%	18.1%	17.4%
Public administration, education and health	28.7%	29.5%	28.8%	30.2%
Other	5%	5.1%	4.5%	4.6%

Local business

16.3.21 The local study area includes the town of Southwold, parts of Saxmundham to the east of the High Street, and villages including Reydon, Wangford, Wenhaston, Blythburgh, Walberswick, Westleton, Middleton, Knodishall and Friston. There are business parks located in Southwold and in Reydon. Other businesses tend to be clustered in town and village centres, with farms and other businesses such as farm shops and campsites located in more rural areas.

16.3.22 Businesses that are considered visitor attractions, including accommodation providers, are identified in Table 16-6. The PEI Report and ES will identify other businesses within the local study area that could be impacted by the construction or operation of the Proposed Scheme.

Promoted recreational routes

16.3.23 Promoted recreational routes identified within the local study area are:

- The Suffolk Coast Path;
- The Sandlings Walk; and
- The East Suffolk Lines – Halesworth to Southwold and The Garden of Suffolk walks.

Community facilities and open space

16.3.24 Community facilities and open spaces identified within the local study area are listed in **Table 16-5**.

Table 16-5 Community facilities and open space within the local study area

Receptor	Location	Description
Friston Village Green	Friston	Amenity greenspace
Friston Play Area	Friston	Play space
St Mary's Church	Friston	Place of worship

Receptor	Location	Description
Knodishall Methodist Church	Knodishall	Place of worship
St Lawrence Church	Knodishall	Place of worship
Knodishall Village Hall	Knodishall	Community facility
Knodishall Common	Knodishall	Natural / semi-natural open space
Knodishall Playground	Knodishall	Play space
St John the Baptists Church	Saxmundham	Place of worship
Coldfair Green County Primary School	Saxmundham	Education
High Lodge Golf Course	Saxmundham	Recreation / leisure facility
Saxmundham Sports and Recreational Club (Carlton Park)	Saxmundham	Recreation / leisure facility
St Mary Magdalene Church	Sternfield	Place of worship
Holy Trinity Church	Blythburgh	Place of worship
All Saint's Church	Blyford	Place of worship
Middleton Primary School	Middleton	Education
Middleton Village Hall	Middleton	Community facility
Middleton Recreation Ground	Middleton	Amenity greenspace
Holy Trinity Church	Middleton	Place of worship
Norwood House	Middleton	Residential care
Reydon Recreation Ground	Reydon	Recreation / leisure facility
Reydon Parish Playground	Reydon	Play space
St Margaret's Church	Reydon	Place of worship
Reydon Sports and Community Centre	Reydon	Recreation / leisure facility
Reydon Primary School	Reydon	Education
St Andrews Church	Sotherton	Place of worship
Southwold Boating Lake and Model Boat Pond	Southwold	Recreation / leisure facility
Southwold Skatepark	Southwold	Play space
Southwold Cemetery	Southwold	Place of worship

Receptor	Location	Description
Southwold Allotments	Southwold	Allotments
Tibby’s Green Playground	Southwold	Play space
St Edmund's Green	Southwold	Park
Southwold Primary School	Southwold	Education
Sole Bay Juniors Football Club	Southwold	Recreation/leisure facility
Southwold Cemetery	Southwold	Community facility
Walberswick Allotments	Walberswick	Allotments
St. Andrew’s Church	Walberswick	Place of worship
Walberswick National Nature Reserve (NNR)/Dark Sky Discovery Site	Walberswick	Natural/semi-natural open space
Walberswick Green Play Area	Walberswick	Play space
Reydon Woods	Wangford	Natural/semi-natural open space
St Peter and St Pauls Church	Wangford	Place of worship
Wangford Allotments	Wangford	Allotments
Wangford Playground	Wangford	Play space
Wenhaston Allotments	Wenhaston	Allotments
Wenhaston Primary School	Wenhaston	Education
Wenhaston Village Hall	Wenhaston	Community facility
St Peters Church	Wenhaston	Place of worship
Wenhaston Cemetery	Wenhaston	Place of worship
Bickers Heath	Wenhaston	Natural/semi-natural open space
Blackheath	Wenhaston	Natural/semi-natural open space
Blowers Common	Wenhaston	Natural/semi-natural open space
Wenhaston Play Area	Wenhaston	Play space
St Peters Church	Westleton	Place of worship
Adventure Playground	Westleton	Play space
Westleton Community Field	Westleton	Amenity greenspace

Receptor	Location	Description
Westleton Village Green	Westleton	Amenity greenspace
Westleton Heath NNR	Westleton	Natural/semi-natural open space
Westleton Common	Westleton	Natural/semi-natural open space
Walberswick Allotments	Walberswick	Allotments
St. Andrew's Church	Walberswick	Place of worship
Walberswick NNR	Walberswick	Natural/semi-natural open space
Walberswick Green Play Area	Walberswick	Play space

Visitor attractions and tourism destinations

16.3.25 Much of the local study area is within The Suffolk Coast area promoted as a visitor destination by The Suffolk Coast Ltd DMO, covering the stretch of coast between Lowestoft in the north and Felixstowe in the south. Parts of the local study area also fall within the Suffolk and Essex Coast and Heaths National Landscape.

16.3.26 Towns within the study area, including Southwold, are recognised tourist destinations with clusters of visitor attractions and accommodation providers. Latitude Festival, an annual music and arts festival, is held at Henham Park near Southwold every July, with a capacity of approximately 40,000 people.

16.3.27 Individual visitor attractions identified within the local study area are listed in **Table 16-6**. The PEI Report and ES will identify and define visitor destinations where there are clusters of tourism receptors that could be affected by the construction or operation of the Proposed Scheme.

Table 16-6: Visitor attractions within the local study area

Receptor	Location	Description
Fareacre Campsite	Knodishall	Visitor accommodation
Manor Farm Knodishall Glamping	Knodishall	Visitor accommodation
Mill Hill Farm Caravan and Campsite	Saxmundham	Visitor accommodation
Haw Wood Farm Caravans and Camping	Saxmundham	Visitor accommodation
Saxmundham Museum	Saxmundham	Visitor attraction
Carlton Park Camping and Caravan Site	Saxmundham	Visitor accommodation

Henham Park	Blythburgh	Visitor attraction/visitor accommodation
Southwold Pier	Southwold	Visitor attraction
Southwold Lighthouse	Southwold	Visitor attraction
Southwold Harbour	Walberswick/Southwold	Visitor attraction
Walberswick Caravan Park	Walberswick	Visitor accommodation
Fishers Field Camping	Theberton	Visitor accommodation
Sycamore Park Caravan Park	Theberton	Visitor accommodation
Sheeps Meadow Caravan Park	Leiston	Visitor accommodation
Leiston Abbey	Leiston	Visitor attraction

Development land

16.3.28 Sites allocated for housing, employment or mixed use development in the East Suffolk Local Plan or Waveney Local Plan identified within the local study area are listed in **Table 16-7**. Further information regarding planning applications for development on unallocated sites will be provided in the baseline for the PEI Report and ES.

Table 16-7 Site allocations within the local study area

Receptor	Location	Description
WLP7.7 Land North of Wangford	Wangford	Housing allocation, Waveney Local Plan
SCLP12.30 Land North-East of Street Farm, Saxmundham	Saxmundham	Housing allocation, Suffolk Coastal Local Plan
SCLP12.55 Land at School Road, Knodishall	Knodishall	Housing allocation, Suffolk Coastal Local Plan

Future baseline

16.3.29 The socioeconomics, recreation and tourism chapter within the PEI Report and ES will consider changes which may affect the future environment in the absence of the proposed Onshore Scheme. The future baseline will also take into account any developments that are likely to be present in the future baseline.

16.3.30 Forecast demographic changes in Suffolk are summarised in the future baseline in **Chapter 10** Health and Wellbeing. No further major changes are anticipated which would result in a future significant change to the current Socioeconomic, recreation and tourism baseline.

16.4 Potential impacts

16.4.1 This section identifies the potential impacts that could occur as a result of the proposed Onshore Scheme during construction and operation based on the baseline information collected for EIA scoping. Details of the proposed Onshore Scheme can be found in **Chapter 2** The proposed Scheme Description. The majority of impacts are considered to be temporary and would take place during the construction phase.

Construction

16.4.2 The following potential impacts could occur during the construction:

- Temporary construction employment;
- Potential supply chain opportunities during construction;
- Direct and indirect impacts on residential property, including disruption to access;
- Direct and indirect impacts on businesses, including disruption to access and the potential for in-combination effects from noise, visual, air quality or traffic effects on amenity for businesses that may be sensitive to changes in their operating environment;
- Direct and indirect impacts on community facilities, recreation and open space, including disruption to access and the potential for in-combination effects from noise, visual, air quality or traffic effects on amenity for facilities that may be sensitive to changes in their operating environment;
- Direct and indirect impacts on visitor attractions, including disruption to access and the potential for in-combination effects on amenity for receptors that may be sensitive to changes in their operating environment;
- Disruption to promoted recreational routes;
- Direct impacts on development land; and
- Impacts on the tourism sector, including visitor attractions, tourism destinations and the availability of tourist accommodation during construction.

16.4.3 The assessment of in-combination effects on amenity will draw on the findings of other relevant environmental assessments, including in relation to visual amenity, access, noise and air quality (see **section 16.1.3** for further information).

Operation

16.4.4 As outlined above, it is anticipated that of the majority of the impacts generated by the proposed Onshore Scheme would be experienced during the construction phase only.

16.4.5 The operation phase of the proposed Onshore Scheme could have direct impacts on employment.

16.5 Design and Control measures

16.5.1 As outlined in **Chapter 5** EIA Approach and Method, a standard hierarchical approach will be taken to mitigation.

16.5.2 The assessment of effects will take into account measures that are embedded into the proposed Onshore Scheme design, together with general good practice measures.

Design measures

16.5.3 Where possible, the proposed Onshore Scheme would be designed to avoid residential properties, businesses, recreational and community facilities and visitor attractions.

Control measures

16.5.4 Where necessary, mitigation proposals would be developed in order to reduce the magnitude of impact on certain receptors. This could include:

- Where practicable, construction activities will avoid the times of the year where the local areas are reported to be busier than when compared to an average month such as key tourism months; and
- Access to residential amenities, recreational and community facilities and local businesses would be maintained at all times during the construction programme. Details of which will be detailed within an Outline Construction Traffic Management Plan (CTMP), as part of the ES.

16.6 Scope of the assessment

16.6.1 This section identifies the potential for the proposed Onshore Scheme to give rise to likely significant effects, taking into account the design and control measures identified in **Section 16.5.**

16.6.2 **Table 16-8** sets out the receptors identified within the study area, the potential impacts as a result of construction and/or operation activities associated with the proposed Onshore Scheme, whether these impacts are likely to give to rise to significant effects, and whether the receptor is scoped in or scoped out of the assessment.

16.6.3 The proposed Friston Substation, as described in **Chapter 2** proposed Scheme Description outlines the optionality that remains at Friston Substation. The scope of this EIA Scoping Chapter has been based on the worst case scenario that the proposed Onshore Scheme would construct Friston Substation.

16.6.4 All identified impacts are of relevance to both the Southwold and Walberswick options unless specified otherwise.

16.6.5 A precautionary approach has been taken and where there is no strong evidence base, insufficient baseline or the significance is uncertain at this stage the impact has been scoped in to the EIA. Where there is a clear evidence base that the effect from the impact will not be significant, either alone or in combination with other plans and projects, the impact has been scoped out of the EIA.

Table 16-8 Proposed scope of the assessment

Project phase	Receptor	Impact	Potential for significant effect	Proposed to be scoped in/ out
Construction	Employment and supply chain effects	The construction of the proposed Onshore Scheme will generate employment and supply chain opportunities, as well as opportunities for training and skills development.	Effects are likely to be beneficial and potentially significant.	Scoped in
Construction	Residential property – direct impacts	The proposed Onshore Scheme will be designed to avoid residential properties and so it is not anticipated that the construction of the proposed Onshore Scheme will result in any demolitions or direct impacts on residential property.	No direct impacts on residential property, therefore no significant effects are anticipated.	Scoped out
Construction	Residential property – indirect impacts	Access to residential properties will be maintained at all times. Any construction works adjacent to residential properties will be temporary and relatively short-term, and appropriately controlled by measures secured in the CTMP and the Construction Environmental Management Plan (CEMP).	Indirect effects such as access and noise will be managed through the CTMP and CEMP, and appropriate management will reduce the potential for significant effects. The potential for in-combination effects on amenity will be considered at community level (see below), rather than at the level of individual properties.	Scoped out
Construction	Community amenity	Impacts from noise will be considered in the relevant chapters referenced in paragraph 16.1.3. In combination, these effects could have the potential to result in effects on amenity at the	Effects such as access and noise will be managed through the CTMP and CEMP. While appropriate management will reduce the potential for significant effects, there may be the potential for	Scoped in

Project phase	Receptor	Impact	Potential for significant effect	Proposed to be scoped in/ out
		community level, where multiple receptors within a community experience effects.	in-combination effects on community amenity, and so this is scoped in on a precautionary basis.	
Construction	Businesses – direct impacts	The design of the proposed Onshore Scheme will seek to avoid businesses, however there is the potential that direct impacts could be introduced as the design evolves.	Businesses, including farm businesses are scoped in on a precautionary basis to allow for any effects that could be introduced as a result of changes in the design to be assessed as part of the PEI Report and ES.	Scoped in
Construction	Businesses – indirect impacts	Access to local businesses will be maintained at all times. Other indirect effects such as noise will be considered in the relevant chapters referenced in paragraph 16.1.3 and could have the potential to result in in-combination effects on amenity for businesses that are sensitive to changes in their operating environment.	Indirect effects such as access and noise will be managed through the CTMP and CEMP. While appropriate management will reduce the potential for significant effects, there may be the potential for in-combination effects on amenity for sensitive businesses, and so indirect impacts are scoped in on a precautionary basis.	Scoped in
Construction	Community facilities and open space – direct impacts	The design of the proposed Onshore Scheme will seek to avoid community facilities and open space, however there is the potential that direct impacts could be introduced as the design evolves.	It is not anticipated at this stage that any community facilities or open spaces will be directly affected, however these receptors are scoped in on a precautionary to allow for any effects that could be introduced as a result of changes in the design to be assessed as part of the PEI Report and ES.	Scoped in
Construction	Community facilities and open space – indirect impacts	Access to community facilities will be maintained at all times. Other indirect effects such as noise will be considered in the relevant chapters	Indirect effects such as access and noise will be managed through the CTMP and CEMP. While appropriate management will reduce the potential	Scoped in

Project phase	Receptor	Impact	Potential for significant effect	Proposed to be scoped in/ out
		referenced in paragraph 16.1.3 and could have the potential to result in in-combination effects on amenity for community facilities that may be more sensitive to changes in their operating environment.	for significant effects, there may be the potential for in-combination effects on amenity for users of sensitive community facilities, and so indirect impacts are scoped in on a precautionary basis.	
Construction	Promoted recreational routes – direct impacts	There is the potential for the construction of the proposed Onshore Scheme to result in direct impacts on PRoW, including promoted recreational routes within the local study area, such as temporary closures and diversions.	Disruption to PRoW as a result of the construction of the proposed Onshore Scheme will be considered within **Chapter 15** Traffic and transport, and mitigated through the CTMP and CEMP. Direct impacts on promoted recreational routes such as temporary closures or increases in travel distances could result in significant effects for users of these routes and are therefore scoped in on a precautionary basis.	Scoped in
Construction	Promoted recreational routes – indirect impacts	The construction of the proposed Onshore Scheme also has the potential to result in indirect impacts on PRoW, including promoted recreational routes within the local study area, such as in-combination effects on amenity for users.	Disruption to PRoW as a result of the construction of the proposed Onshore Scheme will be considered within **Chapter 15** Traffic and transport, and mitigated through the CTMP and CEMP. Indirect impacts on promoted recreational routes such as any temporary reduction in amenity could result in significant effects for users of these routes and are therefore scoped in on a precautionary basis.	Scoped in
Construction	Visitor attractions – direct impacts	The design of the proposed Onshore Scheme will seek to avoid visitor attractions, however there is the	It is not anticipated at this stage that any visitor attractions will be directly affected, however these receptors are	Scoped in

Project phase	Receptor	Impact	Potential for significant effect	Proposed to be scoped in/ out
		potential that direct impacts could be introduced as the design evolves.	scoped in on a precautionary basis to allow for any effects that could be introduced as a result of changes in the design to be assessed as part of the PEI Report and ES.	
Construction	Visitor attractions – indirect impacts	It is anticipated that access to visitor attractions will be maintained at all times. Other indirect effects such as noise will be considered in the relevant chapters referenced in paragraph 16.1.3 and could have the potential to result in in-combination effects on amenity for visitor attractions that may be more sensitive to changes in their operating environment.	Indirect effects such as access and noise will be managed through the CTMP and CEMP. While appropriate management will reduce the potential for significant effects, there may be the potential for in-combination effects on amenity for users of sensitive visitor attractions, and so indirect impacts are scoped in on a precautionary basis.	Scoped in
Construction	Tourism destinations	It is not anticipated that the construction of the proposed Onshore Scheme would result in a significant effect on tourism in East Suffolk as a whole. However, there may be the potential for impacts on tourism destinations in the area, where there are clusters of individual visitor attractions that could experience effects.	As described above, there may be the potential for in-combination effects on amenity for users of sensitive visitor attractions. Where these are clustered in particular areas, the assessment will consider whether there may be the potential for a significant effect on tourism in those areas.	Scoped in
Construction	Tourist accommodation	Potential for impacts on the availability of tourism accommodation in East Suffolk due to use by the construction workforce (if temporary accommodation is required).	It is expected that the majority of the construction workforce will be sourced locally and that there is therefore unlikely to be a significant effect on the availability of tourist accommodation in the East Suffolk area.	Scoped out

Project phase	Receptor	Impact	Potential for significant effect	Proposed to be scoped in/ out
Construction	Development land	The design of the proposed Onshore Scheme will seek to avoid land allocated for development in local plans, however there is the potential that direct impacts could be introduced as the design evolves.	It is not anticipated at this stage that any land allocated for development will be directly affected, however these receptors are scoped in on a precautionary basis to allow for any effects that could be introduced as a result of changes in the design to be assessed as part of the PEI Report and ES.	Scoped in
Operation	Employment and supply chain effects	The operation of the proposed Onshore Scheme will generate a small amount of permanent employment and supply chain opportunities, mostly associated with the Friston substation.	While the overall quantum of permanent employment is likely to be relatively small, given local labour market conditions there is the potential for this to result in a significant effect and this is therefore scoped in on a precautionary basis.	Scoped in
Operation	Residential property – direct and indirect impacts	The operation of the proposed Onshore Scheme will not result in any demolitions or direct impacts on residential property, and it is anticipated that any indirect impacts from operation will be minor.	No direct impacts on residential property, therefore no significant effects are anticipated. Indirect effects such as noise will be considered in other relevant chapters referenced in paragraph 16.1.3, however no significant effects are anticipated and so indirect effects on residential property are scoped out from this assessment.	Scoped out
Operation	Community amenity	It is anticipated that impacts such as noise and traffic impacts arising from operation and maintenance activities will be relatively minor and unlikely to result in in-combination effects on amenity.	Effects from noise and traffic will be considered in other relevant chapters referenced in paragraph 16.1.3. No significant in-combination effects on community amenity are anticipated.	Scoped out

Project phase	Receptor	Impact	Potential for significant effect	Proposed to be scoped in/ out
Operation	Businesses – direct and indirect impacts	The operation of the proposed Onshore Scheme will not result in any direct impacts on businesses. It is anticipated that impacts such as noise and traffic impacts arising from operation and maintenance activities will be relatively minor and unlikely to result in in-combination effects on amenity.	During operation, businesses would continue to function as per the baseline set out in the preceding sections of this Chapter. Any maintenance requirements would be managed to ensure continued access is provided. Environmental effects will be considered in other relevant chapters referenced in paragraph 16.1.3. No significant in-combination effects on amenity are anticipated.	Scoped out
Operation	Community facilities and open space – direct and indirect impacts	The operation of the proposed Onshore Scheme will not impact on community facilities and open space. It is anticipated that environmental impacts such as noise and traffic impacts arising from operation and maintenance activities will be relatively minor and unlikely to result in in-combination effects on amenity.	Post-construction, recreational and community facilities would continue to function as per the baseline set out in the preceding sections of this Chapter. Any maintenance requirements would be managed to ensure continued access is provided. Therefore, no significant effects are anticipated. Environmental effects will be considered in other relevant chapters referenced in paragraph 16.1.3. No significant in-combination effects on amenity are anticipated.	Scoped out
Operation	PRoW including promoted recreational routes	Any potential impacts on or disruption to PRoW as a result of the operation of the proposed Onshore Scheme will be considered within **Chapter 16** Traffic and transport, and mitigated through management plans.	Not applicable to the scope of this Chapter. Effects will be considered in **Chapter 16** Traffic and Transport.	Scoped out

Project phase	Receptor	Impact	Potential for significant effect	Proposed to be scoped in/ out
Operation	Visitor attractions	The operation of the proposed Onshore Scheme will not impact on tourism facilities.	During operation, tourism facilities would continue to function as per the baseline set out in the preceding sections of this Chapter. Any maintenance requirements would be managed to ensure continued access is provided. Therefore, no significant effects are anticipated.	Scoped out
Operation	Tourism sector including tourism destinations	The operation of the proposed Onshore Scheme will not impact on tourism in East Suffolk as a whole.	As noted above, tourism facilities are expected to function as per the baseline during operation, and any disruption associated with maintenance would be minimal. Therefore, no significant effects on the sector or on tourism destinations are anticipated.	Scoped out
Operation	Development land	The operation of the proposed Onshore Scheme will not impact on land allocated for development by local plans.	Any temporary or permanent effects on land allocated for development by local plans would arise during the construction period, and would therefore be assessed as construction effects. No significant effects on allocated development land are therefore anticipated during operation.	Scoped out

16.7 Assessment methodology

Data sources

16.7.1 The assessment will be informed by desk studies. A more detailed desk-based baseline assessment will be undertaken to identify, and provide a description and assessment of the socioeconomic, recreation and tourism receptors as set out above.

16.7.2 Additional data that will be collated includes:

- Review of published mapping of the proposed Onshore Scheme and surrounding areas;
- Internet based searches for key receptors; and
- Census data from Nomis and ONS. There may be further releases of data from the 2021 Census of relevance to the assessment. Census data releases will be reviewed, and the baseline updated as necessary.

16.7.3 This will be done using established statistical sources, and in consultation with stakeholders, where relevant. Relevant policy will be reviewed at the local regional and national levels to identify the key issues of relevance to the proposed Onshore Scheme.

Legislation, policy and guidance

16.7.4 Legislation and policy relevant to the proposed Scheme and this chapter is outlined in **Chapter 4** Legislation and Policy Overview and **Appendix 4-A** National Policy, **Appendix 4-B** Environmental Legislation and **Appendix 4-C** Local Policy.

16.7.5 Given the lack of published significance criteria for the assessment of socio-economic effects, the assessment would use industry accepted methodology and significance criteria which has been developed, used and tested on a number of other schemes and subject to examination. Key guidance documents include the Homes and Communities Agency (HCA) Additionality Guide[10], which will inform the assessment of employment and supply chain effects, including consideration of leakage and displacement factors, and multiplier effects.

Assessment method

16.7.6 **Chapter 5** EIA Approach and Method sets out the standard EIA methodology and matrices to be used for the assessment. The methodology is based on the principle that the environmental effects will be determined by identifying potential receptors, assigning receptor value, assessing the magnitude of change on the receptor and then identifying the significance of the effect. This section provides a summary of the EIA methodology specifically relevant to this chapter.

16.7.7 Assessment of cumulative and combined effects are discussed in **Chapter 29** Cumulative and Combined effects of the Project.

[10] HCA (2014), Additionality Guide, Fourth Edition. Available online at: HCA Policy Covers (publishing.service.gov.uk)

16.7.8 The assessment of socioeconomic, recreation and tourism effects would take account of the value of the receptor, the magnitude of the potential effect, the timescales and the sensitivity of the receptor, as set out within **Table 16-9** and **Table 16-10** below.

16.7.9 Appropriate quantitative and qualitative significance criteria would be defined, based on professional judgement and accepted industry best practice.

Table 16-9 Sensitivity or value of receptors

Sensitivity	Definition of sensitivity
High	Businesses, individuals, groups of individuals, or other receptors possessing very significant economic, social and/or community value. These receptors are considered very likely to incur a material loss or gain as a result of potential changes in the environment, with little to no potential for substitution.
Medium	Businesses, individuals, groups of individuals, or other receptors possessing some significant economic, social and/or community value. These receptors are considered likely to incur some material loss or gain as a result of potential changes in the environment, with limited potential for substitution.
Low	Businesses, individuals, groups of individuals, or other receptors possessing some economic, social and/or community value. These receptors are not considered likely to incur a material loss or gain as a result of potential changes in the environment, with potential for substitution.
Negligible	Businesses, individuals, groups of individuals, or other receptors possessing some economic, social and/or community value. These receptors are not considered likely to incur any loss or gain as a result of potential changes in the environment.

16.7.10 **Table 16-10** below provides definitions of the magnitude of impact criteria which will be used in the assessment.

Table 16-10 Magnitude of impact

Magnitude	Definition of magnitude
High	An impact that would be likely to result in total loss of an individual receptor or permanent changes to baseline conditions for a large number of businesses, individuals or groups of individuals.
Medium	An impact that would be very likely to result in partial changes to baseline conditions for a moderate number of businesses, individuals or groups of individuals.
Low	An impact that would be likely to result in minor changes to baseline conditions for a small number of businesses, individuals or groups of individuals.
Negligible	An impact that would be likely to result in little or no change to baseline conditions for businesses, individuals or groups of individuals.

16.7.11 **Chapter 5** EIA Approach and Method, **Table 5-3** illustrates how the sensitivity and magnitude criteria will be used to assess overall significance of effect.

16.8 Assumptions & limitations

16.8.1 This EIA Scoping Report has been collated based on a range of publicly available data and information only. It is assumed that the data collated is accurate. The data will be supplemented with additional data as part of the EIA process.

16.8.2 In the absence of data, a precautionary approach has been taken and professional judgement, based on experience of similar linear schemes, has been used where required to inform the scope of the assessment.

16.8.3 This EIA Scoping Chapter provides a baseline level of information based on the Onshore Scoping boundary, labour market study area and local study area, as defined in paragraph 16.3.2; the assumptions on the proposed Onshore Scheme; and the data gathered at this time. Importantly, it includes an assumption that most effects will be felt during the construction stage of the proposed Onshore Scheme only.

Contents

17. Material assets and waste

17.1 Introduction

17.1.1 This chapter outlines the proposed scope and methodology for Material Assets and Waste. It will consider the potential for significant effects arising from the construction and operation of the LionLink Scheme (hereafter referred to as 'the proposed Onshore Scheme') in respect of material assets and waste. A review of relevant guidance and policy has been undertaken together with a desk-based assessment, to inform the proposed scope and methodology.

17.1.2 This chapter is supported by the following figures:

- **Figure 1-2:** Proposed Onshore Scheme Scoping Boundary. The Onshore Scheme Scoping boundary forms the Material Assets & Waste Study Area 1 Development boundary;
- **Figure 1-3:** Proposed Onshore Scheme Scoping Boundary and Scheme Components;
- **Figure 17-1:** Material Assets & Waste Expansive study area; and
- **Figure 17-2:** Material Assets and Waste - Mineral safeguarded sites and/or peat resources.

17.1.3 There may be interrelationships with other disciplines. Therefore, this chapter should be read in conjunction with the following chapters:

- **Chapter 9** Geology and Contamination - to provide further details on location and spatial distribution of natural resources such as peat and other mineral resources; and
- **Chapter 27** Climate Change - information regarding carbon and greenhouse gas emissions associated with materials used in the construction, operation and maintenance of the proposed Onshore Scheme.

17.2 Consultation and engagement

17.2.1 Consideration has been given to responses received at Non-Statutory Consultations held in 2022 and 2023 in preparing this scoping chapter. Responses relating to Material Assets and Waste, have been received from the following:

- Suffolk County Council (SCC).

17.2.2 The main themes reported as part of the Non-Statutory Consultations were:

- Potential to come into conflict with a concrete batching plant at Saxmundham and a number of Waste Water Treatment Plants;
- In terms of the underlying sand and gravel resources the majority of the proposed Scheme is not irreversible. Where minerals are extracted on site during the course of construction then they should be used in the construction of the proposed

Scheme where possible. Removal of the development following cessation of use should be required to restore access to mineral resources; and

- Waste created during construction, operation and decommissioning should be treated in accordance with the waste hierarchy of: a) prevention; b) preparing for re-use; c) recycling; d) other recovery, and; e) disposal.

17.2.3 Engagement was undertaken with SCC and East Suffolk Council (ESC) in August 2023. The key points of discussion included:

- Scoping methodology and study area;
- The potential for sterilisation of large areas of the Sand and Gravel Beds, which extent across much of the proposed area and fall within a Mineral Consultation Area (MCA). There are significant mineral safeguarded reserves offshore, which pose a constraint;
- Impacts and mitigation measures including the potential to share resources, where possible, with other large developments; and
- The use of the Contaminated Land: Applications in Real Environments (CL:AIRE) Definition of Waste Code of Practice (DoW CoP) [1]

17.2.4 Further engagement will be undertaken with relevant stakeholders in relation to the proposed Onshore Scheme to obtain any information that they hold to supplement the assessment and to seek their views with regards to the evolving design.

17.2.5 The following bodies will be consulted during the EIA process in relation to Material Assets and Waste:

- SCC;
- ESC; and
- Environment Agency (EA).

17.2.6 In addition, engagement will be undertaken with non-statutory stakeholders as required so that their specialist local views and expertise can be considered as part of the EIA process.

17.3 Baseline conditions

Study area

17.3.1 In accordance with the Institute of Environmental Management Assessment (IEMA) guide to: Materials and Waste in Environmental Impact Assessment[2], the assessment of Material Assets and Waste is based on two geographic study areas that consider the use of primary, secondary and recycled construction materials, and secondly the generation and management of waste:

[1] Contaminated Land: Applications in Real Environments (CL:AIRE) (2011) The Definition of Waste: Development Industry Code of Practice

[2] Institute of Environmental Management and Assessment (IEMA) (2020) IEMA guide to: Materials and Waste in Environmental Impact Assessment 2020

- The study area comprises the proposed Onshore Scheme Scoping Boundary (hereafter referred to as 'the Onshore Scoping Boundary'). See **Figure 1-2**; and
- The expansive study area extends to the availability of construction materials, and capacity of waste management infrastructure and remaining landfill capacity, within a defined region, for example the former planning regions or across multiple regions where required. For the purposes of this assessment, the expansive study area will be for the East of England region. See **Figure 17-1** for the expansive study area.

17.3.2 As indicated within the guidance, professional judgement will be used to provide consideration on a balance of the proximity principle and value for money principle for establishing the second study area.

17.3.3 The study area will be reviewed and, as appropriate, refined for the assessment in the Preliminary Environmental Information (PEI) Report and Environmental Statement (ES) with only one Landfall and one High Voltage Direct Current (HVDC) Underground Cable Corridor being taken forward. This will be based on the proposed Order limits in the ES.

Baseline data sources

17.3.4 The baseline described in this chapter and associated appendices has been informed by the following data sources:

Table 17-1 Scoping baseline data sources

Baseline Data	Source
Waste Data Interrogator[3]	The EA
Mineral and waste plans at a county level (SCC) and regional level (East of England). Suffolk Minerals and Waste Local Plan (SMWLP)[4]. The information includes data on the: Availability of primary, secondary and recycled aggregates; Presence of mineral safeguarded sites and/or peat resources; and Information on licensed waste management capacity, including remaining landfill void space and waste transfer, waste treatment, metal recycling and waste incineration facilities.	The local planning authority
Annual Monitoring Report[5]	East of England Aggregates Working Party (EEAWP)[5]

[3] Environment Agency (2021) Waste Data Interrogator. Available at: https://www.data.gov.uk/dataset/d8a12b93-03ef-4fbf-9a43-1ca7a054479c/2021-waste-data-interrogator [Accessed: 19/04/2023]

[4] Suffolk County Council (2020) Suffolk Minerals and Waste Local Plan, Adopted July 2020. Available at: https://www.suffolk.gov.uk/planning-waste-and-environment/minerals-and-waste-policy/suffolk-minerals-and-waste-development-scheme [Accessed: 24/04/2023]

[5] East of England Aggregates Working Part (2017) Annual Monitoring Report 2017

Baseline

17.3.5 A desk-based assessment has been undertaken for the two study areas to consider the current and likely future baseline conditions for material assets and waste during the anticipated construction and operational period.

17.3.6 The following sections present the existing baseline established at scoping. There are currently two options being considered for the proposed Landfall Site and associated HVDC Underground Cable Corridor, which are shown in **Figure 1-2** and **Figure 1-3**. Baseline information is presented for the two options below.

Materials

Availability of primary, secondary and recycled aggregate

17.3.7 Baseline information on national and global availability for material resources has been collected for the key raw materials likely to be used in the proposed Onshore Scheme, these include aggregates, asphalt, cement and steel, as shown in **Table 17-2**.

Table 17-2 Annual material production

Material	Material availability (tonnes per annum) (2020)
Aggregate (UK)	282,713,000[6]
Asphalt (UK)	25,000,000[7]
Cement (UK)	8,046,000[6]
Copper (global)	20,600,000[6]
Steel (global)	1,857,000,000[6]

17.3.8 The SMWLP[4] states that Suffolk's supply of aggregates comes from various sources including indigenous land-won sand and gravel, imported sand and gravel from neighbouring counties, marine dredged sand and gravel, and recycled construction waste. However, despite having large reserves of marine dredged sand and gravel off the coast of East Anglia, most goes to London or other places in the UK due to market forces. According to the SMWLP, crushed rock, which is primarily used in road maintenance and construction, is not available in Suffolk and is imported by road, rail or sea. The growth in the use of imported crushed rock is uncertain due to various constraints on resources and demand from other projects.

17.3.9 The EEAWP[5] provides more detail on aggregate reserves and forecasts of sales for all sub-regions in the East of England. Notably the EEAWP states that at the end of 2017, reserves of land-won aggregates in the East of England stood at 125.8 million tonnes (Mt), 12.9 Mt less than the figure of 138.7 Mt recorded at the end of 2016. It also

[6] British Geological Survey (2023) Mineral data. Available online at: https://www2.bgs.ac.uk/mineralsuk/download/world_statistics/2010s/WMP_2016_2020.pdf [date accessed: 12.04.23]

[7] Asphalt Industry Alliance (2023) Key Facts. Available on line: https://www.asphaltuk.org/key-facts/ [date accessed: 12.04.23]

records 4.5 Mt of crushed rock reserves at the end of 2017, down from 4.9Mt in 2016. A more detailed review of the EEAWP will be undertaken for the PEI Report and the ES.

17.3.10 During the development of the assessment, consultation will be made with Suffolk County Council to understand any current issues for material supplies relating to the proposed Onshore Scheme. In addition, Suffolk County Council will be approached to request any new materials data.

Mineral safeguarded sites and/or peat resources

17.3.11 The SMWLP[4] does not identify Mineral Safeguarded Areas within the Onshore Scoping Boundary, however it records 20 existing and proposed mineral sites across Suffolk. The nearest being Henham Quarry, located on the outer edge of the Onshore Scoping Boundary for the proposed Underground HVDC Southwold Cable Corridor. These sites are subject to safeguarding policies.

17.3.12 The British Geological Society (BGS) Geoindex online viewer[8] identifies peat mineral resources within the Onshore Scoping Boundary. There are no known existing commercial peat extraction sites within Onshore Scoping Boundary. The extent of these deposits is shown in **Figure 17.2**.

Waste

Waste facilities

17.3.13 The Suffolk Waste Study referred to in the SMWLP[4] indicates that:

- There is no identified shortfall in waste management facilities at the present time; and
- There is sufficient landfill capacity within Suffolk to last until the end of the Plan period in 2036.

17.3.14 A high-level review of EA data[9] (2021) and SMWLP[4] identifies numerous waste management facilities in Suffolk. Most notably, this includes:

- Three historic landfills within the Onshore Scoping Boundary;
- There are no operating landfills recorded within the Onshore Scoping Boundary;
- Henham Park Quarry (active quarry) is located adjacent to the proposed Underground HVDC Southwold Cable Corridor and is recorded as an inert waste landfill; and
- There are six landfills in EA's sub-region of Suffolk, with capacity to accept a mixture inert and non-hazardous waste to a volume of 6,169,769 cubic meters. More detail is provided in **Section 17.3.24**.

17.3.15 The SMWLP (uses the 2018 data, most recent) records numerous waste transfer, waste treatment, metal recycling and waste incineration facilities in Suffolk. There is a Cemex

[8] British Geological Society (2023) Onshore GeoIndex. Available at: https://mapapps2.bgs.ac.uk/geoindex/home.html [Accessed: 19/04/2021]

[9] Environment Agency (2021) Remaining Landfill Capacity. Available at: https://www.data.gov.uk/dataset/237825cb-dc10-4c53-8446-1bcd35614c12/remaining-landfill-capacity [Accessed: 19/04/2023]

Concrete batching plant within the proposed Underground Cable Corridor near Saxmundham.

Waste infrastructure capacity

17.3.16 Information from the EA and SMWLP have been used to inform the baseline with respect to waste infrastructure capacity in the region.

17.3.17 The EA provides landfill capacity data in volume (cubic metres) and has therefore been converted to mass (tonnes) using the following conversion factors identified in the High Speed Rail ES[10]:

- 1.5 tonnes per cubic metre for hazardous waste landfill;
- 0.83 tonnes per cubic metre for non-hazardous waste landfill; and
- 1.5 tonnes per cubic metre for inert waste landfill.

17.3.18 **Table 17-3** summarises the landfill capacity as of 2021[11] in the East of England region from the most recent data available.

[10] High Speed Rail (2015) High Speed Rail London to West Midlands Environmental Statement

[11] Environment Agency (2021) Waste Summary Tables for England – Version 3. Available at: https://environment.data.gov.uk/portalstg/home/item.html?id=a2bf884f8e72435db1998a3cab92b784 [Accessed: 14 April 2023].

Table 17-3 East of England landfill capacity 2021 (all figures are provided in tonnes)

Landfill type	Sub-region						East of England
	Bedfordshire	Cambridgeshire	Essex	Hertfordshire	Norfolk	Suffolk	
Hazardous waste landfill	0	0	0	0	0	0	0
Non-hazardous landfill**	0	5,937,000	6,783,000	0	3,972,000	2,556,000	19,248,000
Inert landfill	987,000	8,649,000	9,071,000	11,711,000	1,080,000	4,635,000	36,132,000
Total	987,000	14,586,000	15,853,000	11,711,000	5,052,000	7,191,000	55,380,000

**Some non-hazardous sites can accept some Stable Non Reactive Hazardous Wastes (SNRHW) into a dedicated cell, but this is usually a small part of the overall capacity of the site.

17.3.19 **Table 17-4** shows the total landfill capacity by landfill type in the East of England from the EA Waste Management datasets from 2017-2021[11]. The data identifies that landfill void capacity has remained generally constant since 2017 and there was adequate inert and non-hazardous landfill capacity in the East of England in 2021. There are zero dedicated hazardous landfills in Suffolk or in the East of England therefore hazardous waste from the proposed Onshore Scheme will likely need to be exported out of the region following the proximity principle. This basis behind this principle is that waste should be dealt with as close to the source as possible.

Table 17-4 East of England landfill capacity trend from 2017 to 2021 (all figures are provided in tonnes)

Landfill Type	**Sub Region**				
	2017	2018	2019	2020	2021
Hazardous landfill	0	0	0	0	0
Non-hazardous landfill	27,558,000	25,566,000	23,675,000	22,837,000	19,248,000
Inert waste landfill	27,689,000	30,513,000	32,882,000	37,470,000	36,132,000
Total	55,246,000	56,079,000	56,557,000	60,307,000	55,380,000

17.3.20 **Table** provides a summary of the transfer, treatment and metal recycling capacity in the East of England in 2021 (EA, 2021)[11.] The data identifies there was adequate transfer, treatment and metal recycling infrastructure capacity in the East of England in 2021.

Table 17-5 Transfer, treatment and metal recycling site input in the East of England in 2021 (all figures are provided in tonnes)

Site Type	Sub-Region						East of England
	Bedfordshire	Cambridgeshire	Essex	Hertfordshire	Norfolk	Suffolk	
Waste Transfer	313,000	653,000	1,973,000	719,000	721,000	488,000	4,867,000
Waste Treatment	485,000	2,009,000	2,633,000	3,067,000	1,696,000	1,628,000	11,518,000
Metal recycling site	142,000	271,000	1,588,000	124,000	240,000	198,000	2,563,000
Total	940,000	2,933,000	6,194,000	3,910,000	2,657,000	2,314,000	18,948,000

Construction and demolition waste

17.3.21 The proposed Onshore Scheme will generate waste arising from Construction, Demolition and Excavation (CD&E) activities which if not recovered would place further demand on existing waste infrastructure. The data on CD&E waste generated by the proposed Onshore Scheme will be assessed in the PEI Report and ES.

17.3.22 The UK had a commitment to recovering (e.g. diverting from disposal) at least 70% of non-hazardous construction waste by 2020 as required by the EU Framework Directive on Waste. This target has not yet been reported against or amended for future years and was reiterated in the Waste Management Plan for England, published by Defra in 2020. The last published data from 2018 indicated that England was achieving a recovery rate of 93.8% for non-hazardous construction waste[12].

17.3.23 At this stage full details are unavailable, and it is unclear how much waste would be produced from the proposed Onshore Scheme and what impact it would have on the existing waste infrastructure. The types of facilities where recycled aggregates are produced vary from purpose built fixed installations to temporary operations on construction sites.

17.3.24 A list of permitted landfill sites from the sub-region of Suffolk is provided in **Table 17-6** (EA data)[13]. In 2021, the EA recorded 53 inert and non-hazardous landfills in the East of England. These could potentially accept CD&E waste generated during the construction phase of the proposed Onshore Scheme. More details regarding permitted waste sites across the region of East of England will be provided in the PEI Report and ES.

Table 17-6 List of landfill sites in the Environment Agency defined sub-region of Suffolk (2021)

Operator Name	Facility Type	Original Permit Reference	Facility Address	Remaining Capacity end 2021 (tonnes)
Masons Landfill Viridor Waste Management Ltd	L02 - Non Hazardous Landfill With SNRHW cell	BV4517IM	Great Blakenham, Ipswich IP6 0NW	1,794,015
Folly Farm Landfill Shotley Holdings Ltd	L02 - Non Hazardous Landfill With SNRHW cell	SP3239BB	Ipswich IP9 2NY	654,119
Lawn Farm Quarry Aggmax Transport Ltd	L05: Inert Landfill	400631	Lawn Farm Quarry, Old Bury Road, Wetherden, Suffolk, IP14 3JU	2,992,500

[12] Department for Environment, Food and Rural Affairs (2021) UK Statistics on Waste

[13] Environment Agency (2021) Remaining Landfill Capacity. Retrieved from https://data.gov.uk/dataset/remaining-landfill-capacity. [Accessed: 21/04/2023]

Operator Name	Facility Type	Original Permit Reference	Facility Address	Remaining Capacity end 2021 (tonnes)
Barton Mills Chalk Quarry Sewells Reservoir Construction Ltd	L05: Inert Landfill	404492	Barton Mills Chalk Quarry, Bury St Edmunds, Suffolk, IP28 6BN	2,603,250
Shrublands Quarry Landfill Brett Aggregates Ltd	L05: Inert Landfill	210046	Shrublands Quarry Landfill, Old Norwich Road, Coddenham, IP6 9QJ	2,362,500
Cartwrights Covert Landfill Cemex UK Materials Ltd	L05: Inert Landfill	404004	Cartwrights Covert Landfill, Flixton Road, Bungay, NR35 1NN	400,500

Future baseline

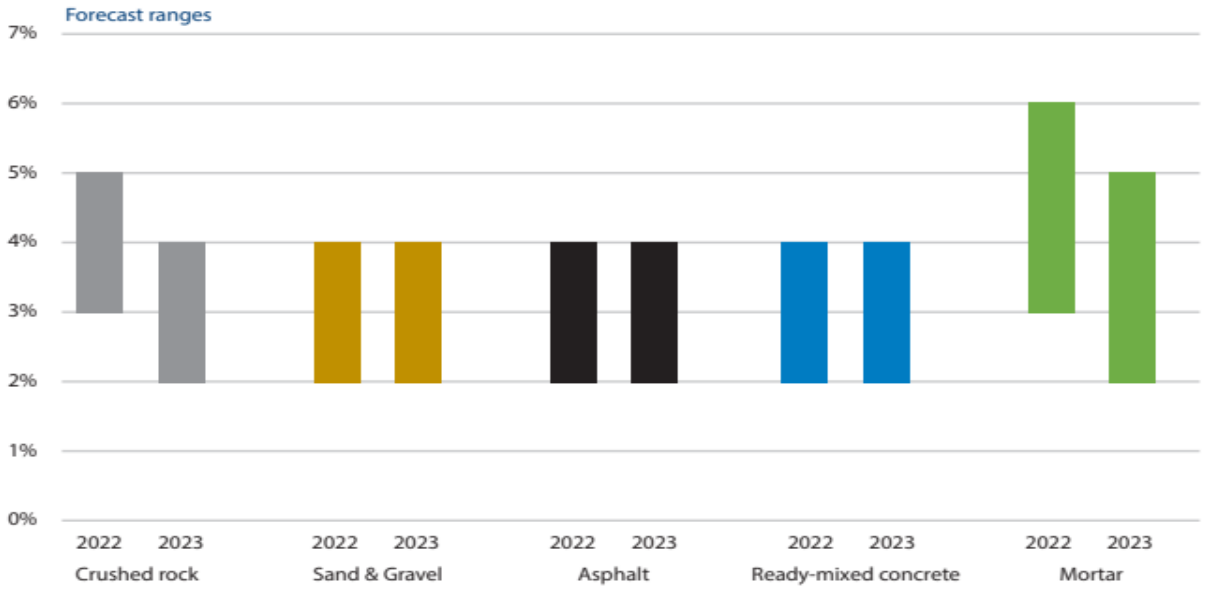
17.3.25 The Material Assets and Waste chapter within the PEI Report and ES will consider changes which may affect the future environment in the absence of the proposed Onshore Scheme. The future baseline will also take into account any developments that are likely to be present in the future baseline.

Materials

17.3.26 The proposed Onshore Scheme will potentially consume large quantities of these key materials increasing the demand on the existing UK supply chain. A breakdown of the key material resources likely to be used during construction of the proposed Onshore Scheme along with the percentage change in sales volumes within the UK (MPA, 2020)[14], are displayed in **Insert 17-1**. The data on key material products used by the proposed Onshore Scheme will be identified in the PEI Report and ES.

[14] Mineral Products Industry (2022) Regional overview and forecasts markets in GB Available at: https://mineralproducts.org/MPA/media/root/Publications/2022/Regional_overview_and_forecasts_markets_in_GB_Spring22.pdf [Accessed: 19/04/2023]

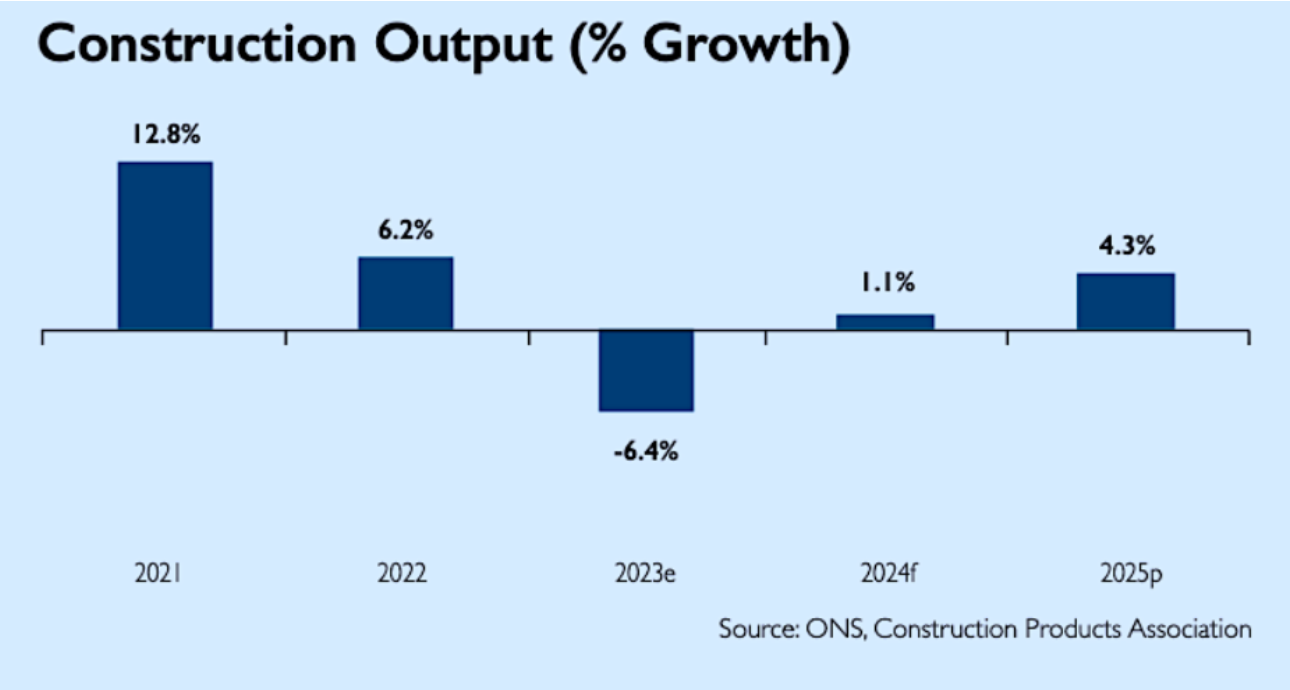
MPA forecast (February 2022) for mineral products sales volumes in Great Britain (Source: MPA)



Insert 17-1 MPA Forecast for aggregates 2022 to 2023 (reproduced from the Mineral Product Association's)

17.3.27 The Construction Products Association forecasts construction output to fall by 6.4% in 2023 before growth of 1.1% in 2024 and 4.3% in 2025 while infrastructure output is to increase 0.7% in 2023 and 1.2% in 2024[15] as shown in **Insert 17-2**.

[15] Construction Products Association (2023) Housing and Infrastructure Drive Downgrade to Construction Output Forecast. Available at: https://www.constructionproducts.org.uk/news-media-events/news/2023/may/cpa-spring-forecasts-2023/ [Accessed: 02/05/2023]



Insert 17-2 Forecasted Construction Output (% Growth). Source: ONS, Construction Products Association

Waste

17.3.28 The Local Aggregates Assessment (LAA)[16] states that the recycling CD&E waste arisings has been important in Suffolk but the levels of CD&E arisings per annum will decrease from 517,000 tonnes in 2015 to 350,000 tonnes in 2036. With lower volumes and CD&E waste being limited by the quality of the recycled aggregates, less CD&E waste is potentially available for recycling in the future.

17.3.29 The SMWLP presented the levels of waste arising expected up to 2036. **Table 17-7** presents the projected CD&E Annual Waste Arisings in Suffolk.

Table 17-7 Projected waste arisings (tonnes) in Suffolk, in line with the SMWLP[17] from 2015 to 2036

Waste Type	2015/16	2020/21	2025/26	2030/31	2035/36
Local authority collected	397,000	415,000	433,000	452,000	470,000
Commercial & Industrial	795,000 to 769,000	857,000 to 697,000	960,000 to 632,000	1,0390,00 to 574,000	1,039,000 to 531,000

[16] Suffolk County Council (2019) Local Aggregates Assessment (2018 data). Available at: https://www.suffolk.gov.uk/asset-library/imported/local-aggregates-assessment-2018-data.pdf [Accessed:19/04/2023]

Waste Type	2015/16	2020/21	2025/26	2030/31	2035/36
Construction Demolition & Excavation	517,000	469,000	434,000	386,000	350,000
Hazardous	44,000	39,000	34,000	31,000	31,000

17.3.30 A review of any proposed developments will be undertaken to inform the PEI Report and ES.

Future Landfill Capacity

17.3.31 It is anticipated that different types of waste infrastructure capacity will continue to be available during the construction and operation of the proposed Onshore Scheme. Landfill will experience some use of available capacity as void space is taken. Government policy measures are also likely to continue to divert waste from landfill.

17.3.32 Permitted capacity data published by the EA for 2017 to 2021 has been used to estimate the projected landfill capacity in the East of England for the future baseline to 2027. This relates to the total capacity of inert, non-hazardous and hazardous waste landfill that will be available within the East of England.

17.3.33 The future landfill capacity is displayed in **Table** and is based on the average percentage change in permitted landfill capacity from 2017 to 2021 and projected forward to 2027. This method assumes that the average percentage change in permitted capacity for each class of landfill remains constant. The use of an average value taken from historical data provides an allowance for potential future increases or decreases in permitted capacity for each class of landfill.

17.3.34 The data identifies the future inert, non-hazardous and hazardous landfill capacity across the East of England for the disposal of CD&E arising from the proposed Onshore Scheme.

Table 17-8 Future landfill capacity in the East of England from 2022 to 2027

Landfill Type	Estimated landfill capacity (tonnes) for the East of England from 2022 to 2027					
	2022	2023	2024	2025	2026	2027
Inert waste landfill	38,693,000	41,435,000	44,371,000	47,515,000	50,883,000	54,489,000
Non-hazardous landfill	17,617,000	16,125,000	14,759,000	13,509,000	12,365,000	11,318,000
Hazardous landfill	0	0	0	0	0	0
Total	56,310,000	57,560,000	59,130,000	61,025,000	63,248,000	65,806,000

17.4 Potential impacts

17.4.1 This section identifies the potential impacts that could occur as a result of the proposed Onshore Scheme during construction and operation based on the baseline information collected for EIA scoping.

Construction

17.4.2 The following impacts could occur during the construction phase:

Materials

17.4.3 With respect to material resources, the proposed Onshore Scheme has the potential to extract primary raw materials and the produce construction materials. This has the potential to constrain existing or future use and extraction of materials.

17.4.4 In addition, the proposed Onshore Scheme has the potential to constrain existing or future use and/or extraction of potential resources such as peat.

17.4.5 As identified in IEMA guidance[2], the direct adverse impact is the consumption of a resource. Depletion of the resource can result in temporary or permanent degradation of the natural environment. Consumption of a resource can also have indirect impacts.

17.4.6 Material to be used across the proposed Onshore Scheme is anticipated to include aggregate, cement, steel and asphalt. Different components will require varying volumes of material. Where possible, the proposed Underground Cable Corridor will sustainably re-use excavated materials and aggregates for its backfill, using the CL:AIRE DoW CoP[18]. The construction of the proposed Friston Substation and the proposed Converter Station may require quantities of imported other materials such as cement, steel, and asphalt.

Waste

17.4.7 Potential impacts could include the temporary occupation of waste management capacity (during treatment) and a permanent decrease in landfill capacity (disposal).

17.4.8 In summary, the generation and disposal of waste arising from the proposed Onshore Scheme can result in:

- The reduction in landfill capacity; and
- Unsustainable use or loss of resources to landfill that results in the temporary or permanent degradation of the natural environment.

Operation

17.4.9 During operation it is anticipated that there will be limited need for large volumes of raw primary, secondary and aggregate resources. Over the operational life span of the proposed Onshore Scheme it is anticipated that materials will be required for general maintenance and wear and tear. The quantities are unlikely to have a direct adverse impact on the consumption of resources.

17.4.10 Potential waste arisings are expected to be generated from general maintenance with the waste hierarchy to be adopted, (e.g. avoid, reduce, recycle). Domestic waste arising from on-site operations is considered to be minimal. The generation and disposal of waste arising from the operation of the proposed Onshore Scheme is unlikely to reduce landfill capacity.

17.5 Design and control measures

17.5.1 As outlined in **Chapter 5** EIA Approach and Method, a standard hierarchical approach will be taken to mitigation.

17.5.2 The assessment of effects will take into account measures that are embedded into the proposed Onshore Scheme design, together with general good practice measures.

Design measures

17.5.3 Potential embedded design measures include:

- The proposed Onshore Scheme would adopt the Designing out Waste principles including aspects such as designing for re-use and recovery, materials optimisation, offsite construction, future (deconstruction and flexibility), and waste efficient procurement.
- The design process would take into consideration the waste hierarchy (see **Insert 17-1**). The waste hierarchy aims to minimise the overall volume of waste arisings through designing out waste and maximising efficient use of materials, ultimately to prevent and minimise waste sent to landfill.
- No part of the proposed Onshore Scheme can start until a Site Waste Management Plan (SWMP) is developed. It would be used throughout the design process, to promote Designing out Waste and then the development of a waste strategy for the demolition, excavation and construction phases. The SWMP would evidence how the design and construction of the proposed Onshore Scheme has adopted the waste hierarchy of prevention, re-use, recycling, other recovery, and disposal, and to ensure that C&DE waste is subjected to material recovery in support of legislative and policy targets.
- The proposed Underground Cable Corridor would require a cut/fill resulting in materials and waste generation. The design would seek to achieve a balance of cut and fill, where feasible. Where excavated material cannot be re-used as part of the proposed Onshore Scheme, the Principal Contractor would fully investigate opportunities to use excess materials at local restoration sites, where practicable in line with the DoW CoP.

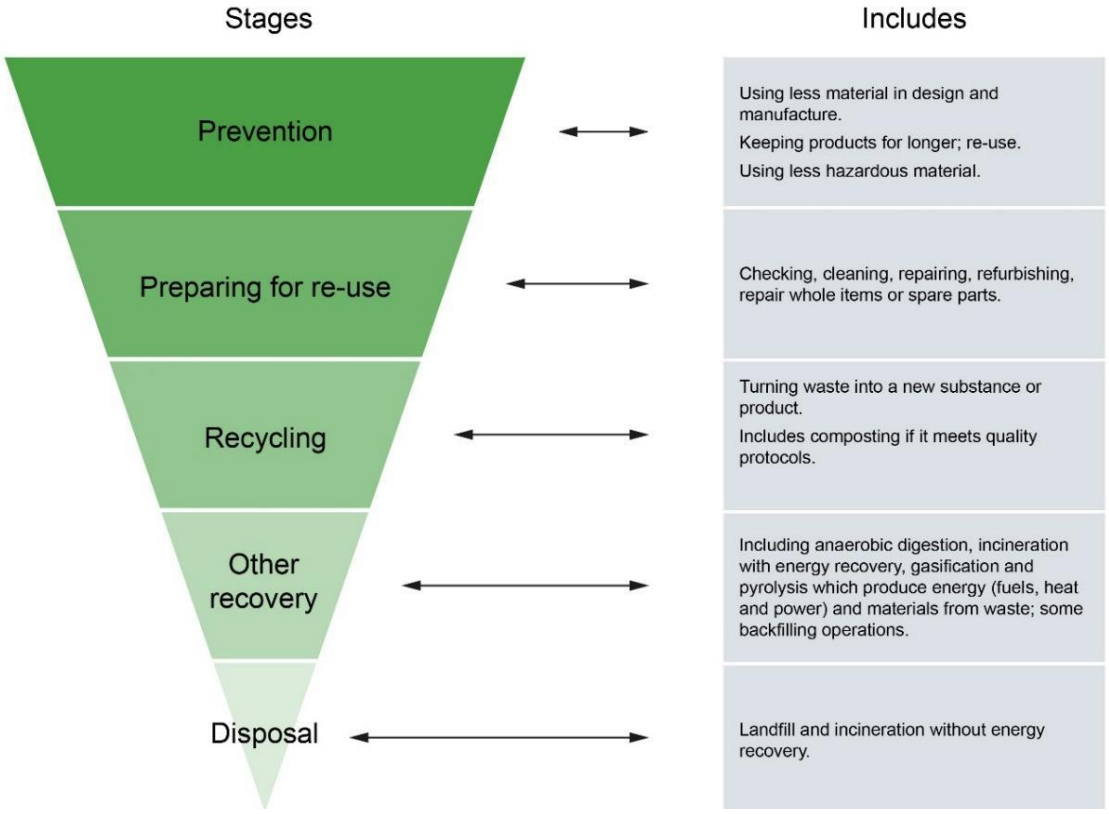
Control measures

17.5.4 Potential control measures include:

- The principal objectives of sustainable resource and waste management are to use material resources more efficiently, prevent waste at source and minimise the quantity of waste that requires final disposal to landfill in accordance with the waste hierarchy.
- The proposed Onshore Scheme would source sustainable construction materials with a high recycled content and supporting a circular economy.

- All waste would be managed in accordance with the waste hierarchy (i.e. prevention, preparing for re-use, recycling, other recovery and disposal) as set out in the Waste (England and Wales) Regulations 2011). See **Insert 17-3**.
- A Construction Environmental Management Plan (CEMP) would be developed detailing mitigation measures to be adhered to on-site to reduce the impacts from material use and waste generation during the site preparation, demolition, earthworks and construction phases.
- A Materials Management Plan (MMP) would be created in accordance to the protocols within the (CL:AIRE) Definition of Waste: Development Industry Code of Practice[18] (DoW CoP).
- As part of the process for procuring materials for use as part of the proposed Onshore Scheme, the Principal Contractor would take into account the environmental impacts associated with their manufacture, as well as other considerations such as structural design, carbon footprint (PAS 2050), energy consumption, long-life performance, visual impacts, durability and cost, with an aim of procuring the most sustainable materials that it is reasonably practicable to do so.
- The Principal Contractor would investigate opportunities to introduce (or retain) standardisation across the proposed Onshore Scheme in the design (e.g., standard specifications for a product, and/or the use of components, methods or processes that are repeated through the proposed Onshore Scheme), to reduce resource consumption and the associated waste inherent in the design.
- Contaminated materials would be segregated from 'clean' excavated materials to avoid cross-contamination before they are sent for appropriate and licensed treatment, recovery or disposal. In addition the outline MMP would be developed further by the Principal Contractor in accordance with the DoW CoP to demonstrate how excavated materials would be managed and re-used.
- The proposed Onshore Scheme would consider the opportunities to re-use or recycle existing infrastructure that would be demolished. This may require a registered waste exemption or an environmental permit.
- While reduction of waste should remain the highest priority, where feasible waste produced would be segregated for recycling. At least 70% of all CD&E waste would be subjected to material recovery in accordance with the Waste Framework Directive. In addition, the proposed Onshore Scheme would aim to achieve at least 90% material recovery of CD&E waste. This would allow materials to be recycled and ultimately reduce the amount of waste that has to be finally disposed of.
- The Principal Contractor would identify waste management facilities for the management of all waste streams arising from the site whilst achieving compliance with all relevant legislation. The waste management facilities, where feasible, would be as close to the proposed Scheme as possible, in line with the proximity principle for waste treatment and disposal. The proximity principle is the requirement to treat and/or dispose of wastes in reasonable proximity to their point of generation.
- Minimising potential effects from the storage and processing of materials and waste, ensuring that construction site compounds and on-site storage, stockpiling and processing areas are designed to minimise impacts to any designated sites and sensitive environmental receptors during construction.

- A specific area would be designated and signposted to facilitate the separation of materials for potential recycling, salvage, re-use and return. The waste storage areas shall include impermeable surfaces with appropriate drainage as well as hazardous waste storage areas to minimise cross contamination of other waste streams and surrounding ground. The Principal Contractor would identify the appropriate drainage which would include temporary interceptors or bunded areas. Liquid wastes would be stored on hard-surfaced areas with secondary containment systems to prevent spillages.
- Where no other waste management option is found to be feasible, wastes shall be sent to an appropriately permitted landfill site in accordance with UK legislation.
- The Principal Contractor will establish agreements with sub-contractors for the management of waste. These agreements will be contractually binding and would include minimum standards and targets for diversion from landfill.



Insert 17-3 The Waste Hierarchy

17.6 Scope of the assessment

17.6.1 This section identifies the potential for the proposed Onshore Scheme to give rise to likely significant effects, taking into account the design and control measures identified in **Section 17.5**.

17.6.2 **Table 17-9** sets out the receptors identified within the study area, the potential impacts as a result of construction and/or operation activities associated with the proposed

Onshore Scheme, whether these impacts are likely to give to rise to significant effects, and whether the receptor is scoped in or scoped out of the assessment.

17.6.3 The proposed Friston Substation, as described in **Chapter 2** proposed Scheme Description outlines the optionality that remains at Friston Substation. The scope of this EIA Scoping Chapter has been based on the worst case scenario that the proposed Onshore Scheme would construct Friston Substation.

17.6.4 All identified impacts are of relevance to both the Southwold and Walberswick options unless specified otherwise.

17.6.5 A precautionary approach has been taken and where there is no strong evidence base, insufficient baseline or the significance is uncertain at this stage the impact has been scoped into the EIA. Where there is a clear evidence base that the effect from the impact will not be significant, either alone or in combination with other plans and projects, the impact has been scoped out of the EIA.

Table 17-9 Proposed scope of the assessment

Project phase	Receptor	Impact	Potential for significant effect	Proposed to be scoped in/ out
Construction	Materials	The potential impacts relate to the extraction of primary raw materials and the production of construction materials. The proposed Onshore Scheme also has the potential to constrain existing or future use and extraction of materials.	At this stage of the design the quantities of resources required for the proposed Onshore Scheme and the potential for mineral sterilisation are not known. Therefore, as a worst-case scenario it is assumed there could be potential for significant effects. A detailed material assets assessment will be undertaken in the PEI Report and the ES.	Scoped in
Construction	Waste	The potential impacts are primarily related to the production, movement, transport, processing, use and disposal of waste from the proposed Onshore Scheme.	At this stage in the design, the volume of waste generated and disposed offsite is not known, therefore as a worst-case scenario it is assumed there could be potential for significant effects. A detailed waste assessment will be undertaken in the PEI Report and the ES.	Scoped in
Operation	Materials	The potential impacts relate to the extraction of primary raw materials and the production of construction materials. The proposed Onshore Scheme also has the potential to constrain existing or future use and extraction of materials.	Materials resource use during operation are expected to be minimal and will be mitigated through standard procedures, therefore materials will be scoped out.	Scoped out
Operation	Waste	The potential impacts are primarily related to the production, movement, transport, processing, use and disposal of waste from the proposed Onshore Scheme.	Waste generation during operation are expected to be minimal and will be mitigated through standard procedures, therefore waste will be scoped out.	Scoped out

17.7 Assessment methodology

Data sources

Sources of information

17.7.1 The assessment will be informed by desk studies. The baseline desk studies will build upon the scoping baseline using publicly available data and literature, together with data requested from local authorities.

17.7.2 Data will be obtained for the PEI Report and ES from the following sources:

- Environment Agency Waste Data Interrogator[3];
- Environment Agency Waste management 2021 in England Data Tables[11];
- British Geological Society – GeoIndex[8];
- The local planning authority mineral and waste plans; and
- East of England Aggregates Working Part (2017) Annual Monitoring Report 2017[5].

Additional information

17.7.3 Where the need for further assessment has been identified, the following information would be obtained for material assets:

- Types and quantities of materials required to construct the proposed Onshore Scheme;
- Information on materials that contain secondary / recycled content;
- Information on any known sustainability credentials for materials to be consumed;
- The region or country from which materials are likely to be sourced;
- The volume or weight of excavated arisings that will be reused or recycled (or stockpiled for future reuse or recycling), either on-site or off-site;
- The type and volume of materials that would be recovered from off-site sources (e.g. Donor sites) for use on the proposed Onshore Scheme;
- Details of on-site storage and stockpiling arrangements for excavated and other arisings, and for construction laydown areas, any supporting logistical details;
- Presence of underlying or adjacent allocated mineral sites; and
- The cut and fill balance.

17.7.4 For waste, the assessment would need to identify the following:

- The volume or weight of waste that will be recovered and diverted from landfill, either on-site or off-site. Where information regarding recovery and diversion from landfill volumes or weights is unavailable, practitioners should assess the likely composition of a waste stream and (using relevant statistics, e.g. regional or national data) make reasonable assertions on disposal. Where no information exists and it is

not possible to assess compositions, it should be presumed that all waste is disposed of to landfill to ensure a worst-case assessment is applied;

- Details of on-site storage and segregation arrangements for waste, and any supporting logistical information;
- Any physical, chemical or other processing requirements that should be deployed to ensure waste is managed to retain utility and value; and
- The type and volume of waste to be discarded to landfill.

17.7.5 The additional information for materials and waste will be obtained from the proposed Scheme designers and regulatory authorities, where relevant. Where information is not available assumptions will be based on professional judgement and/or experience of other similar schemes.

Legislation, policy and guidance

17.7.6 Legislation and policy relevant to the proposed Scheme and this chapter is outlined in **Chapter 4** Legislation and Policy Overview and **Appendix 4-A** National Policy, **Appendix 4-B** Environmental Legislation and **Appendix 4-C** Local Policy.

17.7.7 Relevant guidance and standards that have informed the scoping process are listed below (but not limited to) and will also be taken into account as part of the assessment:

- IEMA guide to: Materials and Waste in Environmental Impact Assessment[2].

Assessment method

17.7.8 **Chapter 5** EIA Approach and Method sets out the standard EIA methodology and matrices to be used for the assessment. The methodology is based on the principle that the environmental effects will be determined by identifying potential receptors, assigning receptor value, assessing the magnitude of change on the receptor and then identifying the significance of the effect. This section provides a summary of the EIA methodology specifically relevant to this chapter.

17.7.9 Assessment of cumulative and combined effects are discussed in **Chapter 29** Cumulative and Combined effects of the Project.

17.7.10 The assessment of waste will be undertaken in accordance with the assessment methodologies described within the IEMA guide to: Materials and Waste in Environmental Impact Assessment[2].

Receptors

17.7.11 Materials used for construction, when compared against national (UK) demand for material resources, are considered a sensitive receptor. Consuming non-renewable materials derived from natural resources depletes those natural resources and may also result in adverse impacts on the environment. The main effects of material consumption can be found in **Table 17-10**.

17.7.12 The IEMA guidance[2] considers that for the waste topic, the sensitive receptor is landfill capacity. Consented landfill void is at any one point in time a finite resource and through the ongoing disposal of waste, there is a continued need to expand existing and

develop new facilities or find alternative means of disposal or recovery. The impacts and effects of waste are set out in **Table 17-10.** Landfill void capacity is considered as the sensitive receptor rather than waste management infrastructure capacity for the following reasons:

- Disposal to landfill results in a permanent impact and the landfill void capacity is no longer available (e.g. in most cases is irreversible);
- Impacts on other types of waste management infrastructure (e.g. material recovery facilities), are temporary in nature. The impacts occur over a period of months or years; and
- Other types of waste management infrastructure are better placed to react to waste management market demands (e.g. by provision of additional plant and equipment).

Table 17-10 Material consumption and waste disposal impacts and effects

Element	Direct Impacts	Effect	Indirect impacts
Materials	Consumption of non-renewable resources	Depletion of resources, resulting in the temporary or permanent degradation of the natural environment.	Release of greenhouse gas emissions (through transportation). Water consumption. Visual impacts, noise, vibration, disruption to traffic and other potential causes of nuisance.
Waste	Generation and disposal of waste	Reduction in landfill capacity Unsustainable use or loss of resources to landfill that results in the temporary or permanent degradation of the natural environment	Release of greenhouse gas emissions (through transportation and management). Ecological impacts (e.g. offshore disposal of dredged arisings). Visual impacts, noise, vibration, disruption to traffic and other potential causes of nuisance.

Sensitivity of receptors

17.7.13 The sensitivity of receptors (i.e. material demand for construction) depends on the availability in the UK and type of resources to be consumed in the course of the proposed Onshore Scheme. As the exact source of the construction materials for the proposed Onshore Scheme is not yet known, the analysis of sustainable features and benefits compared to industry-standard materials has been excluded from this assessment. The criteria described within **Table 17-11** have been used to determine the sensitivity of materials in accordance with the IEMA guide to: Materials and Waste in Environmental Impact Assessment[2].

Table 17-11 Sensitivity of receptor – Materials

Sensitivity	Material receptors description *On balance, the key materials required for the construction of a development*
Very high	Are known to be insufficient in terms of production, supply and/or stock; and/or Comprise no sustainable features and benefits compared to industry-standard materials
High	Are forecast (through trend analysis and other information) to suffer from known issues regarding supply and stock; and/or Comprise little or no sustainable features and benefits compared to industry-standard materials
Medium	Are forecast (through trend analysis and other information) to suffer from some potential issues regarding supply and stock; and/or Are available comprising some sustainable features and benefits compared to industry-standard materials
Low	Are forecast (through trend analysis and other information) to be generally free from known issues regarding supply and stock; and/or Are available comprising a high proportion of sustainable features and benefits compared to industry-standard materials
Negligible	Are forecast (through trend analysis and other information) to be free from known issues regarding supply and stock; and/or Are available comprising a very high proportion of sustainable features and benefits compared to industry standard materials*

17.7.14 The environmental effects, and the associated significance, will be assessed as a function of the sensitivity of the identified receptors (inert, non-hazardous, and hazardous landfill capacity), and the magnitude of impact on those receptors.

17.7.15 The sensitivity of waste receptors relates to the availability of regional (and where appropriate, national) landfill void capacity; this is assessed by virtue of the rate at which the available capacity is anticipated to change in the absence of the proposed Onshore Scheme. The sensitivity thresholds are identified in **Table 17-12** in accordance with the IEMA guide to: Materials and Waste in Environmental Impact Assessment[2].

Table 17-12 Thresholds for considering the sensitivity of landfill capacity

Sensitivity	Waste Receptors: Landfill capacity	
	Inert and non- hazardous *The baseline/future baseline of inert and non- hazardous landfill void capacity is expected to…*	**Hazardous** *The baseline/future of hazardous landfill void capacity is expected to…*
Very high	Reduce very considerably (by > 10%); end during construction or operation; is already known to be unavailable; or, would require new capacity or infrastructure to be put in place to meet forecast demand.	Reduce very considerably (by > 1%); end during construction or operation; is already known to be unavailable; or would require new capacity or infrastructure to be put in place to meet forecast demand
High	Reduce considerably: by 6–10% as a result of wastes forecast	Reduce considerably: by 0.5–1% as a result of wastes forecast.
Medium	Reduce noticeably: by 1–5% as a result of wastes forecast	Reduce noticeably: by 0.1–0.5% as a result of wastes forecast
Low	Reduce minimally: by < 1% as a result of wastes forecast	Reduce minimally: by < 0.1% as a result of wastes forecast.
Negligible	Remain unchanged or is expected to increase through a committed change in capacity	Remain unchanged or is expected to increase through a committed change in capacity

17.7.16 The sensitivity of landfill capacity in the respective baseline area, will be determined through the sourcing and use of data relating to the inert, non-hazardous and hazardous landfill void capacity data in the East of England region, and across England.

Magnitude of impacts

17.7.17 The magnitude of impacts from materials will be assessed by using a percentage-based approach that determines the influence of materials consumption on the baseline market capacity (production, stocks or sales), in construction and/or operation, in combination with the potential to sterilise (substantially) one or more allocated mineral site. The magnitude thresholds to be used are shown in **Table 17-13** in accordance with the IEMA guide to: Materials and Waste in Environmental Impact Assessment[2].

Table 17-13 Magnitude of impact - materials

Magnitude of Impact	Description *The assessment is made by determining whether, through a development, the consumption of…*
Major	One or more materials are >10% by volume of the regional (or where justified national) baseline availability;

Magnitude of Impact	Description *The assessment is made by determining whether, through a development, the consumption of…*
	and/or More than one allocated mineral site is substantially sterilised by the development rendering it inaccessible for future use.
Moderate	One or more materials are between 6-10% by volume of the regional (or where justified national) baseline availability; and/or One allocated mineral site is substantially sterilised by the development rendering it inaccessible for future use.
Minor	One or more materials are between 1-5% by volume of the regional (or where justified national) baseline availability; and/or The development has the potential to adversely and substantially impact access to one or more allocated mineral site (in their entirety), placing their future use at risk.
Negligible	No individual material type is equal to or greater than 1% by volume of the regional (or where justified national) baseline availability.
No change	No materials are required.

17.7.18 The magnitude of impacts from waste will be assessed by determining the percentage of the remaining landfill void capacity that will be depleted by waste produced during the construction and/or operation phases of the development. The magnitude thresholds to be used are shown in **Table 17-14.**

Table 17-14 Magnitude of impacts - waste

		Description	
		Inert and non- hazardous	**Hazardous**
Magnitude	**Major**	Waste generated by the proposed Onshore Scheme will reduce regional landfill void capacity baseline by > 10%.	Waste generated by the proposed Onshore Scheme will reduce national landfill void capacity baseline by > 1%.
	Moderate	Waste generated by the proposed Onshore Scheme will reduce regional landfill void capacity baseline by 6 to 10%.	Waste generated by the proposed Onshore Scheme will reduce national landfill void capacity baseline by < 0.5 to 1%.
	Minor	Waste generated by the proposed Onshore Scheme will reduce regional landfill void capacity baseline by 1 to 5%.	Waste generated by the proposed Onshore Scheme will reduce national landfill void capacity baseline by < 0.1 to 0.5%.
	Negligible	Waste generated by the proposed Onshore Scheme will reduce regional landfill void capacity baseline by < 1%.	Waste generated by the proposed Onshore Scheme will reduce national landfill void capacity baseline by < 0.1%.
	No change	Zero waste generation and disposal from the proposed Onshore Scheme.	Zero waste generation and disposal from the proposed Onshore Scheme.

Significance criteria

17.7.19 The significance of environmental effects associated with material assets and waste will be determined by considering the scale and nature of impacts within the context of the sensitivity of receptors affected, refer to **Table 17-15.**

Table 17-15 Significance matrix

Sensitivity (or value) of receptor	Magnitude of impact					
		No change	**Negligible**	**Minor**	**Moderate**	**Major**
	Very high	Neutral	Slight	Moderate / Large	Large / Very Large	Very Large
	High	Neutral	Slight	Slight / Moderate	Moderate / Large	Large / Very Large
	Medium	Neutral	Neutral / Slight	Slight	Moderate	Moderate / Large
	Low	Neutral	Neutral / Slight	Neutral / Slight	Slight	Slight / Moderate
	Negligible	Neutral	Neutral	Neutral / Slight	Neutral / Slight	Slight`

17.8 Assumptions & limitations

17.8.1 This EIA Scoping Report has been collated based on a range of publicly available data and information only. It is assumed that the data collated is accurate. The data will be supplemented with additional data as part of the EIA process.

17.8.2 In the absence of data, a precautionary approach has been taken and professional judgement, based on experience of similar linear schemes, has been used where required to inform the scope of the assessment.

17.8.3 The information provided within this chapter is considered to provide an appropriate level of detail based on the scoping assessment methodology outlined in the IEMA guide to: Materials and Waste in Environmental Impact Assessment[2].

17.8.4 Material requirements and waste quantities relating to construction of the proposed Onshore Scheme are not known at this stage. Where projects are in an early stage of development it is likely there will be data gaps, for example, there is a general lag (in years) in materials, landfill and waste processing capacity data in the UK. This has implications for EIA practitioners presenting a ‘current picture’. Appropriate caveats/assumptions should be stated for such occurrences.

17.8.5 This EIA scoping assessment for material assets and waste receptors is based on a proportionate review of the baseline information available at the time of assessment. Whilst the baseline data sources used in this assessment have been obtained from the most recently available information, it is still possible that conditions could have changed since their publication and it is not possible to confirm the accuracy of the data. Furthermore, changes to the permitted minerals and waste management capacity during construction of the proposed Onshore Scheme will also be difficult to determine.

Contents

18. Marine Physical Environment

18.1 Introduction

18.1.1 This chapter outlines the proposed scope and methodology to be undertaken for the marine physical environment. It will consider the potential for significant effects arising from the construction and operation of the LionLink Scheme (hereafter referred to as 'the proposed Offshore Scheme') in respect of the marine physical environment. A review of relevant guidance and policy has been undertaken together with a desk-based assessment, to inform the proposed scope and methodology.

18.1.2 This chapter is supported by the following figures:

- **Figure 1-4**: Proposed Offshore Scheme Boundary;
- **Figure 18-1**: Marine physcial environment study area;
- **Figure 18-2**: Seabed sediments across the study area;
- **Figure 18-3**: Suspended particulate matter (SPM) across the study area; and
- **Figure 18-4**: Designated sites.

18.1.3 There may be interrelationships related to the potential effects on physical processes and other disciplines. Therefore, please also refer to the following chapters:

- **Chapter 8** – Ecology and Biodiversity – will identify the potential impacts on onshore ecological receptors that are present in the intertidal area;
- **Chapter 12** – Hydrology, Hydrogeology and Drainage – will identify the potential impacts to the onshore water environment;
- **Chapter 19** – Intertidal and Subtidal Benthic Ecology - outputs from the marine physical environment assessments will inform the assessment of significance of effect from impacts such as temporary increase in suspended sediments and subsequent deposition;
- **Chapter 20** – Fish and Shellfish – outputs from the marine physical environment assessments will inform the assessment of significance of effect from impacts such as temporary increase in suspended sediments and subsequent deposition;
- **Chapter 21** – Intertidal and Offshore Ornithology - outputs from the marine physical environment assessments will inform the assessment of significance of effect from impacts such as changes in water clarity effecting identification of prey species;
- **Chapter 22** – Marine Mammals and Marine Reptiles – outputs from the marine physical environment assessments will inform the assessment of significance of effect from impacts such as changes in water clarity effecting identification of prey species by diving species;
- **Chapter 24** – Commercial Fisheries – outputs from the marine physical environmental assessments will inform the assessment of significance of effects in relation to indirect impacts on target species; and

- **Chapter 26** – Marine Archaeology - outputs from the marine physical environmental assessments will inform the assessment of significance of effects from impacts such as temporary increase in suspended sediments and subsequent deposition which can affect heritage assets.

18.1.4 Physical environment includes the following elements:

- Hydrodynamics including water levels, currents, waves and winds;
- Morphology including bathymetry, geology, surficial sediments and substrate; and
- Sediment transport, including suspended sediment.

18.1.5 In addition, water and sediment quality is also included in this chapter due to the close linkages with physical processes.

18.2 Consultation and engagement

18.2.1 Initial consultation on selected components of the proposed Offshore Scheme has commenced with several stakeholders. The Marine Management Organisation (MMO) were provided with an introductory briefing on the proposed Offshore Scheme in November 2022 and commented were requested on the non-statutory and supplementary non-statutory consultations. In addition, Local Planning Authorities and the Environment Agency have been consulted as part of the non-statutory and supplementary non-statutory consultations, where a main theme arising from comments was to consider the possible effects of onshore and offshore excavation on coastal erosion.

18.2.2 Engagement will continue with relevant stakeholders in relation to the proposed Offshore Scheme to obtain any information that they hold to supplement the assessment and to seek their views with regards to the evolving design. This will be undertaken by the Environmental Impact Assessment (EIA) Team.

18.2.3 The following bodies will be consulted during the EIA process:

- Local Planning Authorities;
- MMO;
- Centre for Environment, Fisheries and Aquaculture Science (Cefas);
- Joint Nature Conservation Committee (JNCC);
- Natural England;
- Environment Agency; and
- The Crown Estate.

18.3 Baseline conditions

Study area

18.3.1 The proposed Offshore Scheme will route from either the Southwold or Walberswick Landfall across the Southern North Sea to the boundary between the UK and Netherlands Exclusive Economic Zones (EEZ).

18.3.2 The proposed Offshore Scheme Scoping Boundary is illustrated on **Figure 18-1** and is described in **Chapter 2** The proposed Scheme Description. It includes a proposed submarine cable corridor from each landfall converging approximately 35km off the east coast. From the point of convergence there are two Submarine Cable Corridor options (B and C) that cross the Southern North Sea to the UK/Netherlands EEZ boundary.

18.3.3 The study area for the marine physical environment comprises:

- The Offshore Scheme Scoping Boundary; and
- An area of 15km off the Offshore Scheme Scoping Boundary. This buffer is based on local tidal excursion distances.

18.3.4 The zone of influence, and therefore the study area, will remain under iterative review in response to refinement of the project design, feedback from consultees, identification of additional constraints (e.g., engineering or environmental constraints identified by detailed site-specific studies) and selection of the preferred Landfall and Submarine Cable Corridor. The study area is shown in **Figure 18-1.**

18.3.5 The study area will be reviewed and, as appropriate, refined for the assessment in the Preliminary Environmental Information (PEI) Report and Environmental Statement (ES) with only one landfall and one submarine cable corridor being taken forward. This will be based on the proposed Order limits in the ES.

Baseline

18.3.6 The following sections present the current baseline established at scoping. There are currently two corridors being considered for the proposed Submarine Cable Corridor, which are shown in **Figure 1-4.** Baseline information is presented for both options below.

18.3.7 This section provides a summary of the baseline marine physical environment in the study area, based on a review of tidal regime, meteorological information, wave climate, bathymetry and seabed sediment data and information from desktop study/reports. In addition, consideration is given to the future baseline, assessing potential for change during the operational lifetime of the Offshore Scheme.

Baseline data sources

18.3.8 The baseline described in this chapter and associated appendices has been informed by the following data sources **Table 18-1**. A metocean study has also been undertaken for the Offshore Scheme[1] which is informed by a number of the same datasets as listed in **Table 18-1.**

[1] NGV (2022). Metoean assessment and operability analysis for EuroLink Interconnector UK-NL: Work Package 1. P2535 UK-NL

Table 18-1 Key data sources for baseline assessment

Data source	Description	Coverage Relative to Study Area
UK Renewables Atlas[2]	Maps of annual wave heights, wind speeds, tidal range (spring and neap), peak tidal flows (spring and neap) and mean tide tidal ellipse	Full
Hybrid Coordinate Ocean Model (HYCOM) GOFS3.1[3]	22 year reanalysis of currents at 1/24° resolution – includes tidal and non-tidal (referred to as residual) flows.	Full
Data explorer, SEASTATES[4]	Modelled hindcast wind and wave data	Full
Climate System Forecast Reanalysis (CFSR)[5]	Hindcast wind data at 0.5 degree resolution, spanning 43 years (1979 to 2022)	Full
WaveWatch III (WW3)[6]	30 year wave hindcast, 3 hourly combined wind waves and swell on 4 minute model grid.	Full
British Geological Society (BGS)[7]	Seabed sediment maps and borehole records	Full
The European Marine Observation and Data Network (EMODnet)[8]	Digitised and interpolated bathymetry Seabed sediment layer	Full
UK Hydrographic Office (UKHO)	Navigation charts	Full
Cefas[9]	Suspended Particulate Matter (SPM) – monthly and seasonal maps	Full

[2] ABPmer (2017). UK Renewables Atlas (online). Available from https://www.renewables-atlas.info/explore-the-atlas/ (May 2023).

[3] HYCOM (online). Available from https://www.hycom.org/dataserver/gofs-3pt1/reanalysis (May 2023).

[4] Data Explorer (2018), ABPmer SEASTATES (online). Available from https://www.seastates.net. (April 2023).

[5] Saha, Suranjana, and Coauthors, 2010: The NCEP Climate Forecast System Reanalysis. Bull. Amer. Meteor. Soc., 91, 1015.1057. doi: 10.1175/2010BAMS3001.1. and Saha, Suranjana and Coauthors, 2014: The NCEP Climate Forecast System Version 2 Journal of Climate J. Climate, 27, 2185–2208. doi: http://dx.doi.org/10.1175/-12-00823.1.

[6] WaveWatchIII (online). Available from https://polar.ncep.noaa.gov/waves/wavewatch/ (April 2023).

[7] British Geological Survey (2021). Seabed Sediment 1:250,0000 geological map.

[8] EMODnet (2018). EMODnet Human Activities project, www.emodnet-humanactivities.eu, funded by the European Commission Directorate General for Maritime Affairs and Fisheries. European Digital Terrain Model.

[9] Cefas (2016). Suspended Sediment Climatologies around the UK. Report for the UK Department for Business, Energy & Industrial Strategy offshore energy Strategic Environmental Assessment programme.

Data source	Description	Coverage Relative to Study Area
Shoreline Management Plan – SMP7[10]	Local annual surveys of coastline	Coastal
UK climate change projections 2018[11]	Sea level rise predictions along the coast	Full along the coastline
East Anglia One EIA and supporting studies[12]	Review of baseline characterisation data	Partial
East Anglia Two EIA and supporting studies[13]	Review of baseline characterisation data	Partial
East Anglia Three EIA and supporting studies[14]	Review of baseline characterisation data	Partial
Norfolk Boreas EIA and supporting studies[15]	Review of baseline characterisation data	Partial
Norfolk Vanguard EIA and supporting studies[16]	Review of baseline characterisation data	Partial
Clean Safe Seas Environmental Monitoring Programme (CSEMP)[17]	Sediment quality data	Discrete sampling locations

[10] Suffolk District Council (2012). The Suffolk SMP, First Review of SMP, SMP7 (previously sub-cell 3C), Lowestoft Ness to Felixstowe Languard Point.

[11] UKCP 2018, UKCP18 Science Overview Report, November 2018. UK met. Office.

[12] Royal Haskoning DHV (2019b). East Anglia One Offshore Wind Farm, Environmental Statement, Volume 1, Chapter 7, Marine Geology, Oceanography and Physical Processes.

[13] Royal Haskoning DHV (2019c). East Anglia Two Offshore Wind Farm, Environmental Statement, Volume 1, Chapter 7, Marine Geology, Oceanography and Physical Processes.

[14] Royal Haskoning DHV (2015). East Anglia Three Offshore Wind Farm, Environmental Statement, Volume 1, Chapter 7, Marine Geology, Oceanography and Physical Processes.

[15] Royal Haskoning DHV (2019a). Norfolk Boreas Offshore Wind Farm, Environmental Statement, Volume 1, Chapter 8, Marine Geology, Oceanography and Physical Processes.

[16] Norfolk Vanguard Limited. (2018). Norfolk Vanguard Limited Environmental Statement, June 2018.

[17] Marine sediment quality data (online). Available from https://www.ices.dk/data/data-portals/Pages/DOME.aspx (April 2023).

Data source	Description	Coverage Relative to Study Area
Environment Agency Bathing Waters map and monitoring data	Water quality	Discrete sampling locations along coast
MAGIC mapping managed by Natural England[18]	Geographical mapping of the natural environment from sources including Defra, Natural England, the Environment Agency and the Marine Management Organisation (MMO)	Full

Bathymetry and seabed features

18.3.9 Water depths across the study area are less than 55m below mean sea level (MSL), with deepest water depths in the middle section of the proposed Submarine Cable Corridors. From the landfall sites the water depths deepen to more than 20m below MSL within approximately 4km of the coast. Water depths at the offshore extent of the proposed Submarine Cable Corridors are around 30m below MSL.

18.3.10 Newcome Sand and Stanford Channel lie to the north of the proposed Submarine Cable Corridors B and C at Lowestoft, while Dunwich Bank, Sizewell Bank and Aldeburgh Napes lie to the south. A number of sand bank features also lie to the west and north of the study area, including the banks of Holm Sand, Hearty Knoll and Smiths Knoll.

18.3.11 Notable areas of sand wave features have been identified in the study area, with heights typically in the range of 2-10m and wave lengths of around 100-500m[19]. Mega ripples are typically present on the flanks of sand waves and on the seabed where sand waves are absent. These features indicate a mobile bed.

Geology and seabed sediments

18.3.12 The Southern North Sea Basin has developed as a result of a long and complex history of basinal subsidence interspersed with discrete periods of uplift and erosion. Lower Paleaozoic sediments are likely to be several kilometres thick beneath most of the southern North Sea.

18.3.13 The geology across the study area is characterised by Holocene sand deposits overlying Quaternary deposits, with the thickness of Holocene sands generally varying from around 1m to more than 20m across sand wave fields. The underlying Quaternary deposits are typically more than 50m thick within the study area, except for a small area at the inshore end of the proposed Submarine Cable Corridors where deposits are 30-50m thick. These overlay Tertiary bedrock, which is Mudstone along most of proposed Submarine Cable Corridors B and C (comprised of fine grained clays and muds) with an area of Argillaceous Rock (sedimentary rock formed from clay deposits) along approximately 40km of the offshore extent of proposed Submarine Cable Corridor C.

18.3.14 The seabed composition along much of the proposed Submarine Cable Corridors is classified as sand, slightly gravelly sand or gravelly sand with a slight tendency for

[18] MAGIC (online). Available from https://magic.defra.gov.uk (May 2023).

[19] NGV (2021). Eurolink cable routes constraints study.

coarsening in an onshore direction[20]. Proposed Submarine Cable Corridor B and C also crosses a small patch of sandy gravel approximately 20km offshore and a small patch of sandy mud approximately 3km offshore (**Figure 18-2)**.

18.3.15 More detailed sediment data from samples collected along export cable corridors and array areas for the offshore wind farm (OWF) developments in the region show that higher proportions of silts were found in samples taken from deeper areas and that in some samples more than 90% was comprised of fines[21].

Coastal form

18.3.16 The coastline within the study area extends from Lowestoft in the North to Thorpeness in the South. The coastline is generally made up of soft geology (predominantly sand and gravel)[22]. Much of the sediment that makes up the present shoreline has come from erosion of the coast and nearshore area over the last 10,000 years as sea level rose and the East Anglian coast eroded after the last ice age. This large-scale erosion provided most of the sediment now retained as shingle and sand beaches. The present day sediment supply to the coast by erosion of the cliffs is now much smaller. The most significant supply at present comes from erosion of the cliffs between Kessingland and Southwold.

18.3.17 Sediment was also historically deposited close to the shoreline as banks, such as the natural shingle bank in front of Walberswick marshes. These banks are moved by waves and currents with a cyclical development and break down (with neighbouring sections of the coast fed by the banks during periods of break down).

18.3.18 The whole of the coast suffers some degree of erosion. As sea level has risen in the past the coast has tended to retreat. This process has been limited in places by man-made defences and, along more undisturbed areas where sediment is limited, has exposed areas to increased flood risk. This risk will increase with sea level rise.

Sediment transport

18.3.19 Net sediment transport in the offshore area is in a northwards direction (based on sandwave asymmetry), mainly in response to northward residual tidal currents (due to stronger northward ebb tidal flows).

18.3.20 Although locally variable, in contrast to offshore sediment transport, sediment generally moves from north to south along the shoreline. Sediment transport is relatively low at Kessingland cliffs and along the Minsmere and Thorpeness cliff frontages, while at Covehithe (approximately 5.5km north of Southwold) erosion and sediment drift is persistent and rapid. Man made defences and structures, such as those at Lowestoft Ness and the entrance to Blyth estuary, interrupt the littoral processes, altering the coastal form.

18.3.21 The Shoreline Management Plan (SMP) strategy is to continue to protect the coast at the proposed Landfall sites (i.e., to hold the line) but to allow natural erosion to continue to the north (i.e., no active intervention) at Covehithe and along the cliff and broads

[20] British Geological Survey (2021). Seabed Sediment 1:250,0000 geological map.

[21] Royal Haskoning DHV (2019b). East Anglia One Offshore Wind Farm, Environmental Statement, Volume 1, Chapter 7, Marine Geology, Oceanography and Physical Processes.

[22] Suffolk District Council (2012). The Suffolk SMP, First Review of SMP, SMP7 (previously sub-cell 3C), Lowestoft Ness to Felixstowe Languard Point.

between Kessingland and Southwold. The strategy immediately to the north and south of the landfall sites is managed realignment.

Tides

18.3.22 Tides in the study area are semi-diurnal, with two high and two low tides per day.

18.3.23 The tides vary significantly across the study area due to the presence of an amphidromic point which is centred slightly east of the landfall sites near the East Anglia THREE OWF.

18.3.24 The tidal range reduces in an offshore direction, with spring tidal ranges of more than 2m at the coast reducing to less than 1m at the offshore extent. Tidal ranges also vary north south, with larger ranges in the northern part of the study area. Tidal levels are given at three locations (which are shown in **Figure 18-1)** across the study area in **Table 18-2.**

Table 18-2 Tide levels across the study area (relative to MSL)[23]

	Level (m above MSL)		
	UK_NS1	**EA3B**	**CGF**
Highest Astronomical Tide (HAT)	1.00	0.50	1.32
Mean High Water Spring (MHWS)	0.77	0.30	0.96
Mean High Water Neap (MHWN)	0.55	0.18	0.62
Mean Low Water Neap	-0.67	-0.18	-0.60
Mean Low Water Spring	-1.04	-0.29	-0.91
Lowest Astronomical Tide (LAT)	-1.47	-0.42	-1.25

18.3.25 Tidal currents are generally southwards on the flood tide and northwards on the ebb tide and are rectilinear, except in the north of the study area where flows are more orbital. Superimposed on this regional scale flow pattern, local flow variations can be expected to occur in response to bathymetric features (for example with local flow circulations around sand banks). Tidal flows vary across the site, with slowest peak spring flows of around 0.5m/s at the offshore extent of proposed Submarine Cable Corridor B and with fastest peak spring flows of around 1.3m/s occurring in the shallower nearshore areas (within 30km of the shoreline). Peak flows on neap tides are typically just over half the peak spring tide flows.

Non-tidal influences

18.3.26 Superimposed on regular tidal signals in water levels and flows are various non-tidal influences, which mainly result from meteorological effects. For example, surges result from rapid changes in atmospheric pressure causing water levels to fluctuate notably above or below the tidal level. This effect can be further affected by local winds.

[23] NGV (2022). Metocean assessment and operability analysis for EuroLink Interconnector UK-NL: Work Package 1. P2535 UK-NL

18.3.27 The North Sea is susceptible to storm surges and water levels can become elevated by 0.5m above highest astronomical tide (HAT) levels under a 1 in 1 year return period storm surge event and by 1.5m for a 1 in 100-year return period surge event[24].

18.3.28 Currents across the study area are dominated by the tidal forcing, with occasional increases in speed during high winds associated with passing extra-tropical storms. Storm surges may modify the tidal flows, with a predicted maximum surge current of 0.4m/s[25].

Winds and waves

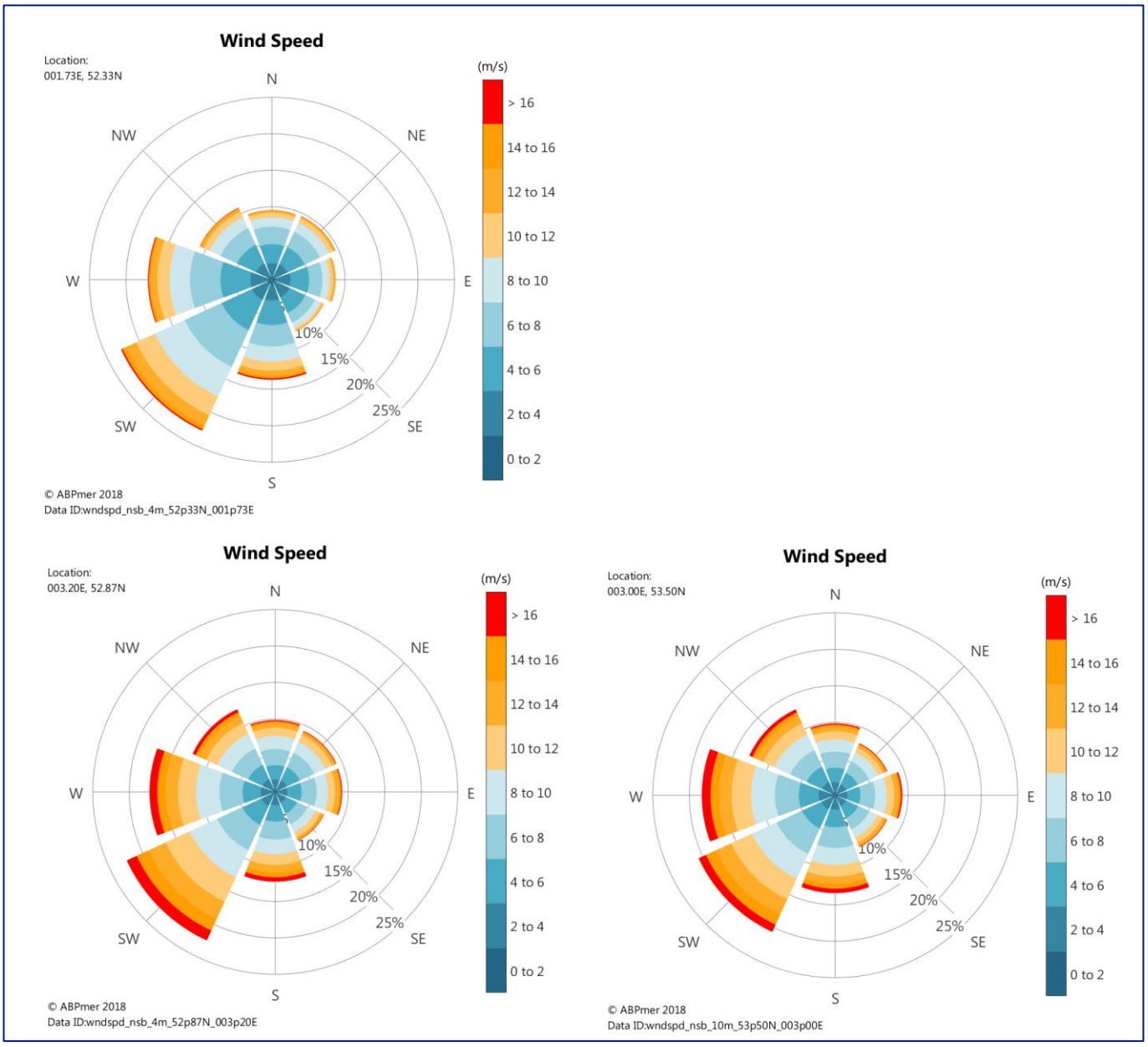
18.3.29 Prevailing winds across the study area are from the southwest, with hourly mean wind speeds of up to 33m/s[26] during storm conditions. More typically, winds vary between 5 and 10m/s with wind speeds increasing slightly with distance offshore (**Insert 18-1**).

[24] Environment Agency. (2018). Coastal flood boundary conditions for UK mainland and islands. Project: SC060064/TR2: Design sea levels. Update 2018.

[25] Royal Haskoning DHV (2019c). East Anglia Two Offshore Wind Farm, Environmental Statement, Volume 1, Chapter 7, Marine Geology, Oceanography and Physical Processes.

[26] NGV (2022). Metocean assessment and operability analysis for EuroLink Interconnector UK-NL: Work Package 1. P2535 UK-NL

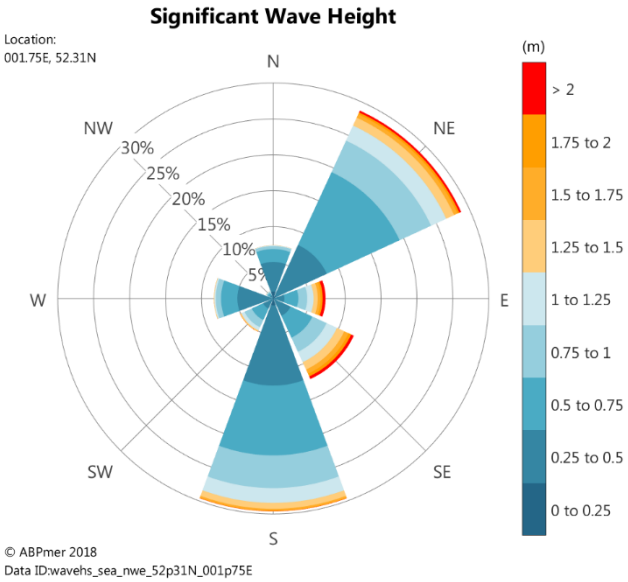
Insert 18-1 Wind Conditions in the study area[27]

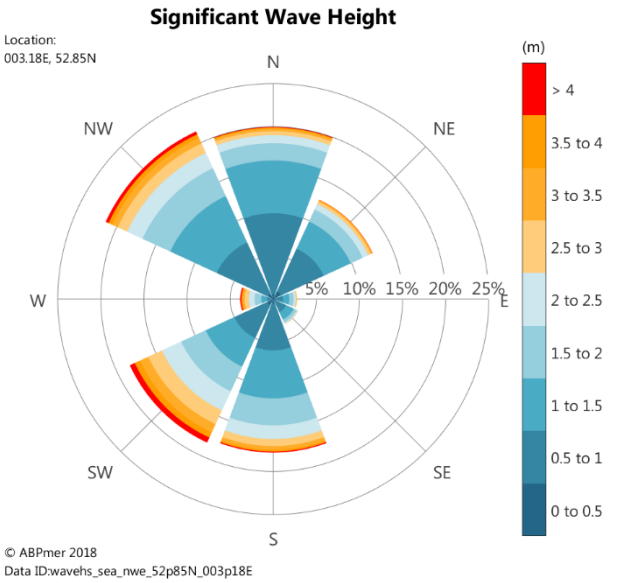


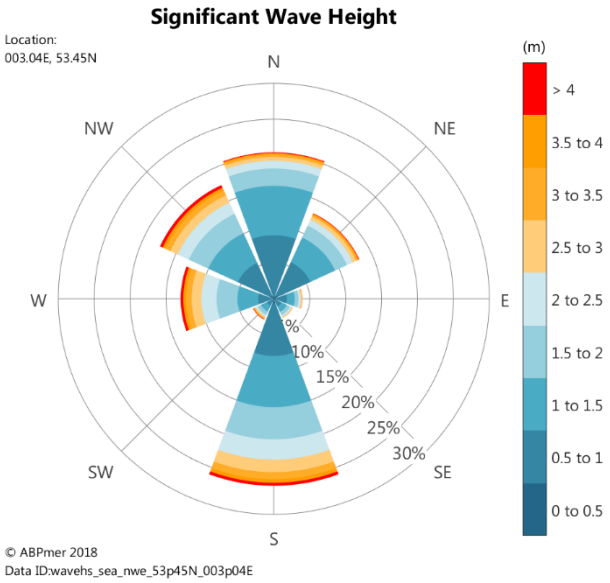
18.3.30 The wave climate across the study area is controlled by a combination of locally generated wind waves and swell waves generated elsewhere in the North Sea. The inshore section of the study area is sheltered to dominant wind directions from the southwest, while the offshore section of proposed Submarine Cable Corridor C is more exposed and can be influenced by waves directed away from the coast (**Insert 18-2**).

[27] Data Explorer (2018), ABPmer SEASTATES (online). Available from https://www.seastates.net. (April 2023).

Insert 18-2 Wave conditions in the study area[28]







18.3.31 Wave heights reduce in an onshore direction as a result of friction effects in the shallower nearshore waters (**Table 18-3**). Mean significant wave heights close to the proposed Landfall sites are 0.7m, while at the offshore end of the proposed Submarine Cable Corridors mean significant wave heights are up to 1.5m.

Table 18-3 Mean wave and wind conditions along the proposed Submarine Cable Corridor[29]

	Landfall	Offshore, Corridor C	Offshore, Corridor B
Mean significant wave height (m)	0.7	1.4	1.5
Mean wind speed (m/s)	6.7	8.2	8.1

[28] Data Explorer (2018), ABPmer SEASTATES (online). Available from https://www.seastates.net. (April 2023).

[29] Data Explorer (2018), ABPmer SEASTATES (online). Available from https://www.seastates.net. (April 2023).

Suspended sediment

18.3.32 Data from the Cefas Suspended Sediment Climatology model show that over the period between 1998 – 2015, suspended particulate matter (SPM) mean values range from around 5mg/l at the offshore extent of the proposed Submarine Cable Corridors up to 47mg/l close to the proposed Landfall sites (**Figure 18-3)**[30].

18.3.33 There is some seasonality in SPM, with highest seasonal mean values of more than 10mg/l at the offshore extent and more than 70mg/l close to the proposed Landfall sites during winter months. The higher SPM during winter months is associated with wave-stirring of sediment from the seabed during storm events, which occur more frequently in the winter months[31]. During such conditions, values can reach greater than 80mg/l offshore[32], with up to 170mg/l having been recorded at the coast[33].

Water quality

18.3.34 Reviews of water quality data as part of the East Anglia OWF studies[34],[35] indicates that trace metals dissolved in seawater in the study area are generally lower than other inshore sites within the Southern North Sea.

18.3.35 The proposed Submarine Cable Corridors pass through the Water Framework Directive (WFD) Suffolk water body which is classed as a moderately exposed mesotidal water body (Water body ID GB650503520002). There are designated bathing waters at Lowestoft (North and South of Claremont Pier) and Southwold (The Pier and The Denes). The Pier and The Denes at Southwold lie between the proposed Landfall sites at Southwold and Walberswick.

18.3.36 All bathing waters in the study area have been classified as good or excellent since 2021.

Sediment quality

18.3.37 The concentrations of metals in sediments are generally higher in the coastal zone and around estuaries, decreasing offshore indicating that river input and run-off from land are significant sources. The sediments within the study area are typically coarse sediments, which pose a low risk for anthropogenic contaminants.

18.3.38 The study area does not overlap with any active disposal sites other than those associated with the East Anglia OWF developments. Other disposal sites within the study area which are now closed include Warren Springs, the AEA experimental site, the North Sea dredge test site and the BBL pipeline temporary pre-sweep site. East Anglia ONE analysed five sediment grab samples in the Warren Springs disposal site

[30] Cefas (2016). Suspended Sediment Climatologies around the UK. Report for the UK Department for Business, Energy & Industrial Strategy offshore energy Strategic Environmental Assessment programme.

[31] HR Wallingford, Posford Haskoning, Cefas, D'Olier, B, 2002. Southern North Sea Sediment Transport Study Phase 2: Sediment Transport Report. Report No. EX4526, August 2002.

[32] EAOW (East Anglia Offshore Wind). (2012a). East Anglia Offshore Wind Zonal Environmental Appraisal Report, March 2012.

[33] Hanson Aggregates Marine Ltd., 2005. Marine Aggregate Extraction Licence Area 401/2. Environmental Statement for Renewal of the License. Hanson Marine Aggregates, Southampton.

[34] Norfolk Vanguard Limited. (2018). Norfolk Vanguard Limited Environmental Statement, June 2018.

[35] Royal Haskoning DHV (2015). East Anglia Three Offshore Wind Farm, Environmental Statement, Volume 1, Chapter 7, Marine Geology, Oceanography and Physical Processes.

which was used between 1987 and 1995 to test oil dispersants in the North Sea. No traces of contaminants were found in these samples and the Marine Management Organisation (MMO) advised that impacts associated with the placement site could be scoped out of further assessment for the East Anglia THREE project[36].

18.3.39 There are oil and gas wells in the northern part of the study area, along proposed Submarine Cable Corridor B; and there is a potential that these wells could be a source of contamination. Surveys undertaken for the East Anglia OWF developments[37] identified no significant levels of contamination.

18.3.40 Contaminant concentrations in sediments from Clean Safe Seas Environmental Monitoring Programme (CSEMP)[38] monitoring locations within the study area were found to generally be low with exceedances of Cefas Action Level 1 confined to sites at the southern edge of the study area close to the Sizewell B power station. There were seven sampling sites located within 6km of proposed Submarine Cable Corridor C which were analysed for Cadmium, Chromium, Copper, Lead and Zinc. At all seven sites contaminant levels were below Cefas Action Level 1.

18.3.41 Grab sampling was undertaken within the Norfolk Vanguard East OWF, East Anglia TWO OWF and East Anglia THREE OWF. Sediment samples were analysed for contaminants including Arsenic, Cadmium, Chromium, Copper, Lead, Mercury, Nickel, Vanadium, Zinc, Aluminium, Iron, Barium, Tin, Polychlorinated biphenyls (PCBs), Polycyclic Aromatic Hydrocarbons (PAHs), Organotins (Dibutyl (DBT) and Tributyl (TBT)) and Total hydrocarbons (THC).

18.3.42 Arsenic, Chromium and Nickel contaminant levels at one sample from Norfolk Vanguard East were found to be at levels which are deemed by Cefas to require further consideration (Action Level 1). Additionally, arsenic contaminant levels from two additional samples within the Norfolk Vanguard OWF array area and cable corridor were also slightly above Cefas Action Level 1. No samples exceeded Cefas Action Level 2. The Norfolk Vanguard EIA concluded that results indicate relatively low levels of contamination across the site (with elevated levels of arsenic typical of the region) and it was agreed with Cefas and the MMO that no further assessment was required.

Protected species/sites

18.3.43 Designated sites in the study area, which are designated for the protection and conservation of marine habitats of relevance to physical processes are shown in **Figure 18-4**. These include:

- Annex I Subtidal sand banks – there are a number of Annex I subtidal sand bank features within the study area, although neither of the proposed Submarine Cable Corridors pass through these features.
- Southern North Sea Special Area of Conservation (SAC) is an area of importance for harbour porpoise, including a key winter and summer habitat for this species. Most of the proposed Submarine Cable Corridors are contained within the Southern

[36] Royal Haskoning DHV (2015). East Anglia Three Offshore Wind Farm, Environmental Statement, Volume 1, Chapter 7, Marine Geology, Oceanography and Physical Processes..

[37] Norfolk Vanguard Limited. (2018). Norfolk Vanguard Limited Environmental Statement, June 2018.

[38] Marine sediment quality data (online). Available from https://www.ices.dk/data/data-portals/Pages/DOME.aspx (April 2023).

North Sea SAC with the exception of an offshore 23km section of proposed Submarine Cable Corridor B.

- Haisborough, Hammond and Winterton Marine Protected Area (MPA) designated for sandbanks features and areas of reef lies just inside the study area. Neither of the Submarine Cable Corridors pass through this designated site.
- North Norfolk Sandbanks and Saturn Reef SAC designated for sandbanks features and areas of *Sabellaria spinulosa* biogenic reef lies just inside the study area. Neither of the Submarine Cable Corridors pass through this designated site.
- Outer Thames Estuary Special Protection Area (SPA) classified for the protection of the largest aggregation of wintering red-throated diver in the UK and of foraging areas for common tern and little tern during the breeding season. The inner section of the proposed Submarine Cable Corridors B and C pass through the designated site.

18.3.44 A number of coastal Sites of Special Scientific Interest (SSSI) are also present:

- Pakefield to Easton Bavents (< 500m north of the proposed Landfall site at Southwold) designated for geological exposures of Lower Pleistocene Norwich Crag formations and coastal morphology of Benacre Ness.
- Minsmere – Walberswick Heaths and Marshes designated for important habitats including coastal shingle vegetation outside the reach of waves. Minsmere – Walberswick is also an internationally or European protected site designated as a Ramsar wetland. The proposed Landfall site at Walberswick passes along the boundary of this designated site.
- Leiston-Aldeburgh designated for its diverse range of habitats which supports an abundant community of breeding and overwintering birds. This site is located at the southern extent of the study area.

18.3.45 The list of protected sites with relevance to physical processes may be refined following selection of the final Submarine Cable Corridor. For example, if proposed Submarine Cable Corridor C is selected, the North Norfolk Sandbanks and Saturn Reef SAC will lie outside of the study area.

Future baseline

18.3.46 The Marine Physical Environment chapter within the PEI Report and ES will consider changes which may affect the future environment in the absence of the proposed Offshore Scheme. The future baseline will also take into account any developments that are likely to be present in the future baseline.

18.3.47 A consideration of the likely evolution of the baseline, is provided in the context of the operating lifetime of the proposed Offshore Scheme. For this assessment the Representative Concentration Pathway (RCP) 8.5 (high emissions) scenario from the UKCP18 climate projections has been adopted[39].

[39] UKCP 2018, UKCP18 Science Overview Report, November 2018. UK met. Office.

18.3.48 UKCP18 indicates an increase in sea level of approximately 0.8m at 2100 along the Suffolk coast. Future changes in storm surges have been predicted to be indistinguishable from background variation[40].

18.3.49 UKCP18 concludes that there are no compelling trends in storminess (as determined by maximum gust speeds) from the UK wind network over the last four decades[41]. Further, global projections do not show a trend in winds in the first half of the 21st Century. However, projected wind speeds during the second half of the 21st Century do show a modest increase and this was noted to be accompanied by an increase in frequency in winter storms.

18.3.50 Average wave heights are expected to reduce by around 10 to 20%. Changes in extreme waves are also of the order of 10-20% but there is no agreement in the sign of change among model projections[42].

18.4 Potential impacts

18.4.1 This section identifies, at a high level, a summary of the sources and potential impacts as a result of the proposed Offshore Scheme during the construction and operational phases.

18.4.2 Potential impacts have been established based on industry experience and where applicable reference to the list of marine pressures established by the JNCC Marine Pressures-Activities Database v1.5 (2022) and Natural England's advice on operations for relevant European protected sites.

Construction

18.4.3 The following impacts could occur during the construction phase:

- Temporary habitat loss/seabed disturbance - changes to subtidal seabed morphology as a consequence of activities such as anchoring, seabed preparation (e.g., pre-lay grapnel run, boulder and potential unexploded ordnance (UXO) removal, sand wave pre-sweeping), and cable burial.
  - The relevant JNCC pressures that would be covered by this impact include:
    - Abrasion/disturbance of the substrate on the surface of the seabed;
    - Penetration and/or disturbance of the substratum below the surface of the seabed, including abrasion; and
    - Water flow (tidal current) changes including sediment transport considerations).
- Permanent habitat loss – due to the deposition of external cable protection (including any associated scour).

[40] Fung F, Palmer M, Howard T, Lowe J, Maisey P and Mitchell JFB (2018). UKCP18 Factsheet: Sea Level Rise and Storm Surge, Met Office Hadley Centre, Exeter

[41] Fung F, Bett P, Maisey P, Lowe J, McSweeney C, Mitchell JFB Murphy J, Rostron J, Sexton D and Yamazaki K. UKCP18 Factsheet: Wind. Met Office Hadley Centre, Exeter.

[42] Palmer. M, T. Howard, J. Tinker, J. Lowe, L. Bricheno, D. Calvert, T. Edwards, J. Gregory, G. Harris, J. Krijnen, M. Pickering, C. Roberts and J. Wolf (2018). UKCP18 Marine Report.

- The relevant JNCC pressures that would be covered by this impact include:
    - Physical change (to another seabed type or sediment type); and
    - Water flow (tidal current) changes including sediment transport considerations).

- Changes to coastal morphology - as a result of a temporary coffer dam (if required) to facilitate the horizontal direction drill exit.
- Temporary increase in suspended sediments and subsequent deposition - during seabed preparation (specifically pre-sweeping) and cable burial.
    - The relevant JNCC pressures that would be covered by this impact include:
        - Changes in suspended solids (water clarity);
        - Smothering and siltation rate changes; and
        - Hydrocarbon & PAH contamination (i.e., from suspended contaminated sediments).
- Change in water quality due to a loss of drilling fluid.
- Transboundary impacts – as a result of a temporary increase in suspended sediments and subsequent deposition close to the EEZ boundary.
- Accidental spills due to the presence of project vessels and equipment.

Operation

18.4.4 If the cables are installed correctly the likelihood of it requiring maintenance and repair is significantly reduced. However, there remains the potential that localised repair works may be required. In these circumstances the impacts will be similar to those during construction, but of lower magnitude. The following impacts could occur during the operational phase:

- Temporary habitat loss/seabed disturbance;
- Permanent habitat loss;
- Temperature increase - During the operation of a high voltage direct current (HVDC) cable heat losses occur because of the resistance in the cable/conductor. This can cause localised heating of the surrounding environment (i.e., sediment for buried cables, or water in the interstitial spaces of external cable protection);
- Temporary increase in suspended sediments and subsequent deposition;
- Transboundary impacts – as a result of a temporary increase in suspended sediments and subsequent deposition close to the EEZ boundary; and
- Accidental spills due to the presence of vessels and equipment.

18.5 Design and control measures

18.5.1 As outlined in **Chapter 5** EIA Approach and Method, a standard hierarchical approach will be taken to mitigation.

18.5.2 The assessment of effects will take into account measures that are embedded into the proposed Offshore Scheme design, together with general good practice measures.

Design measures

18.5.3 Design measures to be implemented by the proposed Offshore Scheme include:

- A separate technical report will consider the potential impacts of erosion and beach draw down on coastal morphology at the proposed landfall sites. It is envisaged that the technical report will embed mitigation into the design i.e. it will be used to inform the landward position of the transition joint bay, the design of the horizontal directional drilling (HDD), and the location of the HDD punch out point in the sea, to prevent any impacts on the stability of the coast.
- Avoidance of sand bank features, sand waves and mega-ripples as well as sub-cropping and outcropping rock, potential stony reef habitat where possible through route design and micro-routeing.
- Cable corridors will be designed to minimise the risk of exposure by seabed mobility.
- A Cable Burial Risk Assessment (CBRA) will be undertaken informed by survey data to determine the recommended burial depth for the cables taking into consideration the seabed conditions and external risks such as fisheries use of the area and potential for anchor strike from vessels.
- If feasible, all cables will be installed in one trench. If not feasible, where practicable the two HVDC submarine cables will be bundled together and installed with a fibre optic cable in one trench with the metallic return cable and a separate fibre optic cable in a second trench.
- Where practicable, cable burial would be the preferred means of cable protection to minimise the requirement for external cable protection.
- Application of external cable protection measures where inadequate cable burial depth is identified as a risk.
- Suitable monitoring of installed cable e.g., to ensure cable burial remains optimal and/or that external cable protection has not degraded.

Control measures

18.5.4 Control measures to be implemented by the proposed Offshore Scheme include:

- A Construction Code of Practice (CCOP) (for the construction and operation phases) will be developed and adhered to. This documentation will detail the proposed Schemes commitment to best practice guidance and procedures including:
  - The designation of (as minimal as possible) anchoring areas and implementation of protocols during marine operations to minimise physical disturbance of the seabed.
  - Production of an Emergency Spill Response Plan and Waste Management Plan, Marine Pollution Contingency Plan (MPCP) and a dropped object procedure.
  - Adherence of all project vessels to the International Convention for the Control and Management of Ships' Ballast Water and Sediments with the aim of preventing the spread of marine invasive non-native species (MINNS).

- Compliance of all project vessels with the regulations relating to International Convention for the Prevention of Pollution from Ships (the MARPOL Convention 73/78) (IMO, 1983)[43] with the aim of preventing and minimising pollution from ships.
- Careful management of drilling fluids required for trenchless operations to minimise the risk of breakouts into the marine environment. Specific avoidance measures would include: the use of biodegradable drilling fluids (PLONOR substances) where practicable, drilling fluids will be tested for contamination to determine possible reuse or disposal; and if disposal is required drilling fluids would be transported by a licensed courier to a licensed waste disposal site.
- Production of a biosecurity plan following the latest guidance on MINNS from the Great Britain (GB) non-native species secretariat.
- Adherence of all project vessels to the International Maritime Organisation (IMO) Guidelines for the control and management of ships' biofouling to minimize the transfer of invasive aquatic species (Biofouling Guidelines) (IMO, 2011)[44].

- Sediments in areas where pre-sweeping is proposed will be tested to ensure compliance with Cefas Action Levels for disposal in line with MMO sampling plan requirements.

18.6 Scope of the assessment

18.6.1 This section identifies the potential for the proposed Offshore Scheme to have likely significant effects, taking into account the design and control measures identified in **Section 18.5**.

18.6.2 **Table 18-4** sets out the receptors within the study area that have been identified, whether there is a pathway for the impacts identified, the potential for significant effects and if the receptor is scoped in for the assessment.

18.6.3 All identified impacts are of relevance to both the Southwold and Walberswick Landfall options and both Submarine Cable Corridor options unless specified otherwise.

18.6.4 A precautionary approach has been taken and where there is no strong evidence base, insufficient baseline or the significance is uncertain at this stage the impact has been scoped in to the EIA. Where there is a clear evidence base that the effect from the impact will not be significant, either alone or in combination with other plans and projects, the impact has been scoped out of the EIA.

18.6.5 Physical processes are best described as pathways, rather than as receptors. While outputs from the marine physical environment assessments will be reported in a stand-alone EIA chapter, for the most part it is not practical for them to be accompanied by statements of effect of significance. Instead, the information on changes to the physical processes pathways will be used to inform other EIA topic assessments including:

- **Chapter 19** – Intertidal and Subtidal Benthic Ecology;

[43] International Maritime Organisation (IMO) (1974). International Convention for the Safety of Life at Sea (SOLAS) 1974. [online] Available at: https://treaties.un.org/doc/Publication/UNTS/Volume%201184/volume-1184-I-18961-English.pdf.

[44] International Maritime Organisation (IMO) (2011). 2011 Guidelines for the Control and Management of Ships' Biofouling to Minimize the Transfer of Invasive Aquatic Species. Annex 26, Resolution MEPC.207(62), Adopted 15 July 2011. [online] Available at: https://wwwcdn.imo.org/localresources/en/KnowledgeCentre/IndexofIMOResolutions/MEPCDocuments/MEPC.207(62).pdf.

- **Chapter 20** – Fish and Shellfish;
- **Chapter 21** – Intertidal and Offshore Ornithology;
- **Chapter 22** – Marine Mammals and Marine Reptiles;
- **Chapter 24** – Commercial Fisheries; and
- **Chapter 26** – Marine Archaeology.

18.6.6 The scoping of indirect impacts from the identified physical processes pathways will be assessed within the relevant topics.

18.6.7 The physical processes features which are considered as potential receptors will be guided by the tidal excursion and will include:

- The adjacent coastline, particularly at the proposed Landfall sites (Southwold and Walberswick);
- Designated sub-tidal sandbanks;
- Nationally or internationally designated sites with seabed/sedimentary or geological interest features below MHWS; and
- Designated bathing waters.

Table 18-4 Proposed scope of the assessment

Project phase	Receptor	Impact	Potential for significant effect	Proposed to be scoped in/ out
Construction and Operation	Seabed morphology	Temporary habitat loss/seabed disturbance	Seabed preparation, submarine cable installation and maintenance/repair activities have the potential to directly disturb the seabed morphology. There is also the potential during operation that scour could develop for example, if cables become exposed due to insufficient burial depth being achieved, or around cable protection deposits. This impact pathway will focus on disturbance of sub-tidal seabed morphology (e.g., sandbanks, sandwaves and notable bathymetric depressions). This is an important impact pathway that has a direct effect on other environmental topics such as intertidal and subtidal benthic habitats, fish and shellfish, and indirectly on seabirds and commercial fisheries as potentially as a result of changes in prey availability or stock recruitment. The marine physical processes EIA will therefore establish the level of the disturbance (in terms of magnitude, duration, spatial extent) for use in other topic assessments. Seabed preparation activities (during construction and ahead of a cable repair during operation) can locally alter water depths. Changes to depths are expected to be small relative to the water depth, are highly localised and are also expected to be short-lived. The presence of sandwaves indicates that the environment is dynamic and it is likely that the sandwaves will re-form over a relatively short period of time (weeks to months)[45]. Consequently, there are expected to be no likelihood of local or regional scale changes to tides, waves and sediment regime and this aspect of the temporary seabed disturbance will not be considered by the EIA. Survey data will inform micro-routeing to minimise the seabed preparation required. Cable protection measures (during construction and if a cable repair is required) could result in a change in substrate. The significance of effect will	Scoped In

[45] ABPmer (2018). Norfolk Vanguard Offshore Wind Farm, Appendix 7.1. ABPmer Sand wave study. For and on behalf of Norfolk Vanguard Limited.

Project phase	Receptor	Impact	Potential for significant effect	Proposed to be scoped in/ out
			depend on the size of any cable protection measures required. Small changes to bathymetry could also arise from cable protection measures. Any changes to water depths and seabed roughness are expected to be small scale and localised with no likelihood of an impact to tidal and wave regimes.	
Construction	Coastal morphology	Changes to coastal morphology	Where the submarine cable makes landfall, disturbance of the coastal morphology will be minimised by use of trenchless techniques. A comprehensive coastal processes assessment would be conducted to analyse shoreline erosion rates, shoreline retreat and beach draw down. The assessment will inform the onshore position of the transition joint bay, the trajectory of the HDD to ensure burial over the asset lifetime and the HDD exit point. The land to sea transition will be engineered to ensure asset security i.e., to ensure the cable does not become exposed. This design measure will avoid impacts on coastal morphology during construction and operation. There may be a requirement for a temporary coffer dam or temporary deposits which could disturb or disrupt existing sediment transport pathways along the coast. Given the presence of the man made coastal defence structure (in the form of a rubble mound breakwater which extends more than 50 m offshore from the beach) at the mouth of the River Blyth the likelihood of impact associated with the presence of a coffer dam or temporary deposits is considered to be low.	Scoped Out
Construction and Operation	Water quality Seabed substrates	Temporary increase in suspended sediments and subsequent deposition	**Pre-sweeping** During construction and occasionally during operation (i.e., to facilitate a cable repair), pre-sweeping is used to either remove portions of sand waves to allow the cables to be buried to below the mobile sediments, or to expose the previously buried cable to enact a repair or remove the cables. Pre-sweeping involves the re-positioning of large quantities of sediment from the cable route to either immediately alongside the cable route, or to a separate disposal location. Depending on the technique used and the size of	Scoped In

Project phase	Receptor	Impact	Potential for significant effect	Proposed to be scoped in/ out
			sand waves requiring pre-sweeping, the redeposition of sediment can cause smothering >10cm deep over relatively wide areas of seabed (in the order of tens of thousands square metres) and temporary elevations in suspended sediment concentrations. The increase in suspended sediment concentration from pre-sweeping, relative to that generated by cable burial, is more significant and can have a direct effect on other environmental topics such as bathing water quality, fish and shellfish, seabirds and commercial fisheries. The marine physical processes EIA will therefore establish the level of the increase (in terms of magnitude, duration, spatial extent) for use in other topics.	
Construction and Operation	Water quality Seabed substrates	Temporary increase in suspended sediments and subsequent deposition	**Seabed preparation other than pre-sweeping, Cable burial, repair and removal** Burying the cable into the seabed, repairing it or removing it will generate a sediment plume. The size of the plume and consequent area affected by changes in suspended sediments depends on the trenching technique deployed e.g., ploughing will create a slightly larger footprint than jet trenching. However, in both cases the spatial extent of heavy smothering is extremely localised, restricted to less than a couple of metres either side of the trench[46] [47] [48] and significant effects are unlikely. Modelling undertaken for other cable projects[46] [47] [48] indicates that approximately 90% of the suspended sediment is re-deposited within close proximity (<100m) and would be classed as heavy smothering. The remaining 10% is transported over a wide area, which depending on the strength of the prevailing currents could be as far as 10 – 15km but will be deposited in thicknesses of less than 2mm. With respect to changes in water clarity, the benchmark used by Natural England for the pressure is a change in one rank e.g., from clear to	Scoped Out

[46] GridLink (2020). GridLink Interconnector Marine Environmental Report.

[47] BERR (2008) Review of cabling techniques and environmental effects application to the offshore wind farm industry.

[48] Viking Link (2017). Viking Link Volume 2: UK Offshore Environmental Statement.

Project phase	Receptor	Impact	Potential for significant effect	Proposed to be scoped in/ out
			intermediate, on the WFD scale for one year. While trenching is undertaken a sediment plume will be generated continuously, but it will move with the location of the cable spread. Sands and gravels do not form part of the sediment load and will settle out of suspension quickly. Modelling undertaken for other cable projects (e.g., Viking Link[48], GridLink[46]), concludes that regardless of the position along a cable route, the sediment plume generated is aligned with the dominant tidal axis. Material is deposited primarily along the dominant tidal axis but with some lateral extension. Over most of the plume the increase in suspended sediment concentrations is generally lower than 30mg/l with natural conditions returning within a single tidal cycle following the cessation of activities, although if very fine chalk particles are present this could be extended to 4-5 days. Overall, the change in water clarity is not significant and generally in line with changes experienced during storm conditions when background concentrations can reach 170mg/l. Disturbance of the seabed during seabed preparation and submarine cable installation activities also has the potential to release contaminants from the sediment. Given the low levels of contaminants in the study area reported in the East Anglia OWF EIA's, further assessment is not considered necessary. The temporary increase and deposition of suspended sediments from activities other than pre-sweeping is not predicted to be significant and therefore it is proposed it is scoped out of the assessment.	
Construction and Operation	Seabed substrates/geology	Permanent habitat loss	The deposition of external cable protection either during construction or during operation associated with a cable repair, will result in a change in substrate e.g., from a natural substrate to an anthropogenic substance. Deposits also have the potential to very locally alter sediment transport, creating scour pits or causing accretion. The significance of effect will depend on the size of any cable protection measures required, water depths, the type of substrate the deposit is made on and other local metocean conditions. Small changes to bathymetry could also arise from cable protection measures.	Scoped In

Project phase	Receptor	Impact	Potential for significant effect	Proposed to be scoped in/ out
Construction and Operation	Water quality Seabed substrates	Transboundary Impacts - Temporary increase in suspended sediments and subsequent deposition	As a linear infrastructure project between two countries the proposed Offshore Scheme boundary stops at the border between UK and Netherlands. However, potential impacts during construction and if necessary, cable repair during operation, will not stop, but will continue along the route of the submarine cables. There is therefore the potential that a temporary increase in suspended sediments and subsequent deposition caused by seabed preparation, cable burial and repair and any cable removal activities will cross from UK waters into the Netherlands EEZ. The effects will be limited in spatial extent in close proximity to the EEZ boundary. The EIA for the Project in the Netherlands will assess the impact of the Project on Dutch environmental receptors. As the impact is proposed to be Scoped Out of the EIA in UK waters (as justified above) it is also proposed to scope out the transboundary impact for the same reasons.	Scoped Out
Construction and Operation	Sediment quality Water quality	Release of drilling fluids	During drilling (used in trenchless techniques) there is the potential that drilling fluids could be discharged to sea either as the trenchless solution punches out on to the seabed at the exit point, or accidentally because of a geological fracture and fluid breakout. Drilling fluids are a combination of water and chemicals which are ranked by Cefas as Posing Little or No Risk (PLONOR) to the environment. Measures would be in place to monitor drill fluid pressure to ensure drilling stops in the event of a breakout to minimise loss, but in certain circumstances, and with approval from authorities drilling could continue with 100% fluid loss to sea. Drilling fluid is rapidly dispersed and diluted in the water column, with no impact on water quality or sediment quality. No significant impacts are predicted from intentional or accidental discharge of drilling fluids.	Scoped Out
Construction and Operation	Sediment quality Water quality	Accidental spills	Project vessels and contractors will comply with the International Convention for the Prevention of Pollution from Ships (MARPOL) 73/78 which relate to pollution from oil from equipment, fuel tanks etc and release of sewage (black and grey water). It is a legal requirement that all vessels have a Shipboard oil pollution emergency plan (SOPEP). Compliance with Regulations will be	Scoped Out

Project phase	Receptor	Impact	Potential for significant effect	Proposed to be scoped in/ out
			sufficient to minimise the risk to the environment and no significant impacts are predicted.	
Operation	Sediment quality	Temperature increase	During the operation of an HVDC cable heat losses occur because of the resistance in the cable/conductor. This can cause localised heating of the surrounding environment (i.e., sediment for buried cables, or water in the interstitial spaces of external cable protection). There are no specific regulatory limits applied to temperature changes in the seabed, although a 2°C change between seabed surface and 0.2m depth is used as a guideline in Germany. Conservative calculations undertaken for Viking Link (which crosses German waters) concluded that heating in excess of 2°C at 20cm sediment depth will only occur if cables are bundled and buried to less than 0.75m[48]. As yet the cable burial risk assessment has not been carried out. However, evidence from similar projects show that risk of shipping and fishing interactions that a burial depths of between 1 – 2m is common with a maximum burial depth of 3m [46 49]. Any temperature changes will be localised to the immediate environment surrounding the cable and undetectable against natural temperature fluctuations in the surrounding sediments and water column. No significant effects are predicted.	Scoped Out

[49] NeuConnect Limited (2019). NeuConnect Offshore GB Environmental Appraisal.

18.7 Assessment methodology

Data sources

Desk study data

18.7.1 In addition to the data sources that were used to inform the baseline reported in this chapter (**Table 18-1**), the data sources identified in **Table 18-5** will be used alongside additional site-specific data collected for the proposed Offshore Scheme to inform the baseline of the PEI Report and ES.

Table 18-5 Key publicly available data sources for physical processes

Data source	Description	Coverage Relative to Study Area
National Tide and Sea Level Facility (NTSLF)	Water level timeseries at Lowestoft	Discrete location
Admiralty TotalTide (ATT)	Tide level predictions from Admiralty tide tables and tidal flow predictions at tidal diamonds	Discrete locations
British Oceanographic Data Centre (BODC)[50]	Measured historical flow data	Discrete locations
TOPEX/Poseidon Global inverse model (TPXO)[51]	Modelled tidal water levels and flows	Full
Channel Coastal Observatory (CCO)[52]	Wave data from Lowestoft Wave Buoy (2016 to present) and Met Station data from Southwold (2020 to present)	Discrete Locations
Admiralty Marine Data Portal[53]	Bathymetric survey data	Partial

Survey data

18.7.2 A cable route characterisation survey will be undertaken to inform the EIA and project engineering design. This will comprise of geophysical, geotechnical and environmental survey scopes. This section provides an overview of the scope of the geophysical and

[50] BODC data holdings (online). Available from https://www.bodc.ac.uk/data/ (April 2023)

[51] Egbert, Gary D., and Svetlana Y. Erofeeva (2002). Efficient inverse modeling of barotropic ocean tides. Journal of Atmospheric and Oceanic Technology 19.2 183-204.

[52] Channel Coastal Observatory data holdings (online). Available from https://www.channelcoast.org/cco (April 2023).

[53] Admiralty Marine Data Portal (online). Available from https://datahub.admiralty.co.uk/portal/apps/sites/#/marine-data-portal (April 2023).

geotechnical survey. For information on the environmental survey parameters refer to **Chapter 19** Intertidal and Subtidal Benthic Ecology.

18.7.3 The objective of the survey campaign is to acquire all appropriate data for the confirmation of a preferred Submarine Cable Corridor. This includes detailed mapping of nearshore shallow geological and seabed character; mapping of seabed relief (bathymetry) and features along offshore sections including potential unexploded ordnance (pUXO) and archaeological sites; and environmental characterisation mapping along the selected Submarine Cable Corridor.

18.7.4 One of the two proposed Submarine Cable Corridors will be selected for survey, based on consultation, engineering studies, environmental constraints and a decision on the preferred landfall and Dutch OWF connection.

18.7.5 The scope of the geophysical and geotechnical campaign is outlined in **Table 18-6**.

Table 18-6 Scope of geophysical and geotechnical cable route survey

Survey	Methods	Survey extents	Description
Topographic and Intertidal Survey	Global navigation satellite system (GNSS) real time kinematic (RTK) equipment. Light detection and ranging (LiDAR) and aerial imagery by UAV flights	Minimum 500m wide corridor centred on Submarine Cable Route i.e., 250m either side of a route centreline. The surveyed area will as a minimum extend from LAT level (or as close as is possible) up to 250 m landward of MHWS. The survey extents will be within the proposed Offshore Scheme Scoping Boundary.	The objective of the survey is to acquire a digital terrain model, ground level contour lines and orthophoto for mapping of the terrain and classification of land use. GNSS RTK will be used to establish a network of primary control points across the survey area. Roving GNSS laser scanner, total station observations and UAV photogrammetric observations will then be used to link these control points together and acquire the data needed to fulfil the survey objectives. Typical survey detail to be collected includes perimeter features, fences & hedges including vegetation type; building footprints; landscape features, walls, steps, posts; slopes, banks, and edges of surfaces; areas of bushes and mature trees over 200mm in diameter, measured at 1m above ground level; service covers with cover levels; and changes in beach material from sand - shingle - bed rock. Data will be captured to Royal Institute of Chartered Surveyors (RICS) Category F topographic survey standards.
Marine geophysical survey	Side scan sonar (SSS) High-resolution multibeam echosounder (MBES) Sub-bottom profiler (SBP) to approximately 10m below seabed Magnetometer	A minimum of a 500m wide corridor nominally centred on the reference cable route (250m either side) at a line spacing of 15-35m (survey corridor). Will extend from as close to LAT as possible at the landfall site to the UK/Netherlands EEZ boundary.	Measure intertidal topography (from LAT seaward) and seabed bathymetry. This data will indicate the surface morphology and allow identification of the nature of the seabed sediments including the height, length, and slope of mobile bedforms. Identify the distribution and thickness of superficial sediments. Identify the distribution of geological features such as areas of exposed bedrock and outcropping geology. Identify the location, extent, and nature of any sensitive marine habitats (e.g., reef, sandbanks) or impediments to installation (e.g., wrecks, debris on seafloor, anchor scours, trawl scars, rock outcrop).

Survey	Methods	Survey extents	Description
	Remotely Operated Vehicle (ROV)		Confirm the position and burial depth of other cables and pipelines that the Proposed Development crosses. Identify pUXO within a 10m corridor to ensure the risk to the survey and subsequent installation is as low as reasonably practicable (ALARP). Plan the scope and positioning of the geotechnical and environmental sampling programme.
Marine geotechnical survey – Terrestrial & Intertidal	Geotechnical boreholes to 20m below seabed	Up to 7 boreholes in total; nominally 4 intertidal/subtidal and 3 onshore, within the proposed Onshore Scheme Scoping Boundary.	Boreholes will be acquired up to 20m below surface to confirm the feasibility of undertaking HDD for the onshore crossing at the landfall. Boreholes are likely to be spaced 250m apart out to 1km from MHWS, however spacing is still to be confirmed. The amount of sediment removed for each borehole will not exceed 1 m^3. The exact borehole drilling methodology for the intertidal area has not yet been confirmed. If bedrock or a cohesive material is expected a rotary drill rig will be used instead. Geological core samples and thermal resistivity measurements will be taken in each borehole.
Marine geotechnical survey – cable corridor	Vibrocore (VC) sampling to 6m below seabed. Cone penetrometer testing (CPTu) to 5m below seabed. Thermal Conductivity (TC) measurement to 5m below seabed.	Up to 180 geotechnical test stations nominally spaced at 1km intervals.	A geotechnical sampling survey will be undertaken to evaluate the nature and mechanical properties of the terrestrial and intertidal, marine superficial and sub-surface seabed sediments.

Legislation, policy and guidance

18.7.6 Legislation and policy relevant to the proposed Scheme and this chapter is outlined in **Chapter 4** Legislation and Policy Overview and **Appendix 4-A** National Policy, **Appendix 4-B** Environmental Legislation and **Appendix 4-C** Local Policy.

18.7.7 Relevant guidance and standards that have informed the scoping process are listed below (but not limited to) and will also be taken into account as part of the assessment:

- 'General advice on assessing potential impacts of and mitigation for human activities on Marine Conservation Zone (MCZ) features, using existing regulation and legislation' (JNCC and Natural England, 2011);
- 'OSPAR Assessment of the Environmental Impacts of Cables' (OSPAR, 2009);
- 'Review of Cabling Techniques and Environmental Effects applicable to the Offshore Wind farm Industry'. Department for Business Enterprise and Regulatory Reform in association with Defra (BERR, 2008); and
- 'Advice Note Eighteen: The Water Framework Directive' (Planning Inspectorate, 2017).

Assessment method

18.7.8 **Chapter 5** EIA Approach and Method sets out the standard EIA methodology and matrixes to be used for the assessment. This section provides a summary of the EIA methodology specifically relevant to this chapter.

18.7.9 Assessment of cumulative and combined effects are discussed in **Chapter 29** Cumulative and Combined effects of the Project.

18.7.10 The criteria for characterising the value and sensitivity and magnitude for marine physical processes are outlined in **Table 18-7** and **Table 18-8** respectively.

Table 18-7 Definitions of value and sensitivity for marine physical processes

Receptor Value and Sensitivity	Description
Very High	Value: Very high importance and rarity, international scale (e.g., designated feature of an SAC. Likely to be minimal potential for substitution. Sensitivity: The receptor has little or no capacity to absorb change without fundamentally altering its present character.
High	Value: High importance and rarity, national scale (e.g., designated feature of a MCZ). Likely to be minimal potential for substitution. Sensitivity: The receptor has little or no capacity to absorb change without fundamentally altering its present character.
Medium	Value: Medium importance and rarity, regional scale (e.g., supporting feature of a SPA, or cited feature of a SSSI). Sensitivity: The receptor has a moderate capacity to absorb change without fundamentally altering its present character.

Receptor Value and Sensitivity	Description
Low	Value: Low importance and rarity, local scale. Sensitivity: The receptor has some tolerance to change without detriment to its character.
Negligible	Value: Not considered to be important (e.g., common or widespread). Sensitivity: The receptor is resistant to change and has capacity to accommodate the proposed changes.

Table 18-8 Definitions of impact magnitude criteria for marine physical processes

Impact Magnitude	Definition
High	Permanent change, total loss or major alternation to key elements/features of the baseline conditions such that post development character/composition of baseline conditions would be fundamentally changed
Medium	Loss or alteration to one or more key elements/features of the baseline conditions such that post development character/ composition will be materially changed
Low	Noticeable, temporary measurable change in attributes or quality. Minor shift away from baseline conditions. Changes arising from the alterations will be detectable but not material; the underlying character/composition of the baseline conditions will be similar to the pre-development situation.
Negligible	Very little change from baseline conditions. Change is barely distinguishable, approximating to a ‘no change’ situation.

18.7.11 The study area for the physical environment baseline within the EIA will be as currently outlined but will be further refined to focus on the final Submarine Cable Corridor. The scope of the physical environment assessment is to characterise the baseline physical processes within the study area and to consider the magnitude and duration of potential impacts of the proposed Offshore Scheme.

18.7.12 To support the characterisation of the baseline a comprehensive coastal processes assessment would be conducted to analyse shoreline erosion rates, shoreline retreat and beach draw down. The assessment will inform the onshore position of the transition joint bay, the trajectory of the trenchless technique to ensure burial over the asset lifetime and the exit point. The land to sea transition will be engineered to ensure asset security i.e., to ensure the cable does not become exposed. This design measure will avoid impacts on coastal morphology during construction and operation.

18.7.13 The marine physical processes assessment approach includes a range of desktop analyses and spreadsheet-based models and this will be supplemented by evidence from analogous assessments and monitoring data (namely from the East Anglia OWF development studies) and other cable projects (the ‘Evidence Base’) to inform the likely scale of any potential impacts.

18.7.14 The assessment of potential impacts to seabed morphology during construction will be based on a semi-quantitative desktop exercise based on the local sediment transport potential and the dimensions of baseline bedforms present, in line with other similar assessments[54].

18.7.15 Spreadsheet based models will be applied to assess the potential suspended sediment concentrations (SSC) and sedimentation associated with pre-sweeping activities for a range of hydrodynamic conditions, sediment types and release rates to capture the impact (in terms of plume extent, concentration, duration of increases and extent and thickness of deposits on the seabed). The assessment will focus on the realistic worst case scenario. The available baseline information and planned geophysical, geotechnical and benthic surveys will provide the data inputs for this assessment. The effects will be assessed in terms of the difference caused relative to the normal range of natural occurrence and variability.

18.7.16 In view of the low percentage of fines present in the sediments along the proposed Submarine Cable Corridors and due to the large existing evidence base which includes multiple similar assessments using numerical modelling tools to assess impacts from cable installation for a range of methods within the study area, no new numerical hydrodynamic modelling is presently considered to be required.

18.7.17 The assessment of impacts associated with changes to the substrate and water depths associated with the deposition of external cable protection will quantify the areas of impact and relative changes in water depth. This will be considered alongside baseline information, results from the benthic survey and expert judgement to determine the likely impact on receptors.

18.7.18 A WFD assessment will be undertaken to assess the potential impacts of the proposed Offshore Scheme on water and sediment quality. It is proposed that the WFD assessment will be presented as a technical appendix, and the results of the assessment will be presented within the Marine Physical Environment and the Hydrology, Hydrogeology and Drainage chapters of the EIA. The assessment of water quality impacts will focus on the impact on turbidity using spreadsheet-based models, with release of contaminated sediments having been scoped out of the assessment.

18.8 Assumptions & limitations

18.8.1 This EIA Scoping Report has been collated based on a range of publicly available data and information only. It is assumed that the data collated is accurate. The data will be supplemented with additional data as part of the EIA process.

18.8.2 In the absence of data, a precautionary approach has been taken and professional judgement, based on experience of similar linear schemes, has been used where required to inform the scope of the assessment.

18.8.3 All potential cable installation methodologies would be assessed to identify if any should be excluded due to the potential for significant impacts, and whether mitigation is required.

[54] ABPmer (2018). Norfolk Vanguard Offshore Wind Farm, Appendix 7.1. ABPmer Sand wave study. For and on behalf of Norfolk Vanguard Limited.

18.8.4 It is considered that no new numerical hydrodynamic modelling is required. Rather the assessment of impacts of increases in suspended sediment concentrations and deposition will be based on spreadsheet-based models.

Contents

19. Intertidal and Subtidal Benthic Ecology

19.1 Introduction

19.1.1 This chapter outlines the proposed scope and methodology for intertidal and subtidal benthic ecology. It will consider the potential for significant effects arising from the construction and operation of the LionLink Scheme (hereafter referred to as 'the proposed Offshore Scheme'). A review of relevant guidance and policy has been undertaken together with a desk-based assessment, to inform the proposed scope and methodology.

19.1.2 This chapter is supported by the following figures:

- **Figure 1-4**: Proposed Offshore Scheme Boundary;
- **Figure 19-1**: Intertidal and subtidal benthic ecology study areas and predicted habitat types; and
- **Figure 19-2**: Relevant designated sites and features within the benthic ecology study area.

19.1.3 There may be interrelationships related to the potential effects on intertidal and subtidal benthic ecology and other disciplines. Therefore, please also refer to the following chapters:

- **Chapter 8**: Ecology and Biodiversity (Onshore) – which identifies the potential impacts on onshore ecology and receptors which might be using the intertidal area;
- **Chapter 12**: Hydrology, Hydrogeology and Drainage – will identify the potential impacts to the onshore water environment;
- **Chapter 18**: Marine Physical Environment – which identifies the spatial extent of potential impacts from temporary sediment suspension and subsequent redeposition; and
- **Chapter 20**: Fish and Shellfish – which identifies the potential impacts on fish and shellfish species may of which rely on specific benthic ecological habitats for prey or breeding habitat.

19.2 Consultation and engagement

19.2.1 Initial non-statutory consultation on the proposed Offshore Scheme has commenced with several stakeholders in relation to Intertidal and Subtidal Benthic Ecology. From November 2022 to November 2023, the Marine Management Organisation (MMO), the Environment Agency (EA), Natural England and Joint Nature Conservation Committee (JNCC) have been provided with introductory briefings on the proposed Offshore Scheme and asked for comment on the non-statutory and supplementary non-statutory consultation.

19.2.2 Engagement will continue with relevant stakeholders in relation to the proposed Offshore Scheme to obtain any information that they hold to supplement the

assessment and to seek their views with regards to the evolving design. This will be undertaken by the Environmental Impact Assessment (EIA) Team.

19.2.3 The following bodies will be consulted during the EIA process:

- Local Planning Authorities;
- Natural England;
- MMO;
- EA;
- JNCC;
- Centre for Environment, Fisheries and Aquaculture Science (Cefas); and
- Eastern Inshore Fisheries and Conservation Authority (EIFCA).

19.3 Baseline conditions

Study area

19.3.1 The proposed Offshore Scheme will route from either the Southwold or Walberswick Landfall across the Southern North Sea to the boundary between the UK and Netherlands Exclusive Economic Zones (EEZ).

19.3.2 The proposed Offshore Scheme Scoping Boundary is illustrated on **Figure 19-1** and is described in **Chapter 2** The Proposed Scheme Description. It includes a proposed Submarine Cable Corridor from each Landfall converging approximately 35km off the east coast of the UK. From the point of convergence there are two Submarine Cable Corridor options (B and C) that cross the Southern North Sea to the UK/Netherlands EEZ boundary.

19.3.3 The study area for the purposes of this scoping exercise includes:

- The proposed Offshore Scheme Scoping Boundary;
- An intertidal area of 2km either side of the landfall sites; and
- A subtidal area of 15km either side of the proposed Offshore Scheme Scoping Boundary. This buffer is based on local tidal excursion distances as defined in **Chapter 18** Marine Physical Environment.

19.3.4 The extent of the study area incorporates the area where there is potential for direct and indirect impacts (associated with the deposition of suspended sediments) to benthic receptors during the construction and operation phases of the proposed Offshore Scheme. The study area therefore covers a precautionary maximum zone of influence (ZoI) within which there may be impacts on benthic ecology receptors.

19.3.5 The zone of influence, and therefore the study area, will remain under iterative review in response to refinement of the project design, feedback from consultees, identification of additional constraints (e.g., engineering or environmental constraints identified by detailed site-specific studies), selection of the preferred Landfall and Submarine Cable Corridor and any sediment dispersion modelling undertaken (if required) to inform the marine physical environment assessment. The study area is shown in **Figure 19-1**.

19.3.6 The study area will be reviewed and, as appropriate, refined for the assessment in the Preliminary Environmental Information (PEI) Report and Environmental Statement (ES) with only one landfall and one submarine cable corridor being taken forward. This will be based on the proposed Order limits in the ES.

Baseline data sources

19.3.7 The baseline described in this chapter and associated appendices has been informed by the following data sources:

Table 19-1 Scoping baseline data sources

Baseline Data	Source
Marine protected areas	JNCC Conservation Advice for Marine Protected Areas
Marine protected areas	Natural England Conservation Advice for Marine Protected Areas
Marine species records	National Biodiversity Network (NBN) Atlas
Marine habitat sensitivity assessment data	Marine Life Information Network (MarLIN)
Marine habitats data	JNCC
Marine habitats data	British Geological Survey (BGS) GeoIndex Offshore portal
Habitat suitability for Annex I reef	European Marine Observation Data Network (EMODnet) Habitat Suitability Model *Sabellaria spinulosa* reefs in the UK[1]
Seabed habitat	European Union Nature Identification System (EUSeaMap) broadscale seabed predictive habitat map[2]
Marine habitats data	Cefas OneBenthic Baseline Tool
Regional Environmental Characterisation (REC) studies	Limpenny et al. (2011)[3]
Designated and protected sites information	Magic maps[4]

[1] EMODnet (2020). Habitat Suitability Model for Sabellaria spinulosa reefs in the UK. (Online) Available from: Habitat Suitability Model for Sabellaria spinulosa reefs in the UK: 2020 | JNCC Resource Hub

[2] EU Seamap (2021) EMODnet broad-scale seabed habitat map for Europe. Available at: https://emodnet.ec.europa.eu/en/euseamap-2021-emodnet-broad-scale-seabed-habitat-map-europe

[3] Limpenny, S.E., Barrio Froján, C., Cotterill, C., Foster-Smith, R.L., Pearce, B., Tizzard, L., Limpenny, D.L., Long, D., Walmsley, S., Kirby, S., Baker, K., Meadows, W.J., Rees, J., Hill, J., Wilson, C., Leivers, M., Churchley, S., Russell, J., Birchenough, A.C., Green, S.L., and Law, R.J. The East Coast Regional Environmental Characterisation. Cefas Open Report 08/04. 2011. 287pp.

[4] MAGIC (online). Available from https://magic.defra.gov.uk (May 2023).

Baseline

19.3.8 The following sections present the current baseline established at scoping. There are currently two corridors being considered for the proposed Submarine Cable Corridor, which are shown in **Figure1-4**. Baseline information is presented for both options below.

19.3.9 Benthic ecology refers to the diversity, abundance and function of organisms living in (infauna) or on (epifauna) the seabed up to mean high-water springs (MHWS). For the purpose of this EIA Scoping Report, shellfish are covered in **Chapter 20** Fish and Shellfish whilst habitats and species landward of MHWS have been considered in **Chapter 8** Ecology and Biodiversity (Onshore).

19.3.10 The baseline environment within the study area has been described in the following sub-sections using publicly available information. Habitats have been reported according to the European Union Nature Identification System (EUNIS) for classifying benthic habitats[5].

19.3.11 For the EIA, this information will be supplemented by additional publicly available data and project-specific survey data (see **Section 19.7** for further details) to provide an up-to-date and robust characterisation of the benthic environment within the study area.

Intertidal

19.3.12 The intertidal habitat at the proposed Southwold Landfall site can be characterised by sand and gravel substrates[6]. An area of circalittoral fine sand or circalittoral muddy sand (EUNIS A5.25 or A5.26) is located immediately next to the landfall with a small area of infralittoral fine sand or infralittoral muddy sand (EUNIS A5.23 or A5.24) just south of the landfall.

19.3.13 An area of littoral mixed sediments (EUNIS A2.4) is located immediately south of the proposed Walberswick Landfall Site and falls entirely within the study area. The nearshore region of the study area is characterised by subtidal sand (EUNIS A5.2).

19.3.14 Several coastal habitats of principal importance as listed under Section 41 of Natural Environment and Rural Communities Act (2006) are present within or adjacent to the study area. These include coastal saltmarsh (EUNIS A2.5), maritime cliffs and slopes, coastal sand dunes, mudflats and saline lagoons[7]. Coastal saltmarsh and maritime cliffs and slopes are found along the Walberswick coastline, with mudflats located at the mouth, and along the banks of the River Blyth. Coastal sand dunes also straddle the mouth of the River Blyth whilst there is a saline lagoon located immediately north of the proposed Southwold Landfall.

Subtidal

19.3.15 BGS data indicates that subtidal seabed substrates within the study area are characterised by large swathes of sand, particularly close inshore and offshore within the northern region of the study area. These substrates are interspersed with gravelly sand and sandy gravel regions, particularly within the central portion of the study area. There are also small discrete regions of muddy sand, gravelly muddy sand and gravel.

[5] European Environment Agency. EUNIS habitat classification, 2021. (Online) Available at: https://www.eea.europa.eu/data-and-maps/data/eunis-habitat-classification-1

[6] MAGIC (online). Available from https://magic.defra.gov.uk (May 2023).

[7] EU Seamap (2021) EMODnet broad-scale seabed habitat map for Europe. Available at: https://emodnet.ec.europa.eu/en/euseamap-2021-emodnet-broad-scale-seabed-habitat-map-europe

19.3.16 Broadscale regional habitat mapping[7], as illustrated in **Figure 19-1,** suggests that the dominant habitat types within the study area include circalittoral find sand or circalittoral muddy sand (EUNIS A5.25 or A5.26), deep circalittoral sand (EUNIS A5.27) and deep circalittoral coarse sediment (EUNIS A5.15).

19.3.17 EUSeaMap[8] predictions are consistent with the findings of the East Coast Regional Environmental Classification (REC) work and site-specific survey data collected within the Former East Anglia Zone and various offshore windfarm sites that fall within the study area [9],[10], [11], [12], [13], and [14].

19.3.18 The following represents a complete list of EUNIS habitat types predicted to be present within the study area[9] (**Figure 19-1**):

- A2.4 Littoral Mixed Sediment;
- A2.5 Coastal saltmarshes and saline reedbeds;
- A5.14: Circalittoral coarse sediment;
- A5.15: Deep circalittoral coarse sediment;
- A5.23 or A5.24: Infralittoral fine or infralittoral muddy sand;
- A5.25 or A5.26: Circalittoral find sand or circalittoral muddy sand;
- A5.27: Deep circalittoral sand;
- A5.35: Circalittoral sandy mud;
- A5.37: Deep circalittoral mud;
- A5.44: Circalittoral mixed sediment;
- A5.45: Deep circalittoral mixed sediment;
- A5.6: Sublittoral biogenic reefs; and
- A5.611: [*Sabellaria spinulosa*] on stable circalittoral mixed sediment.

19.3.19 **Table 19-2** shows the sediment types the proposed Submarine Cable Corridors pass through.

[8] EU Seamap (2021) EMODnet broad-scale seabed habitat map for Europe. Available at: https://emodnet.ec.europa.eu/en/euseamap-2021-emodnet-broad-scale-seabed-habitat-map-europe

[9] Limpenny, S.E., Barrio Froján, C., Cotterill, C., Foster-Smith, R.L., Pearce, B., Tizzard, L., Limpenny, D.L., Long, D., Walmsley, S., Kirby, S., Baker, K., Meadows, W.J., Rees, J., Hill, J., Wilson, C., Leivers, M., Churchley, S., Russell, J., Birchenough, A.C., Green, S.L., and Law, R.J. The East Coast Regional Environmental Characterisation. Cefas Open Report 08/04. 2011. 287pp.

[10] Vattenfall & Scottish Power Renewables (SPR). East Anglia THREE Environmental Statement. Chapter 10 Benthic Ecology. Document Reference – 6.1.10. 2015, 125 pp.

[11] Scottish Power Renewables (SPR). East Anglia One North Offshore Windfarm. Chapter 9 Benthic Ecology. 2019a, 120 pp.

[12] Scottish Power Renewables (SPR). East Anglia TWO Offshore Windfarm. Chapter 9 Benthic Ecology. 2019b, 116 pp.

[13] Vattenfall. Norfolk Vanguard Offshore Wind Farm Environmental Statement. Appendix 10.1 Fugro (2016) Benthic Characterisation Report. Document Reference: 6.2.10.1. 2018, 452 pp.

[14] Vattenfall. Norfolk Boreas Offshore Wind Farm Environmental Statement. Chapter 10 Benthic and Intertidal Ecology. Document Reference: 6.1.10. 2019, 126 pp.

Table 19-2 Sediment types along the proposed Submarine Cable Corridors

Proposed Submarine Cable Corridor	
B	**C**
A5.25 or A5.26: Circalittoral find sand or circalittoral muddy sand	A5.25 or A5.26: Circalittoral find sand or circalittoral muddy sand
A5.35: Circalittoral sandy mud	A5.35: Circalittoral sandy mud
A5.27: Deep circalittoral sand	A5.27: Deep circalittoral sand
A5.45: Deep circalittoral mixed sediment	A5.45: Deep circalittoral mixed sediment
A5.15: Deep circalittoral coarse sediment	A5.15: Deep circalittoral coarse sediment
A5.6: Sublittoral biogenic reefs	A5.6: Sublittoral biogenic reefs

19.3.20 *Sabellaria spinulosa* on stable circalittoral mixed sediment (EUNIS A5.611) is predicted to occur in a localised area located approximately 9km to the south of the proposed Offshore Scheme Scoping Boundary, where the two proposed Submarine Cable Corridors share a common route.

19.3.21 Sublittoral biogenic reefs (EUNIS A5.6) are predicted to occur more widely, although distributed predominately around the 12 nautical mile (NM) limit where the proposed Submarine Cable Corridors from the Southwold and Walberswick Landfalls converge. The proposed Submarine Cable Corridors have been designed to avoid mapped areas of sublittoral reef.

19.3.22 Sandy habitats within the study area form predominately mobile features (sandbanks, sand waves and mega ripples) characterised by robust and sometimes, impoverished faunal assemblages dominated by mobile polychaete worms (e.g., *Sabellaria spinulosa*, *Spiophanes bombyx, Nephtys cirrosa*), malacostracan crustaceans (e.g. *Pisidia longicornis*) and bivalve species (e.g. *Abra alba* and *Fabulina fabula*) ([15],[16] ,[17], [18],[19] , [20]). Siltier sediments found predominately inshore are characterised by species such as mud shrimp (*Corophium volutator)*, hydroids (e.g., *Sertularia cupressina* and *Vesicularia spinosa*), bristle worms (e.g., *Notomastus* sp., *Eunereis longissimi* and *Scalibregma inflatum*) ([17], [18]).

19.3.23 Epifaunal sampling within the study area suggests that communities are dominated by Malacostraca which include crabs, lobsters, shrimp, krill, and amphipods ([15], [17], [18]). Within this group the brown shrimps (*Crangon allmanni* and *Crangon crangon*), hermit crabs (*Paguridae*) and the crab, *Liocarcinus holsatus* are particularly abundant.

[15] European Environment Agency. EUNIS habitat classification, 2021. (Online) Available at: https://www.eea.europa.eu/data-and-maps/data/eunis-habitat-classification-1

[16] Vattenfall & Scottish Power Renewables (SPR). East Anglia THREE Environmental Statement. Chapter 10 Benthic Ecology. Document Reference – 6.1.10. 2015, 125 pp.

[17] Scottish Power Renewables (SPR). East Anglia One North Offshore Windfarm. Chapter 9 Benthic Ecology. 2019a, 120 pp.

[18] Scottish Power Renewables (SPR). East Anglia TWO Offshore Windfarm. Chapter 9 Benthic Ecology. 2019b, 116 pp.

[19] Vattenfall. Norfolk Vanguard Offshore Wind Farm Environmental Statement. Appendix 10.1 Fugro (2016) Benthic Characterisation Report. Document Reference: 6.2.10.1. 2018, 452 pp.

[20] Vattenfall. Norfolk Boreas Offshore Wind Farm Environmental Statement. Chapter 10 Benthic and Intertidal Ecology. Document Reference: 6.1.10. 2019, 126 pp.

Brittlestars (*Ophiuroidea*) are also found to dominant epifaunal communities within East Anglia THREE and the Norfolk Boreas wind farm sites ([21], [22]).

Designated sites and protected habitats

19.3.24 A review has been undertaken to identify designated sites within the study area which are either designated for intertidal and subtidal benthic features or habitats/species which are dependent on or associated with intertidal and benthic ecology.

19.3.25 As shown in **Figure 19-2**, a number of international and national designated sites have been identified, several of which are designated for benthic ecology features. All proposed submarine cable corridors do not intersect any SACs. **Table 19-3** and **Table 19-4** provide further details about designated sites including their qualifying features and distance from the proposed Offshore Scheme Scoping Boundary.

Table 19-3 Offshore sites designated for benthic ecology within the study area

Site name and code	Distance from proposed Submarine Cable Corridor		Summary
	B	C	
North Norfolk Sandbanks and Saturn Reef SAC (UK0030358)	14.2km	>20km	This marine SAC is designated for the protection of Annex I 'sandbanks which are slightly covered by seawater all the time' and 'reefs' owing to the presence of linear ridge sandbanks and *S.spinulosa* biogenic reef. The proposed Submarine Cable Corridors do not overlap the SAC.
Haisborough, Hammond and Winterton SAC (UK0030369)	10.6km	>20km	The Haisborough, Hammond and Winterton SAC is located to the west of the proposed Submarine Cable Corridors and the proposed Submarine Cable Corridors do not overlap with the SAC. The SAC is designated for the protection of Annex I 'sandbanks which are slightly covered by seawater all the time' and 'reefs'. The site contains a series of sandbanks separated by troughs containing more gravelly sediments which support aggregations of *S.spinulosa*.

[21] Vattenfall & Scottish Power Renewables (SPR). East Anglia THREE Environmental Statement. Chapter 10 Benthic Ecology. Document Reference – 6.1.10. 2015, 125 pp.

[22] Vattenfall. Norfolk Boreas Offshore Wind Farm Environmental Statement. Chapter 10 Benthic and Intertidal Ecology. Document Reference: 6.1.10. 2019, 126 pp

Table 19-4 Onshore sites designated for benthic ecology within the study area

Site name and code	Distance from Landfall		Summary
	Southwold	Walberswick	
Minsmere-Walberswick Heaths and Marshes SAC (UK0012809)	3.3km	0.1km	This SAC overlaps with the intertidal study area at the proposed Walberswick Landfall. This site is designated for the primary protection of Annex I 'annual vegetation of drift lines'.
Benacre to Easton Bavents Lagoons SAC (UK0013104)	1.5km	4.1km	This SAC is located to the north of the study area and is designated for the protection of Annex I 'coastal lagoons'.
Minsmere-Walberswick Ramsar	3.3km	0.1km	This Ramsar overlaps with the intertidal study area at the proposed Walberswick Landfall. This site is designated for the protection of a mosaic of marine, freshwater, marshland and associated habitats.
Pakefield to Easton Bavents Site of Special Scientific Interest (SSSI)	0.22km	3.1km	This SSSI overlaps with the intertidal study area at the proposed Southwold Landfall. This site is designated for the protection of a range of coastal habitats including vegetated shingle features and saline lagoons.
Minsmere-Walberswick Heaths and Marshes SSSI	3.3km	0.1km	This SSSI overlaps with the intertidal study area at the proposed Walberswick Landfall. This site is designated for the protection of a range of coastal habitats including mudflats and shingle beach.

19.3.26 Sandbanks within the inshore region of the study area (**Figure 19-2**) are supporting features of the Outer Thames Estuary Special Protection Area (UK9020309). This habitat is of importance for foraging red-throated diver (*Gavia stellata*) which is a qualifying feature of the Outer Thames Estuary SPA.

19.3.27 Sandy coarse sediments within the study area which overlap with the Southern North Sea SAC are also considered to be important habitat for harbour porpoise (*Phocoena phocoena*) likely due to the availability of associated prey species.

19.3.28 A Habitats Regulations Assessment (HRA) Stage 1 Screening exercise will be undertaken to consider possible impacts to European designated sites (SACs, Sites of Community Importance (SCIs) and Ramsar sites).

19.3.29 The Orford Inshore Marine Conservation Zone (MCZ) which is designated for subtidal mixed sediments is located approximately 8.5km outside of the study area and is therefore considered to be beyond the maximum ZoI for indirect impacts.

19.3.30 Annex I habitats are defined under the Council Directive 92/43/EEC on the Conservation of Natural Habitats and of Wild Fauna and Flora; more commonly referred to as the European Commission Habitats Directive (1992) as amended. This legislation has been translated into UK legislation via The Conservation of Habitats and Species Regulations (2017) ("the Habitats Regulations") and The Conservation of Offshore Marine Habitats and Species Regulations (2017) ("the Offshore Habitats Regulations). Under these regulations, species and habitats that fall into specific categories are eligible for legal protection from activities that have the potential to damage them. Annex I habitats are protected through a network for SACs which forms part of the National Site Network that aims to establish a network of important high-quality conservation sites that will make a significant contribution to conserving the habitats listed in Annex I.

19.3.31 The following Annex I habitats are present within the study area:

- Sandbanks which are slightly covered by seawater all the time;
- Reefs;
- Annual vegetation of drift lines; and
- Coastal lagoons.

19.3.32 Seven habitats listed under Section 41 of the 2006 Natural Environment and Rural Communities (NERC) Act as being of 'principal importance' are also present. Five are located intertidally, within the upper littoral fringe or adjacent to this region. These include coastal saltmarsh, maritime cliffs and slopes, coastal sand dunes, intertidal mudflats and saline lagoons. The remaining two habitats include 'subtidal sand and gravels' and *S.spinulosa* reefs.

Future baseline

19.3.33 The Intertidal and Subtidal Benthic Ecology chapter within the PEI Report and ES will consider changes which may affect the future environment in the absence of the proposed Offshore Scheme. The future baseline will also take into account any developments that are likely to be present in the future baseline.

19.3.34 The existing baseline conditions for intertidal and subtidal benthic ecology within the study area are relatively stable. Multiple datasets covering several years demonstrate similar patterns. This can be demonstrated from the findings in the site-specific surveys in close proximity to the study area. The results from surveys conducted across the East Anglia ONE North windfarm site in 2010 and 2011 show similar finding to the North Vanguard site-specific surveys conducted in 2016.

19.3.35 The existing environment within the study area has been largely influenced by a combination of physical processes which occur within the Southern North Sea (**Chapter 18** Marine Physical Processes) and anthropogenic activities, such as fishing, in particular beam trawling (**Chapter 24** Commercial Fisheries) and the development of offshore wind farms which has led to an increasing number of man-made structures in the marine environment (**Chapter 25** Other Marine Users). Therefore, it is noted the baseline conditions for benthic communities are not static.

19.3.36 Anthropogenic induced climate change causing increases in sea temperatures may result in large spatial shifts to the marine benthic ecosystem[23]. Northerly migration of benthic species is likely to occur and at a large scale this would result in changes to the abundance and species composition of benthic communities[24]. A survey was conducted by Hiddink, Burrows and Molinos (2014[25]) which focused on evaluating the changes in distribution of 65 common and widespread North Sea benthic invertebrate species between 1986 and 2000. The species geographic, bathymetric and thermal shifts were taken into account. The study supported the predicted northerly migration of species with many benthic invertebrates showing north-westerly range shifts and a movement towards deeper and cooler waters. Shifts in distribution were found to correspond with increases in surface and seabed temperatures. Studies noted that if the examined species are unable to adjust to or endure an increase in temperature in the North Sea, there may be a decrease in benthic biodiversity.

19.4 Potential impacts

19.4.1 This section identifies, at a high level, a summary of the sources and potential impacts as a result of the proposed Offshore Scheme during the construction and operational phases.

19.4.2 Potential impacts on intertidal and subtidal benthic ecology have been established by the EIA Team based on industry experience and where applicable reference to the list of marine pressures established by the Joint Nature Conservation Committee (JNCC) Marine Pressures-Activities Database v1.5 (2022) and Natural England's advice on operations for relevant European protected sites.

Construction

19.4.3 The following impacts could occur during the construction phase:

- Temporary habitat loss / seabed disturbance as a consequence of activities such as anchoring, seabed preparation (e.g., pre-lay grapnel run, boulder and potential unexploded ordnance (UXO) removal, sand wave pre-sweeping and cutting of Out of Service cables), and cable burial.
  - The relevant JNCC pressures that would be covered by this impact include:
    - Abrasion / disturbance of the substrate on the surface of the seabed; and
    - Penetration and/or disturbance of the substratum below the surface of the seabed, including abrasion.
- Permanent habitat loss as a result of the deposition of external cable protection (including any associated scour).
  - The relevant JNCC pressures that would be covered by this impact include:

[23] Brierley, A. S. and Kingsford, M. J. (2009) Impacts of Climate Change on Marine Organisms and Ecosystems. Volume 19, Issue 14, Pages R602-R614

[24] Cummings, V. J., Hewitt, J. E., Thrush, S. F., Marriott, P. M., Halliday, N. J., and Norkko, A. (2018) Linking Ross Sea Coastal Benthic Communities to Environmental Conditions: Documenting Baselines in a Spatially Variable and Changing World. *Frontiers in Marine Science* 5.

[25] Hiddink, G. J., Burrows, M. T. and Molinos, G. J. (2014). Temperature tracking by North Sea benthic invertebrates in response to climate change. Global Change Biology (21) pp. 117-129, doi 10.1111/gcb.12726

    - Physical change (to another seabed type or sediment type); and
    - Water flow (tidal current) changes including sediment transport considerations).

- Temporary increase and deposition of suspended sediments during seabed preparation (specifically pre-sweeping) and cable burial.
  - The relevant JNCC pressures that would be covered by this impact include:
    - Changes in suspended solids (water clarity);
    - Smothering and siltation rate changes; and
    - Hydrocarbon & polycyclic aromatic hydrocarbons (PAH) contamination.
- Underwater noise changes due to the presence of proposed Scheme vessels and equipment may result in temporary underwater noise changes which could disturb sensitive benthic species.
- Introduction or spread of marine invasive non-native species (MINNS) due to the presence of project vessels and equipment and deposit of external cable protection.
- Changes in marine water quality e.g., as a result of accidental spills due to the presence of project vessels and equipment. The use of horizontal directional drilling (HDD) drilling fluids during cable installation and cable lay and accidental leaks and spills from project vessels and equipment may lead to changes in marine water quality with resultant indirect impacts on sensitive benthic species.
- Transboundary impacts as a result of a temporary increase in suspended sediments and subsequent deposition, water quality changes, underwater noise changes and the introduction or spread of MINNS close to the EEZ boundary.

Operation

19.4.4 The following impacts could occur during the operational phase:

- Temporary habitat loss / seabed disturbance associated with a cable repair.
  - The relevant JNCC pressures that would be covered by this impact are the same as for installation.
- Permanent habitat loss due to the deposition of remedial external cable protection e.g., due to cable exposure or cable repair.
  - The relevant JNCC pressures that would be covered by this impact are the same as for installation.
- Electromagnetic changes / Barrier to species movement. During operation the high voltage direct cables generate electromagnetic fields (EMF) which although dissipate rapidly can represent a change in the natural magnetic field.
- Changes in marine water quality e.g., as a result of accidental spills due to the presence of project vessels and equipment during cable repairs or routine maintenance surveys.
- Introduction or spread of MINNS due to the presence of project vessels and equipment during cable repairs or routine maintenance surveys and deposit of remedial external cable protection e.g., due to cable exposure or cable repair.

- Underwater noise due to the presence of cable repair/maintenance vessels and equipment.
- Temperature increase in sediments due to the presence of operating cables.
- Transboundary impacts as a result of a temporary increase in suspended sediments and subsequent deposition, water quality changes, underwater noise changes and the introduction or spread of MINNS close to the EEZ boundary.

19.5 Design and control measures

19.5.1 As outlined in **Chapter 5** EIA Approach and Method, a standard hierarchical approach will be taken to mitigation.

19.5.2 The assessment of effects will take into account measures that are embedded into the proposed Offshore Scheme design, together with general good practice measures.

Design measures

19.5.3 Design measures to be implemented as part of the Offshore Scheme include:

- A full EMF assessment will be undertaken during the detailed design phase. Where practicable cable burial shall be the preferred means of cable protection, to reduce the impacts associated with habitat loss and EMF on sensitive benthic receptors and minimise the requirement for additional cable protection.
- If feasible, all cables will be installed in one trench. If not feasible, where practicable the two high voltage direct current (HVDC) submarine cables will be bundled together and installed with a fibre optic cable in one trench with the metallic return cable and a separate fibre optic cable in a second trench.
- Cable route will be designed to minimise the risk of exposure by seabed mobility.
- The proposed Submarine Cable Corridors have been sited, where possible, to avoid overlap with sites designated to protect benthic habitat features and areas of mapped Annex I habitat.
- An HDD cable installation method will be used to minimise habitat loss and disturbance within the intertidal zone, with the HDD exit seaward of the 0m LAT.
- Where possible, submarine cable installation will be micro-sited around sensitive benthic features. These features will be identified from surveys of the proposed Submarine Cable Corridor and publicly available information. Their sensitivity will be determined using the MarESA sensitivity assessment.

Control measures

19.5.4 Control measures to be implemented as part of the Offshore Scheme include:

- A Construction Code of Practice (CCOP) (for the construction and operation phases) will be developed and adhered to. This documentation will detail the proposed Schemes commitment to best practice guidance and procedures including:
  - The designation of (as minimal as possible) anchoring areas and implementation of protocols during marine operations to minimise physical disturbance of the seabed.

- Production of an Emergency Spill Response Plan and Waste Management Plan, Marine Pollution Contingency Plan (MPCP) and a dropped object procedure.
- Adherence of all project vessels to the International Convention for the Control and Management of Ships' Ballast Water and Sediments with the aim of preventing the spread of MINNS.
- Compliance of all project vessels with the regulations relating to International Convention for the Prevention of Pollution from Ships (the MARPOL Convention 73/78) (IMO, 1983)[26] with the aim of preventing and minimising pollution from ships.
- Careful management of drilling fluids required for trenchless operations to minimise the risk of breakouts into the marine environment. Specific avoidance measures would include: the use of biodegradable drilling fluids (PLONOR substances) where practicable, drilling fluids will be tested for contamination to determine possible reuse or disposal; and if disposal is required drilling fluids would be transported by a licensed courier to a licensed waste disposal site.
- Production of a biosecurity plan following the latest guidance on MINNS from the Great Britain (GB) non-native species secretariat.
- Adherence of all project vessels to the International Maritime Organisation (IMO) Guidelines for the control and management of ships' biofouling to minimize the transfer of invasive aquatic species (Biofouling Guidelines) (IMO, 2011)[27].

- Sediments in areas where pre-sweeping is proposed will be tested in line with MMO sampling plan requirements to ensure compliance with Cefas Action Levels for disposal.

19.6 Scope of the assessment

19.6.1 This section identifies the potential for the proposed Offshore Scheme to have likely significant effects, taking into account the design and control measures identified in **Section 19.5**.

19.6.2 **Table 19-5** sets out the receptors within the study area that have been identified, whether there is a pathway for the impacts identified, the potential for significant effects and if the receptor is scoped in for the assessment.

19.6.3 All identified impacts are of relevance to both the Southwold and Walberswick Landfall options and both Submarine Cable Corridor options unless specified otherwise.

19.6.4 A precautionary approach has been taken and where there is no strong evidence base, insufficient baseline or the significance is uncertain at this stage the impact has been scoped into the EIA. Where there is a clear evidence base that the effect from the impact will not be significant, either alone or in combination with other plans and projects, the impact has been scoped out of the EIA.

[26] International Maritime Organisation (IMO) (1974). International Convention for the Safety of Life at Sea (SOLAS) 1974. [online] Available at: https://treaties.un.org/doc/Publication/UNTS/Volume%201184/volume-1184-I-18961-English.pdf.

[27] International Maritime Organisation (IMO) (2011). 2011 Guidelines for the Control and Management of Ships' Biofouling to Minimize the Transfer of Invasive Aquatic Species. Annex 26, Resolution MEPC.207(62), Adopted 15 July 2011. [online] Available at: https://wwwcdn.imo.org/localresources/en/KnowledgeCentre/IndexofIMOResolutions/MEPCDocuments/MEPC.207(62).pdf.

Table 19-5 Proposed scope of the assessment

Project phase	Receptor	Impact	Potential for significant effect	Proposed to be scoped in/ out
Construction and operation	Intertidal and nearshore habitats	Temporary habitat loss / seabed disturbance	Due to the presence of a sea wall at the Southwold Landfall and height difference between the onshore compound and the intertidal area at the Walberswick Landfall, the proposed Scheme will be required to use a trenchless technology such as HDD to avoid these features. The HDD will exit seaward of the low water mark and will therefore avoid disturbance of the intertidal area. The boundary of the proposed Onshore Scheme lies above mean high water springs and therefore outside of the intertidal zone. It is possible that some access may be required on the intertidal area to facilitate transition between the proposed Onshore and proposed Offshore Scheme. This may include the presence of personnel or vehicles e.g., to check the drilling trajectory, collect floats used during cable pull-in or other activities. During the operational phase there will no requirement for repair works on HDD ducts. In the unlikely event of a cable fault in the HDD duct, a repair would not be feasible and therefore a new HDD duct would be installed and a new cable pulled through. This would be the subject of a new permit application.	Scoped Out
Construction and operation	Subtidal – broadscale habitats	Temporary habitat loss / seabed disturbance	The study area is characterised by commonly occurring infralittoral and circalittoral habitats (e.g., A5.15, A5.27 and A5.25 or A5.26) that are widely distributed within the Southern North Sea region. MarLIN sensitivity assessments for these habitats indicate that due to the burrowing life habitat of the dominant species the habitat has a low sensitivity to abrasion and penetration. Whilst species within the immediate footprint of the installation activities will be affected, the medium to high resilience of the habitat indicates that recovery will occur in the short-term. Although the significance of the effect will vary	Scoped Out

Project phase	Receptor	Impact	Potential for significant effect	Proposed to be scoped in/ out
			according to the techniques used during cable burial (e.g., jet or plough trenching) and the sensitivity of the habitat, given the nature of the predicted effects on broadscale habitats, these would not be significant. If the cable is installed correctly the likelihood of it requiring maintenance and repair is significantly reduced. However, there remains the potential that localised repair works may be required. Remedial works may result in temporary physical disturbance to intertidal and subtidal benthic habitats and species which could lead to temporary loss of these habitats and associated species. In these circumstances the significance of the effect will be of lower magnitude than during installation and has therefore been scoped out of the assessment for the same reasons.	
Construction and operation	Subtidal – Annex I habitats	Temporary habitat loss/seabed disturbance	The results of the benthic surveys outlined in **Section 19.7** will determine if any Annex I habitats are presented within the proposed Submarine Cable Corridor. Annex I habitats such as biogenic reef, have the potential to be significantly affected by cable installation as they typically have a higher sensitivity and lower resilience to abrasion and penetration. If the cable is installed correctly the likelihood of it requiring maintenance and repair is significantly reduced. However, there remains the potential that localised repair works may be required. Remedial works may result in temporary physical disturbance to intertidal and subtidal benthic habitats and species which could lead to temporary loss of these habitats and associated species. In these circumstances the significance of the effect will be of lower magnitude than during installation and has therefore been scoped out of the assessment for the same reasons.	Scoped In

Project phase	Receptor	Impact	Potential for significant effect	Proposed to be scoped in/ out
Construction and operation	Subtidal habitats and species	Permanent habitat loss	The deposit of external cable protection has the potential to change the seabed type. This may alter the benthic habitats either directly due to a change in the substrate (e.g., sand to rock) or indirectly due to changes to local hydrodynamic conditions (e.g., increase risk of scour). The significance of the effect will vary according to the sensitivity of the habitat and the spatial extent of the deposits. Annex I habitats have a high sensitivity to this pressure due to the potential for reclassification of the habitat type. The results of the benthic surveys outlined in **Section 19.7** will determine if any Annex I habitats are present within the Submarine Cable Corridor. If the cable is installed correctly the likelihood of it requiring maintenance and repair is significantly reduced. However, there remains the potential that localised repair works, or remedial external cable protection may be required. Remedial works may result in the introduction of hard substrates which would otherwise relace soft substrates. This could lead to the permanent loss of these habitats and associated species. In these circumstances the significance of the effect will be of lower magnitude than during installation.	Scoped In
Construction and operation	Subtidal habitats and species	Temporary increase and deposition of suspended sediments during seabed preparation (specifically pre-sweeping)	During construction and occasionally during operation, pre-sweeping is used to either remove portions of sand waves to allow the cables to be buried to below the mobile sediments, or to expose the previously buried cable to enact a repair or remove the cables. Pre-sweeping involves the re-positioning of large quantities of sediment from the proposed Submarine Cable Corridor to either immediate alongside, or to a separate disposal location. Depending on the technique used and the size of sand waves requiring pre-sweeping, the redeposition of sediment can cause smothering >10cm deep over relatively wide areas of seabed (in the order of tens of thousands square metres).	Scoped In

Project phase	Receptor	Impact	Potential for significant effect	Proposed to be scoped in/ out
			Effects could potentially be significant if the disposal site contains sensitive Annex I habitat. Therefore, the impact pathway cannot be scoped out for this specific activity until further information is available on the areas that will require pre-sweeping.	
Construction and operation	Subtidal habitats and species	Temporary increase and deposition of suspended sediments	Burying the cable into the seabed (during cable installation or during the repair of a cable during operation) will generate a sediment plume. The size of the plume and consequent area affected by changes in suspended sediments depends on the trenching technique deployed e.g., ploughing will create a slightly larger footprint than jet trenching. However, in both cases the spatial extent of heavy smothering is extremely localised, restricted to less than a couple of metres either side of the trench[28] [29] and significant effects are unlikely. Modelling undertaken for other cable projects indicates that approximately 90% of the suspended sediment is re-deposited within close proximity (<100m) and would be classed as heavy smothering. The remaining 10% is transported over a wide area, which depending on the strength of the prevailing currents could be as far as 10 – 15km but will be deposited in thicknesses of less than 2mm. With respect to changes in water clarity, the benchmark used by Natural England for the pressure is a change in one rank e.g., from clear to intermediate, on the Water Framework Directive scale for one year. While trenching is undertaken a sediment plume will be generated continuously, but it will move with the location of the cable spread. Sands and gravels do not form part of the sediment load and will quickly settle out of	Scoped Out

[28] GridLink (2020). GridLink Interconnector Marine Environmental Report. 5.6.3.1 Change in suspended solids (Water clarity) pg 5-47

[29] BERR (2008) Review of cabling techniques and environmental effects application to the offshore wind farm industry.

Project phase	Receptor	Impact	Potential for significant effect	Proposed to be scoped in/ out
			suspension. Modelling undertaken for other cable projects[30,31] concluded that regardless of the position along a cable route, the sediment plume generated is aligned with the dominant tidal axis. Material is therefore deposited primarily along the dominant tidal axis but with some lateral extension. Over most of the plume the increase in suspended sediment concentrations is generally lower than 30mg/l with natural conditions returning within a single tidal cycle following the cessation of activities. Overall, the change in water clarity is unlikely to be significant and generally in line with changes experienced during storm conditions which can produce a six-to-eight-fold increase in turbidity over calm weather conditions[32]. Sediment contamination in the Southern North Sea is focused on areas of high anthropogenic activity e.g., around disposal sites, estuaries and where drilling activity has taken place. Cable routeing has avoided these areas and therefore the likelihood of significant quantities of contaminated sediments being released into the water column as a result of the proposed Scheme is extremely low. Indirect effects from the mobilisation of contaminants entering the food chain are not predicted to be significant. As outlined in **Section 19.5**, sediments in areas where pre-sweeping is proposed will be tested to ensure compliance with Cefas Action Levels for disposal. If the cable is installed correctly the likelihood of it requiring maintenance and repair is significantly reduced. However, there remains the potential that localised repair works may be	

[30] GridLink (2020) GridLink Marine Environmental Report. Available at: https://gridlinkinterconnector.com/wp-content/uploads/2021/02/UK-Marine-Environmental-Report.pdf

[31] BERR (2008) Review of cabling techniques and environmental effects application to the offshore wind farm industry.

[32] Meißner, K., Schabelon, H., Bellebaum, J. and Sordyl, H. (2006): Impacts of submarine cables on the marine environment a literature review. Institut für Angewandte Ökosystemforschung, Neu Broderstorf. 88 pp.

Project phase	Receptor	Impact	Potential for significant effect	Proposed to be scoped in/ out
			required. The significance of effects from remedial works will be of lower magnitude than during installation and has therefore been scoped out of the assessment for the same reasons.	
Construction and operation	Subtidal habitats and species	Transboundary Impacts - Temporary increase and deposition of suspended sediments	As a linear infrastructure project between two countries the proposed Offshore Scheme boundary stops at the border between UK and Netherlands. However, potential impacts during construction and if necessary, cable repair during operation, will not stop, but will continue along the route of the submarine cables. There is therefore the potential that a temporary increase in suspended sediments and subsequent deposition caused by seabed preparation, cable burial and repair and any cable removal activities will cross from UK waters into the Netherlands EEZ. The effects will be limited in spatial extent in close proximity to the EEZ boundary. The assessment for the Project in the Netherlands will assess the impact of the Project on Dutch environmental receptors. As the impact is proposed to be Scoped Out of the EIA in UK waters (as justified above) it is also proposed to scope out the transboundary impact for the same reasons.	Scoped Out
Construction and operation	Subtidal species	Changes in underwater noise	Marine invertebrates are believed to be sensitive to particle motion rather than to sound pressure[33], although few formal studies have been conducted on the impacts of underwater sound on benthic species. At present there are no published	Scoped Out

[33] Popper, A. and Hawkins, A. (2018). The importance of particle motion to fishes and invertebrates. The Journal of the Acoustical Society of America, 143(1), pp. 470-488.

Project phase	Receptor	Impact	Potential for significant effect	Proposed to be scoped in/ out
			sensitivity thresholds for invertebrates, but effects have been recorded in some studies[34,35,36]. Although there is currently very limited evidence on the effects of underwater sound on marine invertebrates, current data suggest that the type and duration of underwater sound that will be generated by the proposed Offshore Scheme during both construction and operational phases will not have any significant effect on benthic invertebrates or benthic communities. Any effects will be localised and short-term and are not predicted to be significant.	
Construction and Operation	Subtidal Species	Transboundary Impact - Underwater noise changes	As a linear infrastructure project between two countries the proposed Offshore Scheme boundary stops at the border between UK and Netherlands. However, potential impacts during construction and operation, will not stop, but will continue along the route of the submarine cables. There is therefore the potential that changes in underwater noise levels near the UK border will also be experienced in Dutch waters. The effects will be limited in spatial extent near to the EEZ boundary. The assessment for the Project in the Netherlands will assess the impact of the Project on Dutch environmental receptors. As the impact is proposed to be Scoped Out of the EIA in UK waters (as justified above) it is also proposed to scope out the transboundary impact for the same reasons.	Scoped Out
Construction and operation	Subtidal species	Introduction or spread of MINNS	Taking into account the implementation of control measures outlined in **Section 19.5**, it is considered highly unlikely that the introduction of MINNS through ship hulls and ballast water	Scoped Out

[34] Carrol, A., Przeslawski R., Duncan, A., Gunning, M. and Bruce, B. (2017). A critical review of the potential impacts of marine seismic surveys on fish and invertebrates. Marine Pollution Bulletin, 114(1), pp. 9-24. [online] Available at: https://www.sciencedirect.com/science/article/pii/S0025326X16309584.

[35] Solan, M., Hauton, C., Godbold, J.A., Wood, C.L., Leighton, T.G. and White, P. (2016) Anthropogenic sources of underwater sound can modify how sediment-dwelling invertebrates mediate ecosystem properties [Online] Available at: https://www.nature.com/articles/srep20540

[36] Wale, M., Simpson, S. and Radford, A. (2013). Size-dependent physiological responses of shore crabs to single and repeated playback of ship noise. Biology Letters, 9(2).

Project phase	Receptor	Impact	Potential for significant effect	Proposed to be scoped in/ out
			or the placement of external cable protection on the seabed would have the potential for significant effects.	
Construction and Operation	Subtidal Species	Transboundary Impact – Introduction or spread of MINNS	As a linear infrastructure project between two countries the proposed Offshore Scheme boundary stops at the border between UK and Netherlands. However, potential impacts during construction and if necessary, cable repair during operation, will not stop, but will continue along the route of the submarine cables. There is therefore the potential for the transboundary introduction or spread of MINNS through ship hulls, subsea equipment and ballast water or the placement of external cable protection on the seabed. The assessment for the Project in the Netherlands will assess the impact of the Project on Dutch environmental receptors. As the impact is proposed to be Scoped Out of the EIA in UK waters (as justified above) it is also proposed to scope out the transboundary impact for the same reasons.	Scoped Out
Construction and operation	Intertidal and Subtidal habitats and species	Changes in marine water quality	The presence of vessels during construction, maintenance and repair activities will increase the likelihood of accidental spills into the marine environment. Increases in suspended sediment concentrations (e.g., from pre-sweeping and to a lesser extent cable burial, route clearance and activities during cable repairs) also have the potential to change marine water quality. This in turn can affect rates of photosynthesis via a reduction of light availability or cause contamination of benthic communities[37]. However, the implementation of the control and management measures outlined in **Section 19.5** means that only inert (non-toxic), biodegradable drilling fluid will be used and disposed of at a licenced disposal site. The control and management	Scoped Out

[37] Adams, T., Miller, R., Aleynik, D. and Burrows, M. (2014). Offshore marine renewable energy devices as stepping stones across biogeographical boundaries. Journal of Applied Ecology, 51(2), pp. 330-338. DOI: 10.1111/1365-2664.12207.

Project phase	Receptor	Impact	Potential for significant effect	Proposed to be scoped in/ out
			measures would also create limited potential for accidental spills to occur. Relatively few vessels are expected to be involved in the proposed Offshore Scheme, and potential pollutants would be limited to relatively small volumes. Should an accidental spill or leak occur, it would be small in extent and subject to immediate control measures, dilution and rapid dispersal within the marine environment. As such, significant changes to water quality are unlikely.	
Construction and Operation	Intertidal and Subtidal habitats and species	Transboundary Impact – Changes in marine water quality	As a linear infrastructure project between two countries the proposed Offshore Scheme boundary stops at the border between UK and Netherlands. However, potential impacts during construction and if necessary, cable repair during operation, will not stop, but will continue along the route of the submarine cables. There is therefore the potential for changes in marine water quality that will cross from UK waters into the Netherlands EEZ. The effects will be limited in spatial extent to near the EEZ boundary. The assessment for the Project in the Netherlands will assess the impact of the Project on Dutch environmental receptors. As the impact is proposed to be Scoped Out of the EIA in UK waters (as justified above) it is also proposed to scope out the transboundary impact for the same reasons.	Scoped Out
Operation	Subtidal habitats and species	Temperature increases	During the operation of a submarine cable, heat losses occur because of the resistance in the cable/conductor. This can cause localised heating of the surrounding environment (i.e., sediment for buried cables, or water in the interstitial spaces of external cable protection). There are no specific regulatory limits applied to temperature changes in the seabed, although a 2°C change between seabed surface and 0.2m depth is used as a guideline in Germany. Furthermore, within German waters a more stringent thermal limit is imposed on cables passing through designated conservation sites with sediment	Scoped Out

Project phase	Receptor	Impact	Potential for significant effect	Proposed to be scoped in/ out
			temperatures not allowed to exceed this temperature threshold within 300mm above the cables. Conservative calculations undertaken for Viking Link (which crosses German waters) concluded that heating in excess of 2°C at 20cm sediment depth will only occur if cables are bundled and buried to less than 0.75m[38]. Any temperature changes will be localised to the immediate environment surrounding the cable and undetectable against natural temperature fluctuations in the surrounding sediments and water column. No significant effects are predicted.	
Operation	Subtidal habitats and species	Electromagnetic changes / barriers to species movement	Several laboratory studies have shown that some benthic invertebrates are able to detect EMF (e.g., brown crab, *Cancer pagurus*)[39] and it has been recorded to affect the larval growth and adult survival of some species[40;41]. However, other species such as the polychaete worm (*Hediste diversicolo*r) are considered to be insensitive to EMF. Many of these studies have tested much higher intensities of EMF (around an order of magnitude higher) than the maximum EMF produced by an active 2GW HVDC cable (predicted to be in the region of 400µT). However, studies of more realistic EMF strengths (250µT – 1000µT) have still shown evidence of physiological and behavioural impacts as well as stress responses at higher	Scoped In

[38] National Grid and Energinet (2017) Viking Link Environmental Statement. Appendix I – Cable Heating Effects – Marine Ecological Report.

[39] Scott, K., Harsanyia, P. and Lyndon, A. (2018). Understanding the effects of electromagnetic field emissions from Marine Renewable Energy Devices (MREDs) on the commercially important edible crab, Cancer pagurus (L.). Marine Pollution Bulletin, 131, pp. 580-588.

[40] Bochert, R. and Zettler, M. (2004). Long-term exposure of several marine benthic animals to static magnetic fields. Bioelectromagnetics. Journal of the Bioelectromagnetics Society, 25(7), pp. 498-502.

[41] Harsanyi, P., Scott, K., Easton, B., de la Cruz Ortiz, G., Chapman, E., Piper, A., Rochas, C. and Lyndon, A. (2022). The Effects of Anthropogenic Electromagnetic Fields (EMF) on the Early Development of Two Commercially Important Crustaceans, European Lobster, Homarus gammarus (L.) and Edible Crab, Cancer pagurus (L.). Journal of Marine Science and Engineering, 10(5), pp. 564.

Project phase	Receptor	Impact	Potential for significant effect	Proposed to be scoped in/ out
			EMFs[42] but were not found to impact overall species movements[43,44]). Despite this, it is recognised that a variety of design and installation factors are known to affect the magnitude of EMF in the vicinity of the cables and thus, there remains potential for significant effect to benthic species.	

[42] Scott, K., Harsanyi, P., Easton, B., Piper, A., Rochas, C. and Lyndon, A. (2021). Exposure to Electromagnetic Fields (EMF) from Submarine Power Cables Can Trigger Strength-Dependent Behavioural and Physiological Responses in Edible Crab, Cancer pagurus (L.). Journal of Marine Science and Engineering, 9(7), pp. 16.

[43] Love, M., Nishimotoa, M., Clark, S., McCrea, M. and Bull, A. (2017). Assessing potential impacts of energized submarine power cables on crab harvests. Continental Shelf Research, 151, pp. 23-29.

[44] Hutchison, Z., Sigray, P., He, H., Gill, A., King, J. and Gibson, C. (2018). Electromagnetic Field (EMF) Impacts on Elasmobranch (Shark, Rays, and Skates) and American Lobster Movement and Migration From Direct Current Cables. Sterling (VA): US Department of the Interior, Bureau of Ocean Energy Management. OCS Study BOEM 3.

19.7 Assessment methodology

Data sources

Site-specific survey data

19.7.1 A cable route characterisation survey will be undertaken to inform the EIA and project engineering design. This will comprise of geophysical, geotechnical and environmental survey scopes. This section provides an overview of the scope of the environmental survey. For information on the geophysical and geotechnical survey parameters refer to **Chapter 18** Marine Physical Environment.

19.7.2 Site-specific intertidal and subtidal benthic surveys will be carried out to supplement publicly available data sources to characterise the baseline environment and determine the presence of any features that may have conservation significance. A geophysical survey, as described in **Chapter 18** Marine Physical Environment, will be carried out first, over an approximate 500m wide area, along the length of the proposed Submarine Cable Corridor from MHWS to the EEZ boundary. Only one of the two proposed Submarine Cable Corridors will be selected for survey, based on consultation, engineering studies, environmental constraints and a decision on the preferred landfall and Dutch Offshore Wind Farm (OWF) connection. Preliminary interpretation of the geophysical data will be undertaken onboard the survey vessel and environmental sampling stations will be selected based on this interpretation. However, it is expected that environmental sample stations will be located approximately every 5km along the proposed Submarine Cable Corridor.

19.7.3 Three samples will be collected at each selected station using a 2 x 0.1m^2 dual van-Veen grab as the primary choice with a 0.1m^2 Hamon grab as a backup available in case of coarse material. Only grab samples comprising a minimum of 7cm grab capacity with no evidence of wash-out will be accepted. Three attempts will be made at each station and if no sample is able to be collected this will be recorded. A minimum of one sample will be used for physio-chemical analysis (contaminant and particle size analysis (PSA)), one sample for macrofaunal determination and one sample retained as a back-up.

19.7.4 Seabed video and stills imagery will be collected and used to ground truth results and inform the habitat assessment of the cable route and platform. The exact number of sites and transects will be informed by the geophysical results. It is anticipated that drop down video and stills will be acquired at each environmental station and approximately 12 additional video transects to investigate potential sensitive features. Each video transect will be approximately 50-100m in length dependent on the seabed habitat sensitivity of the area as the more sensitive the area, the longer the transect required. The camera will be towed at approximately 0.25 to 0.5 knots at an elevation of between 0m and 2m above the seabed to ensure consistent footage. The footage will be the only source of ground truthing in areas where a benthic grab has been unsuccessful.

19.7.5 The footage review will include observations such as substrate characterisation, evidence of benthic activity by organisms, identification of habitats and organisms, characterisation of aquatic vegetation and evidence of fishing activity.

19.7.6 Data will be used to produce intertidal and subtidal habitat maps. Faunal identification and quantification will be carried out on grab samples and still photographs to obtain species density data and percentage cover for colonial species.

19.7.7 Habitats will be identified to the lowest European Nature Information System (EUNIS) habitat classification possible. If a sensitive EC Habitats Directive Annex I listed habitat e.g., biogenic, stony or bedrock reef, etc., is identified the extent of the habitat within the survey area will be determined and consideration will be given to whether additional survey is required to avoid the habitat or further classify it.

19.7.8 As the intention is to use a trenchless technique under the intertidal area, it is not planned to undertake a Phase 1 habitat walkover survey of the intertidal area. Instead, characterisation will be based on the subtidal methodology proposed above. It should be noted that the intertidal areas (distance between MHWS and MLWS) at Southwold and Walberswick are 20m and 15m respectively.

19.7.9 A method statement for the survey works will be agreed with the MMO, Natural England, Cefas and the JNCC prior to the survey commencing.

Publicly available data

19.7.10 Desk-based review of publicly available data sources (literature and GIS mapping files) will be used to supplement the site-specific ecology surveys and describe the wider baseline environment and inform the EIA. The data sources used to inform the baseline description presented in this EIA Scoping Chapter (as described above) will be supplemented by a review of OWF Environmental Statements (and associated technical appendices) within the Southern North Sea and covering the former East Anglia Zone. ES's to be reviewed include:

- East Anglia ONE;
- East Anglia ONE North;
- East Anglia TWO;
- East Anglia THREE;
- Norfolk Vanguard;
- Norfolk Boreas;
- Greater Gabbard; and
- Galloper.

Legislation, policy and guidance

19.7.11 Legislation and policy relevant to the proposed Scheme and this chapter is outlined in **Chapter 4** Legislation and Policy Overview and **Appendix 4-A** National Policy, **Appendix 4-B** Environmental Legislation and **Appendix 4-C** Local Policy.

19.7.12 Relevant guidance and standards that have informed the scoping process are listed below (but not limited to) and will also be taken into account as part of the assessment:

- Nature conservation considerations and environmental best practice for subsea cables for English Inshore and UK Offshore waters – Appendix 1 Benthic Characterisation (JNCC and Natural England 2022)[45];

[45] JNCC and Natural England (2022). Nature conservation considerations and environmental best practice for subsea cables for English Inshore and UK offshore waters. September 2022.

- Offshore Wind Marine Environmental Assessments: Best Practice Advice for Evidence and Data Standards (Parker et al., 2022)[46];
- Sensitivity of features based upon the Marine Evidence-based Sensitivity Assessment (MarESA) framework where possible (MarLIN, 2021)[47];
- The Marine Evidence based Sensitivity Assessment (MarESA) approach used by the Marine Life Information Network (Tyler-Walters et al. 2018)[48] which provides sensitivity reviews of species and habitats;
- Guidelines for Ecological Impact Assessment in the UK and Ireland. Terrestrial Freshwater, Coastal and Marine (CIEEM, 2018)[49];
- Guidance note for EIA in respect of FEPA (Food and Environment Protection Act 1985) and CPA (Coastal Protection Act 1949) requirements (Cefas, 2004)[50];
- Guidelines for data acquisition to support marine environmental assessments of offshore renewable energy projects (Judd, 2012)[51]; and
- Guidance on Environmental Considerations for Offshore Wind Farm Development (OSPAR, 2008)[52].

Assessment method

19.7.13 **Chapter 5** EIA Approach and Method sets out the standard EIA methodology and matrices to be used for the assessment. This section provides a summary of the EIA methodology specifically relevant to this chapter.

19.7.14 Assessment of cumulative and combined effects are discussed in **Chapter 29** Cumulative and Combined effects of the Project.

19.7.15 The criteria for characterising the value and sensitivity and magnitude for intertidal and subtidal benthic receptors are outlined in **Table 19-6** and **Table 19-7** respectively.

[46] Parker, J., Banks, A., Fawcett, A., Axelsson, M., Rowell, H., Allen, S., Ludgate, C., Humphrey, O., Baker, A. and Copley, V. (2022). Offshore Wind Marine Environmental Assessments: Best Practice Advice for Evidence and Data Standards. Phase I: Expectations for pre-application baseline data for designated nature conservation and landscape receptors to support offshore wind applications. Natural England. Version 1.1. 79 pp.

[47] Marlin. 2021. Marine Evidence based Sensitivity Assessment (MarESA). Available at: https://www.marlin.ac.uk/sensitivity/sensitivity_rationale

[48] Tyler-Walters, H., Tillin, H.M., d'Avack, E.A.S., Perry, F. and Stamp, T. (2018). Marine Evidence-based Sensitivity Assessment (MarESA) – A Guide. Marine Life Information Network (MarLIN). Marine Biological Association of the UK, Plymouth, pp. 91. [Online] Available at: https://www.marlin.ac.uk/publications

[49] Chartered Institute of Ecology and Environmental Management (CIEEM). 2018. Guidelines for Ecological Impact Assessment in the UK and Ireland. Terrestrial Freshwater, Coastal and Marine. Version 1.2. CIEEM, Winchester. 44 pp.

[50] Centre for Environment, Fisheries and Aquaculture (Cefas). 2004. Guidance note for Environmental Impact Assessment in respect of FEPA (Food and Environment Protection Act 1985) and CPA (Coastal Protection Act 1949) requirements.

[51] Judd, A. 2012. 'Guidelines for data acquisition to support marine environmental assessments for offshore renewable energy projects'. Cefas contract report: ME5403 – Module 15.

[52] OSPAR (2008), 'OSPAR Guidance on Environmental Considerations for Offshore Wind Farm Development'. Reference number: 2008-3.

Table 19-6 Definitions of value and sensitivity for intertidal and subtidal benthic ecology

Receptor Value and Sensitivity	Description
Very High	Value: The receptor is a designated feature of a Highly Protected Marine Area. Sensitivity: Receptor has low tolerance to change i.e., recovery will take longer than 10 years following the cessation of activity or will not occur.
High	Value: The receptor is a designated feature of an internationally protected site (e.g., SAC, SPA) and the licensable activity is taking place during a sensitive season. Sensitivity: Equivalent to MarLIN MarSEA sensitivity category High. Receptor has low tolerance to change i.e., recovery will take longer than 10 years following the cessation of activity or will not occur.
Medium	Value: The receptor is a designated feature of a nationally protected site (e.g., MCZ, SSSI) or a supporting habitat of an internationally protected site. Sensitivity: Equivalent to MarLIN MarSEA sensitivity category Medium. Receptor has intermediate tolerance to change i.e., recovery to pre-impact conditions is possible between 5 and 10 years.
Low	Value: Common and widespread habitats/species of no specific conservation value. Sensitivity: Equivalent to MarLIN MarSEA sensitivity category Low. Receptor has high tolerance to change with recovery to pre-impact conditions between 1 and 5 years.
Negligible	Value: Low importance and rarity, local scale. Artificial, highly modified, and/or degraded benthic habitats/species of low/no conservation interest. Sensitivity: Equivalent to MarLIN MarSEA sensitivity category Not Sensitive. The receptor has some tolerance to change without detriment to its character. Recovery expected to be relatively rapid, i.e., less than approximately six months following cessation of activity.

Table 19-7 Definitions of impact magnitude criteria for intertidal and subtidal benthic ecology

Impact Magnitude	Definition
High	Impacts are of medium-term (7-15 years) through to long-term/permanent duration and/or on a regional or population/habitat level or major alteration to key elements / features of the baseline condition such that post-impact baseline character will be fundamentally changed. Natural recruitment will not return the population / habitat to the baseline condition.
Medium	Impacts are of medium term (7-15 years) duration and/or on a local level (wider than project footprint) or alter an element of the baseline conditions such as that post-impact the damage to the baseline is above that experienced under natural conditions but with no permanent effect on integrity.

Impact Magnitude	Definition
Low	Impacts are temporary (<1 year) or short term (1-7 years) in duration, site specific and/or a minor shift away from the baseline condition such as that experienced under natural conditions. Impacts limited to within the project footprint. Negligible contribution to cumulative effects.
Negligible	Very little or no detectable change from baseline conditions. Disturbance is within the range of natural variability. Impacts predicted to be brief (one to two days) or for a short period (up to 3 months). No contribution to cumulative effects.

19.7.16 Data derived from the site-specific survey will provide a more detailed site characterisation and fill key data gaps such as habitat biotope maps; presence, extent and condition of sensitive habitats; and presence of protected species. The results from assessment undertaken to inform the marine physical environment EIA will be used to establish the potential impacts on intertidal and subtidal benthic receptors.

19.7.17 Where impacts are not predicted to be significant, simple assessments, using an evidence-based approach that is proportionate to the anticipated level of significance will be undertaken. Where potentially significant impacts are identified, consultation will be undertaken with statutory nature conservation bodies to agree proportionate and effective mitigation, and residual effects will be presented.

19.8 Assumptions & limitations

19.8.1 This EIA Scoping Report has been collated based on a range of publicly available data and information only. It is assumed that the data collated is accurate. The data will be supplemented with additional data as part of the EIA process.

19.8.2 In the absence of data, a precautionary approach has been taken and professional judgement, based on experience of similar linear schemes, has been used where required to inform the scope of the assessment.

19.8.3 It is assumed that the data available from existing literature, relevant surveys and the proposed assessments will provide an appropriate evidence base for benthic ecology within the study area. It is recognised that there is limited data available on migration routes but given the linear nature of the proposed Scheme and the temporary nature of the majority of potential impacts it is not anticipated this limitation will adversely affect the assessment.

Contents

20. Fish and Shellfish

20.1 Introduction

20.1.1 This chapter outlines the proposed scope and methodology to be undertaken for fish and shellfish. It will consider the potential for significant effects arising from the construction and operation of the LionLink Scheme (hereafter referred to as 'the proposed Offshore Scheme') in respect of fish and shellfish. A review of relevant guidance and policy has been undertaken together with a desk-based assessment, to inform the proposed scope and methodology.

20.1.2 This chapter is supported by the following figures:

- **Figure 1-4**: Proposed Offshore Scheme Boundary;
- **Figure 20-1**: Fish and Shellfish Study Area; and
- **Figure 20-2:** Fish species spawning and nursery grounds within the study area.

20.1.3 There may be interrelationships related to the potential effects on fish and shellfish and other disciplines. Therefore, please also refer to the following chapters:

- **Chapter 18** – Marine Physical Environment – which identifies the spatial extent of potential impacts from temporary sediment suspension and subsequent redeposition;
- **Chapter 19** – Intertidal and Subtidal Benthic Ecology – will identify the potential impacts on supporting habitats and key prey species for fish and shellfish;
- **Chapter 21** – Intertidal and Offshore Ornithology – will be informed by the conclusions of this chapter as fish and shellfish are key prey species for marine birds;
- **Chapter 22** - Marine Mammals and Marine Reptiles – will be informed by the conclusions of this chapter as fish and shellfish are key prey species for marine mammals and marine reptiles; and
- **Chapter 24** - Commercial Fisheries – will be informed by the conclusions of this chapter as many fish and shellfish are key target species for commercial fisheries.

20.1.4 With respect to establishing the current baseline consideration has been given to:

- Identifying protected and non-protected species likely to be present in the study area such as purely marine species, diadromous species (i.e., species which migrate between freshwater and marine environments), catadromous species (i.e., fish migrate between freshwater and salt water to spawn), elasmobranchs (sharks, rays and skates) and shellfish (crustaceans and molluscs).
- Identifying sensitive areas such as spawning and nursery grounds (i.e., areas where eggs are laid and juveniles are commonly found), and internationally and nationally designated sites that protect fish and shellfish species.

20.2 Consultation and engagement

20.2.1 Initial non-statutory consultation on the proposed Offshore Scheme has commenced with several stakeholders, that covers in general terms fish and shellfish. From November 2022 to February 2023, the Marine Management Organisation (MMO), Natural England and Joint Nature Conservation Committee (JNCC) have been provided with introductory briefings on the proposed Offshore Scheme and asked for comment on the non-statutory and supplementary non-statutory consultation.

20.2.2 Engagement will continue with relevant stakeholders in relation to the proposed Offshore Scheme to obtain any information that they hold to supplement the assessment and to seek their views with regards to the evolving design. This will be undertaken by the Environmental Impact Assessment (EIA) Team.

20.2.3 The following bodies will be consulted during the EIA process:

- MMO;
- Centre for Environment, Fisheries and Aquaculture Science (Cefas);
- JNCC;
- Natural England;
- Eastern Inshore Fisheries and Conservation Authority (EIFCA);
- Kent and Essex Inshore Fisheries and Conservation Authority (KEIFCA); and
- Fisheries Associations (as identified in **Chapter 24** Commercial Fisheries).

20.3 Baseline conditions

Study area

20.3.1 The proposed Offshore Scheme will route from either the Southwold or Walberswick Landfall across the Southern North Sea to the boundary between the UK and Netherlands Exclusive Economic Zones (EEZ).

20.3.2 The proposed Offshore Scheme Scoping Boundary is illustrated on **Figure 20-1** and is described in **Chapter 2** The Proposed Scheme Description. It includes a proposed Submarine Cable Corridor from each Landfall converging approximately 35km off the east coast of the UK. From the point of convergence there are two Submarine Cable Corridor options (B and C) that cross the Southern North Sea to the UK/Netherlands EEZ boundary.

20.3.3 The study area for the purposes of this scoping exercise includes:

- The proposed Offshore Scheme Scoping Boundary; and
- An additional 15km buffer either side of the proposed Offshore Scheme Scoping Boundary. This is a precautionary maximum zone of influence that encompasses the potential impact pathways from underwater noise and increased suspended sediment concentrations.

20.3.4 The study area will be reviewed and refined for the Preliminary Environmental Information (PEI) Report based on maximum tidal excursions and if appropriate

sediment dispersion modelling. The study area will be influenced by the findings of **Chapter 18** Marine Physical Environment.

20.3.5 To ensure any protected fish that may pass through the study area are considered, a more regional approach will be adopted in the screening of relevant protected sites. A 100km radius from the proposed Offshore Scheme Scoping Boundary has been used as an initial screening distance for any protected sites designated for migratory fish.

20.3.6 Reference has also been made in this chapter to the study area defined in **Chapter 24** Commercial Fisheries. This considers an area encompassing seven International Council for the Exploration of the Sea (ICES) rectangles in which the proposed Offshore Scheme Scoping Boundary lies, namely 33F1, 33F2, 33F3, 34F2,34F3, 35F2 and 35F3. The ICES rectangles are used to record and collate statistical commercial fisheries data.

20.3.7 **Figure 20-1** illustrates the extent of the fish and shellfish study area. Please refer to **Figure 24-1** for the extent of the commercial fisheries study area which shows the proposed Offshore Scheme Scoping Boundary in regard to the ICES rectangles.

20.3.8 The study area will be reviewed and, as appropriate, refined for the assessment in the Preliminary Environmental Information (PEI) Report and Environmental Statement (ES) with only one Landfall and one Submarine Cable Corridor being taken forward. This will be based on the proposed Order limits in the ES.

Baseline data sources

20.3.9 The baseline described in this chapter and associated appendices has been informed by the following data sources and international research reports and publications as referenced in the text:

Table 20-1 Scoping baseline data sources

Baseline Data	Source
Transitional and Coastal Waters (TraC) Fish Monitoring Programme	Environment Agency
Spawning and nursery grounds of selected fish species in UK waters	Coull et al. (1998) [1], Ellis et al. (2012)[2]
UK Fisheries Annual Statistic reports	Marine Management Organisation[3]
International Bottom Trawl Survey (IBTS)[4]	ICES (2023) Data Portals – DATRAS

[1] Coull, K.A., Johnstone, R. and Rogers, S.I. (1998). Fisheries Sensitivity Maps in British Waters. Available at: Fisheries Sensitivity maps in British waters (cefas.co.uk)

[2] Ellis, J.R., Milligan, S.P., Readdy, L., Taylor, N. and Brown, M.J. (2012). Spawning and nursery grounds of selected fish species in UK waters. Available at: techrep147.pdf (cefas.co.uk)

[3] MMO (2023) UK Sea Fisheries Statistics 2022. Available at: https://www.gov.uk/government/statistics/uk-sea-fisheries-annual-statistics-report-2022

[4] ICES (2023) Data Portals – DATRAS. Available at: DATRAS (ices.dk)

Baseline Data	Source
Species reference data	Fishbase
Interactive reference website which shows fish abundance and distribution	EMODnet
Environmental Statements from Offshore Wind Farm (OWF) Developments (as referenced in the text)	

Baseline

20.3.10 The following sections present the current baseline established at scoping. There are currently two corridors being considered for the proposed Submarine Cable Corridor, which are shown in **Figure 1-4**. Baseline information is presented for both options below.

Species Present

20.3.11 Over 330 species of fish have been recorded in UK waters, with the Southern North Sea supporting a wider variety of both pelagic and demersal species than the central or northern North Sea[5]. The species most likely to be affected by the construction and operation phases of the Offshore Scheme are those with demersal life stages, and those sensitive to underwater noise changes e.g., hearing specialists such as clupeoids (e.g., Atlantic herring, shad, sprat).

Species caught within study area in 2021

20.3.12 Within the study area 53 different species of fish or shellfish were caught during 2022 as recorded in the MMO UK Sea fisheries statistics 2022[6] as listed in **Table 20-2**.

Table 20-2 Species caught within the study area in 2022

Species				
Bass	Black seabream	Blonde ray	Brill	Cod
Common Octopus	Conger eels	Crabs - Velvet	Crabs - Edible	Crawfish

[5] DECC (2022) Offshore Energy SEA 4: Appendix 1 Environmental Baseline A1a.4 Fish and Shellfish. Available at: https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/1061461/Appendix_1a_4_-_Fish___Shellfish.pdf

[6] MMO (2023) UK Sea Fisheries Statistics 2022. Available at: https://www.gov.uk/government/statistics/uk-sea-fisheries-annual-statistics-report-2022

Species				
Cuttlefish	Dabs	Dogfish	European flying squid	Flounders and Flukes
Great weever	Gurnards - Grey	Gurnards - Red	Haddock	Hake
Herring	Horse mackerel	John dory	Lemon sole	Lesser spotted dog
Lobsters	Mackerel	Mixed squid and octopi	Monks & Anglers	Mullet - other
Pilchards	Plaice	Pollack	Pouting (Bib)	Red scorpionfish
Saithe	Scallops	Sea bream	Smoothhound	Sole
Spider crabs	Spotted ray	Sprats	Squid	Starry smooth hound
Surmullet	Thornback ray	Tope	Tub gurnard	Turbot
Unidentified dogfish	Whelks	Whiting		

Source MMO (2023) [7]

20.3.13 Analysis of the fishing data from the study area (as defined for commercial fisheries) has been used as an indication of the commercial fish species present in the proposed Offshore Scheme Scoping Boundary. **Table 20-3** shows the top five pelagic and demersal species caught in 2022 by catch value and by catch weight[7]

Table 20-3 Top five pelagic and demersal species commercially caught in 2022 within the study area by value and weight

By Value		By Weight	
Demersal Species	**Pelagic Species**	**Demersal Species**	**Pelagic Species**
Sole (*Solea solea*)	Mackerel (*Scomber scombrus*)	Plaice (*Pleuronectes platessa*)	Herring (*Clupea harengus)*
Plaice (*Pleuronectes platessa*)	Herring (*Clupea harengus*)	Sole (*Solea solea*)	Horse Mackerel (*Trachurus trachurus*)
Surmullet (*Mullus surmuletus*)	Horse Mackerel (*Trachurus trachurus*)	Whiting (*Merlangius merlangus*)	Mackerel (*Scomber scombrus*)

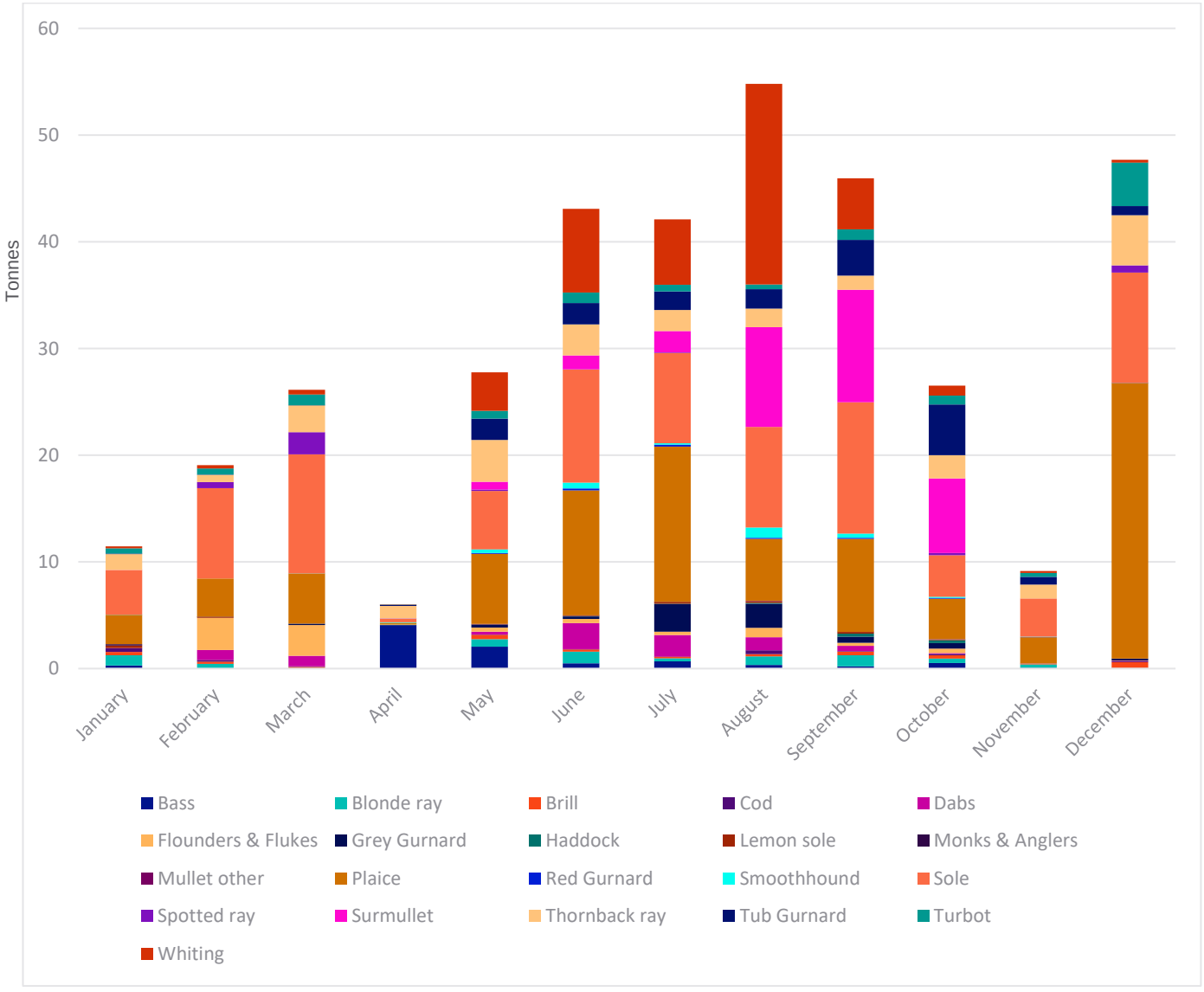
[7] MMO (2023) UK Sea Fisheries Statistics 2022. Available at: https://www.gov.uk/government/statistics/uk-sea-fisheries-annual-statistics-report-2022

By Value		By Weight	
Demersal Species	**Pelagic Species**	**Demersal Species**	**Pelagic Species**
Turbot (*Scophthalmus maximus*)	Pilchards (*Sardina pilchardus*)	Surmullet (*Mullus surmuletus*)	Pilchards (*Sardina pilchardus*)
Bass (*Dicentrarchus labrax*)	Sprats (*Sprattus sprattus*)	Thornback ray (*Raja clavata*)	Sprats (*Sprattus sprattus*)

Source MMO (2023) [7]

20.3.14 **Insert 20-1** illustrates the demersal catch by weight over the year. It clearly shows that the August catch was the largest during the year followed by December. It also shows that these catches are of different species but echoes the most popular species as shown in **Table 20-3.**

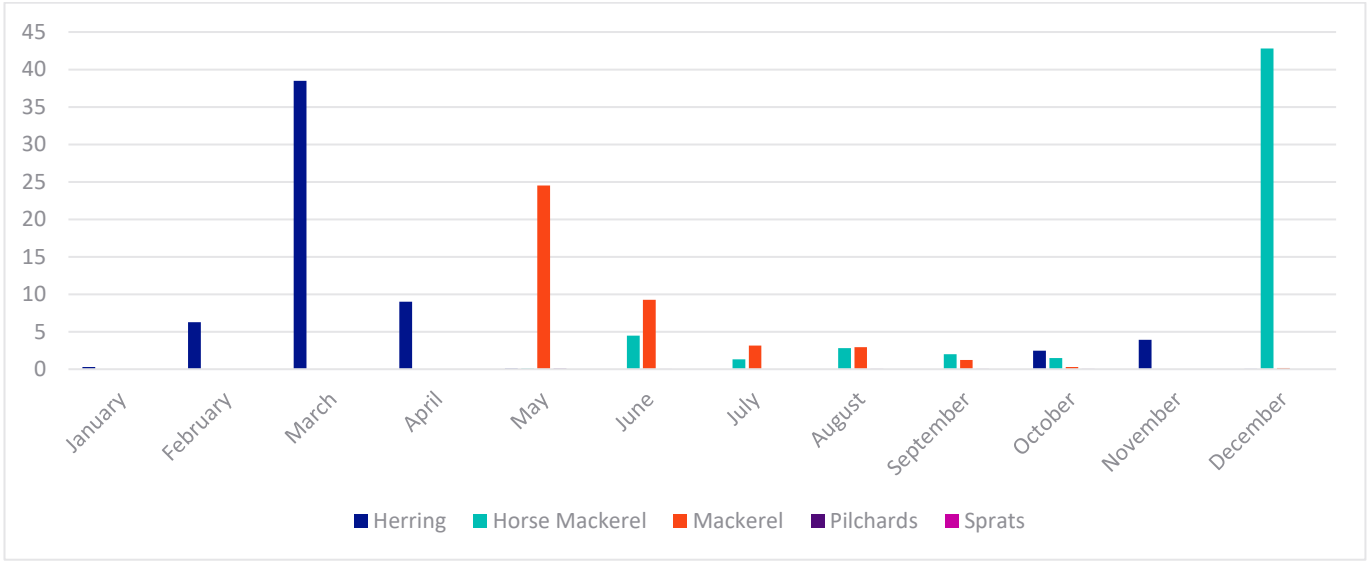
Insert 20-1 Demersal fish catch in 2022 by month and weight within the study area



Source MMO (2023)[8]

20.3.15 **Insert 20-2** illustrates the pelagic catch by weight over the year. The graph clearly shows that the largest catch took place in March, May and December in 2022, but also that the pelagic fisheries is a lot lower in terms of weight than the demersal fishery indicating the pelagic fish species are not as prevalent within the study area.

Insert 20-2 Pelagic fish catch in 2022 by month and weight within the study area



Source MMO (2023) [9]

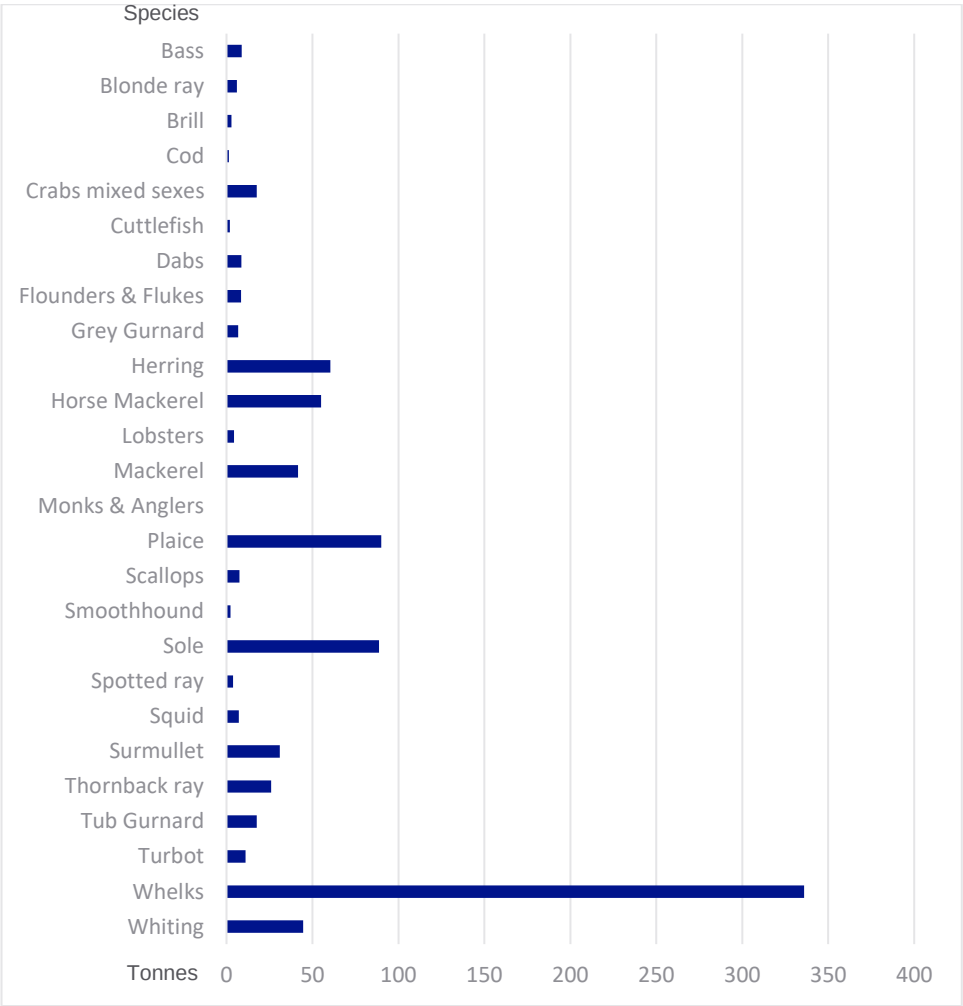
20.3.16 **Insert 20-3** illustrates the overall catch value by weight in 2022 which includes all demersal, pelagic and shellfish species with catches over 1 ton. Information about shellfish is covered in Section 20.3.58.

20.3.17 This insert clearly shows that whelk is by far the most caught species at nearly 4x more than any other species with the next most popular caught species being plaice.

[8] MMO (2023) UK Sea Fisheries Statistics 2022. Available at: https://www.gov.uk/government/statistics/uk-sea-fisheries-annual-statistics-report-2022

[9] MMO (2023) UK Sea Fisheries Statistics 2022. Available at: https://www.gov.uk/government/statistics/uk-sea-fisheries-annual-statistics-report-2022

Insert 20-3 Total species caught in 2022 by weight within the study area



Source MMO (2023) [10]

International Bottom Trawl Survey (IBTS)

20.3.18 The ICES IBTS sampling programme has been running in the North Sea since 1965. Since 1997 the surveys have used a standardised method of trawl sampling with the use of fixed stations during specific quarters of the year. This information is stored within the Database of Trawl Surveys (DATRAS) on the ICES website[11].

20.3.19 **Table 20-4** shows the trawl data for the seven ICES rectangles within the study area. The data is based on two survey times one in Quarter 1 and one in Quarter 3 in 2022. No survey was undertaken in Quarter 3 for rectangle 33F1.

20.3.20 80 different species were observed over the two quarters, compared to the 53 species which were noted in the MMO catch data. Many of the species observed in the IBTS

[10] MMO (2023) UK Sea Fisheries Statistics 2022. Available at: https://www.gov.uk/government/statistics/uk-sea-fisheries-annual-statistics-report-2022

[11] ICES (2023) Data Portals – DATRAS. Available at: DATRAS (ices.dk)

survey are not commercially caught species. However some of these species are prey species such as sandeel.

20.3.21 The top five species caught in the IBTS Quarter 1 2022 survey were: Common dab, whiting, European sprat, Atlantic herring and lesser weever. The top five species caught in the IBTS Quarter 3 2022 survey were: Horse mackerel, Atlantic herring, whiting, European sprat, and Common dab.

20.3.22 The table also shows the seasonal variation with the quantity of fish caught.

Table 20-4 Datras IBTS survey data for 2022 for the seven ICES rectangles within the study area

Common Name	Scientific Name	Number of Individuals per hour Q1 Survey							Number of Individuals per hour Q3 Survey						
		33F1	33F2	33F3	34F2	34F3	35F2	35F3	33F1	33F2	33F3	34F2	34F3	35F2	35F3
Agonus	*Agonus cataphractus*	8	5		4	13	4	4	-		15	4		1	1
Atlantic Cod	*Gadus morhua*		9			5		2	-	20		6			
Atlantic Herring	*Clupea harengus*	2	100	4952		734	62	188	-	4	79	11393	1592	13576	9960
Atlantic Mackerel	*Scomber scombrus*			255		20			-	92	184	363	355	402	404
Atlantic spinous spider crab	*Maja brachydactyla Balss*		2			2			-						
Black goby	*Gobius niger*	2							-						
Black sea bream	*Spondyliosoma cantharus*								-	4					
Black seahorse	*Hippocampus hippocampus*					5			-						
Blonde ray	*Raja brachyura*		9		16	1	13	7	-	6				1	
Blue whiting	*Micromesistius poutassou*					1			-			5			
Brill	*Scophthalmus rhombus*								-			1		1	
Bull rout	*Myoxocephalus scorpius*	4	6				12	1	-		4				
Circular crab	*Atelecyclus rotundatus*								-			9			
Common dab	*Limanda limanda*	52	2526	337	64	8147	367	8455	-	857	746	1643	3118	2488	2513
Common dragonet	*Callionymus lyra*	2				1	2	2	-	7	7	9	8	11	8

Common Name	Scientific Name	Number of Individuals per hour Q1 Survey							Number of Individuals per hour Q3 Survey						
		33F1	33F2	33F3	34F2	34F3	35F2	35F3	33F1	33F2	33F3	34F2	34F3	35F2	35F3
Common goby	*Pomatoschistus*		10			2	1	11	-		30		2	37	37
Common squid	*Alloteuthis subulata*		2			3		2	-	342	65	2513	244	2579	1847
Common starfish	*Asterias rubens*								-			9	9		
Common whelk	*Buccinum undatum Linnaeus*	56	110		9				-						
Compass jellyfish	*Chrysaora hysoscella*											1	6		
Edible crab	*Cancer pagurus*	2	7	2					-			3		1	14
European anchovy	*Engraulis encrasicolus*		1		2	2		1	-			4	1	5	1
European flounder	*Platichthys flesus*		1	31		25		1	-		2				
European pilchard	*Sardina pilchardus*								-	81		5	198	5	1
European plaice	*Pleuronectes platessa*	8	174	200	203	1356	244	508	-	23	152	82	71	184	137
European seabass	*Dicentrarchus labrax*		31						-	4					
European sprat	*Sprattus sprattus*	198	1497	2521	275	503	1317	2170	-			3545	2467	4528	1674
European squid	*Loligo vulgaris*		26	5		13		26	-						
Five-bearded rockling	*Ciliata mustela*		2						-						

Common Name	Scientific Name	Number of Individuals per hour Q1 Survey							Number of Individuals per hour Q3 Survey						
		33F1	33F2	33F3	34F2	34F3	35F2	35F3	33F1	33F2	33F3	34F2	34F3	35F2	35F3
Flying crab	*Liocarcinus holsatus*								-				9		
Fourbeard rockling	*Enchelyopus cimbrius*		5						-						
Great sandeel	*Hyperoplus lanceolatus*		2					2	-	2	1		657	13	10
Greater weever	*Trachinus draco*		2					2	-						
Green sea urchin	*Psammechinus miliaris*								-				9		
Grey gurnard	*Eutrigla gurnardus*		128	4	12	1189	24	186	-	25		27	2	37	8
Hermit crab	*Pagurus bernhardus*								-				9		
Horse mackerel	*Trachurus trachurus*		14	5		298		14	-	38602	26915	23075	217	22630	4121
Hydromedusa jellyfish	*Tima bairdii*				8		8		-						
John dory	*Zeus faber*		2			6		2	-	13				2	2
Lemon sole	*Microstomus kitt*	26	4					3	-	63		10			2
Lesser sandeel	*Ammodytes tobianus*	2							-						
Lesser weever	*Echiichthys vipera*	4	554	30	106	2834	148	598	-	20	127	116	1098	331	134
Little cuttlefish	*Sepiola*		19	4	2	46	2	21	-						
Many-ribbed jellyfish	*Aequorea Péron & Lesueur*								-			2			

Common Name	Scientific Name	Number of Individuals per hour Q1 Survey							Number of Individuals per hour Q3 Survey						
		33F1	33F2	33F3	34F2	34F3	35F2	35F3	33F1	33F2	33F3	34F2	34F3	35F2	35F3
Masked crab	*Corystes cassivelaunus*								-			9			
Mediterranean scaldfish	*Arnoglossus laterna*		6	2		51		6	-		5	9	8	11	13
Northern rockling	*Ciliata septentrionalis*		21						-						
Norway lobster	*Nephrops norvegicus*								-						2
Pencil squid	*Alloteuthis Wülker*		28	10	2	50	2	28	-						
Pollock	*Pollachius virens*								-	3					
Poor cod	*Trisopterus minutus*		29			6		8	-	380		68			
Raites sandeel	*Ammodytes marinus*			4					-		2905		250		
Red gurnard	*Chelidonichthys cuculus*								-	33		1			
Reticulated dragonet	*Callionymus reticulatus Valenciennes*		2			5	1	3	-						
Right-handed hermit crab	*Paguridae Latreille*								-			9	9		
Rock goby	*Gobius paganellus Linnaeus*	2							-						
Sand lance	*Ammodytes Linnaeus*		2		2		5	3	-						
School shark	*Galeorhinus galeus*								-	2					

Common Name	Scientific Name	Number of Individuals per hour Q1 Survey							Number of Individuals per hour Q3 Survey						
		33F1	33F2	33F3	34F2	34F3	35F2	35F3	33F1	33F2	33F3	34F2	34F3	35F2	35F3
Serpent star	*Ophiura ophiura*								-			9	9		
Slender spider crab	*Macropodia tenuirostris*								-			9			
Small-spotted catshark	*Scyliorhinus canicula*	10	272	4	39	49	19	57	-	400		206	4		4
Smoothhound	*Mustelus mustelus*		16		6	2	1	1	-						
Snake pipefish	*Entelurus aequoreus*								-	1		1			
Sole	*Solea solea*	80	16		4		2	2	-		3	1		1	
Solenette	*Buglossidium luteum*		49		30	114	56	181	-		38	39	24	200	167
Spiny dogfish	*Squalus acanthias*					1			-						
Spotted ray	*Raja montagui*		17		7		11	24	-	1		24		25	
Square-end hornwrack	*Securiflustra securifrons*								-				9		70
Starry smooth-hound	*Mustelus asterias*								-	12	1	2	1	3	7
Surmullet	*Mullus surmuletus*		6			14		6	-	71	33	33	4	325	318
Thornback ray	*Raja clavata*	20	10		19	1	36	19	-	14		11		11	1
Tower shells	*Turritellidae Lovén*	2							-						
Tub gurnard	*Chelidonichthys lucerna*				2					1	3		3	2	2

Common Name	Scientific Name	Number of Individuals per hour Q1 Survey							Number of Individuals per hour Q3 Survey						
		33F1	33F2	33F3	34F2	34F3	35F2	35F3	33F1	33F2	33F3	34F2	34F3	35F2	35F3
Urchin snails	*Eulimidae*								-						
Veined squid	*Loligo forbesii*								-	456	115	813	60	880	4
Velvet swimming crab	*Necora puber*	66	108	2					-				2		
White sea urchin	*Echinus acutus Lamarck*								-			9			
Whiting	*Merlangius merlangus*	218	1638	5534	50	4201	444	2744	-	2862	20	17171	76	726	518
Whiting pout	*Trisopterus luscus*	18	60					8	-	2870		6			
Wrack	*Fucus Linnaeus*								-				9		

Sensitive Demersal and Pelagic Species

Prey Species and Food Web Linkages

20.3.23 Several species which occur within the study area have an important role in the Southern North Sea's food web being prey to predators such as birds, marine mammals and piscivorous fish.

20.3.24 Sandeel are preyed upon whilst in the seabed sediment by a number of predators. However, they are also commonly caught while moving through the water[12,13]. Sandeel are part of the diet of many sea birds including kittiwake, razorbill, puffin and tern species[13,14]. They are also prey species to other fish including herring, sea trout, cod, whiting, and grey gurnard. Additionally, they are prey species for several marine mammals including seal and harbour porpoise (*Phocoena phocoena)*.

20.3.25 Herring are a prey item for several species of sea bird and fish species such as whiting, cod, mackerel and horse mackerel[15]. Herring egg mats are also known to attract predators such as haddock, spurdog, mackerel, lemon sole and other herring[16].

20.3.26 Sprat is also important prey for other fish species including cod, grey gurnard, herring, sandeel, spurdog, horse mackerel, mackerel, sea trout and whiting and seabirds.

20.3.27 Both herring and sprat are considered to form an integral part of the diet of marine mammals such as seal and the harbour porpoise[17].

Atlantic herring (*Clupea harengus*)

20.3.28 Atlantic herring is a pelagic species which spawns on the seabed. Herring were the most caught pelagic species within the study area in 2022 by catch value and catch weight. As benthic spawners, the species has a specific habitat preference of gravel and partly sandy gravel[18] which limits the spatial extent of their spawning grounds. This means they are particularly sensitive to any seabed disturbance.

[12] van der Kooij, J., Scott, B.E. and Mackinson, S. (2008) The effects of environmental factors on daytime sandeel distribution and abundance on the Dogger Bank. Journal of Sea Research, vol. 60, pp. 201-209

[13] Furness, R. (1990) A preliminary assessment of the quantities of Shetland sandeels taken by seabirds, seals, predatory fish and the industrial fishery in 1981-83, Ibis, vol. 132, pp.205- 217

[14] Wright, P. J., and Tasker, M. L. (1996). Analysis of fish consumption by seabirds by age class of prey fish. In Hunt, G.L., and Furness, R.W. (Eds.), Seabird/Fish Interactions, with Particular Reference to Seabirds in the North Sea. ICES Cooperative Research Report 216, 25p

[15] ICES (2008) North Sea-Ecosystems overview. ICES Advice 2008. Book 6.

[16] Richardson D.E., Hare J. A., Fogarty M. J., and Link J.S., (2011) Role of egg predation by haddock in the decline of an Atlantic herring population. Available at: https://www.pnas.org/doi/10.1073/pnas.1015400108

[17] Santos M.B., and Pierce G.J. The diet of harbour porpoise (*Phocoena phocoena)* in the northeast Atlantic: a review. Available at: https://www.taylorfrancis.com/chapters/edit/10.1201/9780203180570-36/diet-harbour-porpoise-phocoena-phocoena-northeast-atlantic-review-santos-pierce

[18] Latto P. L., Reach I.S., Alexander D., Armstrong S., Backstrom J., Beagley E., Murphy K., Piper R. and Seiderer L.J., (2013). Screening Spatial Interactions between Marine Aggregate Application Areas and Sandeel Habitat. A Method Statement produced for BMAPA.

20.3.29 A programme of annual surveys has taken place since 1967 by the International Herring Larvae Survey (IHLS) monitoring the abundance of herring larvae[19]. Atlantic herring numbers fluctuate annually with Atlantic herring often abandoning and returning to suitable areas. This means all suitable areas of spawning habitat are important to maintain a resilient population.

20.3.30 The coastal area around the proposed Offshore Scheme Scoping Boundary has been identified as a high intensity Atlantic herring spawning ground; part of the Downs stock[20]. Spawning takes place between November and January.

Sandeel (*Ammodytes spp*.)

20.3.31 Sandeel hibernate in specific types of seabed during the autumn and winter, particularly generally coarse sand or fine gravel[21] where they bury themselves in up to 50cm of sediment[22]. They briefly come out of hibernation between December and January to spawn.

20.3.32 During the spring and summer they feed in the water column during the day and then bury themselves in the seabed at night. Their lifecycle makes them sensitive to seabed disturbance, especially during hibernation season. Studies have found that sandeel are largely resident and do not disperse over distances greater than 30km[23], and that they do not migrate between grounds suggesting that they are not successful re-colonisers[24]. Sandeel are not however considered to be sensitive to increased suspended sediment concentrations and deposition.

Sole (*Solea solea*)

20.3.33 Sole is a key commercially targeted demersal species. In 2022, it was the highest value species landed. It also had the second highest weight value, with over 88 tonnes landed from the study area[25]. Sole prefer a habitat of sandy and muddy sediments at depths up to 70m where their favoured food source, polychaetes, are most abundant[26]. Sole like to

[19] ICES (2022) Eggs and Larvae Available at: https://www.ices.dk/data/data-portals/Pages/Eggs-and-larvae.aspx

[20] Coull, K.A., Johnstone, R. and Rogers, S.I. (1998). Fisheries Sensitivity Maps in British Waters. Available at: Fisheries Sensitivity maps in British waters (cefas.co.uk)

[21] Brown & May Marine Ltd (2009) Autumn-Winter 2008, Pre-construction Fish Survey – Greater Gabbard Windfarm Extension. Available at: https://www.marinedataexchange.co.uk/details/378/2008-2009-brown-and-may-marine-ltd-greater-gabbard-wind-farm-extension-pre-construction-fish-surveys/packages/1378?directory=%2F

[22] Marlin (2022) Species List Lesser sand eel (Ammodytes tobianus). Available at: https://www.marlin.ac.uk/species/detail/2067

[23] RSPB (2017) Revive our Seas: The case for stronger regulation of sandeel fisheries in UK waters. Available at: https://rspb.org.uk/globalassets/downloads/documents/campaigning-for-nature/rspb2021_the-case-for-stronger-regulation-of-sandeel-fisheries-in-uk-waters.pdf

[24] Jensen et al (2011) Inferring the location and scale of mixing between habitat areas of lesser sandeel through information from the fishery. Available at: https://academic.oup.com/icesjms/article/68/1/43/631084

[25] MarineSpace (2018) Atlantic Herring Potential Spawning Habitat and Sandeel Habitat Assessment Baseline 2018 - Thames Region. Available at: https://www.marinespace.co.uk/wp-content/uploads/2021/06/Thames-Herring-Sandeel-Habitat-Baseline-Overview_2018_v3.pdf

[26] Eastwood P.D., and Meaden G.J., (2000) Spatial modelling of spawning habitat suitability for the sole (Solea solea L.) in the eastern English Channel and southern North Sea

prey upon small crustaceans, small molluscs and fish. They are particularly sensitive to temperature which defines their distribution.

20.3.34 The mature fish return to shallow inshore waters such as the mouths of estuaries, which have relatively higher water temperatures, during spring to spawn. Shallow waters like sand banks also act as nursery areas for juveniles. The 0-groups (fish in their first year of life) are relatively abundant at all depths[27]. Their spawning and nursery grounds are illustrated in **Figure 20-2**.

Plaice (*Pleuronectes platessa*)

20.3.35 Plaice is another key commercially targeted species within the study area which are widely distributed within the North Sea and was the highest weight value caught in the study area in 2022. They prefer a seabed habitat of sand and gravel substrates in depths between 10m and 50m[28]. Spawning in the North Sea occurs over a wide area, across most of the offshore and deeper areas of the southern North Sea. Juvenile nursery areas are generally in shallow areas of depths less than 10m with sandy or muddy area habitat. Spawning and nursery areas in relation to the proposed Offshore Scheme Scoping Boundary are illustrated in **Figure 20-2**.

20.3.36 Plaice's diet includes a wide range of benthic and epibenthic species including polychaetes, molluscs, crustaceans and occasionally on brittle stars and sandeels.

Cod (*Gadus morhua*)

20.3.37 Both juvenile and adult cod occur throughout most of the North Sea and therefore within the study area. Although commercially targeted, catch levels are not to the same scale as plaice or sole for UK fishers. Cod are a demersal species and are generally found either, shallower (depths less than 50m), colder and less saline waters of the southern North Sea, or, deeper (depths greater than 100m), warmer and more saline waters of the northern North Sea.[29]. Cod are pelagic spawners; therefore, their spawning grounds are not substrate specific. Their peak spawning is February as shown in **Table 20-5**. Juvenile cod inhabit a wide variety of habitats but are often found in shallower waters than adults.

20.3.38 The results of quarterly IBTS surveys reveal that adult cod are widely distributed during the colder, winter months but their range contracts during spring and summer as they retreat northwards in response to increasing temperatures in the English Channel and Southern Bight. Adult cod have a diet of crustaceans, molluscs, and fish including sandeel, haddock, herring and several flatfish species and there is also evidence of

[27] Aires, C., Gonzalez-Irusta, J.M., Watret R. (2014) "Updating Fisheries Sensitivity Maps in British waters". Scottish Marine and Freshwater Science Report Vol 5 No 10. Marine Scotland Science, ISSN: 2043-7722, available online at: http://www.gov.scot/Resource/0046/00465795.pdf

[28] Kay and Dipper (2009) A Field Guide to Marine Fishes of Wales and Adjacent Waters

[29] Hedger, R., McKenzie, E., Heath, M., Wright, P., Scott, B., Gallego, A., and Andrews, J. (2004) Analysis of the spatial distributions of mature cod (Gadus morhua) and haddock (Melanogrammus aeglefinus) abundance in the North Sea (1980–1999) using generalised additive models. Fisheries Research, vol. 70(1), pp. 17-25.

cannibalism[30]. Cod are thought to be responsible for significant mortality on commercial fish stocks of clupeid, gadoid and flatfish species[31].

Whiting (*Merlangius merlangus*)

20.3.39 Whiting is a fast-growing commercially important demersal species, which is widespread across the North Sea and common to inshore waters. It is found mostly at depths of 30m and 100m and is happy on a variety of substrates including mud, gravel, sand and rock[32].

20.3.40 Location of spawning grounds appears not to be determined on sediment type but tends to be at depths between 50-100m. The factors that determine spawning ground selection are considered limited. Whiting are thought to have one of the longest spawning periods among North Sea species, from February to June, with a peak in April as shown in **Table 20-3**.

20.3.41 Whiting have a mixed diet which consists of decapods e.g. *Crangon spp*., amphipods, copepods, and fish, including small species such as sprat, sandeel, herring, cod, and haddock[33]. Juvenile whiting feed primarily on small crustaceans such as crangonid shrimp.

Mackerel (*Scomber scombrus*)

20.3.42 Mackerel was the third most commercial caught pelagic species within the study area and is distributed throughout the North Sea. Within the study area, mackerel migrate north in June and July to spawn and then disperse to feed within central North Sea. In October, some of the stock migrate to western Shetland and some to the Norwegian Trench, where they overwinter. The following spring, they then return south to the spawning grounds[34].

20.3.43 Mackerel has a varied diet with adults eating large quantities of pelagic crustaceans. They also prey on schools of smaller fish, particularly sprat, herring and sandeel[35]. Juvenile mackerel eat fish larvae, crustacean larvae and their own larvae. Mackerel are the prey species for sharks, marine mammals, and a variety of seabirds.

[30] Wilding., C. and Heard, J., (2004) Gadus morhua. Atlantic cod. Marine Life Information Network: Biology and Sensitivity Key Information Sub-programme [online]. Plymouth: Marine Biological Association of the United Kingdom. [cited 21/03/2013]. Available from: http://www.marlin.ac.uk/speciesinformation.php?speciesID=3359

[31] Daan, N. (1973) A quantitative analysis of the food intake of North Sea cod, Gadus morhua. Netherlands Journal of Sea Research, 6(4), 479-517

[32] Barnes, M.K.S. (2008). Merlangius merlangus Whiting. In Tyler-Walters H. and Hiscock K. Marine Life Information Network: Biology and Sensitivity Key Information Reviews, [on-line]. Plymouth: Marine Biological Association of the United Kingdom. [cited 18-05-2023]. Available from: https://www.marlin.ac.uk/species/detail/96

[33] Derweduwen, J., Vandendriessche, S., Willems, T. and Hostens, K. (2012) Chapter 6. The diet of demersal and semi-pelagic fish in the Thorntonbank wind farm: tracing changes using stomach analyses data. IN: Degraer, S., Brabant, R. and Rumes, B., (Eds.) Offshore wind farms in the Belgian part of the North Sea: Heading for an understanding of environmental impacts. Royal Belgian Institute of Natural Sciences, Management Unit of the North Sea Mathematical Models, Marine ecosystem management unit. pp. 155.

[34] Pawson, M. G. (1995). Biogeographical identification of English Channel fish and shellfish stocks. Fish. Res. Tech. Rep., MAFF Direct. Fish. Res., Lowestoft, (99): 72.

[35] Wheeler, A., (1978) Key to the Fishes of Northern Europe. London: Frederick Warne & Co. Ltd.

Sprat (*Sprattus sprattus)*

20.3.44 European sprat are found throughout the North Sea, although they tend to remain within the 50m depth contour. They are common in inshore waters during summer months where they spawn, before making migrations to winter feeding grounds. Spawning is thought to occur between May and August, peaking between May and June, in both coastal waters and up to 100km offshore in deep basins[36]. Sprat are pelagic spawners with their eggs and larvae being subject to larval drift, moving to inshore nursery areas[37]. Young sprat are often found close inshore in schools with juvenile herring.

20.3.45 Sprat are important prey species for several species, including piscivorous fish, marine mammals and seabirds. They themselves tend to feed on small planktonic crustaceans including copepod nauplii and bivalve larvae[38].

Diadromous and Catadromous Fish

20.3.46 Diadromous fish migrate between salt water and fresh water, normally at the time of spawning. Catadromous fish migrate between freshwater and salt water to spawn.

- Diadromous
  - Allis shad (*Alosa alosa*); and
  - Twaite shad (*Alosa fallax).*
- Catadromous
  - River lamprey (*Lampetra fluvaiatilis);*
  - Sea lamprey (*Petromyzan marinus*);
  - Atlantic salmon (*Salmo salar); and*
  - European eel (*Anguilla anguilla*).

20.3.47 There are no Special Areas of Conservation (SAC) which have migratory fish as a qualifying feature within the study area.

20.3.48 Some of these fish are on the protected species list presented in **Table 20-7,** including twaite and allis shad and European eel. Allis and twaite shad are known to have spawning migrations between April and May; although are rarely observed within the

[36] Whitehead, P.J.P., Bauchot, M.-L., Hureau, J.-C., Neilsen, J. and Tortonese, E. (1986) Clupeidae. In Fishes of the North-eastern Atlantic and the Mediterranean Volume I. UNESCO, Paris, 268-281.

[37] Hinrichsen, H. H., Kraus, G., Voss, R., Stepputtis, D., and Baumann, H. (2005) The general distribution pattern and mixing probability of Baltic sprat juvenile populations. Journal of Marine Systems, vol. 58(1), pp. 52-66.

[38] Maes, J. and Ollevier, F. (2002) Size structure and feeding dynamics in estuarine clupeoid fish schools: field evidence for the school trap hypothesis. Aquatic living resources, vol. 15(04), pp. 211-216

study area[39]. There are a few other species such as sea and river lamprey and Atlantic Salmon which have been sighted but only on rare occasions[40].

Smelt (*Osmerus eperlanus*)

20.3.49 Once widespread in the UK, smelt are now in decline and subject to protection at certain key locations.

20.3.50 Smelt have been seen to congregate in large shoals in lower estuaries and near river mouths during winter, before ascending the river between February and April as they migrate into freshwater where they spawn. The species lay their eggs on to the seabed, where they adhere to gravel and stones[41].

20.3.51 The Alde Ore estuary, which lies within the study area, provides a critical habitat for this species where it can complete its whole life cycle. In 2012 – 2013 the Alde Ore estuary was put forward as a recommended Marine Conservation Zone (MCZ) in Tranche 1 of the designations, with smelt listed as a species of conservation importance (SOCI). However, to date the Alde Ore Estuary has not been designated as an MCZ [42].

Elasmobranchs (Sharks, Rays and Skates)

20.3.52 Elasmobranchs are amongst the most vulnerable marine fish. This is due to their slow growth rates, late maturity, low fecundity and reproductive productivity which limits their ability for population recovery should it decline. All sharks and rays are on the Oslo Paris Convention (OSPAR) list of threated or declining species. There are several elasmobranchs which are regularly caught by commercial fisheries in the study area. These include thornback ray, undulated ray, spotted ray, blonde ray, smooth-hound, and thresher shark. Also caught are tope which are on the International Convention for the Conservation of Nature (IUCN) critically endangered list. Both the thornback ray and tope are known to use the study area as spawning and nursery grounds with peak spawning between April and August (see **Table 20-6**).

Thornback Ray (*Raja clavata*)

20.3.53 Thornback ray used to be widespread and abundant in the North Sea. However, due to their slow growth rate, late maturity and low fecundity they became susceptible to over-exploitation by fishing. Since the 1950's their abundance and range has decreased[43].

[39] NBN Atlas (2023) Occurrence records Allis Twad. Available at: https://records.nbnatlas.org/occurrences/search?q=lsid:NBNSYS0000188601&fq=occurrence_status:present&nbn_loading=true#tab_mapView

[40] NBN Atlas (2023) Occurrence records – Atlantic Salmon. Available at: https://records.nbnatlas.org/occurrences/search?q=Atlantic%20salmon&fq=-occurrence_status%3A%22absent%22&fq=(year%3A%222019%22%20OR%20year%3A%222018%22%20OR%20year%3A%222017%22%20OR%20year%3A%222020%22)&nbn_loading=true#tab_mapView

[41] Marlin (2023) European Smelt. Available at: https://www.marlin.ac.uk/species/detail/146

[42] EIFCA (2017) Eastern Inshore Fisheries and conservation authority. Annual report: Financial year 2016-2017. Available at: https://www.eastern-ifca.gov.uk/wp-content/uploads/2016/02/2017_10_25_Item_10_Appendix_1_Draft_Annual_Report_2016_17.pdf

[43] Chevolot, M., G. Hoarau, et al (2006) Phylogeography and population structure of thornback rays (Raja clavata L., Rajidae). Molecular Ecology, vol. 15(12), pp. 3693-3705.

20.3.54 Thornback ray prefer a variety of softer sediment including mud, sand, shingle and gravel, though less frequently observed on coarser sediment types. They appear to be more widely distributed in the southern North Sea during the autumn and winter. Their spawning grounds are thought to broadly overlap with nursery grounds. Spawning occurs over a considerable period from February to October peaking from April to August[44].

20.3.55 Young thornback ray feed largely on small crustaceans (amphipods, mysids and crangonid shrimps), with larger individuals eating larger crustaceans (e.g. swimming crabs) and fish (e.g. sandeels small gadoids and dragonet).

20.3.56 As with all elasmobranchs the thornback ray is included on the OSPAR list of threatened and / or declining species. In addition, the species has been classified as 'Near Threatened' by the IUCN.

Basking Shark (*Cetorhinus maximus*)

20.3.57 The basking shark is the largest fish to come to UK waters measuring up to 12m in length. Despite its enormous size it only feeds on plankton[45]. There are regular sightings in the summer months from southern Cornwall to the Scottish Isles, however sighting of basking shark within the study area are rare[46].

Shellfish (Crustaceans and Molluscs)

20.3.58 Shellfish is a collective term for crustaceans (e.g., shrimp, lobsters, crabs) and molluscs (e.g., cockles, mussels, oysters, whelk) - animals which have a shell or shell-like exterior. A variety of shellfish species are targeted in the waters of the Southern North Sea by commercial fisheries. The top five shellfish and cephalopod species by catch value in 2022 are shown in **Table 20-5**. Other species targeted include cuttlefish (*Sepia officinalis)*, velvet crab (*Necora puber)*, and crawfish (Spiny lobster) (*Palinurus elephas)*.

Table 20-5 Top five shellfish species caught in 2022 within the study area by value and weight

Shellfish by value	Shellfish by weight
Whelk (*Buccinum undatum*)	Whelk (*Buccinum undatum*)
Lobster (*Homarus gammarus*)	Crabs (*Cancer pagurus*)
Squid (*Alloteuthis subulata*)	Scallops (*Aequipecten opercularis)*.
Crabs (*Cancer pagurus*)	Squid (*Alloteuthis subulata*)
Scallops (*Aequipecten opercularis)*.	Lobster (*Homarus gammarus*)

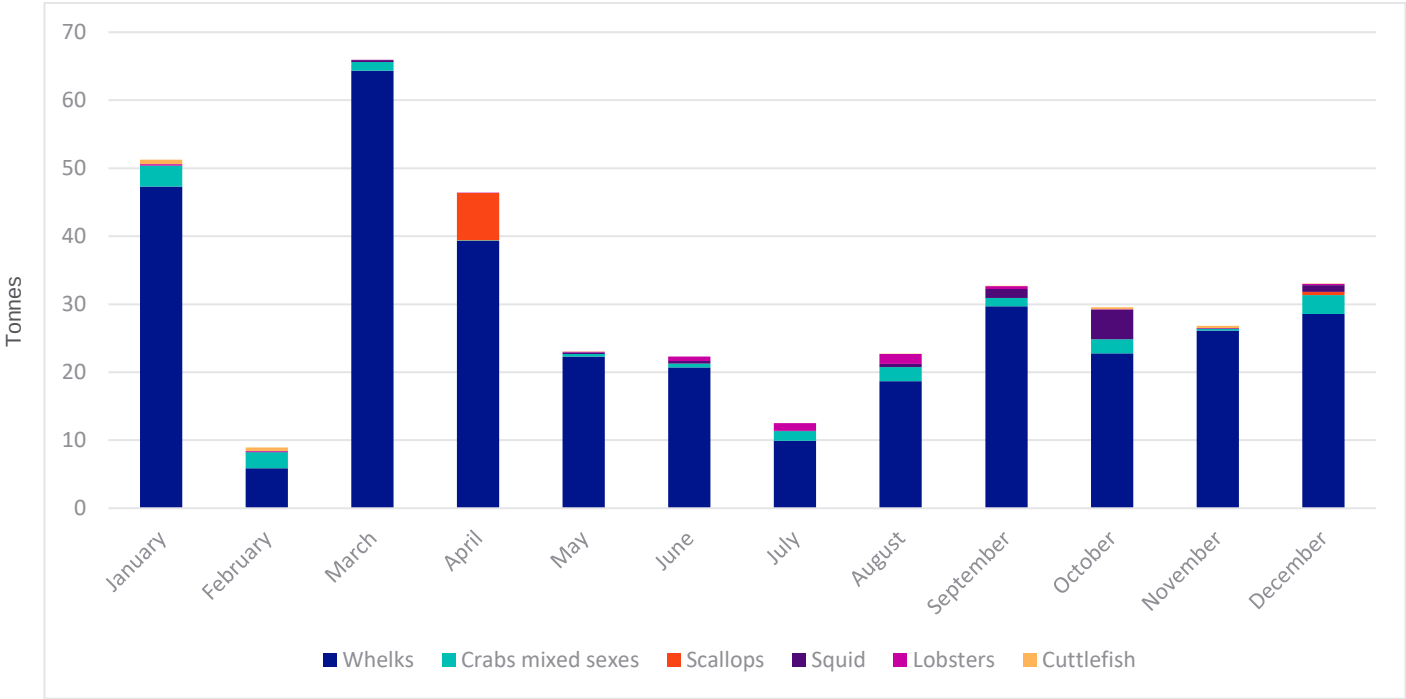
[44] Ellis, J.R., Milligan, S.P., Readdy, L., Taylor, N. and Brown, M.J. (2012) Spawning and nursery grounds of selected fish species in UK waters. Science Series Technical Report, Cefas Lowestoft, pp. 147:56.

[45] Marlin (2023) Species List - Basking shark (Cetorhinus maximus). Available at: https://www.marlin.ac.uk/species/detail/1438

[46] Seawatch foundation (2022) Recent sighting – East England. Available at: https://www.seawatchfoundation.org.uk/recentsightings/

Source MMO (2023)[47]

Insert 20-4 Shellfish catch in 2022 by month and weight within the study area



Source MMO (2023) [47]

Whelk

20.3.59 **Insert 20-4** illustrates that the common whelk is the most commercially caught and valued shellfish within the study area. Over 330 tonnes of whelk were caught in 2022 with a value of over £360,208 with the majority of this coming from ICES rectangles 33F1 and 33F2.

20.3.60 Whelk is frequently found off all British coasts and is happy on a range of seabed types including hard and soft subtidal substrates and occasionally intertidal fringes[48]. There are no known specific whelk migrations for spawning, though they can show aggregating behaviour. The distribution of young whelk tends to be limited to areas close to the adult stock[49].

20.3.61 Breeding occurs in late autumn where demersal egg-cases are laid in masses from November until April. Egg development is intracapsular, meaning clumps of demersal

[47] MMO (2023) UK Sea Fisheries Statistics 2022. Available at: https://www.gov.uk/government/statistics/uk-sea-fisheries-annual-statistics-report-2022

[48] Ager, O. (2008) Buccinum undatum. Common whelk. Marine Life Information Network: Biology and Sensitivity Key Information Sub-programme, [On-line], Plymouth: Marine Biological Association of the United Kingdom, Available: http://www.marlin.ac.uk/speciesinformation.php?speciesID=2815

[49] Lockwood, S. J. (2005). A strategic environmental assessment of the fish and shellfish resources with respect to proposed offshore wind farms in the Eastern Irish Sea. Coastal Fisheries Conservation and Management Colwyn Bay

egg-cases are laid, from which young hatch as a fully formed whelk during February and March[50].

Edible crab (*Cancer pagurus*)

20.3.62 Edible crab is another commercially targeted species within the study area. They are found in a range of intertidal and subtidal habitats, on bedrock, under boulders, mixed coarse grounds and offshore in muddy sand[51].

20.3.63 Edible crab initiate wide-ranging migrations over considerable distances to offshore overwintering grounds where eggs are hatched[52]. After pairing and mating (July to September) and subsequent spawning (October to December), egg bearing females move to offshore over-wintering grounds and are largely inactive over the brooding period until their eggs hatch in the spring and summer. The adult females then return from their migration inshore during spring and summer for pairing and mating to commence again.

European lobster (*Homarus gammarus*)

20.3.64 European lobster has a wide distribution along the UK and Europe coasts. They occupy a range of habitats from rocky grounds and soft sediments and shelf areas from below mean low water to depths of 150m[53]. Unlike edible crab, lobster of both sexes are thought to be sedentary and have not been found to undertake extensive migrations.

20.3.65 Egg bearing females tend to appear from September to December in areas where lobster are normally present with eggs carried externally on females until April/May. As they do not carry out extensive migrations, hatching normally takes place in the same grounds (in spring and early summer)[54]. Main nursery grounds for lobster are thought to be on rocky grounds in coastal waters, juveniles are thought to inhabit crevices and be capable of burrowing into soft sediment[55].

20.3.66 Lobster are opportunistic scavengers with their diet consisting of small crustaceans, molluscs and polychaetes.

[50] Smith, K. and Thatje, S. (2013) Nurse egg consumption and intracapsular development in the common whelk Buccinum undatum (Linnaeus 1758). Helgoland Marine Research, vol. 67(1), pp. 109-120.

[51] Neal, K. and Wilson, E. (2008) Cancer pagurus. Edible crab. Marine Life Information Network: Biology and Sensitivity Key Information Sub-programme, [On-line]Plymouth: Marine Biological Association of the United Kingdom, Available: http://www.marlin.ac.uk/speciesfullreview.php?speciesID=2872

[52] Edwards, E. (1979) The Edible Crab and its fishery in British Waters, Buckland Foundation. Books.

[53] Buchholz, F., Linnane, A., van der Meeren, G., Fenchel, T. and Uiblein, F. (2012) Lobster research integrated: From biology to management. Marine Biology Research, vol. 9 (1), pp. 3-6.

[54] Pawson, M. G. (1995). Biogeographical identification of English Channel fish and shellfish stocks. Fish. Res. Tech. Rep., MAFF Direct. Fish. Res., Lowestoft, (99): 72.

[55] Bennett, D., J. Nichols, et al (2007). NESFC Lobster Fishery - Draft Report 2006, Moody Marine Ltd.

Spawning and Nursery Grounds

20.3.67 **Table 20-6** summarises the species which use the study area as spawning and nursery grounds and the months within which this occurs[56], [57].

20.3.68 Spawning grounds are described as the location where eggs are laid, and nursery grounds are the location where juveniles of a species are common. Information is taken from the Cefas fisheries sensitivities maps.

20.3.69 In addition, to the species listed in the table there is evidence of 0 Group species present. The definition of 0 Group Aggregations of fish, are fish within the first year of their lives[58]. These species include haddock, Norway pout, hake, anglerfish and ling. Where information is available in the form of mapped data this has been presented in **Figure 20-2**.

[56] Coull, K.A., Johnstone, R. and Rogers, S.I. (1998). Fisheries Sensitivity Maps in British Waters. Available at: Fisheries Sensitivity maps in British waters (cefas.co.uk)

[57] Ellis, J.R., Milligan, S.P., Readdy, L., Taylor, N. and Brown, M.J. (2012). Spawning and nursery grounds of selected fish species in UK waters. Available at: techrep147.pdf (cefas.co.uk)

[58] Aires, C., Gonzalez-Irusta, J.M., Watret R. (2014) "Updating Fisheries Sensitivity Maps in British waters". Scottish Marine and Freshwater Science Report Vol 5 No 10. Marine Scotland Science, ISSN: 2043-7722, available online at: http://www.gov.scot/Resource/0046/00465795.pdf

Table 20-6 Spawning and nursery grounds that overlap with the study area

Species	Latin names	Spawning Zone	Intensity	Nursery Zone	Intensity	** Presence of Group 0 Aggregations	J F M A M J J A S O N D
Tope Shark	*Galeorhinus galeus*	-	-	Viviparous	Low	-	
Thornback Ray	*Raja clavata*	Demersal	Low	Demersal	Low	-	
Atlantic Herring	*Clupea harengus*	Demersal	High	Pelagic	High	Moderate	
Atlantic Cod	*Gadus morhua*	Pelagic	Low	Demersal	Low	Low	
Whiting	*Merlangius merlangus*	Pelagic	Low	Pelagic	Low	Moderate	
Horse mackerel	*Trachurus trachurus*	Pelagic	Low	Pelagic	Low	Moderate	
Sandeels	*Ammodytidae spp.*	Demersal	Low	Demersal	Low	-	
Atlantic Mackerel	*Scomber scombrus*	Pelagic	Low	Pelagic	Low	Low	
European Plaice	*Pleuronectes platessa*	Pelagic/Demersal	High	Demersal	High	Low	
Common Sole	*Solea solea*	Pelagic/Demersal	High	Demersal	High	Moderate	
Lemon Sole	*Microstomus kitt*	Demersal	Low	Demersal	Low	-	

Species	Latin names	Spawning Zone	Intensity	Nursery Zone	Intensity	** Presence of Group 0 Aggregations	J	F	M	A	M	J	J	A	S	O	N	D
European Sprat	*Sprattus sprattus*	Pelagic	Low	Pelagic	Low	Moderate					*	*						
Nephrops	*Nephrops norvegicus*	Shellfish	Low	Demersal	Low					*	*	*						

* Peak Spawning

	Spawning Only		Nursery Only		Both

Protected Sites

20.3.70 There are a number of protected sites within the study area including Benacre to Easton Bavents Lagoons SAC, as illustrated in **Figure 19-2**. This site is 1.5km from the Southwold Landfall and 4.9km from the Walberswick Landfall. Annex II species of fish or shellfish are not listed as a qualifying interest of the site. However, it is noted as having present nationally rare or scarce species which inhabit the lagoons namely the lagoonal sand shrimp *(Gammarus insensibilis),* which is on the UK Biodiversity Action Plan Priority list[59].

20.3.71 Two European sites, which list Annex II migratory fish as designated features, are within 100km of the proposed Offshore Scheme Scoping Boundary, namely:

- Vlaamse Banken SAC (Belgium):
  - Twaite shad;
  - River lamprey; and
  - Sea lamprey.
- Essex Estuaries SAC (UK):
  - Allis shad; and
  - Twaite shad.

Protected Species

20.3.72 **Table 20-7** presents the protected species which have been observed within the study area and the relevant conservation framework that protects them.

Table 20-7 Protected species observed in the study area

Species	Wildlife and Countryside Act1	Conservation of Offshore Habitats and Species Regulations	OSPAR	CITES	IUCN	Priority Species*
Pelagic Species						
Mackerel (*Scomber scombrus)*					Least Concern	England
Herring (*Clupea harengus*)					Least concern	England

[59] Natural England (2005) Pakefield to Eastern Bavents SSSI. Available at: https://designatedsites.naturalengland.org.uk/PDFsForWeb/Citation/2000508.pdf

Species	Wildlife and Countryside Act1	Conservation of Offshore Habitats and Species Regulations	OSPAR	CITES	IUCN	Priority Species*
European pilchard (*Sardina pilchardus*)					Least Concern	
Horse mackerel (*Trachurus trachurus*)					Vulnerable	England
Demersal Species						
Atlantic cod (*Gadus morhua*)			Y		Vulnerable	England
Whiting (*Merlangius merlangus*)					Least concern	England
Ling (*Molva molva*)					Least concern	England
Plaice (*Pleuronectes platessa*)					Least concern	England
Sole (*Solea solea)*					Data deficient	England
Atlantic halibut (*Hippoglossus hippoglossus*)					Endangered	England
Elasmobranch species						
Basking shark (*Cetorhinus maximus*)	Schedule 5		Y	Appendix II	Endangered	England
Tope (*Galeorhinus galeus*)					Critically endangered	England
Blonde ray (*Raja brachyura*)					Near threatened	
Cuckoo ray (*Leucoraja naevus*)					Least concern	
Spotted ray (*Raja montagui*)			Y		Least Concern	

Species	Wildlife and Countryside Act1	Conservation of Offshore Habitats and Species Regulations	OSPAR	CITES	IUCN	Priority Species*
Undulate ray (*Raja undulata*)					Endangered	England
Smooth-hound (*Mustelus mustelus*)					Vulnerable	
Starry smooth-hound (*Mustelus asterias*)					Near threatened	
Big - eye thresher *(Alopias superciliosus)*					Vulnerable	
Commercial Shellfish Species						
Crawfish (*Palinurus elephas*)					Vulnerable	England

* Priority species include those listed under Section 41 (England) of the Natural Environment and Rural Communities (NERC) Act 2006.

Future baseline

20.3.73 The fish and shellfish chapter within the PEI Report and ES will include an outline of the likely evolution of the baseline environment in the absence of the proposed Offshore Scheme. The future baseline will also take into account any developments that are likely to be present in the future baseline.

20.3.74 Fish and shellfish populations are subject to natural variation in their population size and distributions. This is largely due to year-to-year variation in breeding success. These population trends will be determined by broad-scale climatic and hydrological variations as well as anthropogenic activities such as overfishing and climate change.

20.3.75 Within the southern North Sea, an increase in sea surface temperatures may lead to an increase in the relative abundance of species associated with more southerly waters. As an example data on herring and sardine (*Sardina sp*.) landings at ports in the English Channel and southern North Sea showed that higher herring landings related with colder winters, while warm winters were associated with large catches of sardine[60].

[60] Alheit J & Hagen E (1997) Long-term climate forcing of European herring and sardine populations. Fisheries Oceanography 6: 130-139.

20.3.76 Climate change may also affect key life stages of fish and shellfish species, including the timing of spawning migrations[61].

20.3.77 Another potential effect of a sea surface temperature increase is that some fish species are likely to move into deeper and colder waters. However, this would be based on the species habitat requirements, and may not be feasible for species who live in shallow waters such as sandeels. Sandeels would struggle to adapt to temperature increases as they require a specific habitat of coarse-sandy sediment. There is evidence of a decline in population in parts of the UK due to sea temperature increases[62].

20.4 Potential impacts

20.4.1 This section identifies, at a high level, a summary of the sources and potential impacts as a result of the proposed Offshore Scheme during the construction and operational phases.

20.4.2 Potential impacts have been established by the EIA Team based on industry experience and professional judgement, and where applicable reference to the list of marine pressures established by the JNCC Marine Pressures-Activities Database v1.5 (2022) and Natural England's advice on operations for relevant European protected sites.

Construction

20.4.3 The following impacts could occur during the construction phase:

- Temporary habitat loss / seabed disturbance as a consequence of activities such as anchoring, seabed preparation (e.g., pre-lay grapnel run, boulder and potential unexploded ordnance (UXO) removal, sand wave pre-sweeping), and cable burial.
  - The relevant JNCC pressures that would be covered by this impact include:
    - Abrasion / disturbance of the substrate on the surface of the seabed; and
    - Penetration and/or disturbance of the substratum below the surface of the seabed, including abrasion.
- Permanent habitat loss as a result of the deposition of external cable protection (including any associated scour).
  - The relevant JNCC pressures that would be covered by this impact include:
    - Physical change (to another seabed type or sediment type); and
    - Water flow (tidal current) changes including sediment transport considerations).

[61] BEIS (2022) UK Offshore Energy Strategic Environmental Assessment 4 (OESEA 4). Appendix 1a.4 – Fish and Shellfish. Available at: https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/1061461/Appendix_1a_4_-_Fish___Shellfish.pdf

[62] Heath M.R., Neat F.C., Pinnegar J.K., Reid D.G., Sims D.W. & Wright P.J. (2012) Review of climate change impacts on marine fish and shellfish around the UK and Ireland. Aquatic Conservation: Marine and Freshwater Ecosystems 22: 337-367.

- Temporary increase and deposition of suspended sediments during seabed preparation (specifically pre-sweeping) and cable burial.
  - The relevant JNCC pressures that would be covered by this impact include:
    - Changes in suspended solids (water clarity);
    - Smothering and siltation rate changes; and
    - Hydrocarbon & polycyclic aromatic hydrocarbons (PAH) contamination.
- Underwater noise changes due to presence of project vessels and equipment (including cable trenching). Underwater noise changes due to the detonation of UXO have been excluded from the assessment. MMO guidance requires a separate Marine Licence to be applied for should detonation be required during construction.
- Accidental spills due to the presence of project vessels and equipment.
- Introduction or spread of marine invasive non-native species (MINNS) due to the presence of project vessels and equipment and deposit of external cable protection.
- Collision risk with basking shark due to the presence of project vessels and equipment.
- Changes in distribution of species - Distributions of fish and shellfish populations have the potential to be affected by construction activities such as pre-sweeping, cable burial and deposition of external cable protection.
- Transboundary impacts as a result of a temporary increase in suspended sediments and subsequent deposition, water quality changes, underwater noise changes and the introduction or spread of MINNS and changes in species distribution close to the EEZ boundary.

Operation

20.4.4 The following impacts could occur during the operational phase:

- Temporary habitat loss / seabed disturbance associated with a cable repair.
  - The relevant JNCC pressures that would be covered by this impact are the same as for installation.
- Permanent habitat loss due to the deposition of remedial external cable protection e.g., due to cable exposure or cable repair.
  - The relevant JNCC pressures that would be covered by this impact are the same as for installation.
- Electromagnetic changes/barrier to species movement. During operation the high voltage direct cables generate electromagnetic fields (EMF) which although dissipate rapidly can represent a change in the natural magnetic field.
- Accidental spills due to the presence of project vessels and equipment during cable repairs or routine maintenance surveys.
- Introduction or spread of MINNS due to the presence of project vessels and equipment during cable repairs or routine maintenance surveys and deposit of remedial external cable protection e.g., due to cable exposure or cable repair.

- Underwater noise due to the presence of cable repair/maintenance vessels and equipment.
- Collision risk to basking shark due to the presence of cable repair/maintenance vessels and equipment.
- Temperature increase in sediments due to the presence of operating cables.
- Transboundary impacts as a result of a temporary increase in suspended sediments and subsequent deposition, water quality changes, underwater noise changes and the introduction or spread of MINNS and changes in species distribution close to the EEZ boundary.

20.5 Design and control measures

20.5.1 As outlined in **Chapter 5** EIA Approach and Method, a standard hierarchical approach will be taken to mitigation.

20.5.2 The assessment of effects will take into account measures that are embedded into the proposed Offshore Scheme design, together with general good practice measures.

Design measures

20.5.3 Design measures to be implemented as part of the Offshore Scheme will include:

- A full EMF assessment will be undertaken during the detailed design phase. Where practicable cable burial shall be the preferred means of cable protection, to reduce the impacts associated with habitat loss and EMF on sensitive benthic receptors and minimise the requirement for additional cable protection.
- If feasible, all cables will be installed in one trench. If not feasible, where practicable the two HVDC submarine cables will be bundled together and installed with a fibre optic cable in one trench with the metallic return cable and a separate fibre optic cable in a second trench.
- Cable routes will be designed to minimise the risk of exposure by seabed mobility.

Control measures

20.5.4 Control measures to be implemented as part of the Offshore Scheme include:

- A Construction Code of Practice (CCOP) (for the construction and operation phases) will be developed and adhered to. This documentation will detail the proposed Schemes commitment to best practice guidance and procedures including:
  - Production of an Emergency Spill Response Plan and Waste Management Plan, Marine Pollution Contingency Plan (MPCP) and a dropped object procedure.
  - Compliance of all project vessels with the regulations relating to International Convention for the Prevention of Pollution from Ships (the MARPOL Convention 73/78) (IMO, 1983)11 with the aim of preventing and minimising pollution from ships.
  - Careful management of drilling fluids required for trenchless operations to minimise the risk of breakouts into the marine environment. Specific avoidance measures would include: the use of biodegradable drilling fluids (PLONOR

substances) where practicable, drilling fluids will be tested for contamination to determine possible reuse or disposal; and if disposal is required drilling fluids would be transported by a licensed courier to a licensed waste disposal site.

20.6 Scope of the assessment

20.6.1 This section identifies the potential for the proposed Offshore Scheme to have likely significant effects, taking into account the design and control measures identified in **Section 20.5**.

20.6.2 **Table 20-8** sets out the receptors within the study area that have been identified, whether there is a pathway for the impacts identified, the potential for significant effects and if the receptor is scoped in for the assessment.

20.6.3 All identified impacts are of relevance to both the Southwold and Walberswick Landfall options and both Submarine Cable Corridor options unless specified otherwise.

20.6.4 A precautionary approach has been taken and where there is no strong evidence base, insufficient baseline or the significance is uncertain at this stage the impact has been scoped into the EIA. Where there is a clear evidence base that the effect from the impact will not be significant, either alone or in combination with other plans and projects, the impact has been scoped out of the EIA.

Table 20-8 Proposed scope of the assessment

Project phase	Receptor	Impact	Potential for significant effect	Proposed to be scoped in/ out
Construction and Operation	Shellfish and marine species with demersal life stage	Temporary habitat loss/seabed disturbance	Any disturbance of the seabed has the potential to affect species which use the seabed for part/all of their lifecycle. Activities during construction would include route clearance, HDD duct excavation, cable burial and trenching. During operation there is the potential of disturbance should the cable need to be repaired, however this will have a lower magnitude of effect than construction. Species most at risk are those that live in the upper layers of sediment, those that live on the seabed with limited mobility (e.g., whelk, crab, lobster, hibernating sandeel) or those which lay their eggs on the seabed (demersal spawners) e.g., herring. The study area crosses many spawning and nursery grounds and whilst these cover large areas of the Southern North Sea suitable habitats within these areas may be limited. Disturbance during the spawning season could have a direct impact on the spawning biomass for a specific year group. The assessment will focus on the effect on shellfish species due to their limited mobility and high commercial values and sandeel and herring as significant prey species.	Scoped In
Construction and Operation	Species with fully pelagic lifecycle	Temporary habitat loss/seabed disturbance	Species which have a fully pelagic lifecycle i.e., species whose lifecycle is within the water column not on the seabed, will not be significantly affected by disturbance of the seabed and will therefore be scoped out of the assessment.	Scoped Out
Construction and Operation	Shellfish and marine species	Permanent habitat loss	The deposition of external cable protection during construction has the potential to change the seabed	Scoped In

Project phase	Receptor	Impact	Potential for significant effect	Proposed to be scoped in/ out
	with demersal life stage		type, changing the habitat for shellfish and marine species with demersal life stages. Deposits also have the potential to very locally alter sediment transport, creating scour pits or causing accretion. If the cable is installed correctly, it is unlikely that it will require maintenance and repair. However, there remains the potential that localised repair works, or remedial external cable protection may be required. In these circumstances the significance of the effect will be of lower magnitude that during construction. If the deposit is close to sensitive shellfish beds or within demersal spawning grounds, there is the potential that changes to the habitat could have a significant effect on shellfish or species with demersal life stages. The significance of the effect will vary according to local factors such as the position of the structure and external cable protection in relation to the prevailing current, the mobility of the seabed, and the sensitivity of the habitat. Information from ecological and marine surveys will be used to avoid areas of significant importance where possible. However, as the locations where external cable protection will be used has not currently been identified, the impact pathway cannot be scoped out of the assessment.	
Construction and Operation	Species with fully pelagic lifecycle	Permanent habitat loss	Species which have a fully pelagic lifecycle, i.e., species whose lifecycle is within the water column not on the seabed, will not be significantly affected by localised seabed deposits and will therefore be scoped out of the assessment.	Scoped Out

Project phase	Receptor	Impact	Potential for significant effect	Proposed to be scoped in/ out
Construction and Operation	Shellfish and marine species with demersal life stage	Temporary increase and deposition of suspended sediments	<u>Seabed preparation – specifically pre-sweeping of sand waves</u> During construction and occasionally during operation, pre-sweeping is used to either remove portions of sand waves to allow the cables to be buried to below the mobile sediments, or to expose the previously buried cable to enact a repair or remove the cables. Pre-sweeping involves the re-positioning of large quantities of sediment from the cable route to either immediate alongside the cable route, or to a separate disposal location. Depending on the technique used and the size of sand waves requiring pre-sweeping, the redeposition of sediment can cause smothering >10cm deep over relatively wide areas of seabed (in the order of tens of thousands square metres). Effects could potentially be significant if the disposal site contains sensitive demersal spawning grounds or shellfish beds. Therefore, the impact pathway cannot be scoped out for this specific activity until further information is available on the areas that will require pre-sweeping. It should be noted that **Chapter 18** Marine Physical Environment concluded that sediments within the study area show low levels of contamination. The suspension of contaminated sediments is not considered a significant risk for the Offshore Scheme.	Scoped In
Construction and Operation	Species with fully pelagic lifecycle	Temporary increase and deposition of suspended sediments	<u>Seabed preparation – specifically pre-sweeping of sand waves</u> Species with fully pelagic lifecycles i.e., species whose lifecycle is within the water column not on the seabed, will not be affected by a temporary increase	Scoped Out

Project phase	Receptor	Impact	Potential for significant effect	Proposed to be scoped in/ out
			and deposition of suspended sediments and will therefore be scoped out of the assessment.	
Construction and Operation	All species	Temporary increase and deposition of suspended sediments	<u>Seabed preparation (excluding pre-sweeping) and Cable burial</u> During construction burying the cable into the seabed will generate a sediment plume. The size of the plume and consequent area affected by changes in suspended sediments depends on the trenching technique deployed e.g., ploughing will create a slightly larger footprint than jet trenching. However, in both cases the spatial extent of heavy smothering is extremely localised, restricted to less than a couple of metres either side of the trench[63] [64] and significant effects are unlikely. Modelling undertaken for other cable projects indicates that approximately 90% of the suspended sediment from cable burial (excluding pre-sweeping activities) is re-deposited within close proximity (<100m) and would be classed as heavy smothering. The remaining 10% is transported over a wide area, which depending on the strength of the prevailing currents could be as far as 10 – 15km but will be deposited in thicknesses of less than 2mm. With respect to changes in water clarity, the benchmark used by Natural England for the pressure is a change in one rank e.g., from clear to	Scoped Out

[63] GridLink (2020). GridLink Interconnector Marine Environmental Report. 5.6.3.1 Change in suspended solids (Water clarity) pg 5-47

[64] BERR (2008) Review of cabling techniques and environmental effects application to the offshore wind farm industry.

Project phase	Receptor	Impact	Potential for significant effect	Proposed to be scoped in/ out
			intermediate, on the Water Framework Directive scale for one year. While trenching is undertaken a sediment plume will be generated continuously, but it will move with the location of the cable spread. Sands and gravels do not form part of the sediment load and will settle out of suspension quickly. Modelling undertaken for other cable projects [65] (e.g., Viking Link), concludes that regardless of the position along a cable route, the sediment plume generated is aligned with the dominant tidal axis. Material is deposited primarily along the dominant tidal axis but with some lateral extension. Over most of the plume the increase in suspended sediment concentrations is generally lower than 30mg/l with natural conditions returning within a single tidal cycle following the cessation of activities, although if very fine chalk particles are present this could be extended to 4-5 days (Royal Haskoning 2009). Overall, the change in water clarity is not significant and generally in line with changes experience during storm conditions when background concentrations can reach 1000mg/l. It should be noted that **Chapter 18** Marine Physical Environment concluded that sediments within the study area show low levels of contamination. The suspension of contaminated sediments is not considered a significant risk for the Offshore Scheme	

[65] National Grid and Energinet (2017). Viking Link Environmental Statement

Project phase	Receptor	Impact	Potential for significant effect	Proposed to be scoped in/ out
			If the cable is installed correctly the likelihood of it requiring maintenance and repair is significantly reduced. However, there remains the potential that localised repair works may be required. In these circumstances the significance of the effect will be of lower magnitude than during construction and the impact has therefore been scoped out of the assessment for the same reasons.	
Construction and Operation	All species	Underwater noise changes due to the presence of project vessels and equipment	All of the activities involved in the construction, maintenance and repair of the Offshore Scheme generate underwater sound. The presence of vessels creates a continuous sound. The construction of the Project will be a one-off event set against a background of existing shipping noise. Any effects will be localised and short-term and are not predicted to be significant. Any vessels which are needed to be used for any maintenance or repairs of the cable would be at a lower magnitude that that of construction and would again be set against a background of existing shipping noise.	Scoped Out
Construction and Operation	All species	Transboundary Impact - Underwater noise changes due to presence of project vessels and equipment (including cable trenching).	As a linear infrastructure project between two countries the Offshore Scheme boundary stops at the border between UK and Netherlands. However, potential impacts during construction and operation, will not stop, but will continue along the route of the submarine cables. There is therefore the potential that changes in underwater noise levels near to the UK border will also be experienced in Dutch waters. The effects will be limited in spatial extent close to the EEZ boundary. The assessment for the Project in the Netherlands will assess the impact of the Project	Scoped Out

Project phase	Receptor	Impact	Potential for significant effect	Proposed to be scoped in/ out
			on Dutch environmental receptors. As the impact is proposed to be Scoped Out of the EIA in UK waters (as justified above) it is also proposed to scope out the transboundary impact for the same reasons.	
Operation	All species	Electromagnetic changes / Barrier to species movement	Some species of mollusc, crustacean, marine fish and elasmobranchs can detect electric and magnetic fields. Recent studies with edible crabs have shown behavioural and physiological responses to EMF[66]. Of the three cables to be installed, only two are HVDC cables, which will generate EMF during operation. Bundling power cables and cable burial reduces the amount of EMF emitted. During normal operations the metallic return cable will not generate EMF, however if one of the HVDC cables fails and the metallic return cable is used to provide redundancy in the system then EMF will be generated. As it will not be bundled with the HVDC cable there is the potential that the EMF generated by the HVDC cable and metallic return cable will be higher than the system during normal operation. Given that calculations as to the field strength and burial depths have not been undertaken this impact pathway cannot be scoped out of the assessment at this stage.	Scoped In
Construction and Operation	All species	Accidental spills	Project vessels and contractors will comply with the International Convention for the Prevention of	Scoped Out

[66] Scott. K et al (2021) Exposure to Electromagnetic Fields (EMF) from Submarine Power Cables Can Trigger Strength-Dependent Behavioural and Physiological Responses in Edible Crab, Cancer pagurus (L.). Available at: https://www.mdpi.com/2077-1312/9/7/776

Project phase	Receptor	Impact	Potential for significant effect	Proposed to be scoped in/ out
			Pollution from Ships (MARPOL) 73/78 which relate to pollution from oil from equipment, fuel tanks etc and release of sewage (black and grey water). It is a legal requirement that all vessels have a Shipboard oil pollution emergency plan (SOPEP). Compliance with Regulations will be sufficient to minimise the risk to the environment and no significant impacts are predicted. Any releases of drilling fluids (e.g., bentonite) during HDD drilling will be quickly dispersed and diluted. Drilling fluids will be inert or biodegradable substances that will not have a significant impact on the environment.	
Construction and Operation	All species	Transboundary impact - Accidental spills	As a linear infrastructure project between two countries the Offshore Scheme boundary stops at the border between UK and Netherlands. However, potential impacts during construction and if necessary, cable repair during operation, will not stop, but will continue along the route of the submarine cables. There is therefore the potential that changes in marine water quality e.g., as a result of an accidental spill, will cross from UK waters into the Netherlands EEZ. The effects will be limited in spatial extent to near the EEZ boundary. The assessment for the Project in the Netherlands will assess the impact of the Project on Dutch environmental receptors. As the impact is proposed to be Scoped Out of the EIA in UK waters (as justified above) it is also proposed to scope out the transboundary impact for the same reasons.	Scoped Out
Construction and Operation	All species	Introduction or spread of MINNS	Although the introduction of project vessels, equipment and external cable protection have the	Scoped Out

Project phase	Receptor	Impact	Potential for significant effect	Proposed to be scoped in/ out
			potential to bring in and spread MINNS all relevant guidelines will be followed including vessel cleaning facilities and the use of anti-fouling paint. Project vessels and contractors will comply with the International Convention for the Control and Management of Ships' Ballast water and Sediments. All seabed deposits will be inert with no biologically active material. Project vessels will complete a biosecurity risk assessment prior to arriving on site which will include factors such as origins of the vessels and ensuring that relevant equipment is cleaned before use. Compliance with Regulations will be sufficient to minimise the risk to the environment.	
Construction and Operation	All species	Transboundary Impact – Introduction or spread of MINNS	As a linear infrastructure project between two countries the Offshore Scheme boundary stops at the border between UK and Netherlands. However, potential impacts during construction and if necessary, cable repair during operation, will not stop, but will continue along the route of the submarine cables. There is therefore the potential for the introduction or spread of MINNS through ship hulls, subsea equipment and ballast water or the placement of external cable protection on the seabed that will cross from UK waters into the Netherlands EEZ. The effects will be limited in spatial extent to near the EEZ boundary. The assessment for the Project in the Netherlands will assess the impact of the Project on Dutch environmental receptors. As the impact is proposed to be Scoped Out of the EIA in UK waters (as justified above) it is also proposed to scope out the transboundary impact for the same reasons.	Scoped Out

Project phase	Receptor	Impact	Potential for significant effect	Proposed to be scoped in/ out
Construction and Operation	Basking Shark	Collision risk	There have only been a couple of sightings of basking shark within the waters of the study area during the last 20 years[67]. The number of vessels during the project phases will be limited and not excessive. Therefore, this impact pathway has been scoped out.	Scoped Out
Construction and Operation	All species	Changes in distribution of species	Distributions of fish and shellfish populations have the potential to be affected by the combined effects of multiple impacts on fish and shellfish. This assessment will have consideration of other impacts such as changes in underwater noise, seabed disturbance during sensitive periods for species with demersal life cycles, and permanent changes in seabed habitat, all which may lead to a change in distribution of target species. Until the fish and shellfish EIA is completed, this impact cannot be scoped out of the assessment.	Scoped In
Operation	Fish and shellfish species with demersal life stage	Temperature increase due to the presence of operational cables	During the operation of an HVDC cable heat losses occur because of the resistance in the cable/conductor. This can cause localised heating of the surrounding environment (i.e., sediment for buried cables, or water in the interstitial spaces of external cable protection). There are no specific regulatory limits applied to temperature changes in the seabed, although a 2°C changed between	Scoped Out

[67] NBN Atlas (2022) Basking Shark Occurrence Records. Available at: https://records.nbnatlas.org/occurrences/search?q=lsid:NHMSYS0021053499&fq=occurrence_status:present&nbn_loading=true#tab_mapView

Project phase	Receptor	Impact	Potential for significant effect	Proposed to be scoped in/ out
			seabed surface and 0.2m depth is used as a guideline in Germany. Conservative calculations undertaken for Viking Link (which crosses German waters) concluded that heating in excess of 2°C at 20cm sediment depth will only occur if cables are bundled and buried to less than 0.75m[68]. As yet the cable burial risk assessment has not been carried out. However, evidence from similar projects show that risk of shipping and fishing interactions that a minimum burial depth of 1.5 – 2m is required[69]. Any temperature changes will be localised to the immediate environment surrounding the cable and undetectable against natural temperature fluctuations in the surrounding sediments and water column. No significant effects are predicted. This pressure has therefore been scoped out of the assessment.	

[68] National Grid and Energinet (2017) Viking Link Environmental Statement. Appendix I – Cable Heating Effects – Marine Ecological Report

[69] NeuConnect (2019) NeuConnect: Great Britain to Germany Interconnector, GB Offshore Scheme, Environmental Appraisal Report, Part 1: chapters 1 to 7

20.7 Assessment methodology

Data sources

Desk study data

20.7.1 Extensive contemporary and historic information is available regarding fish and shellfish in the North Sea. In addition to the data sources that were used to inform the baseline reported in this chapter, the data-sets that will be used to inform the description of the baseline environment and assessment in the PEI Report and ES are described in the following sub-sections and listed in **Table 20-9**.

International Herring Larvae Surveys (IHLS)

20.7.2 Since 1967 ICES have instigated a programme of International Herring Larvae Surveys[70]. The main purpose of this programme is to provide quantitative estimates of herring larvae and egg abundance and distribution, which are used as a relative index of changes of the herring spawning-stock biomass in the assessment.

20.7.3 The most recent surveys have been undertaken three times a year in Q1, Q3 and Q4. All the data from these surveys are available on the ICES website.

Fish and shellfish characterisation surveys

20.7.4 East Anglia One, East Anglia Three and former East Anglia Four Offshore Windfarms undertook fish and shellfish characterisation and epibenthic surveys in 2010 and 2013[71]. These comprised of an otter trawl survey, beam trawl survey and pelagic trawl survey at the three Offshore Windfarm sites and within a control area.

20.7.5 The data was collated in a similar manner to that of the IBTS surveys based on the number of individuals caught per hour. It can be interpreted to show the variation in catch quantity and species over the sites.

Key publicly available data sources

20.7.6 **Table 20-9** presents the key data sources that will be used for fish and shellfish.

[70] IHLS (2022) Data Portals – Eggs and Larvae. Available at: https://www.ices.dk/data/data-portals/Pages/Eggs-and-larvae.aspx

[71] East Anglia ONE North (2019) Environmental Statement – Appendix 10.2 Fish and Shellfish Ecology Technical Appendix. Available at: https://infrastructure.planninginspectorate.gov.uk/wp-content/ipc/uploads/projects/EN010077/EN010077-001156-6.3.10.2%20EA1N%20ES%20Appendix%2010.2%20Fish%20and%20Shellfish%20Ecology%20Technical%20Appendix.pdf

Table 20-9 Key publicly available data sources for fish and shellfish

Data source	Description	Coverage Relative to Study Area
Department of Energy & Climate Change (DECC)[72]	Offshore Energy Strategic Environmental Assessment 4	UK
International Council for the Exploration of the Sea (ICES)[73]	International Herring Larvae Surveys and International research reports and publications ICES Scientific Reports	Europe
International Bottom Trawl Survey (IBTS)[74]	North Sea International Bottom Trawl Survey Data has been collected since 1965 every year or twice a year ICES Data Portal (DATRAS, the Database of Trawl Surveys: http://datras.ices.dk)	Europe
Marine Space (2018)[75]	Atlantic Herring Potential Spawning Habitat and Sandeel Habitat Assessment Baseline 2018	UK
Eastern Inshore Fishing and Conservation Authority (EIFCA)	Website with Information about fishing and the species in the eastern region.	UK
Kent and Essex Inshore Fishing and Conservation Authority (KEIFCA)	Website with Information about fishing and the species in the Kent and Essex region.	UK

[72] DECC (2022) Offshore Energy SEA 4: Appendix 1 Environmental Baseline A1a.4 Fish and Shellfish. Available at: https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/1061461/Appendix_1a_4_-_Fish___Shellfish.pdf

[73] ICES (2018) Report of the Herring Assessment Working Group for the Area South of 62°N (HAWG). Available at: https://www.ices.dk/sites/pub/Publication%20Reports/Expert%20Group%20Report/acom/2018/HAWG/01%20HAWG%20Report%202018.pdf

[74] IBTS (2023) Data Portals – DATRAS. Available at: DATRAS (ices.dk)

[75] MarineSpace (2018) Atlantic Herring Potential Spawning Habitat and Sandeel Habitat Assessment Baseline 2018 - Thames Region. Available at: https://www.marinespace.co.uk/wp-content/uploads/2021/06/Thames-Herring-Sandeel-Habitat-Baseline-Overview_2018_v3.pdf

Data source	Description	Coverage Relative to Study Area
International Convention for the Conservation of Nature (IUCN)	The IUCN Red List of Threatened Species (https://www.iucnredlist.org/)	Europe
Environment Agency	Ecology and Fish Data Explorer. Freshwater fish survey data, used to check presence or absence of migratory fish in catchments and estuaries EA Ecology & Fish Data Explorer	UK
Cefas	Blackwater Herring Survey, regional stock assessment and Broadscale fish surveys, Integrated Fisheries System holding. Cefas Data Portal - View	UK
Kent & Essex Sea Fisheries Committee	Regional research reports. Kent & Essex Sea Fisheries Committee (kentandessex-sfc.co.uk)	UK
Joint Nature Conservation Committee (JNCC)	Species specific data, of native species of conservation interest UK BAP List of UK Priority Species | JNCC Resource Hub	UK
British Geological Society	Marine Sediment Particle Size dataset sourced from the BGS GeoIndex Offshore portal GeoIndex Offshore | BGS	UK
Environmental Statements from Offshore Wind Farm (OWF) Developments.	Scroby Sands OWF https://www.marinedataexchange.co.uk/details/1910/packages Greater Gabbard OWF https://tethys.pnnl.gov/sites/default/files/publications/greatergabbard2005.pdf East Anglia One OWF https://tethys.pnnl.gov/publications/east-anglia-one-offshore-windfarm-environmental-statement	UK
Environmental Statement/ scoping reports from proposed OWF Developments	East Anglia One North https://infrastructure.planninginspectorate.gov.uk/projects/eastern/east-anglia-one-north-offshore-windfarm/?ipcsection=docs East Anglia Two https://infrastructure.planninginspectorate.gov.uk/projects/eastern/east-anglia-two-offshore-windfarm/?ipcsection=docs East Anglia Three https://infrastructure.planninginspectorate.gov.uk/projects/eastern/east-anglia-three-offshore-wind-farm/?ipcsection=docs	UK

Data source	Description	Coverage Relative to Study Area
	Norfolk Vanguard West https://tethys.pnnl.gov/publications/norfolk-vanguard-offshore-wind-farm-environmental-impact-assessment-scoping-report Norfolk Vanguard East https://tethys.pnnl.gov/publications/norfolk-vanguard-offshore-wind-farm-environmental-impact-assessment-scoping-report Norfolk Boreas https://infrastructure.planninginspectorate.gov.uk/projects/eastern/norfolk-boreas/	

Additional studies

Sandeel and Atlantic Herring Habitat Assessment

20.7.7 Sandeel and Atlantic herring have specific habitat preferences that limit the spatial extent of spawning. As primary prey species for higher trophic levels, understanding whether there is primary habitat within the proposed Offshore Scheme Scoping Boundary which could be utilised by the species is important. The baseline characterisation presented above has identified that both species have the potential to spawn in the study area.

20.7.8 The assessment will be based on a review of particle size analysis to be carried out on sediment samples obtained through grab sampling and vibrocoring in the Submarine Cable Corridor (see **Chapter 18** Marine Physical Environment for scope of surveys); noting only one of the two proposed Submarine Cable Corridors will be surveyed. This will be supplemented with desk-based literature review, e.g., International Herring Larvae Surveys (IHLS) data. The assessment methodology will follow the EIA methodology in conjunction with the methodology developed by MarineSpace et al (2013)[76] and Latto et al (2013)[77] to assess effects on sandeel and Atlantic herring.

[76] Marine Space (2013) MarineSpace Ltd, ABPmer Ltd, ERM Ltd, Fugro EMU Ltd and Marine Ecological Surveys Ltd, (2013). Environmental Effect Pathways between Marine Aggregate Application Areas and Atlantic Herring Potential Spawning Habitat: Regional Cumulative Impact Assessments. Version 1.0. A report for the British Marine Aggregates Producers Association. Available at: https://www.marinespace.co.uk/wp-content/uploads/2021/06/Herring-Habitat-Assessment-v1.0_20131216_compressed.pdf

[77] Latto P. L., Reach I.S., Alexander D., Armstrong S., Backstrom J., Beagley E., Murphy K., Piper R. and Seiderer L.J., (2013). Screening Spatial Interactions between Marine Aggregate Application Areas and Sandeel Habitat. A Method Statement produced for BMAPA.

Commercial fishing activity

20.7.9 To assess commercial fishing activity within the study area a study was undertaken by Brown & May in 2022[78] to understand the spatial and temporal distribution of fishing activity within the Study Area. This is described in further detail in **Chapter 24** Commercial Fisheries. Landing data from this study which outlines target species and location of key fisheries areas will be used to inform the baseline for fish and shellfish, in terms of the likely species present.

Electromagnetic Field (EMF) Study

20.7.10 A study will be undertaken to calculate the predicted electromagnetic fields to be generated by the submarine power cables due to the electric current flowing along the cables. The electric and magnetic field strengths will be highest where the cables are separated and/or partially or unburied. The study will therefore focus on determining the maximum field strengths and the distance at which the fields dissipate to background values. This study will be used to determine the spatial extent over which electromagnetic changes could affect sensitive receptors.

Legislation, policy and guidance

20.7.11 Legislation and policy relevant to the proposed Scheme and this chapter is outlined in **Chapter 4** Legislation and Policy Overview and **Appendix 4-A** National Policy, **Appendix 4-B** Environmental Legislation and **Appendix 4-C** Local Policy.

20.7.12 Relevant guidance and standards that have informed the scoping process are listed below (but not limited to) and will also be taken into account as part of the assessment:

- National Infrastructure Planning advice notes - insofar as the principles for good EIA practice, and approaches to related assessments (such as cumulative, transboundary, and in-combination effects) may be considered appropriate.
- Professional EIA guidance documents:
  - Guide to Shaping Quality Development[79]; and
  - Delivering Proportionate EIA, A Collaborative Strategy for Enhancing UK Environmental Impact Assessment Practice[80].
- Best Practice guidance documents informing assessment:

[78] Brown & May Ltd (2022) Euro Link Multi-Purpose Interconnector Cable Project: Fishing Activity Study.

[79] IEMA (2016) Environmental Impact Assessment Guide to: Delivering Quality Development. Available at: Delivering-Quality-Development (1).pdf

[80] IEMA (2017) Delivering Proportionate EIA: A Collaborative Strategy for Enhancing UK Environmental Impact Assessment Practice. Available at: Delivering-Proportionate-EIA.pdf

– Natural England Offshore wind cabling: ten years' experience and recommendations[81].

Assessment method

20.7.13 **Chapter 5** EIA Approach and Method sets out the standard EIA methodology and matrixes to be used for the assessment. This section provides a summary of the EIA methodology specifically relevant to this chapter.

20.7.14 Assessment of cumulative and combined effects are discussed in **Chapter 29** Cumulative and Combined effects of the Project.

20.7.15 The criteria for characterising the value and sensitivity and magnitude for fish and shellfish receptors are outlined in **Table 20-10** and **Table 20-11** respectively.

Table 20-10 Definitions of value and sensitivity for fish and shellfish ecology

Receptor Value and Sensitivity	Description
Very High	The receptor is a designated feature of a Highly Protected Marine Area and/or Receptor has low tolerance to change i.e., recovery will take longer than 10 years following the cessation of activity or will not occur.
High	The receptor is a designated feature of an internationally protected site (e.g., SAC) and the licensable activity is taking place during a sensitive season and/or Receptor has low tolerance to change i.e., recovery will take longer than 10 years following the cessation of activity or will not occur.
Medium	The receptor is a designated feature of a nationally protected site (e.g., MCZ) and/or Receptor has intermediate tolerance to change i.e., recovery to pre-impact conditions is possible between 5 and 10 years.
Low	Common and widespread species of no specific conservation value and/or Receptor has high tolerance to change with recovery to pre-impact conditions between 1 and 5 years.
Negligible	Low importance and rarity, local scale and/or The receptor has some tolerance to change without detriment to its character. Recovery expected to be relatively rapid, i.e., less than approximately six months following cessation of activity

[81] NE (2018) Natural England Offshore wind cabling: ten years' experience and recommendations. Available at: EN010080-001240-Natural England - Offshore Cabling paper July 2018.pdf (planninginspectorate.gov.uk)

Table 20-11 Definitions of impact magnitude criteria for fish and shellfish ecology

Impact Magnitude	Definition
High	Impacts are of medium-term (7-15 years) through to long-term / permanent duration and/or on a regional or population level or major alteration to key elements / features of the baseline condition such that post-impact baseline character will be fundamentally changed. Natural recruitment will not return the population to the baseline condition.
Medium	Impacts are of medium term (7-15 years) duration and/or on a local level (wider than project footprint) or alter an element of the baseline conditions such as that post-impact the damage to the baseline is above that experienced under natural conditions but with no permanent effect on integrity.
Low	Impacts are temporary (<1 year) or short term (1-7 years) in duration, site specific and/or a minor shift away from the baseline condition such as that experienced under natural conditions. Impacts limited to within the project footprint. Negligible contribution to cumulative effects.
Negligible	Very little or no detectable change from baseline conditions. Disturbance is within the range of natural variability. Impacts predicted to be brief (one to two days) or for a short period (up to 3 months). No contribution to cumulative effects.

20.7.16 The following aspects will be considered for fish and shellfish ecology: spawning grounds, nursery grounds, feeding grounds, overwintering areas for crustaceans and migration routes.

20.7.17 Data derived from the site-specific geophysical, geotechnical and environmental survey will provide a more detailed site characterisation and fill key data gaps such as sediment particle size distributions (which informs the presence of species such as sandeel and herring), habitat biotopes and extent of shellfish beds (if present). A sandeel and Atlantic herring habitat assessment will be undertaken to inform the assessment of effects. In addition, the results from any assessment undertaken to inform the marine physical environment EIA will be used to establish the potential impacts on fish and shellfish.

20.7.18 Where impacts are not predicted to be significant, simple assessments, using an evidence-based approach that is proportionate to the anticipated level of significance will be undertaken.

20.7.19 Where significant effects are identified, mitigation measures will be proposed, and residual effects presented.

20.8 Assumptions & limitations

20.8.1 This EIA Scoping Report has been collated based on a range of publicly available data and information only. It is assumed that the data collated is accurate. The data will be supplemented with additional data as part of the EIA process.

20.8.2 In the absence of data, a precautionary approach has been taken and professional judgement, based on experience of similar linear schemes, has been used where required to inform the scope of the assessment.

20.8.3 It is assumed that the data available from existing literature, relevant surveys and the proposed assessments will provide an appropriate evidence base for fish and shellfish populations within the study area. It is recognised that there is limited data available on migration routes but given the linear nature of the Project and the temporary nature of the majority of potential impacts it is not anticipated this limitation will adversely affect the assessment.

Contents

21. Intertidal and Offshore Ornithology

21.1 Introduction

21.1.1 This chapter outlines the proposed scope and methodology to be undertaken for Intertidal and Offshore Ornithology. It will consider the potential for significant effects arising from the construction and operation of the LionLink Scheme (hereafter referred to as 'the proposed Offshore Scheme') in respect of intertidal and offshore ornithology. A review of relevant guidance and policy has been undertaken together with a desk-based assessment, to inform the proposed scope and methodology.

21.1.2 This chapter is supported by the following figures:

- **Figure 1- 4:** Proposed Offshore Scheme Boundary; and
- **Figure 21-1**: Intertidal and Offshore Ornithology Study Area including designated sites.

21.1.3 There may be interrelationships related to the potential effects on Intertidal and Offshore Ornithology and other disciplines. Therefore, please also refer to the following chapters:

- **Chapter 8** – Ecology and Biodiversity – which considers the potential impacts of the proposed Onshore Scheme on all ornithological receptors;
- **Chapter 18** – Marine Physical Environment – will identify the spatial extent of potential for impacts from temporary sediment suspension and subsequent redeposition;
- **Chapter 19** - Intertidal and Subtidal Benthic Ecology – will identify the potential impacts on supporting habitats and key prey species for intertidal and subtidal ornithology; and
- **Chapter 20** - Fish and Shellfish- will identify the potential impacts on key prey species for intertidal and subtidal ornithology.

21.1.4 Whilst this chapter focuses on the proposed scope of assessment to be undertaken for the proposed Offshore Scheme in relation to potential impacts on intertidal and offshore ornithological receptors, it also considers whether the proposed Offshore Scheme could impact onshore ornithological receptors.

21.1.5 The potential impacts of the proposed Onshore Scheme on ornithological receptors (onshore, intertidal and offshore) is considered in **Chapter 8** Ecology and Biodiversity.

21.1.6 It is acknowledged that the proposed Onshore Scheme and the proposed Offshore Scheme could potentially result in effects upon the same ecological receptor. The proposed method for assessing such intra-project combined effects is presented in **Chapter 29** Cumulative and Combined Effects of the Project. This describes a proposed approach that will be used to assess whether the combination of effects upon an individual receptor is likely to lead to an overall effect of greater significance.

21.2 Consultation and engagement

21.2.1 Initial non-statutory consultation on the proposed Offshore Scheme has commenced with several stakeholders for intertidal and offshore ornithology, with particular reference to the potential impacts on the Outer Thames Estuary Special Protection Area (SPA). From November 2022 to November 2023, the Marine Management Organisation (MMO), Natural England and Joint Nature Conservation Committee (JNCC) have been provided with introductory briefings on the proposed Offshore Scheme and asked for comment on the non-statutory and supplementary non-statutory consultation.

21.2.2 The main concerns raised through the discussions were:

- The potential for disturbance/displacement effects to red-throated diver (*Gavia stellata*) in the Outer Thames Estuary SPA during the winter period from vessel movements associated with the proposed Offshore Scheme (see **Table 21-6** for how this would be addressed in the Environmental Impact Assessment (EIA)); and
- Ensuring data on species distribution and densities (especially in relation to red-throated diver) is adequate and current.

21.2.3 Feedback led to changes in the position of the proposed submarine cable route options within the Outer Thames Estuary SPA to reduce potential environmental impacts, which has resulted in the proposed Offshore Scheme Scoping Boundary presented in this EIA Scoping Report.

21.2.4 Engagement will continue with relevant stakeholders in relation to the proposed Offshore Scheme to obtain any information that they hold to supplement the assessment and to seek their views with regards to the evolving design. This will be undertaken by EIA Team.

21.2.5 The following bodies will be consulted during the EIA process:

- MMO;
- JNCC; and
- Natural England.

21.3 Baseline conditions

Study area

21.3.1 The Offshore Scheme will route from the Landfall across the Southern North Sea to the boundary between the UK and Netherlands Exclusive Economic Zones (EEZ).

21.3.2 The proposed Offshore Scheme Scoping Boundary is illustrated on **Figure 21-1** and is described in **Chapter 2** The proposed Scheme Description. It includes a proposed Submarine Cable Corridor from each Landfall converging approximately 35km off the east coast of the UK. From the point of convergence there are two Submarine Cable Corridor options (B and C) that cross the Southern North Sea to the UK/Netherlands EEZ boundary.

21.3.3 The study area for the intertidal and offshore ornithology assessment has been defined recognising the highly mobile nature of birds and the distance over which they can range. The extent of the study area incorporates the area within which there is potential for direct and indirect impacts (associated with increases in concentration of suspended

sediments) to intertidal and offshore ornithology receptors during the construction and operation phases of the Offshore Scheme. The maximum zone of influence has been set as a 15km buffer around the proposed Offshore Scheme Scoping Boundary, representing the maximum predicted tidal excursion (see **Chapter 18** Marine Physical Environment for further details). This has considered:

- Seabird foraging ranges (Thaxter *et al*., 2012[1]; Woodward *et al*., 2019[2]); and
- Recent recommendations from statutory nature conservation bodies (SNCBs) regarding maximum disturbance/displacement ranges for sensitive bird species (MIG-Birds, 2022[3]).

21.3.4 According to advice from statutory nature conservation bodies (SNCBs), a maximum buffer of 10km should be applied to consider red-throated diver, which are considered to be particularly vulnerable to disturbance[3], and a buffer of at least 4km should be applied for other diving birds. The 15km buffer used to define the study area is therefore sufficient to cover the potential effects of displacement as well as potential effects resulting from increases in turbidity, which could affect diving birds' ability to seek prey.

21.3.5 The zone of influence, and therefore the study area, will remain under iterative review in response to refinement of the project design, feedback from consultees, identification of additional constraints (e.g., engineering or environmental constraints identified by detailed site-specific studies) and selection of the preferred Landfall and Submarine Cable Corridor.

21.3.6 Only one Landfall and one Submarine Cable Corridor will be taken forward for assessment in the Preliminary Environmental Information (PEI) report and Environmental Statement (ES). Consultation, engineering studies, environmental constraints and ultimately the Tennet Offshore Wind Farm (OWF) connection point will inform the decision.

Baseline data sources

21.3.7 The baseline described in this chapter and associated appendices has been informed by the following data sources:

Table 21-1 Scoping baseline data sources

Baseline Data	Source
Marine Protected Areas	Natural England Conservation Advice for Marine Protected Areas
Marine Protected Areas	JNCC Conservation Advice for Marine Protected Areas;

[1] Thaxter, C., Lascelles, B., Sugar, K., Cook, A., Roos, S., Bolton, M., Langston, R. and Burton, M. (2012). Seabird foraging ranges as a preliminary tool for identifying candidate Marine Protected Areas. Biological Conservation, 156, pp. 53.

[2] Woodward, I., Thaxter, C., Owen, E. and Cook, A. (2019). Desk-based revision of seabird foraging ranges used for HRA screening. Report of work carried out by the British Trust for Ornithology on behalf of NIRAS and The Crown Estate, Issue BTO Research Report No.724.

[3] MIG-Birds (2022) Joint SNCB interim advice on the treatment of displacement for red-throated diver. Joint SNCB Interim Advice On The Treatment Of Displacement For Red-Throated Diver (2022) (jncc.gov.uk)

Baseline Data	Source
UK Offshore Energy Strategic Environmental Assessment[4].	DECC (2022) UK Offshore Energy Strategic Environmental Assessment 4. UK Offshore Energy Strategic Environmental Assessment Environmental Report

Baseline

21.3.8 The following sections present the current baseline established at scoping. There are currently two corridors being considered for the proposed Submarine Cable Corridor, which are shown in **Figure 1-4**. Baseline information is presented for both options below.

Marine birds

21.3.9 Intertidal and offshore ornithology refers to the diversity, abundance and function of marine bird species present in the study area up to mean high-water springs (MHWS), at all life stages including feeding, breeding, overwintering and migrating. For the baseline for onshore species (landward of MHWS) please refer to **Chapter 8** Ecology and Biodiversity.

21.3.10 Marine birds are highly mobile but can be constrained during certain times of the year by factors such as their need to return to a colony to feed and care for chicks, or when they are flightless during a post-breeding moult. Species can also be restricted by their foraging strategy and the availability of prey species and their sensitivity to human activities such as vessel traffic[5].

21.3.11 For the purposes of this EIA Scoping Report, marine birds have been grouped according to Atterbury et al. (2021)[5] based on their sensitivity and exposure to impacts. **Table 21-2** (extracted and adapted from Atterbury et al. 2021) describes the various functional groups.

[4] DECC (2022) UK Offshore Energy Strategic Environmental Assessment 4. UK Offshore Energy Strategic Environmental Assessment Environmental Report (publishing.service.gov.uk)

[5] Atterbury, A., Canning, S., Dinwoodie, K., Hall, R., Piesinger, N., Stewart, D., Thorpe, E. & West, L. (2021) Natural England and JNCC guidance on key sensitivities of habitats and Marine Protected Areas in English waters to aggregate resource extraction. JNCC Report No. 694. JNCC, Peterborough, ISSN 0963-8091. https://data.jncc.gov.uk/data/6e02f22c-846f-400b-80a4-38f549e52c00/JNCC-Report-694-FINAL-WEB.pdf

Table 21-2 Marine bird groups (adapted from Table 3: Marine Birds in Atterbury et al. 2021 pg.4)

Functional group	Information
Divers, grebes and mergansers	"*This group includes great northern diver, black-throated diver, red-throated diver, Slavonian grebe, and red-breasted merganser. These species tend to aggregate in coastal waters, and in bays, estuaries and firths. They can aggregate in large numbers in specific areas over the winter, whilst during the breeding season they tend to forage within restricted ranges from their breeding areas. Some of these species have a flightless period following breeding (moulting), during which they may be particularly sensitive to some impacts. They are largely thought to be water column feeders, although there is some evidence that some species may also be benthic feeders (Duckworth et al. 2020 in Atterbury et al. 2021).*" *"This group is highly sensitive to noise and visual disturbance, such as from vessel traffic (Fliessbach et al. 2019 in Atterbury et al. 2021). Since some of these species may not resettle quickly after being flushed, the vessel transit route plus a buffer of several kilometres may be effectively lost as habitat to some diver and grebe species, with evidence for this being particularly strong for red-throated diver (Mendel et al. 2019 in Atterbury et al. 2021)."* *"These species are thought to have some sensitivity to underwater noise and may be impacted by changes in suspended solids when foraging in the water column."*
Seaducks, geese and swans	*"This group includes common eider, goldeneye, scaup, long-tailed duck, common scoter, velvet scoter, whooper swan, Bewick's swan, greylag goose, barnacle goose, pink-footed goose, dark-bellied brent goose, light-bellied brent goose, shelduck, pintail, pochard, shoveler, wigeon, teal, mallard and gadwall. This category includes species which breed in the UK, migrate through UK waters, and/or winter in the UK. They can use a variety of waters both inshore and offshore. They are benthic, surface or grazing feeders. While some diving sea duck species like eiders and scoters specialise in foraging on shellfish and crustaceans, others such as long-tailed duck, goldeneye and scaup are generalist feeders and their diet can include aquatic plants, polychaetes, amphipods, aquatic insects and some small fish. Other duck, swan and goose species within this group are surface feeders, utilising prey on the surface of intertidal habitats such as the small gastropod mollusc Hydrobia, as well as grazing on saltmarsh and coastal grazing marsh.* *Most species within this group are sensitive to visual and noise disturbance from vessel traffic (Fliessbach et al. 2019 in Atterbury et al. 2021). In two studies looking at the disturbance effects caused by vessels, common scoters were not observed resettling after being flushed (Schwemmer et al. 2011; Fliessbach et al. 2019 both cited in in Atterbury et al. 2021). However, most species in this group, it is not known if or how quickly they recover and move back to areas once a vessel has passed through. It is unknown whether species within this group are sensitive to underwater noise. For species which are benthic feeders, activities that are likely to disturb seabed habitats and species may affect the availability of suitable prey."*

Functional group	Information
Auks	*"There are four auk species commonly found in waters around the UK: Atlantic puffin, black guillemot, common guillemot and razorbill. They aggregate around the UK in inshore and offshore waters throughout the year. During the breeding season, they tend to form large colonies, and impacts occurring in favoured foraging areas within range of these colonies can have implications for their ability to successfully raise chicks. Adults have a flightless moult period immediately after chicks fledge, which can last several months. When chicks fledge, they too are flightless for several weeks. During these periods adults and chicks may be particularly sensitive to some pressures, including noise and visual disturbance. Auks are water-column feeders, feeding largely on pelagic and demersal fish.* *Auks are sensitive to noise and visual disturbance. Vessel transits through important foraging areas or aggregations of these species should be avoided. While there is evidence for underwater anthropogenic noise affecting the foraging behaviour of related species (African penguins; Pichegru et al. 2017 in Atterbury et al. 2021), it remains unclear how sensitive auks are to this impact. As these are species that feed in the water column, they may be affected by changes in water turbidity due to increases in suspended sediments…, which would affect their ability to successfully forage for their prey. In addition, disturbance and loss of seabed habitats can affect availability of suitable prey (e.g., sandeel)."*
Terns, gulls, kittiwakes and gannets	*"This group includes common tern, Sandwich tern, Arctic tern, little tern, roseate tern, great black-backed gull, lesser black-backed gull, herring gull, common gull, black-headed gull, Mediterranean gull, little gull, black-legged kittiwakes, petrel species and northern gannet. These species aggregate around the UK in inshore and offshore waters, with terns being present during the spring and autumn migrations and the breeding season, while others can be present in UK waters throughout the year. During the breeding season, they tend to breed in colonies, and impacts occurring in favoured foraging areas within range of these colonies can have implications for their ability to successfully raise chicks. Except for gannets, all species in this group are surface feeders, with some species also feeding in exposed tidal areas. They feed on a wide variety of marine prey including fish, squid, crustaceans, jellyfish and offal.* *These species are low to moderately sensitive to noise and visual disturbance, and some species within this group may be attracted to some vessels, potentially in hope of fishery discards/offal. It is unknown whether species within this group are sensitive to underwater noise. As most species in this group are surface feeders, they may be affected by changes in suspended solids that would affect their ability to successfully forage for their prey (van Kruchten & van der Hammen 2011; Cook & Burton 2010, both cited in Atterbury et al. 2021)."*
Waders and harriers	*"This group includes wader species which breed, migrate and winter along the UK coast. Wader species have various foraging strategies, but all are surface or near-surface feeders, making use of open coast, mud and sandflats, saltmarshes, saline lagoons, rocky coasts (e.g., purple sandpiper, oystercatcher) and nearby grazing*

Functional group	Information
	marsh and arable land to both feed and roost. Some, such as oystercatcher, are more (but not exclusively) reliant on localised food resources such as cockle and mussel beds whilst others are more generalist. Some species are largely restricted to certain breeding habitats (e.g., avocet: saline lagoons, saltpans and scrapes; ringed plover: sand and shingle, saltmarsh edges) whilst other species utilise a broader range of coastal and adjacent habitats. *This group also includes marsh and hen harrier. Both species can use intertidal habitats extensively in winter for foraging and roosting. Marsh harrier will also utilise coastal habitats in the breeding season and may also breed in saline reedbeds.* *This group is sensitive to visual and noise disturbance from vessel traffic. Waders and other species using intertidal habitats are at risk from disturbance caused by people and machinery…across and adjacent to those habitats. In general, there is less risk of disturbance of those habitats from shipping…except where vessels capable of navigating shallow waters are employed. Activities that are likely to disturb their intertidal habitats and prey species may affect the availability of suitable prey for these species."*

21.3.12 The southern North Sea and the adjacent coastline provide habitats for a wide range of both nationally and internationally recognised marine bird populations. The distribution and abundance of these bird populations fluctuates throughout the year depending on factors such as food availability and seasonality for periods such as breeding.

21.3.13 The recent Offshore Energy Strategic Environmental Assessment (SEA) 4[6] discusses aspects of the UK baseline environment to facilitate discussion around the potential for future development of renewable energy and oil & gas abstraction. It characterises the UK bird fauna as 'western Palaearctic', meaning that the majority of species are found across western Europe and extend into western Asia and northern Africa.

21.3.14 Digital aerial bird surveys from offshore windfarms in the study area (East Anglia ONE North[7], East Anglia TWO[8], Norfolk Boreas[9], Norfolk Vanguard[10]) consistently identified the species listed in **Table 21-3** as present in the study area.

Table 21-3 Marine birds present in the study area

Functional Group	Species
Divers, grebes and mergansers	Red-throated diver, Black-throated diver, Great northern diver, Cormorant, Shag
Auks	Puffin, Guillemot, Razorbill
Terns, gulls, kittiwakes and gannets	Fulmar, Gannet, Sandwich tern, Common tern, Arctic tern, Kittiwake, Black-headed gull, Little gull, Mediterranean gull, Common gull, Lesser black-backed gull, Herring gull, Great black-backed gull, Arctic skua, Great skua

Designated sites

21.3.15 Publicly available Geographical Information System (GIS) data[11] has been used to identify designated sites within the study area which cite marine bird species as a designating feature. These include Special Protection Areas (SPAs) under the Birds Directive, Ramsar sites under the Ramsar Convention on Wetlands (1971) and Sites of Special Scientific Interest (SSSIs) under the Countryside and Wildlife Act 1981. **Table 21-4** lists the offshore designated sites which are crossed by the proposed Submarine Cable Corridors and states the length of the crossing within the European site(s) using the centreline. **Table 21-5** lists the offshore and onshore sites, their protected features and the distance to the Offshore Scheme Scoping Boundary. The table distinguishes

[6] DECC (2022) UK Offshore Energy Strategic Environmental Assessment 4. UK Offshore Energy Strategic Environmental Assessment Environmental Report (publishing.service.gov.uk)

[7] Scottish Power Renewables (2019) East Anglia ONE North Offshore Windfarm Environmental Statement Volume 1 Chapter 12 Offshore Ornithology. Available at: Title (planninginspectorate.gov.uk)

[8] Scottish Power Renewables (2019) East Anglia TWO Offshore Windfarm Environmental Statement Volume 1 Chapter 12 Offshore Ornithology. Available at Title (planninginspectorate.gov.uk)

[9] Vattenfall (2019). Norfolk Boreas Offshore Wind Farm Environmental Statement Volume 1 Chapter 13 Offshore Ornithology. Available at: EN010087-000399-6.1.13 Environmental Statement Chapter 13 Offshore Ornithology.pdf (planninginspectorate.gov.uk)

[10] Vattenfall (2018) Norfolk Vanguard Offshore Wind Farm Environmental Statement Volume 1 Chapter 13 Offshore Ornithology. Available at: EN010079-001501-Chapter 13 Offshore Ornithology Norfolk Vanguard ES.pdf (planninginspectorate.gov.uk)

[11] JNCC (2022) UK Protected Area Datasets for Download. Available at: UK Protected Area Datasets for Download | JNCC - Adviser to Government on Nature Conservation

between purely terrestrial and marine species, with species not considered to be marine birds in light grey font.

21.3.16 It is understood that designated sites along the Suffolk coastline have been nominated as part of the UNESCO World Heritage Site Eastern Atlantic Flyway. The indicative boundary for the designation[12] appears to align with the several of the onshore protected sites identified in **Table 21-4**.

Table 21-4 Offshore designated sites that the Offshore Scheme crosses

Protected site	Distance Proposed Submarine Cable Corridor crosses site(s)		Protected features (b - Breeding; nb - Non-breeding; w - wintering)
	B	C	
Outer Thames Estuary SPA	Route to Southwold		Red-throated diver (*Gavia stellata*), nb Common tern (*Sterna hirundo*), b Little tern (*Sternula albifrons*), b
	16.4km	19.2km	
	Route to Walberswick		
	13.32km	21.5km	

Table 21-5 Onshore designated sites in the study area

Protected site	Distance from Landfall		Protected features (b - Breeding; nb - Non-breeding; w - wintering)
	Southwold	Walberswick	
Minsmere-Walberswick SPA	2.3km	0.08km	Avocet (*Recurvirostra avosetta*), b Bittern (*Botaurus stellaris*), b Gadwall (*Mareca strepera*), b & nb Greater white-fronted goose (*Anser albifrons albifrons*), nb Hen harrier (*Circus cyaneus*), nb Little tern (*Sterna albifrons*), b Marsh Harrier (*Circus aeruginosus*), b Nightjar (*Caprimulgus europaeus*), b Shoveler (*Spatula clypeata*), b & nb Teal (*Anas crecca*), b
Benacre to Easton Bavents SPA	1.5km	4.0km	Little tern (*Sternula albifrons*), b Bittern (*Botaurus stellaris*), b Marsh harrier (*Circus aeruginosus*), b
Broadland SPA	13.5km	16.0km	Bewick's swan (*Cygnus columbianus bewickii*), nb Bittern (*Botaurus stellaris*), b Gadwall (*Mareca strepera*), nb

[12] https://www.abpmer.co.uk/blog/english-east-coast-wetlands-added-to-uk-s-tentative-list-of-world-heritage-sites/

Protected site	Distance from Landfall		Protected features (b - Breeding; nb - Non-breeding; w - wintering)
	Southwold	Walberswick	
			Hen harrier (*Circus cyaneus*), nb Marsh harrier (*Circus aeruginosus*), b Ruff (*Calidris pugnax*), nb Shoveler (*Spatula clypeata*), nb Whooper swan (*Cygnus cygnus*), nb Wigeon (Mareca penelope), nb
Minsmere-Walberswick Heaths & Marshes SSSI	1.4km	0.08km	Avocet (*Recurvirostra avosetta*), b Bearded Tit (*Panurus biarmicus*), b Bittern (*Botaurus stellaris*), b Cetti's Warbler (*Cettia cetti*), b Garganey (*Anas querquedula*), b Marsh Harrier (*Circus aeruginosus*), b
Pakefield to Easton Bavents SSSI	0.21km	3.1km	Bittern (*Botaurus stellaris*), b & nb Marsh harrier (*Circus aeruginosus),* b Little tern (*Sterna albifrons*), b Water rail (*Rallus aquaticus*), b Bearded tit (*Panurus biarmicus*), b
Sizewell Marshes SSSI	10.3km	5.1km	Breeding bird assemblages
Leiston-Aldeburgh SSSI	12.6km	7.3km	Gadwall (*Mareca strepera*), b & nb Marsh Harrier (*Circus aeruginosus*), b Woodlark (*Lullula arborea*), b Shoveler (*Anas clypeata*), nb White-fronted Goose (*Anser albifrons albifrons*), nb
Minsmere-Walberswick Ramsar	2.3km	0.08km	Wetland bird assemblages, b
Broadland Ramsar	13.6km	16.0km	Bewick's swan (*Cygnus columbianus bewickii*), w Gadwall (*Anas strepera*), w Shoveler (*Anas clypeata*), w Wigeon (*Mareca penelope*), w

Note: species not considered to be marine birds are in light grey.

21.3.17 Some sites have been identified within the study area which do not have marine birds listed as protected features. These sites are as follows:

- Sandlings SPA;

- Sotterley Park SSSI;
- Titsal Wood, Shadingfield SSSI;
- Barnby Broad & Marshes SSSI;
- Sprat's Water and Marshes, Carton Colville SSSI;
- Holton Pit SSSI; and
- Dew's Ponds SSSI.

21.3.18 The **Outer Thames Estuary SPA** extends northwards from the Thames Estuary towards Great Yarmouth on the East Norfolk coast and out into the North Sea. It covers an area of 3,914km^2 and was designated in 2010 for the protection of wintering red-throated diver, breeding little tern and breeding common tern. The Outer Thames Estuary SPA supports the largest aggregation of wintering red-throated diver in the UK with an estimated population of 6,466 individuals, accounting for 38% of the wintering population in Great Britain[13]. Digital video aerial surveys of red-throated diver distributions in the SPA conducted in February 2018 identified that the area through which Submarine Cable Corridors B and C cross has low densities close to the coast (0.11 - 0.2 birds per sq.km) increasing to moderate to high densities (0.51- 2.0 birds per sq.km) with distance from the coast. Submarine Cable Corridors B and C avoid the key areas of higher density where numbers range from 5 to >50 birds per sq.km, which lie to the north of the European site and within the Thames Estuary[14].

21.3.19 The Outer Thames Estuary SPA also protects foraging areas for common tern and little tern during the breeding season. The SPA supports around 2.66% of the UK population of common tern, and around 19.64% of the UK population of little tern. The closest colony of common tern lies outside of the study at Breydon Water. The Landfall sites are at the limit of the foraging range for the colony according to predictive relative usage maps that informed the delineation of the SPA boundary[15].

21.3.20 The **Minsmere-Walberswick SPA** lies in close proximity to the Walberswick Landfall site (80m) and is approximately 3km from the Southwold Landfall. It is an intertidal site on the Suffolk coast and extends between Southwold and Sizewell. The SPA overlaps with the Minsmere-Walberswick Heaths and Marshes SAC and the Minsmere-Walberswick Ramsar site to form the Minsmere-Walberswick European Marine Site[16]. It also includes the Minsmere-Walberswick Heaths & Marshes SSSI.

21.3.21 The Minsmere-Walberswick SPA and associated Ramsar and SSSI is formed of a variety of habitats which support the designated bird species of the site, including saltmarsh, shingle beaches, intertidal mud and mixed sediment, and coastal reedbeds. It is of particular importance during the winter months, supporting nationally and internationally important numbers of migratory wildfowl and waders.

21.3.22 The **Benacre to Easton Bavents SPA** is in proximity to the Landfall sites (1.5km from Southwold and 4.4km from Walberswick). It includes the Pakefield to Easton Bavents

[13] JNCC (2022a). Outer Thames Estuary SPA. Available at: Outer Thames Estuary SPA | JNCC - Adviser to Government on Nature Conservation

[14] Natural England (2019). Digital video aerial surveys of red-throated diver in the Outer Thames Estuary Special Protection Area 2018. Available at: https://publications.naturalengland.org.uk/publication/4813740218515456

[15] Natural England and JNCC (2015) Departmental brief: Outer Thames Estuary potential Special Protection Area. Available at: outer-thames-departmental-brief.pdf (publishing.service.gov.uk)

[16] Natural England (n.d.). Natural England Conservation Advice for Marine Protected Areas. Minsmere-Walberswick SPA. Available at: Marine site detail (naturalengland.org.uk)

SSSI and Benacre National Nature Reserve (NNR). The SPA incorporates internationally important stretches of shingle, dunes, saltmarsh and coastal lagoons of importance for breeding, wintering and passage birds. It supports assemblages of breeding and wintering birds as well as Annex I species including occasional wintering red-throated diver and breeding avocet and common tern[17]. The SSSI supports a number of habitats of importance for nationally important populations of breeding and overwintering bittern and breeding little tern (*Sterna albifrons*), marsh harrier (*Circus aeruginosus*), water rail (*Rallus aquaticus*) and bearded tit (*Panurus biarmicus*), as well as several other breeding bird assemblages[18].

21.3.23 The **Broadland SPA** is underpinned by 26 SSSIs and overlaps with the Broadland Ramsar site. It is located within the study area 13.6km from the Southwold Landfall and 16.0km from the Walberswick Landfall. It is a low-lying wetland site within the floodplains of five principal river systems. The marshland and reedbed habitats are of international importance for a number of breeding and wintering raptors and waterbirds[19] [20].

21.3.24 The **Leiston-Aldeburgh SSSI** overlaps with the Sandlings SPA. Although the SPA is not designated for marine birds, the SSSI includes marsh and open water habitats which support breeding birds which use the marine area such as marsh harrier, gadwall and wintering birds such as Bewick's swan[21].

Future baseline

21.3.25 The Intertidal and Offshore Ornithology chapter within the PEI Report and ES will consider changes which may affect the future environment in the absence of the proposed Offshore Scheme. The future baseline will also take into account any developments that are likely to be present in the future baseline.

21.3.26 The existing baseline conditions for marine birds within the study area are considered to be in decline, primarily as a result of the impacts of climate change and impacts on fisheries[22]. Breeding numbers of most seabird species in the British Isles are decreasing, and it is considered likely that these trends will continue in the short to medium term future.

21.3.27 Sandeel stocks in the North Sea have been observed to decline as a result of fishing pressures. Sandeel are recognised as being the most important prey fish stock for North Sea seabirds during the breeding season[23] and it is considered unlikely that stocks

[17] Natural England (2019) Benacre to Easton Bavents Special Protection Area (SPA) Site Code:UK9009291. Available at: UK9009291_Benacre to Easton Bavents_SPA_Published 21 Sep 2021 (naturalengland.org.uk)

[18] Natural England. (n.d.) Pakefield to Easton Bavents SSSI. Available at: Microsoft Word - 2000508.doc (naturalengland.org.uk)

[19] Natural England (2023) Broadland Special Protection Area (SPA) SiteCode:UK9009253. Available at: UK9009253_Broadland_SPA_Published 25 Jan 2023 (naturalengland.org.uk)

[20] Ramsar (1999) Broadland RIS. Available at: Broadland | Ramsar Sites Information Service

[21] Natural England. (n.d.) Leiston-Aldeburgh SSSI . Available at: 2000370 (naturalengland.org.uk)

[22] East Anglia ONE North Offshore Windfarm Environmental Statement: Chapter 12 Offshore Ornithology (2019). Available at: Title (planninginspectorate.gov.uk)

[23] Furness and Tasker (2000) Seabird-fishery interactions: quantifying the sensitivity of seabirds to reductions in sandeel abundance, and identification of key areas for sensitive seabirds in the North Sea. Available at: [PDF] Seabird-fishery interactions : quantifying the sensitivity of seabirds to reductions in sandeel abundance, and identification of key areas for sensitive seabirds in the North Sea | Semantic Scholar

would recover sufficiently even if fishing effort was reduced due to the impact of climate change on North Sea food webs.

21.3.28 The impacts of climate change may further impact bird species within the intertidal and offshore seas of the UK as a result of increased stormy conditions in winter and other areas such as the Baltic Sea becoming more favourable as wintering areas due to warming.

21.4 Potential impacts

21.4.1 This section identifies, at a high level, a summary of the sources and potential impacts as a result of the proposed Offshore Scheme during the construction and operational phases.

21.4.2 Potential impacts have been established based on industry experience, professional judgement and where applicable reference to the list of marine pressures established by the JNCC Marine Pressures-Activities Database v1.5 (2022) and Natural England's advice on operations for relevant European protected sites.

Construction

21.4.3 The following impacts could occur during the construction phase:

- Visual/physical disturbance or displacement as a result of the presence of the project vessels and equipment. Some species are recognised as being exceptionally sensitive to disturbance, particularly diving birds such as red-throated diver which is a protected feature of the Outer Thames Estuary SPA, through which the proposed Submarine Cable Corridor passes.
- Temporary increase and re-deposition of suspended sediments which has the potential to decrease visibility for birds which dive to hunt for prey, and to smother prey species.
- Changes in distribution of prey species due to disturbance or physical displacement of species arising from construction activities e.g., route clearance, cable burial, pre-sweeping, and the placement of any cable protection.
- Accidental spills from project vessels has the potential to result in significant adverse impacts on flora, fauna and supporting habitats, as well as specifically coating birds' waterproof feathers.
- Transboundary impacts associated with visual/physical disturbance, changes in prey availability and accidental spills.

Operation

21.4.4 The following impacts could occur during the operation phase:

- Visual/physical disturbance or displacement as a result of the presence of the project vessels and equipment;
- Temporary increase and deposition of suspended sediments during cable repair;
- Changes in distribution of prey species due to disturbance or physical displacement of prey species arising from a cable repair, if required;

- Accidental spills due to the presence of project vessels and equipment; and
- Transboundary impacts associated with visual / physical disturbance, changes in prey availability and accidental spills.

21.5 Design and control measures

21.5.1 As outlined in **Chapter 5** EIA Approach and Method, a standard hierarchical approach will be taken to mitigation.

21.5.2 The assessment of effects will take into account measures that are embedded into the proposed Offshore Scheme design, together with general good practice measures.

Design measures

21.5.3 Design measures to be incorporated as part of the Offshore Scheme include:

- If feasible all cables will be installed in one trench. If not feasible, where practicable the two submarine cables will be bundled together and installed with a fibre optic cable in one trench with the metallic return cable and a separate fibre optic cable in a second trench;
- Where practicable, cable burial shall be the preferred means of cable protection;
- The Submarine Cable Corridor will be designed to minimise the risk of exposure from seabed mobility; and
- Design and construction will be carried out in accordance with International Cable Protection Committee (ICPC) Recommendations.

Control measures

21.5.4 Control measures to be implemented as part of the Offshore Scheme include:

- A Construction Code of Practice (CCOP) (for the construction and operation phases) will be developed and adhered to. This documentation will detail the Project's commitment to best practice guidance and procedures including:
  - Production of an Emergency Spill Response Plan and Waste Management Plan, Marine Pollution Contingency Plan (MPCP) and a dropped object procedure;
  - Compliance of all project vessels with the regulations relating to International Convention for the Prevention of Pollution from Ships (the MARPOL Convention 73/78) (IMO, 1983)[11] with the aim of preventing and minimising pollution from ships; and
  - Careful management of drilling fluids required for trenchless operations to minimise the risk of breakouts into the marine environment. Specific avoidance measures would include: the use of biodegradable drilling fluids (PLONOR substances) where practicable, drilling fluids will be tested for contamination to determine possible reuse or disposal; and if disposal is required drilling fluids would be transported by a licensed courier to a licensed waste disposal site.
- Implementation of Natural England 'Best Practice Protocol for Vessels in Red-throated Diver SPAs' including:
  - Where possible avoid works during period 01 November to 31 March inclusive;

- Select routes to avoid known aggregations of birds;
- Restrict vessel routes (where possible) to existing navigation routes;
- Maintain direct transit routes (to minimise transit distances) through areas used by divers; and
- Avoid over-revving engines.

21.6 Scope of the assessment

21.6.0 This section identifies the potential for the proposed Offshore Scheme to have likely significant effects, taking into account the design and control measures identified in **Section 21.5.**

21.6.1 **Table 21-6** sets out the receptors within the study area that have been identified, whether there is a pathway for the impacts identified, the potential for significant effects and if the receptor is scoped in for the assessment.

21.6.2 All identified impacts are of relevance to both the Southwold and Walberswick Landfall options and both Submarine Cable Corridor options unless specified otherwise.

21.6.3 A precautionary approach has been taken and where there is no strong evidence base, insufficient baseline or the significance is uncertain at this stage the impact has been scoped in to the EIA. Where there is a clear evidence base that the effect from the impact will not be significant, either alone or in combination with other plans and projects, the impact has been scoped out of the EIA.

21.6.4 Where relevant, bird species have been grouped according to their sensitivity to disturbance or their method of feeding after Atterbury *et al.* (2021)[5].

21.6.5 Whilst it is acknowledged that some purely onshore species may use the intertidal area for foraging, passage or loafing, the proposed Offshore Scheme will have very limited interaction with the intertidal area as a trenchless technology (HDD) will be used. Works associated with the transition from offshore to onshore such as the HDD punch out and cable pull-in may require personnel or equipment on the intertidal area, but this will be limited in duration (to a couple of days) and most of the activity will be in the nearshore (seaward of low water). There is no pathway for onshore species to be significantly affected as they will not be present in the nearshore works area. Components such as HDD compound are part of the scope of the Onshore Scheme; the potential impacts of which are assessed in **Chapter 8** Ecology and Biodiversity.

21.6.6 It is acknowledged that the proposed Onshore Scheme and the proposed Offshore Scheme could potentially result in effects upon the same ecological receptor. The proposed method for assessing such intra-project combined effects is presented in **Chapter 29** Cumulative and Combined Effects of the Project.

Table 21-6 Proposed scope of the assessment

Project phase	Receptor	Impact	Potential for significant effect	Proposed to be scoped in/ out
Construction and Operation	Divers, grebes and mergansers	Visual/physical disturbance or displacement	Diving species such as red-throated divers are recognised as being highly sensitive to noise and visual disturbance, such as that caused by vessel traffic (Atterbury et al., 2021). Once flushed, they may not rapidly resettle. It is recommended that vessel transit through SPAs where these species are present should be avoided where possible. The extent of the potential impact of Project vessels on diving species will be considered further as part of the EIA.	Scoped In
Construction and Operation	Seaducks, geese and swans	Visual/physical disturbance or displacement	Species present within this group such as shelduck and pintail are considered to be sensitive to noise and visual disturbance (Atterbury et al., 2021), and it is not known how rapidly they resettle following disturbance. The extent of the potential impact of Project vessels on this group will be considered further as part of the EIA.	Scoped In
Construction and Operation	Auks	Visual/physical disturbance or displacement	Species present within this group such as puffin, guillemot and razorbill are sensitive to noise (Atterbury et al., 2021). Post-breeding they moult and become flightless, forming large aggregations on the water. Disturbance during this time could be significant and this group will be considered further as part of the EIA.	Scoped In
Construction and Operation	Terns, gulls, kittiwakes and gannets	Visual/physical disturbance or displacement	Kittiwakes and gannets are not recorded as protected species for any of the designated sites identified within the study area. Tern and gull species are low to moderately sensitive to noise and visual disturbance. It is not considered that the presence of the Project vessels is likely to have a significant impact on this group.	Scoped Out
Construction and Operation	Waders	Visual/physical disturbance or displacement	These species are considered to be sensitive to noise and visual disturbance (Atterbury et al., 2021). Although they are largely present within the intertidal areas rather than offshore, there is the potential for them to be disturbed due to vessel traffic and during installation and any	Scoped In

Project phase	Receptor	Impact	Potential for significant effect	Proposed to be scoped in/ out
			operational activities at the landfall. The extent of any potential impact on these species will be considered further as part of the EIA.	
Construction and Operation	Divers, grebes and mergansers	Temporary increase and re-deposition of suspended sediments.	Diving species such as red-throated divers and little grebe dive for prey and rely on clear vision for success. A reduction in water clarity as a result of increased suspended solids in the water column following disturbance of seabed sediments (i.e., because of route clearance, seabed preparation, cable burial, deposition of external cable protection and repair/remediation works), could negatively impact foraging success. In addition, the deposition of suspended sediments from the water column has the potential to smother potential prey species which live on the sea floor, thus reducing prey abundance. However, as described in **Chapter 18** Marine Physical Environment, there is evidence that any sediment plumes will be rapidly dissipated as result of natural current flow. In addition, the footprint of the Offshore Scheme is sufficiently narrow such that a relatively small area of the seabed will be affected at any one time. Diving birds will therefore have sufficient alternative feeding grounds and prey species available and as a result are unlikely to be significantly adversely affected by a temporary reduction in water clarity or deposition of suspended sediments.	Scoped Out
Construction and Operation	Seaducks, geese and swans	Temporary increase and re-deposition of suspended sediments.	Although none of the sea ducks present in the designated sites as protected species are classified as 'diving ducks' according to the Royal Society for the Protection of Birds (RSPB) [24], surface feeders including shelduck, shoveler and pintail may on occasion 'shallow dive' in search of invertebrates, shellfish and aquatic snails. Therefore, there is potential for an adverse impact on their foraging abilities as a result of decreased water clarity due to increased suspended solids in the water column following disturbance of seabed sediments (i.e., because of route	Scoped Out

[24] RSPB (2023) Types of ducks in the UK. Available at: Types of Ducks, Geese and Swans in the UK - The RSPB

Project phase	Receptor	Impact	Potential for significant effect	Proposed to be scoped in/ out
			clearance, seabed preparation, cable burial, deposition of external cable protection and repair/remediation works). However, as described in **Chapter 18** Marine Physical Environment, there is evidence that any sediment plumes will be rapidly dissipated as result of natural current flow. In addition, the footprint of the Offshore Scheme is sufficiently narrow such that a relatively small area of the seabed will be affected at any one time. Diving ducks will therefore have sufficient alternative feeding grounds available and as a result are unlikely to be significantly adversely affected by a temporary reduction in water clarity.	
Construction and Operation	Auks	Temporary increase and re-deposition of suspended sediments.	Auks feed on pelagic and demersal fish in the water column (Atterbury et al., 2021). Therefore, there is potential for an adverse impact on their foraging abilities as a result of decreased water clarity due to increased suspended solids in the water column following disturbance of seabed sediments (i.e., because of route clearance, seabed preparation, cable burial, deposition of external cable protection and repair/remediation works). However, as described in **Chapter 18** Marine Physical Environment, there is evidence that any sediment plumes will be rapidly dissipated as result of natural current flow. In addition, the footprint of the Offshore Scheme is sufficiently narrow such that a relatively small area of the seabed will be affected at any one time. Auks will therefore have sufficient alternative feeding grounds available and as a result are unlikely to be significantly adversely affected by a temporary reduction in water clarity.	Scoped Out
Construction and Operation	Terns, gulls, kittiwakes and gannets	Temporary increase and re-deposition of suspended sediments.	Diving birds such as kittiwakes and gannets are not recorded as protected species within the relevant designated sites, and gulls do not typically dive for food (Atterbury et al., 2021). However, common tern and little tern, which are protected features of the Outer Thames Estuary SPA, Benacre to Easton Bavents SPA and Pakefield to Easton Bavents SSSI, do plunge dive for food and therefore there is potential for an	Scoped Out

Project phase	Receptor	Impact	Potential for significant effect	Proposed to be scoped in/ out
			adverse impact on their foraging abilities as a result of decreased water clarity due to increased suspended solids in the water column following disturbance of seabed sediments (i.e., because of route clearance, seabed preparation, cable burial, deposition of external cable protection and repair/remediation works). In addition, the deposition of suspended sediments from the water column has the potential to smother potential prey species which live on the sea floor, thus reducing prey abundance. However, as described in **Chapter 18** Marine Physical Environment, there is evidence that any sediment plumes will be rapidly dissipated as result of natural current flow. In addition, the footprint of the Offshore Scheme is sufficiently narrow such that a relatively small area of the seabed will be affected at any one time. Diving birds will therefore have sufficient alternative feeding grounds available and as a result are unlikely to be significantly adversely affected by a temporary reduction in water clarity or deposition of suspended sediments.	
Construction and Operation	Waders and harriers	Temporary increase and re-deposition of suspended sediments.	Wading birds and harriers do not dive for food and will therefore not be adversely affected by a temporary decrease in water clarity as a result of increased suspended solids during any stage of the Offshore Scheme.	Scoped Out
Construction and Operation	All bird species	Changes in distribution of prey or target species	Pre-sweeping and cable burial. Pre-sweeping of the seabed and cable burial will cause a localised, temporary loss of habitat leading to a potential reduction in prey availability. However, these activities will take place over a relatively small area of the seabed, relative to the alternative foraging areas available. In addition, these activities are transient in nature. The seabed habitat will recover and will continue to support prey species within a relatively short time frame. These activities are therefore not considered to significantly adversely affect the prey availability for bird species in the study area.	Scoped Out

Project phase	Receptor	Impact	Potential for significant effect	Proposed to be scoped in/ out
Construction and Operation	All bird species	Changes in distribution of prey or target species	Deposition of external cable protection. The deposition of cable protection will result in permanent alteration of localised areas of the seabed. This has the potential to reduce areas of habitat for prey species such as sandeel and herring and consequently reduce prey availability for bird species in the study area. As the location and quantity of external cable protection is not yet known, further assessment will be undertaken within the EIA to evaluate the sensitivity of relevant prey species to habitat alteration. The seabed will remain in an altered state throughout operation, without the potential for recolonisation due to the lack of soft substrate for spawning. However, there is the potential for the cable protection to be colonised with alternative food sources. This will be further assessed within the EIA.	Scoped In
Construction and Operation	All bird species	Accidental spills	Project vessels and contractors will comply with the International Convention for the Prevention of Pollution from Ships (MARPOL) 73/78 which relate to pollution from oil from equipment, fuel tanks etc and release of sewage (black and grey waters). Compliance with Regulations will be sufficient to minimise the risk to the environment.	Scoped Out

21.7 Assessment methodology

Data sources

Desk study data

21.7.1 Extensive contemporary and historic information is available regarding the ornithological characteristics of the North Sea and will be used in the EIA. In addition to the data sources that were used to inform the baseline reported in this chapter, **Table 21-7** identifies the key data sources that will be used to inform the baseline description in the PEI Report and ES. Data analysis will be verified and supplemented through consultation with relevant stakeholders as outlined in **Section 21.2.**

Table 21-7 Key publicly available data sources for intertidal and offshore ornithology

Data source	Description	Coverage Relative to Study Area
British Trust for Ornithology BTO BirdFacts[25]	Provision of key information on UK bird species and their conservation status.	UK
Royal Society for the Protection of Birds[26]	Species information	UK
IUCN	The International Convention for the Conservation of Nature (IUCN) Red List of Threatened Species https://www.iucnredlist.org/	Europe
Environmental Statements from Offshore Wind Farm (OWF) Developments.	Scroby Sands OWF https://www.marinedataexchange.co.uk/details/1910/packages Greater Gabbard OWF https://tethys.pnnl.gov/sites/default/files/publications/greatergabbard2005.pdf East Anglia One OWF https://tethys.pnnl.gov/publications/east-anglia-one-offshore-windfarm-environmental-statement Galloper OWF https://www.marinedataexchange.co.uk/details/377/summary	UK
Environmental Statement/ scoping reports from proposed	East Anglia One North https://infrastructure.planninginspectorate.gov.uk/projects/eastern/east-anglia-one-north-offshore-windfarm/?ipcsection=docs	UK

[25] Available at: Welcome to BirdFacts | BTO - British Trust for Ornithology

[26] Available at: Birds A- Z | Bird Guides - The RSPB

Data source	Description	Coverage Relative to Study Area
OWF Developments	East Anglia TWO https://infrastructure.planninginspectorate.gov.uk/projects/eastern/east-anglia-two-offshore-windfarm/?ipcsection=docs East Anglia Three https://infrastructure.planninginspectorate.gov.uk/projects/eastern/east-anglia-three-offshore-wind-farm/?ipcsection=docs Norfolk Vanguard West https://tethys.pnnl.gov/publications/norfolk-vanguard-offshore-wind-farm-environmental-impact-assessment-scoping-report Norfolk Vanguard East https://tethys.pnnl.gov/publications/norfolk-vanguard-offshore-wind-farm-environmental-impact-assessment-scoping-report Norfolk Boreas https://infrastructure.planninginspectorate.gov.uk/projects/eastern/norfolk-boreas/	

Site-specific survey data

21.7.2 Due to the temporary and transient nature of construction, offshore bird surveys are not considered necessary for the Submarine Cable Corridors. However, surveys will be undertaken at the proposed Landfall(s) to inform the Habitats Regulations Assessment (HRA) and EIA.

21.7.3 At this stage the final Landfall is yet to be confirmed but it is anticipated that offshore cable laying and HDD launch location will occur within 1km of the shoreline. Associated vessel(s) and jack-up barge(s) could be present at the HDD location for a period of several months.

21.7.4 There is no clearly defined avian survey methodology for land-based inshore bird surveys for interconnectors such as the proposed Offshore Scheme. The proposed survey methodology is based on related guidance for onshore wind farms provided by Scottish Natural Heritage[27] (SNH), having consideration of the nature of the Suffolk coast at potential Landfall(s) and relevant target species behaviours.

21.7.5 A summary of the proposed surveys is as follows:

- Vantage point (VP) surveys will be undertaken at each potential Landfall by experienced ornithologists using appropriate optics (binoculars and telescopes) focussed on a 2km 180^{o} view arc looking out to sea.
- It is proposed to undertake at least 36 hours of observation at each VP for the breeding season (mid-March to August) and 36 hours at each VP for the non-breeding season (September to mid-March). This equates to 6 hours effort per month, to be broken into separate 3-hour watches undertaken on different days within each month.
- In addition, beach surveys will be undertaken 1km either side of the VP location(s) to identify the presence of target species which may breed or roost/loaf on the beach and associated structures. The beach surveys will be undertaken at the same frequency as the VP surveys.
- Both sets of surveys will continue for 12 months.

Legislation, policy and guidance

21.7.6 Legislation and policy relevant to the proposed Scheme and this chapter is outlined in **Chapter 4** Legislation and Policy Overview and **Appendix 4-A** National Policy, **Appendix 4-B** Environmental Legislation and **Appendix 4-C** Local Policy.

21.7.7 The Intertidal and Offshore Ornithology EIA will be prepared in accordance with relevant EIA guidance and industry best practice documents including National Infrastructure Planning advice notes (insofar as the principles of good EIA practice and approaches related to assessments may be considered appropriate); professional EIA guidance

[27] SNH (2017). Available at: Recommended bird survey methods to inform impact assessment of onshore wind farms, Scottish Natural Heritage, March 2017

documents and Natural England Offshore wind cabling: ten years' experience and recommendations[28].

21.7.8 Most of the guidance on the potential impacts of offshore development on birds focuses on renewable energy generation. This guidance will be referred to where relevant and proportionate to the level of construction activity required for the installation of submarine cables.

Assessment method

21.7.9 **Chapter 5** EIA Approach and Method sets out the standard EIA methodology and matrixes to be used for the assessment. This section provides a summary of the EIA methodology specifically relevant to this chapter.

21.7.10 Assessment of cumulative and combined effects are discussed in **Chapter 29** Cumulative and Combined effects of the Project.

21.7.11 The criteria for characterising the value and sensitivity and magnitude for ornithological receptors are outlined in **Table 21-8** and **Table 21-9** respectively.

Table 21-8 Definitions of value and sensitivity for marine birds

Receptor Value and Sensitivity	Description
Very High	Value: A species for which individuals at risk can be clearly connected to a SPA or Ramsar and the activity is taking place during a sensitive season. Sensitivity: Bird species has very limited tolerance of sources of disturbances such as vessel movements and the sight of people.
High	Value: A species for which individuals at risk can be clearly connected to a SSSI and the activity is taking place during a sensitive season. Sensitivity: Bird species has very limited tolerance of sources of disturbances such as vessel movements and the sight of people.
Medium	Value: A species for which individuals at risk can be clearly connected to a SPA, Ramsar or SSSI but the activity is outside the sensitive season. Sensitivity: Bird species has limited tolerance of sources of disturbances such as vessel movements and the sight of people.
Low	Value: Species which is not a feature of a protected site or which is common a widespread. Sensitivity: Bird species has some tolerance of sources of disturbances such as vessel movements and the sight of people.
Negligible	Value: Species which is not a feature of a protected site or which is common a widespread. Sensitivity: Bird species is generally tolerant of sources of disturbances such as vessel movements and the sight of people.

[28] NE (2018) Natural England Offshore wind cabling: ten years' experience and recommendations. Available at: EN010080-001240-Natural England - Offshore Cabling paper July 2018.pdf (planninginspectorate.gov.uk)

Table 21-9 Definitions of impact magnitude criteria for marine birds

Impact Magnitude	Definition
High	A change in the size or extent of distribution of the population that is a designated feature of a protected site that is predicted to be of medium-term (7-15 years) through to long-term/permanent duration. Major alteration to key elements/features of the baseline condition such that post-impact baseline character will be fundamentally changed.
Medium	A change in the size or extent of distribution of the population that is a designated feature of a protected site that is predicted to be of medium-term (7-15 years). Alteration to an element of the baseline conditions such as that post-impact the damage to the baseline is above that experienced under natural conditions but with no permanent effect on integrity.
Low	A change in the size or extent of distribution of the population that is a designated feature of a protected site that is predicted to be temporary (<1 year) or short term (1-7 years) in duration, site specific and does not affect the integrity of the site. A minor shift away from the baseline condition such as that experienced under natural conditions. Impacts limited to within the project footprint. Negligible contribution to cumulative effects.
Negligible	Very little or no detectable change from baseline conditions. Disturbance is within the range of natural variability. Impacts predicted to be brief (one to two days) or for a short period (up to 3 months). No contribution to cumulative effects.

21.7.12 The impact assessment on inter-related topics such as marine physical processes, intertidal and benthic ecology and fish and shellfish will be used to inform the conclusions in the intertidal and offshore ornithology chapter.

21.7.13 Data derived from the site-specific survey will provide a more detailed site characterisation within the intertidal area and fill key data gaps such as presence and seasonality of specific species associated with the nearshore waters in the Outer Thames Estuary SPA. The results from studies completed to inform other topics e.g., sediment dispersion modelling, sandeel and Atlantic herring habitat assessment will be used to establish the potential significance of impacts on marine birds.

21.7.14 Where impacts are not predicted to be significant, simple assessments, using an evidence-based approach that is proportionate to the anticipated level of significance will be undertaken. Where potentially significant impacts are identified, consultation will be undertaken with statutory nature conservation bodies to agree proportionate and effective mitigation, and residual effects will be presented.

21.8 Assumptions & limitations

21.8.1 This EIA Scoping Report has been collated based on a range of publicly available data and information only. It is assumed that the data collated is accurate. The data will be supplemented with additional data as part of the EIA process.

21.8.2 In the absence of data, a precautionary approach has been taken and professional judgement, based on experience of similar linear schemes, has been used where required to inform the scope of the assessment.

21.8.3 It is assumed that the data available from existing literature, relevant surveys and the proposed assessments will provide an appropriate evidence base for intertidal and offshore ornithology within the study area. It is recognised that there is limited data available on migration routes but given the linear nature of the Project and the temporary nature of the majority of potential impacts it is not anticipated this limitation will adversely affect the assessment.

Contents

22. Marine Mammals and Marine Reptiles

22.1 Introduction

22.1.1 This chapter outlines the proposed scope and methodology to be undertaken for marine mammals and marine reptiles. It will consider the potential for significant effects arising from the construction and operation of the LionLink Scheme (hereafter referred to as 'the proposed Offshore Scheme') in respect of marine mammals and marine reptiles. A review of relevant guidance and policy has been undertaken together with a desk-based assessment, to inform the proposed scope and methodology.

22.1.2 This chapter is supported by the following figures:

- **Figure 1-4:** Proposed Offshore Scheme Boundary;
- **Figure 22-1**: Marine mammals study area;
- **Figure 22-2**: Harbour porpoise densities; and
- **Figure 22-3**: Grey seal and harbour seal densities with the study area.

22.1.3 There may be interrelationships related to the potential effects on marine mammals and marine reptiles and other disciplines. Therefore, please also refer to the following chapters:

- **Chapter 8** - Ecology and Biodiversity – which considers European otter (*Lutra lutra*); a mammal that can use the intertidal and nearshore environment for foraging;
- **Chapter 18** - Marine Physical Environment – will identify the spatial extent of potential for impacts from temporary sediment suspension and subsequent redeposition;
- **Chapter 19** - Intertidal and Subtidal Benthic Ecology – will identify the potential impacts on supporting habitats and key prey species for marine mammals and marine reptiles; and
- **Chapter 20** - Fish and Shellfish – will identify the potential impacts on key prey species for marine mammals and marine reptiles.

22.1.4 The baseline description for European otter is provided in **Chapter 8** Ecology and Biodiversity. As the species can use the nearshore environment for foraging it may also come into contact with the Offshore Scheme. Therefore this Chapter considers potential impacts on European otter from the proposed Offshore Scheme.

22.2 Consultation and engagement

22.2.1 Initial non-statutory consultation on the proposed Offshore Scheme commenced with the Marine Management Organisation, Natural England (NE) and the Joint Nature Conservation Committee (JNCC) in November 2022. The JNCC has also provided comment on the non-statutory and supplementary non-statutory consultation. During the discussions the JNCC advised that the potential impacts of electromagnetic fields (EMF) to marine mammals should be scoped 'in' to the Environmental Impact Assessment (EIA) given the uncertainties around the current evidence base.

22.2.2 Engagement will continue with relevant stakeholders in relation to the proposed Offshore Scheme to obtain any information that they hold to supplement the assessment and to seek their views with regards to the evolving design. This will be undertaken by EIA Team.

22.2.3 The following bodies will be consulted during the EIA process:

- JNCC;
- MMO;
- NE; and
- Centre for Environment, Fisheries and Aquaculture Science (Cefas).

22.3 Baseline conditions

Study area

22.3.1 Due to the highly mobile and transitory nature of marine mammals, the study area for marine mammals and marine reptiles has been defined for each species based on the mobility of the species and its geographical extent, as outlined in **Table 22-1.** The study areas have been defined based on either the relevant Management Units for the species or the current knowledge and understanding of each species with respect to foraging distances. This is a precautionary maximum zone of influence that will be reviewed and refined for the EIA based on the refined proposed Scheme description and underwater noise modelling (if appropriate). **Figure 22-1** illustrates the extent of the marine mammal study area.

22.3.2 The study area will be reviewed and, as appropriate, refined for the assessment in the Preliminary Environmental Information (PEI) Report and Environmental Statement (ES) with only one Landfall and one Submarine Cable Corridor being taken forward. This will be based on the proposed Order limits in the ES.

22.3.3 The study area for European otter is defined in **Chapter 8** Ecology and Biodiversity.

Table 22-1 Study area for Marine Mammals and Marine Reptiles

Receptor	Extent of study area	Justification
Cetaceans (whales, porpoises and dolphins)	Management Units (MUs)	Most cetaceans are wide-ranging, and individuals encountered within the Southern North Sea form part of a much larger biological population whose range extends into the North Atlantic and Northwest European waters. MUs have been agreed by the UK Statutory Nature Conservation Bodies for seven of the common regularly occurring species, which provide an indication of the spatial scales at which effects of anthropogenic activities should be taken into

Receptor	Extent of study area	Justification
		consideration[1]. The relevant MUs have been used to define the study area for each species.
Grey seal *(Halichoerus grypus)*	Southeast England	It is estimated that grey seal forage up to 100km from haul-out sites on the coast. Telemetry data indicates that there is exchange of grey seals between colonies in the Netherlands, France, England, Wales, Scotland, and Ireland[2].
Harbour seal (*Phoca vitulina*)	50km radius from proposed Landfall site and coastline	Harbour seals are not known to make trips greater than 50km from haul out sites [2].
Chelonians (marine turtles)	Southern North Sea	Chelonians are wide ranging and infrequent visitors to UK waters.

Baseline data sources

22.3.4 The baseline described in this chapter and associated appendices has been informed by the following data sources:

Table 22-2 Scoping baseline data sources

Baseline Data	Source
Conservation Advice for Marine Protected Areas	NE
Conservation Advice for Marine Protected Areas	JNCC
Offshore Energy Strategic Environmental Assessment	DECC (2022) [3] Offshore Energy SEA 4. Appendix 1 Environmental Baseline – Marine Reptiles
Marine mammal sightings	The Sea Watch Foundation marine mammal sightings distributions maps (online)
Marine mammal sightings	The National Biodiversity Network (NBN) Atlas records
Cetacean distribution	Atlas of cetacean distribution in northwest European waters (Reid *et al*., 2003)[4]

[1] IAMMWG (2015) Management Units for Cetaceans in UK waters (January 2015). JNCC report No. 547, JNCC, Peterborough. Available at: https://data.jncc.gov.uk/data/f07fe770-e9a3-418d-af2c-44002a3f2872/JNCC-Report-547-FINAL-WEB.pdf

[2] OAP (2022) Seal Abundance and Distribution. Available at: https://oap.ospar.org/en/ospar-assessments/intermediate-assessment-2017/biodiversity-status/marine-mammals/seal-abundance-and-distribution/

[3] DECC (2022) Offshore Energy SEA 4. Appendix 1 Environmental Baseline – Marine Reptiles: Available at: https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/1061671/Appendix_1a_6_-_Marine_reptiles.pdf

[4] Reid, J.B., Evans, P.G.H. and Northridge, S.P. (2003) Atlas of Cetacean distribution in north-west European waters, JNCC, Peterborough, ISBN 1 86107 550 2.

Baseline Data	Source
Cetacean Abundance	Estimates of cetacean abundance in European Atlantic waters in summer 2022 from the SCANS-IV aerial and shipboard surveys (Gilles et al, 2023)[5]
Cetacean Abundance	Small Cetacean Abundance in the European Atlantic waters (SCANS-III) (Hammond *et al*., 2021)[6]
Distribution of Cetacean and seabird populations	Distribution maps of cetacean and seabird populations in the North-East Atlantic, (Waggitt *et al*., 2019)[7]
Harbour Porpoise densities	Harbour Porpoise densities estimates in the UK (Heinanen and Skov, 2015)[8]
Grey and harbour seals at-sea distribution	Habitat-based predictions of at-sea distribution for grey and harbour seals in the British Isles (Carter *et al*., 2020)[9]
Academic journal and online reports as referenced in text.	

Baseline

22.3.5 The following sections present the current baseline established at scoping. There are currently two corridors being considered for the proposed Submarine Cable Corridor, which are shown in **Figure 1-4**. Baseline information is presented for both options below.

22.3.6 Marine megafauna receptors include marine mammals (cetaceans, pinnipeds) and marine reptiles (chelonians). This section has been split into the following sub-sections to provide an overview of the ecological baseline in the study area:

[5] Gilles, A., Authier, M., Ramirez-Martinez, N.C., Araújo, H., Blanchard, A., Carlström, J., Eira, C., Dorémus, G., Fernández-Maldonado, C., Geelhoed, S.G.V., Kyhn, L., Laran, S., Nachtsheim, D., Panigada, S., Pigeault, R., Sequeira, M., Sveegaard, S., Taylor, N.L., Owen, K., Saavedra, C., Vázquez-Bonales, J.A., Unger, B. and Hammond, P.S. (2023). Estimates of cetacean abundance in European Atlantic waters in summer 2022 from the SCANS-IV aerial and shipboard surveys. Final report published 29 September 2023. 64 pp. Available from: https://tinyurl.com/3ynt6swa

[6] Hammond (2021) Estimates of cetacean abundance in European Atlantic waters in summer 2016 from the SCANS-III aerial and shipboard surveys. Available at https://scans3.wp.st-andrews.ac.uk/files/2021/06/SCANS-III_design-based_estimates_final_report_revised_June_2021.pdf

[7] Waggitt, J., Evans, P., Andrade, J., Banks, A., Boisseau, O., Bolton, M., Bradbury, G., Brereton, T., Camphuysen, C., Durinck, J., Felce, T., Fijn, R., García-Barón, I., Garthe, S., Geelhoed, S., Gilles, A., Goodall, M., Haelters, J. Hamilton, S. and Hiddink, J. (2019). Distribution maps of cetacean and seabird populations in the North-East Atlantic. Journal of Applied Ecology 57:253-269.

[8] Heinänen, S. and Skov, H. (2015). The identification of discrete and persistent areas of relatively high harbour porpoise density in the wider UK marine area, JNCC Report No. 544, JNCC, Peterborough, ISSN 0963-809. Available at: https://hub.jncc.gov.uk/assets/f7450390-9a89-4986-8389-9bff5ea1978a

[9] Carter M.I.D., Boehme, L., Duck, C.D., Grecian, W.J., Hastie, G.D., McConnell, B.J., Miller, D.L., Morris, C.D., Moss, S.E.W., Thompson, D., Thompson, P.M., and Russell, D.J.F. (2020) Habitat-based predictions of at-sea distribution for grey and harbour seals in the British Isles. Sea Mammal Research Unit, University of St Andrews, Report to BEIS, OESEA-16-76/OESEA-17-78. Available at: https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/959723/SMRU_2020_Habitat-based_predictions_of_at-sea_distribution_for_grey_and_harbour_seals_in_the_British_Isles.pdf

- Species information – sub-divided into cetaceans (porpoises, dolphins and whales), pinnipeds (seal), and chelonians (marine turtles);
- Sightings and density data;
- Protected sites; and
- Protected species.

22.3.7 The baseline for European otter is provided in **Chapter 8** Ecology and Biodiversity.

Species information

Cetaceans

22.3.8 Large scale surveys to monitor the cetacean population size have been carried in UK Waters by Small Cetacean Abundance in the European Atlantic and North Seas (SCANS III) and Cetaceans Offshore Distribution and Abundance in the European Atlantic (CODA). Surveys were carried in 1994, 2005, 2016 and 2022 by SCANS and 2007 for CODA. The study area is located in the SCANS III survey block L and SCANS IV survey blocks NS-B and NS-C.

22.3.9 The SCANS and CODA data showed that twenty-eight cetacean species have been recorded in UK waters, however there are only twelve species who are regular visitors, including minke, fin and sperm whales, harbour porpoise and four species of dolphin – bottlenose, common, Risso's and white beaked.

22.3.10 The only cetaceans species recorded in survey block L during the SCANS III survey was the harbour porpoise (*Phocoena phocoena*) with an estimated density of 0.067 harbour porpoise/km^2 in July 2016[10]. This pattern was repeated in the 2022 SCANS IV survey with harbour porpoise recorded at an estimated density of 0.3096 harbour porpoise/km^2 in survey block NS-B and 0.6027 harbour porpoise/km^2 in survey block NS-C[11]. The Study Area straddles the northern portion of survey block NS-B and the southern portion of survey block NS-C. Similar results were shown from the Joint Cetacean Protocol Phase III report[12], with only harbour porpoise recorded in south east of England.

22.3.11 Whilst minke whale and common dolphin were also recorded during the 2022 SCANS IV survey in survey block NS-C, sightings were to the north of the Study Area, in line with Flamborough Head.

[10] Hammond (2021) Estimates of cetacean abundance in European Atlantic waters in summer 2016 from the SCANS-III aerial and shipboard surveys. Available at https://scans3.wp.st-andrews.ac.uk/files/2021/06/SCANS-III_design-based_estimates_final_report_revised_June_2021.pdf

[11] Gilles, A., Authier, M., Ramirez-Martinez, N.C., Araújo, H., Blanchard, A., Carlström, J., Eira, C., Dorémus, G., Fernández-Maldonado, C., Geelhoed, S.G.V., Kyhn, L., Laran, S., Nachtsheim, D., Panigada, S., Pigeault, R., Sequeira, M., Sveegaard, S., Taylor, N.L., Owen, K., Saavedra, C., Vázquez-Bonales, J.A., Unger, B. and Hammond, P.S. (2023). Estimates of cetacean abundance in European Atlantic waters in summer 2022 from the SCANS-IV aerial and shipboard surveys. Final report published 29 September 2023. 64 pp. Available from: https://tinyurl.com/3ynt6swa

[12] Paxton, C.G.M., Scott-Hayward, L., Mackenzie, M., Rexstad, E. and Thomas, L. (2016). Revised Phase III Data Analysis of Joint Cetacean Protocol Data Resources with Advisory Note, JNCC Report 517, ISSN 0963-8091: http://jncc.defra.gov.uk/page-7201

22.3.12 The other marine mammal species sighted in the southeast of England are rare occasional visitors[13], [14]. Compared to other parts of the UK continental shelf the Southern North Sea has relatively low densities and numbers of species recorded.

Harbour Porpoise (*Phocoena phocoena)*

22.3.13 The harbour porpoise is widespread around the UK and is the smallest and most common cetacean found within the north western European continental shelf waters. It is the most populous species in the Southern North Sea.

22.3.14 Individuals can grow up 1.6m in length with the females being about 0.15m larger than the male. Typically, they can be found in small groups of only 1 to 3 animals. They generally appear shy, avoiding other species and rarely interact with boats. Due to their size and nature they are typically difficult to spot for survey purposes.

22.3.15 Though harbour porpoise have been recorded all year round, they are more common in the summer where they come closer to the shoreline. Individuals also tend to move further north during the summer months so are more frequently recorded in the study area during winter[10].

22.3.16 The mating season lasts from April to September (peaking in July and August). Calves are born between May and August (breeding season peaks in June). Harbour porpoise were the most frequently recorded marine mammal in site-specific surveys carried out for the proposed Five Estuaries Offshore Wind Farm caried out by HiDef Aerial Surveying Ltd (2020, 2021), with a total 575 sightings in 24 months15. Although density estimates varied across the surveys, between 0.14 and 8.48 harbour porpoise/km2, the density estimate was mostly <2 harbour porpoise/km2. These trends are relatively consistent to the SCANS-III and SCANS IV surveys and comparable to other OWF high resolution aerial surveys including East Anglia ONE North windfarm and other offshore windfarm sites in the former East Anglia Zone[16],[17],[18],[19].

22.3.17 The proposed Submarine Cable Corridors cross the Southern North Sea Special Area of Conservation (SAC) which has been designated to conserve harbour porpoise. Numerous additional studies have identified harbour porpoises as being the predominant species within the SAC (Sea Watch Foundation Sightings). The year-round densities of harbour porpoise in the SAC has been demonstrated by the analysis shown

[13] DECC (2022) Offshore Energy SEA 4. Appendix 1 Environmental Baseline – Marine Reptiles: Available at: https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/1061671/Appendix_1a_6_-_Marine_reptiles.pdf

[14] Reid, J.B., Evans, P.G.H. and Northridge, S.P. (2003) Atlas of Cetacean distribution in north-west European waters, JNCC, Peterborough, ISBN 1 86107 550 2.

[15] Five Estuaries (2021) Survey HiDef Aerial Surveying Ltd 2020, 2021. Five Estuaries Offshore Windfarm (2021) Five Estuaries Offshore Wind Farm, Environmental Impact Assessment: Scoping Report

[16] East Anglia ONE North Windfarm (2019) East Anglia ONE North Windfarm Chapter 11 Marine Mammals: Preliminary Environmental Information Report Volume 1.

[17] Norfolk Vanguard Limited (2018). Norfolk Vanguard Offshore Wind Farm Chapter 12 Marine Mammals: Environmental Statement Volume 1.

[18] Norfolk Boreas Limited (2018). Norfolk Boreas Offshore Wind Farm Chapter 12 Marine Mammals: Preliminary Environmental Information Report Volume 1.

[19] DECC (2022) Offshore Energy SEA 4. Appendix 1 Environmental Baseline – Marine Reptiles: Available at: https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/1061671/Appendix_1a_6_-_Marine_reptiles.pdf

in Waggitt et al., (2019)[20] and Gilles et al., (2016)[21] findings. However, the proposed Submarine Cable Corridors lie in the area classified as of importance for the species during the winter months, as illustrated in **Figure 22-3**.

Short-beaked common dolphin (*Delphinus delphis*)

22.3.18 The short-beaked common dolphin is easily identified at sea by the light-coloured hour-glass pattern on their lower flanks. This species grows up to 2.4m in length[22]. They commonly breach and often bow-ride. Average groups sizes observed are between 6 and 10, though large schools have been frequently recorded.

22.3.19 Although commonly seen off the west coast of Britain and Ireland they are only occasionally observed in the North Sea, and this has been mainly during the summer (June to September)[23].

White-beaked dolphin (*Lagenorhynchus albirostris*)

22.3.20 The white-beaked dolphin is recognisable by its short, often white, beak. It can grow up to 3.2m in length[24]. This species frequently display forward, vertical or side breaches and frequently bow-ride vessels. This species is also known to mix with other dolphins and whales to assist in co-operative food herding.

22.3.21 The white-beaked dolphin occurs over a large part of the northern European continental shelf and is frequently record in the central and northern North Sea, although it is only occasionally observed in the southern North Sea. Whilst present all year round it has been most frequently observed between June and October[25].

Common bottlenose dolphin (*Tursiops truncatus*)

22.3.22 The common bottlenose dolphin is largest dolphin which frequents British waters growing up to 4m. They often display forward to sideways breaches, somersaults and tail slaps and frequently bow-ride. As with the white-beaked dolphin it is frequently seen mixing with other species. Group sizes are regularly between 2 and 25 animals but individuals can travel in much larger groups, although this only happens in deep water[26].

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[20] Hammond (2021) Estimates of cetacean abundance in European Atlantic waters in summer 2016 from the SCANS-III aerial and shipboard surveys. Available at https://scans3.wp.st-andrews.ac.uk/files/2021/06/SCANS-III_design-based_estimates_final_report_revised_June_2021.pdf

[21] Gilles et al., (2016). Seasonal habitat-based density models for a marine top predator, the harbour porpoise, in a dynamic environment. Ecosphere 7(6): e01367. 10.1002/ecs2.1367

[22] MarLIN (2022) Species list Short-beaked common dolphin (Delphinus delphis). Available at: https://www.marlin.ac.uk/species/detail/2082

[23] Waggitt, J., Evans, P., Andrade, J., Banks, A., Boisseau, O., Bolton, M., Bradbury, G., Brereton, T., Camphuysen, C., Durinck, J., Felce, T., Fijn, R., García-Barón, I., Garthe, S., Geelhoed, S., Gilles, A., Goodall, M., Haelters, J. Hamilton, S. and Hiddink, J. (2019). Distribution maps of cetacean and seabird populations in the North-East Atlantic. Journal of Applied Ecology 57:253-269.

[24] MarLIN (2022) Species list White-beaked dolphin (Lagenorhynchus albirostris). Available at: https://www.marlin.ac.uk/species/detail/117

[25] Hammond (2021) Estimates of cetacean abundance in European Atlantic waters in summer 2016 from the SCANS-III aerial and shipboard surveys. Available at https://scans3.wp.st-andrews.ac.uk/files/2021/06/SCANS-III_design-based_estimates_final_report_revised_June_2021.pdf

[26] Waggitt, J., Evans, P., Andrade, J., Banks, A., Boisseau, O., Bolton, M., Bradbury, G., Brereton, T., Camphuysen, C., Durinck, J., Felce, T., Fijn, R., García-Barón, I., Garthe, S., Geelhoed, S., Gilles, A., Goodall, M., Haelters, J. Hamilton, S. and Hiddink, J. (2019). Distribution maps of cetacean and seabird populations in the North-East Atlantic. Journal of Applied Ecology 57:253-269.

22.3.23 There are resident populations of this species in Cardigan Bay, Wales and the Moray Firth, Scotland but animals are occasionally sighted in the Southern North Sea[27].

Minke whale (*Balaenoptera acutorostrata*)

22.3.24 The minke whale is the most common and widely distributed of the baleen whales in British waters. It occurs throughout the northern and central North Sea but are rare visitors in the southern North Sea[26].

22.3.25 The smallest of the baleen whales, their length averages 8.5m. Spy hopping and breaching are common for this whale which tend to form groups of about 3 animals[28]. Although the species occurs year-round most sightings have been made between May and September[29].

Pinnipeds

22.3.26 Two species of seal are common in the Southern North Sea, harbour seal or common seal (*Phoca vitulina)* and grey seal *(Halichoerus grypus).* Both species breed at haul-out sites along the Kent coast, Thames Estuary and Norfolk coast.

22.3.27 Grey seal spend most of their time at sea only coming to shore in autumn to form breeding colonies. They are amongst the rarest seals in the world and the UK population represents 40% of the global grey seal population (JNCC, 2022)[30]. Grey seals like to use remote islands, bays, and caves as 'haul out' areas to give birth to their pups but also between foraging trips for food. Grey seals are mainly distributed around and between haul-out sites and foraging areas and are more commonly seen in the central and northern North Sea than in the southern North Sea. Foraging areas can be up to 100km offshore and generally connected to haul-out sites by a corridor of higher use[31].

22.3.28 Harbour seal are frequently found in British estuaries and on mudflats. Though spending much of their time at sea they do need land for breeding purposes and therefore haul locations are important[32]. Pupping typically takes place between June and July. Moult occurs over the first couple of weeks of August.

22.3.29 The most recent August haul-out count for harbour seal and grey seal in the South east England MU is from the 2021 survey, where 3,505 harbour seals and 7,695 grey seals were sighted[33]. However, the telemetry data for grey seal demonstrates that only occasional tagged grey seals and harbour seals have been recorded in close proximity

[27] MarLIN, (2022) Species list Bottle-nosed dolphin (Tursiops truncatus). Available at: https://www.marlin.ac.uk/species/detail/1674

[28] MarLIN (2022) Species list Minke whale (Balaenoptera acutorostrata). Available at: https://www.marlin.ac.uk/species/detail/1994

[29] DECC (2022) Offshore Energy SEA 4. Appendix 1 Environmental Baseline – Marine Reptiles: Available at: https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/1061671/Appendix_1a_6_-_Marine_reptiles.pdf

[30] JNCC (2022) 1364 Grey seal. Available at: https://sac.jncc.gov.uk/species/S1364/

[31] DECC (2016). Offshore Energy Strategic Environmental Assessment 3. Department of Energy and Climate Change. March 2016.

[32] JNCC (2022) 1365 Harbour Seal. Available at: https://sac.jncc.gov.uk/species/S1365/

[33] SMRU (2023) August Seal Counts – England. Available at: https://biology.st-andrews.ac.uk/smru/scos/scos-data/august-seal-counts/august-seal-counts-england/

to the East Anglia ONE North Offshore Wind Farm site[34], which lies within the study area and in proximity to the proposed Submarine Cable Corridors.

22.3.30 Aerial surveys conducted by offshore wind farms in the study area support the results of the tagging data. Grey seals were only rarely sighted during the two years of site-specific surveys carried out by Five Estuaries with a total of 8 sightings in 24 months, however there no sightings of harbour seals[35]. Aerial surveys conducted for the former East Anglia Zone and the East Anglia ONE site did not record any observations of grey and harbour seal, however the boat-based surveys at the East Anglia ONE site, documented three harbour seal[36]. During the East Anglia THREE surveys only two unidentified seals were sighted[37].

22.3.31 **Figure 22-3** illustrates the seal densities for each species within the study area.

Chelonians

22.3.32 Although not indigenous to the UK, sea turtles are the only marine reptiles to be found in UK waters.

22.3.33 The leatherback turtle (*Dermochelys coriacea*) is the most widely distributed turtle species and largest, growing up to 170cm in length, being found in all oceans except the Southern Ocean. Within the North Atlantic its range extends from the tropics to the polar region right across to Europe's north-easterly fringe[38].

22.3.34 Leatherback turtles are pelagic feeders, their presence in UK waters is part of this species wide-ranging migration in response to food distribution, notably jellyfish and other gelatinous zooplankton. There have been rare sightings of the leatherback turtle within the Southern North Sea between 2013 and 2018[39].

Sightings and density information

22.3.35 **Table 22-3** presents sightings and density information for each species identified as occurring within the study area.

[34] Heinänen, S. and Skov, H. (2015). The identification of discrete and persistent areas of relatively high harbour porpoise density in the wider UK marine area, JNCC Report No. 544, JNCC, Peterborough, ISSN 0963-809. Available at: https://hub.jncc.gov.uk/assets/f7450390-9a89-4986-8389-9bff5ea1978a

[35] Waggitt, J., Evans, P., Andrade, J., Banks, A., Boisseau, O., Bolton, M., Bradbury, G., Brereton, T., Camphuysen, C., Durinck, J., Felce, T., Fijn, R., García-Barón, I., Garthe, S., Geelhoed, S., Gilles, A., Goodall, M., Haelters, J. Hamilton, S. and Hiddink, J. (2019). Distribution maps of cetacean and seabird populations in the North-East Atlantic. Journal of Applied Ecology 57:253-269.

[36] East Anglia Offshore Wind Farm Limited (2012). East Anglia ONE Environmental Statement, Chapter 11 Marine Mammals.

[37] EATL (East Anglia THREE Limited) (2015). East Anglia THREE Environmental Statement.

[38] SeaMap (2022) State of the Worlds Sea Turtles. Available at: https://seamap.env.duke.edu/swot

[39] JNCC (2018) Conservation status assessment for the species: S1223 - Leatherback turtle (Dermochelys coriacea) Available at https://jncc.gov.uk/jncc-assets/Art17/S1223-UK-Habitats-Directive-Art17-2019.pdf

Table 22-3 Table of species densities and sightings within the study area

Species	Relevant MU	Seasonality	Frequency	Sightings Data		
				Density estimate	SeaWatch Foundation Sightings April 2022 – April 2023	NBN Atlas Records
Harbour porpoise	North Sea	All year	Common	0.607 individuals per km^2 *	54 Sightings with a max group size of 10 porpoises	18 sightings
Short-Beaked Common dolphin	Celtic and Greater North Sea	Summer	Occasional	-	5 sightings with a max group size of 20	
White-Beaked Dolphin	Celtic and Greater North Sea	Summer	Occasional	-	1 sighting with a max group size of 3	
Bottlenose dolphin	Greater North Sea	All year round	Occasional	-	1 sighting with a max group size of 2	1 sighting
Minke whale	Celtic and Greater North Sea	Summer	Rare	-	2 sightings with a max groups size of 2 whale	
Grey seal	N/A		Common	0.01 individuals per $25km^2$ **	33 sightings with a max group size of 5 seals	57 sightings
Harbour seal	N/A		Common	0.1 individuals per $25km^2$ **	1 sighting with a max groups size of 1 seal	63 sightings
Leatherback turtle	N/A	Summer	Rare	-	-	1 sighting

Species	Relevant MU	Seasonality	Frequency	Sightings Data		
				Density estimate	SeaWatch Foundation Sightings April 2022 – April 2023	NBN Atlas Records

* Source: Hammond, P.S., Lacey, C., Gilles, A., Viquerat, S., Borjesson, P., Herr, H., Macleod, K., Ridoux, V., Santos, M.B., Scheidat, M., Teilmann, J., Vingada, J. and Oien, N. (2021) Estimates of cetacean abundance in European Atlantic waters in summer 2016 from the SCANS-III aerial and shipboard surveys. Available at https://scans3.wp.st-andrews.ac.uk/files/2021/06/SCANS-III_design-based_estimates_final_report_revised_June_2021.pdf

** Source: Carter M.I.D., Boehme, L., Duck, C.D., Grecian, W.J., Hastie, G.D., McConnell, B.J., Miller, D.L., Morris, C.D., Moss, S.E.W., Thompson, D., Thompson, P.M., and Russell, D.J.F. (2020) Habitat-based predictions of at-sea distribution for grey and harbour seals in the British Isles. Sea Mammal Research Unit, University of St Andrews, Report to BEIS, OESEA-16-76/OESEA-17-78. Available at: https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/959723/SMRU_2020_Habitat-based_predictions_of_at-sea_distribution_for_grey_and_harbour_seals_in_the_British_Isles.pdf

Protected Sites

22.3.36 The proposed Submarine Cable Corridors lie within the Southern North Sea SAC (SNS SAC). The Primary Feature of the SNS SAC is harbour porpoise, with the site supporting an estimated 17.5% of the UK North Sea MU population[40]. The SAC covers an area of 36,951km^2, stretching from the Central North Sea (to the north of Dogger Bank) to the Straits of Dover in the south. The physical characteristics of the SAC, including the sandy and coarse substrates which covers most of the site and the shallow water depths, are favoured by the species due to availability of prey.

22.3.37 It is estimated that the SNS SAC supports at least 18,500 individuals for at least part of the year[41]. Within the SAC, animals are thought to move latitudinally between preferred summer and winter grounds. The proposed Submarine Cable Corridors lie within the winter grounds, as illustrated in **Figure 22-2**, which cover an area of approximately 12,696km^2, equivalent to 34% of the entire SAC[42]. The conservation objective for the site is to maintain the favourable conservation status of the species.

22.3.38 There are no protected sites which list harbour seal or grey seal as a Primary or Qualifying feature within 100km of the proposed Submarine Cable Corridors. However, there are two SACs designated in European Economic Area waters for grey seal, harbour seal and harbour porpoise within 100km of the proposed Submarine Cable Corridors; Klaverbank SAC in Dutch waters, and Vlaamse Banken SAC in Belgium waters.

Protected Species

22.3.39 All cetaceans and marine turtles are protected from deliberate disturbance and injury, no matter their location, by The Conservation of Offshore Marine Habitats and Species Regulations 2017 and The Conservation of Habitats and Species Regulations 2017, as European Protected Species (EPS). Pinnipeds are protected when listed as a Primary or Qualifying Feature of a SAC or through the Conservation of Seals Act 1970 (as amended) out to 12 nautical miles (NM).

22.3.40 **Table 22-4** presents the marine mammals recorded within the study area and lists which legislation they are protected under.

Table 22-4 Protection afforded to marine mammals and reptiles

Species	Wildlife and Countryside Act	Conservation of Offshore Habitats and species Regulations	OSPAR	CITES	IUCN	Priority Species
Cetacean						
Harbour porpoise	Schedule 5	Annex II & Annex IV	Yes	Appendix II	Least Concern	England

[40] JNCC (2022) 1351 Harbour porpoise Phocoena phocoena. Available at: https://sac.jncc.gov.uk/species/S1351/

[41] JNCC (2017) JNCC guidelines for minimising the risk of injury to marine mammals from geophysical surveys. Available at: https://data.jncc.gov.uk/data/e2a46de5-43d4-43f0-b296-c62134397ce4/jncc-guidelines-seismicsurvey-aug2017-web.pdf

[42] JNCC (2020). Guidance for assessing the significance of noise disturbance against Conservation Objectives of harbour porpoise SACs Wales & Northern Ireland) 8091. JNCC Report No. 65 4 (England, JNCC, Peterborough, ISSN 0963)

Species	Wildlife and Countryside Act	Conservation of Offshore Habitats and species Regulations	OSPAR	CITES	IUCN	Priority Species
Short-Beaked Common dolphin	Schedule 5	Annex IV		Appendix I	Least Concern	England
White-Beaked Dolphin	Schedule 5	Annex IV		Annex A	Least Concern	England
Bottlenose dolphin	Schedule 5	Annex II & Annex IV		Appendix I	Least Concern	
Minke whale	Schedule 5	Annex IV		Appendix I	Least Concern	England
Pinnipeds						
Grey seal		Annex II			Least Concern	
Harbour (Common) seal		Annex II			Least Concern	England
Chelonians						
Leatherback turtle	Schedule 5	Annex IV	Yes		Vulnerable	England

Future baseline

22.3.41 The marine mammals chapter within the PEI Report and ES will consider changes which may affect the future environment in the absence of the proposed Offshore Scheme. The future baseline will also take into account any developments that are likely to be present in the future baseline.

22.3.42 The existing baseline conditions for marine mammals within the study area are considered to be relatively stable. Marine mammal populations naturally change over spatial and temporal scales and therefore fluctuations are likely to occur over the lifetime of the Project. Marine mammal distributions are largely influenced by the abundance and distribution of prey species. Many species span over large distances, and within limits can adapt to gradual changes in the environment, such as those that may occur as a result of climate change[43]. However, not all species can adapt to the changes in global trends from anthropogenic activities. Some species of marine mammal have more restricted habitat ranges and therefore are more likely to be vulnerable to changes in the surrounding environment. Within the study area, species

[43] Hoegh-Guldberg, O. and Bruno, J.F. (2010). The impact of climate change on the world's marine ecosystems. Science 328: 1523 - 1528.

such as grey and harbour seal may be less resilient to long term changes due to more restricted foraging grounds than other marine mammal species.

22.3.43 The impacts of anthropogenic climate change so far have been identified as decreased ocean productivity, altered food wed dynamics, reduced abundance of habitat-forming species, shifting species distributions and a greater incidence of disease[44]. Over the last 25 years, the North Sea has seen one of the greatest increases in sea surface temperature across the northeast Atlantic, with a rate of increase of 0.6 and 0.8^{o}C[45]. A shift in distribution could occur in species vulnerable to increases in temperature such as white-beaked dolphin[46]. Although there is considerable uncertainty about the spatial and temporal details, climate change is clearly altering ocean ecosystems.

22.3.44 The SCANS III and SCANS IV abundance data for the North Sea indicates the population of harbour porpoise has been fairly stable since the 1960's[47]. Although no overall change in population size was observed, large scale changes in the distribution of harbour porpoise were recorded between SCANS-I in 1994 and SCANS-II in 2005. Surveys show the main concentration of the species has shifted from the Northeastern UK and Denmark to the southern North Sea. Changes in prey availability are likely to occur as a result of the large-scale alterations in the distribution of the species.

22.3.45 In the North Sea grey seal populations have steadily increased annually since the 1960's[48]. Between 2010 and 2016, pup production at colonies in the North Sea has increased by 12% per year due to the rapid expansion of newer colonies in Berwickshire, Lincolnshire, Norfolk and Suffolk[49]. This data suggests that may have been some immigration from colonies further south. The rate of increase has been lower in recent years in the southern North Sea, which suggests that populations around the east coast of England may been reaching carrying capacity[49].

22.3.46 The UK population of harbour seals has gradually increased since the late 2000s. Seal counts for the East coast of England are fairly stable, however the 2017 count was 3.9% lower than in 2016[49]. These records potentially show an early indication that the population is reaching the carrying capacity. The population of harbour seals in the Southeast of England has recovered from the phocine distemper virus (PDV) epidemic in 2002. It is likely there will be subtle shift in the distribution due to climate change, but based on current trends and epidemics, it will be difficult to record the impacts across the marine mammal study area.

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[44] JNCC (2020). Guidance for assessing the significance of noise disturbance against Conservation Objectives of harbour porpoise SACs Wales & Northern Ireland) 8091. JNCC Report No. 65 4 (England, JNCC, Peterborough, ISSN 0963)

[45] Evans, P.G.H., Pierce, G.J., Panigada, S. (2010). Climate change and marine mammals. Journal of the Marine Biological Association of the United Kingdom, 90, pp 1483 - 1487.

[46] Canning, S.J., Santos, M.B., Reid, R.J., Evans, P.G.H., Sabin, R.C., Bailey, N., and Pierce, G.J. (2008) Seasonal distribution of white beaked dolphins (Lagenorhynchus albirostris) in UK waters with new information on diet and habitat use. Journal of the Marine Biological Association of the UK, 88, pp 1159 - 1166.

[47] DECC (2022) Offshore Energy SEA 4. Appendix 1 Environmental Baseline – Marine Reptiles: Available at: https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/1061671/Appendix_1a_6_-_Marine_reptiles.pdf

[48] SCOS (2018). Scientific Advice on Matters Related to the Management of Seal Populations: 2018. Available at: http://www.smru.st-andrews.ac.uk.

[49] Canning, S.J., Santos, M.B., Reid, R.J., Evans, P.G.H., Sabin, R.C., Bailey, N., and Pierce, G.J. (2008) Seasonal distribution of white beaked dolphins (Lagenorhynchus albirostris) in UK waters with new information on diet and habitat use. Journal of the Marine Biological Association of the UK, 88, pp 1159 - 1166.

22.4 Potential impacts

22.4.1 This section identifies, at a high level, a summary of the sources and potential impacts as a result of the proposed Offshore Scheme during the construction and operational phases.

22.4.2 Potential impacts have been established based on industry experience and where applicable reference to the list of marine pressures established by the JNCC Marine Pressures-Activities Database v1.5 (2022) and Natural England's advice on operations for relevant European protected sites.

22.4.3 **Table 22-5** provides further description of the potential impact pathways identified and the proposed assessment approach.

Construction

22.4.4 The following impacts could occur during the construction phase:

- Visual disturbance to European otter - activities in the nearshore at the proposed Landfall site have the potential to disturb otter (through increased levels of noise, light and human presence) if the site is within their foraging range / territory.
- Underwater noise changes.
  - Increased presence of project vessels and equipment will generate continuous underwater noise which may result in the temporary behavioural disturbance and displacement of marine mammals.
- Increased collision risk with marine mammals due to the presence of project vessels and equipment.
- Changes in prey availability.
  - Activities such as seabed preparation, cable burial, and deposition of external cable protection could lead to temporary or localised permanent changes to habitat. Indirectly a change in habitat, especially one that effects stock recruitment for prey species, could lead to a shortage of prey.
- Accidental spills due to the presence of project vessels and equipment.
- Transboundary impacts associated with underwater noise changes, changes in prey availability and accidental spills.

Operation

22.4.5 The following impacts could occur during the operational phase:

- Visual disturbance to European otter - activities in the nearshore at the proposed Landfall site have the potential to disturb otter (through increased levels of noise, light and human presence) if the site is within their foraging range / territory.
- Underwater noise changes.
  - Increased presence of project vessels and equipment will generate continuous underwater noise which may result in the temporary behavioural disturbance and displacement of marine mammals.

- Increased collision risk with marine mammals due to the presence of project vessels and equipment.
- Changes in prey availability.
  - Should a cable repair be required, then there is the potential for localised temporary or permanent changes to habitat. Indirectly a change in habitat, especially one that effects stock recruitment for prey species, could lead to a shortage of prey.
- Electromagnetic changes. During operation the high voltage direct cables generate EMF which although dissipate rapidly can represent a change in the natural magnetic field, which could act as a barrier to electrosensitive species.
- Accidental spills due to the presence of project vessels and equipment.
- Transboundary impacts associated with underwater noise changes, changes in prey availability and accidental spills.
- Thermal increase in sediment due to the presence of operating cables.

22.5 Design and control measures

22.5.1 As outlined in **Chapter 5** EIA Approach and Method, a standard hierarchical approach will be taken to mitigation.

22.5.2 The assessment of effects will take into account measures that are embedded into the proposed Offshore Scheme design, together with general good practice measures.

Design measures

22.5.3 Design measure to be implemented as part of Offshore Scheme will include:

- A full EMF assessment will be undertaken during the detailed design phase. Where practicable cable burial shall be the preferred means of cable protection, to reduce the impacts associated with habitat loss and EMF and minimise the requirement for additional cable protection.
- If feasible, all cables will be installed in one trench. If not feasible, where practicable the two high voltage direct current (HVDC) submarine cables will be bundled together and installed with a fibre optic cable in one trench with the metallic return cable and a separate fibre optic cable in a second trench.
- Cable routes will be designed to minimise the risk of exposure by seabed mobility.

Control measures

22.5.4 Control measures to be implemented as part of the Offshore Scheme will include:

- Implementation of the JNCC suite of mitigation guidelines to reduce impacts from impulsive noise e.g., JNCC mitigation guidelines for geophysical surveys[41] [50].
- Recording of activities that produce loud, low to medium frequency (10Hz – 10kHz) impulsive noise in the UK Marine Noise Registry.

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- Design and construction will be carried out in accordance with International Cable Protection Committee (ICPC) Recommendations.
- A Construction Code of Practice (CCOP) (for the construction and operation phases) will be developed and adhered to. This documentation will detail the Project's commitment to best practice guidance and procedures including:
  - The designation of (as minimal as possible) anchoring areas and implementation of protocols during marine operations to minimise physical disturbance of the seabed.
  - Production of an Emergency Spill Response Plan and Waste Management Plan, Marine Pollution Contingency Plan (MPCP) and a dropped object procedure.
  - Adherence of all project vessels to the International Convention for the Control and Management of Ships' Ballast Water and Sediments with the aim of preventing the spread of marine invasive non-native species (MINNS).
  - Compliance of all project vessels with the regulations relating to International Convention for the Prevention of Pollution from Ships (the MARPOL Convention 73/78) (IMO, 1983)[51] with the aim of preventing and minimising pollution from ships.
  - Careful management of drilling fluids required for trenchless operations to minimise the risk of breakouts into the marine environment. Specific avoidance measures would include: the use of biodegradable drilling fluids (PLONOR substances) where practicable, drilling fluids will be tested for contamination to determine possible reuse or disposal; and if disposal is required drilling fluids would be transported by a licensed courier to a licensed waste disposal site.
  - Production of a biosecurity plan following the latest guidance on MINNS from the Great Britain (GB) non-native species secretariat.
  - Adherence of all project vessels to the International Maritime Organisation (IMO) Guidelines for the control and management of ships' biofouling to minimize the transfer of invasive aquatic species (Biofouling Guidelines) (IMO, 2011)[52].

22.6 Scope of the assessment

22.6.1 This section identifies the potential for the proposed Offshore Scheme to have likely significant effects, taking into account the design and control measures identified in **Section 22.5**.

22.6.2 **Table 22-5** sets out the receptors within the study area that have been identified, whether there is a pathway for the impacts identified, the potential for significant effects and if the receptor is scoped in for the assessment.

22.6.3 All identified impacts are of relevance to both the Southwold and Walberswick Landfall options and both Submarine Cable Corridor options unless specified otherwise.

[51] International Maritime Organisation (IMO) (1974). International Convention for the Safety of Life at Sea (SOLAS) 1974. [online] Available at: https://treaties.un.org/doc/Publication/UNTS/Volume%201184/volume-1184-I-18961-English.pdf.

[52] International Maritime Organisation (IMO) (2011). 2011 Guidelines for the Control and Management of Ships' Biofouling to Minimize the Transfer of Invasive Aquatic Species. Annex 26, Resolution MEPC.207(62), Adopted 15 July 2011. [online] Available at: https://wwwcdn.imo.org/localresources/en/KnowledgeCentre/IndexofIMOResolutions/MEPCDocuments/MEPC.207(62).pdf.

22.6.4 A precautionary approach has been taken and where there is no strong evidence base, insufficient baseline or the significance is uncertain at this stage the impact has been scoped into the EIA. Where there is a clear evidence base that the effect from the impact will not be significant, either alone or in combination with other plans and projects, the impact has been scoped out of the EIA.

Table 22-5 Proposed scope of the assessment

Project phase	Receptor	Impact	Potential for significant effect	Proposed to be scoped in/ out
Construction and Operation	Otter	Visual disturbance	Whilst **Chapter 8** Ecology and Biodiversity concludes that otter are widespread within Suffolk and it assumed that otter will use the majority of watercourses and lakes within the Scoping Boundary, the potential for interaction with the Offshore Scheme is limited. Otter do not often forage greater than 100m from the coastline. The activities associated with the Offshore Scheme are likely to occur at a greater distance than 100m and therefore whilst vessel activity in the nearshore may cause temporary disturbance if animals are present in the nearshore it will not lead to significant effects.	Scoped Out
Construction and Operation	Cetaceans and pinnipeds	Underwater noise changes due to presence of project vessels and equipment (including cable trenching).	The presence of project vessels and equipment used to install and maintain the cables will generate underwater noise. The Oslo and Paris (OSPAR) Convention considered that sound associated with the installation, removal or operation of submarine cables is less harmful compared to impulsive sound activities such as seismic surveys, military activities or construction work involving pile driving[53]. Animals would need to remain in close proximity (<100m) to the source continuously for 24 hours to be exposed to levels sufficient to cause auditory injury[54,55.] For most auditory hearing groups, the noise levels from	Scoped Out

[53] Oslo and Paris (OSPAR) Convention (2012) Guidelines on Best Environmental Practice (BEP) in Cable Laying and Operation. Available at: https://www.gc.noaa.gov/documents/2017/12-02e_agreement_cables_guidelines.pdf

[54] Barham and Mason (2019), Underwater noise modelling at the Teesside A offshore wind farm, Dogger Bank. Available at: Underwater noise modelling at the Teesside A offshore wind farm, Dogger Bank

[55] Orsted (2019) Hornsea Project Four: Preliminary Environmental Information Report (PEIR) Volume 4, Annex 4.5: Subsea Noise Technical Report. Available at: peir-volume-4-annex-45-subsea-noise-technical-report-03309165a1.ashx (azureedge.net)

Project phase	Receptor	Impact	Potential for significant effect	Proposed to be scoped in/ out
			these activities are low enough that there is negligible risk. Therefore, this impact pathway has been scoped out of the EIA. It should be noted that geophysical surveys are exempt from requiring a Marine Licence under the Marine and Coastal Access Act (MCAA), provided they meet certain conditions. The EIA will not consider the effects of the pre- and post-installation surveys. If the cable is installed correctly the likelihood of it requiring maintenance and repair is significantly reduced. However, there remains the potential that localised repair works, or remedial external cable protection may be required. In these circumstances the significance of the effect will be of lower magnitude that during installation and has therefore been scoped out of the assessment for the same reasons.	
Construction and Operation	Cetaceans and pinnipeds	Changes in prey availability	Changes in prey availability is a potential indirect impact which could arise if the Project has a significant effect on fish species such as sandeel and Atlantic herring which are important prey species during any phase of the project life cycle. Disturbance of the seabed during the spawning season for species with a demersal life stage could have a direct impact on the spawning biomass for a specific year group, leading to a shortage on prey species. The impact pathway has been scoped in under the fish and shellfish topic with respect to sandeel and Atlantic herring prey species. A sandeel and Atlantic herring habitat study will be undertaken to inform the EIA (see **Chapter 20** Fish and Shellfish). The conclusions of the study will be used to inform the assessment for cetaceans and pinnipeds. Although it is unlikely that the temporary habitat disturbance and localised habitat loss will result in significant impacts on prey species, until the EIA assessment is complete it cannot be ruled out and this impact pathway will therefore be assessed in the EIA.	Scoped In

Project phase	Receptor	Impact	Potential for significant effect	Proposed to be scoped in/ out
Construction and Operation	Cetaceans and pinnipeds	Collision with project vessels	There are known incidents of marine mammals colliding with fast moving vessels. However, it is largely recognised that the key factors contributing to collision between marine mammals and vessels are the presence of both in the same area and vessel speed (see Schoeman et al. (2023)[56] for review). Injuries to marine mammals from vessel strikes are species-dependent but generally are more severe at higher impact speeds[57]. Laist et al. (2001)[58] conclude that fatal collisions with marine mammals occur at vessel speeds of 14 knots or more. Vessels involved in the Project during construction and operation (maintenance and repair activities) will be either stationary or travelling slowly (circa 5 knots) during all activities, thus allowing both the vessel and any animal in the area time to avoid collision. During transit times, project vessels will be travelling at speeds greater than 5 knots. However, project vessels will follow the shipping routes within the study area, where possible. Cetaceans and pinnipeds in the area are exposed to vessels of all sizes on a regular basis due to the density of shipping in the Southern North Sea. Therefore, the collision risk posed by project vessels associated with the Project is likely to be significantly lower than that posed by commercial shipping activity. No significant effects are predicted. This impact pathway has therefore been scoped out of the assessment.	Scoped Out

[56] Schoeman, R.P., Patterson-Abrolat, C. and Plön, S. (2020) A Global Review of Vessel Collisions with Marine Animals. Available at: https://www.frontiersin.org/articles/10.3389/fmars.2020.00292/full

[57] Wang et al. (2007) Vessel collisions with small cetaceans worldwide and with large whales in the Southern Hemisphere, an initial assessment. Available at: https://www.lajamjournal.org/index.php/lajam/article/view/263

[58] Laist, D., Knowlton, A. R. & Mead, J. G., (2001) Collisions between ships and whales. Available at: https://www.researchgate.net/publication/235768458_Collisions_between_ships_and_whales#:~:text=According%20to%20Laist%20et%20al,length%20or%20more.%20

Project phase	Receptor	Impact	Potential for significant effect	Proposed to be scoped in/ out
Operation	Cetaceans and pinnipeds	Electromagnetic changes	No evidence of magnetic sensitivity has been reported for pinnipeds[59], It is acknowledged that cetaceans use magnetic cues, such as the earth's geomagnetic field, to navigate. The mechanism for how this is done is still unknown[59]. Therefore, there is a current debate around the impacts of EMF on marine mammals. Calculations of EMF fields for similar specification HVDC cables to the Project show rapid attenuation of the magnetic fields to background levels within 10m-50m of the cables[60, 59]. This localised change in the magnetic field may temporarily affect sensitive species as they cross the cables or pass alongside their length and may temporarily reduce their navigational ability within the zone of effect. However, Gill et al., (2005)[61] reports that there have been no impacts to the migration of cetaceans over existing interconnector cables and Walker (2001)[62] note harbour porpoise migration across the Basslink has been observed unhindered despite several crossings of operating sub-sea HVDC cables. Given the rapid attenuation of the magnetic field, the lack of evidence of effects on cetaceans, and the predominantly pelagic existence resulting in separation with the change in field, cetaceans have a relatively low likelihood of being affected by EMF. It is recognised that there could be both	Scoped In

[59] BOEMRE (2011) Effects of EMFS From Undersea Power Cables on Elasmobranchs and Other Marine Species. Available at: https://www.boem.gov/sites/default/files/environmental-stewardship/Environmental-Studies/Pacific-Region/Studies/2011-09-EMF-Effects.pdf

[60] National Grid and Energinet (2017), Viking Link Environmental Statement, Appendix H EMF Report. Viking Document VKL_07_30_J800_15

[61] Gill, A.B., Gloyne-Philips, I., Neal, K.J and Kimber, J.A. (2005) The potential effects of electromagnetic fields generated by sub-sea power cables associated with offshore wind farm developments on electrically and magnetically sensitive marine organisms – a review. Available at: https://tethys.pnnl.gov/sites/default/files/publications/The_Potential_Effects_of_Electromagnetic_Fields_Generated_by_Sub_Sea_Power_Cables.pdf

[62] Walker, T.I. (2001) Available at: Review of Impacts of High Voltage Direct Current Sea Cables and Electrodes on Chondrichthyan Fauna and Other Marine Life Basslink Supporting Study No. 2 https://www.researchgate.net/publication/262232923_Basslink_project_review_of_impacts_of_high_voltage_direct_current_sea_cables_and_electrodes_on_chondrichthyan_fauna_and_other_marine_life_Basslink_Supporting_Study_No_29_Marine_and_Freshwater_Resource#pf

Project phase	Receptor	Impact	Potential for significant effect	Proposed to be scoped in/ out
			direct and indirect impacts as a result of reduced prey availability and there is not yet enough evidence to say that EMF does not have a direct impact. As a precautionary approach, the impacts pathway has been scoped into the assessment.	
Construction and Operation	All species	Accidental spills	Project vessels and contractors will comply with the International Convention for the Prevention of Pollution from Ships (MARPOL) 73/78 which relate to pollution from oil from equipment, fuel tanks etc and release of sewage (black and grey water). It is a legal requirement that all vessels have a Shipboard oil pollution emergency plan (SOPEP). Compliance with Regulations will be sufficient to minimise the risk to the environment and no significant impacts are predicted.	Scoped Out
Operation	All species	Thermal increases	During the operation of an HVDC cable, heat losses occur because of the resistance in the cable/conductor. This can cause localised heating of the surrounding environment (i.e., sediment for buried cables, or water in the interstitial spaces of external cable protection). There are no specific regulatory limits applied to temperature changes in the seabed, although a 2°C change between seabed surface and 0.2m depth is used as a guideline in Germany. Furthermore, within German waters a more stringent thermal limit is imposed on cables passing through designated conservation sites with sediment temperatures not allowed to exceed this temperature threshold within 300mm above the cables. Conservative calculations undertaken for Viking Link (which crosses German waters) concluded that heating in excess of 2°C at 20cm sediment depth will only occur if cables are bundled and buried to less than 0.75m[63].	Scoped Out

[63] National Grid and Energinet (2017) Viking Link Environmental Statement. Appendix I – Cable Heating Effects – Marine Ecological Report.

Project phase	Receptor	Impact	Potential for significant effect	Proposed to be scoped in/ out
			Any temperature changes will be localised to the immediate environment surrounding the cable and undetectable against natural temperature fluctuations in the surrounding sediments and water column. Regardless of whether the cables are buried, no significant effects on marine mammals either directly or indirectly through effects to prey species are predicted.	
Construction and Operation	Cetaceans and pinnipeds	Transboundary Impact - Underwater noise changes due to presence of project vessels and equipment (including cable trenching).	As a linear infrastructure project between two countries the Offshore Scheme boundary stops at the border between UK and Netherlands. However, potential impacts during construction and operation, will not stop, but will continue along the route of the submarine cables. There is therefore the potential that changes in underwater noise levels in close proximity to the UK border will also be experienced in Dutch waters. The effects will be limited in spatial extent in close proximity to the EEZ boundary. The assessment for the Project in the Netherlands will assess the impact of the Project on Dutch environmental receptors. As the impact is proposed to be Scoped Out of the EIA in UK waters (as justified above) it is also proposed to scope out the transboundary impact for the same reasons.	Scoped Out
Construction and Operation	Cetaceans and pinnipeds	Transboundary Impact - Changes in prey availability	As a linear infrastructure project between two countries the Offshore Scheme boundary stops at the border between UK and Netherlands. However, potential impacts during construction and operation, will not stop, but will continue along the route of the submarine cables. There is therefore the potential that changes in prey species in close proximity to the UK border will also be experienced in Dutch waters. The effects will be limited in spatial extent in close proximity to the EEZ boundary. The assessment for the Project in the Netherlands will assess the impact of the Project on Dutch environmental receptors. Although it is unlikely that the temporary habitat disturbance and localised habitat loss	Scoped In

Project phase	Receptor	Impact	Potential for significant effect	Proposed to be scoped in/ out
			will result in significant impacts on prey species, until the EIA assessment is complete it cannot be ruled out and this impact pathway will therefore be assessed in the EIA.	

22.7 Assessment methodology

Data sources

Desk study data

22.7.1 Extensive contemporary and historic information is available regarding the abundance and distribution of cetaceans and pinnipeds in the Southern North Sea and will be used in the EIA. Following a detailed review to inform the scope of the data and assessment, no site-specific surveys for are planned for these species.

22.7.2 **Table 22-6** identifies the key data sources that will be used, in addition to those used to inform the baseline description in this EIA Scoping Report (as described in **Section 22.3.4**) to inform the EIA process. Data analysis will be verified and supplemented through consultation with relevant stakeholders as outlined in **Section 22-2**.

Table 22-6 Key publicly available data sources for marine mammals and marine reptiles

Data source	Description	Coverage Relative to Study Area
The Marine Life Information Network (MarLIN 2023)[64]	Species Information	UK
National Biodiversity Network Gateway (http://data.nbn.org.uk/)	Occurrence records for marine turtles, cetaceans and pinnipeds.	UK
Special Committee on Seals	UK seals monitoring programme – annual report 2020 (or subsequent update if released)	UK
IAMMWG (2022)[65]	Updated abundance estimates for cetacean Management Units in UK waters. JNCC Report No. 680	UK
SCOS reports (SCOS, 2021)[66]	Scientific Advice on Matters Related to the Management of Seal Populations. This outlines the current status of both harbour and grey seals in the UK.	UK

[64] MarLIN (2023) The Marine Life Information Network. Available at: https://www.marlin.ac.uk/

[65] IAMMWG. (2022) Updated abundance estimates for cetacean Management Units in UK waters (Revised 2022). JNCC Report No. 680, JNCC Peterborough, ISSN 0963-8091. Available at: https://hub.jncc.gov.uk/assets/3a401204-aa46-43c8-85b8-5ae42cdd7ff3

[66] SCOS. 2021. Scientific Advice on Matters Related to the Management of Seal Populations: 2020.

Data source	Description	Coverage Relative to Study Area
Seal haul-out data (provided by the Sea Mammal Research Unit (SMRU))	August counts of harbour and grey seals on the English Coast, 1968-2021.	UK
Grey seal pup counts (provided by SMRU)[67]	Surveys of the main UK grey seal breeding colonies annually between 1956-2021.	UK
Offshore Wind Farm Aerial Surveys	Offshore Wind Farms collect two years of aerial survey data to establish the baseline for marine mammals within the array sites. The following OWFs lie within the study area and data will be sought from the projects consent applications to inform the baseline: East Anglia One North, East Anglia One, East Anglia Two, East Anglia Three, North Vanguard West, Norfolk Boreas.	Southern North Sea

Additional studies

22.7.3 No additional studies are proposed.

Legislation, policy and guidance

22.7.4 Legislation and policy relevant to the proposed Scheme and this chapter is outlined in **Chapter 4** Legislation and Policy Overview and **Appendix 4-A** National Policy, **Appendix 4-B** Environmental Legislation and **Appendix 4-C** Local Policy.

22.7.5 Relevant guidance and standards that have informed the scoping process are listed below (but not limited to) and will also be taken into account as part of the assessment:

- Technical guidance for assessing the effects of anthropogenic sound on marine mammal hearing (NOAA, 2018)[68];

[67] SMRU (2023) Grey Seal Pup Production – England. Available at: https://biology.st-andrews.ac.uk/smru/wp-content/uploads/sites/12/2021/06/SCOS-2020.pdf

[68] National Marine Fisheries Service (2018) Technical Guidance for Assessing the Effects of Anthropogenic Sound on Marine Mammal Hearing (Version 2.0) Underwater Thresholds for Onset of Permanent and Temporary Threshold Shifts. Available at : https://media.fisheries.noaa.gov/dam-migration/tech_memo_acoustic_guidance_(20)_(pdf)_508.pdf

- Marine Mammal Noise Exposure Criteria: Updated Scientific Recommendations for Residual Hearing Effects. (Southall et al., 2019)[69];
- Sound Exposure Guidelines for Fishes and Sea Turtles (Popper et al., 2014)[70]; and
- Guidance for assessing the significance of noise disturbance against Conservation Objectives of harbour porpoise SACs (England, Wales & Northern Ireland) (JNCC, 2020)[71].

Assessment method

22.7.6 **Chapter 5** EIA Approach and Method sets out the standard EIA methodology and matrices to be used for the assessment. This section provides a summary of the EIA methodology specifically relevant to this chapter.

22.7.7 Assessment of cumulative and combined effects are discussed in **Chapter 29** Cumulative and Combined effects of the Project.

22.7.8 The criteria for characterising the value and sensitivity and magnitude for marine mammals and marine reptiles are outlined in **Table 22-7**and **Table 22-8** respectively.

Table 22-7 Definitions of value and sensitivity for marine mammals and marine reptiles

Receptor Value and Sensitivity	Description
High	No tolerance and ability to adapt behaviour so that survival and reproduction rates are effected and animal cannot recover.
Medium	Limited tolerance and ability to adapt behaviour so that survival and/or reproduction rates may be affected and/or limited ability for the animal to recover.
Low	Some tolerance such as ability to adapt behaviour or recover from any impact so that survival is not affected, and reproduction rates are not affected in the medium term.
Negligible	Receptor is able to adapt behaviour so that survival and reproduction rates are not affected.

[69] Southall et al (2019), “Marine Mammal Noise Exposure Criteria: Updated Scientific Recommendations for Residual Hearing Effects.” Aquatic Mammals. Available at: https://sea-inc.net/wp-content/uploads/2019/10/Southall-et-al_2019_MM-Noise-critieria-update-with-errata_Aq- Mammals.pdf

[70] Popper et al. (2014) Sound Exposure Guidelines for fishes and sea turtles. Available at: https://www.researchgate.net/publication/279347068_Sound_Exposure_Guidelines

[71] JNCC (2020) Guidance for assessing the significance of noise disturbance against Conservation Objectives of harbour porpoise SACs (England, Wales & Northern Ireland). Available at: https://assets.publishing.service.gov.uk/media/5ed7ba3c86650c76ab17fcc5/SACNoiseGuidanceJune2020.pdf

Table 22-8 Definitions of impact magnitude criteria for marine mammals and marine reptiles

Impact Magnitude	Definition
High	The impact will affect the behaviour and distribution of sufficient numbers of a species, that the favourable conservation status for the relevant management unit/population is adversely affected.
Medium	Temporary changes in behaviour and/or distribution of individuals during a key season such that it would result in potential reductions to reproductive success for the population. Permanent effects on individuals that my influence survival but not at a level that would affect the favourable conservation status of the population.
Low	Short-term and/or intermittent and temporary behaviour effects in a small proportion of the population. Survival and reproductive rates very unlikely to be impacted to the extent that population effects are measured.
Negligible	Very short term, recoverable effect on the behaviour and/or distribution in a very small proportion of the population.

22.7.9 Results from other topic chapters, such as marine physical environment, fish and shellfish and intertidal and subtidal benthic ecology will be used to establish the potential impacts on supporting habitat and prey species for marine mammals and marine reptiles. Where impacts are not predicted to be significant, simple assessments, using an evidence-based approach that is proportionate to the anticipated level of significance will be undertaken.

22.7.10 Where significant effects are identified, mitigation measures will be proposed, and residual effects presented.

22.8 Assumptions & limitations

22.8.1 This EIA Scoping Report has been collated based on a range of publicly available data and information only. It is assumed that the data collated is accurate. The data will be supplemented with additional data as part of the EIA process.

22.8.2 In the absence of data, a precautionary approach has been taken and professional judgement, based on experience of similar linear schemes, has been used where required to inform the scope of the assessment.

22.8.3 There is an established understanding on the existing marine environment from the large amount of data collated from site-specific surveys carried out by offshore wind farms and other available data for marine mammals within the region. However, marine mammals are highly mobile and therefore the data collected by previous marine mammal surveys only provide an overview. Nevertheless, the surveys undertaken in the study area over the last few years show consistent findings.

Contents

23. Shipping and Navigation

23.1 Introduction

23.1.1 This chapter outlines the proposed scope and methodology to be undertaken for Shipping and Navigation. It will consider the potential for significant effects arising from the construction and operation of the LionLink Scheme (hereafter referred to as 'the proposed Offshore Scheme') in respect of shipping and navigation. A review of relevant guidance and policy has been undertaken together with a desk-based assessment, to inform the proposed scope and methodology.

23.1.2 This chapter is supported by the following figures:

- **Figure 1-4**: Proposed Offshore Scheme Boundary;
- **Figure 23-1**: Overview of study area;
- **Figure 23-2**: Navigational features;
- **Figure 23-3**: Commercial vessels by type (three months, Summer);
- **Figure 23-4**: Commercial vessels by type (three months, Winter);
- **Figure 23-5**: Commercial vessel density (six months, Summer and Winter);
- **Figure 23-6**: Fishing vessels by activity (six months, Summer and Winter);
- **Figure 23-7**: Recreational vessels by season (six months, Summer and Winter); and
- **Figure 23-8**: Anchored vessels by type (six months, Summer and Winter).

23.1.3 There may be interrelationships related to the potential effects on Shipping and Navigation and other disciplines. Therefore, please also refer to the following chapters:

- **Chapter 24** - Commercial Fisheries – will consider commercial impacts to fishing vessels; and
- **Chapter 25** – Other Marine Users – will identify impacts to other marine users, such as offshore wind farms, oil and gas activities, dredging and disposal, military exercise areas, and subsea assets (cables and pipelines).

23.2 Consultation and engagement

23.2.1 Preliminary consultation on the scope and approach to the shipping and navigation assessment has been undertaken with the following stakeholders:

- Marine Management Organisation (MMO);
- Maritime and Coastguard Agency (MCA);
- Trinity House;
- Royal Yachting Association (RYA); and
- Sunk Vessel Traffic Scheme User Group.

23.2.2 The main themes/impacts raised and discussed during consultation were:

- Data sources to be used during the navigation risk assessment, with additional sources and stakeholders such as Southwold Harbour being recommended;
- Cable burial and cable protection concerns in relation to under-keel clearance and reductions in chart datum;
- Magnetic field interference with navigation equipment (specifically magnetic compasses);
- Compression of traffic during construction which could push vessels into other offshore structures; and
- Transboundary impacts and how these would be assessed.

23.2.3 Continued engagement will be undertaken with the above stakeholders, with the below organisations also contacted in relation to the proposed Offshore Scheme. The objective of the consultation will be to obtain any information that they hold to supplement the assessment, to seek their views with regards to the evolving design and to supplement desk-top review, Automatic Identification System (AIS) data review, and navigation risk assessment. This will be undertaken by the Environmental Impact Assessment (EIA) Team.

- UK Chamber of Shipping;
- Port and harbour authorities (e.g. Southwold Harbour) on the UK east coast, if relevant;
- Royal National Lifeboat Institute;
- Commercial Ferry Operators;
- Cruising Association (CA); and
- Regular operators identified in the vessel traffic survey data.

23.3 Baseline Conditions

Study area

23.3.1 The proposed Offshore Scheme will route from either the Southwold or Walberswick Landfall across the Southern North Sea to the boundary between the UK and Netherlands Exclusive Economic Zones (EEZ).

23.3.2 The proposed Offshore Scheme Scoping Boundary is illustrated in **Figure 23-1** and is described in **Chapter 2** The Proposed Scheme Description. It includes a proposed Submarine Cable Corridor from each Landfall converging approximately 35km off the east coast of the UK. From the point of convergence there are two Submarine Cable Corridor options (B and C) that cross the Southern North Sea to the UK/Netherlands EEZ boundary.

23.3.3 The study area for the purposes of this scoping exercise includes:

- The proposed Offshore Scheme Scoping Boundary; and
- A 5 nautical mile (NM) buffer applied around proposed Submarine Cable Corridor B and proposed Submarine Cable Corridor C as presented in **Figure 23-1**.

23.3.4 This study area is considered sufficient to characterise the Shipping and Navigation baseline while also remaining project-specific in the vessel activity and navigational features that it captures.

23.3.5 The study area will be reviewed and, as appropriate, refined for the assessment in the Preliminary Environmental Information (PEI) Report and Environmental Statement (ES) with only one Landfall and one Submarine Cable Corridor being taken forward. This will be based on the proposed Order limits in the ES.

Baseline data sources

23.3.6 The baseline described in this chapter and associated appendices has been informed by the following data sources:

Table 23-1 Baseline data sources

Baseline Data Source	Description	Coverage
United Kingdom Hydrographic Office (UKHO) Admiralty Sailing Directions	North Sea (West) Pilot NP54 12th Edition[1]	Complete coverage of study area
AIS data	Six months of seasonal AIS data, collected from onshore and satellite receivers, and covering the periods 01 June – 31 August 2022 (inclusive) and 01 December 2022 – 28 February 2023 (inclusive).[2]	Complete coverage of study area
UKHO Admiralty charts	UKHO Admiralty Charts 2695-4, 1535-0, 1543-0, 106-0, 1632-0, 1504-0, 1503-0, 1631-0, 1610-0, 1630-0, 2182A-0	Complete coverage of study area
Aggregate Dredging Areas	GIS for aggregate dredging areas in England, Wales and Northern Ireland provided by The Crown Estate (TCE) (TCE, 2023)[3]	Complete coverage of study area
Wind Site Agreements	GIS for wind farm sites in England, Wales and Northern Ireland provided by TCE[3]	Complete coverage of study area

[1] UKHO, 2016. Admiralty Sailing Directions North Sea (West) Pilot NP54, 12th Edition.

[2] These periods have been chosen to capture seasonal variation (summer and winter) in traffic behaviour, with a duration of six months considered suitable for shipping and navigation assessment and standard for subsea cables.

[3] TCE, 2023. *The Crown Estate Open Data,* https://opendata-thecrownestate.opendata.arcgis.com/ [Accessed Feb 2024]

Baseline

23.3.7 The following sections present the current baseline established at scoping. There are currently two corridors being considered for the proposed Submarine Cable Corridor, which are shown in **Figure 1-4**. Baseline information is presented for both options below.

Navigational Features

23.3.8 **Figure 23-2** presents the charted navigational features in the vicinity of the proposed Offshore Scheme Scoping Boundary. Focus has primarily been given to those within the study area, however the importance of navigational features outside of the study area has also been considered and any deemed to be of particular relevance i.e., have a material relationship with the traffic within the study area are presented and discussed.

23.3.9 A total of 121 charted wrecks are located within the study area, with 85 of these within 15NM of the coast. A total of 21 charted obstructions are also located within the study area, with a wider geographic distribution. Fifteen aids to navigation are within the study area, three of which have Radar Beacon (Racon). Unexploded ordnance is charted in three locations within the study area, one of which lies approximately 100m from proposed Submarine Cable Corridor C.

23.3.10 Oil and gas infrastructure can be seen primarily within the northern half of the study area i.e., wells, pipelines and platforms, with 500m safety zones surrounding many of the platforms and wells. The platform closest to the Submarine Cable Corridors is located within 0.6NM of proposed Submarine Cable Corridor B.

23.3.11 There are two major Traffic Separation Schemes (TSSs) in proximity to the proposed Offshore Scheme; Off Botney Ground TSS at the northern extent of the study area (adjacent to proposed Submarine Cable Corridor B – northern spur) and TSS Off Brown Ridge (adjacent to proposed Submarine Cable Corridor C). At the entry/exit of these TSSs are mandatory deep-water routes that extend to the south, with the one that routes traffic from Off Botney Ground TSS overlapping with Submarine Cable Corridor B and Submarine Cable Corridor C.

23.3.12 Subsea cables can also be seen throughout the study area, mainly within the southern portion of the study area. This may include cables which are in disuse, but such cables can still be of navigational interest if remaining on the seabed. Six of these cables make landfall at Lowestoft, approximately 7.3NM north of the Southwold Landfall site and 8.8NM north of the Walberswick Landfall site.

23.3.13 Operational wind farms are in proximity to the proposed Offshore Scheme, namely East Anglia One, Greater Gabbard and Galloper. The closest wind farm is East Anglia One at a minimum distance of approximately 6.6NM to the south of proposed Submarine Cable Corridor C; the Greater Gabbard and Galloper wind farms are further south and beyond the scope of **Figure 23-2**. However, although outside the study area, these wind farms account for the majority of wind farm vessel traffic within the study area.

23.3.14 Two dredging areas are located within the study area, inshore of proposed Offshore Route B, with the closest being approximately 2.0NM to the north of the Submarine Cable Corridor from Southwold. Additional dredging areas are located in close proximity and, although outside the study area, account for a large proportion of dredger traffic within the study area.

23.3.15 Southwold Harbour is located within the study area, with its entrance within 250m of the Submarine Cable Corridor from Walberswick and 1.3NM of the Submarine Cable

Corridor from Southwold. A reported anchorage area can be found at its approach, within approximately 60m of the proposed Submarine Cable Corridor from Walberswick.

23.3.16 The Port of Lowestoft is also in the vicinity of the proposed Offshore Scheme, with a pilot boarding station at its approach. A designated anchorage area is located nearby, at a minimum distance of 1.8NM from the proposed Submarine Cable Corridor from Southwold.

Commercial Vessels

23.3.17 **Figure 23-3** and **Figure 23-4** present the commercial vessels (i.e., all vessels excluding fishing and recreational) recorded within the study area colour-coded by type, during the summer period and winter period respectively.

23.3.18 During the summer period, there was an average of 147 to 148 unique commercial vessels per day recorded within the study area, with 99 to 100 per day recorded intersecting one or both of the proposed Submarine Cable Corridors. During the winter period, this was 116 per day within the study area with 77 per day intersecting one or both of the proposed Submarine Cable Corridors.

23.3.19 The most common commercial vessel types within the study area during both periods were cargo, followed by tanker; cargo vessels accounted for 35% and 45% during the summer and winter periods respectively, while tankers accounted for 27% and 34% during the summer and winter periods respectively. These vessels were seen undertaking routes defined by the nearby TSSs and deep-water routes (see section Navigational Features) and undertaking a southeast/northwest route through the centre of the study area; see **Figure 23-5** for greater visual clarity of these routes. Main destinations of cargo vessels and tankers included Rotterdam, Teesport and Immingham.

23.3.20 Wind farm support vessels accounted for 13% of commercial traffic during the summer period, being the third most common vessel type, however this was 4% during the winter period. Wind farm support vessels were mainly associated with the East Anglia One, Greater Gabbard and Galloper wind farms; vessels associated with these wind farms generally remained within 23NM of the coast.

23.3.21 Oil and gas vessels were mainly seen within the northern portion of the study area, where gas fields are located. Passenger vessels were primarily seen undertaking the southeast/northwest route through the centre of the study area. Dredgers were primarily seen within 20NM of the coast, transiting to/from dredging areas located to the northeast of the proposed Landfall sites.

Commercial Vessel Density

23.3.22 **Figure 23-5** presents the density of commercial vessels recorded during the six month period within a 0.5NM x 0.5NM grid.

23.3.23 High-density routes to/from the TSSs and within the deep-water routes can be seen. The high-density traffic to/from TSS Off Brown Ridge and following its adjacent deep-water route avoids the proposed Submarine Cable Corridors, passing at an approximate distance of between 1.2NM and 0.4NM to the southeast of proposed Submarine Cable Corridor C. The traffic to/from Off Botney Ground TSS and following its adjacent deep-water route intersects proposed Submarine Cable Corridors B and C.

23.3.24 The largest high-density route is in the centre of the study area and intersects proposed Submarine Cable Corridors B and C. This is a north west/south east route between

Dutch ports (e.g., Rotterdam and Moerdijk) and British ports (e.g., Immingham and Teesport). The route is mainly comprised of cargo vessels, with tankers and passenger vessels also noted in significant proportions.

23.3.25 Other regions of high density can be seen closer to coast, largely attributed to wind farm support traffic associated with the East Anglia One, Greater Gabbard and Galloper wind farms.

Fishing Vessels

23.3.26 **Figure 23-6** presents the fishing vessels recorded within the study area during the six-month period, colour-coded by activity i.e., whether engaged in active fishing or transiting. Fishing vessels were deemed to be engaged in active fishing via an assessment based on speed, navigational status broadcasted on AIS, destination and track behaviour.

23.3.27 Fishing vessels were primarily seen exhibiting active fishing behaviour as opposed to transiting, with such behaviour accounting for 65% of AIS tracks. Active fishing was widely distributed throughout the study area; the main regions of the study area where active fishing behaviour was relatively low were at the TSSs, within the deep-water route adjacent to TSS Off Brown Ridge and close to the coast. However, it should be noted that fishing vessels below 15m in length are not obligated to broadcast on AIS and thus these vessels (which are likely distributed close to the coast) may be under-represented.

23.3.28 During the summer period, an average of eight to nine unique fishing vessels per day was recorded within the study area, with five per day intersecting one or more of the proposed Submarine Cable Corridors. During the winter period, this was four to five per day within the study area with two to three per day intersecting one or both of the proposed Submarine Cable Corridors.

23.3.29 Excluding one vessel with unspecified length, the average fishing vessel length recorded on AIS during the six months was 37m. Approximately 12% of recorded fishing vessels had a length of less than 15m, the minimum length for mandatory AIS carriage, all of which were recorded within 10NM of the coast. The longest fishing vessel length was 142m, recorded at the northern extent of the study area.

23.3.30 The most common gear type was beam trawler, accounting for approximately 38%, followed by bottom otter trawls which accounted for approximately 13%. The majority (approximately 86%) of fishing gear types were demersal; these have a higher potential of cable interaction as they are dragged along the seabed.

Recreational Vessels

23.3.31 **Figure 23-7** presents the recreational vessels recorded within the study area during the six-month period, colour-coded by season i.e., Summer or Winter.

23.3.32 The vast majority (94%) of recreational traffic was recorded during the Summer, due to the more favourable weather of the Summer period. The majority of recreational traffic was recorded within 10NM of the coast. The average length of recreational vessels (excluding a minority with unspecified length) was 11.7m.

23.3.33 An average of 15 to 16 unique recreational vessels per day was recorded within the study area during the Summer period, with 10 to 11 per day crossing one or both of the proposed Submarine Cable Corridors. For the Winter period, this was one per day

within the study area and one every four to five days crossing one or both of the proposed Submarine Cable Corridors.

Anchored Vessels

23.3.34 **Figure 23-8** presents the anchored vessels recorded within the study area during the six-month period. Vessels were deemed to be at anchor via an assessment based on their speed, navigational status broadcasted on AIS and track behaviour.

23.3.35 Anchored vessels primarily consisted of tankers (67%), followed by cargo vessels (22%) and oil and gas vessels (6%). An average of two anchored vessels per day was recorded within the study area during the six-month period. Anchored vessels were generally located within 20NM of the coast. Both the designated and reported anchorages (as seen/discussed in the Navigational Features section) were utilised during the six-month period, however the majority of anchored vessels were recorded beyond these areas.

Future baseline

23.3.36 The shipping and navigation chapter within the PEI Report and ES will consider changes which may affect the future environment in the absence of the proposed Offshore Scheme. The future baseline will also take into account any developments that are likely to be present in the future baseline. It is noted that among these future developments are a number of consented offshore wind farms that intersect the study area i.e. Norfolk Boreas, Norfolk Vanguard East, Norfolk Vanguard West, East Anglia Three, East Anglia One North and East Anglia Two; however, none of these intersect the proposed Offshore Scheme Scoping Boundary.

23.3.37 The likely evolution of the baseline will be reviewed in the EIA, taking into consideration potential changes in vessel numbers due to changing trends and/or future developments.

23.4 Potential impacts

23.4.1 This section identifies, at a high level, a summary of the sources and potential impacts as a result of the proposed Offshore Scheme during the construction and operational phases.

23.4.2 There is no potential for transboundary impacts on shipping and navigation given that the baseline assessment includes all international vessels likely to be impacted.

Construction

23.4.3 The following impacts could occur during the construction phase:

- Collision of a passing (third party) vessel with a vessel associated with cable installation;
- Cable installation causing disruption to passing vessel routeing/timetables;
- Increase in the risk of a vessel-to-vessel collision due to construction activity;
- Cable installation causing disruption to fishing and recreational activities; and
- Cable installation causing disruption to third party marine activities (e.g., dredging).

Operation

23.4.4 The following impacts could occur during the operational phase:

- Collision of a passing (third party) vessel with a vessel associated with cable maintenance;
- Reduction in under-keel clearance resulting from laid cable and associated protection;
- Potential for the snagging of fishing gear on the cable;
- Potential for the snagging of anchors on the cable (anchor drag or emergency anchoring); and
- Interference with marine navigational equipment from the electromagnetic field created by the operational cables.

23.5 Design and control measures

23.5.1 As outlined in **Chapter 5** EIA Approach and Method, a standard hierarchical approach will be taken to mitigation.

23.5.2 The assessment of effects will take into account measures that are embedded into the proposed Offshore Scheme design, together with general good practice measures.

Design measures

23.5.3 Design measures to be implemented by the Offshore Scheme include:

- Suitable implementation and monitoring of cable protection (via burial or external protection where adequate burial depth as identified via risk assessment is not feasible) as informed by a cable burial risk assessment (CBRA) which takes into account fishing and anchoring practices;
- Compass deviation effects will be minimised through cable design and burial, and separation distance; and
- Relevant policy guidance on water depth reduction to be followed during the planning and installation of the cable.

Control measures

23.5.4 Control measures to be implemented by the Offshore Scheme include:

- Promulgation of information via Notices to Mariners, Kingfisher, KIS-ORCA, Radio Navigational Warnings on Very High Frequency (VHF) radio, Navigational Telex (NAVTEX), and/or broadcast warnings in advance of and during the offshore works.
- Communication with Southwold Harbour will be undertaken when full details of the construction works are known and a cable lay plan will be in place detailing specific procedures relating to cable installation works in busy shipping channels.
- Compliance with international shipping legislation, both for Project vessels and third-party vessels. This includes The International Regulations for Preventing Collisions

at Sea (COLREGs)[4] and International Convention for the Safety of Life at Sea (SOLAS)[5].

- Cable installation vessels and support vessels will display appropriate marks and lights, and, where possible, will broadcast their status on AIS at all times, to indicate the nature of the work in progress, and highlight their restricted manoeuvrability.
- Guard vessel(s) will be employed to work alongside the installation vessel(s) during the construction period. The guard vessel(s) will alert third party vessels to the presence of the installation activity and provide assistance in the event of an emergency.
- Temporary aids to navigation will be deployed (if required) to guide vessels around any areas of installation activity.
- Marine coordination and communication to manage Project vessel movements.
- Passing vessels will be requested to maintain a “safe” distance from installation vessels restricted in manoeuvrability. This will be monitored by guard vessels.
- Fisheries Liaison Officer (FLO) will be in place.
- The cable will be clearly marked on Admiralty Charts with associated note/warning about anchoring, trawling or seabed operations.

23.6 Scope of the assessment

23.6.1 This section identifies the potential for the proposed Offshore Scheme to have likely significant effects, taking into account the design and control measures identified in **Section 23.5**.

23.6.2 **Table 23-2** sets out the receptors within the study area that have been identified, whether there is a pathway for the impacts identified, the potential for significant effects and if the receptor is scoped in for the assessment.

23.6.3 All identified impacts are of relevance to both the Southwold and Walberswick Landfall options and both Submarine Cable Corridor options unless specified otherwise.

23.6.4 A precautionary approach has been taken and where there is no strong evidence base, insufficient baseline or the significance is uncertain at this stage the impact has been scoped in to the EIA. Where there is a clear evidence base that the effect from the impact will not be significant, either alone or in combination with other plans and projects, the impact has been scoped out of the EIA.

[4] International Maritime Organization (IMO), 1972/77. *The International Regulations for Preventing Collisions at Sea (COLREGs).* London: IMO.

[5] IMO, 1974. *International Convention for the Safety of Life at Sea (SOLAS).* London: IMO.

Table 23-2 Proposed scope of the assessment

Project phase	Receptor	Impact	Potential for significant effect	Proposed to be scoped in/ out
Construction and Operation	All vessels	Collision of a passing (third party) vessel with a vessel associated with cable installation and maintenance	An increased collision risk is created during the construction phase for all passing traffic due to the presence of the vessels associated with the cable installation. The nature of cable installation and other construction activities requires large, slow-moving vessels which will be restricted in their ability to manoeuvre. The collision risk is likely to be greater in higher density shipping areas, in particular within the shipping channels. A collision risk is also created during the operational phase for vessels involved in maintenance works. However, this is expected to be a lesser risk than for construction vessels as maintenance works are likely to be shorter duration.	Scoped In
Construction	All vessels	Cable installation causing disruption to passing vessel routeing/timetables	During the construction phase, regular traffic will be required to alter their planned route due to the presence of construction vessels. These vessels have limited manoeuvrability and will request a minimum passing distance in which no other vessel can enter to reduce the likelihood of incidents.	Scoped In
Construction	All vessels	Increase in the risk of a vessel-to-vessel collision due to construction vessel activity	The presence of construction vessels may increase the risk of a vessel-to-vessel collision, if vessels are required to deviate around the construction work.	Scoped In
Construction	Fishing and recreational vessels	Cable installation causing disruption to fishing and recreational activities	Construction vessels may cause a disruption to local fishermen and recreational sailors along the proposed Submarine Cable Corridor, particularly in coastal waters. The baseline description showed that fishing and recreational activity does occur within the study area,	Scoped In

Project phase	Receptor	Impact	Potential for significant effect	Proposed to be scoped in/ out
			however further data assessment will be undertaken as part of the Navigational Risk Assessment (NRA).	
Construction	Dredgers	Cable installation causing disruption to third party marine activities (e.g., dredging)	The proposed Submarine Cable Corridors lie within close proximity to marine aggregate dredging areas. Construction activities may cause a disruption to these users.	Scoped In
Construction and Operation	All vessels	Vessel drags anchor over the cable	There may be a risk during the construction phase from any vessel, at anchor close to the cables, dragging anchor over the cable (due to poor holding ground or bad weather) if there is a period of time when the cable is exposed (e.g., if burial is carried out post-lay). This is expected to be a short-term impact. There is also a risk during the operational phase from vessels dragging anchor over the cable (due to poor holding ground or bad weather). During the operational phase, the cables are expected to be protected (e.g., by cable burial) to mitigate this risk. Vessels were noted to anchor close to the proposed Submarine Cable Corridor, particularly at the reported anchorage at the approach to Southwold Harbour. A wider anchoring assessment within the NRA will determine the extent and positions of anchoring activity near the cables.	Scoped In
Construction and Operation	All vessels	Vessel anchors in an emergency over the cable	There may be a risk during the construction phase from vessels dropping anchor accidentally, in an emergency or negligently over the cables, if there is a period of time when the cables are exposed (e.g., if burial is carried out post-lay). This is expected to be a short-term impact. Due to the high level of shipping which will cross over the submarine cables on a daily basis and the size of vessels that regularly transit	Scoped In

Project phase	Receptor	Impact	Potential for significant effect	Proposed to be scoped in/ out
			the study area, there is a risk from vessels dropping anchor in an emergency. A wider anchoring assessment within the NRA will determine the volume of vessels passing over the cables that might present a risk of emergency anchoring.	
Construction and Operation	Fishing vessels	A vessel engaged in fishing snags its gear on the cable	There may be a risk during the construction phase from fishing gear snagging onto the cables if there is a period of time when the cables are exposed (e.g., if burial is carried out post-lay). This is expected to be a short-term impact. There is also a risk from fishing vessels snagging their gear on the cables during the operational phase. The baseline assessment showed that fishing activity does occur within the study area, however further data assessment will be required as part of the NRA to identify fishing levels and gear types in operation near the cables.	Scoped In
Operation	All vessels	Reduction in under-keel clearance resulting from laid cable and associated protection	The cables, and associated protection, may lead to a reduction in under-keel clearance, which could cause a risk of grounding. Where external cable protection is deposited in water depths <30m there is the possibility that chart datum can be decreased by more than the MCA recommended 5% change in water depth. The NRA will include an under keel clearance assessment where appropriate to determine what the percentage change in water depth will be where external cable protection is required and what impacts this will have on navigation.	Scoped In
Operation	All vessels	Interference with Marine Navigational Equipment	The electromagnetic field created by buried direct current cables has the potential to create interference on a vessel's magnetic compass, in particular on smaller recreational vessels, as such vessels may lack more sophisticated navigational equipment on-board. Typically, this effect is only present in shallow water depths, and where the cables are unbundled e.g., around the HDD exit	Scoped In

Project phase	Receptor	Impact	Potential for significant effect	Proposed to be scoped in/ out
			point. A study to calculate the field strength and potential effects on navigation will be undertaken to inform the EIA.	

23.7 Assessment methodology

Data sources

Desk study data

23.7.1 In addition to the data sources that were used to inform the baseline reported in this chapter, the following data sources will be used to inform the baseline of the PEI Report/ES:

- 12 months of up-to-date AIS data, taking into account seasonal variations. Due to the length of the proposed Submarine Cable Corridor, collecting radar data is not feasible and therefore no site-specific radar surveys are planned. The use of long-term AIS data is considered suitable and is standard practice for cable projects;
- Marine Accident Investigation Branch (MAIB) and Royal National Lifeboat Institution (RNLI) maritime incident data in the area (10 years);
- Additional fishing vessel activity data (e.g., Vessel Monitoring System (VMS) satellite data);
- Port statistics;
- RYA Coastal Atlas of Recreational Boating; and
- Cruise Association pilot guides.

23.7.2 An NRA will be undertaken and submitted as an appendix to the EIA shipping and navigation chapter; this will include a baseline study which will summarise the available background navigation data and focus on any key shipping routes and/or anchoring areas and fishing activity in the vicinity of the selected Submarine Cable Corridor.

Electromagnetic Field (EMF) Study

23.7.0 A study will be undertaken to calculate the predicted electromagnetic fields to be generated by the submarine power cables due to the electric current flowing along the cables. The electric and magnetic field strengths will be highest where the cables are separated and/or partially or unburied. The study will therefore focus on determining the maximum field strengths and the distance at which the fields dissipate to background values. This study will be used to determine the spatial extent over which electromagnetic changes could interfere with marine navigational equipment. It will be used to inform the NRA.

Legislation, policy and guidance

23.7.1 Legislation and policy relevant to the proposed Scheme and this chapter is outlined in **Chapter 4** Legislation and Policy Overview and **Appendix 4-A** National Policy, **Appendix 4-B** Environmental Legislation and **Appendix 4-C** Local Policy.

23.7.2 Impacts on shipping and navigation receptors are assessed within the NRA using a Formal Safety Assessment (FSA) compliant with International Maritime Organisation

(IMO) guidelines. The primary guidance document used during the assessment is therefore:

- Revised Guidelines for FSA for Use in the IMO Rule-Making Process[6].

23.7.3 The secondary guidance documents used during the assessment are listed below:

- MGN (Marine Guidance Note) 654 (Merchant and Fishing) Safety of Navigation: Offshore Renewable Energy Installations (OREIs) – Guidance on United Kingdom (UK) Navigational Practice, Safety and Emergency Response and its annexes[7]; and
- MGN 661 (Merchant and Fishing) Navigation – Safe and Responsible Anchoring and Fishing Practices[8].

23.7.4 Although the MGN 654 guidance is focused on offshore renewables, it highlights issues to be taken into consideration when assessing the effects of offshore developments on navigational safety and includes guidance on cable protection and burial within UK waters.

Assessment method

23.7.5 **Chapter 5** EIA Approach and Method sets out the standard EIA methodology and matrixes to be used for the assessment. This section provides a summary of the EIA methodology specifically relevant to this chapter.

23.7.6 Assessment of cumulative and combined effects are discussed in **Chapter 29** Cumulative and Combined effects of the Project.

23.7.7 This EIA Scoping Report considers two proposed Submarine Cable Corridors B and C. For the Preliminary Environmental Information (PEI) Report only one proposed Submarine Cable Corridor will be assessed. This will be selected following identification of The Netherlands connection point, receipt of scoping comments, stakeholder consultation and further engineering design. A 5NM buffer study area around the selected Submarine Cable Corridor is also proposed for the Shipping and Navigation assessment within the PEI Report and EIA. The aforementioned NRA will supplement this submission.

23.7.8 Potential impacts will be identified for further consideration in the EIA. Hazards will be identified and ranked, and quantified where appropriate, to inform the level of impact during construction and operation with appropriate mitigation measures identified.

23.7.9 In line with standard marine risk assessment, the NRA and EIA shipping and navigation chapter will apply the IMO's FSA approach and terminology to impact assessment. The FSA differs from the EIA methodology used to assess other topics (see **Chapter 5**) but is a requirement of the MCA for any NRA.

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[6] IMO, 2018. *Revised Guidelines for FSA for Use in the IMO Rule-Making Process.* London: IMO.

[7] MCA, 2021a. *MGN 654 (Merchant and Fishing) Safety of Navigation: Offshore Renewable Energy Installations (OREIs) – Guidance on United Kingdom (UK) Navigational Practice, Safety and Emergency Response and its annexes*. Southampton: MCA.

[8] MCA, 2021b. *MGN 661 (Merchant and Fishing) Navigation – Safe and Responsible Anchoring and Fishing Practices*. Southampton: MCA.

23.7.10 The FSA methodology is centred on risk control and assesses each impact in terms of its frequency and consequence in order that its significance can be determined as 'broadly acceptable', 'tolerable', or 'unacceptable' via a risk matrix as shown in **Table 23-3**.

Table 23-3 Risk ranking matrix

Frequency	**Frequent**	Tolerable	Tolerable	Unacceptable	Unacceptable	Unacceptable
	Reasonably Probable	Broadly Acceptable	Tolerable	Tolerable	Unacceptable	Unacceptable
	Remote	Broadly Acceptable	Broadly Acceptable	Tolerable	Tolerable	Unacceptable
	Extremely Unlikely	Broadly Acceptable	Broadly Acceptable	Broadly Acceptable	Tolerable	Tolerable
	Negligible	Broadly Acceptable	Broadly Acceptable	Broadly Acceptable	Broadly Acceptable	Tolerable
		Negligible	**Minor**	**Moderate**	**Serious**	**Catastrophic**
		Severity				

23.7.11 The criteria for defining severity of consequence are outlined in **Table 23-4.** For the level of assistance required to manage environmental damage, the tiers indicated relate to the incident response matrix provided in the National Contingency Plan[9] (MCA, 2014).

Table 23-4 Definition of terms relating to severity of consequence

Severity of Consequence	Definition
Negligible	No perceptible risk to people, property, the environment or business.
Minor	Slight injury(s) to people
	Minor damage to property, i.e. superficial damage
	Tier 1 environmental damage with local assistance required
	Minor reputational risk to business limited to users
Moderate	Multiple minor or single serious injury to people
	Damage to property not critical to operations

[9] MCA (2014). *National Contingency Plan: A Strategic Overview for Responses to Marine Pollution from Shipping and Offshore Installations.* Southampton: MCA.

Severity of Consequence	Definition
	Tier 2 environmental damage with limited external assistance required
	Local reputational risk to business.
Serious	Multiple serious injuries or single fatality to people
	Damage to property resulting in critical risk to operations
	Tier 2 environmental damage with regional assistance required
	National reputational risk to business
Major	Multiple fatalities to people
	Total loss of property
	Tier 3 environmental damage with national assistance require
	International reputational risk to business

23.7.12 The criteria for defining frequency of occurrence are outlined in **Table 23-5**.

Table 23-5 Definition of terms relating to frequency of occurrence

Frequency of Occurrence	Description
Frequent	Yearly
Reasonably Probable	One per one to 10 years
Remote	One per 10 to 100 years
Extremely Unlikely	One per 100 to 10,000 years
Negligible	Less than one occurrence per 10,000 years

23.7.13 Impact assessment will be informed by baseline data, expert opinion, consideration of embedded mitigation and consultation. Should an impact be assessed as 'unacceptable' then additional mitigation measures implemented beyond those considered embedded will be required to bring the impact to 'broadly acceptable' or 'tolerable' significance and to ensure the impact is within As Low As Reasonably Practicable (ALARP) parameters. Similarly, additional mitigation measures may need to be considered for 'tolerable' impacts to ensure they are ALARP.

23.8 Assumptions & limitations

23.8.1 This EIA Scoping Report has been collated based on a range of publicly available data and information only. It is assumed that the data collated is accurate. The data will be supplemented with additional data as part of the EIA process.

23.8.2 In the absence of data, a precautionary approach has been taken and professional judgement, based on experience of similar linear schemes, has been used where required to inform the scope of the assessment.

23.8.3 As the dataset used to assess the vessel traffic comprises AIS data only, this dataset only represents vessels that are equipped with an AIS transceiver and that are utilising it.

23.8.4 AIS equipment is required to be fitted on all vessels of 300 Gross Tonnage (GT) and upwards engaged on international voyages, cargo vessels of 500GT and upwards not engaged on international voyages, and passenger vessels irrespective of size, built on or after 01 July 2002. It also applies to vessels engaged on international voyages, constructed before 01 July 2002, according to the following timetable:

- Passenger vessels, not later than 01 July 2003;
- Tankers, not later than the first survey for safety equipment on or after 01 July 2003; and
- Vessels, other than passenger vessels and tankers, of 50,000GT and upwards, not later than 01 July 2004.

23.8.5 On this basis, AIS data is considered representative of commercial traffic.

23.8.6 All UK and European Union (EU) registered fishing vessels of length 15m and above are required to carry AIS equipment. Smaller fishing vessels (below 15m) as well as recreational craft are not required to carry AIS. It is also noted that military vessels are not obligated to broadcast on AIS at all times. Therefore, these vessels (i.e., fishing, recreational and military vessels) may be under-represented within the AIS data; however, it is noted that smaller vessels are increasingly observed to utilise AIS voluntarily, given the associated safety benefits.

23.8.7 The AIS-based assessment assumes that the information broadcast on AIS is correct and accurate, except in cases of there being clear evidence to the contrary.

Contents

24. Commercial Fisheries

24.1 Introduction

24.1.1 This chapter outlines the proposed scope and methodology to be undertaken for commercial fisheries. It will consider the potential for significant effects arising from the construction and operation of the LionLink Scheme (hereafter referred to as 'the proposed Offshore Scheme') in respect of commercial fisheries. A review of relevant guidance and policy has been undertaken together with a desk-based assessment, to inform the proposed scope and methodology.

24.1.2 This chapter is supported by the following figures:

- **Figure 1-4**: Proposed Offshore Scheme Boundary;
- **Figure 24-1:** Study Area;
- **Figure 24-2**: UK landings weight by vessel length between 2016 and 2020 (MMO);
- **Figure 24-3**: UK landings weight by gear type between 2016 and 2020 (MMO);
- **Figure 24-4**: UK landings weight by species between 2016 and 2020 (MMO); and
- **Figure 24-5**: Historic Fishing Rights within the study area.

24.1.3 There may be interrelationships related to the potential effects on commercial fisheries and other disciplines. Therefore, please also refer to the following chapters:

- **Chapter 18** – Marine Physical Environment - will identify the spatial extent of potential impacts from temporary sediment suspension and subsequent redeposition;
- **Chapter 20** - Fish and Shellfish - will identify the potential impacts on key commercial fisheries target species; and
- **Chapter 23** - Shipping and Navigation - will identify the potential navigational impacts on fishing vessels such as risk of collision and disruption.

24.1.4 With respect to establishing the current baseline consideration has been given to:

- Identifying how the study area is used by pelagic[1], demersal[2] and shellfish[3] fisheries;
- Identifying the characteristics of the fleet using the study area in terms of the Local (English), National (UK) and International vessels present;
- Identifying any fishing restrictions; and
- Provision of landings data to contextualise the value of the fishing industry in the region, for the purposes of reviewing the proposed scope of the assessment and

[1] target species that live within the water column.

[2] target species that live or feed on the seabed

[3] target crustaceans and molluscs

data collection approach that will be adopted in the Environmental Impact Assessment (EIA).

24.2 Consultation and engagement

24.2.1 Initial consultation on the proposed Offshore Scheme has commenced with several stakeholders, that covers in general terms commercial fisheries. From November 2022 to November 2023, the Marine Management Organisation (MMO) and Environment Agency were provided with introductory briefings on the proposed Offshore Scheme and asked for comment on the non-statutory and supplementary non-statutory consultation.

24.2.2 Engagement will continue with relevant stakeholders in relation to the proposed Offshore Scheme to obtain any information that they hold to supplement the assessment and to seek their views with regards to the evolving design. This will be largely undertaken by the Project Fisheries Liaison Officer (FLO) with support from the by EIA Team.

24.2.3 The following bodies will be consulted during the EIA process:

- MMO;
- Centre for Environment, Fisheries and Aquaculture Science (Cefas);
- Environment Agency;
- National Federation of Fishermen's Organisations (NFFO);
- Eastern Inshore Fisheries and Conservation Authority (EIFCA);
- Kent and Essex Inshore Fisheries and Conservation Authority (KEIFCA);
- Lowestoft Fishermen's Association;
- Southwold Fishermen's Association;
- Independent Sizewell Fishermen;
- Aldeburgh's Fishermen's Association;
- Orford & District Fishermen's Association;
- Felixstowe Ferry Fishermen's Association; and
- Harwich Haven Fishermen's Association.

24.3 Baseline conditions

Study area

24.3.1 The proposed Offshore Scheme will route from either the Southwold or Walberswick Landfall across the Southern North Sea to the boundary between the UK and Netherlands Exclusive Economic Zones (EEZ).

24.3.2 The proposed Offshore Scheme Scoping Boundary is illustrated on **Figure 24-1** and is described in **Chapter 2** The Proposed Scheme Description. It includes a proposed Submarine Cable Corridor from each Landfall converging approximately 35km off the east coast of the UK. From the point of convergence there are two Submarine Cable

Corridor options (B and C) that cross the Southern North Sea to the UK/Netherlands EEZ boundary.

24.3.3 The study area for commercial fisheries is defined by the International Council for the Exploration of the Sea (ICES) rectangles in which the proposed Offshore Scheme Scoping Boundary lies. Each Rectangle is approximately 30 nautical miles (NM) square and is 30 min latitude and 1 longitude in size[4] and is used to record and collate statistical fisheries data.

24.3.4 The study area lies within ICES Area IVc (Southern North Sea) and consists of the following seven ICES rectangles: 33F1, 33F2, 33F3, 34F2,34F3, 35F2 and 35F3. Information has been provided, where relevant, for a further four ICES rectangles, namely 34F1, 35F1, 36F2 and 36F3, to provide a regional context.

24.3.5 The study area is illustrated in **Figure 24-1**.

24.3.6 It should be noted that fishing activity is not equally distributed over each ICES rectangle as illustrated in **Figure 24-2, Figure 24-3** and **Figure 24-4.**

Baseline data sources

24.3.7 The baseline described in this chapter and associated appendices has been informed by the following data sources:

Table 24-1 Scoping baseline data sources

Baseline Data	Source
UK Fisheries Annual Statistic reports 2018 - 2022 This data is the most up to date data available from the MMO Annual statistics at the time of EIA Scoping. It should be noted that the most current data will be used for the Preliminary Environmental Information (PEI) Report and Environmental Statement[5].	MMO, 2019[6], 2020[7], 2021[8],2022[9], 2023[10]
Eurolink Interconnector Cable Project: Fishing Activity Study	Brown & May Marine Ltd (2022) [11]

[4] ICES (2022). ICES Statistical Rectangles. Available at: https://www.ices.dk/data/maps/Pages/ICES-statistical-rectangles.aspx

[5] Data is released in September of the following year i.e., 2023 data will be released in September 2024.

[6] MMO (2019) UK Sea fisheries annual statistics report 2018. Available at: UK sea fisheries annual statistics report 2018 - GOV.UK (www.gov.uk)

[7] MMO (2020) UK Sea fisheries annual statistics report 2019. Available at: UK sea fisheries annual statistics report 2019 - GOV.UK (www.gov.uk)

[8] MMO (2021) UK Sea fisheries annual statistics report 2020. Available at: UK sea fisheries annual statistics report 2020 - GOV.UK (www.gov.uk)

[9] MMO (2022) UK Sea fisheries annual statistics report 2021. Available at: https://www.gov.uk/government/statistics/uk-sea-fisheries-annual-statistics-report-2021

[10] MMO (2023) UK Sea Fisheries annual statistics report 2022. Available at: https://www.gov.uk/government/statistics/uk-sea-fisheries-annual-statistics-report-2022

[11] Brown & May Marine Ltd (2022) Eurolink Interconnector Cable Project: Fishing Activity Study

Baseline Data	Source
International Bottom Trawl Survey (IBTS) data	IBTS (2023) Data Portals[12]
Environmental Statements from Offshore Wind Farm (OWF) Developments (as referenced in the text).	

Baseline

24.3.8 The following sections present the current baseline established at scoping. There are currently two corridors being considered for the proposed Submarine Cable Corridor, which are shown in Figure 1-4. Baseline information is presented for both options below.

English Commercial Fisheries

24.3.9 Commercial fishing is widely distributed throughout the North Sea. In English waters, key shellfish target species include scallops, crabs, squid, lobsters and whelks, whilst the most landed demersal species include sole, plaice, surmullet and whiting. Pelagic fish landings from English waters are mainly of horse mackerel, mackerel and herring. In 2022, at a national scale English vessels landed a total of 145,759 tonnes of sea fish (including shellfish) which represents 21.1% of the quantity of landings by the UK Fleet. The English fleet operates from ports all around England, with the three key ports being in Newlyn, Brixham and Shoreham; Newlyn being the most important in terms of quantity; and Brixham most important in terms of value.

Fisheries within the study area

24.3.10 There are over 330 species of fish that have been recorded within the waters of the UK Continental shelf[13] further information about the species is discussed in Chapter 20 Fish and Shellfish. There are five main species types pelagic (open water), demersal (bottom dwelling), elasmobranchs (sharks and rays), diadromous (migrate between sea the freshwater to spawn) and shellfish. To be able to monitor the waters more accurately the ICES divide the sea into ICES Rectangles[14]. Analysis of the fishing data for the seven rectangles within the study area has been used to establish the current baseline for commercial fisheries.

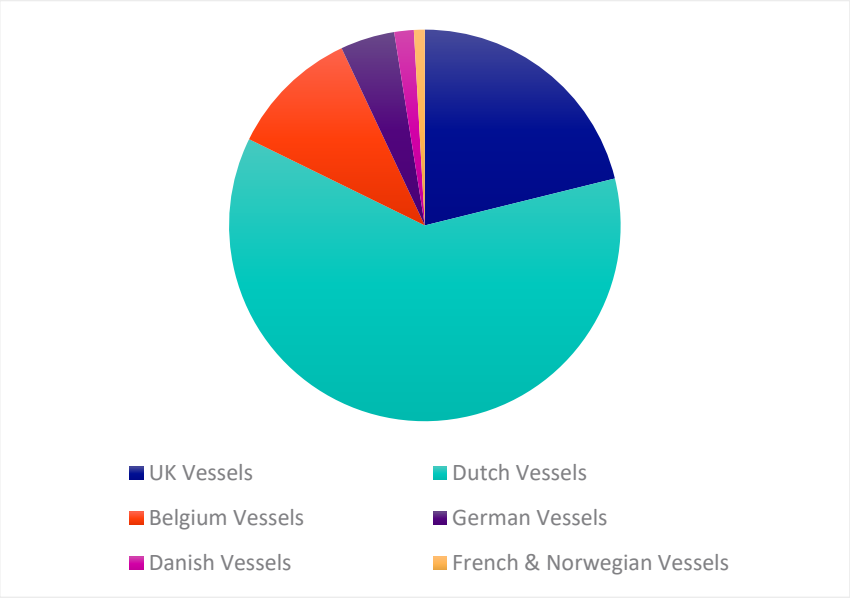
24.3.11 The waters of the Southern North Sea (SNS) are primarily commercially fished by vessels from UK and the Netherlands, but vessels from Belgium, France, Denmark and Germany have also been observed in the study area. Most of the vessels inside the 12NM limit are UK vessels, with Dutch vessels more prevalent outside the 12NM limit. This is illustrated in **Insert 24-1.**

[12] IBTS (2023) Data Portals – DATRAS. Available at: DATRAS (ices.dk)

[13] DECC (2022) Offshore Energy Strategic Environmental Assessment 4. Available at https://www.gov.uk/guidance/offshore-energy-strategic-environmental-assessment-sea-an-overview-of-the-sea-process

[14] ICES (2022) ICES Statistical Rectangles. Available at: https://www.ices.dk/data/maps/Pages/ICES-statistical-rectangles.aspx

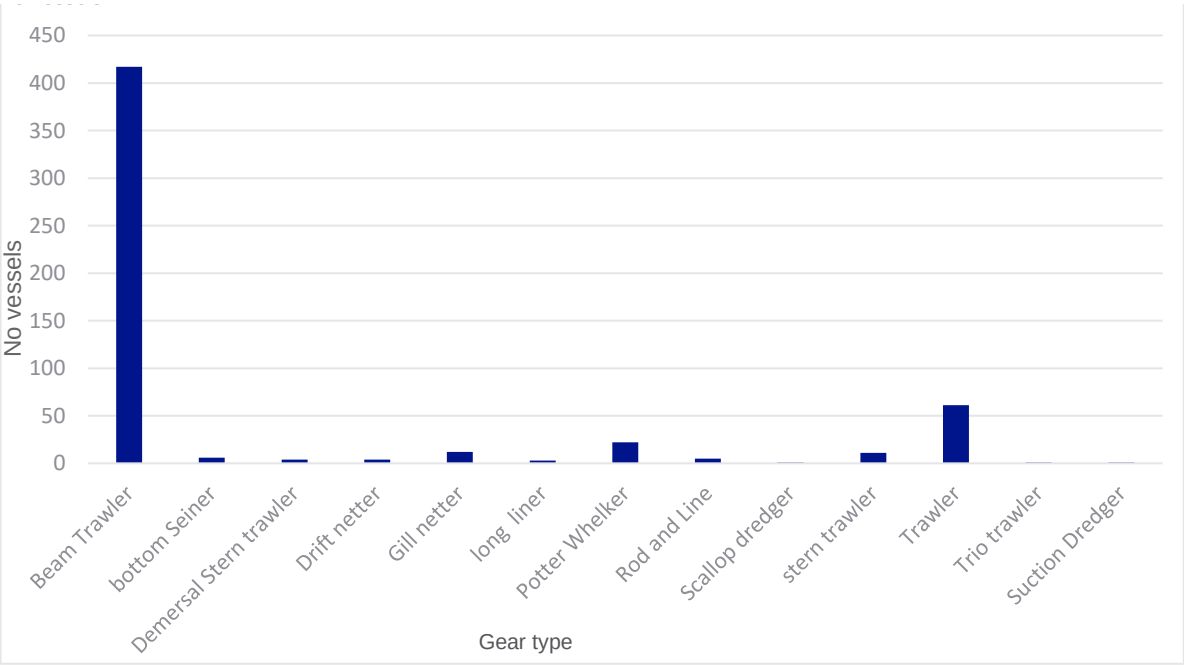
Insert 24-1 Vessel sightings within the study area by vessel nationality between 2011 - 2020



Source: Brown & May 2022[15]

24.3.12 Data from MMO Surveillance sightings[15] suggest that the majority of vessels fishing outside 12NM are trawlers, whereas vessels within the 12NM limit have a larger range of gear types including potters and netters. Vessels within the 12NM limit are smaller (typically less than 10m) than those outside the limit, with some of the Dutch trawlers being in excess of 40m in length. **Insert 24-2** shows the different types of vessel gear being used within the study area.

Insert 24-2 Vessel sightings by gear type within the study area between 2011 and 2020



Source Brown & May 2022[15]

[15] Brown & May Marine Ltd (2022) Eurolink Interconnector Cable Project: Fishing Activity Study

24.3.13 Five key fishery types have been identified along the proposed Submarine Cable Corridor B and proposed Submarine Cable Corridor C within the study area, as described in **Table 24-2** and **Table 24-3.** Kilometre points (KP) are measured from the proposed Landfall at Southwold, noting that there is little variation in terms of use between the nearshore proposed Submarine Cable Corridor from Southwold and Walberswick.

Table 24-2 Key fisheries that spatially overlap with the proposed Submarine Cable Corridor B

Fishery	Gear Type	KP points - spatial overlap between the fishery and the proposed Submarine Cable Corridor
1	Static Gears	KP1 – KP52, KP57 – KP58, KP63 - KP74, KP86—KP118, KP121 – KP 122, KP139 - KP142
2	Dredging	-
3	Pelagic trawl	KP8 – KP16, KP42 – KP63, KP69, KP91 – KP97, KP121 – KP122, KP129 – KP175
4	Bottom Otter Trawl	KP13 – KP16, KP138 – KP142, KP165 – KP175,
5	Beam Trawling	KP5 – KP175

Table 24-3 Key fisheries that spatially overlap with the proposed Submarine Cable Corridor C

Fishery	Gear Type	KP points - spatial overlap between the fishery and the proposed Submarine Cable Corridor
1	Static Gears	KP1 – KP69, KP76 - KP80, KP81 – KP 93, KP104 – KP136,
2	Dredging	-
3	Pelagic trawl	KP8 – KP16, KP41 – KP48, KP59 – KP62, KP72 – KP79, KP81 – KP87, KP88 – KP93, KP96 – KP105, KP111 – KP118, KP131 – KP136
4	Bottom Otter Trawl	KP13 – KP16, KP56 – KP60, KP63 – KP70, KP104 – KP119, KP130 – KP136,
5	Beam Trawling	KP5 – KP136

Local Fishing Fleet

24.3.14 UK vessels of less than 17m in length and with less than 300 horsepower (hp) (221kW) are permitted to fish inside the 6-mile fishery limit, with some fishing restrictions. Fishing effort within the Eastern Inshore Fisheries and Conservation Authority (EIFCA) district is, therefore, limited to inshore fishing activity by vessels of under 17m in length and under 300hp (221kW). Most of the current local based fishing fleet is made up of small under 10m class vessels with an average of around 88hp.

24.3.15 The UK fleet represents just over 20% of vessels that fish within the study area. The UK fleet use a wider range of gear types including pots, trawls, nets, rod and lines, in comparison to the foreign vessels which are primarily trawlers. Local vessels use more than one fishing method. The UK fleet concentrate their fishing efforts in the study area within the 12NM limit, with the majority of vessels under 10m in length.

24.3.16 The vessels who primarily work within the study area are based out of the ports of Lowestoft, Southwold, Aldeburgh, Orford, Felixstowe Ferry and Harwich. It should be noted that due to their size (<10m) they are not captured within current Vessel Monitoring System (VMS) data. **Table 24-4** lists the number of vessels currently registered to these ports and their size.

Table 24-4 Vessels registered at ports local to the study area in January 2023

Home Port	Number of registered vessels <10m[16]	Number of registered vessels >10m[17]
Aldeburgh	6	0
Felixstowe	20	0
Harwich	20	0
Lowestoft	22	4
Orford	4	0
Southwold	13	0
Total	**85**	**4**

Source: MMO (2023) [16,17]

Shellfish

24.3.17 Shellfish such as whelk, crab and lobster are targeted throughout the Southern North Sea, using static gear such as pots. The design of pot will vary depending on region and species being targeted. Generally, the pots have one or more “funnel” shaped openings for the shellfish to enter through. Crab and whelk are targeted on sandy seabed, whilst pots are deployed on hard, rocky ground for lobster.

24.3.18 Whelk are generally caught using a purpose designed pot, which is normally a modified pot which is weighted with plastic drums. The number of whelk pots on a string can be higher than those used for crab or lobster, with up to 80 pots per string.

24.3.19 The static whelk landings peak between January and March and an increase in the amount of static gear vessels suggest non-local/nomadic fishermen coming to the study area during this period. Static gear shellfish landings for lobster and crab are the highest between May and July.

[16] MMO (2023) Vessel list of 10 metres and under January 2023. Available at: https://www.gov.uk/government/statistical-data-sets/vessel-lists-10-metres-and-under

[17] MMO (2023) Vessel list of over 10 metres January 2023. Available at: https://www.gov.uk/government/statistical-data-sets/vessel-lists-over-10-metres

24.3.20 The shellfish catch accounted for 28% of the UK catch within the study area during the five-year period of 2018 to 2022, with a value of £1,611,913 ([18,19,20,21, 22]). **Figure 24-3** shows the distribution of fishing by gear type within the study area.

Demersal Fish

24.3.21 A variety of demersal (bottom contact) trawl gear methods are used to target demersal whitefish species such as Dover sole *Solea solea*, plaice *Pleuronectes platessa*, thornback ray *Raja clavata*, lemon sole *Microstomus kitt*, and brill *Scophthalmus rhombus.* The study area crosses fishing grounds where inshore demersal fishing is regularly carried out by the local Suffolk fishing fleet and offshore demersal trawling activity is carried out by Belgian, Dutch, French and UK registered vessels.

24.3.22 Beam trawling is used in the Southern North Sea by Belgian, Dutch and UK-registered vessels. These vessels are targeting species such as Dover sole, plaice and turbot *Scophthalmus maximus*.

24.3.23 A traditional beam trawler comprises of a steel beam held above the seabed by shoes at each end which is attached to a net. The beam is towed using chain bridles which is attached to the shoes. The gear is towed from outrigger booms either side of the vessel. Tickler chains disturb the fish on the seabed which makes them rise up to be caught in the net.

24.3.24 When vessels operate in areas of hard, rocky substrate, chain mats (made of a lattice of chains) are attached to the beam across the mouth of the net.

24.3.25 Beam trawl vessels can range in size and can be between 4m and 12m in length. The direction of towing of these vessels is dependent on several factors including weather, tidal flow direction, seabed contour and the need to avoid snagging and entanglement.

24.3.26 Demersal otter trawl is another gear type used within the study area. It consists of a funnel shaped net which is towed over the seabed. The horizontal opening of the net is produced by a mix of the hydrodynamic and ground sheer forces acting on the trawl doors. The vertical opening of the net is sustained by a series of floats situated along the net headline. The base of the net is kept on the seabed by a weighted ground line. If fishing over rough ground, it can be fitted with rubber disks known as “rock hoppers”.

24.3.27 The effective gear width of demersal otter trawls can range between 25m for smaller vessels and up to 65m for larger vessels. The towing speeds are dependant and the weather, tidal state and seabed conditions but can be between 2.5 and 3.5 knots.

24.3.28 Seine netting is a more recent alternative to the traditional heavy beam trawling. This fishing method is used regularly by large Dutch, French and UK-registered vessels in the east of the study area. The seine nets need to be deployed over clean and

[18] MMO (2019) UK Sea fisheries annual statistics report 2018. Available at: UK sea fisheries annual statistics report 2018 - GOV.UK (www.gov.uk)

[19] MMO (2020) UK Sea fisheries annual statistics report 2019. Available at: UK sea fisheries annual statistics report 2019 - GOV.UK (www.gov.uk)

[20] MMO (2021) UK Sea fisheries annual statistics report 2020. Available at: UK sea fisheries annual statistics report 2020 - GOV.UK (www.gov.uk)

[21] MMO (2022) UK Sea fisheries annual statistics report 2021. Available at: https://www.gov.uk/government/statistics/uk-sea-fisheries-annual-statistics-report-2021

[22] MMO (2023) UK Sea Fisheries annual statistics report 2022. Available at: https://www.gov.uk/government/statistics/uk-sea-fisheries-annual-statistics-report-2022

obstruction-free seabed for the capture of a range of demersal species. Single or multiple seine nets can be operated with the seine ropes being laid on the seabed in a triangular pattern with the net located within the middle of the base of the triangle.

24.3.29 The first hauling phase comprises the winching in of the seine ropes so they are pulled together, this exploits the behaviour of the fish to swim ahead of the ropes which are moving over the seabed. When the ropes are approximately parallel, the hauling speed is sped up and the net is hauled over the seabed capturing the fish that have been directed into its path.

24.3.30 Demersal drift nets are also used by the inshore fleet. These are a type of gillnet which can be suspended in the water. They can be fixed or drifting and can be used for demersal or pelagic species depending on where the nets are placed in the water column. Similarly, to pots lines they are marked with a surface buoy. **Figure 24-3** shows the distribution of fishing by gear type within the study area.

24.3.31 The demersal catch accounted for 66.7% of the UK catch within the study area during the period of 2018 to 2022, with a value of £3,839,573 ([23,24,25,26, 27]).

Pelagic Fish

24.3.32 In the past, locally based trawl fishermen have fished with pelagic (mid-water) trawl gear, but the use of this method has strongly declined in recent years. Larger UK and other European Union member state offshore pelagic trawlers use the waters in the eastern edge of the study area (ICES rectangles 34F3 and 35F3), targeting mackerel *Scomber scombrus*.

24.3.33 The gear type used to catch pelagic species is similar to those used for demersal species, with the nets placed higher in the water column. Gear types used by the UK fishing fleet include demersal seine, drift and fixed nets, longlines and pelagic trawls. **Figure 24-3** shows the distribution of fishing by gear type within the study area.

24.3.34 The pelagic catch accounted for only 5.2% of the UK catch within the study area during the period of 2018 to 2022, with a value of £303,822 ([23,24,25,26,27]), showing its relative lower importance in comparison to shellfish and demersal fisheries.

Landings Data

24.3.35 It should be noted that the data used for landings data within this section is the most up to date data available from the MMO; the UK sea fisheries annual statistics report 2022.

24.3.36 A high-level review of landings data from 2018 to 2022 ([23,24,25,26,27]) from the study area (as defined by the seven ICES rectangles which the proposed Offshore Scheme Scoping Boundary intersects) has been undertaken to provide information on the

[23] MMO (2019) UK Sea fisheries annual statistics report 2018. Available at: UK sea fisheries annual statistics report 2018 - GOV.UK (www.gov.uk)

[24] MMO (2020) UK Sea fisheries annual statistics report 2019. Available at: UK sea fisheries annual statistics report 2019 - GOV.UK (www.gov.uk)

[25] MMO (2021) UK Sea fisheries annual statistics report 2020. Available at: UK sea fisheries annual statistics report 2020 - GOV.UK (www.gov.uk)

[26] MMO (2022) UK Sea fisheries annual statistics report 2021. Available at: https://www.gov.uk/government/statistics/uk-sea-fisheries-annual-statistics-report-2021

[27] MMO (2023) UK Sea Fisheries annual statistics report 2022. Available at: https://www.gov.uk/government/statistics/uk-sea-fisheries-annual-statistics-report-2022

economic importance of different commercial fish species. There is a high degree of variation of catch type and quantity within the different rectangles.

24.3.37 Over the 5-year period analysed (2018 to 2022) 2,695 tonnes of fish were landed with a value of over £5,948 million (**Table 24-5**). Of this value, £2,047million was landed by <10 m vessels with the remaining £3,9 million landed by the >10m fleet. 66.7% of the total value of landings from the study area were represented by the demersal catch, with 28% shellfish and 5.2% pelagic species.

Table 24-5 Annual UK catch value from 2018 to 2022 for study area

ICES Rectangle	Under 10m Weight	Under 10m value	Over 10m Weight	Over 10m value	Combined total Weight in Tonnes (t)	Combined total Value in £
33F1	770	£2,043,312	99	£145,596	869	£2,192,909
33F2	0.091	£4,314	712	£1,228,511	712	£1,232,825
33F3	0	-	66	£185,728	66	£185,728
34F2	0	-	468	£1,245,242	464	£1,245,242
34F3	0	-	294	£353,383	294	£353,383
35F2	0	-	115	£236,230	115	£236,230
35F3	0	-	170	£501,926	170	£501,926
Total	**770t**	**£2,047,627**	**1925t**	**£3,900,617**	**2695t**	**£5,948,245**

Source: MMO (2023) [28]

24.3.38 **Figure 24-2** illustrates the UK landings weight by vessel size. The figure shows that the majority of catch in rectangles 33F1, 34F1 and 35F1 is by vessels under 10m, these rectangles are closest to the UK coast. The larger vessels fish in the rectangles further offshore 33F2, 33F3, 34F2, 34F3, 35F2 and 35F3.

24.3.39 **Figure 24-3** illustrates the UK landings weight by gear type. This figure shows that the rectangles closest to the UK coast are primarily fished using pots to catch shellfish, whereas the vessels further offshore are more likely to be trawlers catching pelagic or demersal species.

24.3.40 **Figure 24-4** illustrates the species type caught within the ICES Rectangles by landed weight. The pie charts also indicate the size in tonnes of the catch. It can be clearly seen in the Figure that the highest weights of catch are within the rectangles closest to the UK coastline where most vessels are under 10m, however there are a few vessels over 10m who fish these waters for shellfish. These vessels though UK registered are not registered to the local ports but are harboured at Brixham or in the Netherlands.

24.3.41 **Table 24-6** shows the top five species caught by UK registered vessels in the study area.

[28] MMO (2023) UK Sea Fisheries annual statistics report 2022. Available at: https://www.gov.uk/government/statistics/uk-sea-fisheries-annual-statistics-report-2022

Table 24-6 Top five species caught within the study area in 2022

Position	33F1	33F2	33F3	34F2	34F3	35F2	35F3
1	Whelks	Whelks	Sole	Sole	Mackerel	Sole	Sole
2	Sole	Surmullet	Plaice	Plaice	Surmullet	Crabs	Plaice
3	Bass	Squid	Surmullet	Turbot	Sole	Scallops	Turbot
4	Lobsters	Sole	Squid	Surmullet	Tub Gurnard	Plaice	Brill
5	Herring	Whiting	Tub gurnard	Horse Mackerel	Plaice	Lobsters	Tub Gurnard

Source MMO (2023)[29]

24.3.42 The value of the UK catch from rectangles 33F2, 33F3, 34F2, 34F3, 35F2 and 35F2 is relatively low, this is because the majority catch goes to European ports in the Netherland, Belgium, France and Germany as the waters are fished by considerably more non-UK vessels.

24.3.43 Not all the European catch data was available for analysis for the EIA Scoping Report. For the PEI Report this information will be requested. **Table 24-7** shows the value of catch by £ and € within the study area for the UK and the Netherlands during the period of 2017 to 2021. It clearly shows the value of the Dutch landings are much higher than the UK landings with the exception of ICES rectangle 33F1 which is close to the coast and used by smaller UK vessels fishing targeting whelk.

[29] MMO (2023) UK Sea Fisheries annual statistics report 2022. Available at: https://www.gov.uk/government/statistics/uk-sea-fisheries-annual-statistics-report-2022

Table 24-7 Comparison of catch value between the UK and Dutch vessels

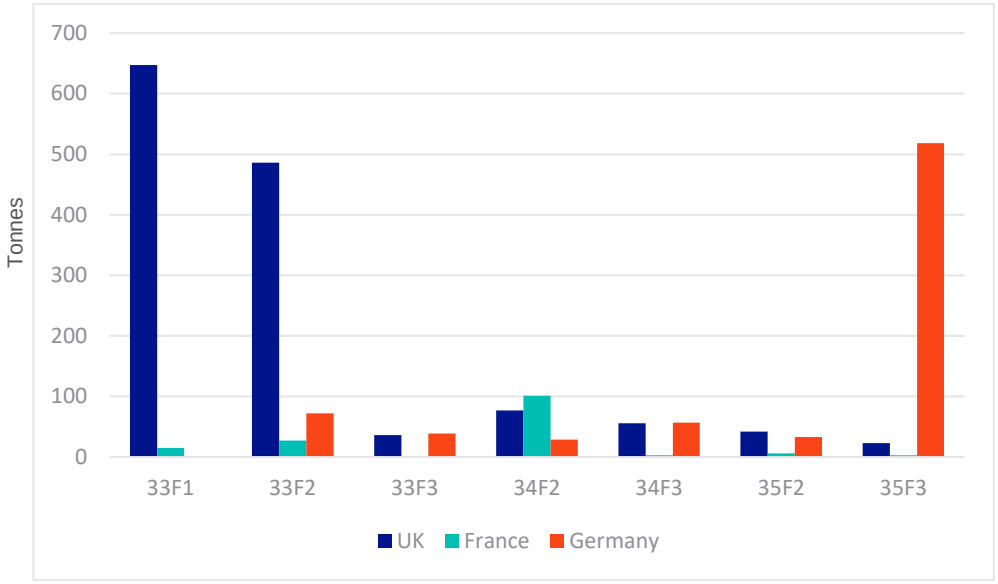
Country	33F1	33F2	33F3	34F2	34F3	35F2	35F3
UK	£2,009,984	£1,103,553	£123,173	£767, 587	£274,351	£226,256	£82,215
Netherlands	€54,894	€7,139,948	€8,586,150	€10,771,578	€ 8,974,772	€ 8,118,574	€8,214,826

Source: Brown & May Marine Ltd (2022) [30]

[30] Brown & May Marine Ltd (2022) Eurolink Interconnector Cable Project: Fishing Activity Study

24.3.44 **Insert 24-3** shows the value of catch in weight within the study area for the UK, France and Germany during the period of 2017 to 2021. It should be noted that data was not available for the Netherlands or Belgium. This data will be requested for the PEI Report.

Insert 24-3 Catch value by weight and nationality within the study area

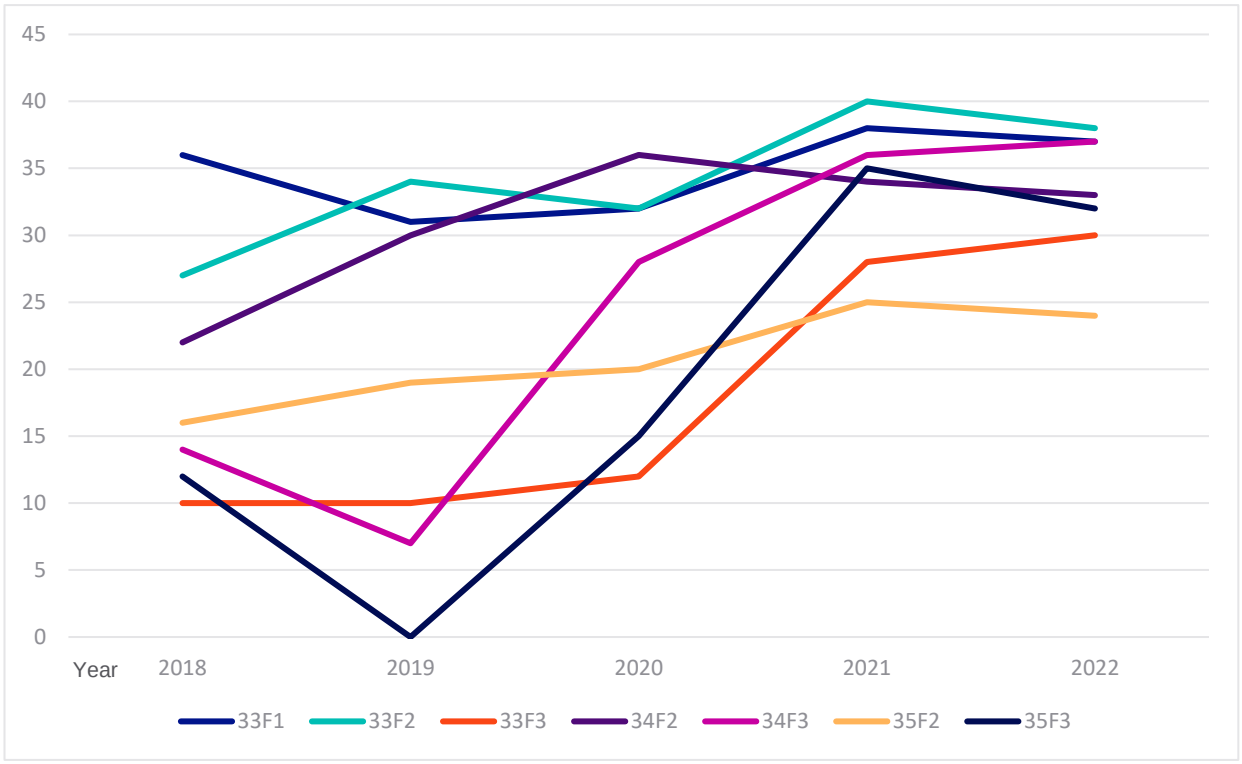


Source: Brown & May Marine Ltd (2022) [31]

24.3.45 Species and quantities of fish caught varies considerably not only by location but also annually. This variety is illustrated in **Insert 24-4** which shows the number of different species caught within each ICES rectangle during a five-year period from 2018 to 2022. There appears to have been an increase of species variety within all ICES rectangles up to 2021 where there is a slight decrease in species numbers in five of the rectangles with the exception of rectangles 33F3 and 34F3 whose species numbers increased.

[31] Brown & May Marine Ltd (2022) Eurolink Interconnector Cable Project: Fishing Activity Study

Insert 24-4 Number of different species caught over a 5-year period (2018 and 2022)



Source MMO 2023[32]

Restricted Fishing Areas

24.3.46 There are no nationally or internationally designated marine protected areas within the study area which restrict commercial fishing activity.

24.3.47 Within the study area, there are three EIFCA Byelaw areas, within the 6NM limit, which restrict the use of certain fisheries methods.

- BYELAW 3: Molluscan shellfish methods of fishing[33] - prohibits fishing for molluscs (i.e., oysters, mussels, cockles, clams, scallops or queens) using a fishing gear (e.g., a mussel dredge) unless authorised by the EIFCA.
- BYELAW 15: Towed gear restriction for bivalve mollusc[34] - prohibits fishing vessels greater than 14m from fishing for molluscs using any towed gear type within the entirety of the EIFCA district. It also prohibits all vessels from using towed gear between Mundesley Church and Blackeney Church on the North Norfolk coastline out to 3NM miles; an area which lies outside of the study area.
- BYELAW 12: Inshore Trawling Restriction[35] - prohibits fishing vessel greater than 15.24m from fishing using towed nets (e.g., shrimp beams, otter trawls) within 3NM

[32] MMO (2023) UK Sea Fisheries annual statistics report 2022. Available at: https://www.gov.uk/government/statistics/uk-sea-fisheries-annual-statistics-report-2022

[33] EIFCA (2023) Byelaw 3: Molluscan shellfish methods of fishing. Available at: http://www.eastern-ifca.gov.uk/byelaw-3-molluscan-shellfish-methods/

[34] EIFCA (2023a) Byelaw 15: Towed gear restriction for bivalve mollusc http://www.eastern-ifca.gov.uk/byelaw-15-towed-gear-restriction/

[35] EIFCA (2023) BYELAW 12:- INSHORE TRAWLING RESTRICTION. Available at: http://www.eastern-ifca.gov.uk/byelaw-12-inshore-trawling-restriction/

of the coastline throughout the EIFCA district. It also mirrors the prohibition in Byelaw 15 prohibiting all vessels from using towed nets between Mundesley Church and Blackeney Church on the North Norfolk coastline out to 3NM miles; an area which lies outside of the study area.

Historic Fishing Rights

24.3.48 As part of the UK-EU Trade and Cooperation Agreement (TCA) French and Belgium fishing vessels are allowed to fish between the 6NM and 12NM mile limit. This is a historic agreement which the UK fishing industry has tried to overturn; but it will remain in place until at least 2025[36]. **Figure 24-5** illustrates this area in relation to the study area.

Future baseline

24.3.49 The commercial fisheries chapter within the PEI Report and Environmental Statement (ES) will include an outline of the likely evolution of the baseline environment in the absence of the proposed Offshore Scheme. The future baseline will also take into account any developments that are likely to be present in the future baseline.

24.3.50 The pattern of use by commercial fisheries fluctuates and changes based on natural, market and management-controlled factors. Commercial fishing fleets respond to market demand and changes in market prices by focusing effort on higher value target species. This was seen during the COVID pandemic and the UK increase in whelk landings due to rising demand in markets such as Korea, Taiwan and Singapore. Stock abundance fluctuates due to recruitment success which is influenced by the status of the stock as well as natural pressures (storms, sea temperatures etc) and fishing pressures.

24.3.51 Changes in fisheries legislation and regulations (i.e., quota and effort allocation, closed areas, gear restrictions, gear improvements or adaptation to requests from seafood buyers for more sustainable practices) may also influence the distribution of fisheries.

24.3.52 It is anticipated over time that global climate change will result in changes to the marine environment, which would include impacts on fish and shellfish populations of commercial importance[37,38]. This may in turn result in changes to commercial fisheries practices in order to respond to any potential changes in species distribution abundance and/or seasonal trends.

24.3.53 The variations and trends in commercial fisheries activities are an important aspect of the baseline assessment, which is why five years of baseline data is used in the assessment. However, following the withdrawal from the EU, the UK and EU have agreed the TCA, which establishes a transitional period until 30 June 2026. During the transitional period there will be changes in the UK quota has 25% of the EU's fisheries quota in UK waters will be transferred to the UK. Based on these changes it could be

[36] Gov.UK (2022) GRANDFATHER RIGHTS AND HISTORIC FISHING PRIVILEGES. Available at: https://publications.parliament.uk/pa/jt200708/jtselect/jtmarine/159/159we107.htm

[37] Cheung W et al (2012) Review of climate change impacts on marine fisheries in the UK and Ireland. Aquatic Conservation: Marine and Freshwater Ecosystems. 22: 368 – 388 (available at: https://onlinelibrary.wiley.com/doi/epdf/10.1002/aqc.2248)

[38] Tripathi A et al (2016) Paradigms of climate change impacts on some major food sources of the world: A review on current knowledge and future prospects. Agriculture, Ecosystems & Environment. 216: 356-373 (available at: https://doi.org/10.1016/j.agee.2015.09.034)

expected that up to 2026, a similar level of fishing activity will be experienced but be undertaken in a slightly greater proportion by UK vessels.

24.4 Potential impacts

24.4.1 This section identifies, at a high level, a summary of the sources and potential impacts as a result of the proposed Offshore Scheme during the construction and operational phases.

24.4.2 There is no potential for transboundary impacts on commercial fisheries given that the baseline assessment includes all international vessels likely to be impacted. The potential for cumulative impacts will be addressed in the PEI Report and ES in **Chapter 29** Cumulative and Intra-project Effects of the Project.

24.4.3 Potential impacts on commercial fish species will be addressed by the fish and shellfish assessment (please refer to **Chapter 20** Fish and Shellfish). Potential impacts on navigation abilities of fishing vessels e.g., reduction in under keel clearance, interference with marine navigational equipment, potential for snagging of fishing gear on exposed cables will be addressed in the navigation risk assessment and considered in **Chapter 23** Shipping and Navigation.

Construction

24.4.4 The following impacts could occur during the construction phase:

- Temporary restricted access to fishing ground (including required static gear clearance) - The implementation of advisory clearance distances around installation vessels and safety zones during construction works may result in temporary loss or restricted access to fishing grounds. Whilst this is a temporary impact it could cause additional costs to fishers associated with additional transit times to avoid construction works, or the requirements to temporarily move static gear during construction activities.
- Temporary displacement of fishing activity into other areas - Fishing activity may be displaced to other areas due to restricted access to fishing grounds because of construction safety zones. Whilst this is a temporary impact it could increase pressure on other grounds or cause additional costs to fishers associated with additional transit times.
- Changes in distribution of target species - Distributions of fish and shellfish populations have the potential to be affected by construction activities such as pre-sweeping, cable burial and deposition of external cable protection. If the fish and shellfish EIA (**Chapter 20**) concludes that the impacts on fish and shellfish are significant there is the potential that this could directly affect commercial fisheries. This impact pathway will include consideration of other impacts such as changes in underwater noise, seabed disturbance during sensitive periods for species with demersal life cycles and permanent changes in seabed habitat.
- Temporary increase and deposition of suspended sediments – During construction activities such as pre-sweeping of sandwaves and cable burial will lead to increases in suspended sediment and deposition. This could potentially lead to impacts on sensitive commercially targeted shellfish e.g., cockles, mussels and oyster, if in close proximity to the construction.

Operation

24.4.5 The following impacts could occur during the operational phase:

- Temporary restricted access to fishing ground (including required static gear clearance) – During routine maintenance activities or in case of a cable repair, advisory clearance distances and safety zones may be required which similar to construction will restrict access to localised areas. This will be a temporary impact, and over a shorter duration than during construction.
- Temporary displacement of fishing activity into other areas - During routine maintenance activities or in case of a cable repair, advisory clearance distances and safety zones may be required, which similar to during construction will cause displacement. This will be a temporary impact, and over a shorter duration than during construction.
- Temporary increase and deposition of suspended sediments – If a cable repair is required there is the potential that controlled flow excavation to expose the cable will be used. In addition, any new section of installed cable will need to be buried. A temporary increase in suspended sediment and deposition could potentially lead to impacts on sensitive commercially targeted shellfish e.g., cockles, mussels and oyster.

24.5 Design and control measures

24.5.1 As outlined in **Chapter 5** EIA Approach and Method, a standard hierarchical approach will be taken to mitigation.

24.5.2 The assessment of effects will take into account measures that are embedded into the proposed Offshore Scheme design, together with general good practice measures.

Design measures

24.5.3 Design measures to be implemented as part of the Offshore Scheme will include:

- Where practicable cable burial shall be the preferred means of cable protection;
- If feasible, all cables will be installed in one trench. If not feasible, where practicable the two high voltage direct current (HVDC) submarine cables will be bundled together and installed with a fibre optic cable in one trench with the metallic return cable and a separate fibre optic cable in a second trench;
- Cable route will be designed to minimise the risk of exposure by seabed mobility; and
- Design and construction will be carried out in accordance with International Cable Protection Committee (ICPC) Recommendations.

Control measures

24.5.4 Control measures to be implemented as part of the Offshore Scheme will include:

- Liaison with fishermen throughout all stages of project including:
  - A Project Fisheries Liaison Officer (FLO) will be appointed to maintain effective communications between the project team, local and regional fisheries

associations, and independent fishermen. The FLO will keep stakeholders informed with respect to development planning and any offshore activities;

- Appropriate liaison, through the FLO, with the EIA Team throughout the EIA process, to develop proportionate and mutually agreeable mitigation for significant effects identified; and
- Notifications of activities e.g., Notice to Mariners (NtM) and other navigational warnings, will be distributed in a timely manner warning of any associated safety distances.

- All vessels associated with the Project will comply with national lighting and marking requirements, international collision regulations (COLREGS) and safety of life at sea regulations (SOLAS).

24.5.5 The Applicant is a member of the European Subsea Cables Association (ESCA). Whilst it is acknowledged that fishing over cables is not prohibited, the Applicant follows ESCAs position which states "*Subsea cables, buried or otherwise, can present a potential hazard or entanglement risk to fishermen. Subsea cables are Critical National and International Infrastructure and fishing in close proximity to cables presents a hazard to those cables which may cause damage, resulting in loss of communications and/or power. ESCA strongly advises against any type of fishing, where there is a known and charted cable*"[39]. Vessels using trawling gear are recommended to lift their gear to cross cables or pipelines.

24.6 Scope of the assessment

24.6.1 This section identifies the potential for the proposed Offshore Scheme to have likely significant effects, taking into account the design and control measures identified in **Section 24.5**.

24.6.2 **Table 24-8** sets out the receptors within the study area that have been identified, whether there is a pathway for the impacts identified, the potential for significant effects and if the receptor is scoped in for the assessment.

24.6.3 All identified impacts are of relevance to both the Southwold and Walberswick Landfall options and both Submarine Cable Corridor options unless specified otherwise.

24.6.4 A precautionary approach has been taken and where there is no strong evidence base, insufficient baseline or the significance is uncertain at this stage the impact has been scoped in to the EIA. Where there is a clear evidence base that the effect from the impact will not be significant, either alone or in combination with other plans and projects, the impact has been scoped out of the EIA.

[39] ESCA (2022) Position Statement of vessels operating in the Vicinity of Subsea Cables. Available at: https://www.escaeu.org/members-area/documents/

Table 24-8 Proposed scope of the assessment

Project phase	Receptor	Impact	Potential for significant effect	Proposed to be scoped in/ out
Construction and Operation	All fisheries	Temporary restricted access to fishing ground (including required static gear clearance).	These two potential impacts are linked as they result in similar commercial effects on fishers. They will occur as a result of the presence of vessels associated with the construction works, any maintenance during operation and any repairs. Even with mitigation in place e.g., notifications of activities and liaison with fishers, there is still the potential that temporary restrictions to fishing grounds, resulting in displacement of vessels to alternative grounds, will result in significant commercial effects on fishers either directly or indirectly. Direct effects will result to those fishers who are restricted in accessing the proposed Submarine Cable Corridor e.g., potential reduction in income due to decreased catches, increased transit times to access alternative grounds. Indirectly fishers who use the alternative grounds may also experience a potential reduction in income as more vessels try to use the same grounds. Until a detailed baseline has been established, through data analysis and consultation, and the nature and extent of displacement and implications for gear conflict have been assessed these impacts cannot be scoped out and will therefore be assessed in the EIA.	Scoped In
Construction and Operation	All fisheries	Temporary displacement of fishing activity into other areas.		Scoped In
Construction	All fisheries	Changes in distribution of target species	Distributions of fish and shellfish populations have the potential to be affected by the activities occurring across the different phases of the Project. If the fish and shellfish EIA chapter concludes the impacts on fish and shellfish are significant there is the potential that this could directly affect commercial fisheries. Until the fish and shellfish EIA is completed, this impact cannot be scoped out of the assessment. This assessment will have consideration of other impacts such as changes in underwater noise, seabed disturbance during	Scoped In

Project phase	Receptor	Impact	Potential for significant effect	Proposed to be scoped in/ out
			sensitive periods for species with demersal life cycles, and permanent changes in seabed habitat, all which may lead to a change in distribution of target species.	
Construction and Operation	Shellfish fisheries	Temporary increase and deposition of suspended sediments	Seabed levelling i.e., during cable routeing, and certain installation activities such as cable trenching, have the potential to lead to localised and temporary increases in suspended sediments. To a lesser extent, i.e., more localised, these activities may also occur during operation if a cable repair is required. The level and area of impact depend on a number of factors including localised hydrodynamics, source activity and seabed substrate. It has been estimated that the extent of potential effects arising from an increase is suspended sediment will be a maximum of 15km due to tidal excursion. Increases in suspended sediment will be temporary but could lead to smothering of sensitive receptors e.g., commercial shellfish beds. Consultation with local fishing associations to understand positions of sensitive shellfish grounds will be undertaken to inform the assessment of this impact.	Scoped In

24.7 Assessment methodology

Data sources

Desk study data

24.7.1 Extensive contemporary and historic information is available regarding commercial fisheries in the North Sea. An initial desk-top review of publicly available data sources (literature and Geographical Information System (GIS) mapping files) was undertaken by Brown & May Marine Ltd[40] to understand the spatial and temporal distribution of fishing activity within the study area. This was based on the data sources presented in **Table 24-9** and has been used to establish the baseline environment presented in this EIA Scoping Report.

24.7.2 **Table 24-9** also identifies additional data sources that will be used to inform the description of the baseline environment and assessment in the PEI Report and ES.

[40] Brown & May Marine Ltd (2022) Eurolink Interconnector Cable Project: Fishing Activity Study

Table 24-9 Key publicly available data sources for commercial fisheries

Data source	Description	Coverage Relative to Study Area
Inshore Fisheries and Conservation Authority (IFCA)	Local fishing and shellfish information	UK
UK Fish Landings by ICES rectangle[41]	Landings data by ICES rectangle for UK vessels landing into UK ports. Brown & May Marine Ltd[42] uses data from 2016 – 2020 (as this was the information available at the time of report preparation). The most up-to-date data available at the time of PEI Report and ES preparation will be used.	UK
UK Fishing Activity for vessels 15m length and over	Vessel Monitoring System (VMS) data combined with logbook data. This data set provides summaries of fishing activity for UK commercial fishing vessels of 15m and over in length that are deemed to have been fishing within a specified calendar year. The data are categorised into aggregated gear groups that have relevance to their potential impact on the seabed, environment, or biota. The data is provided using a grid based on 0.05-degree sub-rectangles. Brown & May Marine Ltd[42] uses data from 2016 – 2020 (as this was the information available at the time of report preparation). The most up-to-date data available at the time of PEI Report and ES preparation will be used.	UK
Surveillance sightings	Surveillance sightings in UK EEZ waters are recorded by fishery protection aircraft and surface craft as a means of policing fisheries legislation. This provides an indication of the relative distribution of fishing activity by method and nationality. Due to the fact that flights by surveillance aircraft are only during daylight, surveillance data does not allow quantitative assessment of fishing activity. Brown & May Marine Ltd[42] uses data from 2011 – 2020 (as this was the information available at the time of report preparation). The most up-to-date data available at the time of PEI Report and ES preparation will be used.	UK

[41] MMO (2020) UK sea fisheries annual statistics report 2020. Available at: https://www.gov.uk/government/statistics/uk-sea-fisheries-annual-statistics-report-2020
[42] Brown & May Marine Ltd (2022) Eurolink Interconnector Cable Project: Fishing Activity Study

Data source	Description	Coverage Relative to Study Area
Belgian Fishing Activity 2010-2014[43]	Belgian VMS data combined with logbook data presented at 1/16th of an ICES rectangle scale. Includes information for Belgian registered vessels of 15m in length. More recent data is not publicly available, but will be sought.	Europe
Dutch Fish Landings by ICES rectangle[44]	Landings data by ICES rectangle for Dutch vessels. Brown & May Marine Ltd[45] uses data from 2016 – 2020 (as this was the information available at the time of report preparation). The most up-to-date data available at the time of PEI Report and ES preparation will be used.	Europe
Dutch Fishing Activity data	Dutch VMS data combined with logbook data presented at 1/16th of an ICES rectangle scale. Includes information for Dutch registered vessels 15m length. Brown & May Marine Ltd[45] uses data from 2016 – 2020 (as this was the information available at the time of report preparation). The most up-to-date data available at the time of PEI Report and ES preparation will be used.	Europe
German Fish Landings by ICES rectangle[46]	Landings data by ICES rectangle for German vessels. Brown & May Marine Ltd[45] uses data from 2012 – 2016(as this was the information available at the time of report preparation). More recent data is not publicly available but will be sought.	Europe
French Fish Landings by ICES rectangle	Landings data by ICES rectangle for French vessels. Brown & May Marine Ltd Brown & May Marine Ltd[45] uses data from 2012 – 2016(as this was the information available at the time of report preparation). More recent data is not publicly available but will be sought.	Europe
UK Fish Landings by ICES rectangle	Landings data by ICES rectangle for UK vessels landing into UK ports. Brown & May Marine Ltd[45] uses data from 2016 – 2020(as this was the information available at the time of report preparation). The most up-to-date data available at the time of PEI Report and ES preparation will be used.	UK

[43] ILVO (2015) Available at: https://pureportal.ilvo.be/en/
[44] WUR (2022) Ecological monitoring and data. Available at: https://www.wur.nl/en/research-results/research-institutes/marine-research/themes/ecological-monitoring-and-data.htm
[45] Brown & May Marine Ltd (2022) Eurolink Interconnector Cable Project: Fishing Activity Study
[46] STECF (2022) Fisheries and Aquaculture. Available at: https://stecf.jrc.ec.europa.eu/dd/fdi/explore-data

Data source	Description	Coverage Relative to Study Area
International Bottom Trawl Survey (IBTS)[47]	North Sea International Bottom Trawl Survey Data has been collected since 1965 every year or twice a year ICES Data Portal (DATRAS, the Database of Trawl Surveys: http://datras.ices.dk)	Europe
Environmental Statements from Offshore Wind Farm (OWF) Developments.	Scroby Sands OWF https://www.marinedataexchange.co.uk/details/1910/packages Greater Gabbard OWF https://tethys.pnnl.gov/sites/default/files/publications/greatergabbard2005.pdf East Anglia One OWF https://tethys.pnnl.gov/publications/east-anglia-one-offshore-windfarm-environmental-statement Galloper OWF https://www.marinedataexchange.co.uk/details/377/summary	UK
Environmental Statement/ scoping reports from proposed OWF Developments	East Anglia One North https://infrastructure.planninginspectorate.gov.uk/projects/eastern/east-anglia-one-north-offshore-windfarm/?ipcsection=docs East Anglia Two, https://infrastructure.planninginspectorate.gov.uk/projects/eastern/east-anglia-two-offshore-windfarm/?ipcsection=docs East Anglia Three https://infrastructure.planninginspectorate.gov.uk/projects/eastern/east-anglia-three-offshore-wind-farm/?ipcsection=docs North Falls https://tethys.pnnl.gov/publications/north-falls-offshore-wind-farm-environmental-impact-assessment-scoping-report Five Estuaries	UK

[47] IBTS (2023) Data Portals – DATRAS. Available at: DATRAS (ices.dk)

Data source	Description	Coverage Relative to Study Area
	https://infrastructure.planninginspectorate.gov.uk/wp-content/ipc/uploads/projects/EN010115/EN010115-000012-5EST%20-%20Scoping%20Report.pdf Norfolk Vanguard West https://tethys.pnnl.gov/publications/norfolk-vanguard-offshore-wind-farm-environmental-impact-assessment-scoping-report Norfolk Vanguard East https://tethys.pnnl.gov/publications/norfolk-vanguard-offshore-wind-farm-environmental-impact-assessment-scoping-report Norfolk Boreas https://infrastructure.planninginspectorate.gov.uk/projects/eastern/norfolk-boreas/	

Additional studies

Sandeel and Atlantic Herring Habitat Assessment

24.7.3 As described in **Chapter 20** Fish and Shellfish, a Sandeel and Atlantic herring habitat assessment will be undertaken to inform the EIA. Sandeel and Atlantic herring are a prey species for higher trophic levels of commercial fish, and in certain areas are also a key target species for commercial fisheries.

Legislation, policy and guidance

24.7.4 Legislation and policy relevant to the proposed Scheme and this chapter is outlined in **Chapter 4** Legislation and Policy Overview and **Appendix 4-A** National Policy, **Appendix 4-B** Environmental Legislation and **Appendix 4-C** Local Policy.

24.7.5 Relevant guidance and standards that have informed the scoping process are listed below (but not limited to) and will also be taken into account as part of the assessment:

- Best Practice Guidance for Offshore Renewables Developments: Recommendations for Fisheries Liaison[48];
- Best Practice Guidance for Offshore Renewables Developments: Recommendations for Fisheries Disruption Settlements and Community Funds[49]; and
- Changes to fishing practices around the UK as a result of the development of offshore windfarms[50].

Assessment method

24.7.6 **Chapter 5** EIA Approach and Method sets out the standard EIA methodology and matrixes to be used for the assessment. This section provides a summary of the EIA methodology specifically relevant to this chapter.

24.7.7 Assessment of cumulative and combined effects are discussed in **Chapter 29** Cumulative and Combined effects of the Project.

24.7.8 The criteria for characterising the value and sensitivity and magnitude for commercial fisheries are outlined in **Table 24-10** and **Table 24-11** respectively.

[48] FLOWW (2014) FLOWW Best Practice Guidelines for Offshore Renewables Developments: Recommendations for Fisheries Liaison January 2014. Available at: https://www.sff.co.uk/wp-content/uploads/2016/01/FLOWW-Best-Practice-Guidance-for-Offshore-Renewables-Developments-Jan-2014.pdf

49 FLOWW (2015) FLOWW Best Practice Guidance for Offshore Renewables Developments: Recommendations for Fisheries Disruption Settlements and Community Funds. Available at: https://www.thecrownestate.co.uk/media/1776/floww-best-practice-guidance-disruption-settlements-and-community-funds.pdf

[50] Gray et al. (2016) Gray, M., Stromberg, P-L., Rodmell, D. 2016. 'Changes to fishing practices around the UK as a result of the development of offshore windfarms – Phase 1 (Revised).' The Crown Estate, 121 pages. ISBN: 978-1-906410-64-3 Available at: c https://www.thecrownestate.co.uk/media/2600/final-published-ow-fishing-revised-aug-2016-clean.pdf

Table 24-10 Definitions of value and sensitivity for commercial fisheries

Receptor Value and Sensitivity	Description
High	Receptor has low/no capacity to return to pre-impact conditions, e.g., low tolerance to change and low recoverability such as loss of access with no alternatives.
Medium	Receptor is generally vulnerable to the impacts and recoverability is slow or costly e.g., low levels of alternative fishing grounds are available, and/or the fishing fleet has a low operational range.
Low	Receptor has moderate levels of recoverability. May affect behaviour but is not a nuisance to user, with acceptable financial consequences e.g., short-term, reversible changes.
Negligible	The receptor is tolerant to change with no effect on its character. High levels of alternative fishing grounds are available and/or fishing fleet is adaptive.

Table 24-11 Definitions of impact magnitude criteria for commercial fisheries

Impact Magnitude	Definition
High	Impact is of long-term duration (15+ years) and/or results in total loss of or major alteration to key elements (e.g., target fish or shellfish biological resource), or features (e.g., location of fishery) of the pre-project conditions, such that the post-project character or composition of the feature would be fundamentally changed. Substantial loss of economic value of commercial landings, that is nationally or regionally significant.
Medium	Impact is of medium duration (7-15 years) and/or results in loss of or alteration to key elements (e.g., target fish or shellfish biological resource), or features (e.g., location of fishery) of the pre-project conditions, such that the post-project character of the feature would be partially changed. Partial loss of economic value of commercial landings that is locally significant.
Low	Impact is of short duration (1-7 years) and/or is a minor alteration to key elements (e.g., target fish or shellfish biological resource), or features (e.g., location of fishery) of the pre-project conditions. Minor loss of economic value of commercial landings that is not locally significant.
Negligible	Impact is temporary (<1 year) and/or is a slight loss of ability to carry out fishing activities or slight loss of target fish or shellfish biological resources. No or unquantifiable change to pre-project conditions. Minimal loss of economic value of commercial landings.

24.7.9 To establish the baseline, interviews with local and regional fisheries stakeholders will be conducted to obtain information on fisheries such as fishing vessels operating in the

area, types and sizes of vessels, fishing gear(s) used, fishing effort, target species, seasonality in effort or species abundance, and location of key grounds. The interviews will be supplemented by a desk-based review of catch and effort statistics. Automatic Identification System (AIS) data from UK and European fishing vessels over 15m in length and VMS data from registered commercial fishing vessels over 12m in length will also be obtained and interrogated to assess the distribution of fishing effort. Information will be sought from the MMO, Eastern IFCA, Dutch, German, French and Belgium fishing organisations.

24.7.10 The impact assessment on inter-related topics such as marine physical environment, fish and shellfish, water and sediment quality and shipping and navigation will be used to inform the conclusions in the commercial fisheries chapter. The potential for displacement, as a result of cumulative impacts, will be considered carefully and an appropriate assessment approach agreed with key stakeholders once the number of other projects to be assessed is defined. Further detail on the approach to the assessment of cumulative impacts is provided in **Chapter 29** Cumulative and combined effects of the project.

24.7.11 Where significant impacts are identified, consultation will be undertaken with local and regional fisheries stakeholders to agree proportionate and effective mitigation, and residual effects will be presented.

24.8 Assumptions & limitations

24.8.1 This EIA Scoping Report has been collated based on a range of publicly available data and information only. It is assumed that the data collated is accurate. The data will be supplemented with additional data as part of the EIA process.

24.8.2 In the absence of data, a precautionary approach has been taken and professional judgement, based on experience of similar linear schemes, has been used where required to inform the scope of the assessment.

24.8.3 It is acknowledged that publicly available statistics will underrepresent the inshore fleet; fishing vessels <12m are not required to carry AIS and do not directly report landings data. Landings data derived from the MMO catch statistics can therefore only provide a general overview of fishing effort. Data will be supplemented by data from the IFCA, fish characterisation surveys conducted for the EIA's for the offshore windfarm developments in the region (East Anglia Three, Norfolk Vanguard and Norfolk Boreas OWF's), and consultation with the local fisheries stakeholders.

24.8.4 Variations and trends in commercial fisheries activity are an important aspect of the baseline assessment. Although statistics and consultation can identify past long-term trends, it is harder to predict future trends which may result from changes in market conditions, changes following the withdrawal of the UK from the EU or global events such as conflict. Given the time period assessed, data may also reflect potential short-term changes in activity due to the 2020-2021 COVID pandemic, which temporarily affected market demand and supply chains.

24.8.5 Given the above limitations, a precautionary approach to the assessment will be adopted, with consultation with local fisheries stakeholders forming a key part in establishing the current and future baseline.

24.8.6 Stakeholders in other Member States will be consulted in regard to transboundary issues, and the most up to date information of fisheries data and European projects will be used as part of the assessment.

Contents

25. Other Marine Users

25.1 Introduction

25.1.1 This chapter outlines the proposed scope and methodology to be undertaken for other marine users. It will consider the potential for significant effects arising from the construction and operation of the LionLink Scheme (hereafter referred to as 'the proposed Offshore Scheme') in respect of other marine users. A review of relevant guidance and policy has been undertaken together with a desk-based assessment, to inform the proposed scope and methodology.

25.1.2 This chapter is supported by the following appendices and figures:

- **Appendix 25-A**: Additional information on other marine users;
- **Figure 1-4**: Proposed Offshore Scheme Boundary;
- **Figure 25-1:** Offshore Windfarm developments within proximity of the study area; and
- **Figure 25-2**: Interconnector and telecommunication cables, aggregate extraction sites and disposal sites within proximity of the study area.

25.1.3 There may be interrelationships related to the potential effects on other marine users and other disciplines. Therefore, please also refer to the following chapters:

- **Chapter 16** – Socio-Economics, Recreation and Tourism – will identify the potential impacts on recreational users;
- **Chapter 23** - Shipping and Navigation – will identify the potential navigational impacts on other marine users such as risk of collision and disruption; and
- **Chapter 24** – Commercial fisheries – will identify the potential commercial impacts on fishing vessels.

25.2 Consultation and engagement

25.2.1 Initial consultation on the proposed Offshore Scheme commenced in November 2022 with several stakeholders of relevance to the other marine users topic. Introductory briefings on the Offshore Scheme have been held with the Marine Management Organisation (MMO), ScottishPower Renewables, the Royal Yachting Association (RYA) and Offshore Energies UK. The meeting with Offshore Energies UK in January 2023 focused on gathering information on the oil and gas use of the area. This information supported the development of the proposed Submarine Cable Corridors.

25.2.2 Engagement will continue with relevant stakeholders in relation to the proposed Offshore Scheme to obtain any information that they hold to supplement the assessment and to seek their views with regards to the evolving design. This will be undertaken by Environmental Impact Assessment (EIA) Team.

25.2.3 The following bodies will be consulted during the EIA process:

- MMO;

- Environment Agency;
- The Crown Estate;
- Ministry of Defence (MoD);
- North Sea Transition Authority (NSTA);
- Offshore Petroleum Regulator for Environment and Decommissioning (OPRED);
- Offshore Energies UK (OEUK);
- Perenco Oil & Gas;
- British Marine Aggregate Producers Association (BMAPA);
- RYA;
- ScottishPower Renewables (East Anglia One North, East Anglia One, East Anglia Two, East Anglia Three Offshore Wind Farms);
- Vattenfall Ltd (Norfolk Vanguard East, Norfolk Vanguard West, Norfolk Boreas Offshore Wind Farms);
- ABP & SSE Renewables (Ijmuiden Ver Offshore Wind Farms); and
- Third-party asset owners (e.g., pipelines, power and telecommunication cables) which the Offshore Scheme crosses.

25.3 Baseline conditions

Study area

25.3.1 The proposed Offshore Scheme will route from either the Southwold or Walberswick Landfall across the Southern North Sea to the boundary between the UK and Netherlands Exclusive Economic Zones (EEZ).

25.3.2 The proposed Offshore Scheme Scoping Boundary is illustrated on **Figure 25-1** and is described in **Chapter 2** The Proposed Scheme Description. It includes a proposed Submarine Cable Corridor from each Landfall converging approximately 35km off the east coast of the UK. From the point of convergence there are two Submarine Cable Corridor options (B and C) that cross the Southern North Sea to the UK/Netherlands EEZ boundary.

25.3.3 The study area for the purposes of this scoping exercise includes:

- The Offshore Scheme Scoping Boundary; and
- A 10km buffer applied to the proposed Submarine Cable Corridors. This was used to search for potentially relevant other marine users.

25.3.4 The study area for other marine users is similar in extent to the study area used for **Chapter 23** Shipping and Navigation (5 nautical miles which is approximately 10km when rounded up). Other marine users will be transiting between their licensed areas and ports and therefore it was considered appropriate to have a corresponding sized study area.

25.3.5 **Figure 25-1** illustrates the extent of the other marine users' study area.

25.3.6 The study area will be reviewed and, as appropriate, refined for the assessment in the Preliminary Environmental Information (PEI) Report and Environmental Statement (ES) with only one Landfall and one Submarine Cable Corridor being taken forward. This will be based on the proposed Order limits in the ES.

Baseline data sources

25.3.7 The baseline described in this chapter and associated appendices has been informed by the following data sources:

Table 25-1 Scoping baseline data sources

Baseline Data	Source
The offshore windfarms lease agreement areas, wind export cable agreements, marine aggregate sites, carbon capture and storage sites a natural gas storage sites[1]	The Crown Estate Asset Maps
Offshore Renewable Cable (KIS-ORCA): Marine cables digital data[2]	The Kingfisher Information Service
Digital data for historical oil and gas infrastructure and blocks[3]	NSTA
Mapping recreational sea anglers in the UK waters[4]	MMO
Military Practice and Exercise Areas[5]	UK Hydrographic Office
Digital data for Automatic Identification System (AIS) vessel densities, and other marine users	European Marine Observation and Data Network (EMODnet)
UK Coastal Atlas of Recreational Boating[6]	RYA
AIS vessel traffic data[7]	Marine Traffic (2022)
Information on offshore renewable and submarine cable infrastructure[8]	European Subsea Cable Association (ESCA)
Information on where to dive recreationally in the UK[9]	British Sub-Aqua Club (BASC)

[1] The Crown Estate (2022). Search our assets. Available at: https://www.thecrownestate.co.uk/en-gb/what-we-do/asset-map

[2] KIS-ORCA (2022) Available at: https://kis-orca.org/map/

[3] Oil and Gas Interactive (2022). Available at: https://w3.abdn.ac.uk/clsm/OandGInteractive

[4] MMO (2022) Mapping Sea Angling. Available at: https://www.gov.uk/government/publications/mapping-sea-angling-mmo1163

[5] UKHO (2022) Available at: https://www.admiralty.co.uk/defence/additional-military-layers

[6] RYA (2019) UK Coastal Atlas of Recreational Boating. Available at: https://www.rya.org.uk/knowledge/planning-licensing/uk-coastal-atlas-of-recreational-boating

[7] Marine Traffic (2022) Available at: https://www.marinetraffic.com/en/ais/home/centerx:-7.0/centery:55.4/zoom:8

[8] ESCA (2023) European Subsea Cables Association. Available at: https://www.escaeu.org/

[9] BSAC (2023) Available at: https://www.bsac.com/home/?&&type=rfst&set=true#cookie-widget

Baseline Data	Source
locations of water activities around Suffolk[10]	Visit Suffolk website

Baseline

25.3.8 The following sections present the current baseline established at scoping. There are currently two corridors being considered for the proposed Submarine Cable Corridor, which are shown in **Figure 1-4**. Baseline information is presented for both options below.

25.3.9 This section has been split into the following sub-sections to provide an overview of the other marine users in the study area:

- Offshore wind farms;
- Other power and telecommunication cables;
- Carbon capture and storage (CCS) and natural gas storage sites;
- Disposal sites;
- Aggregate extraction sites;
- Chemical weapon and munitions sites;
- MoD Practice and Exercise Area (PEXA);
- Oil and gas infrastructure;
- Recreational activities (note that recreational boating is also covered in **Chapter 23** Shipping and Navigation); and
- Angling – including chartered anglers (note that commercial fishing is also covered in **Chapter 24** Commercial Fisheries).

Offshore Wind Farms

25.3.10 There are nine existing or planned offshore wind farms (OWF) within the study area as shown in **Figure 25-1**. **Table 25-2** shows the distance between the closest point of the OWF to the proposed Submarine Cable Corridors.

Table 25-2 Distance from proposed Submarine Cable Corridors to OWFs

OWF name	Operator	Status	Distance from proposed Submarine Cable Corridor	
			B	C
East Anglia One North	ScottishPower Renewables	Approved	2.3km	1.0km
East Anglia Two	ScottishPower Renewables	Approved	8.1km	8.1km

[10] Visit Suffolk (2023) Available at: https://www.visitsuffolk.com/see-do/sports-adventure

OWF name	Operator	Status	Distance from proposed Submarine Cable Corridor	
			B	C
East Anglia Three	ScottishPower Renewables	Construction	11.3km	1.3km
Norfolk Vanguard East	Vattenfall Ltd	Approved	11.4km	1.4km
Norfolk Vanguard West	Vattenfall Ltd	Approved	0.3km	>20km
Norfolk Boreas	Vattenfall Ltd	Approved	0.7km	0.5km
Nederwiek Alpha	The Netherlands Enterprise Agency (RVO)	Planned	14.7km	>20km
Nederwiek Beta	The Netherlands Enterprise Agency (RVO)	Planned	9.5km	>20km
Nederwiek Gamma	The Netherlands Enterprise Agency (RVO)	Planned	0.5km	2km

Source: EmodNet (2022)[11]

Power and Telecommunications Cables

25.3.11 There are 25 existing or planned power or telecommunication cables in the study area as shown in **Figure 25-2**. **Table 25-3** shows the distance from the proposed Submarine Cable Corridors to these cables. The table also includes OWF export cables which are crossed by the proposed Submarine Cable Corridors.

Table 25-3 Distance from the proposed Submarine Cable Corridors to existing or planned power or telecommunication cables

Cable name	Type	Status IS / OOS**	Operator	Distance from proposed Submarine Cable Corridors	
				B	C
UK – NL6	Telecom	OOS	Unknown*	Crosses	Crosses
UK – NL4	Telecom	OOS	Unknown*	Crosses	Crosses
Ulysses 2	Telecom	IS	Verizon	Crosses	Crosses

[11] EmodNet (2022). Human Activities Interactive Map. Available at: https://www.emodnet-humanactivities.eu/view-data.php

Cable name	Type	Status IS / OOS**	Operator	Distance from proposed Submarine Cable Corridors	
				B	C
UK – NL5	Telecom	OOS	Unknown*	Crosses	Crosses
Rembrandt 1	Telecom	IS	Unknown*	Crosses	Crosses
Circe North 1	Telecom	IS	Zayo	Crosses	Crosses
Pangea Segment 2	Telecom	IS	ASN	Crosses	Crosses
Circe North 2/ Zeus	Telecom	IS	Zayo	Crosses	Crosses
Scylla	Telecom	IS	euNetworks	Crosses	Crosses
UK – NL10	Telecom	OOS	Unknown*	Crosses	Crosses
UK – Germany 5	Telecom	IS	BT	Crosses	9.1km
UK – Germany 3	Telecom	OOS	Unknown*	Crosses	>20km
UK – NL 14	Telecom	IS	Vodafone and KPN	Crosses	Crosses
Winterton – Borkum 1	Telecom	OOS	Unknown*	Crosses	>20km
UK – DK 3	Telecom	OOS	Unknown*	Crosses	>20km
UK – Germany 4	Telecom	OOS	Unknown*	0.5km	18.5km
SEA – ME-WE 3	Telcom	IS	Unknown*	7.7km	1.9km
BT North Sea	Telecom	IS	BT	Crosses	Crosses
ICENI	Telecom	IS	BT	Crosses	Crosses
Atlantic Crossing 1	Telecom	IS	Century Link	1.1km	0.4km
NeuConnect	Interconnector	In construction	NeuConnect Britain Ltd	17.3km	Crosses
Norfolk Vanguard East	OWF export cables	Approved	Vattenfall Ltd	Crosses	>20km

Cable name	Type	Status IS / OOS**	Operator	Distance from proposed Submarine Cable Corridors	
				B	C
Norfolk Vanguard West	OWF export cables	Approved	Vattenfall Ltd	0.4km	>20km
East Anglia One North	OWF export cables	Approved	ScottishPower Renewables	4km	4km
East Anglia Three	OWF export cables	In construction	ScottishPower Renewables	18.2km	Crosses

Source: EmodNet (2022)[12]
*Unknown operators will be identified in the EIA
** IS = In Service, OOS = Out of Service

Disposal Sites

25.3.12 There are 11 spoil disposal sites within the study area and within proximity of the proposed Submarine Cable Corridors as shown in **Figure 25-2. Table 25-4** shows the distance from the proposed submarine cable corridors to these sites.

Table 25-4 Distance from proposed Submarine Cable Corridors to disposal sites

Disposal Site name	Distance from proposed Submarine Cable Corridors	
	B	C
AEA Experimental site	Crosses	Crosses
Warren Spring EXPTL Area 1	1.9km	Crosses
EAOW3	17.2km	Crosses
NeuConnect Upper Mid Site	>20km	Crosses
Norfolk Vanguard East	11.6km	1.2km
Norfolk Vanguard West	0.4km	>20km
Norfolk Vanguard ECC 2	Crosses	19.2km
Norfolk Vanguard ECC 1	19.8km	Crosses
Iceni Disposal 2	17.5km	Crosses
BBL Pipeline Temporary pre-sweep	Crosses	>20km
Norfolk Boreas Array	1km	5.6km

Source: EmodNet (2022)12

[12] EmodNet (2022). Human Activities Interactive Map. Available at: https://www.emodnet-humanactivities.eu/view-data.php

Aggregate Extraction Sites

25.3.13 There are nine aggregate extraction sites within the study area. When designing the Offshore Scheme these sites were actively excluded from the area of search to avoid interaction. **Figure 25-2** presents the location of the sites in relation to the proposed Submarine Cable Corridors. All are sited at least 4km from the proposed Submarine Cable Corridors.

Dumped Chemical and Munitions Sites

25.3.14 EMODnet identifies 11 locations where a dumped munition has been located within the study area as shown in **Figure 25-2**[13]. Note there are no official sites for the disposal of chemical munitions or munitions within the study area.

Oil & Gas Operations

25.3.15 The northern part of the study area lies within an active gas exploitation area, with active offshore gas installations and pipelines. Proposed Submarine Cable Corridor B crosses 11 different pipelines whilst proposed Submarine Cable Corridor C crosses two pipelines, as shown in **Figure 25-2.** A list of these pipelines is provided in **Appendix 25-A** of this document in **Table 25-7.**

25.3.16 There are eight offshore surface structures within the study area. Of these three are operational platforms, two are closed down platforms and three are buoys. **Table 25-8** in **Appendix 25-A** shows the distance from the nearest point on the proposed Submarine Cable Corridors to these structures.

25.3.17 **Table 25-5** presents the active oil and gas Licence Blocks which the proposed Submarine Cable Corridors intersect.

Table 25-5 Active oil and gas license blocks which the proposed Submarine Cable Corridors intersect

Proposed Submarine Cable Corridor	License block crossed
B	49/30, 49/25, 49/20
C	54/1

Source: NSTA (2022)[14]

Recreational Activities

Bathing Water

25.3.18 The Southwold Landfall site lies in close proximity to the Southwold The Pier bathing water which was classified in 2022 as of Excellent quality. Between the Southwold landfall site and the Walberswick landfall site lies Southwold The Denes bathing water, which was also classified as of Excellent quality in 2022. Walberswick is not classified as a bathing water.

[13] EmodNet (2023) EMODnet Map Viewer Dumped Munitions Points. Available at: https://emodnet.ec.europa.eu/geoviewer/

[14] NSTA (2022) UK Offshore License block information. Available at: https://www.nstauthority.co.uk/data-centre/data-downloads-and-publications/licence-data/

Diving

25.3.19 There is evidence that there is recreational diving which takes place along the Suffolk coast, associated with wrecks but also for marine environmental research (Seasearch, 2023)[15].

Sailing and Cruising

25.3.20 The coast of Suffolk is a popular area to sail. The Royal Yachting Associations Coastal Atlas (RYA, 2019)[16] identifies the area as of medium-use for recreational sailing. Full information in regard to this will be in **Chapter 23** Shipping and Navigation.

Water sports

25.3.21 Suffolk has seasonal recreational water sports along its coast including surfing, paddleboarding, canoeing, kite surfing, sailboarding, foiling and water skiing.

Angling

25.3.22 There are a number of chartered fishing vessels along the Suffolk coast which run fishing trips during the winter months aiming to catch cod, skate and whiting and in the summer months targeting bass, skate and smooth-hounds[17]. More information on fishing can be found in the **Chapter 24** Commercial fisheries.

Other Categories of User

25.3.23 Interrogation of the Geographic Information System (GIS) data confirmed that the following user categories are not present within the study area.

- MoD PEXA; and
- CCS and natural gas storage.

Future baseline

25.3.24 The Other Marine Users chapter within the PEI Report and ES will consider changes which may affect the future environment in the absence of the proposed Offshore Scheme. The future baseline will also take into account any developments that are likely to be present in the future baseline.

25.3.25 The future baseline for other marine users is gradually evolving, with a detailed pipeline of UK offshore windfarms already in operation, construction, and planning phases. The renewable energy industry is growing rapidly in the UK, with offshore wind playing a significant role in supplying the demand for clean energy and in achieving the 2030 Climate Target Plan. The Crown Estate released the Offshore Wind Leasing Round 4 in January 2023 which has created opportunity for 8GW of new offshore windfarm projects in English and Welsh waters by 2030.

25.3.26 The future baseline for offshore interconnectors and CCS is likely to change over time as new sites and projects are identified. The NTSA launched the UK's first carbon storage licence round in 2022 and offered 20 carbon storage licences at offshore sites

[15] Seasearch, (2023). Seasearch Data. Available at: https://www.seasearch.org.uk/data

[16] RYA (2019) UK Coastal Atlas of recreational boating. Available at: uk-coastal-atlas-of-recreational-boating (rya.org.uk)

[17] CBUK (2023) Chartered Boats Suffolk. Available at: https://www.charterboats-uk.co.uk/england/east/suffolk/

in May 2023. In the North Sea, the licenses awarded were focused off the coasts of Norfolk, Lincolnshire and Yorkshire, with none off Suffolk, whilst this does not preclude the development of CCS off Suffolk it suggests it may not be within the timescale of the proposed Offshore Scheme.

25.3.27 The oil and gas industry is in decline as the energy transition progresses into the production of renewable energies. Factors including decommissioning, exploration and development, repurposing of infrastructure and acquisitions will also determine change in oil and gas activities. Although the decline is anticipated to continue, the rate of production of oil and gas is dependent on many fluctuating and unknown variables, including the level of investment, oil and gas reserves and environmental related concerns.

25.4 Potential impacts

25.4.1 This section identifies, at a high level, a summary of the sources and potential impacts as a result of the proposed Offshore Scheme during the construction and operational phases.

25.4.2 Impacts have been established by the EIA Team based on industry experience and professional judgement.

25.4.3 It is recognised that the other marine users will be transiting between their licensed areas and ports. However, potential impacts on vessel movements will be assessed in **Chapter 23** Shipping and Navigation. In addition, potential impacts on tourism and recreation will be captured in **Chapter 16** Socio-Economics, Recreation and Tourism.

25.4.4 It is therefore proposed that the assessment of other marine users focuses on the occupancy of the seabed by the Project either below the seabed due to the presence of the cables, or on the seabed due to the presence of external cable protection. The presence of the cable and any external cable protection may disrupt the placement of any future infrastructure.

25.5 Design and control measures

25.5.1 As outlined in **Chapter 5** EIA Approach and Method, a standard hierarchical approach will be taken to mitigation.

25.5.2 The assessment of effects will take into account measures that are embedded into the proposed Offshore Scheme design, together with general good practice measures.

Design measures

25.5.3 Design measures to be implemented as part of the Offshore Scheme include:

- Where practicable cable burial shall be the preferred means of cable protection.
- If feasible, all cables will be installed in one trench. If not feasible, where practicable the two HVDC submarine cables will be bundled together and installed with a fibre optic cable in one trench with the metallic return cable and a separate fibre optic cable in a second trench.
- Cable route will be designed to minimise the risk of exposure by seabed mobility.

- The cable route will be designed to avoid crossing licensed areas and to minimise interaction as far as possible with other cables and pipelines.

Control measures

25.5.4 Control measures to be implemented as part of the Offshore Scheme include:

- Proximity / crossing agreements will be agreed with all relevant third-party asset owners.
- Continued liaison with relevant stakeholders throughout all stages of design and the Project including:
  - Notifications of activities e.g., Notice to Mariners (NtM) and other navigational warnings, will be distributed in a timely manner warning including details of any associated safety distances.
- All vessels associated with the Project will comply with national lighting and marking requirements, international collision regulations (COLREGS) and safety of life at sea regulations (SOLAS).
- Design and construction will be carried out in accordance with International Cable Protection Committee (ICPC) Recommendations.

25.6 Scope of the assessment

25.6.1 This section identifies the potential for the proposed Offshore Scheme to have likely significant effects, taking into account the design and control measures identified in **Section 25.5**

25.6.2 **Table 25-6** sets out the receptors within the study area that have been identified, whether there is a pathway for the impacts identified, the potential for significant effects and if the receptor is scoped in for the assessment.

25.6.3 All identified impacts are of relevance to both the Southwold and Walberswick Landfall options and both Submarine Cable Corridor options unless specified otherwise.

25.6.4 A precautionary approach has been taken and where there is no strong evidence base, insufficient baseline or the significance is uncertain at this stage the impact has been scoped into the EIA. Where there is a clear evidence base that the effect from the impact will not be significant, either alone or in combination with other plans and projects, the impact has been scoped out of the EIA.

25.6.5 It is recognised that other marine users will be transiting between their licensed areas and ports. However, potential impacts on vessel movements such as increased risk of vessel to vessel collisions, disruption or displacement to/from planned navigation routes etc, will be assessed in **Chapter 23** Shipping and Navigation.

Table 25-6 Proposed scope of the assessment

Project phase	Receptor	Impact	Potential for significant effect	Proposed to be scoped in/ out
All phases	Dumped munitions	No impact pathways have been identified	None – An Unexploded Ordnance (UXO) survey will be undertaken prior to construction to ensure that the selected Submarine Cable Corridor is free of any UXO. Any potential UXO identified will be investigated and cleared from the Submarine Cable Corridor.	Scoped Out
Operation	Oil and gas, marine aggregates, power and telecom cables, offshore wind / renewables, CCUS and gas storage	Occupancy of seabed – below seabed	The presence of the cables in the seabed may disrupt the placement of future infrastructure / offshore activities	Scoped In
Operation	Oil and gas, marine aggregates, power and telecom cables, offshore wind / renewables, CCUS and gas storage	Occupancy of seabed – on seabed	The presence of external cable protection may disrupt the placement of future infrastructure / offshore activities	Scoped In

25.7 Assessment methodology

Data sources

Desk study data

25.7.1 Extensive information is available regarding other marine users of the Southern North Sea. Following a detailed review to inform the scope of the data and assessment, as presented, no site-specific surveys are planned for this topic. In addition to the data sources that were used to inform the baseline reported in this chapter, **Table 25-7** lists the data sources will be used to inform the baseline of the PEI Report/ES.

Table 25-7 Additional publicly available data sources for other marine users

Data Source	Description	Coverage Relative to Study Area
Environmental Statements from Offshore Wind Farm (OWF) Developments.	Scroby Sands OWF https://www.marinedataexchange.co.uk/details/1910/packages Greater Gabbard OWF https://tethys.pnnl.gov/sites/default/files/publications/greatergabbard2005.pdf East Anglia One OWF https://tethys.pnnl.gov/publications/east-anglia-one-offshore-windfarm-environmental-statement Galloper OWF https://www.marinedataexchange.co.uk/details/377/summary	UK
Environmental Statement/ scoping reports from proposed OWF Developments	East Anglia One North https://infrastructure.planninginspectorate.gov.uk/projects/eastern/east-anglia-one-north-offshore-windfarm/?ipcsection=docs East Anglia Two, https://infrastructure.planninginspectorate.gov.uk/projects/eastern/east-anglia-two-offshore-windfarm/?ipcsection=docs East Anglia Three https://infrastructure.planninginspectorate.gov.uk/projects/eastern/east-anglia-three-offshore-wind-farm/?ipcsection=docs Norfolk Vanguard West https://tethys.pnnl.gov/publications/norfolk-vanguard-offshore-wind-farm-environmental-impact-assessment-scoping-report Norfolk Vanguard East https://tethys.pnnl.gov/publications/norfolk-vanguard-offshore-wind-farm-environmental-impact-assessment-scoping-report	UK

Data Source	Description	Coverage Relative to Study Area
	Norfolk Boreas https://infrastructure.planninginspectorate.gov.uk/projects/eastern/norfolk-boreas/	

Legislation, policy and guidance

25.7.2 Legislation and policy relevant to the proposed Scheme and this chapter is outlined in **Chapter 4** Legislation and Policy Overview and **Appendix 4-A** National Policy, **Appendix 4-B** Environmental Legislation and **Appendix 4-C** Local Policy.

25.7.3 Relevant guidance and standards that have informed the scoping process are listed below (but not limited to) and will also be taken into account as part of the assessment:

- ESCA Guideline No.6: The Proximity of Offshore Renewable Energy Installations & Submarine Cable Infrastructure in UK waters (ESCA 2016)[18];
- International Cable Protection Committee (ICPC) Recommendation No.2. Cable Routing and Reporting Criteria (ICPC, 2015)[19];
- International Cable Protection Committee (ICPC Recommendation No.3. Cable and Oil Pipeline/ Power Cables Crossing Criteria (ICPC, 2014)[19];
- International Cable Protection Committee (ICPC Recommendation No.13. The Proximity of Offshore Renewable Wind Energy Installations and Submarine Cable Infrastructure in National Waters (ICPC, 2013)[19];
- The European Subsea Cable Association (ESCA guideline No.19. Marine Aggregate Extraction Proximity Guidelines (ESCA 2016)[20]; and
- Guidance on assessing the socio-economic impacts of offshore windfarms (OWFs), produced by Oxford Brooks and Vattenfall (Glasson et al., 2020)[21].

Assessment method

25.7.4 **Chapter 5** EIA Approach and Method sets out the standard EIA methodology and matrices to be used for the assessment. This section provides a summary of the EIA methodology specifically relevant to this chapter.

25.7.5 Assessment of cumulative and combined effects are discussed in **Chapter 29** Cumulative and Combined effects of the Project.

[18] ESCA, (2016) The Proximity of Offshore Renewable Energy Installations & Submarine Cable Infrastructure in UK Waters. Available at : https://www.escaeu.org/guidelines/

[19] ISCPC.org (2021) ICPC Recommendations. Available at: https://www.iscpc.org/publications/recommendations/

[20] ESCA (2018) Guideline 19 – Marine Aggregate Extraction Proximity. Available at: https://www.escaeu.org/guidelines/

[21] Glasson et al., (2020) Guidance on assessing the socio-economic impacts of offshore wind farms (OWFs) Available at: https://radar.brookes.ac.uk/radar/file/6c7548dd-c768-4db8-9dce-7980c426c7a4/1/Best%20Practice%20Guidance%20-%20Final%20Oct%202020.pdf

25.7.6 The criteria for characterising the value and sensitivity and magnitude for other marine users are outlined in **Table 25-8** and **Table 25-9** respectively.

Table 25-8 Definitions of value and sensitivity for other marine users

Receptor Value and Sensitivity	Description
High	Receptor is economically valuable and has low/no capacity to return to pre-impact conditions, e.g., low tolerance to change and low recoverability such as loss of access with no alternatives or the impact will have major financial consequences for the receptor.
Medium	Receptor is of intermediate economic value and/or is tolerable to change e.g., acceptable alternatives with minor financial consequences.
Low	Receptor is of minor value or importance. May affect behaviour but is not a nuisance to user, with acceptable financial consequences.
Negligible	Receptor is very low value or importance or has high recovery with little financial consequences.

Table 25-9 Definitions of impact magnitude criteria for other marine users

Impact Magnitude	Definition
High	Total loss of ability to continue activities. Impact is of medium-term (7-15 years) through to long-term / permanent duration and/or frequency of repetition is continuous and/or effect is not reversible.
Medium	Loss or alteration to significant portion of key components of current activity leading to a reduction in the activity that may be undertaken. Impacts are of medium term (7-15 years) duration and/or on a local level and/or frequency of repetition is medium to continuous.
Low	Minor shift away from baseline, leading to a reduction in the level of activity that may be undertaken. Impacts are temporary (<1 year) or short term (1-7 years) in duration and/or, site specific and/or frequency of repetition is low. Impacts limited to within the project footprint. Negligible contribution to cumulative effects.
Negligible	Very little or no detectable change from baseline conditions. Impacts predicted to be brief (one to two days) or for a short period (up to 3 months). No contribution to cumulative effects.

25.7.7 The baseline will be established through desk-based review of literature and GIS mapping files and consultation with relevant stakeholders. Where possible quantitative

analysis will be provided e.g., an estimate of the amount of area that is no longer available for other projects, including where positioning of the Offshore Scheme may restrict future development or use. If quantitative analysis is not possible, qualitative assessment will be undertaken based on consultation with relevant stakeholders and review of publicly available literature.

25.7.8 The impact assessment on inter-related topics such as shipping and navigation will be used to inform the conclusions. The potential for displacement, as a result of cumulative impacts, will be considered carefully and an appropriate assessment approach agreed with key stakeholders once the number of other projects to be assessed is defined. Further detail on the approach to the assessment of cumulative impacts is provided in **Chapter 29** Cumulative and combined effects of the project of this EIA Scoping Report.

25.7.9 Where significant impacts are identified, consultation will be undertaken with other marine users to agree proportionate and effective mitigation, and residual effects will be presented.

25.8 Assumptions & limitations

25.8.1 This EIA Scoping Report has been collated based on a range of publicly available data and information only. It is assumed that the data collated is accurate. The data will be supplemented with additional data as part of the EIA process.

25.8.2 In the absence of data, a precautionary approach has been taken and professional judgement, based on experience of similar linear schemes, has been used where required to inform the scope of the assessment.

25.8.3 It is assumed that the data available from existing literature and consultation will provide an appropriate evidence base for other marine users. It should be noted that it is dependent on publicly available datasets.

Contents

26. Marine Archaeology

26.1 Introduction

26.1.1 This chapter outlines the proposed scope and methodology for marine archaeology. It will consider the potential for significant effects arising from construction and operation of the LionLink Scheme (hereafter referred to as 'the proposed Offshore Scheme') on marine archaeology receptors. A review of relevant guidance and policy has been undertaken together with a desk-based review of existing data, to inform the proposed scope and methodology.

26.1.2 This chapter is supported by the following figures:

- **Figure 1-4:** Proposed Offshore Scheme Boundary; and
- **Figure 26-1**: Location of recorded seabed and intertidal features within, and in proximity to, the proposed Submarine Cable Corridors.

26.1.3 There may be interrelationships related to the potential effects on marine archaeological receptors and other disciplines. Therefore, please also refer to the following chapters:

- **Chapter 11** - Historic Environment - will identify the potential for impacts in relation to onshore archaeology, built heritage and historic landscape; and
- **Chapter 18** - Marine Physical Environment - will identify the potential for impacts from changes to hydrodynamic patterns and sediment transport regimes.

26.2 Consultation and engagement

26.2.1 Introductory meetings were held in January 2023 with Historic England and the University of Southampton[1] to gather information on the coastal archaeology of the Suffolk coastline. This information supported the selection of the Landfall Sites. A further meeting was held with Historic England in November 2023 to discuss the proposed content of the Environmental Impact Assessment (EIA).

26.2.2 Engagement will be continue with relevant stakeholders in relation to the proposed Offshore Scheme to obtain any information that they hold to supplement the assessment and to seek their views with regards to the evolving design. This will be undertaken by EIA Team.

26.2.3 The following bodies will be consulted during the EIA process:

- Marine Management Organisation (MMO);
- Historic England; and
- Suffolk County Council Archaeology.

[1] Professor David Seer. Consulted to inform Landfall selection, with particular reference to the submerged settlement off Dunwich.

26.2.4 In addition, engagement will be undertaken with non-statutory stakeholders as required so that their specialist local views and expertise can be considered as part of the EIA process.

26.3 Baseline conditions

Study area

26.3.1 The proposed Offshore Scheme will route from either the Southwold or Walberswick Landfall across the Southern North Sea to the boundary between the UK and Netherlands Exclusive Economic Zones (EEZ).

26.3.2 The proposed Offshore Scheme Scoping Boundary is illustrated on **Figure 26-1** and is described in **Chapter 2** The Proposed Scheme Description. It includes a proposed Submarine Cable Corridor from either the Southwold or Walberswick Landfall converging approximately 35km off the east coast of the UK. From the point of convergence there are two Submarine Cable Corridor options (B and C) that cross the Southern North Sea to the UK/Netherlands EEZ boundary.

26.3.3 The study area for marine archaeology comprises:

- The proposed Offshore Scheme Scoping Boundary; and
- A 1km wide archaeological buffer which was applied to either side of Submarine Cable Corridor B and Submarine Cable Corridor C. This buffer is based on the need to mitigate potential impacts from the proposed Offshore Scheme on marine heritage receptors.

26.3.4 Marine archaeological seabed features that are located close to the boundary of the study area are included in the scoping assessment as the features themselves, or their potential mitigation measure, may extend into the study area potentially impacting the chosen cable corridor. Future assessment of any acquired geophysical survey data will ascertain whether these receptors will be included in the assessment at the EIA stage. As part of due diligence a buffer of 1km will be maintained around the final iteration of the Submarine Cable Corridor to ensure these features are captured, and appropriate mitigation measures enacted where necessary.

26.3.5 The study area will be reviewed and, as appropriate, refined for the assessment in the Preliminary Environmental Information (PEI) Report and Environmental Statement (ES) with only one Landfall and one Submarine Cable Corridor being taken forward. This will be based on the proposed Order limits in the ES.

Baseline data sources

26.3.6 The baseline described in this chapter and associated appendices has been informed by the following data sources:

Table 26-1 Scoping baseline data sources

Baseline Data	Source
Charted wrecks and obstructions	United Kingdom Hydrographic Office (UKHO) data

Baseline Data	Source
Terrestrial and marine archaeological sites, find spots and archaeological events	National Marine Heritage Record (NMHR) maintained by Historic England
Database of recorded archaeological sites, find spots, and archaeological events	Historic Environment Record (HER) for Suffolk
Designated heritage assets including sites protected under the Protection of Military Remains Act 1986 and the Protection of Wrecks Act 1973	National Heritage List for England (NHLE) maintained by Historic England
Historic Seascape Characterisation (HSC): Consolidating the National HSC Database[2]	Land Use Consultants (LUC)
North Sea Prehistory Research and Management Framework 2009[3]	Historic England publication
Research and Archaeology Revisited: A revised framework for the East of England 2011[28]	Historic England publication

Baseline

26.3.7 The baseline information presented here has been gathered following the best practice professional guidance outlined by the Chartered Institute for Archaeologists' (CIfA) Standard and Guidance for Historic Environment Desk-Based Assessment (2014, revised October 2020)[4].

26.3.8 Setting is defined under the National Planning Policy Framework (Ministry of Housing, Communities & Local Government, 2021: 71)[5] as '*the surroundings in which a heritage asset is experienced. Its extent is not fixed and may change as the asset and its surroundings evolve. Elements of a setting may make a positive or negative contribution to the significance of an asset, may affect the ability to appreciate that significance, or may be neutral*.'

26.3.9 The themes relevant to the marine archaeological resource are:

- Palaeogeography (for example, palaeochannels and other features that contain prehistoric sediment, and derived Palaeolithic and Mesolithic artefacts such as handaxes) including their setting;

[2] LUC (Land Use Consultants) 2018. National Historic Seascape Characterisation Consolidation. York: Archaeology Data Service. Available at: https://doi.org/10.5284/1046273 [Accessed Feb 2024]

[3] Peeters, H., Murphy, P and Flemming 2009. North Sea Prehistory Research and Management Framework (NSPRMF) 2009. Available at https://historicengland.org.uk/images-books/publications/ns-prehistory-research-manage-framework/10278_north_sea_prehistory_web/ [Accessed Feb 2024]

[4] Chartered Institute for Archaeologists 2020. Standard and guidance for historic environment desk-based assessment. Published December 2014, updated in 2020. Available at https://www.archaeologists.net/sites/default/files/CIfAS%26GDBA_4.pdf [Accessed Feb 2024]

[5] Ministry of Housing, Communities & Local Government 2021. National Planning Policy Framework. Available at: https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/1005759/NPPF_July_2021.pdf [Accessed Feb 2024]

- Seabed features, including maritime sites (such as shipwrecks and associated material including cargo, obstructions, and fishermen's fasteners) and aviation sites (aircraft crash sites and associated debris) including their setting;
- Intertidal heritage receptors relating to marine activity for example fish traps, piers, sea defences located within the intertidal zone, between mean high-water spring (MHWS) and mean low-water spring (MLWS); and
- The historic seascape character in and around the study area.

26.3.10 The types of archaeology listed above relate to the known marine resource, which will be discussed further in this chapter, and also the currently unknown resource. There is potential for the presence of palaeogeographic material dating from the Palaeolithic onwards. There is also potential for discoveries of maritime craft from the Mesolithic to the modern period. Post-medieval and modern wrecks, as they were generally made of more substantial material, are more likely to have been discovered through surveys undertaken by the UKHO and others, and thus recorded in the archaeological record. However, there is still potential for the discovery of previously unrecorded wreck sites, particularly of wooden wrecks, broken up wrecks or partially buried wrecks that are more difficult to detect through geophysical survey.

26.3.11 There is also potential for 20th century aircraft, particularly in relation to the Second World War[6]. Aircraft crash sites are difficult to identify through archaeological assessments of geophysical survey, although experience indicates material from the site, such as engines or other material may be recorded as small obstructions or anomalies.

26.3.12 The following section provides summary of the marine archaeology and cultural heritage baseline within the study area, compiled from the data sources listed in **Table 26-2** and a range of secondary sources, including academic papers, geological information (e.g., British Geological Survey (BGS) mapping), and previous work undertaken by Wessex Archaeology from the wider region.

26.3.13 The following sections present the current baseline established at scoping. There are currently two corridors being considered for the proposed Submarine Cable Corridor, which are shown in **Figure 1-4**. Baseline information is presented for both options below.

26.3.14 The distribution of the known heritage receptors discussed in this section is illustrated in **Figure 26-1**.

Seabed Prehistory

26.3.15 The following section provides an overview of the geological and archaeological history of the East Coast region and wider southern North Sea; based on a range of primary and secondary sources, including academic papers, and geological information. It should be noted that this section includes details on the Palaeo-Yare catchment area[7] which lies to the north and east of the proposed Cable Corridors, and the former Thames and Bytham river catchments which lie to the south of the proposed Cable Corridors and are considered indicative of the archaeological potential across the region of the Southern North Sea.

[6] Wessex Archaeology 2008. Aircraft Crash Sites at Sea: A scoping study. Salisbury: unpublished report ref. 666410.02

[7] Wessex Archaeology 2021. Palaeo-Yare Catchment Monitoring: Interpretative Report. Salisbury, Wessex Archaeology, report ref: 226020.03

26.3.16 The assessment of prehistoric character of the region revealed a complex history of deposition and erosion during the Holocene period, with significant tidal movement and ranges occurring once the full marine transgression had occurred[8]. The southern North Sea is known to contain relatively well preserved palaeolandscape features with the evidence of this former terrestrial landscape frequently recovered by dredging and fishing in numerous areas around the southern North Sea, generally in the form of the remains of extinct megafaunal remains.

26.3.17 The discovery of actual human artefacts is a rarer occurrence but does occur. Reported finds from offshore activity, including from the aggregate industry, have to date, produced a range of early prehistoric lithic artefacts indicating early prehistoric activity in submerged palaeolandscapes from the Lower, Middle, and Upper Palaeolithic periods[9,10,11,12]), with notable collections of more recent Mesolithic artefacts from submerged palaeolandscape contexts[13] [14].

26.3.18 The onshore archaeological record of Upper Palaeolithic activity is considered relatively sparse, and therefore offshore locations can provide unique and important context for coastal and lowland human activity during this period[14]. For example, a Maglemosian harpoon artefact from trawled peat in the early 20th century was subsequently radiocarbon dated to around 12,000 years ago[15]. Further archaeological and palaeoenvironmental material has been reported from North Sea contexts for over a century by the fishing community, and the oil and gas industry[16,17].

26.3.19 The Mesolithic period began in the early Holocene. Around 10,000 before present (BP), sea levels were still more than 60m below current levels, with a significant area of the southern North Sea and English Channel suitable for human exploitation. Considerable attention has been paid to Mesolithic Doggerland in the last decade[18,19] along with the geoarchaeology[20], submerged forests[21], and palaeo-river systems within the North Sea

[8] Limpenny, S E, Barrio Froján, C, Cotterill, C, Foster-Smith, R L, Pearce, B, Tizzard, L, Limpenny, D L, Long, D, Walmsley, S, Kirby, S, Baker, K, Meadows, W J, Rees, J, Hill, J, Wilson, C, Leivers, M, Churchley, S, Russell, J, Birchenough, A C, Green, S L and Law, R J 2011. The East Coast Regional Environmental Characterisation. MEPF

[9] Tizzard, L, Bicket, A R, Benjamin, J, and De Loecker, D 2014. A Middle Palaeolithic Site in the Southern North Sea: Investigating the Archaeology and Palaeogeography of Area 240. Journal of Quaternary Science 29, 698–710.

[10] Tizzard, L, Bicket, A. R, Benjamin, J and De Loecker, D 2015. A Middle Palaeolithic Site in the Southern North Sea: Investigating the Archaeology and Palaeogeography of Area 240. Salisbury, Wessex Archaeology Monograph no 35.

[11] Wessex Archaeology 2011. Seabed Prehistory: Site Evaluation Techniques (Area 240). Salisbury, unpublished report, ref: 70754.04.

[12] Wessex Archaeology 2011. Seabed Prehistory: Site Evaluation Techniques (Area 240). Salisbury, unpublished report, ref: 70754.04.

[13] Momber, G, Tomalin, D, Scaife, R, Satchell, J and Gillespie, J 2011. Mesolithic Occupation at Bouldner Cliff and the Submerged Prehistory Landscapes of the Solent. CBA Report 164, Council for British Archaeology.

[14] Wessex Archaeology 2013. Audit of Current State of Knowledge of Submerged Palaeolandscapes and Sites. Salisbury, unpublished report, ref: 84570.01.

[15] Housley, R A 1991. AMS Dates from the Late Glacial and Early Postglacial in North-West Europe: A Review. In Barton, N, Roberts, A J, and Roe, D A (eds.) The Late Glacial in North-West Europe: Human Adaptation and Environmental Change at the End of the Pleistocene. London, Council for British Archaeology, 25-36.

[16] Reid, C 1913. Submerged Forests. London, Cambridge University Press.

[17] Godwin, H, and Godwin, M E 1933. British Maglemose Harpoon Sites. Antiquity 7, 36–48.

[18] Gaffney, V, Thomson, K and Fitch, S 2007. Mapping Doggerland: The Mesolithic Landscapes of the Southern North Sea. Oxford, Archaeopress.

[19] Tappin, D R, Pearce, B, Fitch, S, Dove, D, Gearey, B, Hill, J M, Chambers, C, Bates, R, Pinnion, J, Diaz Doce, D, Green, M, Gallyot, J,Georgiou, L, Brutto, D, Marzialetti, S, Hopla, E, Ramsay, E, and Fielding, H 2011. The Humber Regional Environmental Characterisation. British Geological Survey Open Report OR/10/54.

[20] Boomer, I, Waddington, C, Stevenson, T, and Hamilton, D 2007. Holocene Coastal Change and Geoarchaeology at Howick, Northumberland, UK. The Holocene 17(1), 89–104.

[21] Hazell, Z. 2008. Offshore and Intertidal Peat Deposits, England — A Resource Assessment and Development of a Database. Environmental Archaeology 13(2), 101–110.

region[14,8]. Increasingly, a maritime perspective has developed for understanding the early prehistoric archaeological record, where coasts, estuaries and wetlands are key landscape elements.

26.3.20 It is evident from the currently published research and ongoing developer funded research projects that postglacial marine transgression did not destroy the Pleistocene and Holocene palaeogeography by default[14]. Areas of preserved palaeogeographic features do remain, and detailed reconstructions of palaeoenvironments and palaeogeography are being achieved for large parts of the North Sea basin[22,8]. By the early Holocene, Mesolithic hunter-fisher-gatherers in Doggerland were active in a familiar ecosystem of mixed deciduous woodland with oak, elm, alder, and lime populated by deer and a wide variety of other mammals[22]. Evidence of these animals has been reported through marine aggregate dredging, and the associated reporting requirements[23].

26.3.21 However, between 7,000 and 5,000 BP, much of the land was inundated by eustatically driven sea level change[24], and by 6,000 BP sea level was only approximately 7m below the present level[25]. Around this time, Britain became an island again[26]. Settlements at the time were often transitory and seasonal, and therefore leave little trace in the archaeological record, however, new types of stone tools were introduced during this period. It is possible that the now submerged environment of which the study area was a part was occupied up until the final marine transgression between 7,000 and 5,000 BP.

26.3.22 Evidence from the region can contribute to the research questions set out in the following Research Frameworks:

- Research and Conservation Framework for the British Palaeolithic (English Heritage and the Prehistoric Society 2008[27]);
- North Sea Prehistory Research and Management Framework (Peeters *et al.* 2009[3]);
- Research and Archaeology Revisited: a revised framework for the East of England (Medlycott 2011[28]); and
- People and the Sea: A Maritime Research Agenda for England (Ransley *et al*. 2013[29]).

[22] Tappin, D R, Pearce, B, Fitch, S, Dove, D, Gearey, B, Hill, J M, Chambers, C, Bates, R, Pinnion, J, Diaz Doce, D, Green, M, Gallyot, J,Georgiou, L, Brutto, D, Marzialetti, S, Hopla, E, Ramsay, E, and Fielding, H 2011. The Humber Regional Environmental Characterisation. British Geological Survey Open Report OR/10/54.

[23] Bicket, A. and Tizzard, L. 2015. 'A review of the submerged prehistory and palaeolandscapes of the British Isles', in Proceedings of the Geologists' Association 26, 643–663.

[24] Bicket, A and Tizzard, L 2015. A Review of the Submerged Prehistory and Palaeolandscapes of the British Isles, Proceedings of the Geologist's Association Volume 126, Issue 6, p.643-663.

[25] Cameron, T D J, Crosby, A, Balson, P S, Jeffery, D H, Lott, G K, Bulat, J and Harrison, D J 1992. The Geology of the Southern North Sea. British Geological Survey United Kingdom Offshore Regional Report, London, HMSO.

[26] Coles, B 1998. Doggerland: a speculative survey. Proceedings of the Prehistoric Society 64, 45-81.

[27] Available at: newpalaeo(2).qxp (historicengland.org.uk). [Accessed Feb 2024]

[28] Medlycott M. (ed.). 2011. Research and Archaeology Revisited: a revised framework for the East of England. East Anglian Archaeology Occasional Papers 24

[29] Fraser, S., Ransley, J., Dix, J., and Blue, L., (Eds), 2013. People and the Sea: A Maritime Research Agenda for England. York, Council for British Archaeology.

26.3.23 Post the Holocene marine transgression, the archaeological potential of the southern North Sea, including the study area, shifts to the maritime history of the UK which is presented in summary below.

Marine Cultural Heritage

26.3.24 Maritime archaeological sites can be considered to comprise two broad categories; the remains of vessels that have been lost because of stranding, foundering, collision, enemy action and other causes, and those sites that consist of vessel-related material. Wreck related debris includes (but is not limited to) equipment lost overboard or deliberately jettisoned such as fishing gear, armaments and munitions, anchors or the only surviving remains of a vessel such as its cargo or ballast mound. Shipwrecks on the seabed provide an insight on the types of vessels used in the past, the nature of shipping activity in the wider area and the changing usage of the marine environment through different periods. Such remains are considered more likely in sediments which promote the preservation of wreck sites (e.g., finer grained sediments that are not subject to high levels of mobility), particularly where such sediments have seen limited, recent disturbance. Shipwreck inventories and documentary sources are usually biased towards the 18th century and later when more systematic reporting began. Therefore, there are few known historical records of wrecks from medieval or earlier periods.

26.3.25 Marine aviation archaeology assets comprise the remains or associated remains of military and civilian aircraft that have been lost at sea. Evidence is divided into three primary time periods based on major technological advances in aircraft design: Pre-1939; 1939-1945; and post-1945[6]. Maritime aircraft crash sites can retain a significant amount of material, whilst being an ephemeral target to identify, with the potential for in situ human remains. Aircraft are protected under the Protection of Military Remains Act 1986 and there is a significant possibility that aircraft material may be present within the study area.

26.3.26 The potential heritage receptors found in intertidal environments can range from any marine activity from the prehistoric period to early modern, such as fish traps, piers, sea defences located within the intertidal zone and coastal submerged landscapes.

Protected Sites

26.3.27 Wrecks protected under the Protection of Wrecks Act 1973[30], the Protection of Military Remains Act 1986[31] or the Ancient Monuments and Archaeological Areas Act 1979[32] are marked on appropriate UKHO Admiralty Charts. Interference or damage to these wrecks is considered a criminal offense.

26.3.28 There are no sites within the study area that have statutory designation under the above-mentioned legislations. If there were any aircraft material from crashed military aircraft within the study area, it would automatically be legally protected under the Protection of Military Remains Act 1986[31]

[Accessed Feb 2024]

[30] LUC (Land Use Consultants) 2018. National Historic Seascape Characterisation Consolidation. York: Archaeology Data Service. Available at: https://doi.org/10.5284/1046273 [Accessed Feb 2024]

[31] Chartered Institute for Archaeologists 2020. Standard and guidance for historic environment desk-based assessment. Published December 2014, updated in 2020. Available at https://www.archaeologists.net/sites/default/files/CIfAS%26GDBA_4.pdf [Accessed Feb 2024]

[32] Peeters, H., Murphy, P and Flemming 2009. North Sea Prehistory Research and Management Framework (NSPRMF) 2009. Available at https://historicengland.org.uk/images-books/publications/ns-prehistory-research-manage-framework/10278_north_sea_prehistory_web/ [Accessed Feb 2024]

26.3.29 The wreck site of Dunwich Bank lies approximately 5.5km south of the study area. This archaeological site is designated under the Protection of Wrecks Act 1973 and has a 300 m radius Restricted Area around the site. This highlights the potential for significant archaeological material to be present within the vicinity of the study area.

UKHO Records within the study area

26.3.30 There are 51 UKHO records located within the study area (see **Figure 26-1**).

26.3.31 Of these, 33 consist of wreck sites, which comprise: 13 records relating to unknown wreck sites, one of which relates to an aircraft crash site and another vessel that was lost during the First World War; and the remaining 20 records relate to named wreck sites which include one dating to the 17th century (HMS *Royal James* (possibly)),12 dating to the First and Second World War, one vessel lost between the wars, five modern losses and one of unknown date.

26.3.32 Eighteen records are listed as obstructions, comprising 14 relating to foul ground which include eight fishermen's fasteners, one wellhead, one area of metal debris and four unidentified anomalies. The remaining four obstructions are unidentified.

National Marine Heritage Record (NMHR) records within the study area

26.3.33 There are 23 NMHR point and line records located within the study area (shown on **Figure 26-1**). The point records correlate to three records detailing wreck sites (two of which are named); ten sites associated with military activities, including pill boxes and anti-tank cubes dating to the Second World War; with the remaining point records consisting of a fishermen's fastener, a small unidentified object, one area of foul ground and the remains of an alleged 13th - 17th century pottery kiln. The two line records relate to a 16th century earthen wall constructed to protect Southwold and an 18th century river lock on the Blyth Navigation. Four polygon records refer to an unidentified fishermen's fastener, a possible medieval pottery production site, a 19th century workshop and Southwold Pier built in 1900.

26.3.34 There are 53 NMHR polygon records located within, or intersecting, the study area. All but four of these refer to Recorded Losses, which are records for ships or aircraft that are known to have wrecked or crashed offshore, but for which the exact locations are not known. Recorded Losses are often grouped by area into Maritime Named Locations by the NMHR. For example, a Recorded Loss within this dataset may be based on the loss of a vessel or aircraft off the coast near Southwold or associated with a known navigational hazard such as a sand bank or rocks which may give rise to a falsely precise geographic coordinate for the record. The positional data of these records is therefore unreliable and serves only to provide an indication of the types of vessels that passed through the area and the wrecking incidents that are known to have occurred in the general region. Whilst the remains of these vessels and aircraft are expected to exist somewhere on the seafloor, their location is therefore considered unknown at present. As such, they signify the potential maritime and aviation resource and are not presented on a figure. There are 49 Recorded Losses, four of which relate to aircraft and 45 relate to shipping casualties. If any material pertaining to crashed military aircraft remains is encountered, this is automatically afforded statutory designation as 'protected places' under the Protection of Military Remains Act 1986[33]

[33] Chartered Institute for Archaeologists 2020. Standard and guidance for historic environment desk-based assessment. Published December 2014, updated in 2020. Available at https://www.archaeologists.net/sites/default/files/CIfAS%26GDBA_4.pdf [Accessed Feb 2024]

26.3.35 It should be noted that Historic England and its predecessor English Heritage did not historically record data beyond the 12NM limit.

Suffolk records within the study area

26.3.36 There are 78 Suffolk point, line and polygon records located within the study area.

26.3.37 This total correlates to five Grade II listed buildings, 15 find spots and artefact scatters dating from the Neolithic to the 20th century, flood defences, archaeological monuments and standing remains and a probable Saxon settlement. There are also 30 monument records consisting of military defence structures dating from the Second World War. This area of the British coastline would have seen a lot of military action due to its location in proximity to the East Coast war channels, indicating the high level of military defence structures recorded.

26.3.38 Specifically relevant to maritime remains, there are also the remains of two hulks dating to the post-medieval period. A total of 53 records also relate to Recorded Losses, all of which correlate with the NMHR data except two that record additional maritime losses.

26.3.39 Furthermore, there are an additional 161 records that relate to National Mapping Programme data recorded from aerial photographs along the coastline. These include 30 ditch features, 25 bank features and 106 structural features.

Historic Seascape Characterisation (HSC)

26.3.40 Data from the consolidated HSC national database (LUC 2018)[2] will be used to assess the seascape character of the region, with a focus on the eastern region. This section provides a summary of the seascape character.

26.3.41 The character of the southern element of the study area is divided into coastal, sea surface, water column, sea floor and sub-sea floor. Character types for these elements of the assessment located within the study area include navigation activity and hazards, ports and docks, recreation, industries (including energy, shipping, fishing, and telecommunications), palaeolandscapes, cultural topography, flood and erosion defence, and maritime safety.

Future baseline

26.3.42 The marine archaeology chapter within the PEI Report and ES will consider changes which may affect the future environment in the absence of the proposed Scheme. The future baseline will also take into account any developments that are likely to be present in the future baseline.

26.3.43 In the absence of the proposed Offshore Scheme there would be no change to known and potential marine heritage receptors beyond those caused by natural physical processes and natural deterioration. Physical effects to marine receptors are considered below in terms of likely impacts and effects.

26.3.44 Any changes that may occur during the design life span of the proposed Offshore Scheme should be considered in the context of both greater variability and sustained trends occurring on national and international scales in the marine environment.

26.4 Potential impacts

26.4.1 This section identifies the potential impacts that could occur during construction and operation.

Construction

26.4.2 The following impacts could occur during the construction phase:

- All seabed receptors have the potential to be damaged or destroyed if they directly interact with seabed preparation or construction activities. All damage to archaeological sites or material is permanent and recovery is limited to stabilisation or re-burial, limiting further interactions.
- Potential impacts to seabed, sub-seabed and intertidal marine heritage assets include both direct and indirect impacts.
- Direct impacts can include direct damage to structures, features, deposits and artefacts, and the disturbance of relationships between these elements and the wider surroundings. The setting of known and named wreck sites may also be impacted and in turn this could potentially affect the significance of such receptors.
- In the intertidal area, direct impact may occur during cable installation, using either trenched or trenchless methods including horizontal directional drill (HDD). The indirect interactions upon the known and potential marine archaeological receptors occur as a result of changes to hydrodynamic patterns and sediment transport regimes, where these changes have occurred as a consequence of activities and structures associated with the construction activities.
- Scour has an adverse impact on marine archaeological receptors whereby it can expose material which leads to increased rates of deterioration through biological, chemical, and physical processes. Alternatively, the redeposition of sediments following settling of sediment plumes can be beneficial to the preservation of marine archaeological receptors as greater sediment cover increases the potential for anaerobic environment, which inhibits a range of biological, chemical, and physical degradation processes. These interactions may occur from the clearance works during route preparation but may also occur through sediment deposition or the placement of non-burial cable protection on the seabed.
- Sources of direct physical impacts during construction include:
  - Pre-installation ground preparation including pre-lay surveys, cable route clearance, pre-sweeping and unexploded ordnance (UXO) clearance;
  - Trenched cable installation methods including cable lay and post lay burial, ploughs, jet trenching, mechanical trenching, controlled flow excavation and simultaneous cable lay and burial;
  - External cable protection where burial cannot be achieved including rock placement, concrete mattresses, rock/gravel/sand/grout bags and/or protection sleeves;
  - Cable and pipeline crossings, whereby the separation and protection structures may comprise concrete mattresses, protective sleeves on the high voltage direct current (HVDC) cables and/or pre- and post-lay rock placement;

  - Cable installation at landfall, using either trenched or trenchless methods including horizontal directional drill, micro-tunnel, or direct pipe; and
  - Vessel usage associated with the cable installation, including cable lay vessel(s), cable burial vessel(s), guard vessel(s), support vessel(s), rock placement vessel(s) and cable lay barge(s).
- Sources of indirect physical impacts during construction include:
  - Clearance works associated with route preparation;
  - Sediment deposition or the placement of non-burial cable protection on the seabed; and
  - Seabed sediment movement caused by propellers of construction vessels.

26.4.3 Sources of potential transboundary impacts, that extend across international boundaries, during construction include:

- Damage to shipwrecks, aircraft crash sites and other material of other nations that is now located within UK waters.

Operation

26.4.4 The following impacts could occur during the operational phase:

- Operational interactions will generally be limited to non-intrusive inspections. Such inspections will not lead to direct or indirect impacts on the marine archaeological receptors assuming there is no contact with the seabed. However, the propellers of operations vessels, depending on seawater depth, may still cause sediment movement on the seabed leading to indirect impacts to the marine archaeological resource, but these impacts are likely to be limited to very shallow coastal waters.
- Some activities associated with the maintenance phase may give rise to impacts similar to those considered during the construction phase. Maintenance will include cable repairs and replacement, where necessary. Remedial burial may be required which will use methods similar to those used during the construction phase, in particular jetting and placement of external cable protection.
- These interactions may result in the alteration of sediment transport regimes, indirectly interacting with marine heritage receptors, but may also lead to potential direct damage to known and unknown heritage receptors from sediment disturbance and deposition.
- Sources of direct physical impacts during operation include:
  - Use of vessels (from anchors and jack-up legs) (e.g., jack-up barge; multi cat; workboat; dive-support vessel; crane-barge; tug);
  - Other maintenance activities (e.g., biofouling removal; remotely operated vehicle (ROV)/diver inspection or repairs); and
  - Use of equipment to monitor devices in situ or other environmental parameters (e.g., ROV, cameras or acoustic devices) including thruster wash, dredger wash, direct impacts, or changes in local sediment coverage from these impacts.
- Sources of indirect physical impacts during operation include:

  - Changes in local scouring and sedimentation patterns.
- Sources of potential transboundary impacts during construction include:
  - Damage to shipwrecks, aircraft crash sites and other material of other nations that is now located within UK waters.

26.5 Design and control measures

26.5.1 As outlined in **Chapter 5** EIA Approach and Method, a standard hierarchical approach will be taken to mitigation.

26.5.2 The assessment of effects will take into account measures that are embedded into the proposed Offshore Scheme design, together with general good practice measures.

Design measures

26.5.3 Measures to be implemented as part of the Offshore Scheme have been split between those that can be incorporated into the design and control measures that impose industry standard best practice guidance.

26.5.4 Where it is not possible to avoid sensitive receptors, a number of measures will be embedded into the design to limit any effects.

26.5.5 Potential embedded design measures include:

- A desk-based survey and archaeological review of the marine geophysical survey and geotechnical datasets acquired in 2023 so that marine and intertidal historic assets can be identified and avoided during route development;
- If feasible, all cables will be installed in one trench. If not feasible, where practicable the two HVDC submarine cables will be bundled together and installed with a fibre optic cable in one trench with the metallic return cable and a separate fibre optic cable in a second trench;
- Where practicable cable burial shall be the preferred means of cable protection; and
- Cable route will be designed to minimise the risk of exposure by seabed mobility.

Control measures

26.5.6 Control measures to be implemented as part of the Offshore Scheme will include:

- The production of a marine archaeological Written Scheme of Investigation (WSI) and a Protocol for Archaeological Discoveries (PAD) to manage potential impacts and recommend appropriate mitigation strategies for unexpected discoveries; and
- The implementation of Archaeological Exclusion Zones (AEZs) around known wreck sites.

26.6 Scope of the assessment

26.6.1 This section identifies the potential for the proposed Offshore Scheme to have likely significant effects, taking into account the design and control measures identified in **Section 26.5.**

26.6.2 **Table 26-2** sets out the receptors within the study area that have been identified, whether there is a pathway for the impacts identified, the potential for significant effects and if the receptor is scoped in for the assessment.

26.6.3 All identified impacts are of relevance to both the Southwold and Walberswick Landfall options and both Submarine Cable Corridor options unless specified otherwise.

26.6.4 A precautionary approach has been taken and where there is no strong evidence base, insufficient baseline or the significance is uncertain at this stage the impact has been scoped into the EIA. Where there is a clear evidence base that the effect from the impact will not be significant, either alone or in combination with other plans and projects, the impact has been scoped out of the EIA.

Table 26-2 Proposed scope of the assessment

Project phase	Receptor	Impact	Potential for significant effect	Proposed to be scoped in/ out
Construction	Sub-seabed and seabed heritage receptors including known and potential palaeogeography and known and recorded maritime and aviation features.	Direct damage to subtidal marine archaeology heritage assets and their setting	Any direct disturbance of the seabed during seabed preparation works, cable lay and burial and other construction works could directly affect any marine archaeology and palaeo-environments present within the proposed Submarine Cable Corridor(s). These effects are likely to be localised, but should they occur, they could lead to adverse and irreversible damage to known or previously undiscovered heritage assets. Where asset locations are already known, measures can be adopted as part of the proposed mitigation to avoid and protect features. These include the establishment of AEZs and micro-siting of cables to avoid any known archaeological constraints identified in pre-construction surveys. To provide for unexpected discoveries encountered during construction activities a PAD will be adopted. This is a system for reporting and investigation unexpected archaeological discoveries, with a Retained Archaeologist providing guidance and advising on the implementation of the PAD.	Scoped In
Construction	Intertidal heritage receptors including known and potential palaeogeography, known, and recorded historic terrestrial marine and aviation features.	Direct damage to intertidal marine archaeology heritage assets and their setting	Any direct disturbance of the intertidal seabed during landfall installation, including HDD and trenching could directly affect any marine archaeology and palaeo-environments present within the intertidal area at the Landfall site. These effects are likely to be localised, but should they occur, they could lead to adverse and irreversible damage to known or previously undiscovered heritage assets. Where asset locations are already known, measures can be adopted as part of the proposed Scheme to avoid and protect features. These include the	Scoped In

Project phase	Receptor	Impact	Potential for significant effect	Proposed to be scoped in/ out
			establishment of AEZs and micro-siting of cables to avoid any known archaeological constraints identified in pre-construction surveys.	
Construction	Sub-seabed and seabed heritage receptors including known and potential palaeogeography and known and recorded maritime and aviation features.	Indirect changes to hydrodynamic and sedimentary regimes may expose receptors leading to increased rates of deterioration through biological, chemical, and physical processes.	Construction works and seabed preparation may disturb seabed sediments or cause changes in the sedimentary regime that leads to negative or adverse impacts on marine archaeology heritage receptors. For example, it can expose material which leads to increased rates of deterioration through biological, chemical, and physical processes. Alternatively, the redeposition of sediments following settling of sediment plumes can be beneficial to the preservation of marine archaeological receptors as greater sediment cover increases the potential for anaerobic environment, which inhibits a range of biological, chemical, and physical degradation processes. The assessment of significance of impacts will be informed by the marine physical environment EIA.	Scoped In
Construction	Seabed and sub-seabed heritage receptors including palaeogeography, known and potential maritime and aviation features with interest that extends across international boundaries.	Transboundary impacts through direct and indirect impacts, to features.	Direct and indirect impacts have the potential to cause transboundary effects, extending across international boundaries. For example, many Palaeogeographic features are of international interest. Additionally transboundary effects may occur where wrecks 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 or aircraft crash sites lost in UK waters.	Scoped In
Operation	Sub-seabed and seabed heritage receptors including	Direct damage to intertidal marine archaeology	Activities such as re-burial of cable sections; maintenance and reinstatement of any degrading rock or other protection features; vessel and ROV propellor or thruster wash, and	Scoped In

Project phase	Receptor	Impact	Potential for significant effect	Proposed to be scoped in/ out
	known and potential palaeogeography and known and recorded maritime and aviation features.	heritage assets and their setting	vessel usage such as jack-ups, during the operation phase will directly disturb the sub-seabed and seabed and is likely to cause damage to receptors. The effects are likely to be of lower magnitude than during installation, as micro-siting of cables will have already been undertaken to avoid archaeological assets identified during installation. However, there is still the potential that previously unidentified assets or assets which had previously been avoided could be impacted.	
Operation	Sub-seabed and seabed heritage receptors including known and potential palaeogeography and known and recorded maritime and aviation features.	Indirect changes to hydrodynamic and sedimentary regimes may expose receptors leading to increased rates of deterioration through biological, chemical, and physical processes.	If the cables are installed correctly the likelihood of them requiring maintenance and repair is significantly reduced. However, there remains the potential that localised repair works, or remedial external cable protection may be required. Like installation, the methods deployed for cable repair although localised have the potential to have similar indirect impacts on marine archaeology heritage assets.	Scoped In
Operation	Seabed and sub-seabed heritage receptors including palaeogeography, known and potential maritime and aviation features with interest that extends across	Transboundary impacts through direct and indirect impacts, to features.	Direct and indirect impacts, such as cable repairs or resulting changes to sedimentary regimes, have the potential to cause transboundary effects, extending across international boundaries. For example, many Palaeogeographic features are of international interest. Additionally transboundary effects may occur where wrecks of non-British nationality are subject to impact from development. Such wrecks may fall within the jurisdiction of	Scoped In

Project phase	Receptor	Impact	Potential for significant effect	Proposed to be scoped in/ out
	international boundaries.		another country, and may include, for example foreign warships or aircraft crash sites lost in UK waters.	

26.7 Assessment methodology

Data sources

Desk study data

26.7.1 Desk based reviews of publicly available data sources (literature and Geographical Information System (GIS) mapping files) will be used to describe the baseline environment alongside the site-specific data outlined below. **Table 26-3** lists the key data sources which will be used in the EIA assessment.

Table 26-3 Key publicly available data sources for marine archaeology

Data Source	Description
UKHO	Data for charted wrecks and obstructions.
NMHR	Maintained by Historic England, comprising data for terrestrial and marine archaeological sites, find spots and archaeological events.
Suffolk HER	Dataset comprising a database of recorded archaeological sites, find spots, and archaeological events.
NHLE	Maintained by Historic England, comprising data of designated heritage assets including sites protected under the Protection of Military Remains Act 1986 and the Protection of Wrecks Act 1973.
HSC	LUC's 2018 Historic Seascape Characterisation (HSC): Consolidating the National HSC Database[2] which amalgamates individual HSC assessment into one overall dataset.
Grey Literature	North Sea Prehistory Research and Management Framework 2009[3].
Grey Literature	Research and Archaeology Revisited: A revised framework for the East of England 2011[28].

Survey data

26.7.2 Following submission of the EIA Scoping Report, the baseline description for marine archaeology will be further enhanced following the archaeological assessment of geophysical survey data obtained from the study area. The data will be archaeologically assessed to provide a full assessment of the known marine heritage receptors. Further desk-based research will be used to understand the potential for marine heritage receptors being located within the selected Submarine Cable Corridor. The setting and significance of the known and potential seabed features will also be assessed.

26.7.3 Furthermore, the palaeogeography baseline summary will be based on the geoarchaeological review of geotechnical and geophysical datasets gathered for the proposed Scheme. This information will be further enhanced by a review of geological mapping of seabed sediments, solid geology, and bathymetry from published BGS sources. The HSC of the region will also be assessed following review of current HSC reporting.

26.7.4 An intertidal walkover survey will be undertaken at the selected Landfall Site to ground truth previously recorded heritage receptors and to identify any new receptors that may be of relevance to the assessment.

26.7.5 The results of these surveys will be incorporated into a full desk-based technical assessment, which will be undertaken in conjunction with data obtained from the UKHO, and national and local archive sources. Relevant mapping including Admiralty Charts, historic maps and Ordnance Survey together with documentary sources and grey literature held by Wessex Archaeology, and those available through the Archaeological Data Service and other websites, will also be utilised for the marine archaeological technical assessment.

26.7.6 The results of which will be used to prepare a robust chapter for the ES, clearly presenting the information regarding the known and potential marine heritage receptors, with a discussion as to their archaeological value and sensitivity to impact. This will be used to inform the next strategic phase of the project in a timely and appropriate manner.

Legislation, policy and guidance

26.7.7 Legislation and policy relevant to the proposed Scheme and this chapter is outlined in **Chapter 4** Legislation and Policy Overview and **Appendix 4-A** National Policy, **Appendix 4-B** Environmental Legislation and **Appendix 4-C** Local Policy.

26.7.8 Relevant guidance and standards that have informed the scoping process are listed below (but not limited to) and will also be taken into account as part of the assessment:

- Identifying and Protecting Palaeolithic Remains: Archaeological Guidance for Planning Authorities and Developers (English Heritage (now Historic England) 1998)[34];
- Military Aircraft Crash Sites: Guidance on their significance and future management (English Heritage (now Historic England) 2002)[35];
- JNAPC Code of Practice for Seabed Development (Joint Nautical Archaeology Policy Committee and The Crown Estate 2006)[36];
- Conservation Principles, Policies and Guidance for the Sustainable Management of the Historic Environment (English Heritage (now Historic England) 2008)[37];
- Guidance for Assessment of Cumulative Impacts on the Historic Environment from Offshore Renewable Energy (Oxford Archaeology 2008);
- Our seas – a shared resource: High level marine objectives (DEFRA 2009)[38];

[34] English Heritage (1998) Identifying and Protecting Palaeolithic Remains: Archaeological Guidance for Planning Authorities and Developers.

[35] English Heritage (2002) Military Aircraft Crash Sites: Guidance on their significance and future management.

[36] Joint Nautical Archaeology Policy Committee (2006) Code of Practice for Seabed Developers, Joint Nautical Archaeology Policy Committee. Available at http://www.jnapc.org.uk/Code%20of%20Practice%20No.2.pdf (Accessed May 2023)

[37] English Heritage (2008) Conservation Principles, Policies and Guidance for the Sustainable Management of the Historic Environment. Updated consultation draft 10/11/2017

[38] Department for Environment, Food and Rural Affairs (2009) Our Seas – A shared resource: High level marine objectives.

- Offshore Geotechnical Investigations and Historic Environment Analysis: Guidance for Renewable Energy Sector (Gribble & Leather 2011)[39];
- Ships and Boats: Prehistory to Present: Designation Selection Guide (English Heritage (now Historic England), 2012)[40];
- Marine Geophysics Data Acquisition, Processing, and Interpretation Guidance Notes (English Heritage and Bates, R., Dix, J. K., Plets, R. 2013)[41];
- Protocol for Archaeological Discoveries: Offshore Renewables Projects ('ORPAD') (The Crown Estate 2014);
- Geoarchaeology: Using Earth Sciences to Understand the Archaeological Record (Historic England (now Historic England) 2015)[42];
- Managing Lithic Scatters: Archaeological Guidance for planning authorities and developers (English Heritage, (now Historic England) 2000)[43];
- Archaeological Written Scheme of Investigation for Offshore Wind Farm Projects (The Crown Estate 2021)[44]; and
- Curating the Palaeolithic (Historic England 2023)[45].

Assessment method

26.7.9 **Chapter 5** EIA Approach and Method sets out the standard EIA methodology and matrixes to be used for the assessment. This section provides a summary of the EIA methodology specifically relevant to this chapter.

26.7.10 Assessment of cumulative and combined effects are discussed in **Chapter 29** Cumulative and Combined effects of the Project.

Assessment criteria and assignment of significance

26.7.11 The UK Marine Policy Statement[46] describes a heritage asset (including archaeological receptors) as holding a degree of significance, where significance relates to the heritage interest of an asset that may be archaeological, architectural, artistic, or historic.

26.7.12 For the significance of any given impact to be fully understood, the sensitivity of any receptors that may be impacted need to be considered along with the magnitude of the effect. The criteria used to assess the significance of an impact is presented below.

[39] COWRIE 2011. Offshore Geotechnical Investigations and Historic Environment Analysis: Guidance for the Renewable Energy Sector. Southampton: Emu.

[40] English Heritage 2012. Designation Selection Guide, Ships and Boats: Prehistory to Present. London: Historic England.

[41] Plets, R., Dix, J. and Bates, R. 2013. Marine geophysics data acquisition, processing, and interpretation: Guidance notes. London: English Heritage.

[42] English Heritage 2015. Geoarchaeology: Using Earth Sciences to Understand the Archaeological Record.

[43] English Heritage 2000. Managing Lithic Scatters: Archaeological Guidance for planning authorities and developers.

[44] The Crown Estate 2021. Archaeological Written Schemes of Investigation for Offshore Wind Farm Projects. Prepared by Wessex Archaeology. Available at https://www.thecrownestate.co.uk/media/3917/guide-to-archaeological-requirements-for-offshore-wind.pdf [Accessed May 2023].

[45] Historic England 2023. Curating the Palaeolithic. Historic England, Swindon

[46] Tizzard, L, Bicket, A R, Benjamin, J, and De Loecker, D 2014. A Middle Palaeolithic Site in the Southern North Sea: Investigating the Archaeology and Palaeogeography of Area 240. Journal of Quaternary Science 29, 698–710.

Receptor Sensitivity

26.7.13 The sensitivity of an historic environment receptor is a function of its capacity to accommodate change and reflects its ability to recover if it is affected. The sensitivity of the receptor will be assessed with regard to the following factors:

- Value – a measure of the receptor's importance, rarity and worth;
- Adaptability – the degree to which a receptor can avoid or adapt to an effect;
- Tolerance – the ability of a receptor to accommodate temporary or permanent change without significant negative impact; and
- Recoverability – the temporal scale over and extent to which a receptor will recover following an effect.

26.7.14 The National Planning Policy Framework[5] states that heritage assets should be recognised as "*an irreplaceable resource*" and to "*conserve them in a manner appropriate to their significance*".

26.7.15 Archaeological receptors cannot typically adapt, tolerate, or recover from physical impacts resulting in material damage or loss caused by development. Consequently, the sensitivity of each receptor is predominantly quantified only by their value. Where receptors are considered to be capable of adapting to, tolerating, or recovering from indirect impacts, these factors were incorporated into an assessment of their sensitivity.

Value of marine archaeological receptors

26.7.16 Based on Historic England's Conservation Principles, Policies and Guidance for the Sustainable Management of the Historic Environment 14[37], the significance of a historic asset "*embraces all the diverse cultural and natural heritage values that people associate with it, or which prompt them to respond to it*".

26.7.17 Within this chapter, significance is weighted by consideration of the potential for the asset to demonstrate the following value criteria:

- Evidential value – deriving from the potential of a place to yield evidence about past human activity;
- Historical value – deriving from the ways in which past people, events and aspects of life can be connected through a place to the present. It tends to be illustrative or associative;
- Aesthetic value – deriving from the ways in which people draw sensory and intellectual stimulation from a place; and
- Communal value – deriving from the meanings of a place for the people who relate to it, or for whom it figures in their collective experience or memory. Communal values are closely bound up with historical (particularly associative) and aesthetic values but tend to have additional and specific aspects.

26.7.18 It should be noted that, while designation indicates that a receptor has been identified as being of high value, non-designated archaeological assets are not necessarily of lesser value. Consequently, non-designated receptors that can be demonstrated to be of equivalent value to designated sites are considered to be of equivalent significance.

26.7.19 The nature of the marine archaeological resource is such that there is a high level of uncertainty concerning remains on the seabed. Often data regarding the nature and

extent of sites are limited or out of date and, as such, the precautionary principle has been applied to all aspects of archaeological impact assessment.

26.7.20 The value of known archaeological assets were assessed on a five-point scale using professional judgement informed by criteria provided in **Table 26-4** below.

Table 26-4 Criteria to assess the archaeological value of assets

Value	Definition
High	Above average example and/or high potential to contribute to knowledge and understanding and/or outreach. Assets with a demonstrable national dimension to their importance are likely to fall within this category. Receptors with a demonstrable international dimension to their importance are likely to fall within this category. All other wrecked ships and aircraft with statutory protection under the Protection of Wrecks Act 1973, Ancient Monuments and Archaeological Areas Act 1979 or Protection of Military Remains Act 1986, plus as-yet undesignated sites that are demonstrably of equivalent archaeological value. Palaeogeographic features with demonstrable potential to include artefactual and/or palaeoenvironmental material, possibly as part of a prehistoric site or landscape.
Medium	Average example and/or moderate potential to contribute to knowledge and understanding and/or outreach. Receptors with a demonstrable district level dimension to their importance are likely to fall within this category. Includes wrecks of ships and aircraft that do not have statutory protection or equivalent significance, but have moderate potential based on a formal assessment of their importance in terms of build, use, loss, survival, and investigation. Prehistoric deposits with moderate potential to contribute to an understanding of the palaeoenvironment.
Low	Below average example and/or low potential to contribute to knowledge and understanding and/or outreach. Receptors with a demonstrable local dimension to their importance are likely to fall within this category. Includes wrecks of ships and aircraft that do not have statutory protection or equivalent significance, but have low potential based on a formal assessment of their importance in terms of build, use, loss, survival, and investigation. Prehistoric deposits with low potential to contribute to an understanding of the palaeoenvironment.
Negligible	Poor example and/or little or no potential to contribute to knowledge and understanding and/or outreach. Assets with little or no surviving archaeological interest.
Unknown	There is not presently enough information available about the site to assess its value.

26.7.21 The perceived value of each marine archaeological receptor is generally assessed and assigned on a site-by-site basis, using professional judgement and past experience, and with reference to the criteria listed in **Table 26-4** . Furthermore, On the Importance of Shipwrecks[47], suggests importance can be assessed through the following criteria: build, use, loss, survival, and investigation. In general, the Selection Guide on Boats and Ships in Archaeological Contexts[48] drew some generalisations about importance based on the age of the wreck:

- Pre-1500 AD: this covers the period from the earliest Prehistoric evidence for human maritime activity to the end of the medieval period, circa 1508. Little is known of watercraft or vessels from this period and archaeological evidence of them is so rare that all examples of craft are likely to be of special value.
- 1501-1815: this encompasses the Tudor and Stuart periods, the English Civil War, the Anglo-Dutch Wars and later the American Independence and French Revolutionary Wars. Wreck and vessel remains from these periods are also quite rare and can be expected to be of special value.
- 1816-1913: this period witnessed great changes in the way in which vessels were built and used, corresponding with the introduction of metal to shipbuilding, and steam to propulsion technology. Examples of watercraft from this period are more numerous and as such, it is those that specifically contribute to an understanding of these changes that should be regarded as having special value.
- 1914-1945: this period encompasses the First World War, the Interwar years, and the Second World War. This date range contains Britain's highest volume of recorded boat and ships losses. Those which might be regarded as having special interest are likely to relate to technological changes and to local and global activities during this period.
- Post 1945: the final period extends from 1946 through the post-war years to the present day. Vessels from this date range would have to present a strong case if they are to be considered of special interest.

26.7.22 According to this composite timeline, vessels that pre-date 1816 are likely to be considered of special value on the basis of their rarity and subsequent national and international value in our understanding of maritime activity and shipping movements during these periods.

26.8 Assumptions & limitations

26.8.1 The assessment has been undertaken based on the following assumptions:

- This EIA Scoping Report has been collated based on a range of publicly available data and information only. It is assumed that the data collated is accurate. The data will be supplemented with additional data as part of the EIA process.
- In the absence of data, a precautionary approach has been taken and professional judgement, based on experience of similar linear schemes, has been used where required to inform the scope of the assessment.

[47] Wessex Archaeology 2006. On the importance of shipwrecks, final report. York: Archaeology Data Service (distributor). Available at https://doi.org/10.5284/1000313 (Accessed January 2023).

[48] Wessex Archaeology 2008a. Selection Guide: Boats and Ships in Archaeological Contexts. Salisbury: unpublished report.

- Data used to compile this chapter comprises elements of secondary information derived from a variety of sources, only some of which have been directly examined for the purposes of this appraisal. The assumption is made that the secondary data, as well as that derived from other secondary sources, are reasonably accurate.
- The records held by the UKHO, National Record of the Historic Environment (NRHE), Suffolk HER and the other sources used in this appraisal are not a record of all surviving cultural heritage assets, rather a record of the discovery of a wide range of archaeological and historical components of the marine historic environment. The information held within these is not complete and does not preclude the subsequent discovery of further elements of the historic environment that are, at present, unknown. In particular, this relates to buried archaeological features.

Contents

27. Climate Change and Carbon

27.1 Introduction

27.1.1 This chapter outlines the proposed scope and methodology to be undertaken for Climate Change and Carbon. It identifies the Climate receptors of relevance and considers the potential impacts from the construction and operation of the LionLink Interconnector (hereafter referred to as 'proposed Scheme'). A review of relevant guidance and policy has been undertaken together with a desk-based assessment, to inform the proposed scope and methodology.

27.1.2 It includes an assessment of both the onshore and offshore elements of the proposed Scheme. Greenhouse Gas (GHG) emissions are inherently a transboundary consideration as the single receptor is the global atmosphere and all net emissions of GHG to the atmosphere will contribute to climate change.

27.1.3 The three elements within the Climate Change assessment are as follows:

- GHG Emissions assessment – this will identify the estimated GHG emissions associated with construction, operation & maintenance (i.e. whole lifecycle GHG emissions) in comparison with the current and future baseline. It will also identify mitigation measures to reduce GHG emissions through the life cycle of the proposed Scheme. The term 'carbon' is used interchangeably to refer to GHG emissions.
- Climate Change Resilience (CCR) assessment – this will identify the changes in climate expected in the future with regards to the operational life of the proposed Scheme, and assess how the proposed Scheme may be exposed to additional vulnerability arising from these changes.
- In-combination Climate Change Impact (ICCI) assessment – this will consider where the future changed climate may increase environmental impacts from the proposed Scheme on all environmental receptors, beyond those impacts arising from present climate conditions.

27.1.4 This chapter is supported by the following figures:

- **Figure 1-1** Proposed Scheme Scoping Boundary;
- **Figure 1-2** Proposed Onshore Scheme Boundary;
- **Figure 1-3** Proposed Onshore Scheme Scoping Boundary and Scheme Components; and
- **Figure 1-4** Proposed Offshore Scheme Boundary.

27.1.5 There may be interrelationships between the potential effects on Climate Change and Carbon and other disciplines. Therefore, please also refer to the following chapters:

- **Chapter 6** Air Quality – there is a strong relationship between GHG emissions and air quality, similar inputs will be used in the assessment;
- **Chapter 8** Ecology and Biodiversity – outputs from the habitat designations for the biodiversity assessment will be used in the land use GHG emissions assessment;

- **Chapter 12** Hydrology, Hydrogeology and Drainage – one of the main considerations for the CCR assessment will be water and increased precipitation rates;
- **Chapter 15** Traffic and Transport – GHG calculations may use outputs from the traffic and transport assessment; and
- **Chapter 17** Material Assets and Waste – the GHG emissions assessment may use outputs from the materials and waste assessment.

27.2 Consultation and engagement

27.2.1 Consideration has been given to responses received at Non-Statutory Consultations held in 2022 and 2023 in preparing this scoping chapter. Responses relating to Climate Change and Carbon have been received from the following:

- Suffolk County Council (SCC);
- East Suffolk Council (ESC);
- Alde and Ore Association;
- Suffolk Wildlife Trust;
- Royal Society for the Protection of Birds (RSPB); and
- Parish and Town Councils: Aldeburgh Town Council, Dunwich Parish Council, Kelsale-cum-Carlton Parish Council, Benhall and Sternfield Parish Council, Friston Parish Council, Leiston-cum-Sizewell Town Council, Reydon Parish Council, Southwold Town Council.

27.2.2 The main themes reported as part of the Non-Statutory Consultations were:

- Achieving UK Government's net zero target;
- Delivering 'nature friendly net zero';
- Use of SF6 gases in the substation; and
- Climate change resilience such as sea level rise, coastal erosion and flooding.

27.2.3 Engagement will be undertaken as required with relevant stakeholders in relation to the proposed Scheme to obtain any information that they hold to supplement the assessment and to seek their views with regards to the evolving design.

27.2.4 In addition, engagement will be undertaken with non-statutory stakeholders as required so that their specialist local views and expertise can be considered as part of the environmental impact assessment (EIA) process.

27.3 Baseline conditions

27.3.1 The study area will be reviewed and, as appropriate, refined for the assessment in the Preliminary Environmental Information (PEI) Report and Environmental Statement (ES) with only one Landfall and one High Voltage Direct Current (HVDC) Underground Cable Corridor being taken forward. The study area will be based on the proposed Order limits in the ES.

27.3.2 The following sections present the existing baseline established at scoping. There are currently two options being considered for the proposed Landfall Site and associated HVDC Underground Cable Corridor, which are shown in **Figure 1-2** and **Figure 1-3**. Baseline information is presented for the two options below.

Greenhouse gases

Study area and baseline

27.3.3 The spatial study area for the GHG emissions assessment includes sources and removals of GHG emissions arising from pre-construction, construction, operation and maintenance of the proposed Scheme, as set out in **Section 27.6** Scope of the assessment.

27.3.4 Aligning with Institute of Environmental Management and Assessment (IEMA) (2022) guidance[1], the baseline (Do-Minimum (DM) scenario) is the reference against which the impact of the proposed Scheme will be compared and assessed. Assumptions are made on the projected cumulative GHG emissions over the study period under this DM scenario. The DM scenario comprises the cumulative GHG emissions within the study area without implementation of the proposed Scheme.

27.3.5 The GHG baseline has been taken as a continuation of the current situation in which the proposed Scheme is not delivered.

27.3.6 The proposed Scheme Scoping Boundary which covers both the proposed Onshore scheme and the proposed Offshore scheme (hereafter referred to as 'the Scoping Boundary') is shown on **Figure 1-1**.

27.3.7 The onshore aspect comprises predominately arable land, managed hedgerows, and trees. Infrastructure within the boundary includes two existing 400kV overhead lines that connect the existing Sizewell substation to Bramford substation, the railway line connecting Saxmundham to Leiston, the A12, and the Sizewell Nuclear Site to the east. The proposed Scheme would not be expected to result in any changes in GHG emissions from other discrete infrastructure within the Scoping Boundary and therefore will not be considered in the baseline. As the land use within the Scoping Boundary is mainly arable there are minimal emissions of GHG emissions which are associated with land management and machinery.

27.3.8 There may be changes in emissions associated with land-use and carbon sequestration in relation to the offshore aspects of the site such as due to any changes in habitats in the area near landfall and offshore cabling as a result of the proposed Scheme. This will be reviewed and assessed as part of the PEI Report and ES. There are no other emissions associated with the baseline in relation to the offshore aspects of the site.

Climate change resilience

Study area and baseline

27.3.9 The study area for the CCR assessment is based on the construction footprint of the proposed Scheme (both the proposed Onshore scheme and the proposed Offshore scheme) and includes temporary and completed works within the Scoping Boundary.

[1] Institute of Environmental Management, 2022. Institute of Environmental Management. [Online] Available at: https://s3.eu-west-2.amazonaws.com/iema.net/documents/knowledge/policy/impact-assessment/J35958_IEMA_Greenhouse_Gas_Guidance-1.pdf [Accessed February 2024]

The assessment includes all potential climate hazards for infrastructure and assets associated with the proposed Scheme and the assessment of climate effects are assessed over the assumed 60-year appraisal period for the proposed Scheme (2027-2069). The proposed Scheme has a design life of 40 years, however in line with the guidance outlined in IEMA (2020) Climate Change Resilience and Adaptation Guidance[2] which states that many developments remain in situ long after the original development has fulfilled its objectives, an appraisal period of 60 years has been assumed to take into account construction, ongoing maintenance to extend the design life.

27.3.10 The Met Office generates climatologies for different areas of the UK, known as climate regions, including historical regional climate information[3]. The proposed Onshore part of the Scoping Boundary is located within the Eastern England climate region. The availability of similar climate change data for offshore regions is limited however this will be reviewed in the PEI Report and ES.

27.3.11 High-level climate observations for Eastern England over a 30-year averaging period between 2081-2010 are presented in **Table 27-1**.

27.3.12 The study area will be reviewed and refined for the assessment in the PEI Report and ES.

Table 27-1 High level climate observations for the Eastern England climate region (1981-2010) (Source: Met Office, 2016)

Climatic conditions	Climate observations 1981-2010
Temperature	Mean annual temperatures varied from around 9.5°C to just over 10.5°C. January (winter) mean daily temperatures ranged from 6 °C to 8°C, whilst July (summer) mean daily maximum temperatures were approximately 20°C to 23°C.
Sunshine	Average annual sunshine totals were approximately 1,450 to 1,600 hours, with average hours decreasing further from the coast. On average, December is the month with the least sunshine and July is the sunniest.
Rainfall	Annual average rainfall near the proposed Scheme was less than 700mm. In the area, rainfall tends to be evenly distributed across the region and the year, and is one of the driest areas in the country.
Snowfall	Snow usually occurs between December and March, with under 20 days of snowfall in the south east of the area to over 30 on higher ground. The average number of days with snow lying varies from six to 15.
Wind	Eastern England is very sheltered. Winds are usually stronger in the day than the night and wind speeds reduce moving away from the

[2] IEMA (2020), Environmental Impact Assessment Guide to: Climate Change Resilience and Adaptation. Available at: https://www.iema.net/resources/reading-room/2020/06/26/iema-eia-guide-to-climate-change-resilience-and-adaptation-2020 [Accessed February 2024]

[3] Met Office, 2016. *Met Office.* [Online] Available at: https://www.metoffice.gov.uk/binaries/content/assets/metofficegovuk/pdf/weather/learn-about/uk-past-events/regional-climates/ [Accessed February 2024]

Climatic conditions	Climate observations 1981-2010
	coast. On average, wind blows from the south west, however the strongest wind gusts blow from the south and north west. Wind speeds vary between 70 and 40 knots.
Air Frost	Air frost occurs when the temperature at 1.25m above the ground falls below 0°C. The average number of days with air frost varies from 30 days per year at the coast to 55 days per year inland.
Ground Frost	Ground frost occurs when a temperature below 0°C is measured on a grass surface. The ground frost generally occurs between October and April but there are occasional records of ground frost in July and August at inland locations.

27.3.13 **Table 27-2** shows historic weather data for 1991–2020 from the Met Office weather station in Coltishall[4], located approximately 42km north of the Scoping Boundary. These values will be used as a baseline for later comparison with future climate projections in the area surrounding the proposed Scheme in the PEI Report and ES.

Table 27-2 Historic weather data, monthly averages, for Coltishall (42km N of the proposed Scheme)

Month	Maximum temperature (C)	Minimum temperature (C)	Days of air frost	Sunshine (hours)	Rainfall (mm)	Days of rainfall 1mm	Monthly mean wind speed at 10m (knots)
January	7.5	1.8	8.5	58.9	55.1	11.5	10.1
February	8.1	1.7	8.5	80.4	45.2	11.0	9.9
March	10.4	3.0	5.0	129.6	46.2	9.2	9.4
April	13.2	4.8	2.1	174.5	38.6	8.8	8.4
May	16.3	7.8	0.3	207.0	46.5	7.9	8.2
June	19.2	10.5	0.0	181.3	63.2	9.5	7.5
July	21.7	12.7	0.0	205.6	57.5	9.4	7.4
August	21.7	12.5	0.0	184.8	66.5	9.2	7.2
September	18.9	10.5	0.0	154.4	59.6	9.4	7.6
October	14.9	7.8	0.6	113.1	70.4	11.4	8.3
November	10.8	4.3	3.4	66.5	71.2	12.8	8.7
December	8.	2.3	8.4	55.2	64.0	12.9	9.8

[4] Met Office, *Met Office.* [Online] Available at: https://www.metoffice.gov.uk/research/climate/maps-and-data/uk-climate-averages/u12unggmv [Accessed February 2024]

Month	Maximum temperature (C)	Minimum temperature (C)	Days of air frost	Sunshine (hours)	Rainfall (mm)	Days of rainfall 1mm	Monthly mean wind speed at 10m (knots)
Annual	14.24	6.7	36.8	1611.4	683.9	123.0	8.5

27.3.14 IEMA (2020) Guidance on Climate Change Resilience and Adaptation[5] recommends the use of the Met Office's UK Climate Projections 18 (UKCP18)[6] when defining the future baseline. UKCP18 data is the most comprehensive and widely used data set of climate projections covering the UK.

27.3.15 UK Climate Projections over the next 60 years show the following long-term seasonal averages and trends for the UK:

- Warmer, drier summers;
- Milder, wetter winters;
- An increase in annual average temperature;
- Fewer days with snow and frost;
- Increased likelihood of a higher frequency of very hot days;
- Increased likelihood of intense downpours of rain (particularly in summer); and
- An increase in dry spells.

27.3.16 Moreover, it is likely, although with increased uncertainty, that there will be a heightened probability of the following extreme weather events due to climate change:

- Short periods of intense cold weather (still expected due to natural variability); and
- An increase in the frequency of storms and high winds (generally considered as difficult to predict with any certainty).

27.3.17 Under the high emissions scenario (Representative Concentration Pathway (RCP) 8.5), the average warming experienced in the UK could be as high as 5.4°C in summer by 2070, with winters experiencing an average increase of 4.2°C. The high emissions scenario also predicts that on average the UK could experience a 35% increase in the volume of winter precipitation and a 47% decrease in summer precipitation. However, despite the decrease in overall precipitation volumes, projections indicate an increase in the intensity of heavy summer rainfall events. High or heavy rainfall events are linked to increased surface water on roads and an increased risk of flooding.

[5] IEMA (2020), Environmental Impact Assessment Guide to: Climate Change Resilience and Adaptation. Available at: https://www.iema.net/resources/reading-room/2020/06/26/iema-eia-guide-to-climate-change-resilience-and-adaptation-2020 [Accessed February 2024]

[6] Met Office, 2018. *Met Office.* [Online] Available at: https://ukclimateprojections-ui.metoffice.gov.uk/products [Accessed February 2024]

In-combination climate change impacts

Study area and baseline

27.3.18 The study area for the ICCI Assessment is the study area for each environmental discipline as described in the individual topic chapters, see **Chapters 6 to 29**.

27.3.19 The baseline for the ICCI Assessment will be the baseline as described in each of the environmental discipline chapters.

27.4 Potential impacts

27.4.1 This section identifies the potential impacts that could occur as a result of the proposed Onshore Scheme during construction and operation based on the baseline information collected for EIA scoping.

Greenhouse gas

27.4.2 The proposed Scheme would lead to the generation of GHG emissions during the proposed Scheme lifecycle from the potential sources identified below.

Construction

27.4.3 The following impacts may occur during the construction phase:

- An increase in emissions associated with the product stage (including raw material supply, transport and manufacture (A1-3)):
  - Embodied GHG emissions associated with the required raw materials;
  - Vehicle emissions for transportation prior to factory gate; and
  - Industrial and energy emissions in the manufacture of materials.
- An increase in emissions associated with the construction process stage (including transport to and from works site as well as construction and installation processes (A4-A5)):
  - Vehicle emissions for transportation of materials to site;
  - Energy and fuel use in construction processes; and
  - Construction worker transport.
- an increase in emissions from land use is also possible due to disruption/release from existing carbon stocks in land impacted by construction.

Operation

27.4.4 The following impacts may occur during the operational phase:

- Emissions associated with operation and maintenance (including repair and replacement) (B2- B4):
  - Energy consumption for infrastructure operation;
  - Activities of organisations conducting routine maintenance including extraction, manufacture, transportation and installation energy use; and

  - Embodied GHG emissions associated with materials used for repair and replacement activities.
- Carbon sequestration/removal may arise where new habitat is created as part of the proposed Scheme.

Climate change resilience

Construction

27.4.5 Changes to the climate and extreme weather events have the potential to result in the following impacts on the proposed Scheme in the construction phase:

- Heavy rain could result in flooding on site or on delivery routes, resulting in delays to deliveries of construction material which could impact the construction programme;
- Increased temperatures and prolonged periods of hot weather could result in damage to construction materials, increased dust generation and Increased HVAC system power demand;
- High winds, gales and increased extreme weather events could result in delays to the construction programme or damage to materials; and
- Snow and ice could result in damage to structures and materials.

27.4.6 As the construction period is in the short term (2027-2029), climate change is not expected to result in significant changes.

Operation

27.4.7 During the operational phase of the proposed Scheme, there is potential for the anticipated changes to the climate and extreme weather events to impact on the proposed Scheme. The following impacts may occur:

- Heavy rain could result in damage to structures;
- High winds, gales and increased extreme weather events could result in damage to structures and increased requirement for maintenance and repair and the associated costs;
- Increased temperatures and prolonged periods of hot weather could result in heat stress on electronic equipment and increased frequency of maintenance and repair/replacement;
- Increased occurrence of lightning could result in structural damage to infrastructure, power surges and tripping electricity breakers and fires; and
- Snow and ice could result in damage to structures and materials.

In-combination climate change impacts

Construction

27.4.8 There are potential impacts associated with climate change for onshore and offshore environmental topics scoped into the EIA in the construction phase. For example:

- Air Quality

- Hotter and drier conditions could exacerbate dust generation and concentrations of certain air pollutants. Increased wind speed could influence dispersion of pollutants. Wetter conditions could suppress dust movement.

- Ecology and Biodiversity
  - Drier conditions, increased wind speed, flooding and variation in temperature and rainfall can result in habitat loss and fragmentation and may affect the ability of certain species to adapt.
- Noise
  - Increased temperature and changes in humidity in summer could result in a greater number of people sleeping with windows open. These climate changes can also alter propagation characteristics of sound through air and may lead to increased building services demand to cool buildings which may produce more noise.

27.4.9 As the construction period is in the short term (2027-2029), climate change is not expected to result in significant changes to any of the environmental topics scoped into the EIA.

Operation

27.4.10 There are potential impacts associated with climate change for all onshore and offshore environmental topics scoped into the EIA. For example:

- Ecology and Biodiversity:
  - A reduction in summer rainfall is likely to have a negative impact on flora and fauna, due to reduced water availability. Habitats such as ground water-dependent ecosystems are likely to be negatively affected (as well as rivers and ponds). An increase in rainfall during the winter months is likely to result in more flooding events, which may impact certain biodiversity net gain (BNG) habitats that are provided by the proposed Scheme; and
  - Variations in temperature would have various impacts on habitats and species. Certain plant communities would have low tolerance to changes in temperature. Likely to cause changes in the breeding season for certain species (such as birds).
- Historic Environment:
  - Increased wind speeds, rainfall patterns and warmer temperatures could impact on the designated landscape changing views to and from the proposed Scheme as a result of tree loss and changes to the growing season; and
  - Drought conditions could exacerbate the risk of ground settlement threatening archaeological sites and the foundations of buildings and dry out waterlogged remain beyond the impact of the proposed Scheme alone.
- Landscape and Visual:
  - Drier conditions, hotter and wetter conditions could lead to loss of vegetation and defoliation which could disrupt views to and from the site during construction. It may affect the type of vegetation which would change the landscape character. Increased windspeed could also cause tree loss.

27.4.11 Other impacts may be identified during the assessment work for the PEI report. The ICCI assessment will be carried out for all topics scoped into the assessment.

27.5 Design and control measures

27.5.1 As outlined in **Chapter 5** EIA Approach and Method, a standard hierarchical approach will be taken to mitigation.

27.5.2 The assessment of effects will take into account measures that are embedded into the proposed Onshore Scheme design, together with general good practice measures.

Greenhouse gas

Design measures

27.5.3 The detailed design shall seek to minimise GHG emissions during construction and operation. Measures to be implemented include:

- The design of the new vertical and horizontal geometry shall, where practicable (and in accordance with the Works Plans, Limits of Deviation and other constraints set out in the DCO application) maximise the potential for reuse of material recovered from site. Alternatively, near-site sources of material will be identified to minimise transportation and ground treatment emissions;
- Where appropriate, identify, assess and integrate measures to further reduce carbon through on or off-site sequestration;
- Where appropriate the proposed scheme will endeavour to use materials with the highest recycled content, where this leads to lower whole life carbon emissions and encourage their use through procurement exercises;
- The proposed Scheme will continue to integrate carbon as a weighted element within the design and tender decision-making process and continue to work with partners across the industry on lower carbon alternatives; and
- The proposed Scheme will assess the carbon impact throughout the project lifecycle.

Control measures

27.5.4 Proposed mitigation measures to reduce as far as reasonably practicable the proposed Scheme's GHG emissions will be presented in PEI Report and ES. These may include, but would not be limited to:

- Identifying low carbon and/or reduced resource consumption solutions (including technologies, materials and products) to minimise resource consumption during the construction, operation and at end of life;
- Efforts will also be made to reduce the off-site haul distance of excess material, by prioritising its use on neighbouring schemes;
- Efforts will be made to consider offsite manufacture opportunities to minimise waste generation;
- Careful construction management to avoid over-ordering of materials, to reduce transportation emissions;

- Setting of targets to minimise GHG emissions and reduce GHG emissions during construction in line with the principles of PAS 2080;
- Any diversions required shall be the shortest acceptable route, to minimise GHG emissions;
- Training of construction staff in actions to be taken to reduce construction stage emissions;
- Implementation of travel planning for construction staff;
- Monitoring of construction site energy use, water use, waste, material use and transportation;
- Powering down of construction equipment/plant during periods of non-utilisation;
- Optimising vehicle utilisation;
- Use of energy efficient lighting; and
- Implementation of alternative powered construction plant in preference over fossil fuel powered construction plant (e.g. electric or Hydrogenated vegetable oil (HVO)).

Climate change resilience

Design measures

27.5.5 The development of the proposed Converter Station, amended Friston Substation, proposed Underground Cables and associated infrastructure would be designed to take account of potential for increased flood risk and ambient temperatures associated with climate change.

27.5.6 Some topics, including those relating to flooding and drainage, take account of future climate predictions in the assessment as a result of following best practice guidance and through the formal consultation process such as with the Environmental Agency. Climate change is therefore considered to be adequately addressed for these topics and would not require further consideration in the climate change assessment.

27.5.7 Any proposed mitigation measures to reduce as far as reasonably practicable the proposed Scheme's impacts and risks to climate change will be presented in the PEI Report and ES. These may include, but would not be limited to, landscaping design that considers flora appropriate for potential future climates, designing sustainable drainage systems (SuDS) for extreme flood events, and building materials which would aid natural cooling and ventilation.

Control measures

27.5.8 Measures to mitigate against the impacts of climate change during the construction and operation of the proposed Scheme will be developed at the ES stage. These will include measures to protect the following elements from the impacts of climate change (including variations in temperature and precipitation and extreme weather events):

- Material specification, use and storage;
- Material delivery;
- Drainage systems;

- Plant and equipment;
- Maintenance regimes;
- Workforce health and safety;
- Design of the proposed Scheme including site compounds;
- Traffic management; and
- Weather forecasting and emergency procedures.

In-combination climate change impacts

27.5.9 Any proposed design and control measures, and mitigation measures will be reported within each of the discipline chapters. The ICCI assessment will identify potential mitigation to reflect where in-combination impacts are identified for specific environmental topics and receptors.

27.6 Scope of the assessment

27.6.1 A precautionary approach has been taken and where there is no strong evidence base or the significance is uncertain at this stage the impact has been scoped in to the EIA. Where there is a clear evidence base that the effect from the impact will not be significant, either alone or in combination with other plans and projects, the impact has been scoped out of the EIA.

Greenhouse gas

27.6.2 For the assessment of GHG emissions associated with construction of the proposed Scheme, the study area is defined by the emissions sources associated with constructing the proposed Scheme. This includes emissions associated with the extraction, manufacture, and transportation of materials to the proposed Scheme (which may be sourced at a large distance from the site of the proposed Scheme) as well as emissions associated with construction processes on each site (such as fuel/energy use, and construction waste management).

27.6.3 For the assessment of operational GHG emissions associated with the proposed Scheme over the 60-year appraisal period, emissions arising from maintenance and replacement of development will be estimated. In addition, GHG emissions associated with the proposed Scheme's operational energy consumption will be considered within the assessment.

27.6.4 Aligning with PAS 2080: Carbon Management in Infrastructure[7], IEMA (2022) guidance[8] and best practice, a summary of GHG emission sources included within the lifecycle assessment informing this assessment can be found below within **Table 27-3**.

[7] PAS 2080:2023. (April 2023). Carbon management in infrastructure. [online]. Available at: www.bsigroup.com [Accessed February 2024]

[8] Institute of Environmental Management, 2022. Institute of Environmental Management. [Online] Available at: https://s3.eu-west-2.amazonaws.com/iema.net/documents/knowledge/policy/impact-assessment/J35958_IEMA_Greenhouse_Gas_Guidance-1.pdf [Accessed February 2024]

Table 27-3 Summary of GHG study area components within the Climate assessment

Project Work Stage	PAS 2080 Lifecycle Stage	Description	Justification for inclusion in/exclusion from the assessment	Proposed to be scoped in / out
Pre-construction	A0	Preliminary studies, consultation	Excluded as it is expected that the majority of pre-construction work will be desk based and hence GHG emissions are likely to be very small and therefore not likely to be material to the assessment.	Scoped out
Construction	A1-3	Raw material supply	Included to understand the emissions associated with the construction of the proposed Scheme.	**Scoped in**
	A4	Transport to works site	Included to understand the emissions associated with the transportation of materials required for the construction of the proposed Scheme.	**Scoped in**
	A5	Construction/ installation processes	Included to understand the emissions associated with the construction of the proposed Scheme.	**Scoped in**
	D	Land use change	Included to understand the removal of any vegetation due to construction of the proposed Scheme.	**Scoped in**
Operation	B1	Use	Included for the proposed Converter Station only which includes office space.	**Scoped in**
	B2, B3 and B4	Maintenance, Repair and Replacement	Included for amended Friston Substation, proposed Converter Station, proposed Landfall and proposed Onshore Cables and proposed Submarine Cables.	**Scoped in**
	B5	Refurbishment	Excluded. Unlikely to have a change of use in life of the proposed Scheme.	Scoped out
	B6 and B7	Operational energy and water use	Excluded. Minimal energy and water use expected and therefore emissions will not be material to the assessment conclusions.	Scoped out

Project Work Stage	PAS 2080 Lifecycle Stage	Description	Justification for inclusion in/exclusion from the assessment	Proposed to be scoped in / out
	B8	Other operational processes	Excluded as it is unlikely that there will be any other operational processes	Scoped out
	B9	User utilisation of infrastructure	Excluded. The proposed Scheme is not expected to have any direct and quantifiable impact on GHG emissions from electricity use that is distinct from wider national trends on grid decarbonisation. The interconnector is treated as a general flow of electricity in/out the grid. There is no practical mechanism to quantify the carbon impact without carrying out a time-based analysis of relative grid carbon emissions factors over the operational life of the proposed Scheme, seeking to identify over what period electricity will be supplied to UK at grid intensities above/below the grid average. While this is no doubt technically possible it is likely to add little to the GHG assessment.	Scoped out
	D	Ongoing land use emissions and sequestered	Included due to proposed landscaping proposed as part of the design which has the potential to change GHG sequestration.	**Scoped in**

27.6.6 The temporal boundary for GHG emissions assessment (2027-2069) constitutes the construction phase (assumed to commence in 2027 for a duration of approximately three years) and operational phase (assumed to be 60 years).

In-combination climate change impacts and climate chance resilience

27.6.7 An assessment of construction impacts has been scoped out of the ICCI and CCR assessment as climate change is not expected to result in significant changes in the short-term construction period (2027-2029). It is assumed that all weather and climate-related risks to construction activities are expected to be mitigated through best practice site management, including relevant specific measures set out in the Outline Code of Construction Plan (CoCP) to be submitted with the DCO application. The best practice site management measures and relevant specific measures would provide a level of resilience to the proposed Scheme throughout construction, including adapting measures as any changes to the climate ae observed in the short term.

27.6.8 The operational CCR assessment will be carried out using the current and future climate conditions and will comprise an assessment of the risk of climate change impacts to the new assets created by the proposed Scheme. The CCR assessment will involve:

- Identifying potential climate change risks to the proposed Scheme;
- Assessing these risks; and
- Formulating mitigation actions to reduce the impact of the identified significant risks.

27.6.9 The operational ICCI assessment will be undertaken to understand the impacts of climate change on all scoped in environmental topics (technical **Chapters 6-28**).

27.7 Assessment methodology

27.7.1 **Chapter 5** EIA Approach and Method sets out the standard EIA methodology and matrices to be used for the assessment. The methodology is based on the principle that the environmental effects will be determined by identifying potential receptors, assigning receptor value, assessing the magnitude of change on the receptor and then identifying the significance of the effect. This section provides a summary of the EIA methodology specifically relevant to this chapter.

27.7.2 Assessment of cumulative and combined effects are discussed in **Chapter 29** Cumulative and Combined effects of the Project.

Legislation, policy and guidance

27.7.3 Legislation and policy relevant to the proposed Scheme and this chapter is outlined in **Chapter 4** Legislation and Policy Overview and **Appendix 4-A** National Policy, **Appendix 4-B** Environmental Legislation and **Appendix 4-C** Local Policy.

27.7.4 The proposed Scheme will be assessed within the context of the UK's Climate Change Act[9] and associated national carbon budgets. This assessment will use the most up-to-date guidance that is feasible under programming constraints.

27.7.5 The assessment within the ES will be carried out with due consideration of the IEMA (2022) Environmental Impact Assessment Guide to: Assessing Greenhouse Gas Emissions and Evaluating their Significance guidance document[10].

27.7.6 The CCR and ICCI assessment will use the most up-to-date guidance that is feasible under programming constraints. The assessments within the ES will be carried out with due consideration of the IEMA (2020) Environmental Impact Assessment Guide to: Climate Change Resilience and Adaptation guidance document[11].

27.7.7 The methodology for the three assessments outlined above has been developed in line with relevant legislation, policy and industry guidance on assessment of GHGs and climate risk and resilience.

27.7.8 The following documents of best practice guidance will inform the assessment:

- IEMA Environmental Impact Assessment Guide to Climate Change Resilience and Adaptation[12];

[9] https://www.legislation.gov.uk/ukpga/2008/27/contents [Accessed February 2024]

[10] Institute of Environmental Management, 2022. Institute of Environmental Management. [Online] Available at: https://s3.eu-west-2.amazonaws.com/iema.net/documents/knowledge/policy/impact-assessment/J35958_IEMA_Greenhouse_Gas_Guidance-1.pdf [Accessed February 2024]

[11] IEMA (2020), Environmental Impact Assessment Guide to: Climate Change Resilience and Adaptation. Available at: https://www.iema.net/resources/reading-room/2020/06/26/iema-eia-guide-to-climate-change-resilience-and-adaptation-2020 [Accessed February 2024]

[12] IEMA (2020), Environmental Impact Assessment Guide to: Climate Change Resilience and Adaptation. Available at: https://www.iema.net/resources/reading-room/2020/06/26/iema-eia-guide-to-climate-change-resilience-and-adaptation-2020 [Accessed February 2024]

- IEMA Environmental Impact Assessment Guide to Assessing Greenhouse Gas Emissions and Evaluating their Significance[13];
- IEMA's Principles on Climate Change Mitigation and EIA[14];
- The Publicly Available Specification 2080 (PAS 2080) on carbon management in infrastructure[7];
- British Standard EN 15978:2011[15] Sustainability of Construction works – assessment of environmental performance of buildings – calculation method;
- Government Construction Industry Strategy[16];
- UK Clean Growth Strategy[17];
- UK Climate Change Risk Assessment[18];
- UKGBC Net Zero Whole Life Carbon Roadmap[19];
- LETI Embodied Carbon Primer[20]; and
- RICS (2017) Whole Life Carbon Assessment for the built environment (1st edition)[21].

Greenhouse gas

Data sources

27.7.9 The information to inform this GHG assessment will be from a combination of proposed Scheme specific information available at the current design stage alongside publicly available industry benchmarks that can be used to provide a preliminary estimate of life cycle GHG impacts.

[13] Institute of Environmental Management, 2022. Institute of Environmental Management. [Online] Available at: https://s3.eu-west-2.amazonaws.com/iema.net/documents/knowledge/policy/impact-assessment/J35958_IEMA_Greenhouse_Gas_Guidance-1.pdf [Accessed February 2024]

[14] Institute of Environmental Management and Assessment, 2010. Institute of Environmental Management and Assessment. [Online] Available at: https://www.iema.net/resources/news/2010/05/27/iema-launches-principles-on-climate-change-mitigation-and-eia [Accessed February 2024]

[15] European Standards, 2012. European Standards. [Online] Available at: https://www.en-standard.eu/bs-en-15978-2011-sustainability-of-construction-works-assessment-of-environmental-performance-of-buildings-calculation-method/ [Accessed February 2024]

[16] UK Government (2013), Construction 2025: strategy. Available at: https://www.gov.uk/government/publications/construction-2025-strategy [Accessed February 2024]

[17] UK Government (2018), Clean Growth Strategy. Available at: https://www.gov.uk/government/publications/clean-growth-strategy [Accessed February 2024]

[18] UK Government (2022), UK Climate Change Risk Assessment 2022. Available at: https://www.gov.uk/government/publications/uk-climate-change-risk-assessment-2022 [Accessed February 2024]

[19] UKGBC (2021), Net Zero Whole Life Carbon Roadmap for the Built Environment. Available at: https://www.ukgbc.org/ukgbc-work/net-zero-whole-life-roadmap-for-the-built-environment/ [Accessed February 2024]

[20] LETI (2020), Embodied Carbon Primer. Available at: https://www.leti.london/ecp[Accessed February 2024]

[21] RICS (2017), Whole life carbon assessment for the built environment. Available at: https://www.rics.org/globalassets/rics-website/media/news/whole-life-carbon-assessment-for-the--built-environment-november-2017.pdf. [Accessed February 2024]

27.7.10 The GHG emissions for the proposed Scheme will be calculated by converting 'activity' data into carbon emissions through the application of referenced typical emissions conversion factors widely used within the industry.

27.7.11 The main emissions factors used in the assessment will be from the following sources:

- Greenhouse Gas Reporting: Conversion Factors (published annually by UK Government)[22];
- Inventory of Carbon and Energy (ICE) database v3[23]; and
- Valuation of energy use and GHG emissions for appraisal: supplementary guidance to the HM Treasury Green Book[24].

27.7.12 Data of appropriate quality to satisfy the goal and scope of the assessment will be used. Where limited data is available due to the outline nature of the application appropriate assumptions or benchmarks will be used.

27.7.13 The main reference periods for assessing emissions will be in line with the UK Carbon Budget periods, covering 2027-2069 (fourth, fifth and sixth Carbon Budgets), summarised in **Table** below.

Table 27-: **Carbon budget periods**

Carbon Budget and Period	Carbon Budget Limit	Reduction below 1990 levels
Fourth (2023-2027)	1,950 $MtCO_2e$	50% by 2025
Fifth (2028-2032)	1,725 $MtCO_2e$	68% by 2030*
Sixth (2033-3037)	965 $MtCO_2e$	78% by 2035

* Originally 57% when Fifth Carbon Budget was enshrined in law, was increased to 68% as the UK's National Determined Contribution ahead of the United Nations' COP26 in November 2021[25].

[22] Department for Business, Energy, and Industrial Strategy (2022) Greenhouse gas reporting: conversion factors 2022. Available at: https://www.gov.uk/government/publications/greenhouse-gas-reporting-conversion-factors-2022 [Accessed February 2024]

[23] Circular Ecology (2019). Inventory of Carbon and Energy (ICE) Database v3.0 Available at: https://circularecology.com/embodied-carbon-footprint-database.html [Accessed February 2024]

[24] Department for Business, Energy, and Industrial Strategy (2023) Green Book supplementary guidance: valuation of energy use and greenhouse gas emissions for appraisal. Available at: https://www.gov.uk/government/publications/valuation-of-energy-use-and-greenhouse-gas-emissions-for-appraisal [Accessed February 2024]

[25] Department for Business, Energy, and Industrial Strategy (2021) Available at https://www.gov.uk/guidance/carbon-budgets [Accessed February 2024]

Assessment method

27.7.14 The GHG assessment will be consistent with the best practice approach set out in the IEMA guidance on assessing GHG emissions and evaluating their significance[26].

27.7.15 The GHG assessment will quantify and report the GHG emissions anticipated to be generated or avoided by the proposed Scheme. This will be reported in tonnes of carbon dioxide equivalent (tCO_2e), a single metric of the global warming potential of the main GHGs.

27.7.16 The methodology focuses on assessing the impact of the proposed Scheme on carbon emissions by quantifying the net carbon emissions arising from each lifecycle stage and presenting these as a time series. Emissions associated with the proposed Scheme will be compared to the baseline and future baseline DM scenario (as described under 'Baseline Conditions' above) to quantify the net impact of the proposed Scheme.

27.7.17 The significance criteria for the GHG assessment will take account of the proposed Scheme's GHG emissions in the context of policy, and specifically the UK's target of net zero by 2050. This will consider the proposed Scheme's net GHG emissions, but also whether the proposed Scheme contributes to reducing GHG emissions consistent with a trajectory towards net zero by 2050.

27.7.18 The net emissions associated with the proposed Scheme will also be contextualised against appropriate existing national carbon budgets where practicable to understand its relative contribution to climate change. Where possible, this will also be contextualised against industry specific carbon budgets.

27.7.19 The assessment process will work with the wider development team to identify opportunities to reduce the whole-life carbon of the proposed Scheme.

Assumptions and limitations

27.7.20 The GHG assessment will be undertaken using the best available information at time of assessment. A reasonable worst-case assessment will be developed using appropriate industry benchmarks, and conservative assumptions on materials, design, assembly, earthworks and use of components to provide a robust assessment of likely carbon emissions.

27.7.21 Assumptions will be made about design and construction information to inform the assessment of GHG emissions. In general, any assumptions made will seek to reflect a reasonable worst case (i.e. seeking not to under-report GHG emissions arising from the proposed Scheme).

27.7.22 Assumptions/judgements in each case will be made from either:

- emerging design detail;
- engineering specialist knowledge;
- environmental specialist knowledge;
- climate change/carbon specialist knowledge;
- manufacturer specifications; or

[26] Institute of Environmental Management, 2022. Institute of Environmental Management. [Online] Available at: https://s3.eu-west-2.amazonaws.com/iema.net/documents/knowledge/policy/impact-assessment/J35958_IEMA_Greenhouse_Gas_Guidance-1.pdf [Accessed February 2024]

- proxy engineering data from previous comparable projects.

27.7.23 The methodology used to calculate the UK carbon budgets is different to that used for the calculation of lifecycle emissions for the proposed Scheme and therefore caution must be taken when making a direct comparison. However, for the purposes of identifying the extent to which the proposed Scheme may impact the ability of the UK government to meet its carbon budgets it is necessary to make this comparison to put the proposed Scheme into context. Additionally, the GHG emissions quoted for the proposed Scheme in this report are best estimations based on the design information available at the time of the assessment and the carbon factors utilised.

27.7.24 A full list of assumptions and limitations will be provided within the ES.

Climate change resilience

Data sources

27.7.25 Future projected climate conditions and extreme weather events for the area encompassing the proposed Scheme will be provided for the 2030s and 2060s. These time periods cover the assumed 60-year operational life (2029-2089).

27.7.26 Using the historical baseline data, changes in average climate conditions will be obtained from the UKCP18 probabilistic projections of climate change[27] to establish the future climate baseline.

27.7.27 In the ES climate change projections for a range of meteorological parameters will be presented for different probability levels within the RCP8.5 high emission scenario for the near-term and long-term future time periods for the 2030s and 2060s.

Assessment method

27.7.28 The CCR assessment relates to the resilience of the proposed Scheme to climate change impacts. This will be reported in the form of potential hazards to development assets. The study period for assessment of climate risks will be 60 years based on the design life.

27.7.29 The CCR assessment will be qualitative. It will identify likely future climate hazards and will consider potential impacts and risks arising from these for the proposed Scheme. A qualitative appraisal of the significance of impacts will be carried out based on consideration of the likelihood and consequence of each impact in line with the approach set out in IEMA guidance on Climate Change Resilience and Adaptation[28].

27.7.30 Key issues related to climate changes include sea level rise, storm surges and storms/extreme weather events due to the coastal location of the proposed Scheme. These will need to be taken into consideration operation of the proposed Scheme.

27.7.31 The significance of the risks identified in the CCR assessment is based on the likelihood of a hazard having an impact on the proposed Scheme and the consequence of the impact. As per IEMA (2020) guidance, the potential likelihood and consequence of

[27] Met Office, 2018. *Met Office.* [Online] Available at: https://ukclimateprojections-ui.metoffice.gov.uk/products [Accessed February 2024]

[28] IEMA (2020), Environmental Impact Assessment Guide to: Climate Change Resilience and Adaptation. Available at: https://www.iema.net/resources/reading-room/2020/06/26/iema-eia-guide-to-climate-change-resilience-and-adaptation-2020 [Accessed February 2024]

impacts on the proposed Scheme will be scored using a qualitative five-point scale with the assessment concluding “significant” or “not significant”.

27.7.32 It is considered unlikely that significant climate resilience effects will be identified, or where the potential for these are identified it is expected that adequate mitigation will be included within wider environmental and engineering design approaches. This will be confirmed within the PEI Report.

Assumptions and limitations

27.7.33 The CCR assessment currently has the following limitations:

- the assessment is largely qualitative, with the exception of assessments relevant to drainage assets and flood risk, which have been informed by Environment Agency climate change allowances for increases in peak river flow and rainfall intensity;
- there is limited methodological guidance on the assessment of individual risks;
- there is inherent uncertainty in climate change projections. This study will be quantified using UKCP18[29], the latest set of probabilistic climate projections for the UK; and
- there is often uncertainty in the relationship between changes in climate hazards and the respective response in terms of asset performance. This uncertainty will be assessed qualitatively.

27.7.34 A full list of assumptions and limitations will be provided within the ES.

In-combination climate change impacts

Data sources

27.7.35 The data sources required for the ICCI assessment will be the same as those outlined above for the CCR assessment.

Assessment method

27.7.36 Following consideration of potential climate change impacts, professional judgement will be used by environmental discipline experts to produce high level, qualitative statements about potential topic specific impacts resulting from projected climate change (i.e. changes and trends in climate averages and extreme weather events) for receptors and resources in the area surrounding the proposed Scheme. These will include recommendations for any required mitigation measures as well as allowances for future monitoring to ensure the identification of unexpected impacts on environmental receptors and resources.

27.7.37 The potential significance of in-combination climate change impacts will be assessed qualitatively, based upon the professional judgement of relevant environment and climate change specialists.

27.7.38 All environmental topics within the subsequent ES may be affected by changes in climatic conditions. The proposed Scheme would be designed to be resilient to

[29] Met Office, 2018. *Met Office.* [Online] Available at: https://ukclimateprojections-ui.metoffice.gov.uk/products [Accessed February 2024]

forecasted changes in climate and the in-combination impacts will be assessed for all topics.

27.8 Assumptions & limitations

27.8.1 This EIA Scoping Report has been collated based on a range of publicly available data and information only. It is assumed that the data collated is accurate. The data will be supplemented with additional data as part of the EIA process.

27.8.2 In the absence of data, a precautionary approach has been taken and professional judgement, based on experience of similar linear schemes, has been used where required to inform the scope of the assessment.

27.8.3 Assumptions for the ICCI assessment will be a combination of those from topic chapters and CCR assessment as detailed in section above. A full list of assumptions and limitations will be provided within the ES.

Contents

28. Major Accidents and Disasters

28.1 Introduction

28.1.1 This chapter outlines the proposed scope and methodology for the Major Accidents and Disasters assessment. It will consider the potential for significant effects arising from the LionLink Interconnector (hereafter referred to as 'the proposed Onshore Scheme. A review of relevant guidance and policy has been undertaken together with a desk-based assessment, to inform the proposed scope and methodology.

28.1.2 There may be interrelationships related between Major Accidents and Disaster and other disciplines. Therefore, please also refer to technical **Chapters 6 to 27**, in particular:

- **Chapter 6** Air Quality – which covers the air quality baseline and proposed assessment;
- **Chapter 9** Geology and Contamination – which covers the contamination and ground conditions;
- **Chapter 12** Hydrology, Hydrogeology and Drainage – covers the flood risk of the proposed Onshore Scheme;
- **Chapter 18** Marine Physical Environment - considers the water quality and sediment quality baseline;
- **Chapter 23** Shipping & Navigation - covers the risk of collision with other vessels, or damage to third-party assets;
- **Chapter 25** Other Marine Users - which provides an overview of the other marine users in the study area; and
- **Chapter 27** Climate Change – which provides an overview of the climatic conditions and trends in the area.

28.1.3 The aim of the scoping stage, as described by the Institute of Environmental Management and Assessment (IEMA) Major Accidents and Disasters in Environmental Impact Assessment (EIA): A Primer (hereafter referred to as the 'IEMA Primer')[1], is *'to determine in more detail whether there is potential for significant effects as a result of major accidents and/or disasters associated with a development, and the resulting scope of and approach to the assessment if required.'*

28.1.4 In order to determine which risks have the potential to cause a major accident or disaster, a scoping exercise has been undertaken, see **Appendix 28-A**.

[1] https://www.iema.net/resources/reading-room/2020/09/28/major-accidents-and-disasters-in-eia-an-iema-primer [accessed Feb 2024]

28.2 Relevant policy and guidance

28.2.1 Legislation and policy relevant to the proposed Scheme and this chapter is outlined in **Chapter 4** Legislation and Policy Overview and **Appendix 4-A** National Policy, **Appendix 4-B** Environmental Legislation and **Appendix 4-C** Local Policy.

28.2.2 The requirement to consider major accidents and disasters as part of the EIA process comes from the EIA Regulations (Schedule 4, paragraph 8), which state that an environmental statement must include:

'A description of the expected significant adverse effects of the development on the environment deriving from the vulnerability of the development to risks of major accidents and/or disasters which are relevant to the project concerned… 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.'

28.2.3 At present, there is no recognised standard methodology for the assessment of major accidents and disasters within EIA or more simple environmental assessments. The IEMA Primer[2], which follows a risk identification approach, is the most commonly used approach and has therefore been used to inform the baseline and approach to scoping for this EIA Scoping Report.

28.2.4 For the purpose of this EIA Scoping Report, the following definitions from the EIA Primer have been adopted:

- Disaster – a natural hazard (e.g. earthquake) or a man-made/external hazard (e.g. act of terrorism) with the potential to cause an event or situation that meets the definition of a major accident; and
- Major Accident – events that threaten immediate or delayed serious environmental effects to human health, welfare and / or the environment and require the use of resources beyond those of the client or its appointed representatives to manage.

28.2.5 The Cabinet Office National Risk Register (2020 Edition)[3] have also been used to inform the identification of potential major accidents and natural disasters relevant to the proposed Onshore Scheme.

28.3 Consultation and engagement

28.3.1 Consideration has been given to responses received at Non-Statutory Consultation in preparing this scoping chapter. Of the responses received there were none relating directly to Major Accidents and Disasters.

28.3.2 Engagement will be undertaken with relevant stakeholders in relation to the proposed Scheme to obtain any information that they hold to supplement the assessment and to seek their views with regards to the evolving design. This will be undertaken by EIA Team.

[2] https://www.iema.net/resources/reading-room/2020/09/28/major-accidents-and-disasters-in-eia-an-iema-primer [accessed Feb 2024]

[3] https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/952959/6.6920_CO_CCS_s_National_Risk_Register_2020_11-1-21-FINAL.pdf [accessed Feb 2024]

28.3.3 The following bodies will be consulted during the EIA process:

- Maritime and Coastguard Agency;
- Suffolk Country Council; and
- If required other such resilience forums, or the local Fire and Rescue Authority.

28.4 Baseline conditions

28.4.1 This section describes the methods used to establish the baseline. The baseline identifies, for each risk category, if there is a source of the risk and a pathway to a receptor. This section also considers risks associated with the future baseline where relevant. For example, where climate change may exacerbate flood risk in the future, there is potential for an impact pathway to develop over time.

28.4.2 If a pathway is identified from source to receptor, current or future, the presence of existing design measures, compliance with legislation, best practice and/or sufficient coverage by other topic chapters is checked. If no such mitigation exists the risk category will be scoped in to the EIA. The approach is based on the methodology set out within the IEMA Primer and is covered in **Section 28.5**.

Study area

28.4.3 As there is no specific regulatory guidance or standardised methodology the study area for this assessment has been defined based on the professional judgement of the EIA Team.

28.4.4 The study area has been set as the proposed Scheme Scoping Boundary (hereafter referred to as 'the Scoping Boundary') see **Figure 1-1**, due to the current boundary being larger than required for the proposed Onshore Scheme and will be refined down through the design process.

Sources of baseline data

28.4.5 The following data has been used to inform the baseline:

Table 28-1 Baseline data sources

Baseline data	Source of data
Features of the proposed Onshore Scheme and sensitive environmental receptors	Technical Chapters of the EIA Scoping Report
Potential risks	the National Risk Register[4]
Earthquakes and landslides	British Geological society[5]

[4] https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/952959/6.6920_CO_CCS_s_National_Risk_Register_2020_11-1-21-FINAL.pdf [Online resource] [Feb 2024]

[5] http://www.earthquakes.bgs.ac.uk/hazard/uk_hazard_map.html [accessed Feb 2024]

Baseline data	Source of data
Sinkholes	British Geological Society[6]
Tsunamis	International Tsunami information centre[7]
Control of Major Accidents and Hazards (COMAH) sites	Health and Safety Executive website and COMAH search tool[8] Health and Safety Executive's Planning Advice Web App
Flooding	EA flood risk data[9]
Fire risk	Fire and Rescue Service statistics[10] and Met Office[11]
Storm frequency and severity	Met Office[12]
Climate	Met Office[13]
Air quality	Defra UK AIR AQMAs Interactive Map [14]
Statutory designated sites	Natural England
Unexploded Ordnance	Zetica[15]
Coal mining	The Coal Authority Interactive Map

Baseline relevant to the proposed Scheme

28.4.6 The baseline conditions relevant to the proposed Scheme are split into three areas:

[6] https://www.bgs.ac.uk/geology-projects/sinkholes-research/what-causes-sinkholes-where-uk/ [accessed Feb 2024]

[7] http://itic.ioc-unesco.org/index.php?option=com_content&view=article&id=1310&Itemid=1166 [accessed Feb 2024]

[8] https://notifications.hse.gov.uk/COMAH2015/Search.aspx [Online resource] [accessed Feb 2024]

[9] https://flood-map-for-planning.service.gov.uk/; https://check-long-term-flood-risk.service.gov.uk/postcode [Online resource] [accessed Feb 2024]

[10] https://www.gov.uk/government/statistics/fire-and-rescue-incident-statistics-england-year-ending-december-2021/fire-and-rescue-incident-statistics-england-year-ending-december-2021 [Online resource] [accessed Feb 2024]

[11] https://www.metoffice.gov.uk/public/weather/fire-severity-index/#?tab=map&fcTime=1653303600&zoom=5&lon=-4.00&lat=55.74 [Online resource] [accessed Feb 2024]

[12] https://www.metoffice.gov.uk/weather/warnings-and-advice/uk-storm-centre/uk-storm-season-2020-21 [Online resource] [accessed Feb 2024]

[13] Existing Climate at the Thornley Island Meteorological Station for the Period 1991 – 2020. Met Office, 2022

[14] https://uk-air.defra.gov.uk/aqma/maps/ [Online resource] [accessed Feb 2024]

[15] https://zeticauxo.com/downloads-and-resources/risk-maps/ [accessed Feb 2024]

- **Potential environmental receptors**: these will have been described in the technical chapters and considered in this chapter where they could be vulnerable to a major accident or disaster:
  - ecological features both onshore and marine;
  - hydrological features;
  - heritage assets;
  - human receptors including residential and communities;
  - commercial receptors both onshore and offshore such as shipping and commercial fisheries;
  - marine users; and
  - Coastal and physical marine processes.
- **Nearby major accident installations**: There are no sites that fall under the Control of Major Accident Hazard Regulations 2015 (COMAH) within proximity to the proposed Converter Station, and proposed Landfall Sites[16]. Sizewell B Power Station is located to the east of the Scoping Boundary (approximately 3.2km at the closest point).
- **Natural hazards and disasters**: a review of existing baseline data relating to natural hazards/disasters, such as flooding or drought, that inform the likelihood of a natural disaster occurring within the study area. The IEMA Primer[17] outlines examples of natural hazards in the UK. These have been used to guide the baseline data collection and assist with determining the likelihood of the identified risk. The main natural hazards that can disrupt infrastructure in the UK are outlined below:

Table 28-2 Natural hazards relevant to the UK

Natural Hazard	Description relevant to the proposed Onshore Scheme
Flooding	The Scoping Boundary is partly located in Flood Zone 2 & 3 The Onshore Scheme is situated in the Suffolk Coastal Operational Catchment (surface water) and Waveney and Suffolk East Chalk and Crag Operational Catchment (ground water). The designated Main Rivers in the Scoping Boundary are the River Wang, River Blyth, River Minsmere and Hundred River. **Chapter 12** Hydrology, Hydrogeology and Drainage covers flooding in more detail.
Climate	Data sourced from the UK Met Office confirm the highest daily maximum temperature in East Anglia was recorded in July 2022 at

[16] associated post code searches via HSE COMAH search tool, returns sites within 3 miles of the entered postcode.

[17] Major Accidents and Disasters in EIA: A Primer. September 2020. https://www.iema.net/resources/reading-room/2020/09/28/major-accidents-and-disasters-in-eia-an-iema-primer#:~:text=This%20primer%20has%20been%20developed%20in%20partnership%20with,and%20identifies%20key%20terminology%20that%20can%20be%20used. [accessed Feb 2024]

Natural Hazard	Description relevant to the proposed Onshore Scheme
	39.9°C and whereas the lowest temperature was recorded at – 20.6°C in 1947[18]. The National Risk Register expects extreme weather events to become more frequent, with a general trend towards warmer winters and hotter summers, as a result of changing climate.
Storms and high winds	Extreme storms are very rare in the UK; however, storms of a lower magnitude occur particularly during winter, and cause issues when they do occur[19]. For example, Storm Eunice hit the region of East Anglia in Feb 2022 which resulted in a major incident being declared by emergency services and Suffolk County Council. High winds combined with high tides can potentially lead to storm surges. The environmental management plan developed and secured as part of the DCO process will mitigate the risk to assets and individuals posed by storm surges. **Chapter 12** Hydrology, Hydrogeology and Drainage covers flooding in more detail.
Wildfire	The UK has a temperate climate that is not usually associated with wildfires however, these have been partly increasing with frequency as a result of climate change. 2018 had a peak of wildfire incidents of 431, however 2021 Suffolk Fire and Rescue Service dealt with 101[20]. Suffolk Fire and Rescue Service have a live fire incidents map which track responses to fires[21].

Accident and disaster categories

28.4.7 The Appendix 28-A uses the following accidents and disaster groups to screen the potential risks within the study area:

- Natural hazards:
  - Geophysical;
  - Hydrological;
  - Climatological and meteorological; and
  - Biological
- Technological or Manmade hazards:
  - Societal;
  - Industrial and urban accidents;

[18] https://www.metoffice.gov.uk/research/climate/maps-and-data/uk-climate-extremes [accessed Feb 2024]

[19] https://www.metoffice.gov.uk/weather/warnings-and-advice/uk-storm-centre/uk-storm-season-2021-22[accessed Feb 2024]

[20] https://www.suffolk.gov.uk/suffolk-fire-and-rescue-service/about-suffolk-fire-and-rescue-service/common-questions-about-incidents-we-attend/wildfire-incidents [accessed Feb 2024]

[21] https://frsincidents.suffolk.gov.uk/ [accessed Feb 2024]

- Pollution accidents;
- Utility failures;
- Malicious Attacks;
- Engineering accidents and failures;
- Human error/management failure;
- Sabotage/arson;
- Explosion (including nuclear); and
- Terrorism.

Future baseline

28.4.8 The Major Accidents and Disaster chapter within the PEI Report and ES will consider changes which may affect the future baseline conditions in the absence of the proposed Onshore Scheme. The future baseline will also take into account any developments that are likely to be present in the future baseline.

28.4.9 **Chapter 27** Climate Change includes the climate projections for the UK over the next 60 years which show a change in trends and increased likelihood of extreme weather events. Climate change could have short term and long-term impacts on a number of aspects that are considered as part of major accidents and disasters, for example on hydrological and biological features.

28.5 Scope of the assessment

28.5.1 The IEMA Primer[22] states that the major accidents and disasters topic can be scoped out of the EIA if the chapter can demonstrate:

- *"there is no source-pathway-receptor linkage of a hazard that could trigger a major accident and/or disaster or potential for the scheme to lead to a significant environmental effect; or*
- *all possible major accidents and/or disasters are adequately covered elsewhere in the assessment or covered by existing design measures or compliance with legislation and best practice."*

28.5.2 However, if the above cannot be demonstrated then the topic must be scoped in. Major accidents and disasters focuses on the potential for a risk event to occur.

28.5.3 The IEMA Primer also identifies significance based on criteria adopted from Annex VI of the Seveso III Directive which details the 'criteria for the notification of a major accident to the Commission'. Using this as a reference, the significance threshold for the proposed Onshore Scheme for major accidents and disasters is determined to be anything which could cause loss of life or permanent injury and/or long-lasting damage to an environmental receptor.

[22] Major Accidents and Disasters in EIA: A Primer. September 2020. https://www.iema.net/resources/reading-room/2020/09/28/major-accidents-and-disasters-in-eia-an-iema-primer#:~:text=This%20primer%20has%20been%20developed%20in%20partnership%20with,and%20identifies%20key%20terminology%20that%20can%20be%20used. [accessed Feb 2024]

28.5.4 The outcome of this assessment demonstrates that, as satisfactory evidence has been provided to demonstrate that all potential risks will be mitigated during construction and operation of the proposed Onshore Scheme, major accidents and/or disasters can be scoped out of the EIA at this stage. **Table 28-3** provides a high level summary of **Appendix 28-A** where the Major Accidents and Disasters Screening justification is provided in more detail.

Table 28-3 Proposed scope of the assessment

Major event group	Major event category	Scoped in or out
Natural Hazard	Geophysical	Scoped out
	Hydrology	Scoped out
	Climatologic al and Meteorological	Scoped out
	Biological	Scoped out
Technological or Manmade Hazard	Societal	Scoped out
	Industrial and Urban Accidents	Scoped out
	Transport accidents	Scoped out
	Vessel collisions	Scoped out
	Pollution accidents	Scoped out
	Utilities failures	Scoped out
	Malicious Attacks	Scoped out
	Engineering accidents and failures	Scoped out
	Human error	Scoped out
	Sabotage or arson	Scoped out

28.6 Assumptions & limitations

28.6.1 Major accidents and/or disasters associated with construction and operation activities that fall within the scope of health and safety legislation and associated obligations are not considered.

28.6.2 The risk identification exercise does not consider risks where there is no ‘source-pathway-receptor’ linkage.

Contents

29. Cumulative Effects and Intra-project Effects of the Project

29.1 Introduction

29.1.1 This chapter outlines the proposed methodology for the assessment of cumulative and intra-project effects arising from the construction and operation of the LionLink Scheme located in the UK (hereafter referred to as 'the proposed Scheme').

29.1.2 Cumulative and intra-project effects are usually additive or interactive (synergistic). They are a result of multiple actions on environmental receptors or resources over time. Two categories of effects will be considered:

- Intra project effects (also known as intra-project effects) – the intra-project effect of multiple aspects of the Project. For example, noise, dust and visual effects on one particular receptor. This includes the intra-project effect of the onshore and offshore aspects of the proposed Scheme, and the intra-project effects of the proposed Offshore Scheme and the Dutch Offshore Components; and
- Inter project effects (also known as cumulative effects) - where one receptor is impacted by the proposed Scheme and other projects or plans which could result in a greater effect.

29.1.3 This chapter is supported by the following figures:

- **Figure 1-1** Proposed Scheme Scoping Boundary;
- **Figure 1-2** Proposed Onshore Scheme Boundary;
- **Figure 1-3** Proposed Onshore Scheme Scoping Boundary and Scheme Components;
- **Figure 1-4** Proposed Offshore Scheme Boundary; and
- **Figure 29-1** Cumulative Development Boundaries Map.

Guidance

29.1.4 A range of public sector and industry-led guidance is available on cumulative effects assessment and in-combination effects assessment but at present there is no single, agreed industry standard method. The assessment will be consistent with the following guidance:

- Planning Inspectorate (PINS) Advice Note Seventeen[1]: Cumulative effects assessment relevant to nationally significant infrastructure projects, which provides advice regarding a staged approach within an Environmental Statement (ES), relevant to nationally significant infrastructure projects, and highlights the need to consider the potential for cumulative effects to arise due to the interactions between

[1] Advice Note Seventeen: Cumulative effects assessment relevant to nationally significant infrastructure projects Published August 2019 (version 2). https://infrastructure.planninginspectorate.gov.uk/legislation-and-advice/advice-notes/advice-note-17/ [accessed Feb 2024]

different components of the development, as well as with 'other existing development and/or approved development'; and

- Marine Management Organisation (MMO): A Strategic Framework for Scoping Cumulative Effects (2014)[2]: Cumulative effects assessment relevant to plans and projects undertaken in the marine environment. It provides a high-level framework for scoping of potential cumulative effects at a strategic level, but the concepts can be applied on a project basis.

29.2 Consultation and engagement

29.2.1 Consideration has been given to responses received at Non-Statutory Consultations held in 2022 and 2023 in preparing this scoping chapter. A number of the responses received as part of the Non-Statutory Consultations express the view that:

- Coordination with other projects and developments in the area should be undertaken;
- Colocation should be assessed and considered with other energy projects in the area; and
- Consideration should be given to the proposed multi project use of Friston Substation.

29.2.2 Statutory Consultation on the proposed Scheme has not yet commenced for cumulative and intra-project effects.

29.2.3 The local planning authorities, Suffolk County Council (SCC) and East Suffolk Council (ESC), the MMO, the PINS and other relevant consultees such as the Statutory Nature Conservation Bodies will be consulted on the 'other developments and/or approved development' proposed to be included in the assessment.

29.3 Cumulative assessment methodology

29.3.1 The following assessment methodology will be applied as part of the environmental chapters within the ES and will follow the PINS Advice Note Seventeen: Cumulative effects assessment relevant to nationally significant infrastructure projects[3].

Intra project effects assessment

Intra-project effects of multiple aspects on receptors

29.3.2 The first step in the assessment will be to consider where there is potential for an intra-project effect to occur as a result of the proposed Scheme. The potential for intra-project effects is presented in **Table 29-1** and **Table 29-2**. A source-pathway-receptor

2 MMO (2014). A Strategic Framework for Scoping Cumulative Effects. Available at: https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/389876/MMO1055_Report_Final.pdf [accessed Feb 2024]

3 Advice Note Seventeen: Cumulative effects assessment relevant to nationally significant infrastructure projects. Published August 2019 (version 2). https://infrastructure.planninginspectorate.gov.uk/legislation-and-advice/advice-notes/advice-note-17/ [access Feb 2024]

approach will be used to inform the assessment (as described in **Chapter 5** EIA Approach and Method, Section 5.4).

29.3.3 In **Table 29-1** (onshore) and **Table 29-2** (offshore) below, grey squares indicate ‘N/A’ as they are relating to the same chapter. For all other chapters an ‘X’ indicates where there is the potential for an intra-project effect between two topic chapters.

Table 29-1 Potential for intra projects effects onshore

	A&S	AQ	CC	EC	GC	H&W	HE	H&D	L&V	MA&D	M&W	N&V	S-E	T&T
A&S	N/A			X		X		X	X				X	
AQ		N/A	X	X		X						X		X
CC		X	N/A	X				X	X					X
EC	X	X	X	N/A				X				X		
GC					N/A	X		X						
H&W	X	X			X	N/A						X	X	X
HE							N/A		X					
H&D	X		X	X	X			N/A						
L&V	X		X				X		N/A					
MA&D										N/A				
M&W											N/A			
N&V		X		X		X						N/A		X
S-E	X					X							N/A	
T&T		X	X			X						X		N/A

Acronyms used above: AQ: Air Quality; A&S: Agriculture and Soils; EC: Ecology and Biodiversity; GC: Geology and Contamination; H&W: Health and Wellbeing; HE: Historic Environment; H&D: Hydrology, Hydrogeology and Drainage; L&V: Landscape and Visual; N&V: Noise and Vibration; T&T: Traffic and Transport; S-E: Socio-Economics, Recreation and Tourism; M&W: Material Assets and Waste; CC: Climate Change; and MA&D: Major Accidents and Disasters.

Table 29-2: Potential for intra projects effects offshore

	MPE	I & SBE	F&S	MM & MR:	I & MO	S&N	CF	OMU	MA
MPE	N/A	X	X	X	X		X		X
I & SBE	X	N/A	X	X	X		X		
F&S	X	X	N/A	X	X		X		
MM & MR:	X	X	X	N/A					
I & MO	X	X	X		N/A				
S&N						N/A			
CF	X	X	X				N/A		
OMU								N/A	
MA	X								N/A

Acronyms used above: MPE: Chapter 18 Marine Physical Environment, I & SBE: Chapter 19 Intertidal & Subtidal Benthic Ecology, F&S Chapter 20 Fish & Shellfish, I & MO: Chapter 21 Intertidal and Marine Ornithology, MM & MR: Chapter 22 Marine Mammals and Marine Reptiles, S&N Chapter 23 Shipping & Navigation, CF: Chapter 24 Commercial Fisheries, OMU: Chapter 25 Other Marine Users, and MA: Chapter 26. Marine Archaeology

29.3.4 Where **Table 29-1** and **Table 29-2** identifies the potential for intra project effects, these will be considered within the relevant Preliminary Environmental Information (PEI) Report chapter and a judgement made whether or not a theoretical pathway exists.

29.3.5 Where a theoretical pathway exists, an assessment of intra-project effects will be made and any additional mitigation over and above that already taken into account in determining the individual residual effects will be identified and implemented as required and where practicable.

Intra-project effects of the proposed Onshore and Offshore Scheme

29.3.6 At the interface between the proposed Onshore Scheme and proposed Offshore Scheme the scope of intra project effects are limited. **Table 29-3** identifies the potential intra-project impacts and provides justification as whether they will be scoped in or out of the EIA. Where an impact has been scoped ‘in’ to the EIA, the assessment of intra-project effects will be informed by the assessments provided in the relevant topic chapters. Any additional mitigation over and above that already taken into account in determining the individual residual effects will be identified and implemented as required.

Table 29-3 Potential for intra-project effects of Onshore and Offshore Scheme

Project Phase	Receptor	Impact	Potential for significant effect	Proposed to be scoped in / out
Construction	Recreation	Visual Impact/ Disturbance	There will be a temporary elevation in the visual and noise disturbance to recreational users at the proposed Landfall Site when offshore and onshore activities overlap temporally. For example, there will be activity in the Horizontal Directional Drilling (HDD) compound at the same time as activity in the nearshore when the HDD is installed, or when the cables are pulled in through the HDD ducts. These activities will be temporary but may cause short-term disturbance or restricted use of certain areas. The significance of this intra-project impact will be assessed in the EIA.	Scoped in
Construction	Birds	Visual Impact/ Disturbance	There will be a temporary elevation in the visual and noise disturbance to ornithology when offshore and onshore activities overlap temporally. For example, there will be activity in the HDD compound at the same time as activity in the nearshore when the HDD is installed, or when the cables are pulled in through the HDD ducts. These activities will be temporary but may cause short-term disturbance or restricted access to foraging areas. The significance of this intra-project impact will be assessed in the EIA.	Scoped in

Intra-project effects of Offshore Scheme and Dutch Offshore Components

29.3.7 For a linear infrastructure project such as the proposed Scheme, there is the potential that intra-project effects could conceivably occur where there is a pathway between the Offshore Scheme and the Dutch Offshore Components. At the UK/Netherlands Exclusive Economic Zone (EEZ) boundary the effects from construction will move with the installation spread and therefore there is no spatial or temporal overlap in effects as it is a continuation of effects along the linear project. The significance of intra-project effects is therefore assessed in the EIA individual topic chapters rather than the cumulative effects assessment.

29.3.8 Each of the offshore topic chapters will consider the potential for significant transboundary impacts between the UK/Netherlands and other nations' jurisdictions. **Table 29-4** summarises the transboundary impacts considered by offshore topic **Chapters 18 to 24** and the conclusions of the scoping assessment.

Table 29-4 Transboundary impact scoping summary

Chapter	Phase	Receptor	Impact	Proposed to be scoped in / out
18 Marine Physical Environment	Construction and Operation	Water quality Seabed substrates	Temporary increase in suspended sediments and subsequent deposition	Scoped Out
19 Intertidal and Subtidal Benthic Ecology	Construction and operation	Subtidal habitats and species	Temporary increase in suspended sediments and subsequent deposition	Scoped Out
19 Intertidal and Subtidal Benthic Ecology	Construction and Operation	Subtidal Species	Underwater noise changes	Scoped Out
19 Intertidal and Subtidal Benthic Ecology	Construction and Operation	Subtidal Species	Introduction or spread of Marine invasive non-native species (MINNS)	Scoped Out
19 Intertidal and Subtidal Benthic Ecology	Construction and Operation	Subtidal Species	Changes in marine water quality	Scoped Out
20 Fish and Shellfish	Construction	All species	Underwater noise changes due to unexploded ordnance (UXO) detonation.	Scoped Out
20 Fish and Shellfish	Construction and Operation	All species	Underwater noise changes due to presence of project vessels and equipment (including cable trenching).	Scoped Out
20 Fish and Shellfish	Construction and Operation	All species	Accidental spills	Scoped Out
20 Fish and Shellfish	Construction and Operation	All species	Introduction or spread of MINNS	Scoped Out
22 Marine Mammals	Construction and Operation	Cetaceans and pinnipeds	Underwater noise changes due to presence of project vessels and equipment (including cable trenching).	Scoped Out

Chapter	Phase	Receptor	Impact	Proposed to be scoped in / out
22 Marine Mammals	Construction	Cetaceans and pinnipeds	Underwater noise changes due to unexploded ordnance (UXO) detonation.	Scoped In
22 Marine Mammals	Construction and Operation	Cetaceans and pinnipeds	Changes in prey availability	Scoped In
26 Marine Archaeology	Construction and Operation	Seabed and sub-seabed heritage receptors including palaeogeography, known and potential maritime and aviation features with interest that extends across international boundaries.	Transboundary impacts through direct and indirect impacts, to features.	Scoped In

29.3.9 The Dutch Offshore Components will be the subject of a separate environmental assessment/EIA, compliant with Dutch legislation and EU requirements, which will also consider intra-project and transboundary effects.

29.3.10 A “Summary of the Onshore and Offshore Environmental Effects” document will be prepared once the UK and Dutch environmental assessment process is complete. This will provide:

- a description of the LionLink Project end-to-end;
- an overview of the environmental assessments that have been conducted and the conclusions of those assessments; and
- highlight any significant intra project effects and mitigation that will be implemented to avoid or reduce the significance of effects.

Inter project effects assessment

29.3.11 PINS Advice Note Seventeen: Cumulative effects assessment relevant to nationally significant infrastructure projects provides a staged and sequential approach to cumulative effects assessment (CEA) which can be split into four distinct phases. The CEA undertaken will be iterative and may need to be repeated a number of times during the preparation of a Development Consent Order (DCO) application. The process is outlined below.

29.3.12 Whilst Advice Note Seventeen advises that Stages 1-2 should be ideally undertaken before requesting a Scoping Opinion, given the scale of the proposed Scheme order limits and the fact that the study area will significantly reduce as the proposed Scheme is refined, it is not considered proportionate at this stage to produce a long list or short list. The long list and short list will be developed as the proposed Scheme boundary is refined and will be consulted on with the relevant consultees.

Stage 1: Establishing the long list

29.3.13 The first step is to establish the Zone of Influence (ZoI) for the proposed Scheme and from that a long list of ‘other existing development and/or approved development’.

29.3.14 **Table 29-5, Table 29-6** and **Table 29-7** provide an overview of the proposed ZoIs to be used for each topic chapter. The starting point is consideration of the study areas within each technical chapter of this EIA Scoping Report. However, to identify the ZoI for the assessment of cumulative effects, it is appropriate to consider the likely spatial extent of the impacts from the source activities in order to identify a proportionate and realistic ZoI rather than the study area identified to inform the baseline conditions or trends. There are cases where these are the same and where they differ. In some cases it is not possible at this early stage in the EIA process to define the ZoI as this will require further study and preliminary assessment for this to be defined prior to the cumulative assessment. Brief explanatory notes are provided in the tables to explain the reason behind the ZoI.

29.3.15 Where a topic or topic aspect has been scoped out of the EIA then there is no ZoI proposed.

29.3.16 Where there is more than one ZoI in a topic the largest ZoI will be used for the identification of the long list of ‘other existing development and/or approved development’.

29.3.17 The ZoIs will remain under iterative review in response to refinement of the proposed Scheme design, feedback from consultees, identification of additional constraints and results of assessments undertaken to inform the EIA.

29.3.18 Near to the boundary between onshore and offshore there might be cumulative effects that arise from an onshore and an offshore other development on onshore and/or offshore receptors. During the EIA process, the individual topic assessment will consider the potential for significant cumulative effects on receptors from both onshore and offshore 'other existing development and/or approved development'.

Table 29-5 Zone of Influence for Offshore Environmental Topics

Environmental topic and aspect	Maximum ZoI (Distance from the proposed Offshore Scheme order limits)	Brief explanatory note
Marine Mammals and Marine Reptiles	25km – UXO effects European otter ZoI is within the Offshore Scheme order limits.	Guidance regarding the assessment of effects from underwater sound source impacts in relation to Special Areas of Conservation (SACs) designated for the protection of harbour porpoise (the cetacean species with the highest hearing sensitivity) indicates the maximum distance for significant disturbance is 26km for high order UXO detonation[4]. During the EIA 'other developments' outside of the ZoI may be identified and scoped into the assessment on a case by case basis where they are within the relevant study area for species e.g., cetacean management unit, or are within or may significantly affect a protected site that may also be affected by the proposed Scheme.
Marine Physical Environment Intertidal and Subtidal Benthic Ecology Fish and Shellfish	15km	15km represents a precautionary maximum ZoI based on local tidal excursion distances where there is the potential for direct and indirect effects from the deposition of suspended sediments. The study area for protected fish and shellfish species is 100km. Note that it is not proportionate to set a ZoI of 100km for protected fish and shellfish species. Therefore, during the EIA 'other developments' outside of the ZoI may be identified and scoped into the assessment on a case by case basis where they are in the relevant baseline study area once the likelihood of effects are reasonably understood.
Intertidal and Offshore Ornithology	15km	15km represents a precautionary maximum ZoI based on local tidal excursion distances where there is the potential for direct and indirect effects from the deposition of suspended sediments. The ZoI may be refined down with regards to specific impacts such as disturbance where advice from the statutory nature conservation bodies

[4] JNCC (2020). Guidance for assessing the significance of noise disturbance against Conservation Objectives of harbour porpoise SACs (England, Wales and Northern Ireland), JNCC Report No. 654, ISSN 0963-8091. Peterborough: JNCC.

Environmental topic and aspect	Maximum ZoI (Distance from the proposed Offshore Scheme order limits)	Brief explanatory note
		consider 10km to be appropriate for red-throated diver and 4km for other diving species.
Shipping and navigation	5 nautical mile (NM)	5 NM is based on the study area identified in **Chapter 23** Shipping and Navigation. It is a standard ZoI used in navigation risk assessments. During the EIA 'other developments' outside of the ZoI may be identified and scoped into the assessment on a case by case basis. This will be undertaken in consultation with navigation authorities.
Commercial Fisheries	Region covered by International Council for the Exploration of the Sea (ICES) rectangles 33F1, 33F2, 33F3, 34F2,34F3, 35F2 and 35F3.[5]	A regional approach will be taken when identifying relevant 'other developments' to include within the commercial fisheries cumulative effects assessment recognising that displacement and spatial squeeze is a complex issue facing the industry. 'Other developments' outside of the ZoI may be identified and scoped into the assessment on a case by case basis. This will be done in consultation with local fisheries associations.
Other Marine Users	10km	The ZoI is based on the study area identified in **Chapter 25** Other Marine Users and is a similar extent to that used for **Chapter 23** Shipping and Navigation (10km is approximately 5 NM). During the EIA 'other developments' outside of the ZoI may be identified and scoped into the assessment on a case by case basis. For example, if there is uncertainty as to where the corridor for a proposed Offshore wind farm export cable may be routed.
Marine Archaeology	1km	The ZoI is based on the study area identified in **Chapter 26** Marine Archaeology. During the EIA 'other developments' outside of the ZoI may be identified and scoped into the assessment on a case by case basis where their potential impacts extend into the ZoI for the proposed Offshore Scheme and/or they may impact the same paleo-archaeological feature.

[5] Each Rectangle is approximately 30 nautical miles (NM) square and is 30 min latitude and 1° longitude in size[5] and is used to record and collate statistical fisheries data.

Table 29-6 Zone of Influence for Onshore Environmental Topics

Environmental topic and aspect	Maximum ZoI (Distance from the proposed Scheme Onshore order limits)	Brief explanatory note
Ecology and Biodiversity	10km	The ZoI is based on the presence of 10 statutory nature conservation designations within 10km. The wider 30km study area for bats does not apply because there are no designated sites for bats between 10-30km. All other biodiversity ZoIs are less than 10km.
Traffic and Transport	To be confirmed	For traffic and transport the extent of the ZoI will be defined during the course of undertaking the EIA by defining the affected road network (ARN). 'Other developments' will be included in the generation of future year construction traffic data for the proposed Scheme. This will be undertaken in consultation with the relevant authorities.
Landscape and Visual	3km	The ZoI is based on the preliminary study area and the surroundings and the potential effects from the tallest proposed infrastructure (the proposed Converter Station). For landscape and visual the extent of the ZoI will be defined during the course of undertaking the EIA by defining the Zone of Theoretical Visibility (ZTV).
Historic Environment	1km	The ZoI for historic environment is based on the potential for changes to the setting of designated heritage assets which could result in effects. This will be kept under review during the course of the EIA with reference to the ZTV.
Noise and Vibration	300m for construction noise and vibration.	The ZoI for noise and vibration during construction is 300m from the order limits. As per best practice guidance stated in the Noise and Vibration Chapter 300m is the maximum distance at where it is likely that could result in effects. The ZoI is the same as the construction noise and vibration study area. The ZoI for noise and vibration during operation is 1km from the order limits around the converter and substation locations. As per best practice guidance stated in the Noise and Vibration Chapter 1km is the maximum distance at where it is likely that could result in effects. The ZoI is the same as the operational noise and vibration study area.

Environmental topic and aspect	Maximum ZoI (Distance from the proposed Scheme Onshore order limits)	Brief explanatory note
	1km around substations and converter stations for operational noise and vibration.	
Air quality	350m	The ZoI for potential effects on air quality from dust is up to 350m. Effects beyond this 350m would be negligible. The ZoI for potential effects on air quality from construction traffic emissions is 200m from the ARN. However, the construction traffic data used in the air quality assessment will include the projected traffic flows from 'other developments' in the traffic and transport ZoI. Therefore, the air quality construction traffic assessment does not inform the ZoI.
Geology and contamination	500m	The maximum ZoI for Geology and Contamination is 500m, to capture sensitive groundwater receptors and the assessment of potential impacts on groundwater quality from significant contamination sources, such as large historical landfill sites.
Hydrology, hydrogeology and drainage	500m	The ZoI for Hydrology, hydrogeology and drainage is 500m. This is considered appropriate taking into account the nature of the proposed Onshore Scheme and potential for likely effects on the water environment.
Socio-economics	500m for socio-economic resource effects East Suffolk Council administrative boundary for employment effects	The ZoI for the socio-economic resource effects (businesses, open space community facilities, visitor attractions, development land) is 500m which is the same as the study area. The ZoI for employment effects is wider and is set at the local planning authority administrative boundary.
Health and Wellbeing	250m for construction (based on air quality ZoI).	The ZoI is based on the potential for effects on residential, community and healthcare facilities which is determined by the greatest ZoI for potential inter-related effects from air quality and noise effects.

Environmental topic and aspect	Maximum ZoI (Distance from the proposed Scheme Onshore order limits)	Brief explanatory note
	1km for operational noise and vibration effects from converter station and substation locations.	
Agriculture and soils	The extent of farm holdings that overlap the onshore scoping boundary	The ZoI is based on the potential for effects on agricultural soils which would be limited to the scoping study boundary and effects on the full extent of any affected farm holdings.
Materials and waste	Not applicable	The expansive study area for Material assets and Waste is the East of England region. The Material assets and waste assessment will consider the baseline trends and availability of material resources as well as future landfill capacity in the East of England. The assessment reported in the chapter is inherently cumulative. Therefore, the setting of a Minerals and Waste ZoI to inform the identification of 'other developments' to inform the Minerals and Waste intra-project assessment for does not need to be considered in addition.

Table 29-7 Zone of influence for project wide environmental topics

Environmental topic and aspect	Maximum ZoI (Distance from the proposed Scheme order limits)	Brief explanatory note
Climate Change and Carbon	Not applicable	Greenhouse gas emissions which contribute to climate change have an influence across all geographic scales (local, regional, UK and planetary). These geographic scales provide context for describing the baseline and trends and gauging the relative scale of the impact of the project. However, it is not proportionate and does not assist the inter project assessment to set this as the maximum ZoI for the identification of 'other developments'. All 'other developments' globally may contribute to climate change if they are not net zero. The assessment reported in the chapter is inherently cumulative. Therefore, the setting of a Climate

Environmental topic and aspect	Maximum ZoI (Distance from the proposed Scheme order limits)	Brief explanatory note
		Change and Carbon ZoI to inform the identification of ‘other developments’ to inform the Climate and Carbon intra-project assessment does not need to be considered in addition.
Major Accidents and Disasters	Not applicable	As this topic is scoped out there is no ZoI required for this topic.

29.3.19 The preliminary long list of potential 'other developments and/or 'approved development' will be identified through a desk-based review within the greatest ZoI for each topic of the proposed Scheme of the following sources:

- Planning Inspectorate's website: permitted and submitted NSIPs;
- Marine Case Management System MMO: licensed and submitted Marine Licences;
- Local planning authorities Suffolk County Council and East Suffolk Council: permitted and submitted planning applications.

29.3.20 The offshore ZoI extends across the UK/Netherlands EEZ boundary. Other projects beyond the boundary in the Netherland EEZ will be considered for inclusion in the long list. This information will be sourced from the Dutch Project team.

29.3.21 It is considered that any development with a consent older than five years will have been built out or lapsed after the three year consent for commencement has passed. Therefore, it is proposed that any development with a consent older than five years will be excluded from the long list. This will be discussed and agreed prior to the long list search being undertaken with the Local Planning Authorities and PINs and will take into account any changes to the spatial extent of the proposed Scheme prior to the CEA being undertaken for the PEI Report and ES.

29.3.22 Rejected and withdrawn planning applications will be excluded from the long list on the assumption that planning approval would not be pursued further. However, successful appeals or new planning applications brought forward will be included in the short list as identified from periodic updates of the long list up to the proposed cut-off date three months prior to the planned submission of the PEI Report and ES.

29.3.23 Allocations within Local Development Plans and other plans and programmes will be excluded from the long list because, as 'Tier 3' developments under the Planning Inspectorate's Advice Note 17, the amount of information available and the resulting certainty around the assessment of cumulative effects is likely to be limited. It is expected that future developers bringing forward proposed development in line with those allocations would carry out their own assessment of cumulative effects.

29.3.24 Data will be collected on each 'other developments and/or 'approved development' from the planning portals as follows: application reference, planning authority, application name, description of development, within onshore/offshore ZoI, distance from onshore/offshore Scheme order limits, date of application and status of application (for example, pre-application, approved, awaiting decision, decided/permitted, refused, responded[6], withdrawn, and unknown).

29.3.25 Minor development such as advertising consents, Tree Preservation Order (TPO) applications and householder applications will not be included in the long list because they would not be likely to result in significant cumulative effects over and above the proposed Scheme in isolation see **Table 29-8**.

29.3.26 However, it is recognised that minor developments that are not classed as major development under the Development Management Procedure (England) Order 2010 (as amended) may give rise to a cumulative effect by virtue of their proximity to the proposed Scheme and, therefore, these types of minor developments will be included in the long list where they are located within 200m of the boundary defined by design

[6] Where the LPA has provided a consultation response on a county council application.

development as presented in the PEI Report (or similar). **Table 29-8** provides the criteria to be used in excluding minor development from the long list.

Table 29-8 Criteria for excluding minor development from the long list

Development type	Threshold criteria for exclusion from long list	Buffer distance from the proposed Scheme order limits
Advertising consents, TPOs and householder application	All	10km
Residential development	1-9 or <0.5ha	>200m
Non-residential development	<1ha or <1000m^2	>200m

29.3.27 Advice Note Seventeen[7] identifies three tiers of development based on where they are in the planning process and recognises that the amount of information available to inform the assessment varies according to which tier it fits in to. Tier 1 developments are the most certain, with a high level of publicly available information, while Tier 3 developments are the least certain, with limited publicly available information to inform assessments. The criteria are assigned in tiers which descend from Tier 1 (most certain) to Tier 3 (least certain) and reflect a diminishing degree of certainty which can be assigned to each development (see **Table 29-9**).

Table 29-9 Criteria used to determine the tier of development for the inter-project cumulative effects assessment

Tier	Description	Data availability
Tier 1	• developments under construction. • permitted application(s), whether under the PA2008, Marine Works (Environmental Impact Assessment) Regulations 2007 (as amended) or other regimes, but not yet implemented. • submitted application(s) whether under the PA2008, Marine Works (Environmental Impact Assessment) Regulations 2007 (as amended) or other regimes but not yet determined.	Decreasing level of available data ↓
Tier 2	• projects on the Planning Inspectorate's Programme of Projects where a Scoping Report has been submitted. • projects on the Marine Case Management System portal where a Scoping Report has been submitted.	

[7] Advice Note Seventeen: Cumulative effects assessment relevant to nationally significant infrastructure projects. Published August 2019 (version 2). https://infrastructure.planninginspectorate.gov.uk/legislation-and-advice/advice-notes/advice-note-17/ [Access Feb 2024]

Tier	Description	Data availability
Tier 3	• projects on the Planning Inspectorate's Programme of Projects where a Scoping Report has not been submitted. • allocations identified in the relevant Development Plan (and emerging Development Plans – with appropriate weight being given as they move closer to adoption) recognising that there will be limited information available on the relevant proposals. • identified in other plans and programmes (as appropriate) which set the framework for future development consents/approvals, where such development is reasonably likely to come forward.	

Stage 2: Establishing the short list

29.3.28 The next step will be to establish the preliminary shortlist of 'other developments and/or approved development' to determine whether the other developments in the long list have the potential to give rise to significant effects in combination with the proposed Scheme.

29.3.29 The following criteria in combination with professional judgement will be used to identify whether potential cumulative inter-project effects are likely to be significant and therefore subject to further consideration:

- **Likelihood development comes forward/level of information available (based on Tiers):** Allocations within Local Development Plans and other plans and programmes will be excluded from the preliminary short list and scoped out of the assessment. This is because, as Tier 3 developments, the amount of information available and the resulting certainty around the assessment of cumulative effects is likely to be limited. It is expected that future developers bringing forward proposed development in line with those allocations would carry out their own assessment of cumulative effects.
- **Temporal scope:** 'Other developments and/or approved development' within the ZoI with overlapping construction phases (2026-2030) and operational phases (2030-2070) will be included in the preliminary short list. Where 'other developments and/or approved development' are expected to be completed before construction of the proposed Scheme and the effects of those projects are fully determined, effects arising from them will be considered as part of the future baseline assessed in the technical chapters and they will be excluded from the preliminary short list and scoped out of the cumulative effects assessment.
- **Scale and nature of development:**
  - Development identified as Schedule 1 and 2 developments in the Infrastructure Planning (EIA) Regulations 2017 and the Town and Country Planning (EIA) Regulations 2017 will be considered further.
  - Development not identified as Schedule 1 and 2 developments in the Infrastructure Planning (EIA) Regulations 2017 and the Town and Country Planning (EIA) Regulations 2017 will be scoped out of the assessment, except

where it was considered that potential significant environmental effects may arise in combination with the project.

- **Sensitivity of the receiving environment**: Where there are potential source-pathway-receptor linkages between the proposed Scheme and other developments, cumulative effects will be considered further. Other developments with no clear source-pathway-receptor linkage will be excluded from the preliminary short list and scoped out of the assessment.

29.3.30 The definition of the preliminary short list will take into consideration that documented information for 'other existing development and/or approved development' may be high level at this stage. If assumptions regarding potential for significant effects need to be made then these will be briefly outlined.

Stage 3: Information gathering

29.3.31 Available information will be gathered on the 'other existing development and/or approved development' short listed at Stage 2 including:

- Proposed design and location information;
- Proposed programme of construction and operation; and
- Environmental assessments that set out baseline data and effects arising from the 'other existing development and/or approved development' (for example, ES or Scoping Reports).

Stage 4: Assessment

29.3.32 An assessment of the cumulative effects of the proposed Scheme with the 'other development and/or approved development' identified in Stage 2 will be carried out using the following methodology:

- Each of the 'other developments and/or approved development' will be assessed in turn with the proposed Scheme to determine if both activities/proposals give rise to significant cumulative effects during either construction or operation;
- The assessment will consider the apportionment of effect between the proposed Scheme and the 'other development' e.g., is the contribution to the effect demonstrably related to one development or is there an equal contribution from either development based on professional judgement;
- The assessment will consider whether certain assessments (e.g., transport and associated air quality/ noise vehicular emissions assessments) are inherently cumulative and have been carried out on a worse-case basis. In such circumstances no additional cumulative assessment will be carried out;
- Cumulative effects will be identified by considering whether:
  - there would be any change in the significant effects from the proposed Scheme, as identified within the individual technical chapters of the PEI Report and ES, taking into consideration any effects from the short listed 'other existing development and/or approved development'. For example, a moderate adverse significant effect becoming a major adverse significant effect; or where the effects of the proposed Scheme on key receptors potentially affected by the short listed 'other existing development and/or approved development' would trigger a significant effect where the effects of the proposed Scheme in isolation would

non-significant. For example, a minor adverse non-significant effect becoming a moderate adverse significant effect;

- Significant effects of the proposed Scheme will be taken from the environmental topic chapters to inform the significance of cumulative effects with other developments. Effects will be identified as direct, indirect, short-term or long-term, permanent or temporary; and
- All likely significant cumulative effects and a description of the proposed mitigation and monitoring measures that may be required will be documented in a matrix.

29.3.33 The results of the assessment will be documented and presented in an accessible format similar to that in Matrix 2 provided in Appendix 2 of Advice Note Seventeen and tabulated within the ES.

29.4 Summary

29.4.1 **Table 29-10** provides a summary of the proposed scope of assessment and a rationale to the proposed scope.

Table 29-10 Summary table

Sub-topic	Construction	Operation	Rationale for scoping sub-topics in or out
Intra effects – intra-project effects of multiple aspects	Scoped In	Scoped In	During construction and operation, there is the potential for intra effects on receptors from multiple impacts. These will be assessed and reported within the PEI Report and ES, including the identification of any required mitigation.
Intra effects – Onshore and Offshore Scheme	Scoped In	Scoped In	During construction and operation, there is the potential for intra effects between the Onshore and Offshore Scheme. These will be assessed and reported within the PEI Report and ES, including the identification of any required mitigation.
Intra effects – Offshore Scheme and Dutch Offshore Components	Scoped Out	Scoped Out	During construction and operation, there is the potential for intra effects between the Offshore Scheme and the Dutch Offshore Components. These will be the subject of a separate environmental assessment/EIA. A separate document will be prepared which summarises the intra-project effects of the LionLink Project end-to-end.
Inter cumulative effects	Scoped In	Scoped In	During construction and operation, there is the potential for inter effects with other existing development and/or approved development. These will be assessed and reported within the PEI Report and ES, including the identification of any required mitigation.

29.5 Colocation

29.5.1 At this time there is the potential opportunity to coordinate with SeaLink, a National Grid Electricity Transmission (NGET) project connecting in to Friston Substation. The SeaLink project is proposing a converter station at the same location as the proposed Converter Station, and as a result there may be coordination and colocation should both schemes acquire consent. Whilst this cannot be confirmed at this time, this is being explored through the design process.

29.5.2 Should both projects proceed, the inter project effects from the colocation of the proposed Converter Station will be assessed in detail in the CEA.

Contents

30. Summary

30.1.1 **Table 30-1** summarises the aspects that are proposed to be scoped into and out of the Environmental Impact Assessment (EIA) and the proposed content of the Environmental Statement (ES).

Table 30-1 EIA Scoping Report summary table

Onshore or Offshore	Environmental Topic	Construction Phase	Operational phase
Onshore	Air Quality	Scoped in	Scoped out
	Agricultural Land and Soil	Scoped in	Scoped out
	Ecology And Biodiversity	Scoped in	Scoped in
	Geology And Contamination	Scoped in	Scoped out
	Health And Wellbeing	Scoped in	Scoped out
	Historic Environment	Scoped in	Scoped in
	Hydrology, Hydrogeology and Drainage	Scoped in	Scoped out
	Landscape And Visual	Scoped in	Scoped in
	Noise And Vibration	Scoped in	Scoped in
	Traffic And Transport	Scoped in	Scoped in
	Socio-Economics, Recreation And Tourism	Scoped in	Scoped in
	Materials Assets and Waste	Scoped in	Scoped out
Offshore	Marine Physical Environment	Scoped in	Scoped in
	Intertidal and Subtidal Benthic Ecology	Scoped in	Scoped in
	Fish and Shellfish	Scoped in	Scoped in
	Intertidal and Offshore Ornithology	Scoped in	Scoped in
	Marine Mammals and Marine Reptiles	Scoped in	Scoped in
	Shipping and Navigation	Scoped in	Scoped in
	Commercial Fisheries	Scoped in	Scoped in
	Other Marine Users	Scoped in	Scoped in
	Marine Archaeology	Scoped in	Scoped in

Onshore or Offshore	Environmental Topic	Construction Phase	Operational phase
proposed Scheme wide	Climate Change and Carbon	GHG Scoped in CCR Scoped out ICCI Scoped out	GHG Scoped in CCR Scoped out ICCI Scoped out
	Major Accidents and Disasters	Scoped out	
	Cumulative And Combined Effects of The Project	Scoped in	

30.2 The structure of the Environmental Statement

30.2.1 The ES is likely to be structured as follows:

- Non-Technical Summary (NTS);
- Volume 1: Environmental Statement;
- Volume 2: Figures; and
- Volume 3: Technical Appendices.

30.2.2 In addition, the following related documents will accompany the DCO application:

- Habitats Regulations Assessment (HRA);
- Water Framework Directive (WFD) Compliance Assessment;
- Flood Risk Assessment (FRA);
- Marine Conservation Zone (MCZ) Assessment; and
- Code of Construction Practice (CoCP).

30.2.3 Each technical chapter in the ES will report the results of the assessment in a consistent manner and will likely include the following sections:

- Introduction;
- Competent expert evidence;
- Legislative and policy framework;
- Assessment methodology;
- Assessment assumptions and limitations;
- Study area;
- Baseline conditions;
- Potential impacts;
- Design and control measures;
- Assessment of the likely significant effects;
- Mitigation and enhancement measures;

- Residual effects; and
- Monitoring.

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