White Cross Offshore Windfarm
EIA Scoping Report

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Document History

Version Number	Reason for Issue / Major Changes
V 1.0	Draft for client review
V 2.0	Final draft
V 3.0	Final for issue

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Glossary of Acronyms

Acronym	Definition
AEZ	Archaeological Exclusion Zone
ADBA	Archaeological Desk Based Assessment
ADDs	Acoustic Deterrent Devices
AfL	Agreement for Lease
AIS	Automatic Identification System
AOD	Above Ordnance Datum
AONB	Area of Outstanding Natural Beauty
AoS	Area of Search
AQMA	Air Quality Management Area
ASCOBANS	Agreement on the Conservation of Small Cetaceans of the Baltic and North Seas
ATBA	Area To Be Avoided
BAS	Burial Assessment Study
BEIS	Department for Business, Energy and Industrial Strategy
BGS	British Geological Society
BMAPA	British Marine Aggregate Producers Association
BSI	British Standards Institution
CAA	Civil Aviation Authority
CBRA	Cable Burial Risk Assessment
CCC	Committee on Climate Change
Cefas	Centre for the Environment and Fisheries and Aquaculture Science
CEMP	Construction Environmental Management Plan
CfD	Contracts for Difference
CIA	Cumulative Impact Assessment
CIEEM	Chartered Institute of Ecology and Environmental Management
CIRIA	Construction Industry Research and Information Association
CoCP	Code of Construction Practice
DCO	Development Consent Order
DECC	Department for Energy and Climate Change
Defra	Department for Environment, Food and Rural Affairs
EEA	European Economic Area
EIA	Environmental Impact Assessment
EMFs	Electromagnetic Frequency
EPS	European Protect Species
ERCoP	Emergency Response Co-operation Plan
ES	Environmental Statement
EU	European Union

Acronym	Definition
FWMA	The Flood and Water Management Act
GEART	Guidelines for the Environmental Assessment of Road Traffic
GHG	Greenhouse Gas
GIS	Global Imaging Systems
GIS	Geographical Information System
GPS	Global Positioning System
GT	Gross Tonnage
ha	Hectare
HDD	Horizontal Directional Drilling
HMSO	Her Majesty's Stationery Office
HPMA	Highly Protected Marine Areas
HRA	Habitats Regulation Assessment
IALA	International Association of Marine Aids to Navigation and Lighthouse Authorities
IAMMWG	Inter-Agency Marine Mammal Working Group
IAQM	Institute of Air Quality Management
ICES	International Council for the Exploration of the Sea
IEMA	Institute of Environmental Management and Assessment
IMO	International Maritime Organization
IPC	Infrastructure Planning Commission
IPCC	Intergovernmental Panel on Climate Change
IUCN Red List	The International Union for Conservation of Nature's Red List of Threatened Species
JCP	Joint Cetacean Protocol
JNCC	Joint Nature Conservancy Council
km	Kilometre
LAQM	Local Air Quality Management
LCA	Landscape Character Area
LCT	Landscape Character Type
LNR	Local Nature Reserve
LoWS	Local Wildlife Site
m	Metre
MAIB	Marine Accident Investigation Branch
MCA	Maritime and Coastguard Agency
MCZ	Marine Conservation Zone
MGN	Marine Guidance Note
MMMP	Marine Mammal Mitigation Protocol
MMO	Marine Management Organisation
MoD	Ministry of Defence

Acronym	Definition
MPS	Marine Policy Statement
MSFD	Marine Strategy Framework Directive
MU	Management Units
MW	Megawatts
NAS	Noise Abatement Systems
NATS	National Air Traffic Services
NE	Natural England
NGC	National Grid Company
nm	Nautical Mile
NNR	National Nature Reserve
NRA	Navigational Risk Assessment
NPL	National Physical Laboratory
NOAA	National Oceanic and Atmospheric Administration
NPS	National Policy Statement
NPPG	The National Planning Practice Guidance
NRA	Navigational Risk Assessment
NtM	Notice to Mariners
O&M	Operation and Maintenance
OFTO	Offshore Transmission Owner (OFTO)
ONS	Office for National Statistics
OS	Ordnance Survey
OSPAR	The Convention for the Protection of the Marine Environment of the North-East Atlantic
OTNR	Offshore Transmission Network Review
OWL	Offshore Wind Ltd
PAD	Protocol for Archaeological Discoveries
PEXA	Practice and Exercise Area
PINS	Planning Inspectorate
PPG	Pollution Prevention Guidelines
PPG	Planning Practice Guidance
PRoW	Public Right of Way
PTS	Permanent Threshold Shift
RIAA	Report to Inform an Appropriate Assessment
RIGS	Regionally Important Geological Sites
RNLI	Royal National Lifeboat Association
RSPB	Royal Society for the Protection of Birds
RYA	Royal Yachting Association
S.36	Section 36 Consent
SAC	Special Area of Conservation

Acronym	Definition
SAR	Search and Rescue
SCANS-III	Small Cetaceans in the European Atlantic and North Sea
SCI	Site of Community Importance
SCOS	Special Committee on Seals
SELcum	Cumulative impact from Sound Exposure Level
SELss	Sound Exposure Level for a single strike
SLVIA	Seascape, Landscape and Visual Impact Assessment
SMRU	Sea Mammal Research Unit
SNCB	Statutory Nature Conservation Body
SOLAS	Safety of Life at Sea
SPA	Special Protection Area
SPLpeak	Peak Sound Pressure Level
SPZ	Source Protection Zone
SSSI	Site of Special Scientific Interest
TCE	The Crown Estate
TfL	Transport for London
TJB	Transition Joint Bay
TSS	Traffic Separation Scheme
TTS	Temporary Threshold Shift
UKC	Under Keel Clearance
UKHO	UK Hydrographic Office
UXO	Unexploded Ordnance
VMS	Vessel Monitoring Systems
WCPS	West Coast Palaeolandscapes Survey
WPD	Western Power Distribution
WTG	Wind Turbine Generator
WWT	Wildfowl and Wetlands Trust
ZoI	Zone of Influence
ZTV	Zone of Theoretical Visibility

Glossary of Terminology

Defined Terms	Description
Applicant	Offshore Wind Limited
Development Area	The area comprising the Onshore Development Area and the Offshore Development Area
Export Cable Corridor	The area in which the export cables will be laid, from the Offshore Substation Platform to the Onshore Substation comprising both the Offshore Export Cable Corridor and Onshore Export Cable Corridor.
inter-array cables	Cables which link the wind turbines to each other and the Offshore Substation Platform
jointing bay	Underground structures constructed at regular intervals along the Onshore Export Cable Corridor to join sections of cable and facilitate installation of the cables into the buried ducts.
Landfall	Where the offshore export cables come ashore.
link boxes	Underground chambers or above ground cabinets next to the cable trench housing electrical earthing links.
White Cross Offshore Windfarm	100MW capacity offshore windfarm including associated onshore and offshore infrastructure.
Offshore Development Area	The Windfarm Site and Offshore Export Cable Corridor to Landfall.
offshore export cables	The cables which would bring electricity from the Offshore Substation Platform to the Landfall.
Offshore Export Cable Corridor	The proposed offshore area in which the export cables will be laid, from the perimeter of the Windfarm Site to Landfall.
offshore infrastructure	All of the offshore infrastructure including wind turbines, Offshore Substation Platform(s) and all cable types.
Offshore Substation Platform(s)	A fixed structure located within the Windfarm Site, containing electrical equipment to aggregate the power from the wind turbines and convert it into a more suitable form for export to shore.
Onshore Development Area	The onshore area above MHWS including the underground onshore export cables connecting to the Onshore Substation
Onshore Export Cables	The cables which bring electricity from Landfall to the Onshore Substation.
Onshore Export Cable Corridor	The proposed onshore area in which the export cables will be laid, from Landfall to the Onshore Substation
onshore infrastructure	The combined name for all infrastructure associated with the Project from Landfall to grid connection.
Onshore Substation	Part of an electrical transmission and distribution system. Substations transform voltage from high to low, or the reverse by means of the electrical transformers.
platform link cable	This is an electrical cable which links one or more offshore platforms.
safety zones	An area around a structure or vessel which should be avoided
scour protection	Protective materials to avoid sediment being eroded away from the base of the foundations as a result of the flow of water.

Defined Terms	Description
Transition bay	Underground structures at the Landfall that house the joints between the offshore export cables and the onshore export cables.
Windfarm Site	The area within which the wind turbines, Offshore Substation Platform and inter-array cables will be present

Agreed Terminology	Description
Agreement for Lease	An agreement for lease (AfL) is a non-binding agreement between a landlord and prospective tenant to grant and/or to accept a lease in the future. The AfL only gives the option to investigate a site for potential development. There is no obligation on the developer to execute a lease if they do not wish to.
Commitment	A term used interchangeably with mitigation. Commitments are Embedded Mitigation Measures. Commitments are either Primary (Design) or Tertiary (Inherent) and embedded within the assessment at the relevant point in the EIA (e.g. at Scoping). The purpose of commitments is to reduce and/or eliminate Likely Significant Effects (LSE's), in EIA terms
Cumulative effects	The effect of the Project taken together with similar effects from a number of different projects, on the same single receptor/resource. Cumulative impacts are those that result from changes caused by other past, present or reasonably foreseeable actions together with the Project
Department for Business, Energy and Industrial Strategy	Government department that is responsible for business, industrial strategy, science and innovation and energy and climate change policy and consent under Section 36 of the Electricity Act.
Design Envelope	A description of the range of possible elements that make up the Project design options under consideration. This envelope is used to define the Project for Environmental Impact Assessment purposes when the exact parameters are not yet known.
Engineer, Procure, Construct and Install	A common form of contracting for offshore construction. The contractor takes responsibility for a wide scope and delivers via own and subcontract resources.
Environmental impact assessment	Assessment of the potential impact of the proposed Project on the physical, biological and human environment during construction, operation and decommissioning.
Front end engineering and design	Front-end engineering and design (FEED) studies address areas of windfarm system design and develop the concept of the windfarm in advance of procurement, contracting and construction.
High Voltage Alternating Current	High voltage alternating current is the bulk transmission of electricity by alternating current (AC), whereby the flow of electric charge periodically reverses direction.
High Voltage Direct Current	High voltage direct current is the bulk transmission of electricity by direct current (DC), whereby the flow of electric charge is in one direction
In-combination effects	In-combination effects are those effects that may arise from the development proposed in combination with other plans and projects proposed/consented but not yet built and operational
Inter-related effects	Multiple effects on a given receptor such as benthic habitats (e.g. direct habitat loss or disturbance, sediment plumes, scour, jack-up vessel use etc.) may interact to produce a different or greater effect on this receptor than when the effects are considered in isolation.
Mean high water springs	The average tidal height throughout the year of two successive high waters during those periods of 24 hours when the range of the tide is at its greatest
Mean low water springs	The average tidal height throughout a year of two successive low waters during those periods of 24 hours when the range of the tide is at its greatest

Agreed Terminology	Description
Mean sea level	The average tidal height over a long period of time.
Mitigation	A term used interchangeably with Commitment(s). Mitigation measures (Commitments) are embedded within the assessment at the relevant point in the EIA (e.g. at Scoping)
Offshore Transmission Owner	An OFTO, appointed in UK by Ofgem (Office of Gas and Electricity Markets), has ownership and responsibility for the transmission assets of an offshore windfarm.
Service operation vessel	A vessel that provides accommodation, workshops and equipment for the transfer of personnel to turbine during OMS. Vessels in service today are typically up to 85m long with accommodation for about 60 people
Works completion date	Date at which construction works are deemed to be complete and the windfarm is handed to the operations team. In reality, this may take place over a period of time.

1. Part 1: Introduction

1. Part 1 of this Scoping Report covers the following:

- Section 1.1: Project Background
- Section 1.2: Approach to Scoping
- Section 1.3: Proposed Programme
- Section 1.4: Consultation
- Section 1.5: Policy and Legislative Context
- Section 1.6: Site Selection and Assessment of Alternatives
- Section 1.7: Scoping Areas of Search
- Section 1.8: Description of the Project
- Section 1.9: EIA Methodology

1.1 Project Background

1.1.1 Introduction

2. White Cross Offshore Windfarm (the Project) is a proposed offshore windfarm located in the Celtic Sea (Figure 1.2.1) with a capacity of up to 100MW. The Project is being developed by Offshore Wind Ltd (OWL) a joint venture between Cobra Instalaciones Servicios, S.A., and Flotation Energy plc.

3. The Project will help achieve the UK Government's commitment to net zero by 2050 and tackle the climate emergency by producing electricity from renewable energy. The Project was selected in 2021 as part of The Crown Estate's Test and Demonstration leasing opportunity.

4. The Windfarm Site is located over 52km off the North Cornwall and North Devon coast (west-north-west of Hartland Point). The Offshore Export Cable will connect the Offshore Substation Platform to shore. Onshore, the grid connection is confirmed as East Yelland (Figure 1.2.2). The Export Cable will come ashore at a Landfall and then be routed underground to the Onshore Substation where it connects into the Western Power Distribution Network.

1.1.2 Purpose of this Document

5. This document supports a request for an EIA scoping opinion from the Department for Business, Energy & Industrial Strategy (BEIS), in accordance with Section 36 of the Electricity Act 1989 for the construction or extension, and operation, of electricity generating stations ("Section 36 consents"). The Section 36 consents

enable an applicant to request a scoping opinion from the Secretary of State on the information to be included in an EIA.

6. This scoping report outlines the receptors that will be considered during the EIA, the proposed data gathering and assessment methodology in order to characterise the existing environment; assess potentially significant impacts; identify likely significant effects; and develop mitigation measures. This scoping report provides initial information which will be expanded during a programme of consultation with stakeholders throughout the EIA process. An Environmental Statement (ES) will be submitted concluding the findings of the EIA process.

7. Receptors and impacts have been scoped in or out on the basis of lessons learned from a wide range of previous scoping opinions for offshore windfarms, recognising that a number of items cannot be scoped out until further information is known about the Project and the existing environment. Any further refinement of the impacts scoped out would be justified and agreed with the relevant stakeholders (see Section 1.4).

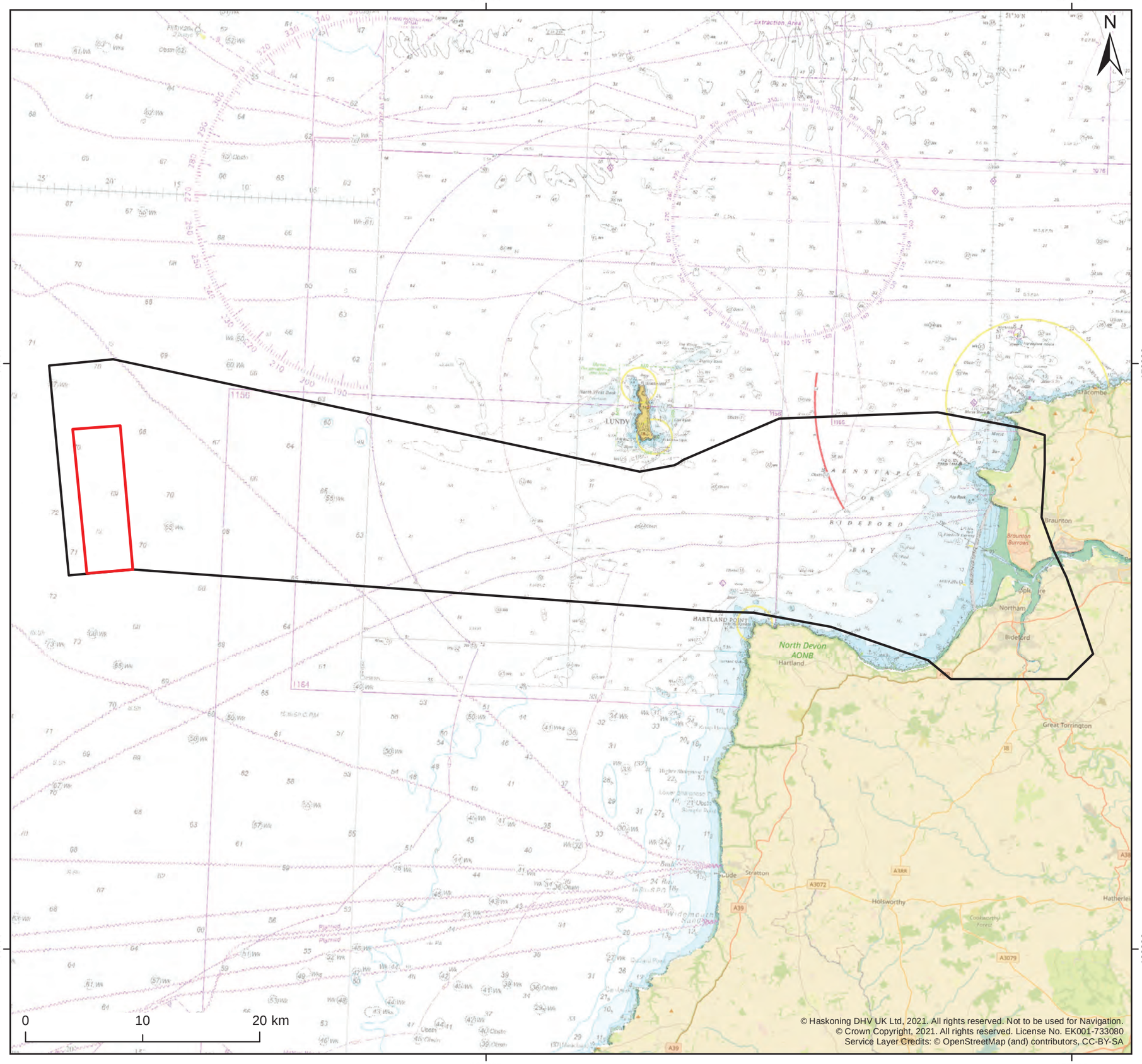
1.1.3 Offshore Wind Limited

8. Offshore Wind Ltd (OWL) is a joint venture between Cobra Instalaciones Servicios, S.A., and Flotation Energy plc. The successful partnership has delivered the Kincardine Floating Offshore Windfarm project and also secured development rights for the 480MW Morecambe offshore wind project in the Irish Sea and is working on further developments in the UK, Ireland and Taiwan.

1.2 Approach to Scoping

9. The Department of Business, Energy and Industrial Strategy (BEIS) is currently undertaking an Offshore Transmission Network Review (OTNR). The objective of the OTNR is to ensure that the transmission connections for offshore wind generation are delivered in the most appropriate way, considering the increased ambition for offshore wind to achieve net zero. The OTNR is looking to introduce policy and regulatory changes via the Energy Bill in 2022 which would introduce changes to the way connection points for onshore infrastructure are selected and ensure greater levels of coordination between proposed developments.

10. OWL have a connection agreement from Western Power Distribution (WPD) to connect to the existing substation at East Yelland which will utilise the remaining capacity at this grid connection. Therefore, there is no opportunity for an OTNR coordinated approach or a developer led coordinated approach.



Legend:

- White Cross Offshore Windfarm
- Area of Search

Client:	Project:
Offshore Wind Ltd.	White Cross Offshore Windfarm

Title:

White Cross Offshore Windfarm Location

Figure: 1.1.1	Drawing No: PC2978-RHD-ZZ-XX-DR-Z-0073				
Revision:	Date:	Drawn:	Checked:	Size:	Scale:
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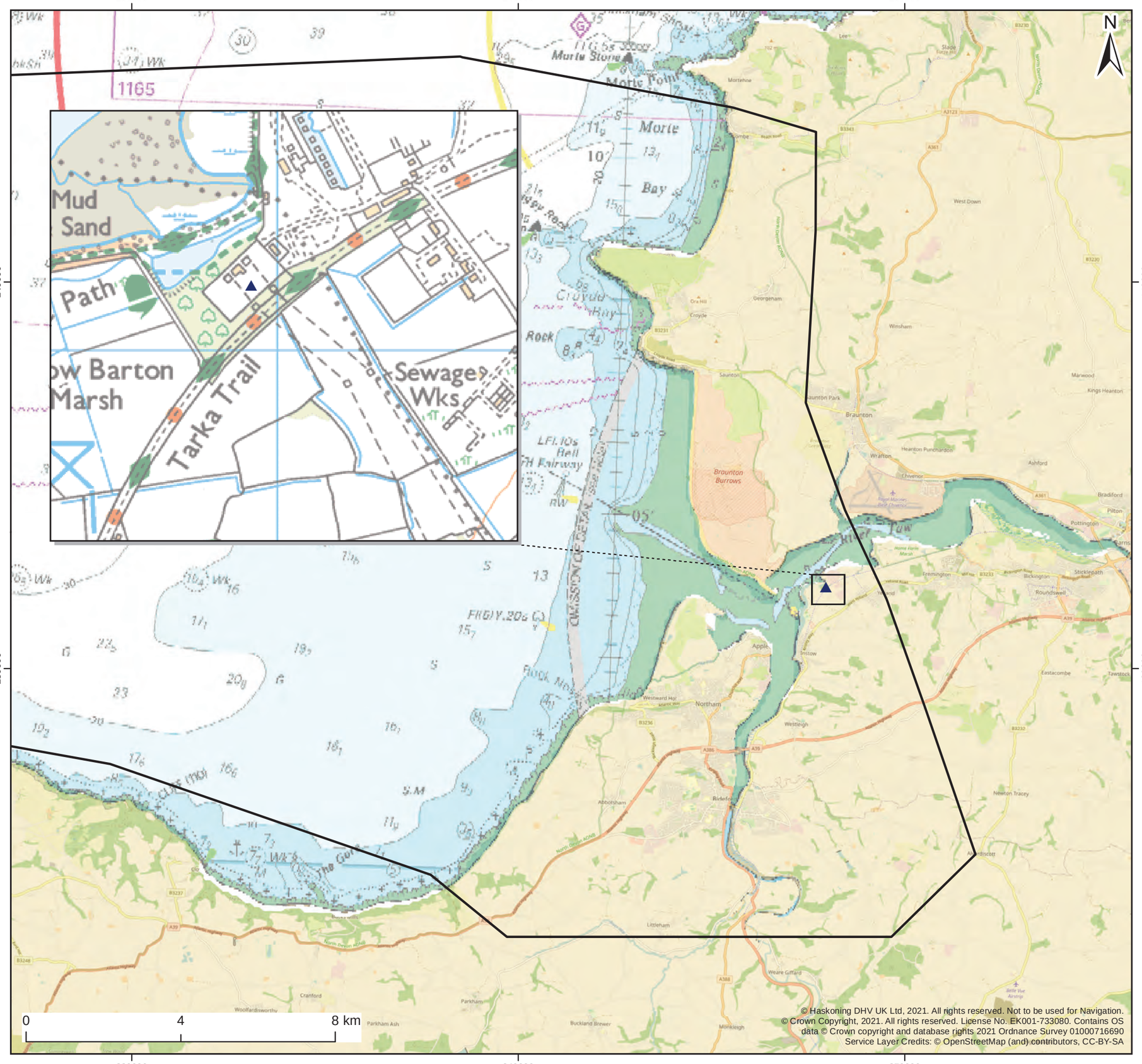
Co-ordinate system: British National Grid

WHITE CROSS

Royal HaskoningDHV
Enhancing Society Together



Legend:

- Area of Search
- Substation Connection Location

Client:	Project:
Offshore Wind Ltd.	White Cross Offshore Windfarm

Title:

Substation Connection at East Yelland

Figure: 1.1.2 | Drawing No: PC2978-RHD-ZZ-XX-DR-Z-0074

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Co-ordinate system: British National Grid

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1.3 Proposed Programme

11. At the time of writing, the programme is still being developed but an overview of the indicative schedule and key milestones are displayed in Plate 1.

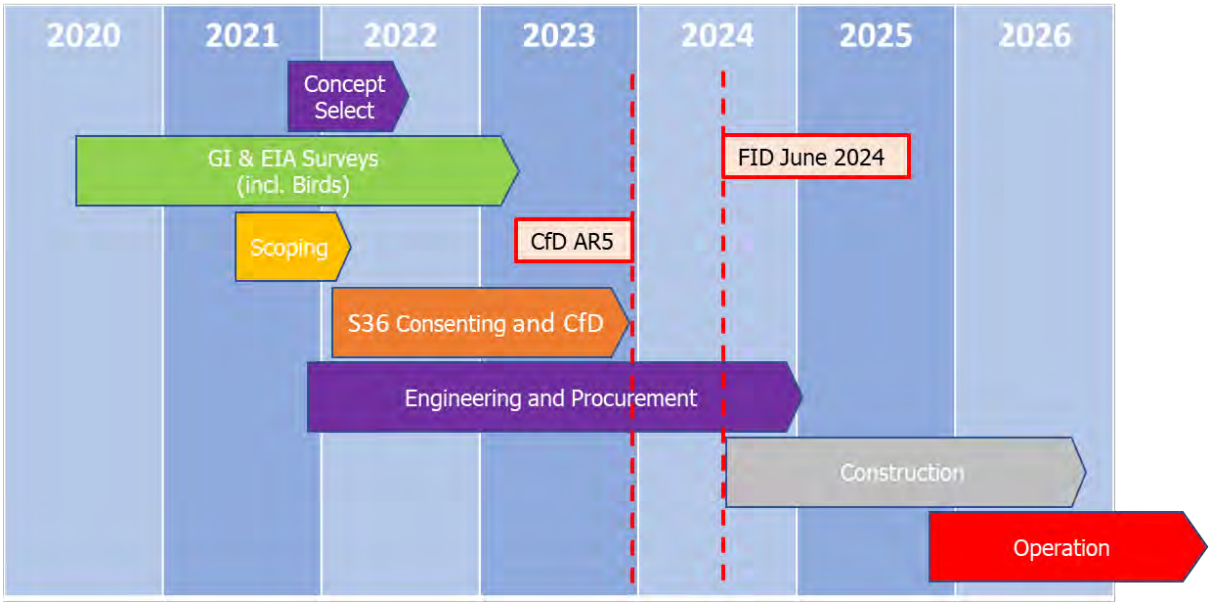


Plate 1 Indicative Project Programme

1.4 Consultation

1.4.1 Approach to Consultation

12. OWL is committed to open dialogue and engagement with both stakeholders, regulators, and communities which may be affected by the Project (including local, those who may be affected but are remote (fishermen etc.) and hard to reach groups).

13. OWL recognises that the involvement of local communities, local authorities and statutory consultees at an early stage can bring about significant benefits for all parties. OWL will undertake consultation with prescribed bodies, Local Planning Authorities and people with an interest in the land to which the application relates. More widely consultation will take place through the general notification of a proposed application.

1.4.2 Pre-Scoping Consultation

14. OWL has proactively initiated engagement with several stakeholders from an early stage in the Project. Table 1.1 provides an overview of stakeholder consultation meetings undertaken to date and OWL will build from this initial consultation to ensure that all stakeholders are effectively engaged as the EIA process progresses.

Table 1.1 Early initial consultation meetings undertaken to date

Organisation Consulted	Activity	Dates
Maritime and Coastguard Agency	Introductory meeting	19/11/2021
Trinity House	Introductory meeting	19/11/2021
Christie Devon Estates	Introductory meeting	23/11/2021
Cornwall Wildlife Trust	Introductory meeting	24/11/2021
Devon Wildlife Trust	Introductory meeting	24/11/2021
North Devon District Council Planning	Introductory meeting	26/11/2021
Cornwall County Council Archaeologist	Introductory meeting	02/12/2021
Devon County Council Archaeologist	Introductory meeting	02/12/2021
Historic England	Introductory meeting	02/12/2021
Various (Local councils, community groups and businesses)	Introductory meeting	08/12/2021
Various (Local councils, community groups and businesses)	Introductory meeting	09/12/2021
Cornish Fish Producers Organisation	Introductory meeting	10/12/2021
North Devon Fisherman's Association	Introductory meeting	10/12/2021
Various (Local councils, community groups and businesses)	Introductory meeting	12/01/2021
RSPB	Introductory meeting	13/12/2021
Maritime Management Organisation	Introductory meeting	14/12/2021
Torridge District Council Planning	Introductory meeting	14/12/2021

1.4.3 Technical Consultation

15. Consultation is a key element of the EIA process and consultation with technical consultees will be crucial to the development of the assessments. This consultation will initially include discussions on the detailed methodologies for data collection and undertaking the impact assessments.

16. As additional data and project information, including mitigation measures develop, further discussions will take place and it may be appropriate to scope impacts out at this stage. If so, this would be documented through agreement logs with stakeholders and if appropriate an update the scoping opinion sought.

1.4.4 Public engagement

17. Pre-application consultation will be the main opportunity for stakeholders to review the plans, provide comments, submit feedback and to have an influence on elements of the process and shape the development prior to submission of the application. All stakeholders will have the opportunity to be consulted on the Project both formally and informally as described further below.

18. OWL will ensure that stakeholders who are most affected by the proposals are engaged in the development of the Project from start to finish and have the opportunity to comment on the proposals at key decision-making points.

19. OWL will utilise both traditional and online consultation methodologies to allow various opportunities for the public to provide views and for OWL to where relevant and possible to take account of this feedback within the project development and design. These consultation methodologies include:

    - Digital consultation
    - Community / public events
    - Newsletters (online and hard copy)
    - Direct mail (letters, invitations and information materials) to those within the consultation area
    - Establishment of community liaison groups as applicable
    - Meetings with local representatives including parish, district and county councillors
    - Project specific website
    - Project-specific email address

20. This approach to consultation, using various consultation methodologies, reflects OWL's commitment to meaningful engagement and to capture the views of the local communities from individuals, community groups and those harder to reach groups including the elderly, disabled and non-IT literate members of the community.

The Evidence Plan Process

21. The Evidence Plan Process (EPP) is a non-statutory, voluntary process, and there are no legal obligations associated with it. The EPP is a mechanism to help agree the information needed in the EIA and HRA. It been used to great effect on multiple Nationally Significant Infrastructure Projects (NSIPs) in England, and we would seek to mirror this approach. The EPP improves the consultation process by:

    - Giving greater certainty to all parties on the amount and range of evidence to be presented within the application

- Providing structure and efficiency to discussion and sequential identification of key environmental and consenting issues
- Enabling time and resource requirements to be planned and optimised for all parties
- Helping address and agree issues earlier on in the pre-application stage where possible so robust, streamlined decisions can be taken, and additional data can be collected as required
- Providing a platform to debate advice on each topic between multiple agencies

22. The EPP does not replace or duplicate existing requirements. The EPP will be formulated to fit with the Section 36 consent application process. Although the EPP is not part of the formal consultation, it will provide the audit trail for documents produced by OWL, which will be formally consulted upon.

1.5 Policy and Legislative Context

1.5.1 Need for the Project

23. The need for the Project and its key objectives will be set out fully in consultation documents and/or application. In summary, there are four drivers for the development of offshore wind energy:

- The need to reduce greenhouse gas emissions
- The need for energy security
- The need to maximise economic opportunities from energy infrastructure investment for the UK
- The need to produce affordable energy

24. These four drivers are discussed further in the sections below.

The Need to Reduce Greenhouse Gas Emissions

25. Global temperature rise as a result of greenhouse gas emissions is associated with potential impacts on weather, ecosystems and human health and welfare. The Intergovernmental Panel on Climate Change (IPCC) Working Group I contribution to the Sixth Assessment Report (to be published in 2022) provides new estimates of the chances of crossing the global warming level of 1.5°C in the next decades, and finds that unless there are immediate, rapid and large-scale reductions in greenhouse gas emissions, the 1.5°C or even 2°C increase level will be crossed (IPCC, 2021).

26. The UK has made international commitments to limit global temperature increases, most recently through the 21st Conference of Parties in Paris in 2015. This commitment has been ratified and has been implemented in 2020 through the sixth UK Carbon Budget which recommends the UK commits to a 78% reduction in carbon emissions by 2035, compared to emission levels in 1990 (Climate Change Committee, 2020). The UK Government has committed to net zero (reduction in greenhouse gas emissions by 100% relative to 1990 levels) by 2050.

27. The Climate Change Committee (CCC) (2020) recommends that "*Offshore wind becomes the backbone of the whole UK energy system, growing from the Prime Minister's promised 40GW in 2030 to 100GW or more by 2050*".

The Need for Energy Security

28. With existing fossil fuels and nuclear-powered electricity generation coming to the end of their operational lives, there is a need for replacement generation as old infrastructure is decommissioned. In 2020, 28% of energy used in the UK was imported, down sharply from the 2019 level due to the impact of the Covid-19 pandemic as the UK imported less fuel to meet reduced demand (BEIS, 2021a).

29. Electricity generation in the UK has fallen by 2.4% between 2018 and 2019 and by 15% between 2010 and 2019, highlighting the need for new infrastructure to deliver a secure national energy supply as part of a long-term sustainable energy policy and to support the UK Government's policy to "*Build Back Better*" (HM Government, 2021).

30. Renewable electricity accounted for a record 43.1% of electricity generated in the UK during 2020, more than 6 percentage points higher than in 2019 (BEIS, 2021a). Renewable energy use grew by 6.7% between 2019 and 2020 and has increased almost tenfold on the 2000 total. Electricity generated from renewable sources increased by 13% between 2019 and 2020 and energy supply from wind increased by 18% in 2020, with capacity up by 2.5% (BEIS, 2021a).

The Need to Maximise Economic Opportunities from Energy Infrastructure Investment for the UK

31. In 2019 the Offshore Wind Sector Deal was adopted by the Government and the offshore wind sector to build on the United Kingdom's global leadership in offshore wind, maximising the advantages for UK industry from the global shift to clean growth. The Sector deal provided a target of delivering 30GW of energy from offshore wind by 2030. Subsequently, the Energy White Paper (HM Government, 2020b) commits to increase this target to 40GW. Building up to 40GW of offshore

wind by 2030 could account for over £50 billion of infrastructure spending in the next decade.

32. A key commitment within the UK's Low Carbon Transition Plan (HM Government, 2009) was to assist in making the UK a green industry centre by supporting the development and use of clean energy technologies, a commitment updated by the Ten Point Plan for a Green Industrial Revolution (HM Government, 2020). This plan sets out how the UK can make the most of the opportunities presented by the shift to net zero and is a pivotal part of the Build Back Better Plan for Growth to deliver a green industrial revolution (HM Government, 2021).

33. The Ten Point Plan explains the Government's vision for the energy industry whereby Industry and Government work together to build a competitive and innovative UK supply chain that delivers and sustains jobs, exports and generates economic benefits for the UK, supporting offshore wind as a core and cost-effective part of the UK's long-term electricity mix. The Offshore Wind Sector Deal (BEIS, 2020) estimates that by 2030, offshore wind could support 60,000 jobs.

34. Furthermore, the UK Government's Offshore Wind Manufacturing Investment Support Scheme has been put in place to help deliver these ambitions and it designed to support the delivery of manufacturing investment in the offshore wind supply chain. It provides grant funding for major investments in the manufacture of strategically important offshore wind components (BEIS, 2021b). This scheme will be integral to delivery of this employment, which will be essential to building back better through a green revolution in the post-Covid recovery.

35. Offshore wind support from the government offers a potential opportunity in the local area given the previous lack of existing projects in the south west. Offshore wind will play an important part in providing training, jobs, supply chain opportunities, and knowledge, to help revitalise coastal communities.

The Need to Produce Affordable Energy

36. As offshore wind technology has matured and developers have innovated there has been a significant reduction in the cost of energy produced by offshore wind in recent years, with a 32% reduction between 2012 and 2016 (ORE Catapult, 2017). The latest allocation round of the UK Government's Contracts for Difference (CfD) scheme was notable for the greatly reduced cost of offshore wind projects to as low as £40/MWh, compared with the first CfD round in 2015 of which resulted in costs of £150/MWh (HM Government, 2020b). This demonstrates the progress being made, with, a reduction in costs by 73% in five years.

1.5.2 Summary of Climate Change and Renewable Energy Policy and Legislation

37. Climate change policy has been established at an international and national level. Key aspects are presented in Table 1.2.

Table 1.2 Summary of relevant climate change policies

Policy	Summary
United Nations Framework Convention on Climate Change (Paris climate agreement)	• Limit global temperature increase to below 2°C, while pursuing efforts to limit the increase to 1.5°C • Commitments by all parties to prepare, communicate and maintain a Nationally Determined Contribution • In 2023 and every five years thereafter, a global stocktake will assess collective progress toward meeting the purpose of the Agreement.
The UK Climate Change Act 2008	• A reduction of 34% in greenhouse gases by 2020 (below 1990 levels) • A reduction of 80% in greenhouse gases by 2050 (below 1990 levels)
The UK Energy Act 2013	• Introduction of provisions to enable a statutory 2030 decarbonisation target range for the GB electricity sector • Electricity Market Reform including introduction of the CfDs support mechanism
Climate Change Act 2008 (2050 Target Amendment) Order 2019	• Introduces a target for at least a 100% reduction of greenhouse gas emissions (compared to 1990 levels) in the UK by 2050 • Supersedes the Climate Change Act 80% target

1.5.3 Planning Policy and Legislation

The Electricity Act 1989

38. Section 36 consent (within the Electricity Act 1989) applies to proposals for the construction, extension or operation of an offshore electricity generating station whose capacity exceeds 50 Megawatts electrical (MW). Proposals above 100MW are consented under the Development Consent Order process. Section 36 consent is administered by the Secretary of State within BEIS.

39. Alongside Section 36 consent, planning permission is also needed for the development. This is usually obtained by also applying to the Secretary of State for 'deemed' planning permission, which is provided under Section 90(2) of the Town and Country Planning Act 1990.

40. For offshore consents, a Marine Licence is also required from the Marine Management Organisation, an executive agency of Defra. The Marine Licence is required from the Secretary of State for Environment, Food and Rural Affairs (Defra) for depositing articles or materials in the sea/tidal waters, including the placement of construction material or disposal of waste dredging material. The Marine Licence can be applied for alongside the Section 36 consent route and MMO can be requested and is empowered by the Secretary of State for BEIS to have the MMO lead the consent.

41. Section 36 does not include consent for connections to the electricity grid system which are dealt with under Section 37 of the Electricity Act 1989.

The EIA Directive

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

43. Amendments were made by EIA Directive 2014/52/EU and have been transposed into English law for NSIPs by the Infrastructure Planning (Environmental Impact Assessment) Regulations 2017 (the EIA Regulations) 2017. These are the relevant EIA regulations for the Project.

National Policy Statements

44. The overarching assessment requirements are set out within National Policy Statement (NPS) EN-1, with more specific requirements set out in EN-3 (DECC, 2011).

45. It is noted that the NPS for Renewable Energy Infrastructure (EN-3) is in the process of being revised. A draft version was published for consultation in September 2021 (Department for Business Energy and Industrial Strategy (BEIS), 2021). A review of this draft version has been undertaken in the context of this EIA. At the time of writing revisions to the current energy NPS are under consultation and updates are

expected to be published at the end of 2021. Any updates will be incorporated into the ES.

46. In addition, the Marine Policy Statement (MPS) adopted by all UK administrations in March 2011 provides the policy framework for the preparation of marine plans and establishes how decisions affecting the marine area should be made in order to enable sustainable development.

Marine Plans

47. The Marine Policy Statement (MPS) (HM Government, 2011) provides a high-level approach to marine planning and general principles for decision making that contribute to the NPS objectives. It also sets out the framework for environmental, social and economic considerations that need to be taken into account in marine planning. The high-level objective 'Living within environmental limits' covers points relevant to offshore ecology and requires that:

- Biodiversity is protected, conserved and where appropriate recovered and loss has been halted
- Healthy marine and coastal habitats occur across their natural range and are able to support strong, biodiverse biological communities and the functioning of healthy, resilient and adaptable marine ecosystems
- Our oceans support viable populations of representative, rare, vulnerable, and valued species

48. England currently has nine marine plans; those relevant to the Project are the South West Inshore and South West Offshore Marine Plans (HM Government, 2021). These contain the three objectives stated below, which are of relevance to offshore ecology, as they cover policies and commitments on the wider ecosystem:

- Objective 11: Biodiversity is protected, conserved and, where appropriate, recovered, and loss has been halted
- Objective 12: Healthy marine and coastal habitats occur across their natural range and are able to support strong, biodiverse biological communities and the functioning of healthy, resilient and adaptable marine ecosystems
- Objective 13: Our oceans support viable populations of representative, rare, vulnerable, and valued species

1.5.4 Environmental Legislation

49. Table 1.3 provides an overview of the key environmental legislation that will be of relevance to the Project.

Table 1.3 Key relevant environmental legislation

Level	Legislation	Summary
International	The OSPAR Convention	• Establishes a network of Marine Protected Areas (MPAs).
	The Convention on Wetlands of International Importance especially as Waterfowl Habitat (Ramsar Convention)	• Establishes Ramsar sites to protect important areas for waterfowl.
UK Legislation	The Wildlife and Countryside Act 1981	• Enables the designation of Sites of Special Scientific Interest (SSSI) to provide protection for flora, fauna, geological and physio-geological features. • Enables designation of sites which are considered to be of national importance as National Nature Reserves (NNRs). • Makes it an offence to intentionally: kill, injure, or take wild birds and to take, damage or destroy the nest of any wild bird while that nest is in use or being built. • Makes it an offence to intentionally kill, injure or take any animal listed in Schedule 5 of the Act and protects occupied and unoccupied places used for shelter or protection. • Makes it an offence to intentionally pick, uproot or destroy any wild plant listed in Schedule 8 and to plant or otherwise cause to grow any non-native, invasive species listed under Schedule 9 of the Act.
	Countryside and Rights of Way Act 2000	• Gives Natural England the power to designate Areas of Outstanding Natural Beauty (AONBs).
	Water Environment (WFD) (England and Wales) Regulations 2003	• Ensures a 'good ecological status' of inland, estuarine and groundwater bodies including coastal surface waters up to one nautical mile offshore.
	Natural Environment and Rural Communities Act 2006 (NERC)	• Requires the relevant Secretary of State to compile a list of habitats and species of principal importance for the conservation of biodiversity.
	The Commons Act 2006	• Protects areas of common land, in a sustainable manner delivering benefits for farming, public access and biodiversity.

Level	Legislation	Summary
	Marine Coastal and Access Act 2009	• Enables the designation of MPAs in England, Wales and UK offshore waters, including Marine Conservation Zones (MCZs) and Highly Protected Marine Areas (HPMA). • Introduced measures including a streamlined marine licensing system and the introduction of a marine planning system and decision-making to enable sustainable development in accordance with the MPS.
	Marine Strategy Regulations 2010	• Establishes measures to maintain or achieve 'good environmental status' (GES) in the marine environment.
	Conservation of Habitats and Species Regulations 2017 and Conservation of Offshore Marine Habitats and Species Regulations 2017 (together the 'Habitats Regulations')	• Provides a framework for the conservation and management of wild fauna and flora, including protection for specific habitats listed in Annex I and species listed in Annex II of the Directive. • Provides for the establishment of a Europe wide network of protected sites, known as Natura 2000 (the definition of which includes Special Areas of Conservation (SAC) and Special Protection Areas (SPA)). Makes it an offence to kill, injure, capture or disturb European Protected Species (EPS). • Note that these two sets of regulations are currently being consolidated by the Government; however, there will be no policy changes as a result of this exercise. • Further detail is provided in the following text.

Habitat Regulations Assessment

50. Under the Habitats Regulations the Secretary of State must consider whether a plan or project has the potential to have an adverse effect on the integrity and features of a National Site Network site (i.e. a SAC, SPA, candidate SAC or Site of Community Importance (SCI)). This process is known as a Habitat Regulations Assessment (HRA). Under the Habitats Regulations, Appropriate Assessment is required for a plan or project, which either alone or in combination with other plans or projects, is likely to have a significant effect on a National site and is not directly connected with or necessary for the management of the site.

51. HRA can be described as a four-stage process (Planning Inspectorate, 2017b):

- Stage 1: Screening is the process which initially identifies the likely impacts upon the interest features of a National site of a project or plan, either alone or in combination with other projects or plans and considers whether these impacts may be significant. It is important to note that the burden of evidence is to show, on the basis of objective information, that there will be no significant

effect; if the effect may be significant, or is not known, that would trigger the need for an appropriate assessment.

- Stage 2: Appropriate assessment is the detailed consideration of the impact on the integrity of the National site of the project or plan, either alone or in combination with other projects or plans, with respect to the site's conservation objectives and its structure and function. This is to determine whether there is objective evidence that adverse effects on the integrity of the site can be excluded. This stage also includes the development of mitigation measures to avoid or reduce any possible impacts.
- Stage 3: Assessment of alternative solutions is the process which examines alternative ways of achieving the objectives of the project or plan that would avoid adverse impacts on the integrity of the National site, should avoidance or mitigation measures be unable to prevent adverse effects.
- Stage 4: Where no alternative solutions exist and where adverse impacts remain, an assessment is made as to whether or not the development is necessary for imperative reasons of overriding public interest (IROPI) and, if so, compensatory measures are required to maintain the overall coherence of the National Sites Network.

52. The HRA Screening has been undertaken for the Project in 2021 in parallel with the EIA scoping stage. This can be found in Appendix C.

53. Further assessment will be undertaken as required and presented in the Report to Inform an Appropriate Assessment (RIAA). The RIAA will contain sufficient information to enable the competent authority to carry out an appropriate assessment.

54. The requirement for Stage 3 and 4 will be subject to the findings of the RIAA. In addition, once preliminary data from surveys has been assessed OWL will make a judgement on whether a derogation case and potentially compensation measures under Article 6(4) of the Habitats Regulations is required for particular species or sites, either alone or in-combination.

1.6 Site Selection and Assessment of Alternatives

1.6.1 Strategic alternatives

55. A number of strategic alternatives have been and will continue to be considered as part of the ongoing site selection and project design refinement processes. Alternatives will often be technological, for example, there may be locations onshore where overhead lines are preferable to buried cables. Additionally, the choice of

switchgear technology for the onshore project substation (i.e. Gas Insulated Switchgear (GIS) or Air Insulated Switchgear (AIS)) will be considered very carefully in terms of the different environmental impacts each may have (e.g. the potential landscape and visual impacts resulting from different footprints and building heights).

56. All strategic alternatives will be detailed in the ES with explanations for why some were not brought forward and others selected.

1.6.2 Site Selection

57. Site selection for project infrastructure is at an early stage and will continue throughout the project development phase, taking into account the relevant policy requirements that are available at the time.

58. Initial Areas of Search (AoS) have been identified to allow for the development of the site selection process to fully consider environmental, technical, physical and commercial factors as well as stakeholder feedback as the project evolves.

Identifying the Windfarm Site

59. The Windfarm Site boundary was established through site selection associated with the Crown Estate Test and Demonstration leasing opportunity. Environmental, technical and commercial constraints and factors were analysed including:

- Physical Parameters (including water depths, wave height, ground conditions and wind resource)
- Grid Connection
- Landscape designations
- Environmental designations
- Sensitive ecological habitats (ecological receptors)
- Other users (e.g. Ministry of Defence (MoD) activity, shipping and navigation, National Air Traffic (NATs) services, fishing activity, oil and gas infrastructure and key resource areas (marine aggregates and tidal energy))
- Cumulative impacts with other licensed activities

60. Further refinement of the Windfarm Site is now currently being undertaken considering for example:

- Grid connection
- Wind resource
- Environmental constraints

Identifying a grid connection point

61. In England and Wales, the selected grid connection point at East Yelland for the offshore windfarm is set out in an agreement with Western Power Distribution (WPD) as operator of the national electricity transmission system (NETS) and accepted by the electricity generator (OWL) in a grid connection agreement.

Identifying a Landfall Location

62. The identification of a Landfall location requires the consideration of both offshore and onshore factors. A number of technical, physical and environmental constraints are being considered in the identification and appraisal of potential locations, also guided by ideal design criteria such as the following:

- A location that allows for open cut works if practicable and without unacceptable environmental impacts
- A water depth of 10m at the location of the installation vessel if used
- A maximum cable pull length of 2,000m
- A foreshore area free of development for at least 250m cross shore
- An onshore location that is a maximum distance of 250m from at least a B road

Identifying a corridor for the offshore export cables

63. The identification of a corridor (noting that a number of corridor options may be identified) for the offshore export cables is dictated by their start and end points (i.e. the Windfarm Site and the Landfall location). Again, technical, physical and environmental constraints are being considered in order to identify an area of search in which the cables can be installed. Key design principals for the corridor include:

- Corridor to allow for 50m cable separation as a minimum
- Routing options should be as short as possible
- Minimising the number of crossings of existing offshore cables and pipelines, where crossing is required, cables and pipelines to be crossed at 90° angle where possible
- Maintaining required separation distances with other offshore cables and pipelines
- Maintaining sufficient space for offshore cable installation (including anchor spread of installation vessels) whilst maintaining an appropriate safety zone with existing sub-sea cables and pipelines
- Avoiding direct significant impacts to sites designated for nature conservation as far as possible

- Avoiding direct significant impacts to ecologically important habitats such as sandbanks and potential reefs as far as possible
- Avoiding wrecks, navigational aids, dredging areas and disposal grounds as far as possible
- Avoiding operational oil and gas infrastructure as far as possible

64. For the purposes of this Scoping Report, the AoS for the Offshore Export Cable is routed from the Windfarm Site to each stretch of coastline under consideration for potential Landfall locations and is presented in Figure 1.7.1.

Identifying an onshore project substation site

65. The Onshore Substation is assumed to be at East Yelland as set out in an agreement with Western Power Distribution.

66. The identification and appraisal of the potential site has been guided by the planning and environmental considerations set out in Section III of National Grid Company plc (NGC) Substations and the Environment: Guidelines on Siting and Design (the 'Horlock Rules') (The National Grid Company Plc, undated). Particularly the following:

- As far as reasonably practicable, sites should avoid altogether internationally and nationally designated areas of the highest amenity, cultural or scientific value
- Areas of local amenity value, important existing habitats and landscape features including ancient woodland, historic hedgerows, surface and ground water sources and nature conservation areas should be protected as far as reasonably practicable
- Sites should take advantage of the screening provided by landform and existing features and the potential use of site layout and levels to keep intrusion into surrounding areas to a reasonably practicable minimum.
- Visual, noise and other environmental effects should be kept to a reasonably practicable minimum
- Land use effects should be considered

Identifying a corridor for the Onshore Export Cables

67. As for the offshore export cable, the identification of a corridor for the Onshore Export Cables (noting that a number of corridor options may be identified) is dictated by their start and end points (i.e. the Landfall location and the Onshore Project Substation site / grid connection point). Assuming a width of between 50m (ideal) and 20m (at pinch-points), the most direct, least congested route has been

sought giving consideration to technical, physical, planning consideration (such as allocations in local development plans) and environmental constraints and adhering to the following design principles where practicable:

- Avoiding crossing and/or significant impacts on international and national designations
- Avoiding the need for woodland removal
- Minimising the crossing of linear features (e.g. roads, railways, watercourses, utilities and hedgerows)
- Minimising routing through challenging ground conditions (e.g. rocky outcrops or wetlands)
- Utilising existing boundaries to avoid sterilising land for future uses
- Avoiding substantial infrastructure and urban land uses (e.g. residential titles)

1.7 Scoping Areas of Search

68. As noted, site selection is an ongoing process that will continue to refine as the Project develops through further data gathering and site surveys, consultation with stakeholders and regulators and seeking the views of communities and the wider public. Therefore, for the purposes of this scoping report, initial areas of search have been identified that allow for a robust consideration of options and future refinement.

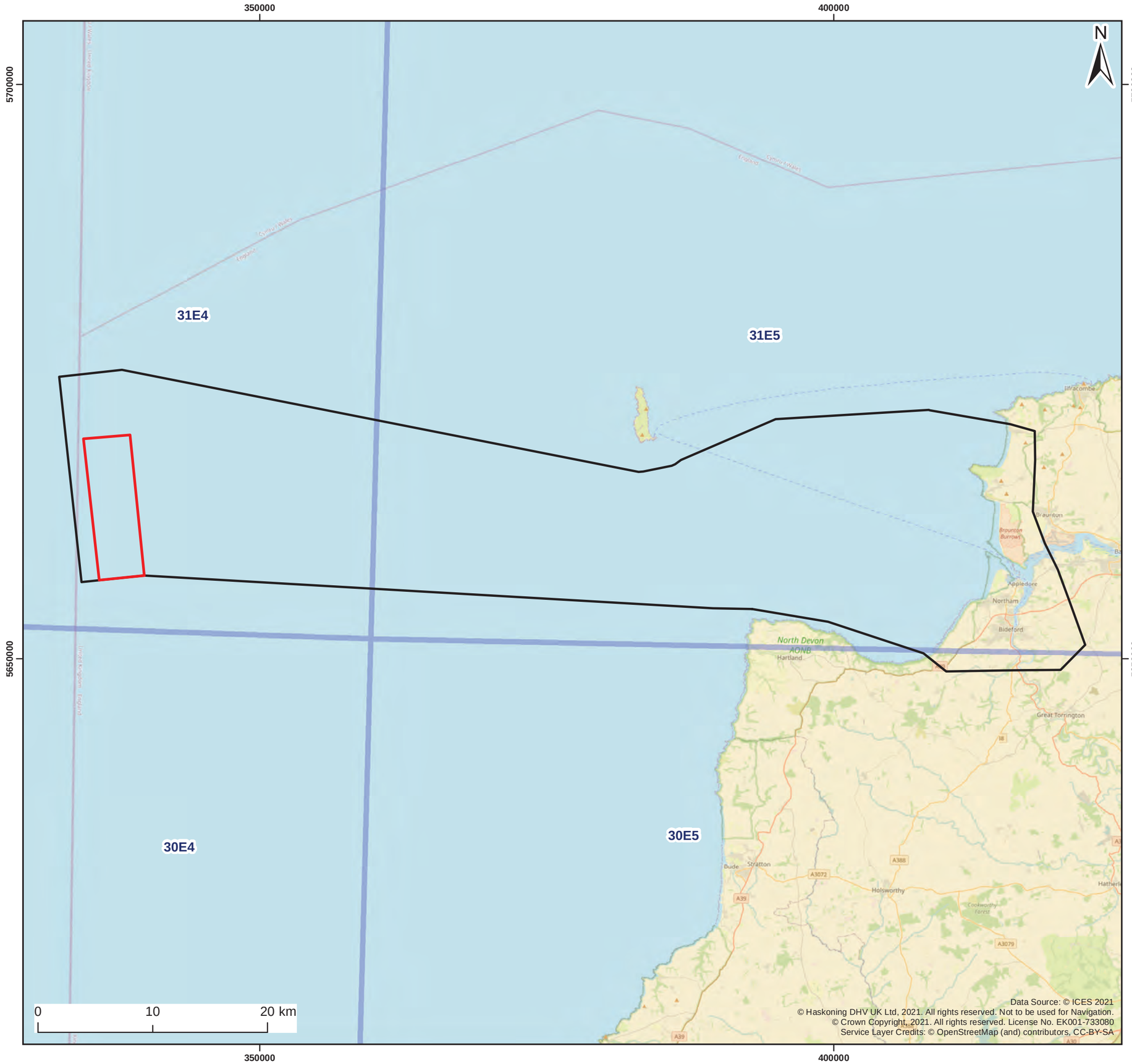
1.7.1 Offshore Area of Search

69. As the Landfall location is yet to be determined, an Offshore Export Cable Corridor AoS has been developed that allows for Landfalls that will provide for onshore cable routes to each of the substations at East Yelland. The AoS (Figure 1.7.2) encompasses potential Offshore Export Cable Corridors that best balance the offshore constraints and as far as possible follow the design principles, while allowing for refinement following baseline surveys.

1.7.2 Onshore Area of Search

70. At the time of writing the onshore site selection process is ongoing. As such, for the purposes of this Scoping Report it has been necessary to determine a broad Onshore AoS that provides for identifying suitable locations for the Onshore Cable Corridor.

71. It is important to note not all the land within these Onshore AoS is considered developable. As the EIA progresses, the relevant Onshore AoS will be refined in accordance with the processes set out for each infrastructure element.



Legend:

- White Cross Offshore Windfarm
- Area of Search
- ICES Rectangles

Client:	Project:
Offshore Wind Ltd.	White Cross Offshore Windfarm

Title:

Offshore Cable Corridor Area of Search

Figure: 1.7.1 | Drawing No: PC2978-RHD-ZZ-XX-DR-Z-0075

Revision:	Date:	Drawn:	Checked:	Size:	Scale:
P01	18/11/2021	GC	CB	A3	1:330,000

Co-ordinate system: WGS 1984 UTM Zone 30N

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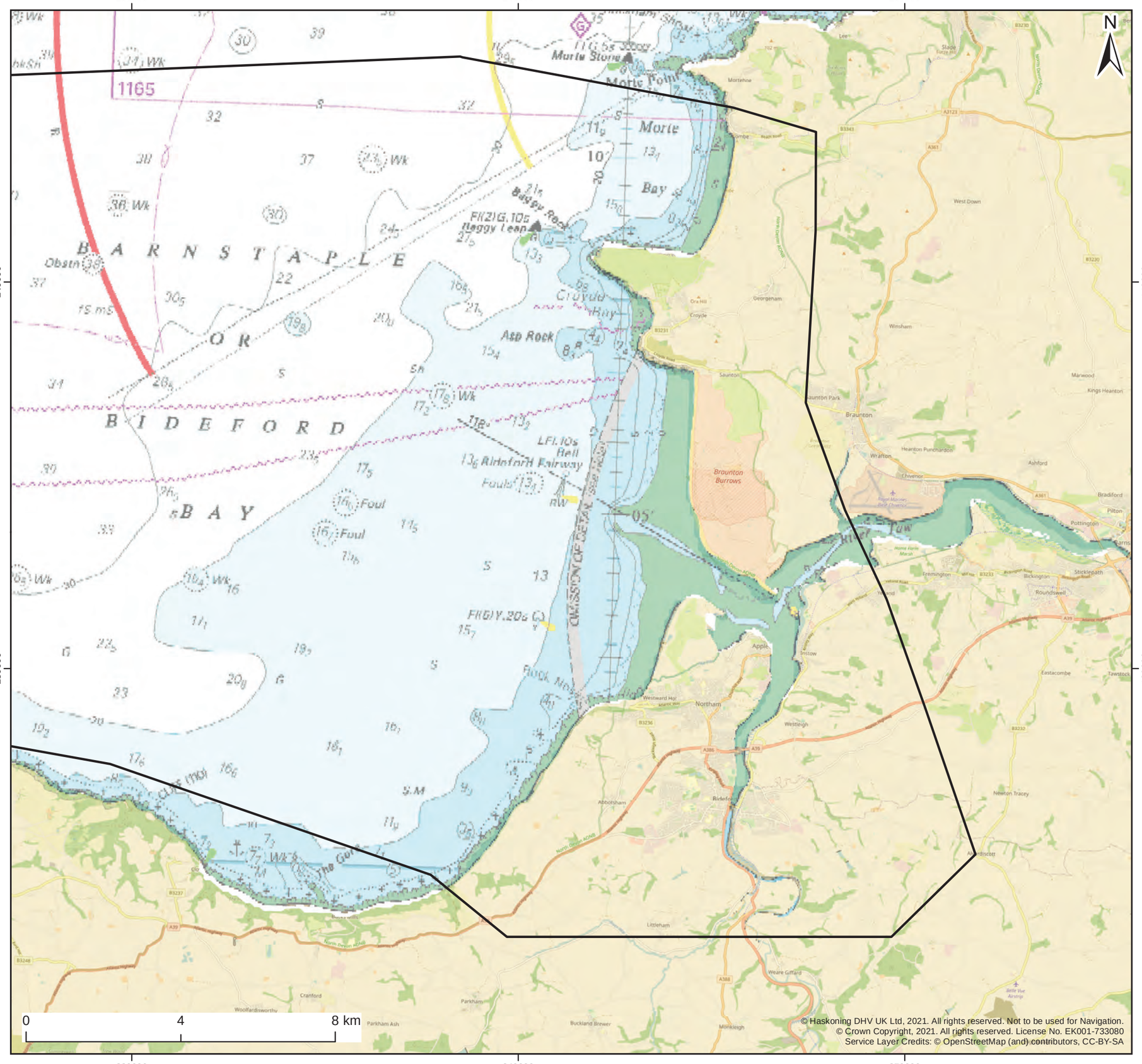
Enhancing Society Together



Legend:

Area of Search

Client:	Project:
Offshore Wind Ltd.	White Cross Offshore Windfarm

Title:

Landfall and Onshore Cable Corridor Area of Search

Figure: 1.7.2 | Drawing No: PC2978-RHD-ZZ-XX-DR-Z-0076

Revision:	Date:	Drawn:	Checked:	Size:	Scale:
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Co-ordinate system: British National Grid

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1.8 Description of the Project

1.8.1 Introduction

72. This section provides an overview of the Project by setting out its main components. It also gives an overview of the main activities that will be undertaken during construction, operation, and decommissioning.

73. An illustration of the main components of the Project is provided on Plate 2 and are further detailed in Table 1.4.

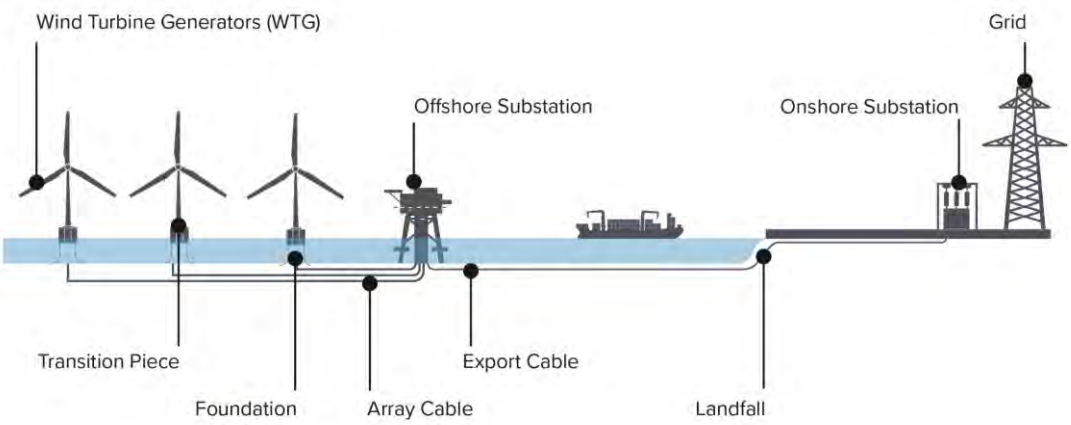


Plate 2: Project infrastructure

Table 1.4 Project infrastructure

Component	Overview
Wind Turbine Generators (WTG)	The wind turbines convert wind energy to electricity. Key components include rotor blades, gearboxes (in some cases), transformers, power electronics and control equipment. Offshore turbine models are continuously evolving and improving. Therefore the exact wind turbine model will be selected post-consent from the range of models available at the point of procurement.
Transition Piece	The transition piece includes various functionalities such as access for maintenance, cable connection for the energy of the turbine and the corrosion protection of the entire foundation.
Mooring system	The mooring system is designed to address station-keeping issues (it does not need to contribute to the platform's stability) and enables simple connection-disconnection procedures that can be performed by widely available tug vessels.

Component	Overview
Array cables	Array cables will connect the wind turbines to the Offshore Substation. Cables will be buried wherever possible.
Offshore Substation	One substation will convert the power to higher voltages to transmit the power more efficiently (reduced electrical losses) to shore.
Offshore Export Cable	Cable connecting the Offshore Substation to the landfall. The cable can be delivered in sections and jointed in-situ or be delivered in one length (factory joined). If seabed conditions make burial unfeasible, as well as in the immediate proximity of turbine foundations, cable may be protected by a hard-protective layer such as rock or concrete mattresses.
Landfall	The location at which the offshore export cable will come ashore.
Onshore Export Cable	The buried cable will connect the landfall to the Onshore Substation. The cable will be delivered in sections and buried in trenches. Sections will be connected within jointing bays.
Onshore substation	The project will connect directly with an existing Western Power Distribution substation which is unused due to decommissioning of the attendant power station. The substation may require updating of the electrical and auxiliary equipment.
Grid connection	The Project will connect to the Western Power Distribution Network through the East Yelland substation.

1.8.2 Offshore

Lease area

74. The Agreement for Lease (AfL) area is illustrated in the map in Figure 1.2.1. The AfL area, known as the Windfarm Site, is located 52km north-west of the Cornwall and Devon coastline in a water depth of 60m – 80m. The Windfarm Site covers 50km^2.

75. The key characteristics of the AfL area are summarised in Table 1.5.

Table 1.5 White Cross Offshore Windfarm Site Overview

Area	Parameters	Values
AfL/Windfarm Site	Area	50km^2
	Closest distance to shore	52km
	Water depth	60m - 80m

76. Figure 1.7.2 shows the current Area of Search (AoS) for the Landfall and Onshore Cable Corridor. The configuration at the Landfall will be location specific and will involve an onshore-offshore jointing pit.

Wind measurements

77. There is no requirement for the installation of a met mast. Furthermore, it is considered unsuitable for the Windfarm Site. If wind measurements are needed this could be collected through floating LIDARs inside the Windfarm Site. The installation of floating LIDARs will be subject to separate marine licences and will be dealt with under a marine license application process. The possibility of using Celtic Sea Power floating LiDAR or a fixed LiDAR system on Lundy Island will be explored.

Wind Turbine Generators

78. The size and capacity of the wind turbines will be decided at a later stage, prior to final investment decision. Technology develops rapidly and the available sizes of turbines are expected to increase over the coming years. The current wind turbine design envelope for the Project is outlined in Table 1.6 and illustrated in Plate 3.

Table 1.6 Wind Turbine Design Envelope

Wind Turbine Generator Parameter	Range to be considered
WTG capacity (MW)	12 – 24
Turbine type	3-bladed, with horizontal axis
Rotor Diameter (m)	220-300
Number of wind turbines	6 - 8
Individual Rotor swept area (m^2)	38,000 – 70,700
Total Rotor swept area (km^2)	~0.304km^2 (based on 8 x 220m diameter turbines)
Max Tip Height (m) above Mean Sea Level (MSL)	~345
Air Gap above MSL	22m
Indicative separation distance between turbines (inter-row)	Min. 1000m (subject to yield assessment)

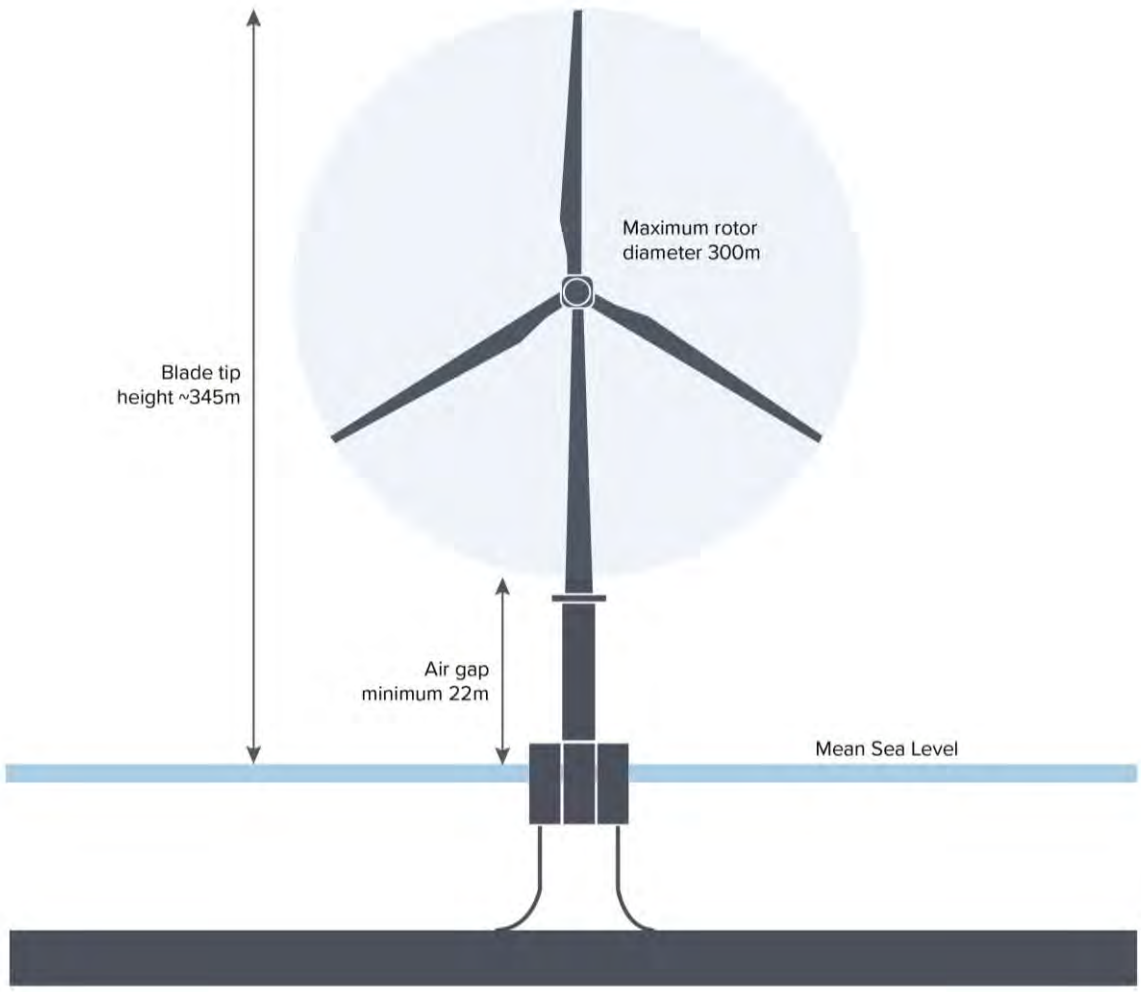


Plate 3 Turbine schematics

Wind Turbine Floating Substructure

79. The floating substructure provides a base for the installation of the wind turbine. The substructure as defined here has three key components: (1) the mooring system, which anchors the structure to the seabed; (2) the substructure, a floating structure that supports the wind turbine; and (3) the transition, which provides the connection from the substructure to the wind turbine tower. Substructures are typically made of tubular steel columns.

80. Conventional fixed substructures are less suitable for deeper waters (>50m), and floating substructures, where water depth presents less of an issue, could be a viable option. In addition to allowing turbines to be installed in deeper waters further from shore, floating structures offer benefits in that their construction is largely yard based, with significantly less offshore construction activity, therefore reducing the impacts of offshore construction, the cost and scheduling uncertainties traditionally associated with more conventional windfarm construction.

81. The substructure is constructed and the turbine installed in a dry dock or inshore (tensionleg/submersible only), thus reducing the high costs of assembly and installation at sea. Once complete it is towed to site where it is attached to the pre-installed moorings and inter-array cables. The substructure is then fully ballasted then fully ballasted by pumping, water moorings are picked up and tensioned, the electrical cable head pulled-in and the Wind Turbine commissioned.

Tension leg platform (TLP)

82. A semi-submerged buoyant structure, anchored to the seabed with tensioned mooring lines, which provide stability (see illustration in Plate 4). The shallow draft and tension stability allows for a smaller and lighter structure, but this design increases stresses on the tendon and anchor system. There are also challenges with stability during tow, the installation process and increased operational risks if a tendon fails. It is considered the least mature technology of the three options. This mooring option is also considered less favourable environmentally than drag embedment anchors Examples include: PelaStar (by Glosten); Blue H TLP (by Blue H Group); Eco TLP (by DBD Systems); GICON-SOF (by GICON).

Semi-submersible platform

83. Buoyancy stabilised platform which floats semi-submerged on the surface of the ocean whilst anchored to the seabed with catenary mooring lines (see illustration in Plate 4). Often requires a large and heavy structure to maintain stability. A relatively shallower draft allows for more flexible application, increased port options (for construction and maintenance) and simpler installation. Examples include: WindFloat (by Principle Power); Damping Pool (by IDEOL); SeaReed (by DCNS).

Spar-buoy

84. A cylindrical ballast-stabilised structure which gains its stability from having the centre of gravity lower in the water than the centre of buoyancy (see illustration in Plate 4). Thus, while the lower parts of the structure are heavy, the upper parts are usually lighter, thereby raising the centre of buoyancy. The simple structure of the spar-buoy is typically easy to fabricate and provides good stability, but the large draft requirement can create logistical challenges during assembly, transportation, and installation (and decommissioning), and can constrain deployment to waters >100m depth. Therefore, this option is not anticipated to be used for the Project. Examples include: Hywind (by Equinor); Sway (by Sway); Advanced Spar (by Japan Marine United).

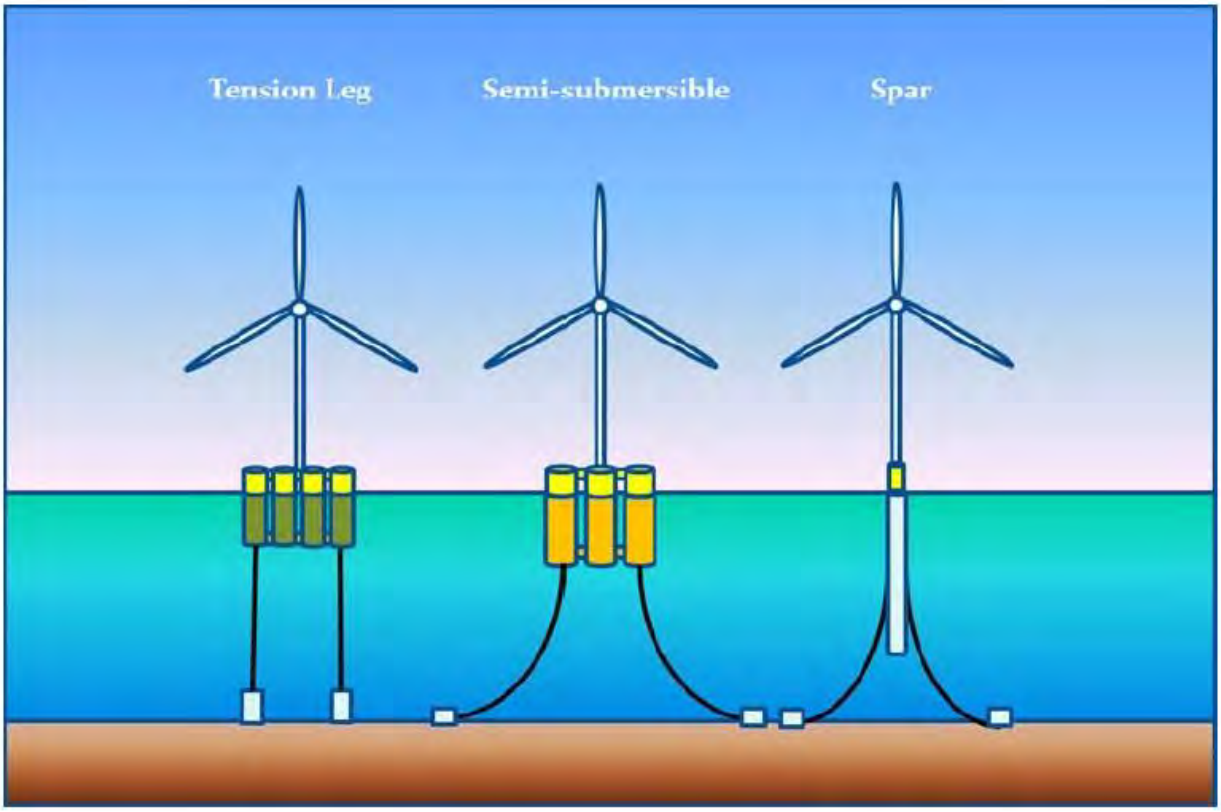


Plate 4 Types of floating offshore windfarm systems - Tension leg, Semi-sub and Spare Buoy

85. Currently the selection of the floating substructure is defined by the water depths that each substructure requires for safe operation and the suitable construction ports/locations where the proposed development is located. The Carbon Trust (2015) document highlights the key strengths of each system (Given the depth of the Windfarm Site, OWL is likely to use the semi-submersible technology type.

86. Table 1.7).

87. Given the depth of the Windfarm Site, OWL is likely to use the semi-submersible technology type.

Table 1.7 Key strengths and weaknesses of each substructure type

Technology	Strengths	Weaknesses
Tension Leg (water depth +100m)	• Low Structural mass. • Onshore turbine assembly. • Few moving parts (no active ballast required). • Stability.	• High loads on the mooring and anchoring system. • Challenging installation process. • Bespoke installation barge often required.

Technology	Strengths	Weaknesses
Semi-submersible (water depth +40m)	• Flexible application due to the ability to operate in shallow water depths. • Low vessel requirement- only basic tugboats required. • Onshore turbine assembly. • Amenable to port-side major repairs.	• High structural mass to provide sufficient buoyancy and stability. • Complex steel structures with many welded joints - can be difficult to fabricate. • Potentially costly active ballast systems.
Spar-buoy (water depth +120m)	• Simple design is amenable to serial fabrication processes. • Few moving parts (No active ballast required). • Excellent stability.	• High loads on the mooring and anchoring system. • Challenging installation process. • Bespoke installation barge often required • Challenging manufacturing and assembly process.

Table 1.8 Wind Turbine Floating Substructure Envelope

Turbine Floating Substructure Parameters*	Parameter
Overall length of each face (m)	~100
Draft in operation (m)	12 – 18 (indicative range)
Freeboard (in operation) (m)	10 – 16 (indicative range)
Total substructure unit height (m)	22 – 34 (indicative range)

*The baseline assumption is that the type of floating substructure used will be semi-submersible. However, until sufficient engineering has been completed, other floating substructure types cannot be ruled out.

Wind Turbine Anchors and Mooring

88. The floating substructures described require moorings to anchor the turbine to the seabed in order to maintain position. The type and number of anchors and moorings used for the Project will depend on the type of floating substructure, loads imposed on the mooring system by the substructure/WTG assembly in the metocean conditions prevailing on site, in addition to geotechnical and environmental considerations.

89. The anchoring system options being considered are detailed in Table 1.9, with an illustration of the types shown in Plate 5.

Table 1.9 Wind Turbine Anchoring Options

Wind Turbine Substructure Anchoring Options	Options
Sub-structure types	Tension Leg, Semi-sub and Spar-buoy
Number of mooring lines	Depends on sub structure type
Mooring types	Depends on sub structure type
Anchor types	Drag Embedment Anchors, Torpedo Anchors, Gravity Based Anchors, Suction Anchors and Micro-piling (if required for TLP)
Anchor mass	To be determined
Mooring lines	Anchor chain, Mooring cables, polyester mooring lines
Pennant wires/buoys	Temporary surface buoys during construction, Permanent submersible buoys at seabed for ROV recovery
Mooring line radius	To be determined

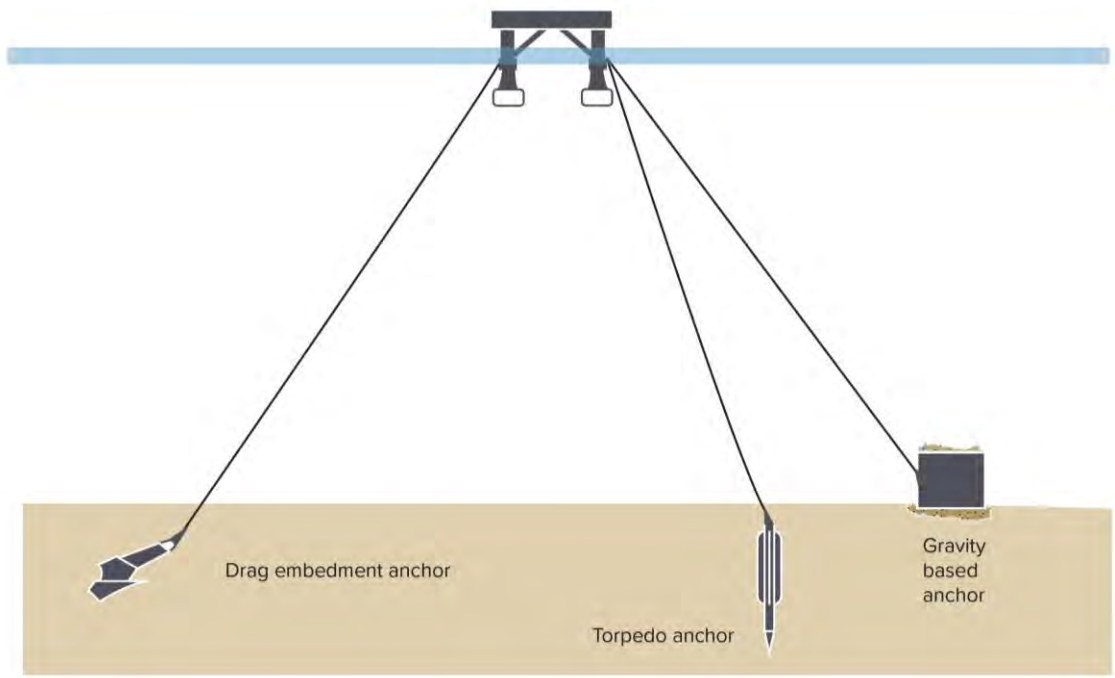


Plate 5 Types of floating offshore windfarm anchoring systems

90. Table 1.10 presents the key dimensions of the anchoring systems.

Table 1.10 Wind Turbine Anchoring Systems Envelope

Turbine Anchoring Options Parameters	Parameter
Weight (tonnes)	15 – 20 tonnes per anchor
Estimated length of mooring line	Up to 800m
No. of anchors and mooring lines per turbine	3 – 6 per turbine

Windfarm Site Layout

91. The wind turbines will be arranged subject to prevailing meteorological conditions in addition to geotechnical and environmental considerations. It may also be influenced by navigational and Search and Rescue safety requirements.

1.8.3 Electrical system

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

93. The key components of the electrical infrastructure are described below.

Array cables

94. Array cables connect the turbines to each other and to the Offshore Substation. The array cables are expected to be 66KV to 132kV alternating current (AC). The length of each array cable will depend on the final layout. A realistic maximum distance of array cables will be defined for the purposes of the EIA and used as the basis for the assessments.

95. The inter-array cables will be buried in the seabed, typically to a depth of 1m, but may range from 0.5m - 3m, and can be buried via several techniques depending on the seabed conditions along the route. The depth will be determined by a Burial Assessment Study (BAS) and a Cable Burial Risk Assessment (CBRA). These techniques can be ploughing, jetting, trenching or post-lay burial. Where cable burial is not possible alternative cable protection measures could be used. This includes rock placement, grout / sandbags, concrete mattresses and polyethylene ducting, but no protection will also be considered.

Offshore Substation

96. It is assumed that the cables from turbines will be brought to an Offshore Substation Platform, located appropriately to optimise the array cable and export cable lengths.

The current assumption for the Project is that one substation is required. This may change depending on the outcome of electrical studies. At the substation, the generated power will be stepped up to a higher AC voltage. This higher voltage will be determined by detailed studies, although it expected that the substation will step up the 66kV or 132kV array cable voltage to up to 220kV for the export cabling.

97. The Offshore Substation Platform will typically include components including but not limited to transformers, batteries, generators, switchgear, fire systems, and modular facilities for operational and maintenance activities.

98. The Offshore Substation will comprise a topside platform installed on a foundation. The location of the Offshore Substation (if required) will be confirmed during the detailed design process.

99. The typical footprint plan of the Offshore Substation will be in the region of 80m x 60m with the topsides comprised of several layers / decks stacked on top of another as required. The Offshore Substation foundation type will likely be a jacket or possibly a Gravity Based Structure (GBS) foundation. The jacket foundation will have 4 or 6 legs with up to three piles at each leg or one suction bucket at each leg. Leg spacing at the seabed will be up to 40m. In case of a GBS foundation the diameter of the foundation at seabed will be up to 50m. Table 1.11 describes the Offshore Substation foundation parameters for jacket and GBS options as well as a number of other potential options. A floating substation option will also be investigated.

Table 1.11 Offshore Substation Foundation Options Parameters

Offshore Substation Foundation Options Parameters	Parameter	Maximum (unless specified)
Jacket with piling	Leg spacing	<30m
	Hammer size	<3000kJ
	Pile Diameter	3m - 5m per pile
Gravity based structure	Diameter	<50m
	Diameter of seabed levelling	100m
Tripod	Leg spacing	<30m
	Hammer size	<3000kJ
	Pile Diameter	3m - 5m per pile
Suction bucket	Leg spacing	<35m
	Bucket diameter	<20m
Monopile	Diameter	14m (estimated)
	Hammer size	5000kJ (estimated)

Offshore export cable

100. Electricity from the Offshore Substation will be transmitted via one subsea export cable to shore. The export cable (up to 220kV AC) is likely to run from the Offshore Substation to a transition joint bay at the Landfall. The transition joint bay connects the offshore cable and Onshore Export Cable. The export cable will be installed in an individual trench and protected in line with good industry practice. Table 1.12 describes the main cable parameters.

101. The cable will be buried where possible to ensure that the cable is protected from damage by external factors. Typical burial depth is 1m but may range from 0.5m - 3m. The depth will be determined by a BAS and CBRA. Where cable burial is not possible alternative cable protection measures could be used. This includes rock placement, grout / sandbags, concrete mattresses and polyethylene ducting, but no protection option will also be considered. The appropriate level of protection will be determined based on an assessment of the risks posed to the Project in specific areas.

102. It is likely that the export cable will have to cross other cables. Formal agreements with regards to existing cable crossings will be entered into by OWL and the existing owners / operators, with the installation techniques discussed and agreed to ensure integrity of the existing infrastructure and any new cables associated with the Project. Several techniques can be utilised, include tubular products, concrete mattresses, and rock placement.

Table 1.12 Offshore cable parameters (based on an HVAC export cable system)

Item	Indicative parameters
Substation	1
Number of array cables	2 - 3 per wind turbine
Export cable/trench	1
Fibre optic cables	Bundled in export cable
Export cable route standard working width (cable corridor)	Minimum 22m, maximum 50m
Array cables length	Dependent upon distance between turbines
Export cable length	70km

* The baseline assumption is that one Offshore Substation will be required. However, once sufficient engineering has been completed, OWL will consider options to remove the need for an Offshore Substation from the Project.

103. Pre-lay intervention activities may be required prior to the installation of cables including boulder removal, sandwave clearance, installation of equipment at crossings and the cutting and removal of any out-of-service cables.

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

1.8.4 Landfall

105. Table 1.13 shows the main construction parameters for the Landfall site. Final Landfall location will be selected during the route selection and subsequent EIA process.

106. Figure 1.7.2 shows the current Area of Search (AoS) for the Landfall and Onshore Cable Corridor. The configuration at the Landfall will be location specific and will involve an onshore-offshore jointing pit.

Table 1.13 Landfall construction parameters

Landfall	Indicative parameters
Landfall installation method	Horizontal Directional Drilling (HDD) and/or open trench where no obstruction
Number of transition bays	1
Transition bay dimensions (length x width)	20 x 10m
Transition bay dimensions depth	2m
HDD compound area (length x width)	~200m x 200m

107. Cable installation methodology at the Landfall will be selected based on a comparative assessment of impacts. It is assumed that suitable technologies will include a mix of open cut trenching and horizontal directional drilling (HDD). The offshore and onshore cable will be jointed in one transition bay onshore.

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

109. If HDD is chosen as the appropriate installation methodology at the Landfall, the HDD is drilled from an onshore construction compound and will exit the seabed in an exit pit at a suitable water depth. The length of the HDD will depend upon factors such as water depth, seabed topography, shallow geology/soil conditions and

environmental constraints. The onshore construction compound will be temporary in nature and reinstated after completion of the Project.

110. The exit pit is likely to be 3m wide at the bottom to allow collection of drilling fluids. The total length will be approximately 10m, while the depth of the exit pit will reflect the depth at which the export cable will continue further offshore. However, it is likely that the exit pit depth will be less than 1m. The export cable is generally protected in the HDD exit pit and in the Offshore Export Cable trench. However, additional permanent protection measures in the form of rock protection where the export cable is not naturally protected may be required. For the purposes of the EIA appropriate protective measures will be identified and discussed with key stakeholders prior to submission of the application.

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

1.8.5 Onshore

Onshore Export System

112. Table 1.14 shows the main parameters for the onshore cable and its construction. The standard temporary working width of the Onshore Cable Corridor will typically be 50m and comprises the trench or trenches, storage of excavated material (split into segregated subsoil and topsoil) and a haul road. At specific locations along the Onshore Cable Corridor the working width may require widening to accommodate access at crossings or specific specialist equipment associated with HDD or micro-tunnelling or indeed decreasing at pinch points to around 20m.

Table 1.14 Onshore cable parameters

Onshore cable corridor	Indicative parameters
Electrical connection	High Voltage Alternating Current (HVAC)
Number of cable circuits / trenches	1 circuit
Cable construction width (onshore corridor)	50m
Cable construction width at trenchless crossings	60m
Depth to top of buried infrastructure (ducts)	>1m
Trenchless (HDD) crossings	At least Sandy Lane and River Taw
Trenchless (HDD) crossings compound (length x width)	200 x 200m
Typical jointing bay frequency	Every ~300m – 1000m
Jointing bay dimensions (length x width x height)	20 x 10 x 1.5m
Depth to top of jointing bay (m)	>1m
Link box frequency	Every ~300m – 1000m
Link box (length x width)	2m x 2m

113. The onshore underground cable system will be installed in one trench with one circuit. The circuit consists of three high voltage cables and one fibre optical cable. The trench holding the circuit may be up to 2.5m wide.

114. Jointing bays will be used to pull the cable into the ducts and/or to join the cable lengths to each other. Link boxes are used for earthing cables and will be installed inside a protective concrete chamber. The jointing bays are subsurface structures, while the link boxes will require access (for inspections) from the surface during operations and will therefore be located at or above ground level. At each jointing location there will be one link box for the circuit. The frequency of jointing bays and link boxes will vary between 300m – 1,000m.

Onshore Substation and Grid Connection

115. The onshore cable would connect to an existing Onshore Substation at East Yelland where it would connect the Project to the distribution grid. The substation supported a previous power station which came to the end of its life and has been decommissioned and dismantled. The existing overhead power line (OHL) remains in place and is not required to be altered. It is not yet known whether the existing substation will require updating. If it does, it would require the installation of necessary electrical and auxiliary equipment and components for transforming the power from the windfarm for connection to the distribution grid.

116. Following enabling works including site access establishment, the main construction activities associated with the updating of the onshore substation will involve the potential installation of an additional electrical unit, cable trenches, ducts and pits. It will also involve the installation of underground services. The maximum parameter for the construction compound area for temporary works is 4ha.

117. Table 1.15 describes the main Onshore Substation construction parameters.

Table 1.15 Onshore substation construction parameters

Onshore Substation Parameters*	Indicative parameters
Construction compound area (temporary works)	4ha
Substation Footprint (permanent including maintenance activities)**	1ha
Building height	To be determined
External equipment height	To be determined

* WPD have confirmed that the Project can connect into the existing East Yelland substation.

** Landscaping area not included at this stage as extensive tree growth already present around existing substation.

118. The maximum parameter for the operational footprint of 1ha. The need and location of landscaping activities will be identified and agreed with relevant stakeholders at a later stage.

119. In case the Project Onshore Substation is located adjacent to the existing main Western Power Distribution substation, an overhead connection between the two substations will be considered. An underground cable connection will be used if the substations are not adjacent to each other. The Cable Corridor between the two substations will be similar to the Export Cable Corridor in design and width.

Energy Balancing Equipment

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

121. All energy balancing equipment – if designed in - will be housed within or close by the footprint of the Onshore Substation.

1.8.6 Indicative Programme and Sequencing

Construction Program

122. The indicative high-level construction milestones over an anticipated 2-year construction program are as follows:

- Months 1 - 2 – mobilisation and site preparation
- Months 3 to 10 – cable / onshore cable construction and installation / Onshore Substation works
- Months 10 to 22 – installation of wind turbines and cables / offshore cable construction and installation / Offshore Substation works
- Months 12 to 24 – commissioning of entire system (wind turbines, Offshore Substation and Onshore Substation)

Fabrication

123. All elements of the Project including turbines, mooring systems, substations and electrical infrastructure will be fabricated offsite, stored at a suitable port facility and transported to site as required. Fabrication contracts have not been placed and OWL will run competitive tendering processes to identify the best suitable contractors to deliver the different elements of the Project. Fabrication can take place in the UK, in Europe or elsewhere dependent upon the location of the chosen contractor.

Seabed preparation

124. Some form of seabed preparation may be required. Seabed preparation includes seabed levelling, ground reinforcement cutting and removal of any out of service cables and removing surface and subsurface debris such as boulders, fishing nets, lost anchors etc. If debris are present below the seabed then excavation may be required for access and removal. Any unexploded ordnances found with live ammunition will be detonated and any remaining debris removed, where practicable.

125. Consent for Unexploded Ordnance (UXO) removal will be sought in a future Marine Licence application when geophysical survey data of suitable spatial resolution is available to identify and quantify UXO risk.

Marine operations

126. Following seabed preparation a typical turbine construction sequence is as follows:

- Install mooring system
- Install scour protection (for mooring system and substation) and inter array cables
- Install substructure
- Install turbine tower
- Install nacelle
- Install blades

127. The mooring system and turbines are likely to be installed by using jack-up vessels.

128. The wind turbine components of the tower, nacelle and blades will typically be transported from the onshore fabrication site or port to the Windfarm Site via a transportation barge or an installation vessel. For the installation of the Offshore Substation, it is expected that a heavy lift installation vessel or jack-up vessel with up to six legs will be required.

129. The export cable will be installed by an installation vessel. Similar to the inter-array cables, installation of the offshore cable typically is undertaken by ploughing, jetting, trenching or post-lay burial depending on the soil conditions along the cable route as illustrated by Plate 6.

Onshore cable route

130. The onshore cable ducts will be installed using a trenching machine/open-cut trench techniques; and where necessary HDD or other trenchless methods to avoid surface disturbance at sensitive features. The cable will be direct laid or installed in ducts at the bottom of the trench.

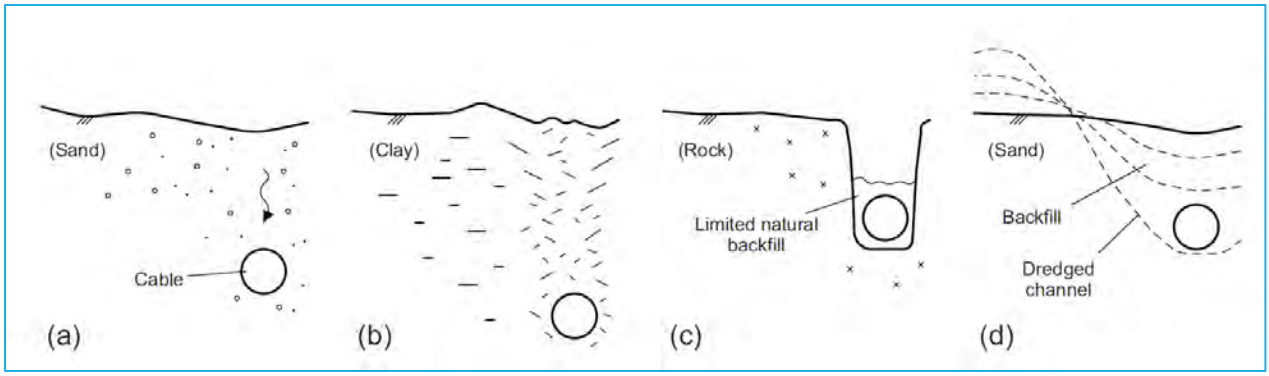


Plate 6 Protection of cable through burial. (a) Jetting / fluidisation, (b) ploughing, (c) mechanical cutting, (d) open trench dredging

131. The cable burial includes the removal of topsoil, excavating the trench, installing the ducts and backfilling the trench. The cable will be pulled through the ducts after the trench has been backfilled.

132. Haul roads will be constructed along the cable route to allow access to the cable route during the construction phase and removed as required once construction has finalised.

133. There will be need for several temporary compounds along the onshore Cable Corridor for material and equipment.

Trenchless crossings (including Landfall)

134. Where an open trench approach is not possible due to significant obstructions (e.g. a major road or watercourse or at the Landfall) non-trenching techniques will be employed. It is anticipated that HDD technique or similar will be used.

135. The HDD method comprises three stages:

- A pilot hole is drilled between the entry and exit point
- The hole is enlarged by passing a larger cutting tool through known as the back reamer
- The cable duct is placed in the enlarged hole

136. HDD is undertaken with the help of a drilling fluid, which is usually a mixture of water and bentonite (an inert clay-based material). During drilling the drilling fluid is continuously pumped to the cutting head or drill bit to facilitate the removal of cuttings, stabilise the borehole, cool the cutting head, and lubricate the passage of the product pipe.

137. Plate 7 shows the layout of a typical HDD rig site.

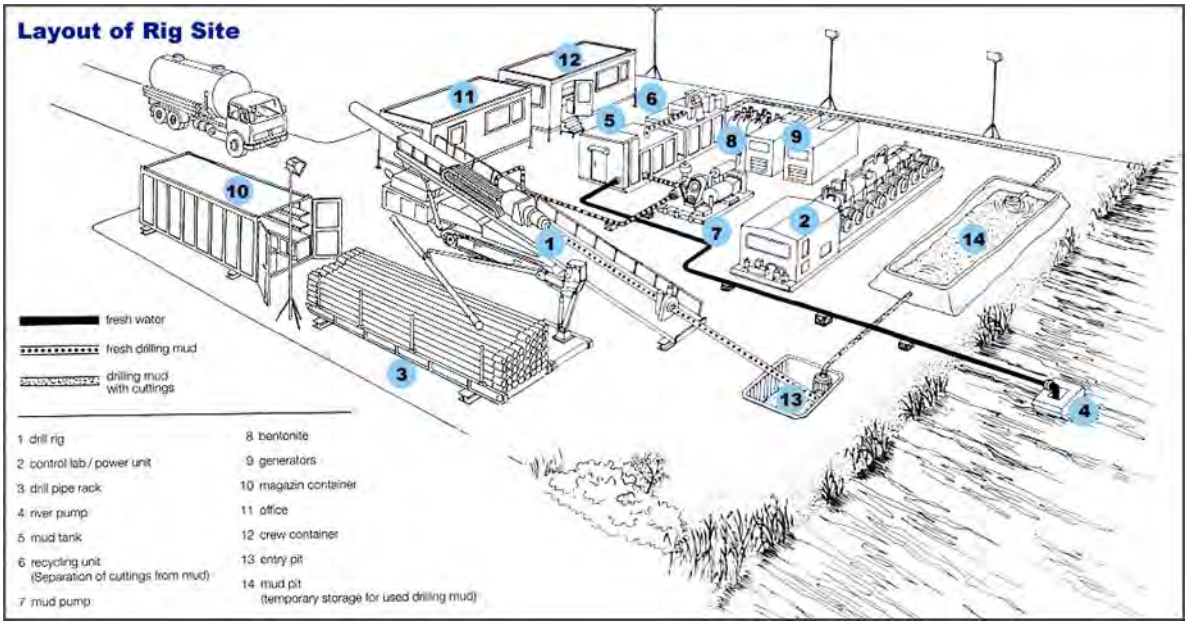


Plate 7 Typical schematic of HDD drill rig site

138. Use of any trenchless technique will also require temporary construction compounds at the entry and exit points.

Onshore Substation

139. Updating of the Onshore Substation will include:

- Site preparation/levelling for the temporary construction compounds
- Installation of underground utility/drainage and foundations for buildings and equipment
- Installation of electrical equipment
- Updating of the perimeter fencing around entire substation

1.8.7 Operation, Maintenance and Decommissioning Phases

Operation and Maintenance

140. Across the operational life of the Project, O+M activities can be split into three main categories as follows:

- Scheduled maintenance
- Unscheduled maintenance
- Emergency / special maintenance (in the event of major equipment breakdown and repairs)

141. The strategy for operation and maintenance will be finalised based on the location of a suitable port / harbour which is yet to be defined. In choosing a suitable port / harbour there will be requirements to ensure sufficient access to a fleet of vessels with the capabilities to complete any required operations and maintenance (O&M) activities. The overall O&M strategy will also reflect the technical specification once known, including wind turbine type, electrical transmission design and final project layout.

142. At this stage, the high-level offshore activities will include but not be limited to the following:

- Wide ranging inspections of mooring system, transition pieces, blades, safety equipment, Offshore Substation equipment, etc.
- System performance assessments and fault-finding
- Replacement of lubricants, oils, filters, etc.
- Painting and coating application of turbines, etc.
- Replacement of wind turbine parts including bearings, gearboxes, generators, nacelles, transformers and blades
- Minor repair and replacements including access ladders, corrosion protection system including anodes and protective coatings, secondary steel, boat landings, cable penetrations and ducting, aids to navigation
- Removal of marine growth and guano
- Structural surveys
- Periodic cable burial surveys, including any crossings and at interfaces at subsurface structures
- Reburial or other remedial actions of inter-array cables, export cable and crossings array cables
- Repair or replacement of export and array cables
- Replenishment of rock protection as additional cable and scour protection.

143. There is expected to be minimal maintenance of the Onshore Export Cables during the operational phase. Typically, every two to five years, there will be periodic testing of the cable which involves access to the link boxes along the entire onshore route. With regards to equipment, access can be achieved using lightweight vehicles.

144. The Onshore Substation will require periodic maintenance visits during the operational phase, this will be carried out by WPD as part of their existing maintenance activities. Therefore no additional activities would be associated with this element of the Project.

Decommissioning

145. At the end of the operational lifetime of the Project, provisionally anticipated to be a minimum 25 years. The decommissioning sequence will be undertaken in reverse of the construction sequence, involving similar types and numbers of vessels and equipment.

146. Offshore it is anticipated that all offshore structures above the seabed will be removed. All electrical cables will be left in-situ to minimise environmental impacts associated with their removal. The possibility of removing the subsea cables and leaving structures above the seabed in-situ with appropriate navigation markers will also be assessed.

147. Onshore there are two main options with regards to decommissioning of the Landfall section. The cables can be left buried in-situ with the cable ends cut, sealed and securely buried. Alternatively, the cables can be removed by pulling them through the ducts. Along the onshore cable route it is anticipated that the onshore cable will be left buried in-situ with the cable ends cut, sealed and securely buried.

148. The substation site may be kept operational and upgraded accordingly for other potential electrical use or fully decommissioned (performed in the reverse of the construction works utilising similar types of equipment).

149. At this stage, the full detail of the required decommissioning activities is not currently known. A decommissioning plan will be prepared during detailed design and developed and refined during the Project's lifetime and as decommissioning approaches. To reflect future best practice and new technologies, the approach and methodologies of the decommissioning activities will be compliant with the relevant legislation, guidance and policy requirements at the time of decommissioning.

1.8.8 Other Projects

150. Currently there are several offshore windfarm / aggregate projects either in consenting stages or early construction within the Celtic Sea and Bristol Channel. These are:

- Erebus Floating Wind Demonstrator Project
- The Llŷr projects (floating offshore wind)
- South Pembrokeshire Demonstration Zone (floating offshore wind and wave)
- Wave Hub (floating offshore wind)
- Marine Energy Test Area (META) (tidal and wave energy)
- ORE Catapult (innovation and research centre for wind, wave and tidal energy)
- NOBEL Banks (aggregate extraction)
- Culver Extension (aggregate extraction)

- Area 470 Extension (aggregate extraction)
- North Bristol Deep (aggregate extraction)
- North Middle Ground (aggregate extraction)

151. The Crown Estate has published proposals for further floating wind leasing in the Celtic Sea. The proposals, published in November 2021, include a focus on early-commercial scale projects (of circa 300-350MW) and full-commercial scale projects (of up to 1GW).

1.9 EIA Methodology

1.9.1 Characterisation of the Existing Environment

152. The characterisation (description) of the existing environment will be undertaken in order to determine the baseline conditions in the area with potential to be affected by the Project. This will require the following steps:

- Study areas defined for each receptor based on the zone of influence and relevant characteristics of the receptor (e.g. mobility/range)
- Review available information
- Review likely or potential impacts that might be expected to arise from the Project
- Determine if sufficient data to make the EIA judgements with sufficient confidence
- If further data required, ensure data gathered are targeted and directed at answering the key question and filling key data gaps
- Review information gathered to ensure the environment can be sufficiently characterised in sufficient detail

153. Existing data from research, government and industry, will be used alongside data collected by OWL specifically for the Project. The proposed data and information sources are outlined in the Baseline Environment subsections within topic chapters.

154. Consideration will also be given to the evolution of the baseline in the absence of the Project. This will take account of wider issues such as climate change and biodiversity loss (in line with the EIA Regulations).

155. Where appropriate, detailed method statements will be provided to the relevant stakeholders in order to agree the relevant approach.

1.9.2 Assessment of Impacts

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

157. The approach to the EIA and the production of the ES will closely follow relevant guidance including:

- Assessment of the environmental impact of offshore wind-farms (OSPAR Commission, 2008)
- Relevant guidance issued by other UK Government and non-governmental organisations
- Receptor-specific guidance documents

Rochdale envelope approach

158. The 'Rochdale Envelope' approach has been employed under various consenting regimes including the infrastructure Planning route, Town and Country Planning Act 1990, as well as the Electricity Act 1989 where an application has been made at a time when the details of a project have not been resolved. The Rochdale Envelope is used where the nature of the Proposed Development means that some details of the whole project have not been confirmed (for instance the precise dimensions of structures) when the application is submitted, and flexibility is sought to address uncertainty.

Determining Receptor Sensitivity and Value

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

160. Receptor value considers whether, for example, the receptor is rare, has protected or threatened status, importance at local, regional, national or international scale, and in the case of biological receptors whether the receptor has a key role in the ecosystem function.

161. The overall receptor sensitivity is determined therefore by considering a combination of value, adaptability, tolerance and recoverability as well as applying professional judgement and / or past experience. Expert judgement is particularly important when determining the sensitivity of receptors. For instance, an Annex II species (under the Habitats Directive) would have a high value, but if it was highly tolerant of an effect or had high recoverability it would follow that the sensitivity in this instance should reflect this.

Predicting the Magnitude of Impacts

162. In order to predict the significance of an impact it is fundamental to establish the magnitude and probability of impact occurring through a consideration of:

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

Evaluation of Significance

163. Subsequent to establishing the receptor sensitivity and magnitude of effect, the impact significance will be predicted by using quantitative or qualitative criteria, as appropriate to ensure a robust assessment. Where possible a matrix such as the one presented in Table 1.16 will be used to aid assessment of impact significance based on expert judgement, latest guidance and any specific input from consultation. A description of the approach to impact assessment and the interpretation of significance levels will be provided within each section of the ES. This approach will ensure that the definition of impacts is transparent and relevant to each topic under consideration

164. For the purposes of the EIA, major and moderate adverse impacts are deemed to be significant, and, as such, may require mitigation. Whilst minor impacts are not significant in their own right, these may contribute to significant impacts cumulatively or through interactions.

Table 1.16 Significance of an impact - resulting from each combination of receptor sensitivity and the magnitude of the effect upon it

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

Embedded and Additional Mitigation, Impact Significance and Residual Impact

165. The EIA Regulations require a description of the measures envisaged to avoid, prevent, reduce or (where possible) offset any significant adverse effects on the environment. Where possible, embedded mitigation, i.e. mitigation identified at an early stage (often using experience from operational projects), can include:

- The design elements aimed at reducing impacts
- Commitment to specific best practice
- Commitment to pre-construction surveys
- Commitment to consultation

166. Embedded mitigation will be incorporated into the project design and listed where relevant for each topic. Impacts will then be assessed with this mitigation in place. Where impacts are significant and additional mitigation is required, impacts may be reassessed and the post-mitigation or 'residual impact' identified. If the impact does not require mitigation (or none is possible) the residual impact will remain the same.

167. In some circumstances it may be necessary to detail monitoring requirements as part of the mitigation measures identified. Monitoring may be appropriate to confirm the assumptions that the assessment is reliant upon (i.e. continue to monitor baseline conditions) and / or to confirm the efficacy of mitigation measures implemented. Monitoring should be proportionate and directly relevant to the findings of the impact assessment, i.e. it should not be monitoring for the sake of monitoring.

Confidence

168. Once an assessment of a potential impact has been made, it is necessary to assign a confidence value to the assessment to assist in the understanding of the judgment. This is undertaken on a simple scale of high-medium-low, where high confidence assessments are made on the basis of robust evidence, with lower confidence assessments being based, for example on extrapolation and use of proxies.

Inter-relationships

169. The impact assessment will consider the inter-relationship of impacts on individual receptors. The objective will be to identify where the accumulation of residual impacts on a single receptor, and the relationship between those impacts, gives rise to a need for additional mitigation. When considering the potential for impacts to inter-relate it is assumed that any residual effect determined as having no impact will not result in a significant inter-relationship when combined with other effects on receptors. However, where a series of negligible or greater residual impacts are identified, they will be considered further.

Cumulative Impacts

170. Cumulative impact assessment (CIA) forms part of the EIA process. Only projects which are reasonably well described and sufficiently advanced to provide information on which to base a meaningful and robust assessment will be included in the CIA. Projects which are sufficiently implemented during the site characterisation for the Project will be considered as part of the baseline for the EIA. Where possible OWL will seek to agree with stakeholders the use of as-built project parameter information (if available) as opposed to consented parameters to reduce over-precaution in the cumulative assessment.

171. For some topics (where for example the receptors include highly mobile or migratory species, fishing or shipping) the CIA will have a large geographic scale and involve in many plans and projects, for others where receptors (or impact ranges) are more spatially fixed the CIA will be narrower. The scope of the CIA will therefore be established on a topic-by-topic basis with the relevant consultees as the EIA progresses.

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

- Other windfarms
- Aggregate extraction and dredging
- Licensed disposal sites

- Navigation and shipping
- Commercial fisheries
- Sub-sea cables and pipelines
- Potential port and harbour development
- UXO clearance

173. Onshore plans or projects that may be considered include (but are not limited to):

- Other offshore windfarm infrastructure
- Other energy generation infrastructure
- Building and / or housing developments
- Installation or upgrade of road
- Installation or upgrade of cables and pipelines
- Coastal protection works

Transboundary Impacts

174. Regulation 32 of the EIA Regulations sets procedures to address issues associated with a development that might have a significant impact on the environment in another European Economic Area (EEA) member state.

175. The procedures involve providing information to the member state and for the Planning Inspectorate to enter into consultation with that state regarding the significant impacts of the development and the associated mitigation measures. Further advice on transboundary issues, in particular with regard to consultation is given in the Planning Inspectorate advice note twelve (Planning Inspectorate, 2018b).

176. Transboundary impacts, like cumulative impacts are considered on a topic-by-topic basis for offshore topics and are not relevant to onshore topics.

177. It is intended that screening of plans and projects to include in the CIA and Transboundary assessment will be undertaken for the Project in 2022.

2. Part 2: Offshore

2.1 Introduction

178. This section of the Scoping Report details the existing environment, approach to data collection and assessment of potential impacts covered under the EIA regulations of the construction, operation and maintenance, and decommissioning of the Project on offshore receptors.

179. The offshore topics within the EIA will include all receptors seawards of Mean High Water Spring (MHWS). This will include any receptors in the intertidal zone, expect where specifically defined. All receptors landwards of MHWS will be included within the onshore EIA.

180. It should be noted that Study Areas per topic are defined in the sections below based on the potential spatial and temporal considerations of the impacts on relevant receptors and are intended to cover the area within which an effect can be reasonably expected.

181. Part 2 of this Scoping Report considers the following offshore topics:

- Section 2.2: Marine Geology, Oceanography and Physical Processes
- Section 2.3: Marine Water and Sediment Quality
- Section 2.4: Benthic and Intertidal Ecology
- Section 2.5: Fish and Shellfish Ecology
- Section 2.6: Marine Mammal and Marine Turtle Ecology
- Section 2.7: Offshore Ornithology
- Section 2.8: Commercial Fisheries
- Section 2.9: Shipping and Navigation
- Section 2.10: Marine Archaeology and Cultural Heritage
- Section 2.11: Civil and Military Aviation
- Section 2.12: Infrastructure and Other Users
- Section 2.13: Offshore Seascape, Landscape and Visual Amenity
- Section 2.14: Offshore Air Quality
- Section 2.15: Offshore Airborne Noise
- Section 2.15: Offshore Inter-Relationships

2.2 Marine Geology, Oceanography and Physical Processes

2.2.1 Introduction

182. This section of the Scoping Report considers the potential effects of construction, operation and maintenance, and decommissioning of the Project on the marine geology, oceanography and physical processes. It covers tidal currents, waves, bedload sediment transport, suspended sediments and processes at the coast.

2.2.2 Policy, Legislation and Guidance

National Policy Statement

183. Section 1.5 describes the wider policy and legislative context for the Project. The specific assessment requirements for marine geology, oceanography and physical processes are set out within the overarching National Policy Statement (NPS) for Energy (EN-1) and NPS for Renewable Energy Infrastructure (EN-3) and include:

- EN-1 – 5.5.6: 'where relevant, applicants should undertake coastal geomorphological and sediment transfer modelling to predict and understand impacts and help identify relevant mitigating or compensatory measures'
- EN-1 – 5.5.7: 'the ES should include an assessment of the effects on the coast. In particular, applicants should assess:
    - the impact of the proposed project on coastal processes and geomorphology, including by taking account of potential impacts from climate change. If the development will have an impact on coastal processes the applicant must demonstrate how the impacts will be managed to minimise adverse impacts on other parts of the coast.
    - the vulnerability of the proposed development to coastal change, taking account of climate change, during the project's operational life and any decommissioning period.'
- EN-1 – 5.5.9: 'the applicant should be particularly careful to identify any effects of physical changes on the integrity and special features of Marine Conservation Zones, candidate marine Special Areas of Conservation (SACs), coastal SACs and candidate coastal SACs, coastal Special Protection Areas (SPAs) and potential SCIs and Sites of Special Scientific Interest (SSSI).'
- EN-3 – 2.6.81: 'an assessment of the effects of installing cable across the intertidal zone should include information, where relevant, about:
    - increased suspended sediment loads in the intertidal zone during installation.'

- EN-3 – 2.6.113: 'where necessary, assessment of the effects on the subtidal environment should include:
  - loss of habitat due to foundation type including associated seabed preparation, predicted scour, scour protection and altered sedimentary processes.
  - environmental appraisal of inter-array and cable routes and installation methods.
  - increased suspended sediment loads during construction.'
- EN-3 – 2.6.194: 'the assessment should include predictions of the physical effect that will result from the construction and operation of the required infrastructure and include effects such as the scouring that may result from the proposed development.'

South West Inshore and South West Offshore Marine Plan

184. In addition, the South West Inshore and South West Offshore Marine Plan published in June 2021 (Defra, 2021) includes policy relating to marine geology, oceanography and physical processes. This is summarised in Table 2.1.

Table 2.1 The South West Inshore and South West Offshore Marine Plan policy relating to marine geology, oceanography and physical processes

Policy code	Policy text	Policy aim
SW-CC-1	Proposals that conserve, restore or enhance habitats that provide flood defence or carbon sequestration will be supported. Proposals that may have significant adverse impacts on habitats that provide a flood defence or carbon sequestration ecosystem service must demonstrate that they will, in order of preference: a) avoid; b) minimise; c) mitigate - adverse impacts so they are no longer significant; d) compensate for significant adverse impacts that cannot be mitigated.	Proposals that conserve, restore or enhance habitats that provide flood defence or carbon sequestration will be supported. Habitats that provide flood defence and carbon sequestration contribute to natural resilience for coastal communities that are vulnerable to coastal erosion and change. SW-CC-1 requires proposals to manage impacts, enabling these important habitats to continue to provide this valuable service. Proposals that cannot avoid, minimise and mitigate or, or as a last resort, compensate for significant adverse impacts, will not be supported.

Policy code	Policy text	Policy aim
SW-CC-2	Proposals in the south west marine plan areas should demonstrate for the lifetime of the project that they are resilient to the impacts of climate change and coastal change.	The effects of climate change are wide-ranging and can include sea level rise, coastal flooding and rising sea temperatures. SW-CC-2 adds provision to enable enhanced resilience of developments, activities and ecosystems within the south west marine plan areas to the effects of climate change and coastal change.
SW-CC-3	Proposals in the south west marine plan areas, and adjacent marine plan areas, that are likely to have significant adverse impacts on coastal change, or on climate change adaptation measures inside and outside of the proposed project areas, should only be supported if they can demonstrate that they will, in order of preference: a) avoid; b) minimise; c) mitigate - adverse impacts so they are no longer significant.	Large areas of the south west inshore marine plan area coastline are subject to or vulnerable to change. SW-CC-3 ensures proposals do not exacerbate coastal change, enabling communities to be more resilient and better able to adapt to coastal erosion and flood risk where identified. SW-CC-3 also supports proposals that do not compromise existing adaptation measures, which will enable an improvement in the resilience of coastal communities to coastal erosion and flood risk. Proposals that cannot avoid, minimise and mitigate significant adverse impacts will not be supported.

185. The assessment will also be undertaken in accordance with the following standards and guidance:

- Guidance on Environmental Impact Assessment in Relation to Dredging Applications (Office of the Deputy Prime Minister, 2001)
- Offshore Windfarms: Guidance Note for Environmental Impact Assessment in respect of Food and Environmental Protection Act (FEPA) and Coast Protection Act (CPA) requirements: Version 2 (Cefas, 2004)
- Review of Cabling Techniques and Environmental Effects applicable to the Offshore Windfarm Industry (BERR, 2008)
- Coastal Process Modelling for Offshore Windfarm Environmental Impact Assessment (COWRIE, 2009)
- Guidelines for Data Acquisition to support Marine Environmental Assessments of Offshore Renewable Energy Projects (Cefas, 2011)

2.2.3 Study Area

186. The study area for marine geology, oceanography and physical processes comprises the southern part of the Outer Bristol Channel west of the Devon coast (Figure 2.2.1). This study area accounts for the potential local and regional effects on hydrodynamics and sedimentary process, and includes a tide-parallel 10km wide buffer around the project boundaries and Area of Search.

2.2.4 Baseline Data

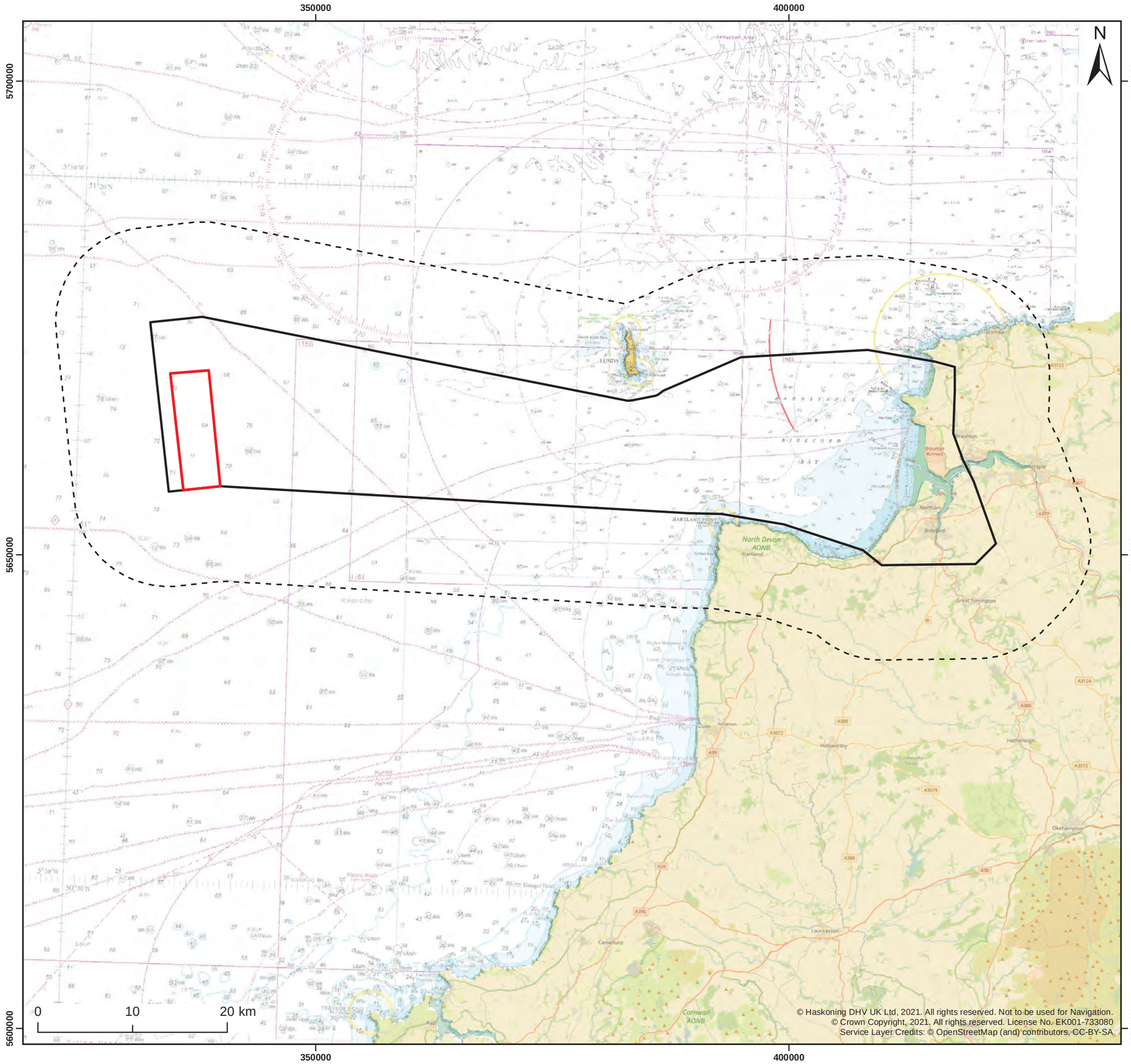
187. The following surveys/studies will be undertaken to inform the assessment (Table 2.2). Surveys methodologies will be agreed in advance with stakeholders where possible.

Table 2.2 Proposed baseline surveys

Survey/study	Purpose	Spatial Coverage
Geophysical survey	Seabed feature identification	Offshore Development Area
Multibeam echosounder	Bathymetry	Offshore Development Area
Side-scan sonar	Sea-bed texture	Offshore Development Area
Sub-bottom profiling	Shallow geology	Offshore Development Area
Grab samples and drop-down camera and video samples	Sea-bed sediment characterisation	Offshore Development Area

188. Other data and information available to inform the EIA include:

- UK Atlas of Marine Renewable Energy
- Wavenet wave buoys
- United Kingdom Hydrographic Office (UKHO) tidal diamonds and historical charts
- Class A tide gauges
- United Kingdom Climate Projections 2018 (UKCP18)
- British Geological Survey 1:250,000 sea-bed sediment, Quaternary geology and bedrock geology mapping
- Admiralty Charts and UKHO bathymetry data
- Projects including Futurecoast and Shoreline Management Plans



Legend:

- White Cross Offshore Windfarm
- Area of Search
- Study Area

Client:	Project:
Offshore Wind Ltd.	White Cross Offshore Windfarm

Title:

Study area for Marine Geology, Oceanography and Physical Processes

Figure: 2.2.1 | Drawing No: PC2978-RHD-ZZ-XX-DR-Z-0116

Revision:	Date:	Drawn:	Checked:	Size:	Scale:
P01	07/01/2021	AB	CB	A3	1:400,000

Co-ordinate system: WGS 1984 UTM Zone 30N

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2.2.5 Baseline Environment

Bathymetry

189. The minimum and maximum depths across the Windfarm Site are about 69m and 72m below Chart Datum (CD), respectively (Figure 2.2.2). Across the offshore Area of Search, water depths are variable from 70m below CD in the deepest areas to less than 5m below CD in the nearshore Landfall Area of Search.

Tidal Currents

190. Spring tide current flows across the Windfarm Site are directed approximately east-northeast on a flood tide and west-southwest on an ebb tide. ABPmer (2008) modelled peak flows for mean spring tides of between approximately 0.6m/s and 0.65m/s at the site. Higher velocities (1.3-1.4m/s) occur across the Area of Search where the tidal currents pass between Lundy Island and Hartland Point (Figure 2.2.3). Closer to the coast, current velocities reduce again and are approximately shore-parallel.

Waves

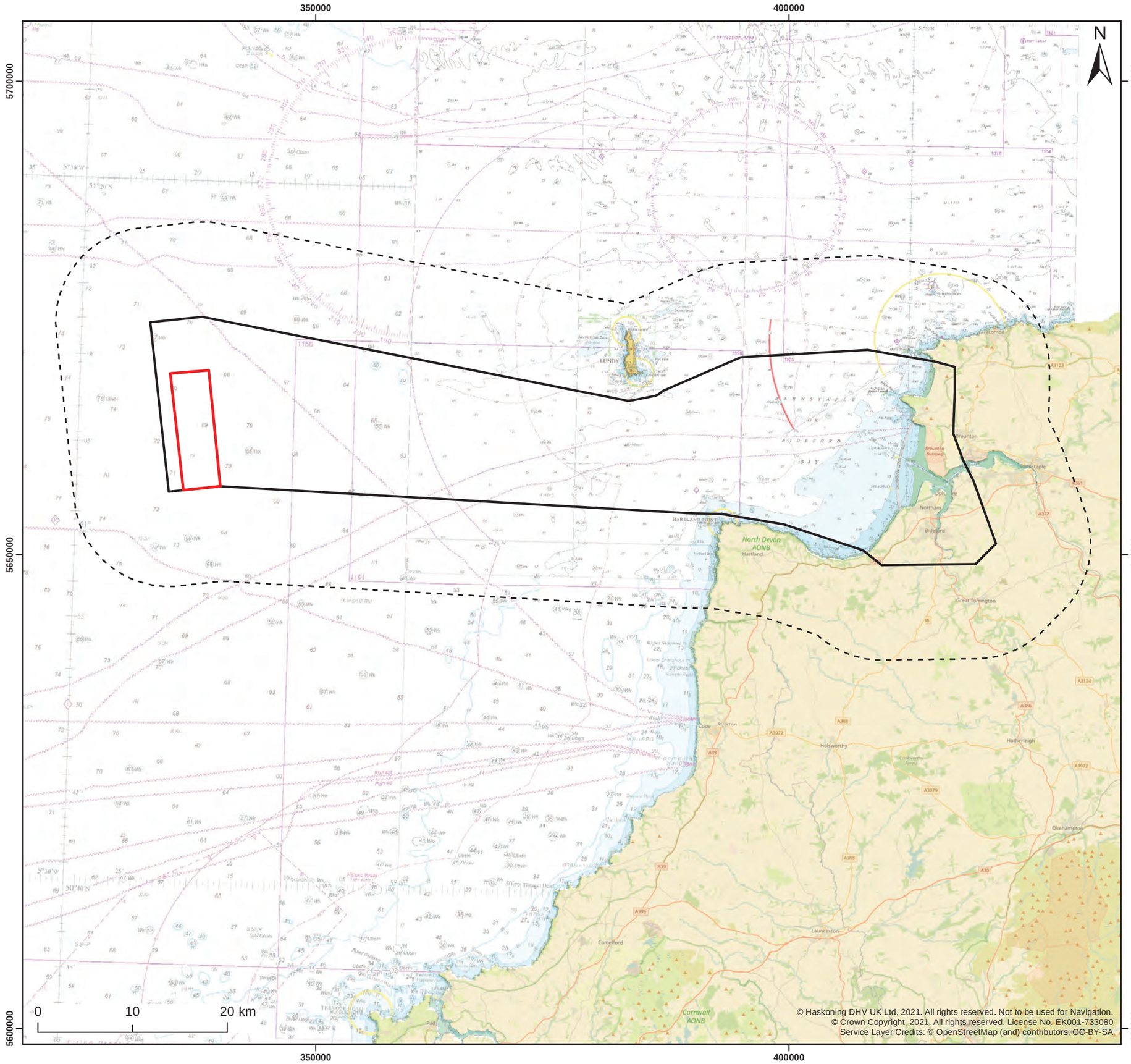
191. The most frequent waves across the Windfarm Site are from the southwest to south-southwest sector. ABPmer (2008) described annual mean significant wave heights of 1.9m to 2.0m (Figure 2.2.4).

Offshore Bedload Sediment and Transport

192. Mapping of sediment types completed by British Geological Survey (BGS) is shown in Figure 2.2.5. The data shows that the Windfarm Site is dominated by sand. Across the offshore Area of Search, sea-bed sediments are predominantly gravelly sand and sandy gravel with sand closer to the coast.

Suspended Sediments

193. Cefas (2016) mapped the spatial distribution of average annual suspended sediment concentrations across the UK continental shelf between 1998 and 2015 and found that the array is characterised by values lower than 5mg/l. Towards the coast, concentrations increase to less than 15mg/l.



Legend:

- White Cross Offshore Windfarm
- Area of Search
- Study Area

Client:	Project:
Offshore Wind Ltd.	White Cross Offshore Windfarm

Title:

Study area for Marine Geology, Oceanography and Physical Processes

Figure: 2.2.1 | Drawing No: PC2978-RHD-ZZ-XX-DR-Z-0116

Revision:	Date:	Drawn:	Checked:	Size:	Scale:
P01	07/01/2021	AB	CB	A3	1:400,000

Co-ordinate system: WGS 1984 UTM Zone 30N

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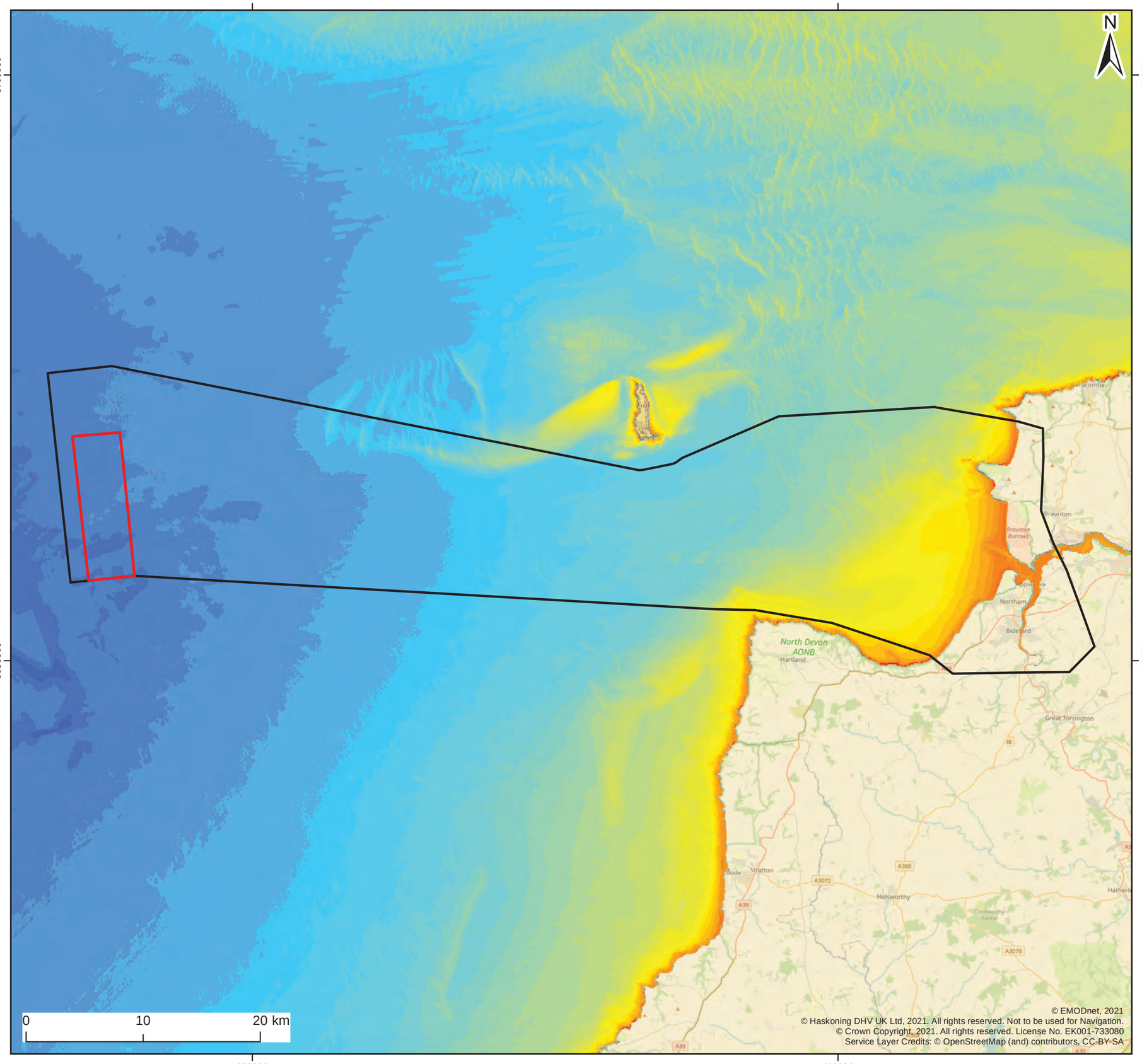

Legend:

- White Cross Offshore Windfarm
- Area of Search

Depth (m)

- >15
- 12 - 15
- 9 - 12
- 6 - 9
- 3 - 6
- 0 - 3
- -3 - 0
- -6 - -3
- -9 - -6
- -12- -9
- -15 - -12
- -18 - -15
- -21 - -18
- -24 - -21
- -27 - -24
- -30 - -27
- -33 - -30
- -36 - -33
- -39 - -36
- -42 - -39
- -45 - -42
- -48 - -45
- -51 - -48
- -54 - -51
- -57 - -54
- -60 - -57
- -65 - -60
- -70 - -65
- -75 - -70
- -80 - -75
- -85 - -80
- -90 - -85
- -95 - -90
- -100 - -95
- < -100

Client:	Project:
Offshore Wind Ltd.	White Cross Offshore Windfarm

Title: Offshore bathymetry

Figure: 2.2.2 | Drawing No: PC2978-RHD-ZZ-XX-DR-Z-0077

Revision:	Date:	Drawn:	Checked:	Size:	Scale:
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Co-ordinate system: WGS 1984 UTM Zone 30N

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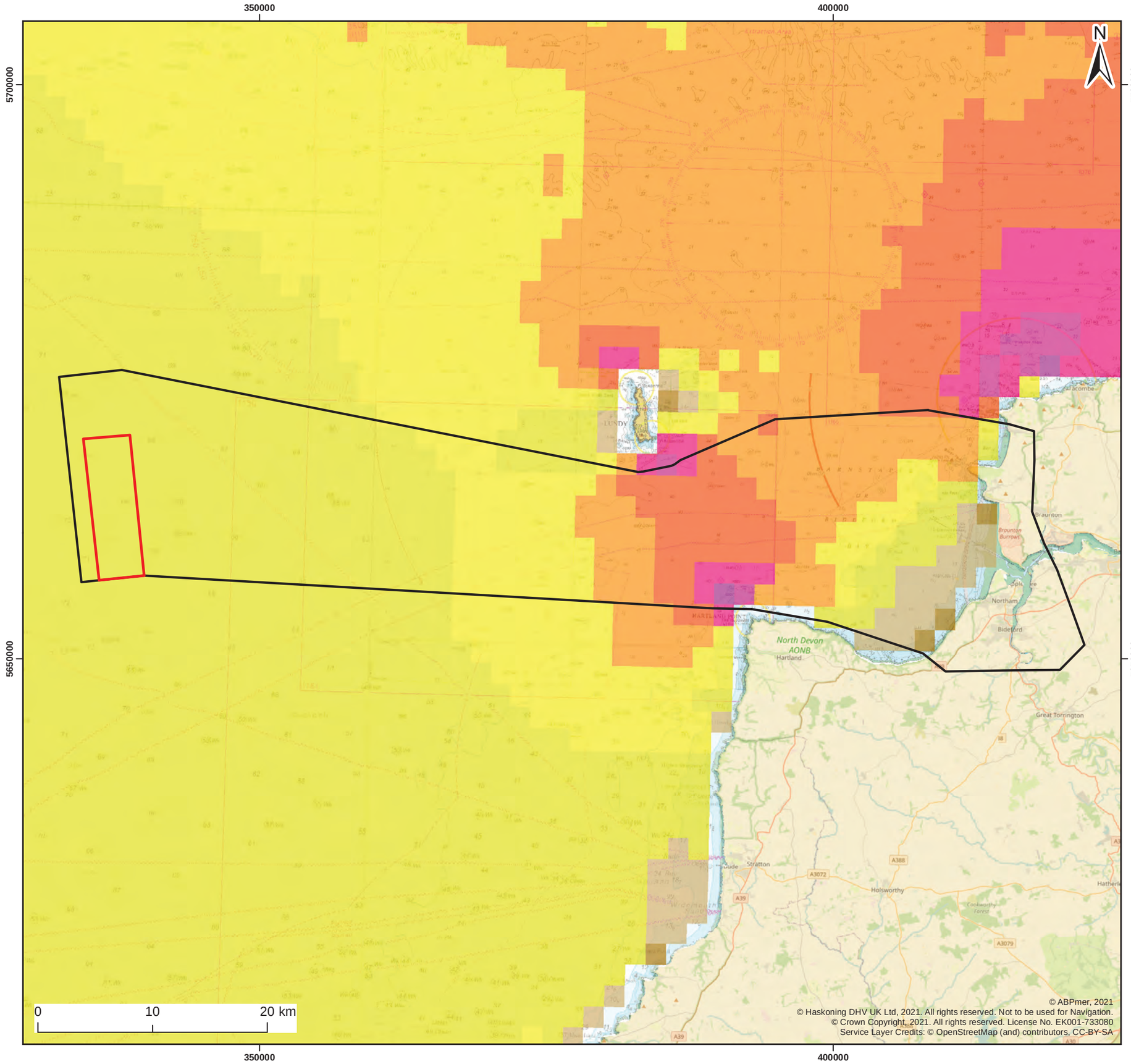

Legend:

- White Cross Offshore Windfarm
- Area of Search

Peak Flow for a Mean Spring Tide

- < 0.11
- 0.11 - 0.25
- 0.25 - 0.5
- 0.5 - 0.75
- 0.75 - 1.0
- 1.0 - 1.25
- 1.25 - 1.5
- 1.5 - 1.75
- 1.75 - 2.0
- 2.0 - 2.5
- 2.5 - 3.0
- 3.0 - 3.5
- 3.5 - 4.0
- > 4.0

Client:	Project:
Offshore Wind Ltd.	White Cross Offshore Windfarm

Title:

Peak Flow for a Mean Spring Tide Across the Array Area and Area of Search

Figure: 2.2.3	Drawing No: PC2978-RHD-ZZ-XX-DR-Z-0078				
Revision:	Date:	Drawn:	Checked:	Size:	Scale:
P01	21/12/2021	GC	CB	A3	1:330,000

Co-ordinate system: WGS 1984 UTM Zone 30N

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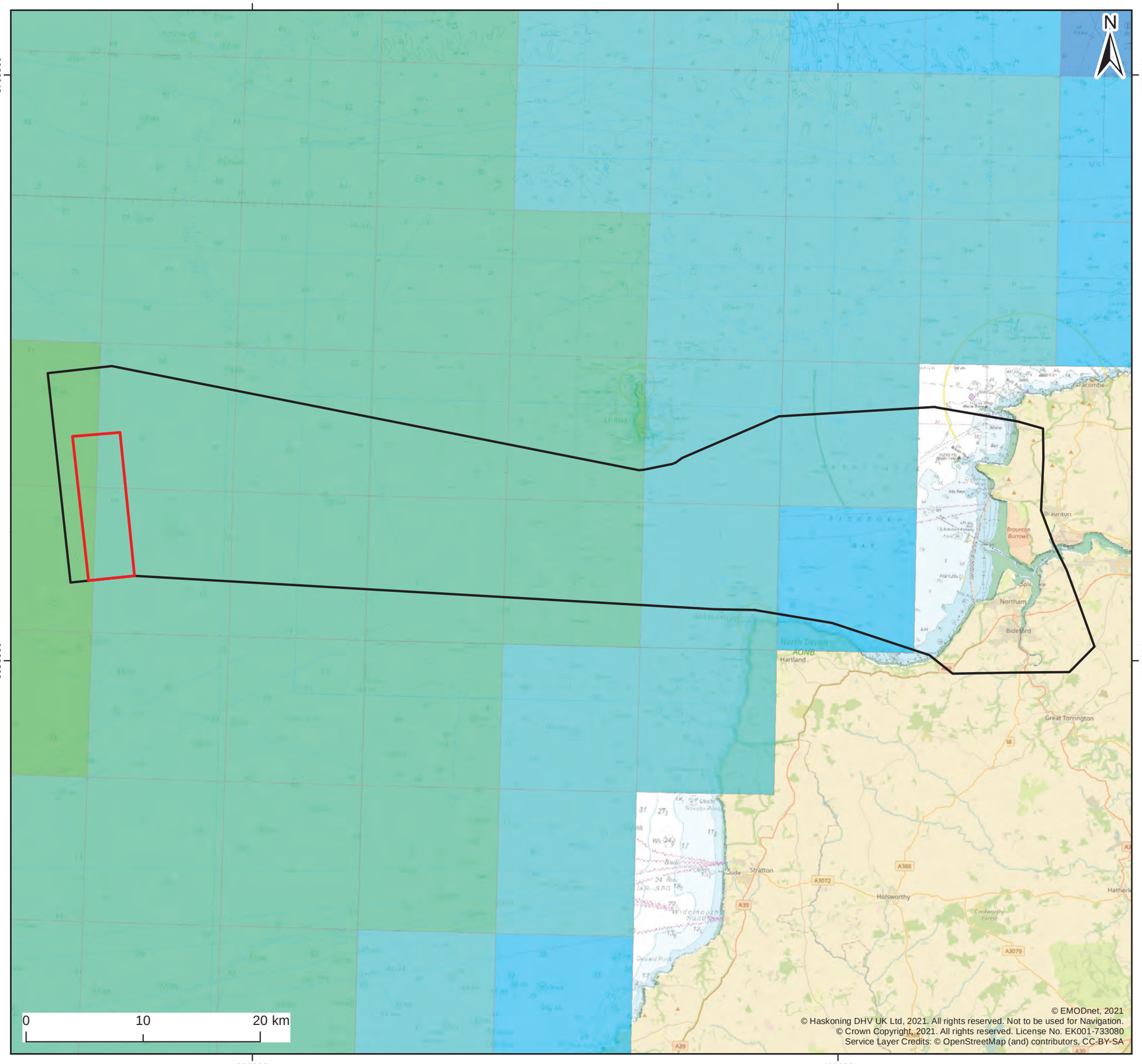

Legend:

- White Cross Offshore Windfarm
- Area of Search

Annual Mean Significant Wave Height

- < 0.75
- 0.75 - 1.0
- 1.0 - 1.25
- 1.25 - 1.5
- 1.5 - 1.75
- 1.75 - 2.0
- 2.0 - 2.25
- 2.25 - 2.5
- 2.5 - 2.75
- 2.75 - 3.0
- 3.0 - 3.25
- 3.25 - 3.5
- 3.5 - 3.75
- 3.75 - 4.0
- 4.0 - 4.25
- 4.25 - 4.5

Client:	Project:
Offshore Wind Ltd.	White Cross Offshore Windfarm

Title:

Annual Mean Significant Wave Height
Across the Array Area and Area of Search

Figure: 2.2.4 | Drawing No: PC2978-RHD-ZZ-XX-DR-Z-0079

Revision:	Date:	Drawn:	Checked:	Size:	Scale:
P01	21/12/2021	GC	CB	A3	1:330,000

Co-ordinate system: WGS 1984 UTM Zone 30N

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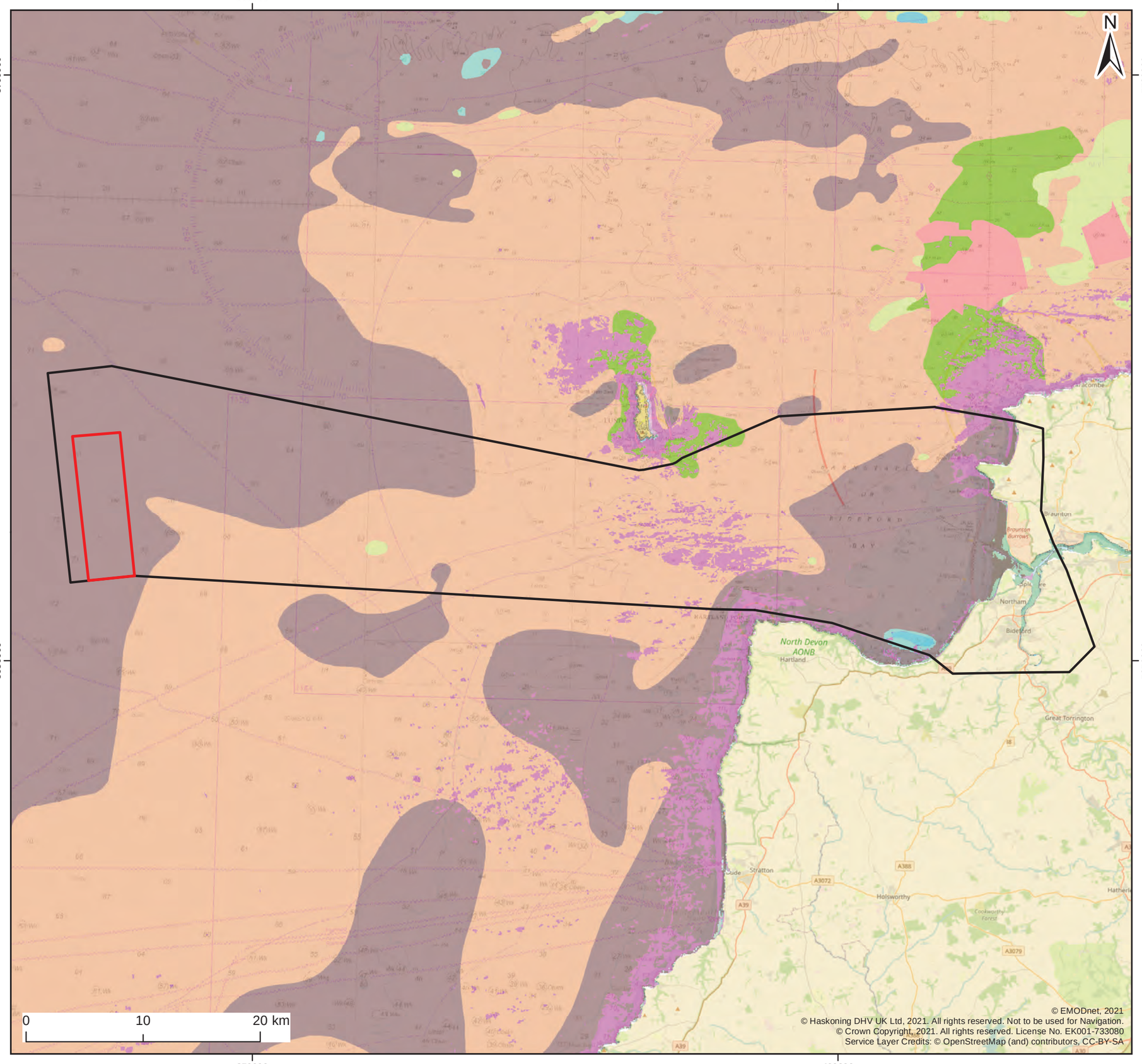

Legend:

- White Cross Offshore Windfarm
- Area of Search

Sea-bed Sediment Substrate

- Coarse substrate
- Fine mud
- Mixed sediment
- Muddy sand
- Rock or other hard substrata
- Sand
- Sandy mud
- Sandy mud or Muddy sand
- Seabed
- Sediment
- [Sabellaria alveolata] reefs
- [Sabellaria spinulosa] reefs

Client:	Project:
Offshore Wind Ltd.	White Cross Offshore Windfarm

Title:

Sea-bed Sediment Distribution Across the Array Area and Area of Search

Figure: 2.2.5 | Drawing No: PC2978-RHD-ZZ-XX-DR-Z-0080

Revision:	Date:	Drawn:	Checked:	Size:	Scale:
P01	21/12/2021	GC	CB	A3	1:330,000

Co-ordinate system: WGS 1984 UTM Zone 30N

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Coastal Processes

194. The export cable will make Landfall at a location along the west coast of Devon between Clovelly in the west and Woolacombe in the east. The coast contains a variety of environments. High and hard cliffs of sandstone and shale with local gravel/pebble storm beaches occur between Clovelly and Westward Ho! Cliff erosion rates are low and driven by landslides. Wave induced transport is to the east and mainly occurs during storm events (Hartland Point protects this coast from much of the south-westerly directed waves), when there is sufficient wave energy to transport the coarse sediment alongshore. However, there is currently little sediment being supplied to the 3km-long pebble ridge at Westward Ho! from the west due to the low rates of cliff erosion.

195. Between Westward Ho! and Saunton Down, the coast is dominated by the mouth of Taw-Torridge Estuary and its associated intertidal areas, and spit and dune systems. The southern shore of the estuary is marked by the pebble ridge. The northern shore includes the extensive dune system of Braunton Burrows fronted by a wide sand beach which extends southwards approximately 5km from the headland of Saunton Down into the mouth of the Taw-Torridge Estuary. North of Saunton Down, the coast is dominated by resistant cliff headlands bounding two sand bays (backed by dunes), Croyde Bay and Morte Bay, formed by differential erosion of the coast between the headlands. Croyde Bay and Morte Bay are considered to be self-contained systems in terms of sediment budget (sediment eroded within each bay is likely to remain within that bay).

196. The coast south from Hartland Point to Bude faces west and is fully exposed to the south-westerly-dominated wave climate. The entire coast is dominated sandstone rock cliffs and shore platforms. There are no significant accumulations of mobile sediment and the intertidal width is limited, with limited alongshore sediment transport. The cliffs are competent and eroding slowly, with average rates controlled by local geological factors. Future rates of erosion are likely to be less than 10m over the next 100 years.

2.2.6 Potential Impacts

Potential impacts during construction

Effects to hydrodynamic regime (waves and tidal currents)

197. Whilst there is potential for the physical presence of construction plant and offshore infrastructure to impact upon the hydrodynamic regime, this impact would increase incrementally as the Windfarm is constructed with the greatest potential impacts resulting from the physical presence of the completed windfarm. This impact is

therefore covered under 'Potential impacts during operation and maintenance', below, and is scoped out of further consideration in relation to the construction phase.

Effects on bedload sediment transport and sea-bed morphological change

198. Construction of the Windfarm will not change the geology of the site other than in the case of localised effects associated with anchor and cable installation. Due to the localised nature of these effects, it is not anticipated that such changes would give rise to significant impacts on sea-bed features, and neither would there be any changes in coastal morphology. Hence, these impacts are scoped out of further consideration in relation to the construction phase. However, further consideration will be given to the potential effects on the form and function of the bedload sediment transport processes due to cable installation.

Effects on suspended sediment concentrations, transport and deposition

199. Potential effects during construction include temporary disturbance of the seabed due to the installation activities for cables and anchors which release sediment into the water column resulting in increased suspended sediments and changes to sea-bed levels from deposition. Nearshore cable installation could result in changes to coastal processes and shoreline levels due to deposition or erosion. These effects are anticipated to be minimal but will be assessed as part of the EIA. The effects and potential interactions will be considered separately for the Windfarm Site and for the Offshore Export Cable Corridor, and potential interactions considered. The effect of construction activities on suspended sediment concentrations will be assessed using expert based assessment, predicated on a source-pathway-receptor conceptual model.

Indentations on the seabed due to installation vessels

200. There is potential for certain vessels used during installation of the anchors and cable infrastructure to directly impact the seabed. This applies for those vessels that utilise jack-up legs or several anchors to hold station and to provide stability for a working platform. Where legs or anchors (and associated chains) have been inserted into the seabed and then removed, there is potential for an indentation to remain, proportional to the dimensions of the object, and depending on local conditions such as sediment transport. These effects are anticipated to be minimal but will be assessed as part of the EIA.

Potential impacts during operation and maintenance

Effects on waves and tidal currents

201. Potential effects during operation could occur due to the physical presence of infrastructure (i.e. anchors, chains and any cable protection above the seabed) and substructure (mooring system, floating structure that supports the wind turbine, and the transition providing the connection from the substructure to the wind turbine tower), which may result in localised changes to waves and tidal currents due to physical blockage effects. These changes could potentially affect the sediment transport regime and/or sea-bed morphology. In addition, there is potential for the temporary presence of engineering equipment (e.g. jack-up barges or anchored vessels) to have local effects on the hydrodynamic and sediment regimes during maintenance activities. These effects are anticipated to be minimal but will be assessed as part of the EIA.

Effects on bedload sediment transport and sea-bed morphological change (including coastal erosion)

202. Impacts on sediment transport due to changes in waves and tidal currents are likely to be localised to the areas immediately surrounding the individual anchors in the form of sea-bed scour where the sediment is soft enough to be mobilised. Scour at each anchor will be assessed as part of the EIA using well-established empirical methods applied to offshore windfarms elsewhere.

203. Where the export cables are buried there would be no effect on bedload sediments and sediment transport. However, it is possible that cable protection would be required at locations where the seabed is characterised by hard geology, at cable and pipeline crossing locations and at Landfall. The effects that cable protection may have on marine geology, oceanography and physical processes primarily relate to the potential for interruption of sediment transport, both offshore and at the coast, and the footprint presented on the seabed. These effects are anticipated to be minimal but will be assessed as part of the EIA.

Effects on suspended sediment concentrations and transport

204. There is potential for sediments to be re-suspended by scouring effects. Consideration will be given to likely changes in suspended sediment concentrations due to scour during the operation and maintenance phase within the EIA.

Potential impacts during decommissioning

205. The scope of the decommissioning works would most likely involve removal of the accessible installed components. Offshore, this is likely to include removal of all the wind turbine components, the anchors and chains (those above sea-bed level),

removal of some or all of the infield cables and export cables. Scour and cable protection would likely be left *in situ*.

206. The removal of the anchors, chains and cables has the potential to affect the wave and tidal current regimes, bedload sediment transport, and suspended sediment concentrations and transport. Any impacts arising from decommissioning would be comparable to those identified for the construction phase and will be assessed as part of the EIA:

- Effects on suspended sediment concentrations and transport
- Effects on sea-bed morphology due to deposition of suspended sediment
- Indentations on the seabed due to decommissioning vessels

207. The magnitude of effects would be comparable to or less than those identified for the construction phase.

Potential cumulative impacts

208. The CIA will be based on a zone of influence identified during the project alone impact assessment, which will define the geographical extent to which effects of the Windfarm are expected. The CIA will consider cumulative impacts with the existing Windfarms and any other projects and marine users within the zone of influence (aggregate extraction and dredging, subsea cables and oil and gas activity). The approach to cumulative assessment is set out in Section 1.9.2.

Potential transboundary impacts

209. The Project is approximately 130km from any international territory boundary. Given that the likely marine geology, oceanography and physical processes impacts will be restricted to near-field change, coupled with its remote location from any international territory boundary, there would be no pathway for transboundary impacts. It is therefore proposed to scope out transboundary effects on marine geology, oceanography and physical processes.

2.2.7 Mitigation Measures

210. Any impacts on marine geology, oceanography and physical processes will have small spatial and temporal scales (localised and temporary). Therefore, no mitigation measures are expected in addition to those already assumed:

- Where seabed preparation is required (e.g. levelling) adoption of methods and equipment that have been designed to minimise potential for sediment suspension and dispersal

- Selection of cable installation methods and equipment most suitable for seabed conditions along the Offshore Export Cable Route(s) and designed to minimise sediment suspension into the water column
- Preparation of Construction Method Statements (CMS) setting out detailed cable installation methods and techniques (based on final project design).
- Offshore export cables would be buried to a minimum target burial depth of 1m where possible (recognised industry good practice). A detailed Cable Burial Risk Assessment will also be required to confirm the extent to which cable burial can be achieved. Where it is not possible to achieve cable burial, additional cable protection (rock placement, concrete mattressing or grout bags) may be required

2.2.8 Approach to Assessment and Data Gathering

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

- Bathymetry
- Geology
- Water levels
- Tidal currents
- Waves
- Climate change
- Seabed sediment distribution
- Bedload sediment transport
- Suspended sediment transport
- Morphological change
- Coastal processes at the Landfall
- Anticipated trends in baseline conditions

212. For the effects on marine geology, oceanography and physical processes, the assessment will follow two approaches. The first type of assessment is impacts directly affecting receptors which possess their own intrinsic morphological value (Table 2.3). The impact assessment will incorporate a combination of the sensitivity of the receptor, its value (if applicable) and the magnitude of the change to determine a significance of impact.

Table 2.3 Marine geology, oceanography and physical processes receptors

Receptor group	Receptor	Closest distance from White Cross Offshore Windfarm
Designated sites and features	Bristol Channel Approaches SAC	Offshore Export Cable Corridor will pass through the SAC
Southwest coast of England	Bideford to Foreland Point MCZ and various coastal SSSIs, SACs and AONBs	Offshore Export Cable Corridor will make landfall on the southwest coast

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

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

2.2.9 Summary of Scoped In Impacts

215. Table 2.4 outlines the effects which are proposed to be scoped into the EIA. This may be refined through the Evidence Plan Process as additional information and data become available.

Table 2.4 Summary of Impacts Relating to the Marine Physical Environment. Topics to be Scoped In (✓) and Out (x)

Potential Impact	Construction	Operation and Maintenance	Decommissioning
Effects on waves and tidal currents	x The effect arises as a result of the presence of anchors and chains so is assessed in the operational phase	✓	x The effect arises as a result of the presence of anchors and chains so is assessed in the operational phase
Effects on bedload sediment transport and changes to sea-bed morphology	x The effect arises as a result of the presence of anchors and chains so is assessed in the operational phase	✓	x The effect arises as a result of the presence of anchors and chains so is assessed in the operational phase
Effects on suspended sediment concentrations and transport	✓	✓	✓
Effects on sea-bed morphology due to deposition of suspended sediment	✓	✓	✓
Indentations on the seabed due to installation and decommissioning vessels	✓	x The effect is related to construction and decommissioning activities	✓
Cumulative impacts	✓	✓	✓
Transboundary impacts	x	x	

Key:
✓ Impact scoped in
✗ Impact scoped out

2.3 Marine Water and Sediment Quality

2.3.1 Introduction

216. This section of the Scoping Report considers the potential effects of construction, operation and maintenance, and decommissioning of the Project on marine sediment and water quality.

2.3.2 Policy, Legislation and Guidance

217. Section 1.5 describes the wider policy and legislative context for the Project. The principal policy and legislation used to inform the assessment of potential impacts on marine water and sediment quality for the Project are outlined in this section.

Water Framework Directive

218. The Water Environment (Water Framework Directive) (England and Wales) Regulations 2017 (the Water Framework Directive (WFD)) is the primary legislation relevant to marine water and sediment quality. These regulations revoke and replace the Water Environment (Water Framework Directive) (England and Wales) Regulations 2003 (SI 2003 No. 3242). They continue to transpose Directive 2000/60/EC, for England and Wales, establishing a framework for Community action in the field of water policy. They also transpose aspects of Directive 2006/118/EEC on the protection of groundwater against pollution and deterioration (the Groundwater Directive) and of Directive 2008/105/EC on environmental quality standards in the field of water policy (the Environmental Quality Standards Directive).

219. Following the United Kingdom's departure from the European Union and completion of the transition period, the requirements of the WFD as implemented in England by national legislation remain applicable until such time as new legislation is passed either revoking or amending the current 2017 WFD Regulations.

220. The WFD applies to all water bodies, including those that are man-made. The consideration of the proposed scheme under the WFD will, therefore, need to be applied to all water bodies that have the potential to be impacted by the proposed scheme

MARPOL Convention 73/78

221. The UK is also a signatory to the International Convention for the Prevention of Pollution from Ships (the MARPOL Convention 73/78) and all ships flagged under signatory countries are subject to its requirements, regardless of where they sail.

The convention includes regulations aimed at preventing and minimising pollution from ships, both accidental and that arising from routine operations.

Other UK Policies and Plans

222. Other UK policies and plans of relevance to this chapter are the Marine Policy Statement (MPS) (HM Government, 2011), which provides the high-level approach to marine planning and general principles for decision making that contribute to achieving this vision, and the South West Inshore and South West Offshore Marine Plan1 (HM Government, 2014). These documents guide decision making with regard to marine developments and signpost the relevant legislation to be followed.

2.3.3 Study Area

223. The study area comprises the Offshore Area of Search and a buffer zone of 20km around the Windfarm Site to consider sufficient areas and sensitive receptors are considered.

2.3.4 Baseline Data

224. The majority of the baseline data is currently derived from governmental sources such as the Environment Agency and Cefas. There is limited data relating to sediment quality in the Windfarm Site and the majority of the Export Cable Corridor. Section 1.9.2 sets out the approach to the assessment and data gathering during the EIA.

2.3.5 Baseline Environment

Sediment quality

225. At the Windfarm Site boundary 52km offshore, seabed sediments are typically sands and slightly gravelly sands. Similar sediments characterise proposed Export Cable Corridor routes, although there are gravelly areas south of Lundy. Between approximately 20km offshore to the coast, sediments become finer (sand and mud) associated with the sheltering effect of Bideford Bay.

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1 https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/1004494/FINAL_South_West_Marine_Plan__1_.pdf

226. Cefas undertake monitoring of cadmium, lead, and mercury in the Celtic Sea and in 2012 indicated the levels of cadmium, lead and mercury are unchanged. However, there are concerns that lead and mercury could occur in levels that cause harm[2].

Water quality

227. The only WFD coastal water body that will be affected by The Project is Barnstaple Bay (GB610807680003) (Table 2.5). The water body is not designated artificial or heavily modified and is at Good ecological status and Fail for chemical status. Failing chemical status is due to high levels of some priority hazardous substances (i.e. mercury and its compounds and polybrominated diphenyl ethers (PBDE)).

Table 2.5 Barnstaple Bay (GB610807680003) WFD status summary

Classification element	2013	2014	2015	2016	2019
Ecological	Good	Good	Good	Good	Good
Biological quality elements	Good	Good	Good	Good	Good
Physico-chemical quality elements	Good	Good	Good	Good	Good
Hydromorphological supporting elements	High	High	High	High	High
Specific pollutants	High	High	High	High	High
Chemical	Fail	Fail	Good	Good	Fail
Priority hazardous substances	Good	Good	Good	Good	Fail
Priority substances	Fail	Fail	Good	Good	Good

228. Bathing waters are located on the coast in proximity to the onshore study areas (these are also protected areas designated under the WFD). They are classified based on bacteriological parameters as either excellent, good, sufficient or poor. Table 2.6 provides a summary of bathing water quality in the AoS, which are typically excellent.

[2] https://moat.cefas.co.uk/pressures-from-human-activities/contaminants/metals-in-sediment/

Table 2.6 Bathing Water Quality 2014-2019 (Environment Agency)

Bathing waters	2014	2015	2016	2017	2018	2019
Saunton Sands	Excellent	Excellent	Excellent	Excellent	Excellent	Excellent
Croyde Bay	Good	Good	Good	Good	Excellent	Good
Putsborough	Excellent	Excellent	Excellent	Excellent	Excellent	Excellent
Woolacombe Village	Good	Good	Excellent	Excellent	Excellent	Excellent
Combesgate Beach	Excellent	Excellent	Excellent	Excellent	Excellent	Excellent
Westward Ho!	Excellent	Excellent	Excellent	Excellent	Excellent	Excellent

2.3.6 Potential Impacts

Potential impacts during construction

229. Potential impacts during construction will result from disturbance of the seabed due to cable installation activities and foundations (including seabed preparation) if required for an Offshore Substation. These have potential to cause:

- Localised temporary increases in suspended sediments
- Remobilisation of existing contaminated sediments

230. Potential impacts related to the resuspension of contaminants are currently scoped in for assessment. Effects could also occur if there is accidental release of pollutants into the water from construction vessels. However, all vessels involved will be required to comply with the International Convention for the Prevention of pollution from Ships (MARPOL) 73/78. A Project Environmental Management and Monitoring Plan (or similar) will also be put in place for The Project to ensure all works are undertaken in line with best practice for working in the marine environment. As a result, it is proposed that effects relating to accidental release of pollutants are scoped out of the EIA.

Potential impacts during operation

231. There is the potential for impacts to arise during routine operational maintenance activities from the use of vessels and other equipment. Potential impacts during operation will be similar to those of construction and may include localised increases in sediment concentration and the remobilization of existing contaminated sediments, although these will be much lower in magnitude than during

construction. There is the potential for scour to give rise to sediment plumes which would temporarily increase levels of suspended sediments which could impact water quality. As such, during operation and maintenance the following potential impacts are scoped in for further assessment:

- Localised temporary increases in suspended sediments
- Remobilisation of existing contaminated sediments

232. As per the approach for potential impacts during construction, effects from the accidental release of pollutants from operation and maintenance work or vessels have been scoped out of the assessment. This is due to mitigation that would be put in place through the Project Environmental Management and Monitoring Plan.

Potential impacts during decommissioning

233. Decommissioning impacts on marine water and sediment quality are likely to be similar to that of construction, albeit of lower magnitude. For example, where construction may require drilling of foundations, which would result in drill arisings, decommissioning would likely require the cutting of foundations just below seabed level and therefore result in less seabed disturbance than construction. As such, the following potential impacts during decommissioning are scoped in for further assessment:

- Localised temporary increases in suspended sediments
- Remobilisation of existing contaminated sediments

Potential cumulative impacts

234. Consideration will be given to cumulative impacts with other plans and projects which have the potential to interact with the impacts of the Project. Assessment of cumulative impacts will be dependent on the availability and accessibility of information for other developments. The approach to cumulative assessment is set out in Section 1.9.2.

Potential transboundary impacts

235. Given that the likely water quality impacts would be restricted to near-field effects only, transboundary impacts are unlikely to occur, or are unlikely to be significant, and therefore it is proposed that transboundary impacts will not be considered further during the EIA for this topic.

2.3.7 Mitigation Measures

236. Mitigation measures will be developed as site specific information becomes available, and the project design is refined during the main EIA stage. Several mitigation measures that may be appropriate for the Project could be embedded within the design and accounted for within the assessment of impacts. Further mitigation measures may be proposed in response to impact assessments. These will evolve as the Project design develops and the EIA progresses, and/or in response to consultation. Examples of mitigation measures which are likely to be considered include:

- Adoption of methods and equipment that have been designed to minimise potential for sediment suspension and dispersal where seabed preparation is required (e.g. levelling)
- Application of foundation (for the Offshore Substation) installation techniques using methods and equipment to minimise sediment suspension
- Selection of cable installation methods and equipment most suitable for seabed conditions along the cable route(s) and designed to minimise sediment suspension into the water column
- Preparation of Construction Method Statements (CMS)s setting out detailed turbine foundation and cable installation methods and techniques (based on final project design)
- A Project Environment Management Plan (PEMP) which will be produced post-consent and implemented to cover the construction and operation and maintenance phases of the Project. This will set out all procedures and measures (in the form of a Marine Pollution Contingency Plan (MPCP)) to be taken during cable installation to minimise the risk of, and subsequently manage in the event of an accidental spill, potential pollution from cable lay vessels, cable installation equipment and drill rigs (if using HDD techniques at the Landfall). The PEMP will be developed in consultation with key stakeholders pre-construction for approval by the MMO
- An Offshore Decommissioning Plan will be developed and implemented

237. Potential mitigation measures for water and sediment quality (and associated biological receptors) will be consulted upon with stakeholders throughout the EIA process.

2.3.8 Approach to Assessment and Data Gathering

Assessment

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

- Clearing the waters for all (Environment Agency 2017)
- Application of Cefas Action Levels (MMO, 2018)

239. The assessment of sediment quality and the potential risk to water quality will be based on a source-pathway-receptor conceptual model in relation to sediment disturbance. The risk associated with the release of contaminated sediment would be based on the site-specific survey data and use of recognised sediment quality guidelines such as the Cefas Action Levels (see Table 2.7)

Table 2.7 Cefas action levels

Contaminant	Action Level 1 (mg/kg)	Action Level 2 (mg/kg)
Arsenic	20	100
Mercury	0.3	3
Cadmium	0.4	5
Chromium	40	400
Copper	40	400
Nickel	20	200
Lead	50	500
Zinc	130	800
Organotins	0.1	1
Polychlorinated Biphenyl PCBs (sum of ICES 7)	0.01	none
PCBs (sum of 25 congeners)	0.02	0.2
Polyaromatic hydrocarbons (PAHs)	0.01	none
Total hydrocarbons	100	none

240. Where concentrations are at, or below, action level 1, no additional assessment is considered necessary as the risk to water quality is considered to be low (Environment Agency, 2017). Where concentrations fall close to, or above action level 2, then more quantitative assessment regarding water quality effects might be required which would consider the risk of breaching water quality Environmental Quality Standards.

241. The impact significance on marine water quality is assessed based on the magnitude of effect and the receptor sensitivity.

242. The findings of the impact assessment for marine water and sediment quality will be used to assist in undertaking the WFD Compliance Assessment which will be a supporting document to the ES.

243. Design assumptions used to inform assessments will be clearly identified in the project design envelope (PDE), considering worst case parameters specifically for marine water and sediment quality receptors.

Data gathering

244. The assessment is closely linked to the Marine Geology, Oceanography and Physical Processes Chapter, therefore relevant information from that chapter will be used to inform impacts on Marine Water and Sediment Quality.

245. Given the paucity of site-specific data within the Celtic Sea (South West Offshore area) a suite of seabed sediment sampling and analysis will be undertaken before summer 2022. The sampling should include the standard suite of contaminants indicated in Table 2.7, and be carried out within the Windfarm Site and Offshore Export Cable Corridor. The detailed scope and approach to the grab sampling survey and contaminant analysis (including the number of samples, areas to be sampled and the use of a lab accredited by the Marine Management Organisation (MMO)) will be agreed with relevant stakeholders.

246. Other data and information available to inform the EIA includes:

- The Clean Seas Environmental Monitoring Programme (CSEMP, 2018)
- Bathing water profiles (updated by the Environment Agency on an annual basis)
- Catchment data explorer – water quality information for WFD water bodies (updated by the Environment Agency)
- OSPAR Quality Status Report 2010

247. Following the identification of the Offshore Export Cable Corridor, further liaison with stakeholders will be undertaken to agree the methodology and approach to data collection for EIA purposes and the specific assessment methodology.

2.3.9 Summary of Scoped In Impacts

248. Table 2.8 summarises the impacts which are proposed to be scoped into and/or out of the EIA. This may be refined as additional information and data become available.

Table 2.8 Summary of impacts relating to Marine Water and Sediment Quality

Potential Impact	Construction	Operation	Decommissioning
Localised temporary increases in suspended sediments	✓	✓	✓
Remobilisation of existing contaminated sediments	✓	✓	✓
Pollution events resulting from the accidental release of pollutants	x	x	x
Cumulative impacts	✓	x	✓
Transboundary impacts	x	x	x

Key:
✓ Impact scoped in
✗ Impact scoped out

2.4 Benthic and Intertidal Ecology

2.4.1 Introduction

249. This chapter describes the baseline environment and assesses the potential impacts of the Project in relation to benthic and intertidal ecology.

2.4.2 Policy, Legislation and Guidance

250. The overarching assessment requirements relevant for benthic and intertidal ecology are set out within National Policy Statement (NPS) EN-1, with more specific requirements set out in EN-3 (DECC, 2011).

251. Section 1.5 describes the policy and legislative context for the Project. The assessment of benthic and intertidal ecology will be undertaken in accordance with following standards, legislation and guidance, including but not limited to:

- The Habitats Directive and Habitats Regulations
- National and International Legislation in Relation to Fish and Shellfish Ecology
- The relevant NPS requirements, as noted above
- The Marine Strategy Framework Directive (MSFD) 2008/56/EC (EC, 2008)
- The Marine Policy Statement (MPS) (HM Government, 2011)

- The South West Inshore and Offshore Marine Plans (HM Government, 2021)

252. The following guidance will be utilised during the EIA in relation to benthic and intertidal ecology:

- Cefas (2004) Offshore Windfarms: Guidance Note for Environmental Impact Assessment in Respect of FEPA and CPA requirements: Version 2
- Cefas (2010) Strategic Review of Offshore Windfarm Monitoring Data Associated with FEPA licence conditions, with input from the Food and Environment Research Agency (FERA) and the Sea Mammal Research Unit (SMRU)
- Marine Management Organisation (MMO) (2014) Review of Post-Consent Offshore Windfarm Monitoring Data Associated with Licence Conditions, with input from the British Trust for Ornithology (BTO), National Physical Laboratory (NPL) and the SMRU
- Defra (2005) Nature Conservation Guidance on Offshore Windfarm Development. A guidance note on the implications of the EC Wild Birds and Habitats Directives for developers undertaking offshore windfarm developments. Version R1.9. 13
- TCE (2019) Cable Installation, Protection, Mitigation and Habitat Recoverability
- Natural England and JNCC (2019) Natural England and JNCC advice on key sensitivities of habitats and Marine Protected Areas in English Waters to offshore windfarm cabling within Proposed Round 4 leasing areas

253. It is expected the principal guidance documents used to inform the baseline characterisation and the assessment of impacts for benthic and intertidal ecology will include the following:

- Cefas (2012) Guidelines for data acquisition to support marine environmental assessments of offshore renewable energy projects
- Wyn & Brazier (2001); Joint Nature Conservation Committee (JNCC) Marine Monitoring Handbook
- Ware and Kenny (2011) Guidance for the Conduct of Benthic Studies at Marine Aggregate Extraction Sites
- Institute of Ecology and Environmental Management (IEEM) (2010) Guidelines for Ecological Impact Assessment in Britain and Ireland – Marine and Coastal
- Chartered Institute of Ecology and Environmental Management (CIEEM) (2016) Guidelines for Ecological Impact Assessment in the UK and Ireland: Terrestrial, Freshwater and Coastal, 2nd Edition
- The British Standards Institution (2015) Environmental impact assessment for offshore renewable energy projects – Guide. PD 6900:2015

2.4.3 Study Area

254. The Study Area for benthic and intertidal ecology encompasses a 10km radius around the project boundary for the Project and the area of search for the offshore Cable Corridor, shown in Figure 2.4.1. The study area will be further refined during the EIA process using information from the Marine Geology, Oceanography and Physical Processes impact assessment.

255. The Windfarm Site covers a seabed area of approximately 50km^2 and is situated approximately 52km off the North Cornwall coast. The Offshore Export Cable Route and Landfall locations are not yet finalised however of the whole area of search has been considered in this chapter.

2.4.4 Baseline Data

256. The benthic and intertidal baseline has been developed using publicly available data covering the project boundary and area of search for the Export Cable Corridor. No project-specific surveys have been undertaken at this stage in the EIA process.

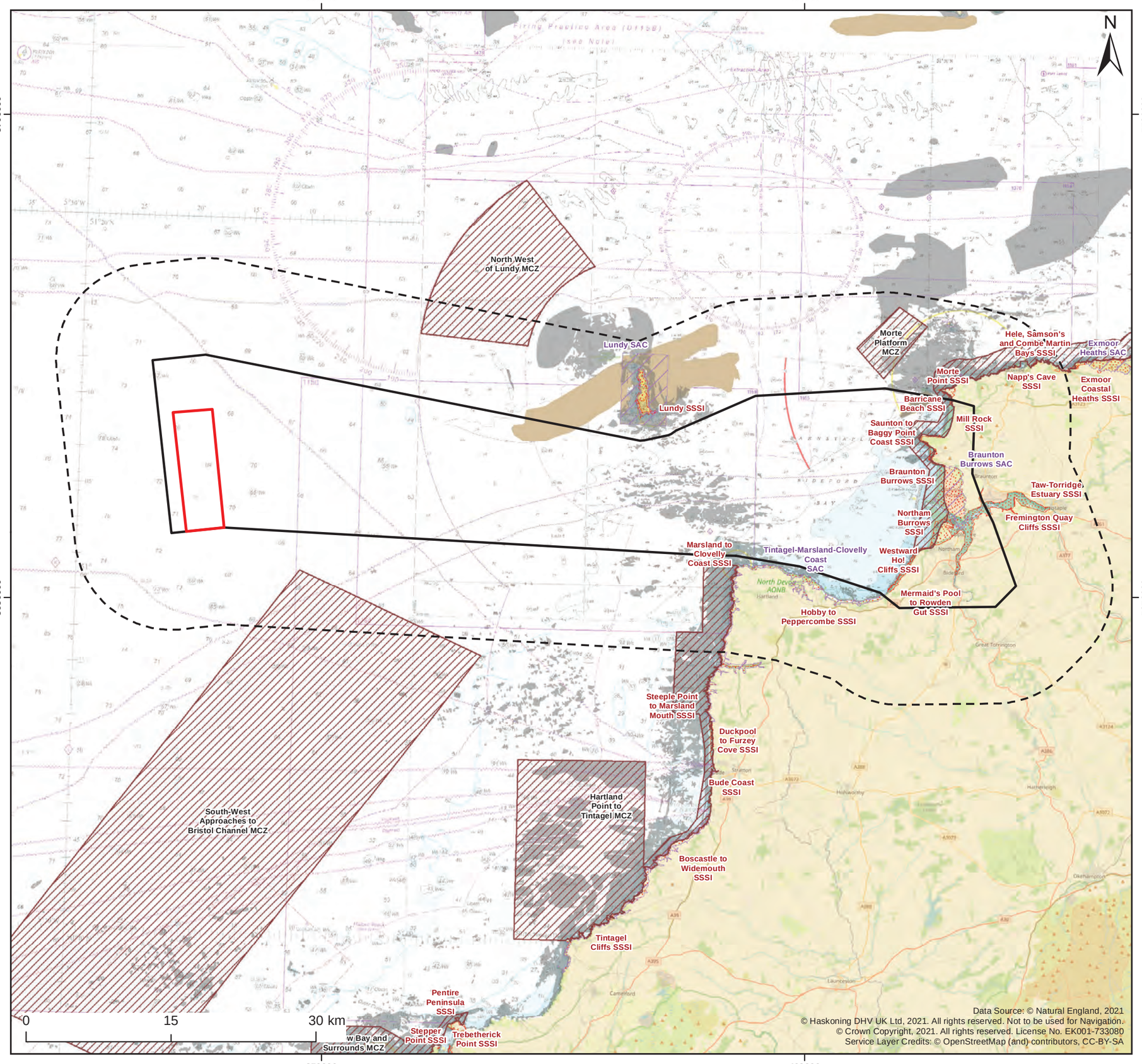
257. Key data sources used to inform the baseline include:

- Marine Information Network (MarLIN)
- EMODnet's EUSeaMAP (2021)
- EUNIS habitat classifications
- Natural England's Designated Sites View
- MMO's South West Inshore and Offshore Marine Plans

2.4.5 Baseline Environment

Intertidal habitats

258. A review of EMODnet's EUSeaMAP (2021) broadscale predictive habitat map which uses EUNIS habitat classifications has been undertaken. The map shows that the intertidal, infralittoral and shallow circalittoral area of the area of search are is predominantly sand, with small areas of mud and sandy mud or muddy sand. There are records of Annex I bedrock and/or stony reef present along the coastline overlapping the area of search for the offshore Cable Corridor.



Legend:

- White Cross Offshore Windfarm
- 10km Buffer
- Area of Search
- Marine Conservation Zones (MCZ)
- Special Areas of Conservation (SAC)
- Sites of Special Scientific Interest (SSSI)
- Annex 1 Reef
- Annex 1 Sandbanks

Client:	Project:
Offshore Wind Ltd.	White Cross Offshore Windfarm

Title: Benthic and Intertidal Designated Nature Conservation Sites and Species

Figure: 2.4.1 | Drawing No: PC2978-RHD-ZZ-XX-DR-Z-0081

Revision:	Date:	Drawn:	Checked:	Size:	Scale:
P01	18/11/2021	GC	CB	A3	1:400,000

Co-ordinate system: WGS 1984 UTM Zone 30N

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Subtidal habitats

259. The EUSeaMAP (2021) shows that the subtidal environment is mainly circalittoral coarse sediment along the area of search, with deep circalittoral sand occurring further offshore along the area of search and overlapping the project boundary. There are discrete areas of mixed sediment, and rock or other hard substrate occurs around Lundy Island to the North of the area of search. EMODnet also shows discrete records of Annex I bedrock and/or stony reefs and Annex I sandbanks which overlap with the area of search for the offshore Cable Corridor. The sandbanks surround Lundy Island; and the Annex I bedrock and/or stony reef are present across the Area of Search in discrete locations.

Designated Sites relevant to Benthic and Intertidal Ecology

260. Designated sites that are within a 10km radius of the project boundary and area of search for the Offshore Export Cable Corridor and designated to protect benthic and intertidal species or habitats are shown in Figure 2.4.1 and have been described in Table 2.9.

261. Lundy MCZ is approximately 1km away from the area of search for the offshore Cable Corridor. However, it is designated for Spiny lobster (*Palinurus elephas*) and is therefore considered within Section 2.5 of this report which considers Fish and Shellfish Ecology. Additionally, Bristol Channel Approaches SAC overlaps with the project boundary and area of search. However, it is designated for Harbour porpoise (*Phocoena phocoena*) and is therefore considered within Section 2.6 of this report which considers Marine Mammals.

262. Hele, Samson's and Combe Martin Bays SSSI is also not included in Table 2.9. The SSSI is only 7km away landward across Devon. However, it is approximately 12km away along the coast, past Morte Point Peninsula and northwards at Ilfracombe beach. Therefore, due to the distance of this SSSI to the area of search it has been scoped out of this chapter.

263. The SSSIs listed below are located within the area of search for the Offshore Export Cable and are along the coastline, however they designated for features of geological interest, rather than benthic or intertidal habitats or species, therefore they have not been included in Table 2.9 or in this chapter. However, they have been considered within Section 2.2: Marine Geology, Oceanography and Physical Processes:

- Westward Ho! Cliffs SSSI
- Mermaids Pool to Rowden Gut SSSI
- Barricane Beach SSSI

Table 2.9 Designated sites with benthic or intertidal designated features within a 10km radius of the project boundary and area of search

Designated site	Distance from Project	Designated features
Marine Conservation Zones (MCZ)		
Bideford to Foreland Point MCZ	0km. Overlaps the area of search for the Offshore Export Cable Corridor	Low energy intertidal rock; Moderate energy intertidal rock; High energy intertidal rock; Intertidal coarse sediment; Intertidal mixed sediments; Intertidal sand and muddy sand; Intertidal underboulder communities; Littoral chalk communities; Low energy infralittoral rock; Moderate energy infralittoral rock; High energy infralittoral rock; Moderate energy circalittoral rock; High energy circalittoral rock; Subtidal coarse sediment; Subtidal mixed sediments; Subtidal sand; Fragile sponge & anthozoan communities on subtidal rocky habitats; (*Sabellaria alveolate*) reefs; pink sea-fan (*Eunicella verrucose*); spiny lobster.
Hartland Point to Tintagel	1km from area of search for the Offshore Export Cable Corridor	Coastal saltmarshes and saline reedbeds; Low energy intertidal rock; Moderate energy intertidal rock; High energy intertidal rock; Intertidal coarse sediment; Intertidal sand and muddy sand; Moderate energy infralittoral rock; High energy infralittoral rock; Moderate energy circalittoral rock; High energy circalittoral rock; Subtidal coarse sediment; Subtidal sand; Fragile sponge & anthozoan communities on subtidal rocky habitats; (*S. alveolate*) reefs; pink sea-fan.
Morte Platform	1km from area of search for the Offshore Export Cable Corridor	High energy circalittoral rock; moderate energy circalittoral rock; subtidal coarse sediment.
South West Approaches to Bristol Channel	4km from area of search for the Offshore Export Cable Corridor	Subtidal coarse sediment; subtidal sand.
North West of Lundy	6km from area of search for the Offshore Export Cable Corridor	Subtidal coarse sediment.

Designated site	Distance from Project	Designated features
Special Area of Conservation (SAC)		
Braunton Burrows SAC	0km. Overlaps the area of search for the Offshore Export Cable Corridor	2120 "Shifting dunes along the shoreline with *Ammophila arenaria* (""white dunes"")"; 2130 "Fixed coastal dunes with herbaceous vegetation (""grey dunes"")"; 2170 Dunes with Salix repens ssp. argentea (*Salicion arenariae)*; 2190 Humid dune slacks; 1140 Mudflats and sandflats not covered by seawater at low tide; 1395 Petalwort.
Tintagel-Marsland-Clovelly Coast SAC	0.5km from area of search for the Offshore Export Cable Corridor	1230 Vegetated sea cliffs of the Atlantic and Baltic Coasts; 91A0 Old sessile oak woods with Ilex and Blechnum in the British Isles; 4030 European dry heaths.
Lundy SAC	1km from area of search for the Offshore Export Cable Corridor	1170 Reefs; 1110 Sandbanks which are slightly covered by sea water all the time; 8330 Submerged or partially submerged sea caves; 1364 grey seal (*Halichoerus grypus*).
Sites of Special Scientific Interest (SSSI)		
Saunton to Baggy Point Coast SSSI	0km. Overlaps the area of search for the Offshore Export Cable Corridor	This section of the North Devon coast is of special interest for its geological exposures, and for its botanical features particularly maritime heathland, grassland and lichens
Braunton Burrows SSSI	0km. Overlaps the area of search for the Offshore Export Cable Corridor	Braunton Burrows is one of the largest dune systems in Britain, about 5km long north-south and 1km wide, with lime-rich dune sup to 30m high, and an extensive system of variably-flooded slacks, grassland and scrub, inland of a wide sandy foreshore. There is thus a variety of habitats for many flowering and lower plants, and for many birds and invertebrates. Several species are nationally rare or vulnerable. There are also important features of geological interest.
Taw-Torridge Estuary SSSI	0km. Overlaps the area of search for the Offshore Export Cable Corridor	The Taw-Torridge Estuary is of major importance for its overwintering and migratory populations of wading birds. In addition, rare plants grow along its shores. The Estuary' s wide tidal range is reflected by the very large areas of mudflats and sandbanks present. Together with beaches and saltmarshes, the area provides a rich and varied source of food for many birds and other animals.

Designated site	Distance from Project	Designated features
Northam Burrows SSSI	0km. Overlaps the area of search for the Offshore Export Cable Corridor	Northam Burrows is of interest for its wide range of coastal habitats and in particular for the rare and local plants to be found. The site also supports many overwintering and migratory birds. In addition, the cobble ridge is an important land-form feature.
Hobby to Peppercombe SSSI	0km. Small overlap with the area of search for the Offshore Export Cable Corridor	This 6km section of the North Devon coast supports extensive sessile oak (*Quercus Petraea)* woodlands which contain nationally important communities of Atlantic climate old-woodland lichens, many of which are rare or have a restricted distribution. A wide variety of breeding birds occur here. Coastal species include fulmar *Fulmarus glacialis*, oystercatcher (*Haematopus ostralegus*) and great black-backed gull Larus marinus. Along the seaward lip of the cliffs the canopy becomes very open, with scattered, wind-stunted sessile oak. Here, maritime heath containing heather, bell heather and gorse (*Ulex spp*. grades in with the scrub.
Morte Point SSSI	0.5km from area of search for the Offshore Export Cable Corridor	The site is primarily of interest for its maritime heath, but also displays a variety of coastal, cliff and foreshore habitats.
Marsland to Clovelly Coast SSSI	0.5km from area of search for the Offshore Export Cable Corridor	The site is nationally important for its geological, geomorphological and biological interest. The cliffs, clifftops and valleys carry a wide range of habitats including extensive areas of ancient woodland and parkland which support nationally important lichen communities, and a range of species-rich grassland, heath and scrub communities. In addition, the site supports diverse assemblages of invertebrates and breeding birds.
Lundy SSSI	1km from area of search for the Offshore Export Cable Corridor	Granite with slate, bare cliffs, wave form heaths, breeding populations of sea and coastal birds. Breeding seals, marine and terrestrial flora and fauna.

264. Features listed in Table 2.9 below that are not benthic or intertidal features are not considered in this chapter and but have been included in the relevant chapters in this report. A MCZ Screening Assessment has been undertaken for the Project and can be found in Appendix D.

2.4.6 Potential Impacts

265. A range of potential impacts to benthic and intertidal ecology may occur during the construction phase, operation and maintenance phase and decommissioning phase of the Project. Sensitivities of the benthic communities will be determined for each of these impacts on the basis of expert judgement and reference to Marine Evidence-based Sensitivity Assessments (MarESA) available from Marine Life Information Network (MarLIN).

266. The benthic and intertidal ecology assessment is likely to have key inter-relationships with marine physical processes, marine water and sediment quality, fish and shellfish ecology and offshore ornithology and these will be considered where relevant throughout the EIA process.

Potential impacts during construction

267. Temporary habitat loss / physical disturbance: There is potential for direct physical disturbance of the seabed construction activities such as foundation (for the Offshore Substation Platform), mooring system, and cable installation, seabed preparation (dredging) and sandwave levelling. Areas affected by installation activities would be relatively small scale in relation to the wider environment, they will be local in nature limited to the footprint of the activity, and seabed recovery is expected quickly following cessation of installation activities, given the likely tolerance and recoverability of the habitats present.

268. Increased suspended sediments and deposition: The installation of foundations (for the Offshore Substation Platform), mooring systems, and cables may cause an increase of suspended sediment concentrations in the water column. Such concentrations have the potential to affect benthos through blockage of filter feeders and/or smothering sessile species once the sediment settles out of the water column and is deposited on the seabed.

269. Re-mobilisation of contaminated sediments: Sediment disturbance could lead to the mobilisation of contaminants (if present) that could be harmful to benthic habitats and species. This will be assessed in the EIA based on the results of sediment sampling which will be collected within the Project Boundary and offshore corridor and the results will be reported within the Marine Water and Sediment

Quality Chapter. If the sediment sample results show no contaminated sediment, or if contamination levels are below relevant thresholds such as CEFAS action Levels then it is proposed this impact is scoped out of the EIA. More information on the relevant thresholds is provided in Section 2.3.

270. Underwater noise and vibration: Research into the effects of underwater noise in relation to benthic and intertidal ecology is ongoing. However it is likely that there is habituation to noise created by the existing shipping which occurs in the area. There may be reactions from some benthic species to episodic noise such as that from pile driving (Lovell et al, 2005, Heinisch and Weise, 1987). Any impact is likely to be localised and temporary. The latest research will be considered and presented within the ES.

271. Invasive Non-Native Species (INNS): The risk of spreading INNS will be mitigated by employing biosecurity measures in accordance with the following relevant regulations and guidance:

- International Convention for the Prevention of Pollution from Ships (MARPOL). The MARPOL sets out appropriate vessel maintenance
- The Environmental Damage (Prevention and Remediation (England) Regulations 2015, which set out a polluter pays principle where the operators who cause a risk of significant damage or cause significant damage to land, water or biodiversity will have the responsibility to prevent damage occurring, or if the damage does occur will have the duty to reinstate the environment to the original condition
- The International Convention for the Control and Management of Ships' Ballast Water and Sediments (BWM Convention), which provide global regulations to control the transfer of potentially invasive species
- These commitments would be secured in the Project Environmental Management Plan (PEMP) which will be agreed prior to the start of construction

272. With mitigations in place it is not expected INNS will be introduced, therefore it is proposed that with this embedded mitigation INNS can be scoped out of the EIA in relation to the construction phase of the Project.

Potential impacts during operation

273. Temporary habitat loss / Physical disturbance: There is potential for ongoing physical disturbance of the seabed during the operational phase from maintenance activity such as indentations on the seabed from jack-up vessels required for cable repairs or reburial. In general, the impacts from planned maintenance should be temporary, localised and smaller in scale than during construction.

274. Temporary increased suspended sediment concentrations and deposition: Small volumes of sediment could be re-suspended during maintenance activities; the volumes would be lower than for construction. It is not expected that there would be significant smothering effects.

275. Remobilisation of contaminated sediment: Given the likely low levels of sediment contamination it is unlikely that a pathway exists for impacts from the remobilisation of contaminants from within the offshore sediments. If the sediment sample results show no contaminated sediment, or if contamination levels are below relevant thresholds such as CEFAS action Levels then it is proposed this impact is scoped out of the EIA. More information on the relevant thresholds is available in Section 2.3.

276. Permanent habitat loss / long term habitat loss: The presence of foundations on the seabed (for the Offshore Substation Platform) and cable protection would result in a relatively small footprint of lost habitat in the context of the habitat from the surrounding region. Depending on whether the infrastructure is removed or left in-situ at the decommissioning stage this impact is either long term or permanent habitat loss. As a worst case scenario it is assumed it would be permanent habitat loss unless the Applicant commits to removing any areas of infrastructure at decommissioning.

277. Colonisation of introduced artificial substrate: The sub-sea structures (mooring systems, scour, and cable protection) are expected to be colonised by a range of species leading to a localised increase in biodiversity. The presence of the structures would also provide habitat for mobile species and for example serve as a refuge for fish. This represents a change from the baseline ecology. Overall, the area available for colonisation would be low and to date there is no evidence of significant changes of the seabed beyond the vicinity of the foundation structures due to the installation of windfarms (Lindeboom *et al*, 2011).

278. Underwater noise and vibration: Noise and vibration generated by the operational wind turbine generators can be conducted through the tower and foundations into the water. Monitoring studies of underwater noise from operational turbines have shown the noise levels from North Hoyle, Scroby Sands, Kentish Flats and Barrow windfarms to be only marginally above ambient noise levels. There is no evidence to suggest this low level of noise and vibration has a significant impact on benthic ecology. Additionally, as the Project is floating rather than fixed foundations the noise and vibration to the seabed is expected to be lower than from fixed foundations. It is therefore proposed that this impact should be scoped out from further consideration within the EIA.

279. Electromagnetic fields (EMF): EMFs as a result of the presence of offshore cables may be detected by some benthic species. Effects are likely to be highly localised, as EMFs are strongly attenuated and decrease as an inverse square of distance from the cable (Gill and Barlett, 2010). A number of studies have shown that various benthic species do not react to EMF such as brown shrimp Crangon, common starfish (*Asterias rubens*) and polychaete worm (*Nereis diversicolor*) (Bochert & Zettler, 2006). Gibb *et al*. (2014) state there is no evidence of EMF impacting Ross worm (*Sabellaria spinulosa*). It is therefore proposed that this impact should be scoped out from further consideration within the EIA due to the lack of evidence to suggest EMF would result in an impact to benthic and intertidal ecology. EMF impacts to fish and shellfish will be considered in Section 2.5.

280. INNS: As stated in the construction stage for INNS, it is not expected INNS will be introduced by the Project due to the mitigation measures which will be adhered to. The potential operational impact in relation to INNS during the operational phase is therefore related to the artificial structures introduced by the Project which have the potential to act as 'stepping stones' for the spread of INNS. There are other sources of hard infrastructure present in the area such as cables and vessels transiting in the area. Therefore, the stepping stone potential is already present in the area and the hard infrastructure introduced by the Project will not materially add to this. Therefore, it is proposed impacts from INNS are scoped out in relation to benthic and intertidal ecology.

Potential impacts during decommissioning

281. It is anticipated that the decommissioning impacts would be similar in nature to those of construction, although the magnitude of effect is likely to be lower. As the impacts are anticipated to be the same as the construction phase or lower it is proposed the same impacts that have been scoped out of the construction phase will also be scoped out of the decommissioning phase.

Potential cumulative impacts

282. There is the potential for cumulative impacts with a range of other plans, projects and activities including other nearby offshore windfarms at planning, construction, operation and decommissioning phases, aggregate and dredging activities, subsea cables and oil and gas activity. These will be identified and assessed in line with the approach to cumulative assessment is set out in Section 1.9.2.

Potential transboundary impacts

283. The Project is approximately 130km from any international territory boundary. As the effects on benthic and intertidal ecology are likely to be restricted to the project boundaries and immediate surrounding area, transboundary effects are proposed to be scoped out for this topic.

284. There is potential for the hard infrastructure introduced by the Project to act as 'stepping stones' enabling the spread of INNS. It is known INNS can spread tens to over a hundred kilometres away (Álvarez-Noriega, 2020), however given the Project is approximately 130km away from any international territory boundary it is not expected any INNS from the Project specifically would pass over a territorial boundary and any potential impact occurring from this would be so small as to be undetectable when considered against natural variation.

285. There is the consideration of the stepping stone potential from the Project to other artificial structures which could then lead to a transboundary impact. However there are other sources of infrastructure in the area that could act as stepping stones, such as marine cables and vessels passing through the area therefore the potential for transboundary impacts from the spread of INNS between artificial hard substrates is already present and the addition of more artificial hard substrate will not materially increase that spreading potential. Therefore, no detectable transboundary impacts from the spread of INNS from the Project's introduced artificial hard structures are expected and INNS is therefore scoped out in relation to transboundary impacts.

Summary of potential impacts

286. A summary of potential impacts is shown in Table 2.10.

2.4.7 Mitigation Measures

287. Mitigation measures relevant to the benthic ecology assessment, which have been incorporated into the design of the project or have the potential to be incorporated into the design of the Project at a later stage include:

- Site Selection
  - Careful site selection of the Windfarm Site and Offshore Cable Corridor has been carried out to avoid designated sites as far as possible.
  - The Offshore Cable Corridor takes the shortest, most direct route possible from the Windfarm Site to Landfall, whilst avoiding as many known sensitive benthic habitats as possible therefore reducing impacts to benthic ecology

- Where seabed preparation is required (e.g. levelling) adoption of methods and equipment that have been designed to minimise potential for sediment suspension and dispersal
- Application of foundation installation techniques using methods and equipment to minimise sediment suspension
- Selection of cable installation methods and equipment most suitable for seabed conditions along the cable route and designed to minimise sediment suspension into the water column
- Sediment disposal to occur nearby so sediment isn't taken out of the local habitat
- Preparation of Construction Method Statements (CMS) setting out detailed turbine foundation and cable installation methods and techniques (based on final project design)
- Cables will be buried to a target burial depth of 1m where possible (recognised industry good practice) so benthic habitat loss due to cable protection is reduced. A detailed Cable Burial Risk Assessment (CBRA) will also be required to confirm the extent to which cable burial can be achieved. Where it is not possible to achieve cable burial, additional cable protection (rock placement, concrete mattressing or grout bags) may be required, as discussed in Section 1.8
- A Project Environment Management Plan (PEMP), which will include a Marine Pollution Contingency Plan (MPCP)) (which will include invasive and biosecurity measures), will be developed and implemented. Mitigation measures relating to INNS have been set out in Section 264
- An Offshore Decommissioning Plan will be developed and implemented
- Micrositing
    - Conduct pre-construction surveys to identify sensitive habitats
    - Based on the results of the pre-construction surveys microsite to avoid sensitive benthic habitats where possible.

2.4.8 Approach to Assessment and Data Gatheing

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

289. Identification of potential sensitive receptors will be undertaken using available literature and the Marine Evidence Based Sensitivity Assessment (MarESA) method to determine sensitivity of benthic species and habitats (biotopes) using data from

the Marine Life Information Network (MarLIN). This approach measures sensitivity of biotopes using available research on their resistance and resilience to different impacts.

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

The following site-specific surveys listed below will be undertaken to inform the baseline for benthic and intertidal ecology:

- Geophysical survey:

  Multi-beam bathymetry, side scan sonar and sub-bottom profiler
- Benthic characterisation survey:
  - Grab samples and drop-down camera and video samples

291. Surveys will be undertaken in accordance with Ware and Kenny (2011) guidelines and agreed in advance with stakeholders including the MMO, Cefas and Natural England where required.

292. The site-specific surveys will broadly include the following steps:

- Site specific geophysical surveys including multi-beam bathymetry, side scan sonar and sub-bottom profiler
- Analysis of geophysical data to produce habitat maps
- The habitat maps will inform the design of benthic surveys which will include a combination of grab sampling and seabed imagery
- Production of Benthic baseline habitat reports and biotope maps based on the results of the benthic surveys

293. Following the identification of the preferred Offshore Cable Corridor, further consultation with stakeholders through the Evidence Plan Process will be undertaken to agree the data collection approach and the methodology for the impact assessment to be undertaken in the ES.

2.4.9 Summary of Scoped In Impacts

Table 2.10 Summary of impacts relating to Benthic and Intertidal Ecology

Potential Impact	Construction	Operation	Decommissioning
Temporary habitat loss / physical disturbance	✓	✓	✓
Increased SSC and deposition	✓	✓	✓
Remobilisation of contaminated sediments	✓	x	✓
Permanent / long term habitat loss	x	✓	✓
Colonisation of introduced artificial substrates	x	✓	✓
INNS	x	x	x
Underwater noise and vibration	✓	x	✓
EMF	x	x	x
Cumulative impacts	✓	✓	✓
Transboundary impacts	x	x	x

Key:
✓ Impact scoped in
✗ Impact scoped out

2.5 Fish and Shellfish Ecology

2.5.1 Introduction

294. This chapter describes the baseline environment and assesses the potential impacts of the Project on fish and shellfish ecology.

2.5.2 Policy, Legislation and Guidance

295. The overarching assessment requirements relevant for fish and benthic ecology are set out within National Policy Statement (NPS) EN-1, with more specific requirements set out in EN-3 (DECC, 2011).

296. Section 1.5 describes the wider policy and legislative context for the Project. The assessment of fish and shellfish ecology will be undertaken in accordance with following standards, legislation and guidance, including but not limited to:

- The Habitats Directive and Habitats Regulations
- National and International Legislation in Relation to Fish and Shellfish Ecology
- The relevant NPS requirements, as noted above

- The Marine Strategy Framework Directive (MSFD) 2008/56/EC (EC, 2008)
- The Marine Policy Statement (MPS) (HM Government, 2011)
- The South West Inshore and Offshore Marine Plans (HM Government, 2021)

297. The following guidance will be utilised during the EIA in relation to fish and shellfish ecology:

- Cefas (2004) Offshore Windfarms: Guidance Note for Environmental Impact Assessment in Respect of FEPA and CPA requirements: Version 2
- Cefas (2010) Strategic Review of Offshore Windfarm Monitoring Data Associated with FEPA licence conditions, with input from the Food and Environment Research Agency (FERA) and the Sea Mammal Research Unit (SMRU)
- Marine Management Organisation (MMO) (2014) Review of Post-Consent Offshore Windfarm Monitoring Data Associated with Licence Conditions, with input from the British Trust for Ornithology (BTO), National Physical Laboratory (NPL) and the SMRU
- Defra (2005) Nature Conservation Guidance on Offshore Windfarm Development. A guidance note on the implications of the EC Wild Birds and Habitats Directives for developers undertaking offshore windfarm developments. Version R1.9. 13

298. It is expected the principal guidance documents used to inform the baseline characterisation and the assessment of impacts for fish and shellfish ecology will include the following:

- Cefas (2012) Guidelines for data acquisition to support marine environmental assessments of offshore renewable energy projects
- Wyn & Brazier (2001); Joint Nature Conservation Committee (JNCC) Marine Monitoring Handbook
- Institute of Ecology and Environmental Management (IEEM) (2010) Guidelines for Ecological Impact Assessment in Britain and Ireland – Marine and Coastal
- Chartered Institute of Ecology and Environmental Management (CIEEM) (2016) Guidelines for Ecological Impact Assessment in the UK and Ireland: Terrestrial, Freshwater and Coastal, 2nd Edition
- The British Standards Institution (2015) Environmental impact assessment for offshore renewable energy projects – Guide. PD 6900:2015

2.5.3 Study Area

299. For the majority of fish and shellfish species, the study area is focused on the Offshore Development Area of the Project. For certain migratory species, the study area is larger covering the wider Celtic Sea region and beyond, to account for the mobile nature of these species.

300. The Offshore Windfarm Site is within International Council for the Exploration of the Sea (ICES) rectangle 31E4 with the majority of the Offshore Export Cable Corridor AoS within 31E5. A small portion of the Offshore Export Cable Corridor AoS, near to Clovelly is within 30E5. Thus, the Study Area encompasses the ICES rectangles 31E4, 31E5 and 30E5 as shown in Figure 1.7.1. Those species targeted within the ICES rectangles are considered to be of commercial importance to the region.

2.5.4 Baseline Data

301. Table 2.11 outlines existing primary data that has been used to inform this section and will also be used to inform the EIA.

Table 2.11 Existing datasets

Dataset	Spatial Coverage	Survey Year
MMO Landings Data (weight and value) by species	Celtic Sea - Landings from ICES rectangles 31E4, 31E5 and 30E5	2009 - 2019
International Bottom Trawl Survey (IBTS)	Celtic Sea	1965-2019
Cefas (2019) Young Fish Survey	North Sea, North East Atlantic, Irish and Celtic sea and Channel	1981-2010
Distribution of Spawning and Nursery Grounds as defined in Coull *et al.* (1998) and in Ellis *et al.* (2012)	North Sea, North East Atlantic, Irish and Celtic sea and Channel	1998 and 2010
Basking Shark Watch database	Data/information on relative abundance, distribution and behaviour of basking sharks in UK water	1987-2021
International Herring Larvae Surveys	North Sea, English Channel and Celtic Sea	1967-2015
Erebus EIA Scoping Report (Intertek, 2019)	There have been many fish and shellfish surveys and desk	n/a

Dataset	Spatial Coverage	Survey Year
Grace Hopper Telecommunications Cable Environmental Appraisal (NIRAS, 2021)	studies undertaken for the Celtic Sea. All fish and shellfish information and data related to the existing projects will be used to inform the Project's EIA.	n/a
Atlantic Array Environmental Statement (RWE, 2013)		n/a

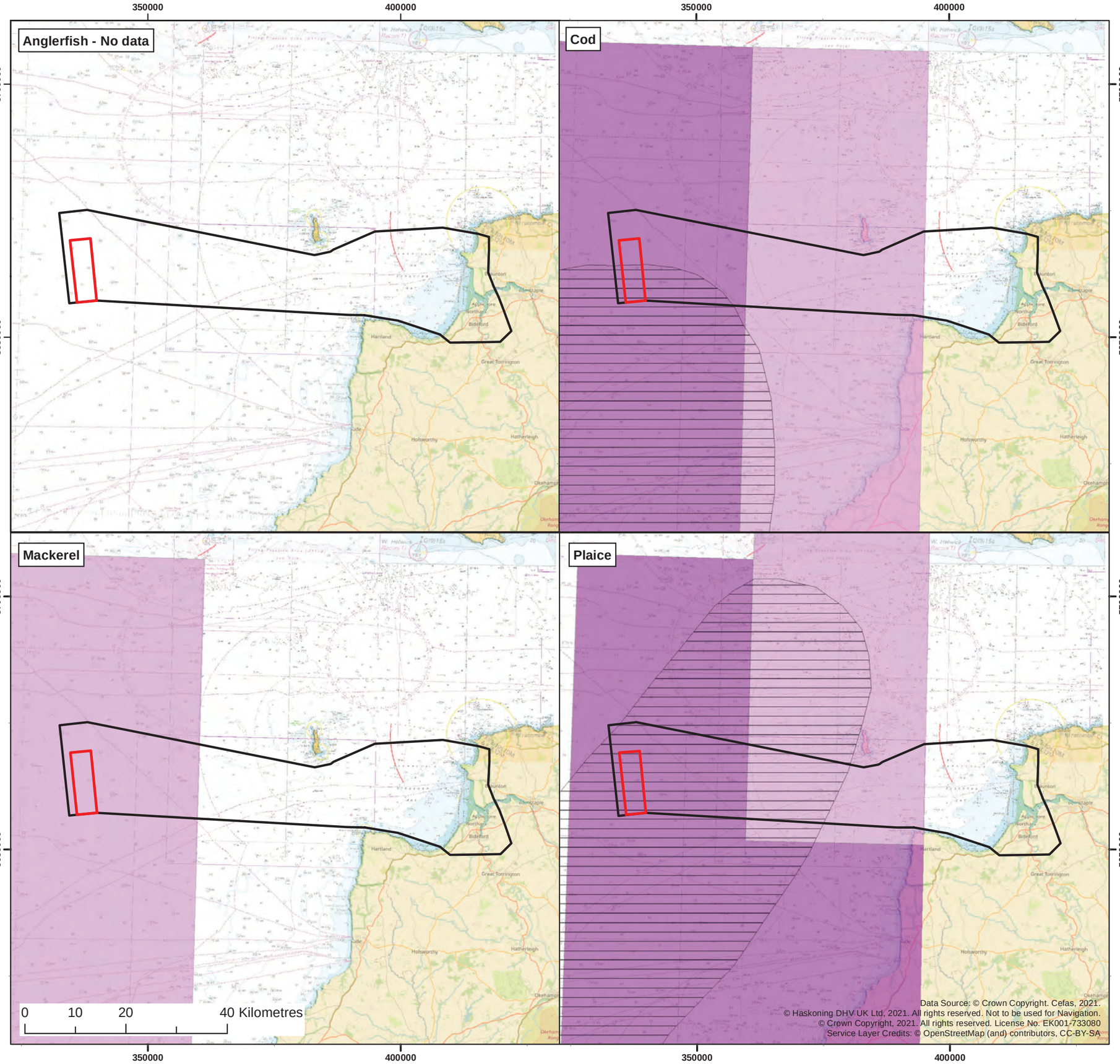
2.5.1 Baseline Environment

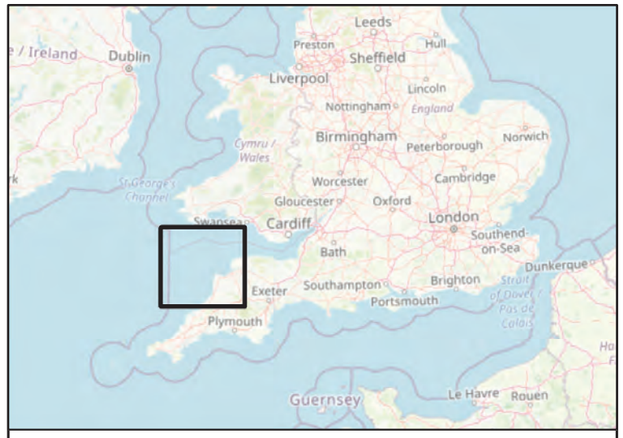
Fish

302. The variable seabed conditions across the southwestern coasts of England and Wales support a number of ecologically and commercially important fish and shellfish species. The Offshore Development Area overlaps or is in close proximity to a number of fish spawning and nursery grounds (see Figure 2.5.1). It is noted that herring spawning grounds, while not overlapping the Offshore Development Area, are in the vicinity to the north of the Project at Milford Haven (Coull *et al*. 1998). The wider Celtic Sea area also supports populations of elasmobranchs (sharks, skates and rays), including basking sharks and thornback ray which are of national significance. Detailed information on species of commercial importance is provided in the Commercial Fisheries chapter of the Scoping Report (Section 2.8).

Shellfish

303. The Devon and North Cornwall coast is a historically important nursery ground for juvenile edible crabs (Pawson and Robson, 1996). Alongside edible crab (*Cancer pagurus*), lobster (*Homarus gammarus*) and spider crabs (*Maja squinado*) are found along most of the exposed or rocky shorelines of the region. The spiny lobster (*Palinurus elephas*) is a designated feature of the Lundy and Bideford to Foreland Point MCZs and is listed by the IUCN as a globally 'Vulnerable' Red List species and is a UK priority species and a species of principle importance under the Natural Environment and Rural Communities Act 2006. Brown shrimp (*Crangon crangon*) are found but are more common in sandier estuaries.





Legend:

- White Cross Offshore Windfarm
- Area of Search
- Spawning Grounds (*Coul et al, 1998*)

Spawning Grounds (*Ellis et al, 2010*)

Intensity

- High
- Low

Client:	Project:
Offshore Wind Ltd.	White Cross Offshore Windfarm

Title:

Spawning grounds near to Windfarm site and Export Cable Corridor Area of Search

Figure: 2.5.1a

Drawing No: PC2978-RHD-ZZ-XX-DR-Z-0082

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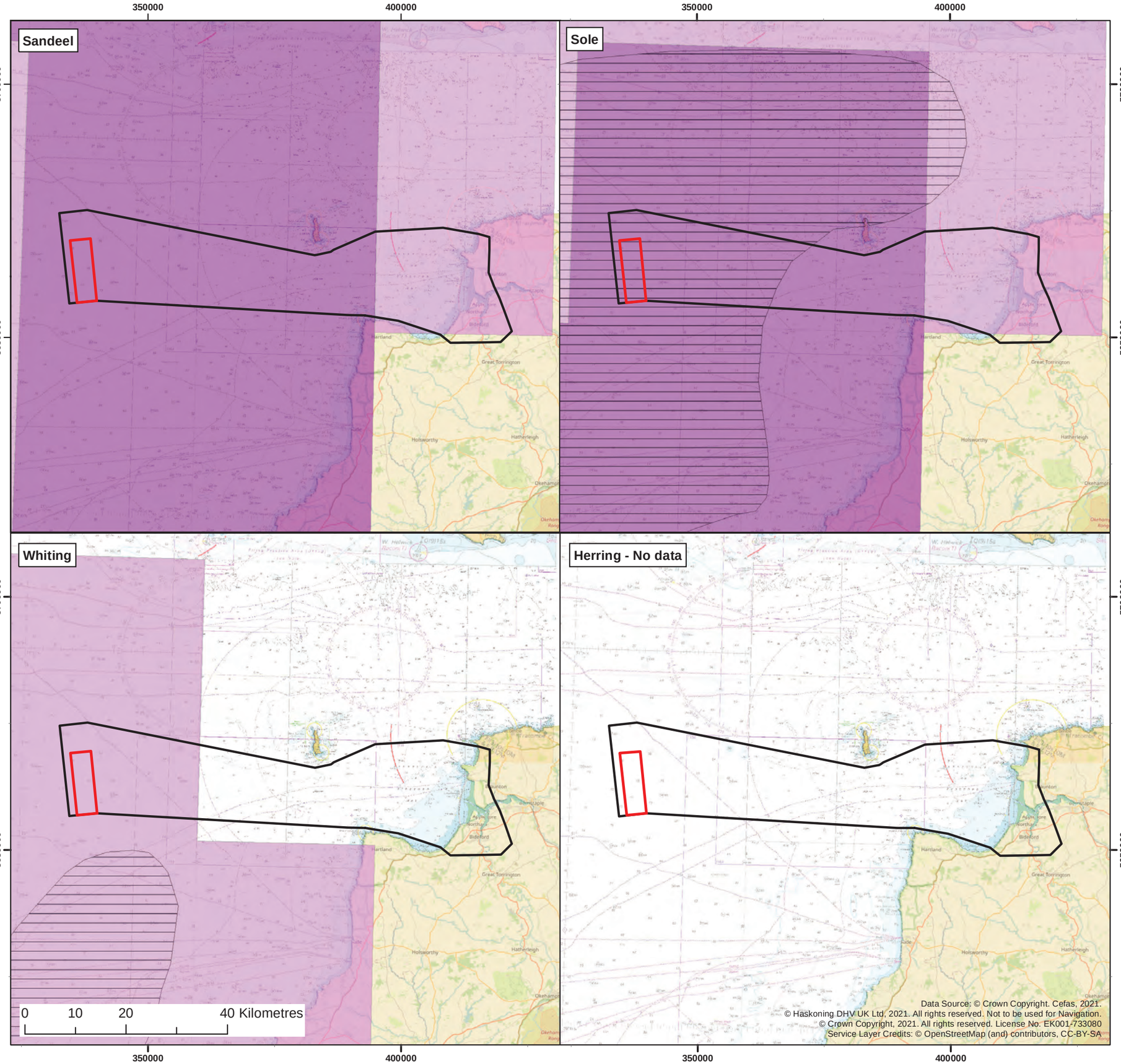

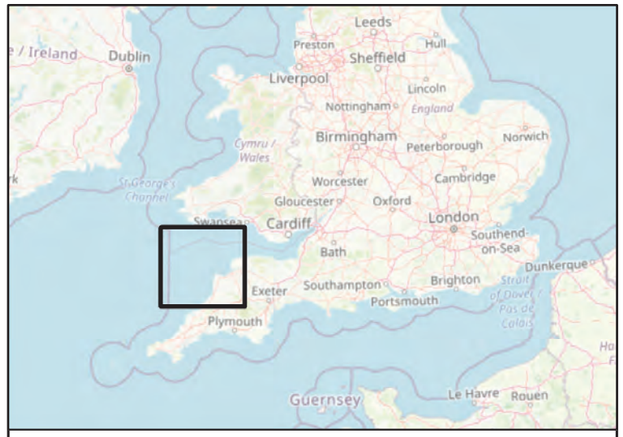

Legend:

- White Cross Offshore Windfarm
- Area of Search
- Spawning Grounds (*Coul et al, 1998*)

Spawning Grounds (*Ellis et al, 2010*)

Intensity

- High
- Low

Client:	Project:
Offshore Wind Ltd.	White Cross Offshore Windfarm

Title:

Spawning grounds near to Windfarm site and Export Cable Corridor Area of Search

Figure: 2.5.1b

Drawing No: PC2978-RHD-ZZ-XX-DR-Z-0083

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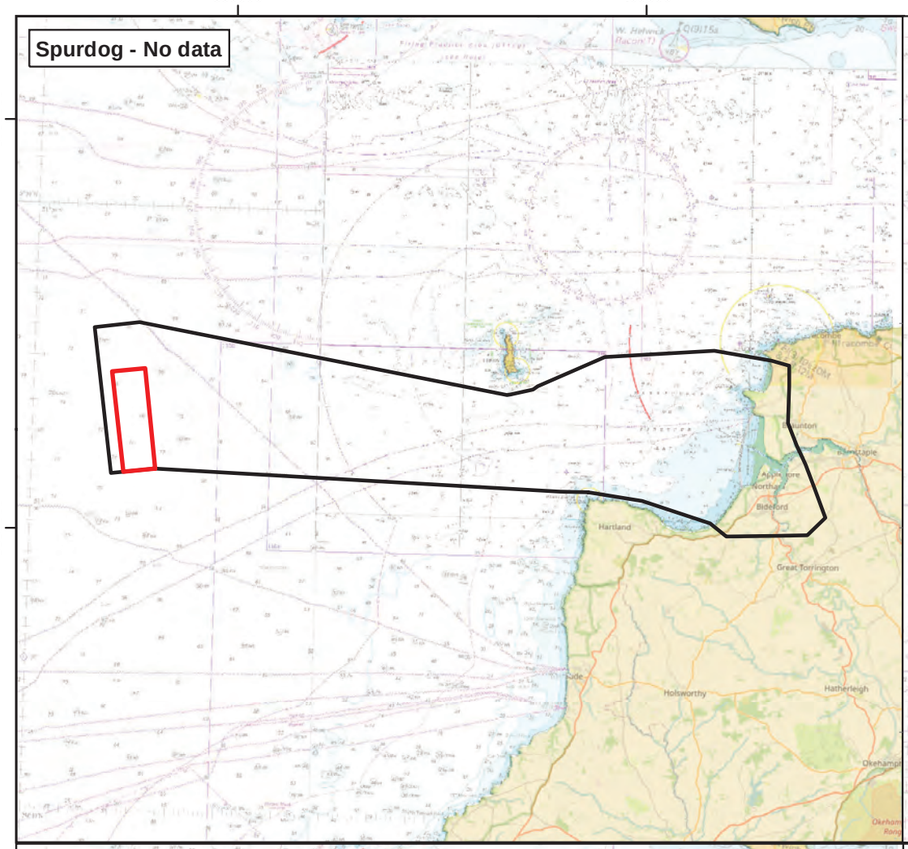

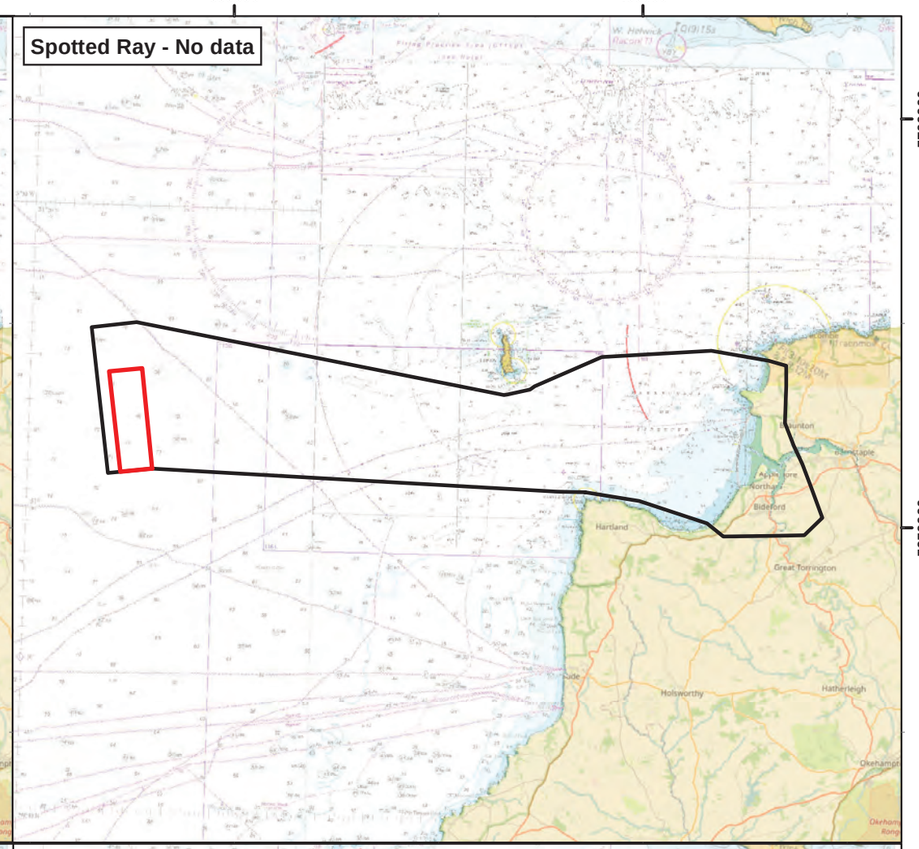

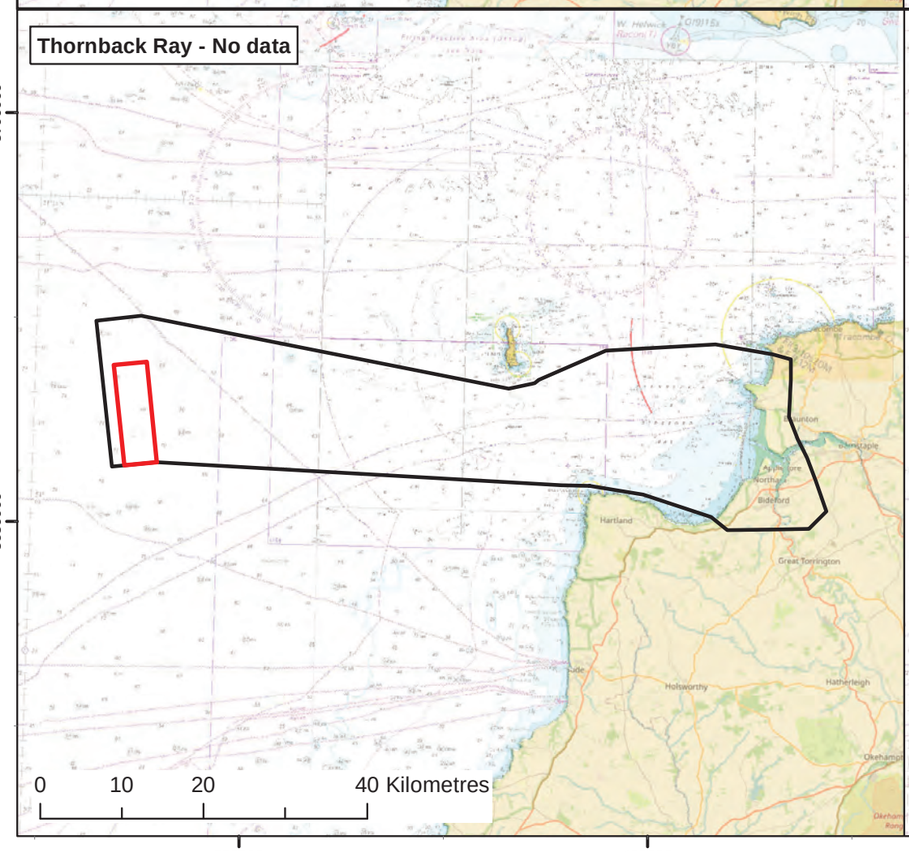

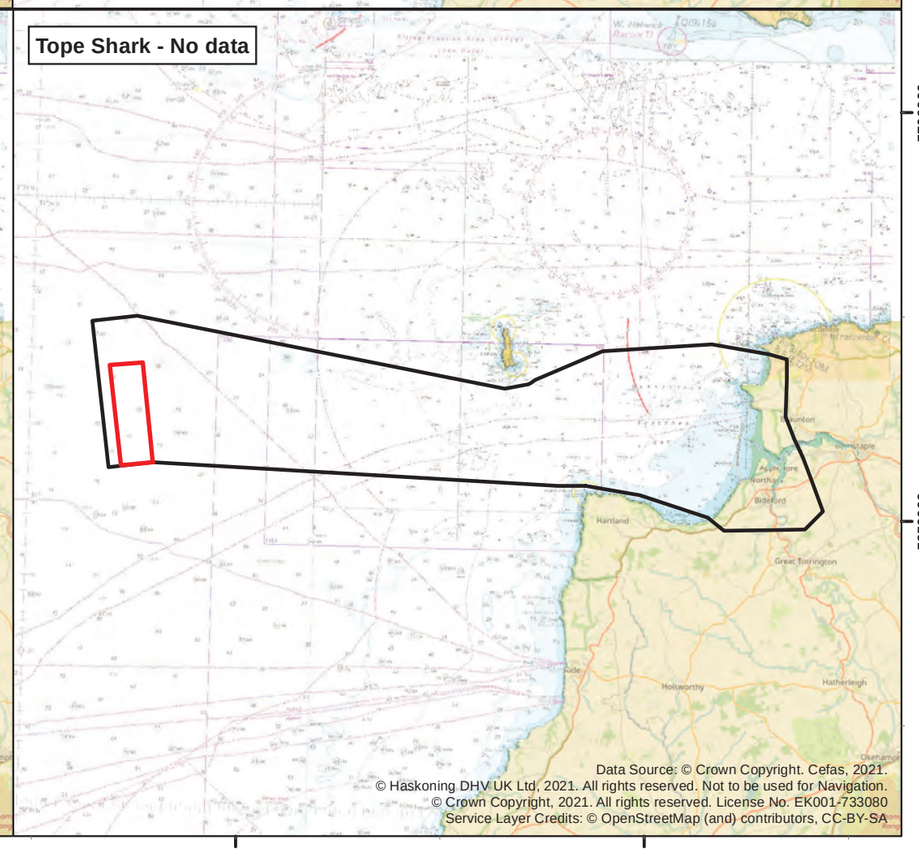

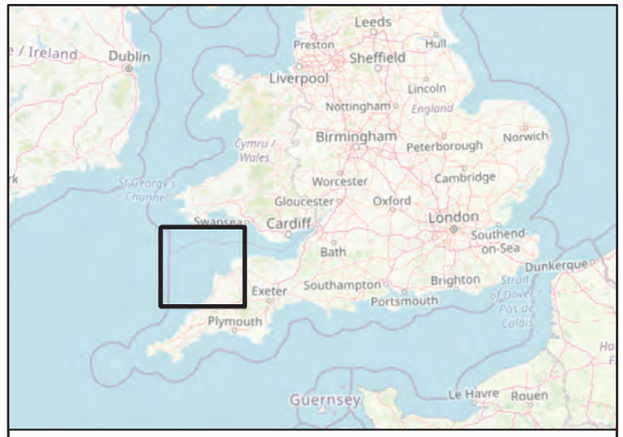

Legend:

- White Cross Offshore Windfarm
- Area of Search

Client:	Project:
Offshore Wind Ltd.	White Cross Offshore Windfarm

Title:

Spawning grounds near to Windfarm site and Export Cable Corridor Area of Search

Figure: 2.5.1c

Drawing No: PC2978-RHD-ZZ-XX-DR-Z-0084

Revision:	Date:	Drawn:	Checked:	Size:	Scale:
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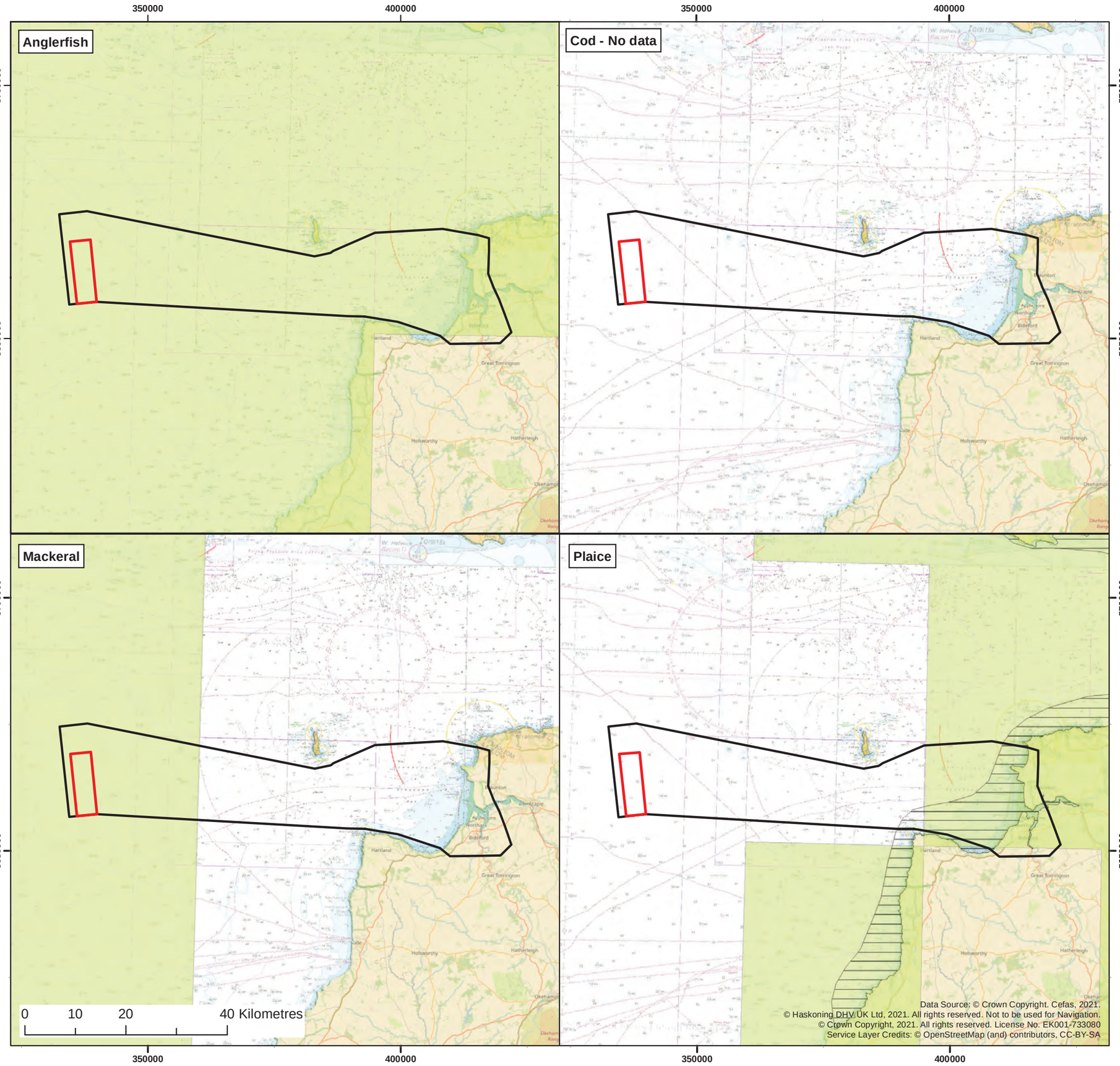

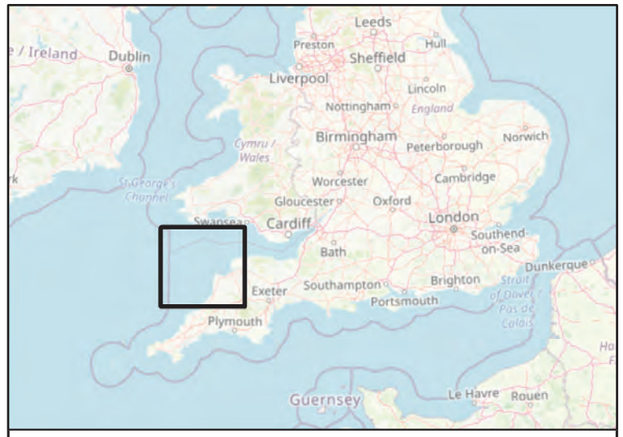

Legend:

- White Cross Offshore Windfarm
- Area of Search
- Nursery Grounds (*Coul et al, 1998*)

Nursery Grounds (*Ellis et al, 2010*)

Intensity

- High
- Low

Client:	Project:
Offshore Wind Ltd.	White Cross Offshore Windfarm

Title:

Nursery grounds near to Windfarm site and Export Cable Corridor Area of Search

Figure: 2.5.1d

Drawing No: PC2978-RHD-ZZ-XX-DR-Z-0085

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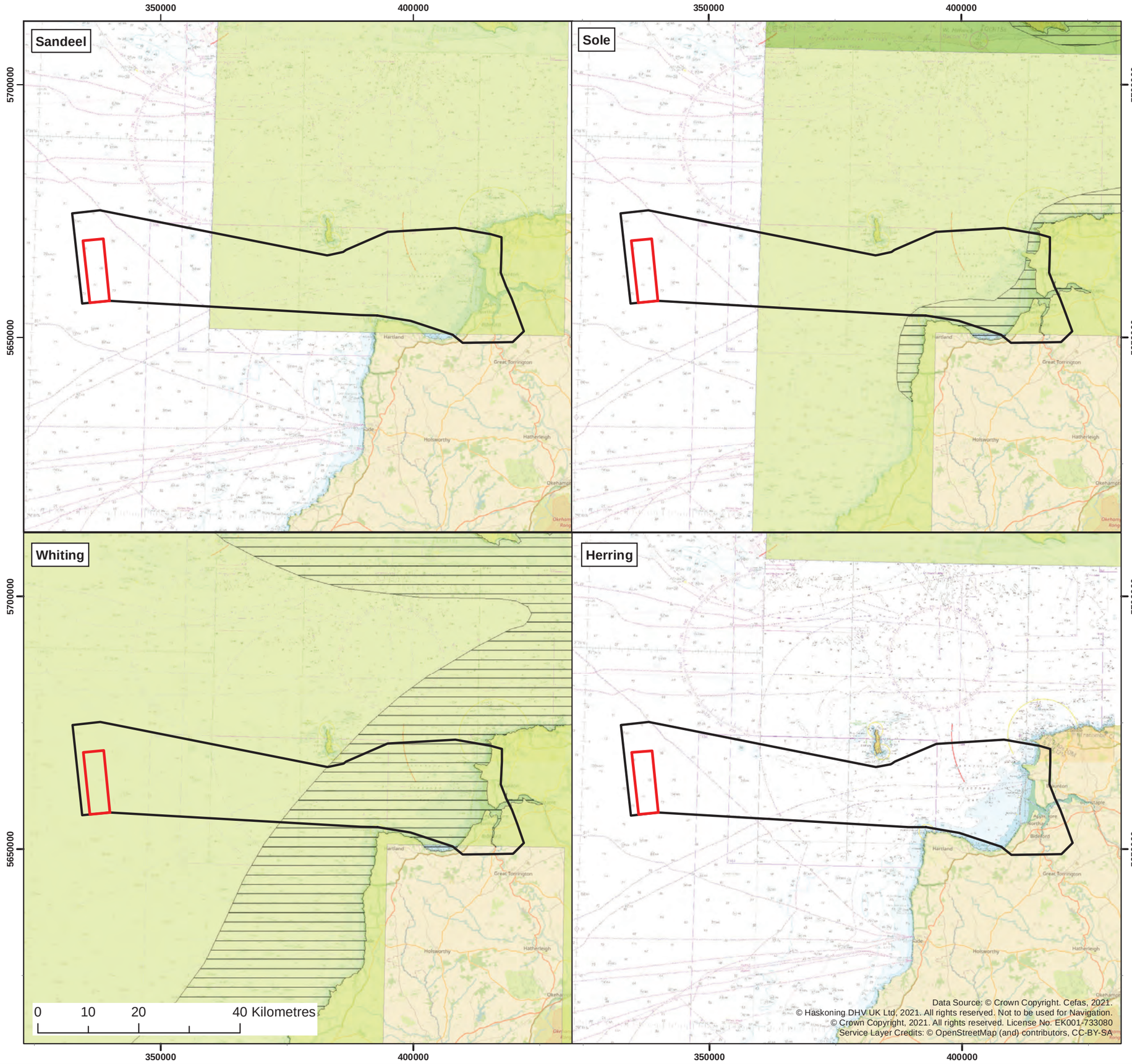

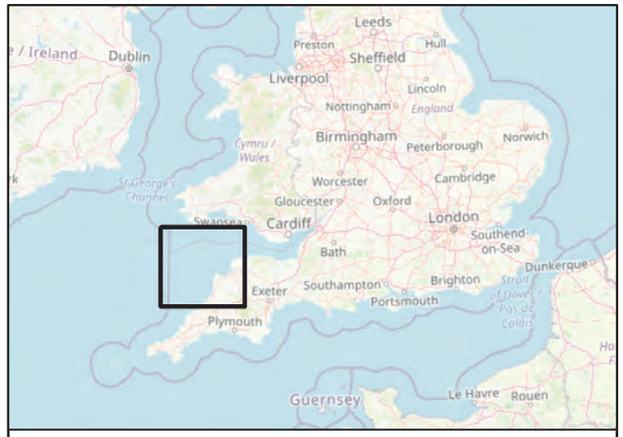

Legend:

- White Cross Offshore Windfarm
- Area of Search
- Nursery Grounds (*Coul et al, 1998*)

Nursery Grounds (*Ellis et al, 2010*)

Intensity

- High
- Low

Client:	Project:
Offshore Wind Ltd.	White Cross Offshore Windfarm

Title:

Nursery grounds near to Windfarm site and Export Cable Corridor Area of Search

Figure: 2.5.1e

Drawing No: PC2978-RHD-ZZ-XX-DR-Z-0086

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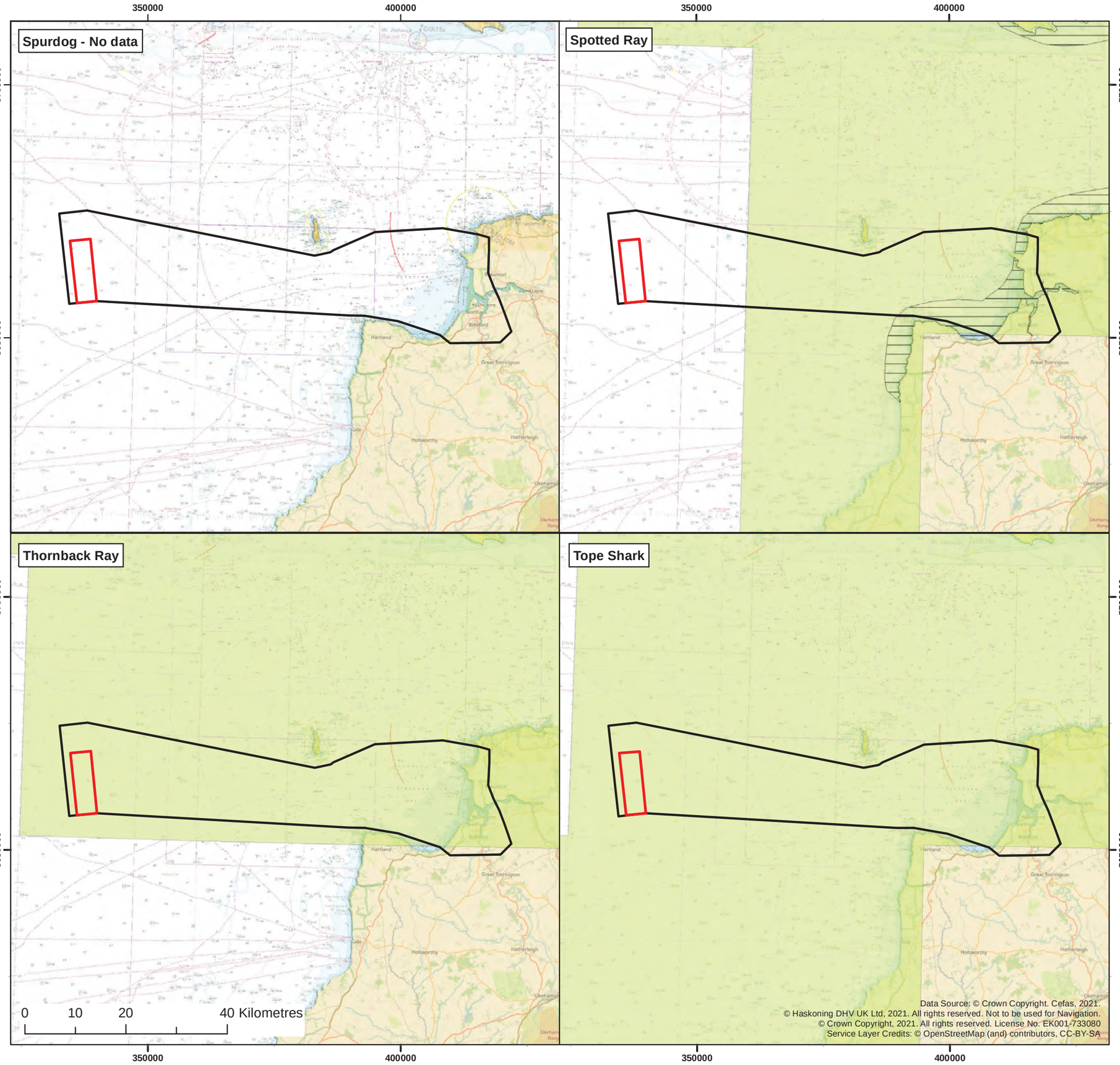

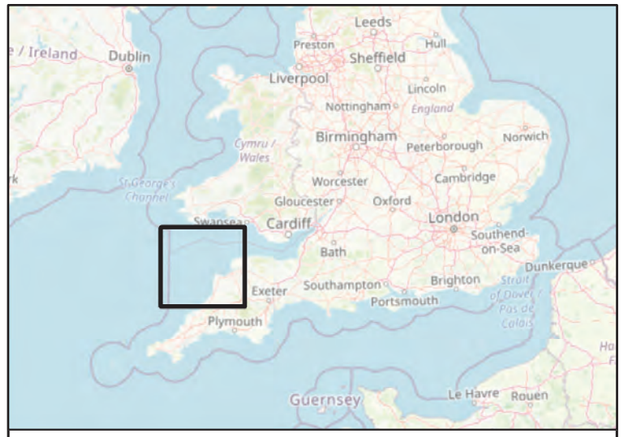

Legend:

- White Cross Offshore Windfarm
- Area of Search
- Nursery Grounds (*Coul et al, 1998*)

Nursery Grounds (*Ellis et al, 2010*)

Intensity

- High
- Low

Client:	Project:
Offshore Wind Ltd.	White Cross Offshore Windfarm

Title:

Nursery grounds near to Windfarm site and Export Cable Corridor Area of Search

Figure: 2.5.1f

Drawing No: PC2978-RHD-ZZ-XX-DR-Z-0087

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Co-ordinate system: WGS 1984 UTM Zone 30N

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Table 2.12 Spawning and nursery areas

Species	Areas overlapping the Offshore development Area		Commercial Importance	Conservation Designation
	Spawning	Nursery		
Sandeel sp.	Y (high intensity)	Y (low intensity)	Low	The lesser sandeel is a Priority Species under the UK Post-2010 Biodiversity Framework.
Sole (*Solea solea*)	Y (high intensity)	Y (low intensity)	Medium	International Union for Conservation of Nature (IUCN): data deficient
Plaice (*Pleuronectes plattessa*)	Y (high intensity)	Y (low intensity)	High	IUCN (least concern)
Cod (*Gadhus morhua*)	Y (high intensity)	No data	Medium	IUCN Status Global: VU (Vulnerable) Europe: LC (Least Concern)
Whiting (*Merlangius merlangus*)	Y (low intensity)	Y (low intensity)	Medium	UK Biodiversity Action Plan (BAP), IUCN (least concern)
Mackerel (*Scomber scombrus*)	Y (low intensity)	Y (low intensity)	Low	UK BAP, IUCN (least concern)
Ling (*Molva molva*)	Y (low intensity)	N	Low	UK BAP
Herring (*Clupea harengus*)	No data	N	Low	UK BAP, IUCN (least concern)
Spurdog (*Squalus acanthias*)	No data	No data	Medium	UK BAP, OSPAR, IUCN (vulnerable)
Anglerfish (*Lophius pisccatorius*)	No data	Y (low intensity)	Medium	UK BAP

Species	Areas overlapping the Offshore development Area		Commercial Importance	Conservation Designation
	Spawning	Nursery		
Tope shark (*Galeorhinus galeus*)	No data	Y (low intensity)	Low	UK BAP, IUCN (vulnerable)
Thornback ray (*Raja clavata*)	No data	Y (low intensity)	High	OSPAR, IUCN (near threatened)
Spotted ray (*Raja montagui*)	No data	Y (low intensity)	Medium	UK BAP, IUCN (least concern)

304. Mussels (*Mytilus edulis*) occur from the mid-shore to the sub-tidal zone on all areas exposed to currents along the costs of the region, attaching themselves to bedrock, sand, gravel or pebble substrata. Exploitable populations of mussel are recorded in the Taw-Torridge estuary (Pawson and Robson, 1996). Ocean quahog (*Arctica islandica*) may occur and is a Feature of Conservation Importance for which Marine Conservation Zones can be designated. However, densities of the bivalve are much lower on the Devon and north Cornwall coast compared to the south Cornwall coast where it is a listed feature of the Whitsand and Looe Bay MCZ (Pawson and Robson, 1996). Cuttlefish (*Sepia officinalis*) are largely concentrated in the centre of the western channel over winter and move into coastal areas of the region to spawn during spring/summer. Squid are also found offshore seasonally moving into the coastal waters of the region to spawn during the spring (Pawson and Robson, 1996).

Migratory species

305. Atlantic salmon (*Salmo salar*), sea trout (*Salmo trutta*) and European eel (*Anguilla Anguilla*) have a widespread distribution in UK coastal seas and are present in the rivers which drain into the Bristol channel (Aprahamian and Robson, 1996). The Taw-Torridge estuary is a known salmon and seatrout river (Environment Agency, 2019). The Bristol Channel and Severn Estuary also contain the only viable population of Allis shad (*Alosa alosa*) and twaite shad (*Alosa fallax*) in UK waters, in addition to populations of river lamprey (*Lampetra fluviatilis*) and sea lamprey (*Petromyzon marinus*) (Aprahamian and Robson, 1996). It is possible therefore that these species may be present in the waters in which the Offshore Development Area is located.

306. There is evidence of increased occurrence of Atlantic bluefin tuna (*Thunnus thynnus*) in territorial waters of the United Kingdom and Ireland including the Celtic Sea region (Thomas *et al.,* 2021). Data in the study suggests that Atlantic bluefin tuna were likely absent, or present in undetectable numbers, in the English Channel and Celtic Sea between 2008 and 2014. It is possible therefore that these species may be present in the waters in which the Offshore Development Area is located.

307. With the exception of sea trout, all these diadromous species are listed under the European Habitat and Species Directive (92/43/EEC) in Annex II (species whose conservation requires the designation of SACs). Salmon and river lamprey are also listed under Annex V (species whose exploitation and management in the wild may be subject to management measures).

Elasmobranchs

308. There are several elasmobranch species that can be found in the region including a number of ray species: thornback ray (*Raja clavata*), blonde ray (*Raja brachyura*) and spotted ray (*Raja montagui*), small-eyed ray (*Raja microocellata*), cuckoo ray (*Leucoraja naevus*) and undulate ray (*Raja undulata*). Spawning grounds tend to be within shallow bays however, the egg cases of a number of these species have been found at beaches within the Study Area with those of the spotted ray appearing to the most common (Sharktrust, 2019).

309. A number of shark species are also present in the region and include: nursehound (*Scyliorhinus stellaris*), tope (*Galeorhinus galeus*), spurdog (*Squalus acanthias*), porbeagle (*Lamna nasus*) and lesser spotted catshark (*Scyliorhinus canicular*) (Pawson and Robson, 1996 and Sharktrust, 2019). Egg cases for both nursehound and lesser spotted cat shark have been recorded from Crooklets Bay (Sharktrust, 2019). Thresher (*Alopias vulpinus*) and blue shark (*Prionance glauca*) are both sporadic visitors with summer sightings recorded from the north Cornish coast (Pawson and Robson, 1996 and Sharktrust, 2019).

310. The Irish and Celtic Seas are important migration routes of basking sharks (*Cetorhinus maximus*). Sightings of the Devon and North Cornwall coastline, as well as further offshore along the cable route, are reported during summer months. Basking sharks are considered by IUCN as Endangered in the Northeast Atlantic (Rigby et al., 2020) and are protected under Schedule 5 of the Wildlife and Countryside Act (1981) it is illegal to kill, injure or recklessly disturb any basking shark inside UK territorial waters.

2.5.2 Potential Impacts

Potential impacts during construction

311. Underwater noise: Underwater noise generated by pile driving (if required for the construction of the Offshore Substation) and underwater noise generated by anchoring activities may result in disturbance and displacement of fish species. Construction activities may also affect spawning and nursery areas; and migration patterns. Acoustic barrier effects (noting the potential presence of Annex II migratory species) may also arise during construction as a result of underwater noise during construction will be included as part of the underwater noise assessment.

312. Increased suspended sediments: There is potential for direct physical disturbance of the seabed habitats during construction related to suspension of sediment during cable and mooring installation work (including seabed preparation).

313. Re-mobilisation of contaminated sediments: Potential impacts related to the resuspension of contaminants are currently scoped in for assessment; however, should the results of benthic sampling demonstrate low levels of contamination the Applicant would seek to scope these out following further assessment. Water quality effects are also scoped in at this stage.

Potential impacts during operation

314. Temporary habitat loss / Physical disturbance: There is potential for ongoing physical disturbance of the seabed during the operational phase from maintenance activity such as indentations on the seabed from jack-up vessels required for cable repairs or reburial. In general, the impacts from planned maintenance should be temporary, localised and smaller in scale than during construction.

315. Temporary increased suspended sediment concentrations and deposition: Small volumes of sediment could be re-suspended during maintenance activities; the volumes would be lower than for construction. It is not expected that there would be significant smothering effects.

316. Remobilisation of contaminated sediment: Given the likely low levels of sediment contamination it is unlikely that a pathway exists for impacts from the remobilisation of contaminants from within the offshore sediments. If the sediment sample results show no contaminated sediment then it is proposed this impact is scoped out of the EIA.

317. Permanent habitat loss / Physical disturbance: Potential impacts during operation will mostly result from loss of habitat and changes to seabed substrata from the physical presence of infrastructure (i.e. foundations of the Offshore Substation and any cable protection above the seabed). The presence of foundations on the seabed (for the Offshore Substation Platform) and cable protection would result in a relatively small footprint of lost habitat in the context of the habitat from the surrounding region. Depending on whether the infrastructure is removed or left in-situ at the decommissioning stage this impact is either long term or permanent habitat loss. As a worst-case scenario it is assumed it would be permanent habitat loss unless the Applicant commits to removing any areas of infrastructure at decommissioning.

318. Colonisation of introduced artificial substrate: The sub-sea structures (mooring systems, scour, and cable protection) are expected to be colonised by a range of species leading to a localised increase in biodiversity. The presence of the structures would also provide habitat for mobile species and for example serve as a refuge for fish. This represents a change from the baseline ecology. Overall, the area available for colonisation would be low and to date there is no evidence of significant changes of the seabed beyond the vicinity of the foundation structures due to the installation of windfarms (Lindeboom *et al*, 2011).

319. Underwater noise and vibration: Noise and vibration generated by the operational wind turbine generators can be conducted through the tower and foundations into the water. However, as the Project is floating rather than fixed foundations the noise and vibration to the seabed is expected to be lower than from fixed foundations. There is the potential for vibration transported down anchoring cables and from cable 'snapping' associated with cable tension release in the mooring system.

320. Electromagnetic fields (EMF): Potential impacts from EMF from operational cables will also be considered. NPS EN-3 states that where cables are buried to "a depth of at least 1.5m below the seabed, the applicant should not have to assess the effect of the cables on intertidal habitat during the operational phase of the offshore windfarm". It is currently expected that where cables can be buried, the typical depth would be 1m but may range from 0.5 to 3m. There is also the potential that it is not possible to bury cables at all locations (e.g. at crossings or in hard substrate) and therefore there may be sections of surface laid cables with cable protection. The assessment will consider a worst-case scenario based on the extent of cables with potential to be buried at less than 1.5m depth. Potential impacts from dynamic cables in the water column will also be considered. It is not expected that

barrier effects would be significant during operation, given the scale of operational and maintenance activities, however the impact is scoped in to allow for further justification with full baseline information.

321. Ghost fishing: There is the potential for ghost fishing caused by entangled of lost fishing gear in the mooring system to occur. Additionally, fish aggregation in proximity to the sub-structure and other infrastructure may be perceived as positive if it enhances feeding or reproductive opportunities or if it provides a habitat for species that are otherwise in a degraded state due to being habitat limited. However, it may also be perceived as negative if fish aggregation results in increased risk of collision or entanglement of subsequently attracted predators (such as seabirds and mammals). This will be considered in the EIA.

Potential impacts during decommissioning

322. It is anticipated that the decommissioning impacts would be similar in nature to those of construction, although the magnitude of effect is likely to be lower. For example, noise impacts will be lower (as piling is unlikely) and if the cables are left in situ, there will be less seabed disturbance.

Potential cumulative impacts

323. Consideration will be given to cumulative impacts with other plans and projects which have the potential to interact with the impacts of the Project. The assessment will be dependent on the availability and accessibility of information for other developments. The cumulative assessment will consider cumulative noise impacts, habitat loss and changes to seabed habitat. These will be identified and assessed in accordance with the approach to cumulative assessment is set out in Section 1.9.2.

Potential transboundary impacts

324. The distribution of fish and shellfish species is independent of national geographical boundaries. The EIA will be undertaken taking account of the distribution of fish stocks and populations irrespective of national jurisdictions. As a result, it is considered that a specific assessment of transboundary effects is unnecessary. This approach was adopted and accepted for several previous projects (e.g. East Anglia THREE (East Anglia THREE Ltd, 2015), East Anglia ONE North (East Anglia ONE North Ltd, 2019).

2.5.3 Mitigation Measures

325. Mitigation measures relevant to the fish and shellfish ecology assessment, which have been incorporated into the design of the project or have the potential to be incorporated into the design of the Project at a later stage include:

- Site Selection
    - Careful site selection of the Windfarm Site and Offshore Cable Corridor has been carried out to avoid designated sites as far as possible.
    - The Offshore Cable Corridor takes the shortest, most direct route possible from the Windfarm Site to Landfall, whilst avoiding as many known sensitive benthic habitats as possible therefore reducing impacts to shellfish ecology
- Where seabed preparation is required (e.g. levelling) adoption of methods and equipment that have been designed to minimise potential for sediment suspension and dispersal
- Application of foundation installation techniques using methods and equipment to minimise sediment suspension
- Selection of cable installation methods and equipment most suitable for seabed conditions along the cable route and designed to minimise sediment suspension into the water column
- Sediment disposal to occur nearby so sediment isn't taken out of the local habitat.
- Preparation of Construction Method Statements (CMS) setting out detailed turbine foundation and cable installation methods and techniques (based on final project design).
- Cables will be buried to a target burial depth of 1m where possible (recognised industry good practice) so benthic habitat loss due to cable protection is reduced. A detailed Cable Burial Risk Assessment (CBRA) will also be required to confirm the extent to which cable burial can be achieved. Where it is not possible to achieve cable burial, additional cable protection (rock placement, concrete mattressing or grout bags) may be required, as discussed in Section 1.8.
- A Project Environment Management Plan (PEMP), which will include a Marine Pollution Contingency Plan (MPCP)) (which will include invasive and biosecurity measures), will be developed and implemented. Mitigation measures relating to INNS have been set out in Section 264.
- An Offshore Decommissioning Plan will be developed and implemented.
- Micrositing
    - Conduct pre-construction surveys to identify sensitive habitats
    - Based on the results of the pre-construction surveys microsite to avoid sensitive benthic habitats where possible
- If required, a wildlife licence application will be submitted prior to construction, for the protection of basking sharks from injury or significant disturbance

326. Potential mitigation measures will be consulted upon with stakeholders throughout the EIA process.

2.5.4 Approach to Assessment and Data Collection

Approach to Assessment

327. The specific assessment requirements for fish and shellfish ecology are in accordance with the overarching NPS for Energy EN-1 and NPS for Renewable Energy infrastructure (EN-3), of which draft versions have been published for consultation. Requirements under The Eels (England and Wales) Regulations 2009 will also be agreed with relevant bodies during the EIA process.

328. A key source of information will be fisheries landings data (see Section 2.8); these provide both large spatial coverage and effort. These datasets will be complimented with existing site-specific data available from previous projects.

329. In addition, it is envisioned that the impact assessment will use existing and additional noise survey data (ambient noise) combined with appropriate guidance such as Popper *et al* (2014). This approach uses a combination of Popper *et al* (2014) and Hawkins & Popper (2014) to assess the level of potential noise impacts upon fish, including migratory fish and shellfish. As outlined in Section 2.6, site specific underwater noise modelling will be undertaken for all potential noise sources that could impact fish and shellfish species.

330. Design assumptions used to inform assessments will be clearly identified in the project description, considering worst case parameters specifically for fish and shellfish ecology receptors.

331. The assessment of impacts on fish and shellfish ecology will be further informed by physical processes and geophysical and benthic data from the Project's Marine Geology, Oceanography and Physical Processes; and Benthic and Intertidal Ecology chapters.

Data Collection

332. In addition to the data sources listed in Table 2.11, the following data and information available will also be used to inform the EIA:

- Predictive European Nature Information System (EUNIS) seabed habitats, European Marine Observation and Data Network (EMODnet) (2021)
- Database containing information on the predicted seabed habitats present across Europe, mapped in accordance with the EUNIS habitat classification system, 2009 – 2013, 2013 – 2016 and 2017 – 2019

- South West Inshore and South West Offshore Marine Plan (2021)

333. Given that fish are highly mobile, both temporally and spatially, a site-specific survey only provides one point in time coverage of the species present in a particular area at one particular time; this has the potential to skew the baseline. Other datasets, as outlined in Table 2.11, with large-scale coverage are relevant for characterising the natural fish and shellfish resource. A key source of information used are fisheries landings data; these provide both large spatial coverage and effort. These long-term datasets provide sufficient to information, detail and coverage to characterise and describe the fish and shellfish resource within the Study Area. Any previous monitoring from existing projects can also add to this information.

334. It is therefore proposed that given the volume of existing data and the low value of site-specific data collection, no site-specific survey is undertaken for the Project. Further consultation with stakeholders through the Evidence Plan Process will be undertaken to agree the data collection approach and the methodology for the impact assessment to be undertaken in the ES.

2.5.5 Summary of Scoped In Impacts

335. Table 2.13 outlines the potential impacts which are proposed to be scoped into and/or out of the EIA. This may be refined as additional information and data become available.

Table 2.13 Summary of potential impacts relating to fish and shellfish ecology

Potential Impact	Construction	Operation	Decommissioning
Temporary habitat loss / physical disturbance	✓	x	✓
Permanent habitat loss	x	✓	x
Increased suspended sediments and sediment re-deposition	✓	✓	✓
Re-mobilisation of contaminated sediments	✓	✓	✓
Underwater noise and vibration	✓	x	✓

Potential Impact	Construction	Operation	Decommissioning
Electromagnetic fields	x	✓	x
Barrier effects	✓	✓	✓
Ghost fishing	x	✓	x
Fish aggregation	x	✓	x
Cumulative underwater noise	✓	✓	✓
Cumulative permanent habitat loss	x	✓	✓
Cumulative changes to seabed habitat	✓	✓	✓
Deterioration of water quality	✓	✓	✓
Transboundary impacts	x	x	x

Key:
✓ Impact scoped in
✗ Impact scoped out

2.6 Marine Mammal and Marine Turtle Ecology

2.6.1 Introduction

336. The section outlines the EIA scoping for marine mammals to determine the marine mammal species and potential impacts that will be assessed in the EIA Report.

2.6.2 Policy, Legislation and Guidance

337. Section 1.5 describes the wider policy and legislative context for the Project. The overarching assessment requirements relevant for marine mammals are set out within National Policy Statement (NPS) EN-1, with more specific requirements set out in EN-3.

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

- The Habitats Directive and Habitats Regulations
- National and International Legislation in Relation to Marine Mammals
- The relevant NPS requirements, as noted above
- The Marine Strategy Framework Directive (MSFD) 2008/56/EC (EC, 2008)

- The Marine Policy Statement (MPS) (HM Government, 2011)
- The South West Inshore and Offshore Marine Plans (HM Government, 2021)

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

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

2.6.3 Study Area

340. The Study Area for marine mammals is based on the wider Celtic and Irish Sea area to take into account the wide ranges and movements of marine mammals, and their relevant Management Units (MU)[3].

2.6.4 Baseline Data

Site Specific Survey Information

341. The aerial surveys for the Windfarm Site commenced in July 2020, and will continue for a total of 24 months, completing in June 2022. The surveys are conducted

[3] MUs provide an indication of the spatial scales at which impacts of plans and projects alone, cumulatively and in-combination, need to be assessed for the key cetacean species in UK waters, with consistency across the UK.

monthly. APEM collect high resolution aerial digital still imagery for marine megafauna (combined with ornithology surveys) over the Windfarm Site, including a 4km buffer. Data for the first 12 months of the aerial surveys have been used to inform this scoping report, and the full 24 months of data will be used to inform the EIA process.

342. Where possible (where there are sufficient sightings for a species), data from the site-specific surveys will be used to generate marine mammal density estimates for the Windfarm Site. This will be considered against wider data sources from around the Offshore Development Area.

343. The surveys for July 2020 to June 2021 have recorded one seal species (grey seal *Halichoerus grypus*), and three species of cetacean (minke whale *Balaenoptera acutorostrata*, harbour porpoise (*Phocoena phocoena*), and common dolphin (*Delphinus delphis)* within the windfarm area and 4km buffer (Table 2.14). Common dolphin were the most commonly recorded species, particularly in the spring (with a peak of 285 individuals recorded in May). To date no marine turtles have been recorded during the site-specific surveys.

Table 2.14 Species recorded during the site-specific aerial surveys from July 2020 to June 2021 [spring = March to May, summer = June to August, autumn = September to November, winter = December to February]

Species recorded	Number of individuals recorded per season (from July 2020 to June 2021)				Total individuals for first year
	Spring	Summer	Autumn	Winter	
Grey seal	5	0	0	0	5
Seal species (unidentified)	1	2	0	1	4
Minke whale	2	1	0	0	3
Common dolphin	289	37	32	2	360
Dolphin species (unidentified)	51	43	12	17	123
Harbour porpoise	9	2	5	0	16
Dolphin / porpoise species (unidentified)	19	16	18	2	55

Desk Based Sources

344. In addition to the site-specific surveys as outlined above, other data and information sources that will be used to inform the EIA include, but will not be limited to:

- Small Cetaceans in the European Atlantic and North Sea (SCANS-III): Estimates of cetacean abundance in European Atlantic waters in summer 2016 from the SCANS-III aerial and shipboard surveys (Hammond *et al.*, 2021)
- The identification of discrete and persistent areas of relatively high harbour porpoise density in the wider UK marine area (Heinänen and Skov, 2015)
- Revised Phase III data analysis of JCP data resources (Paxton *et al.*, 2016)
- ObSERVE surveys (Rogan *et al.*, 2018)
- Distribution maps of cetacean and seabird populations in the North-East Atlantic (Waggitt *et al.*, 2019)
- MARINElife surveys from relevant ferry routes (Bideford to Lundy; Ilfracombe to Lundy; Cefas PELTIC surveys[4]) (MARINElife, 2021)
- Sea Watch Foundation volunteer sightings off south-west England and south Wales (Sea Watch Foundation, 2021)
- Welsh Marine Atlas (Baines and Evans, 2012)
- Management Units for cetaceans in UK waters (Inter-Agency Marine Mammal Working Group (IAMMWG, 2021)
- Seal telemetry data (e.g. Sharples *et al.*, 2008; Russel and McConnell, 2014; Vincent *et al.*, 2017)
- UK seal at sea density estimates and usage maps (Russell *et al.*, 2017*;* Carter *et al.*, 2020)
- Other windfarm survey data (e.g. Valorous; Erebus; Llyr 1 and 2; Pembrokeshire Development Zone; Gywnt Glas; Celtic Sea)
- SCOS annual reporting of scientific advice on matters related to the management of seal populations (e.g. SCOS, 2020)

345. The latest and most up to date references will be applied to the assessment, data used will also be supplemented with appropriate results of ongoing research and studies as it becomes available.

346. Some of these data sources are described further in the following section.

[4] https://www.marine-life.org.uk/post/complete-2020-2019-reports-archive

2.6.5 Baseline Environment

Marine mammals

347. A full assessment of the baseline conditions will be undertaken through the EIA process, and will inform, alongside the results of the site-specific aerial surveys, the species to be included in the EIA. The below provides an initial assessment of the marine mammal (and turtle species) expected to be present.

Cetaceans (whales, dolphins, and porpoises)

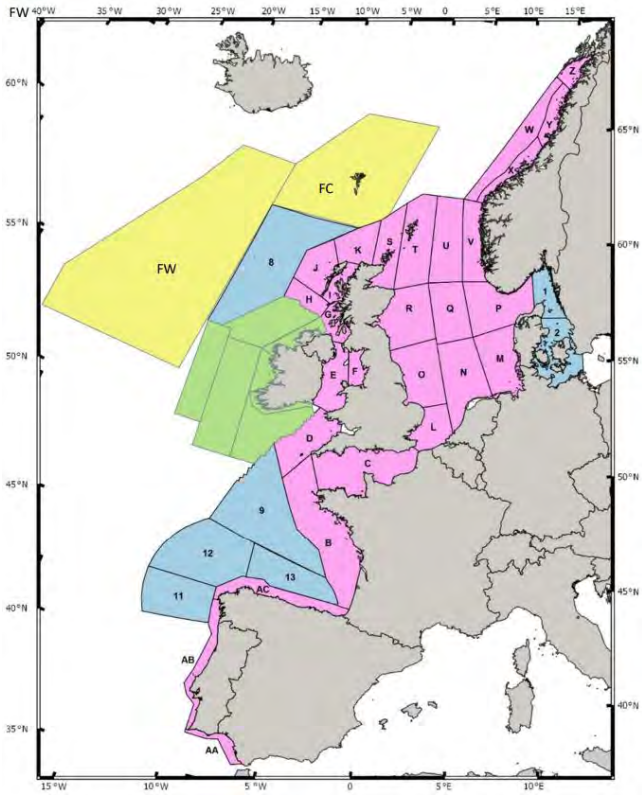
348. Volunteer based sightings data from around the south-west coast of England include shore watches by various organisations through and distance sampling surveys on ferry routes. MARINElife provide marine mammal observations on-board existing ferry and survey routes, including a route from Bideford / Ilfracombe to Lundy Island. Recent sightings on these ferry routes include common dolphin, harbour porpoise, and grey seal (MARINElife, 2021).

349. The Offshore Development Area is within the south-west England and south Wales region of the Sea Watch sightings data, and between the 30th August to 24th October 2021, three species of cetacean were commonly recorded in the region, including harbour porpoise, bottlenose dolphin (*Tursiops truncates*), and common dolphin. White-beaked dolphin and long-finned pilot whale were also recorded on the south coast of Devon and Cornwall respectively. The occasional minke whale, fin whale and humpback whale were recorded off the south coast of Cornwall (at Mounts Bay, Falmouth and Looe respectively), as well as grey seal (Sea Watch Foundation, 2021).

350. A large-scale survey of the presence and abundance of cetacean species around the north-east Atlantic, undertaken in the summer of 2016 (the SCANS III survey; Hammond *et al.,* 2021), indicates harbour porpoise, bottlenose dolphin, common dolphin, striped dolphin (*Stenella coeruleoalba*), and minke whale to be only cetacean species present in survey block D (Figure 2.6.1).

351. The JCP Phase III report (Paxton *et al.,* 2016) shows similar results, with relatively moderate densities of harbour porpoise and minke whale in the Celtic Sea, and relatively low densities of bottlenose dolphin (with a hot-spot off the west of Cornwall), and common dolphin (with a hot-spot off the south-west of Wales). The JCP data indicated that Risso's dolphin, Atlantic white-sided dolphin and white-beaked dolphin are not present in the Celtic Sea.

Figure 2.6.1 Area covered by SCANS-III and adjacent surveys. SCANS-III: pink lettered blocks were surveyed by air; blue numbered blocks were surveyed by ship. Blocks coloured green were surveyed by the Irish ObSERVE project. B (Hammond et al., 2017)



352. Distribution maps of cetacean species within the north-east Atlantic (Waggitt *et al.,* 2019; Figure 2.6.2) also indicate that harbour porpoise would be the most likely species to be present within the Offshore Development Area. Minke whale and common dolphin are also expected to be present, in line with other data sources. Bottlenose dolphin may be present in lower number, although it should be noted that the Waggitt *et al* (2019) data includes the offshore bottlenose dolphin ecotype, rather than the inshore resident ecotypes (e.g. the Cardigan Bay resident population are not included in these density maps). The Waggitt *et al*. (2019) data indicates that Risso's dolphin, killer whale (*Orcinus orca*), and white-beaked dolphin may also be present in the wider area, but in much lower numbers.

353. As noted above, the study for marine mammal species takes into account their wider MU; or the area over which individuals are considered to be of the same wider population. These areas are used to inform the area of which connectivity with the Offshore Development Area is possible. The MUs relevant to each species are shown in Figure 2.6.3.

Figure 2.6.2 Spatial variation in predicted densities (animals per km2) of cetacean species in January and July in the North-East Atlantic. Values are provided at 10km resolution. A different colour gradient is used for each species (Waggitt et al., 2019)

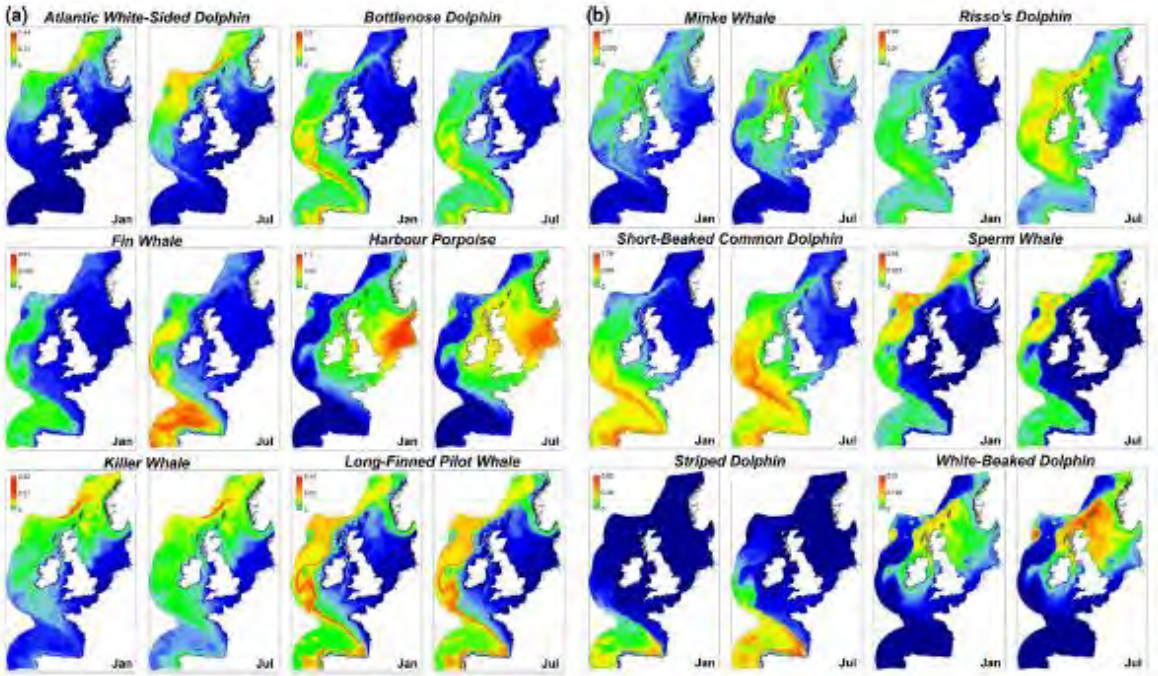
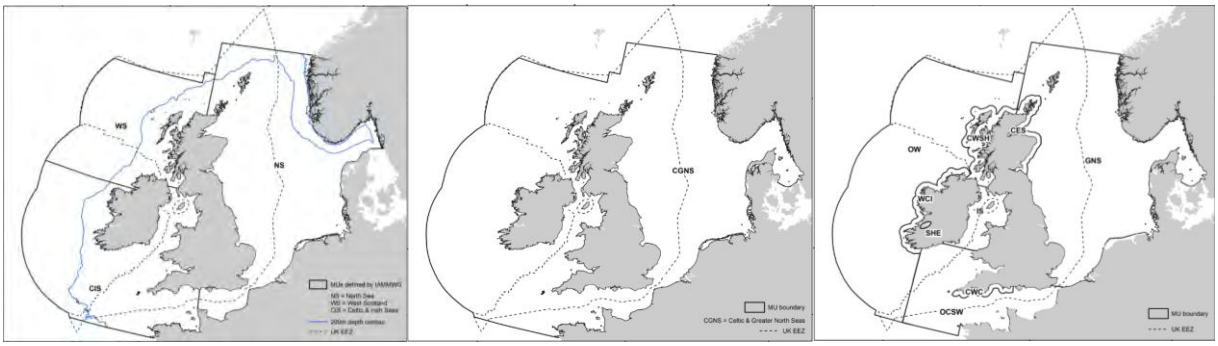


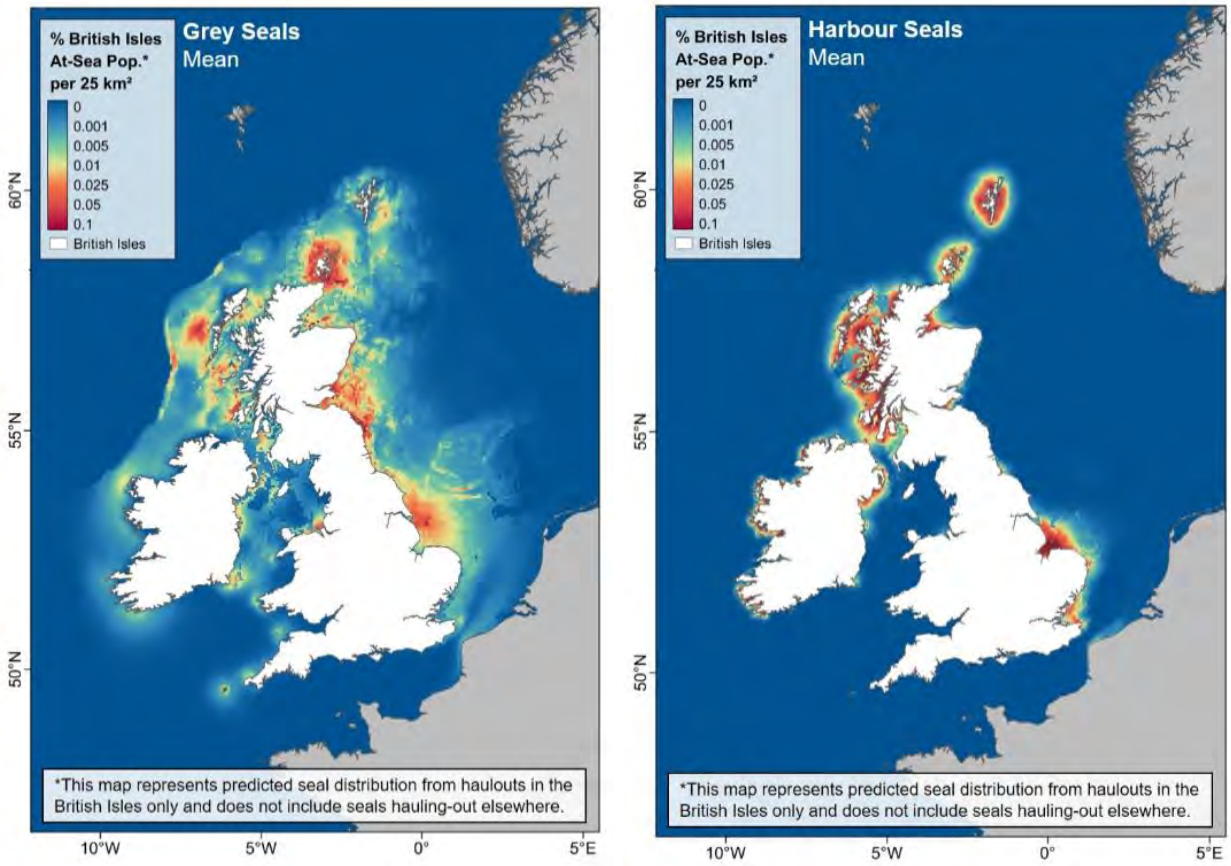
Figure 2.6.3 The MUs for each cetacean species considered to be likely present in the Offshore Development Area. [Left = harbour porpoise (Celtic and Irish Sea MU); Right = common dolphin & minke whale (Celtic and Greater North Sea MU); Bottom = bottlenose dolphin (Offshore Channel, Celtic Sea, & South West England MU)]. (IAMWWG, 2021)



Pinnipeds (seals)

354. Grey seal are present throughout the Celtic and Irish Sea in varying numbers. Densities of the species within the Offshore Development Area are relatively low in, while there are some localised areas of increased densities, particularly around Lundy Island (Carter *et al.,* 2020; Russell *et al.,* 2017; Figure 2.6.4).

Figure 2.6.4 Grey seal and harbour seal mean at-sea relative densities. [Left = grey seal relative densities; Right = harbour seal relative densities]. (Carter et al., 2020)



355. Harbour seal (*Phoca vitulina*) presence is low in the south-west of England and Wales.

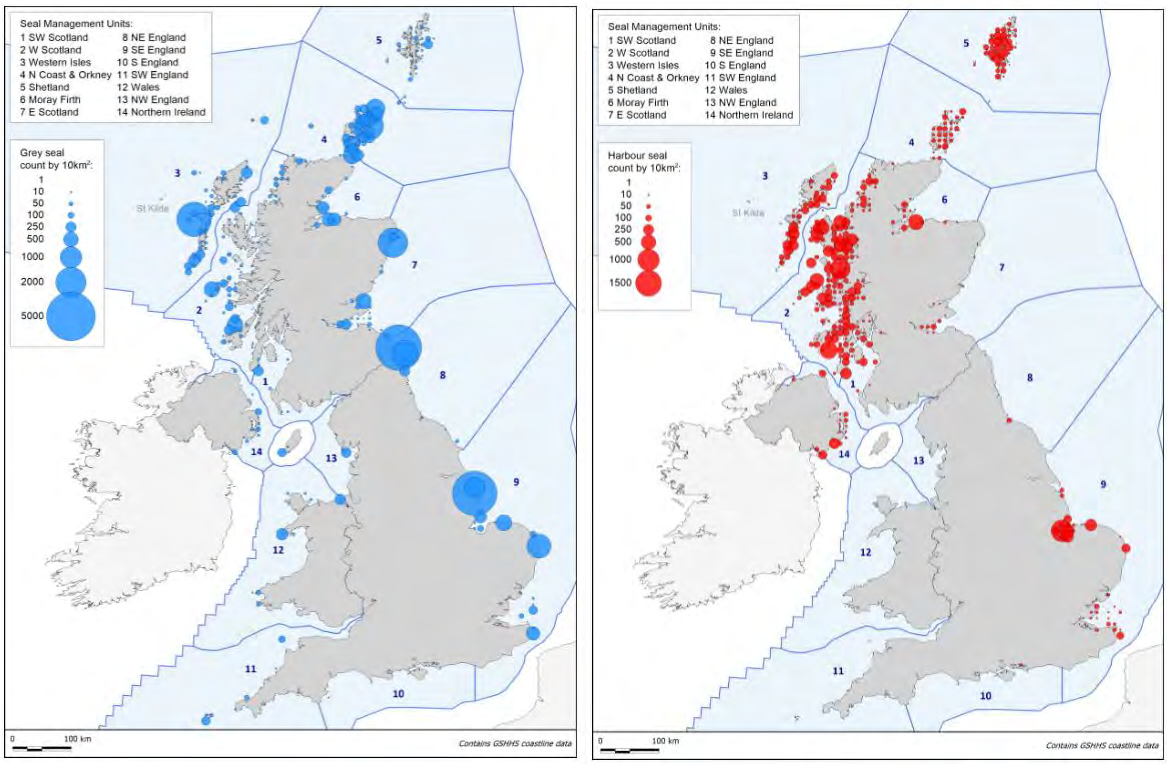
356. The latest SCOS report (SCOS, 2020) reports that, within the Southwest England MU, an estimated 500 grey seal are present, with an estimated 900 in the Wales MU. Of importance for the Offshore Development Area, is the haul-out site at Lundy Island; approximately 44km from the Windfarm Site, and 2.6km from the offshore area of search. Harbour seal are present in very low number in the same areas; with an estimated 10 individuals in the Wales MU, and none in the Southwest England MU.

357. The above sources suggest that harbour seal would not be present in the vicinity of the Offshore Development Area, and are rare throughout the Celtic and Irish Seas, and are therefore likely to be scoped out of further assessment.

358. As shown in Figure 2.6.5, there are a small number of grey seal haul-out sites within the Celtic and Irish Seas. The closest ones to the Offshore Development Area are at Lundy Island, and near Boscastle, along the north Cornwall coastline. Note

that Lundy Island is a designated SAC for grey seal, this is described in further detail below, and will be considered within the HRA screening report.

Figure 2.6.5 Grey and harbour seal haul-out locations (and MUs). [Left = grey seal; Right = harbour seal]. (SCOS, 2020).



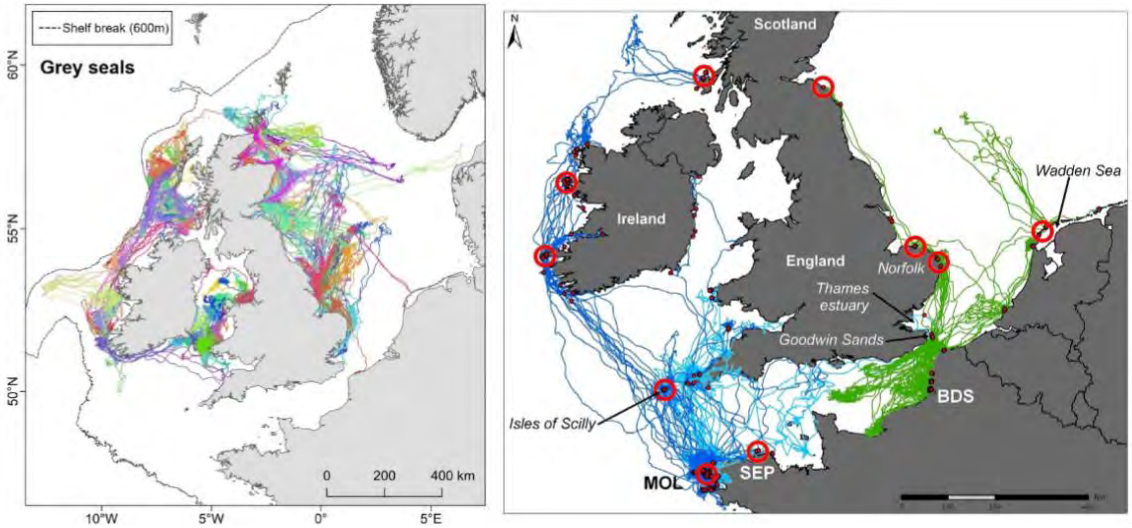
359. The latest grey seal pup production estimate for Cornwall was approximately 150 in 2019, and for the main breeding colony in Lundy was 43 pups in 2019 (SCOS, 2019). In total, the approximate pup production was estimated to be 450 in the Southwest England MU (SCOS, 2020).

360. Global positioning system (GPS) tracking data from tagged grey seals indicates there is the potential for grey seal to be present in the Offshore Development Area, and to travel some distance from Wales and Irish coastlines (Carter *et al.,* 2020). As shown in Figure 2.6.6, tagging data from the north coast of France also shows the potential for connectivity with the Offshore Development Area (Vincent *et al.,* 2017).

Marine turtles

361. Five species of marine turtle have been recorded in the UK, with the majority of sightings being of leatherback turtles (*Dermochelys coriacea*), and this species is considered to be resident in UK waters (DECC, 2016). Other species of marine turtle are considered to be rare or vagrant within UK waters.

Figure 2.6.6 Grey seal tagging studies [tagging of grey seal around UK coastlines (Carter et al., 2020); tagging of grey seal from the north coast of France (Vincent et al., 2017)]



362. Leatherback turtles migrate through UK waters, in response to food distributions. Nesting locations are in the tropics and sub-tropics, and then individuals migrate north, some towards the European shelf, reaching UK waters. Waters around the UK are at a temperate that reaches their lower limit, and the species are therefore only present in warmer summer months (specifically between June to October) (DECC, 2016).

363. Through surveys for aerial surveys for waterbirds, undertaken by the Wildfowl and Wetlands Trust (WWT) from 2001 to 2008, opportunistic sightings of marine turtles were also recorded. Sightings of marine turtle species were made on three occasions; all located between the south coast of Wales and the north Devon coast (WWT, 2009). Sightings and stranding's of marine turtles around the UK coast show the west coast of England and Wales to have relatively high presence of marine turtle species. Leatherback turtles were the most commonly reported species, with peak numbers in July, August, and September (Penrose & Gander, 2020).

Summary of Marine Mammal (and Turtle Species)

364. Initial assessments of the distribution of marine mammals and turtles throughout the Celtic and Irish Sea, as outlined above, has identified six marine mammal species and one marine turtle species that could occur in and around the Offshore Development Area (e.g. Hammond *et al.,* 2021; Paxton *et al.,* 2016; Waggitt *et al.,* 2019; Department of Energy and Climate Change (DECC) (now Department for Business, Energy and Industrial Strategy (BEIS) 2016; Special Committee on Seals (SCOS) 2020). These include:

- Likely present marine mammal and turtle species:

  - Harbour porpoise
  - Common dolphin
  - Minke whale
  - Grey seal
- Potentially present marine mammal and turtle species:
  - Bottlenose dolphin
  - Striped dolphin
  - Leatherback turtle

365. Other marine mammal species that have been recorded in the Celtic and Irish Sea in lower numbers include Risso's dolphin, killer whale, and harbour seal. The above listed species will be considered in further detail within the assessments, with the final scoped in list to be based on a full review of the desk-based baseline review, and the final results of the site-specific surveys.

Designated sites

366. The closest harbour porpoise SAC is the Bristol Channel Approaches SAC, which is less than 1.5km from the windfarm area, and the offshore Cable Corridor will pass through the SAC. Connectivity between the Offshore Development Area and all SACs with harbour porpoise as a qualifying feature in the Celtic and Irish Sea MU are considered within the HRA screening report.

367. For bottlenose dolphin, connectivity between the Offshore Development Area and all SACs with bottlenose dolphin as a qualifying feature in the both the Offshore Channel, Celtic Sea, & South West England MU and the Irish Sea MU will be considered during the HRA screening. More information on the reasoning behind the use of both Mus as the wider study area for bottlenose dolphin are included within the HRA screening report. The closest bottlenose dolphin SAC within this study area is the Cardigan Bay SAC, which is approximately 119km from the Offshore Development Area.

368. For grey seal, tagging studies and information on species' movements will be reviewed to determine the potential for connectivity between the Offshore Development Area and all SACs with grey seal as a qualifying feature in the Celtic and Irish Sea area. The closest SAC for grey seal is Lundy SAC, which is approximately 42km from the offshore windfarm area, and 1km from the offshore area of search.

2.6.6 Potential Impacts

369. The potential impacts during the construction, operation, maintenance and decommissioning phases are outlined below, and summarised in Table 2.17.

370. In addition, the potential for cumulative and transboundary impacts, as well as inter-relationships and interactions between impacts for the Project will also be determined and assessed.

Potential impacts during construction

371. The potential impacts for marine mammals and marine turtles during construction scoped in for further assessments in the EIA are outlined below.

Underwater noise

372. The key potential impacts during construction for marine mammals and marine turtles are expected to be those from underwater noise. Underwater noise has the potential for the following impact to on marine mammals (and marine turtles):

373. Activities that have the potential to generate underwater noise associated with the construction of the Project are:

- Clearance of unexploded ordnance (UXO), if required, at the Windfarm Site and along the cable route
- Piling of the pin-piles for the Offshore Substation
- Installation of foundations (depending on method used)
- Other construction activities such as seabed preparation, cable laying and rock placement
- Vessels

374. Site specific underwater noise modelling will be undertaken for all potential noise sources that could impact marine mammals and marine turtles. The potential impacts associated with underwater noise during construction has been scoped in and will be assessed in the EIA, taking into account the most recent and robust research, guidance and information available.

375. A Marine Mammal Mitigation Protocol (MMMP) will be produced to reduce the risk of physical injury or permanent auditory injury (Permanent Threshold Shift (PTS)) in marine mammals from underwater noise (see Section 2.6.7). This will also include any mitigation requirements for marine turtles.

Vessel Interaction

376. Other impacts to be considered during the construction phase would for the potential for interactions / an increase in collision risk with construction vessels. Despite the potential for marine mammals to detect and avoid vessels, ship strikes are known to occur (Wilson *et al.,* 2007). An increase in vessels could potentially lead to an increase in vessel collision risk.

377. The increased risk of collision with marine mammals and marine turtles during construction has been scoped in and will be assessed in the EIA, taking into account the most recent and robust research, guidance and information available.

Disturbance at Seal Haul-Out Sites

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

379. Disturbance from vessel transits to and from the Project and the local port also has the potential to disturb seals at haul-out sites, depending on the route and proximity to the haul-out sites. Depending on the Landfall selected and the vessel routes, there is the potential for disturbance at seal haul-out sites (i.e. at the nearby Lundy Island). The potential for disturbance at seal haul-out sites will therefore be assessed, taking into account finalised Cable Corridors.

380. The potential for any disturbance of seals from haul-out sites foraging at sea will also be determined.

381. The potential for any disturbance of seals at or from seal haul-out sites during construction has been scoped in and will be assessed in the EIA, taking into account the most recent and robust research, guidance and information available.

Changes to Water Quality

382. The increases in suspended sediments and for the accidental release of contamination during construction has the potential to impact marine mammals, marine turtles and their prey. Any changes to water quality would be localised and short lived, and the potential for any impacts from changes in water quality on marine mammals or their prey is expected to not be significant.

383. Potential impacts on marine mammals and turtles related to changes in water quality during construction are scoped in for assessment in the EIA. Impacts will be based on the assessments on the potential for water quality changes determined in the Marine Water and Sediment Quality Chapter (see Section 2.3), including the management measures that would be put in place.

Changes to Prey Resource

384. As outlined in Section 2.5, the potential impacts on fish species and therefore the prey resource for marine mammals and marine turtles during construction can result from:

- Physical disturbance and temporary habitat loss of seabed habitat, spawning or nursery grounds or migration
- Permanent habitat loss
- Increased suspended sediments and sediment re-deposition
- Re-mobilisation of contaminated sediment
- Underwater noise impacts to hearing sensitive species during pile driving and other activities (vessels, seabed preparation, cable installation etc)
- Introduction of anchors, foundations, scour protection and hard substrate and associated fish aggregation
- Cumulative impacts from underwater noise, permanent habitat loss, and changes to seabed habitat

385. The potential for any changes to the prey resource for marine mammals and marine turtles during construction will be assessed further in the EIA. Impacts will be based on the assessments in the Fish and Shellfish Ecology Chapter (see Section 2.5).

Potential impacts during operation

386. The potential impacts for marine mammals and marine turtles during operation and maintenance (O&M) scoped in for further assessments in the EIA are outlined below.

Underwater Noise

387. Potential sources of underwater noise during the operation and maintenance phase include:

- Operational noise from WTGs and from movement of floating turbine moorings on the seabed
- Maintenance activities, such as cable re-burial and any additional rock placement
- Operation and maintenance vessel activity

388. The potential for disturbance from underwater noise during the operation and maintenance phase will be based on the underwater noise modelling and assessment of similar activities for the construction phase. If suitable underwater noise data is not available for noise levels associated with the underwater noise from the floating operational turbines, then a suitable proxy such as dredging will be used.

389. The potential impacts associated with underwater noise during operation and maintenance (including PTS, TTS, disturbance and behavioural effects, impacts on prey species and barrier effects) are scoped in and will be considered further in the EIA, taking into account the most recent and robust research, guidance and information available.

Entanglement

390. Depending on the method used, there is the perceived potential for entanglement in the mooring systems for floating offshore wind turbines. To date, there have been no recorded instances of marine mammal entanglement from mooring systems of renewable devices (Sparling *et al.,* 2013; Isaacman and Daborn, 2011), or for anchored FPSO vessels in the oil and gas industry (Bejamins *et al.,* 2014) with similar mooring lines as proposed for floating turbine structures.

391. The level of risk to become entangled varies with species (Benjamins *et al.,* 2014), these varying factors include body size, flexibility of movement, the ability to detect mooring lines, and the feeding ecology of the species.

392. Toothed whales have a lower risk than baleen whales, primarily due to their small size and manoeuvrability. Seal species have a similar risk level to small toothed cetaceans, with an increase in manoeuvrability.

393. The potential for entanglement has been scoped in and will be assessed further in the EIA, taking into account the risk to each marine mammal species and the worst-case parameters for the mooring lines of the floating turbines.

394. The risk from indirect entanglement in anthropogenic debris, such as the lost, abandoned or discarded fishing gear and other marine debris caught in the mooring lines, has all also been scoped in and will be assessed further in the EIA.

Vessel Interaction

395. As outlined for construction, the increased risk of collision with marine mammals and marine turtles will be given further consideration in the EIA. It is anticipated that the impacts associated with vessel activities during operation and maintenance would be similar to, or less than those during the construction phase, due to a likely lower number of vessels.

396. The increased risk of collision with marine mammals and marine turtles during operation has been scoped in and will be assessed in the EIA, taking into account the most recent and robust research, guidance and information available.

Disturbance at Seal Haul-Out Sites

397. As outlined for construction, depending on the vessel routes, there is the potential for disturbance at seal haul-out sites (i.e. at Lundy). As for constriction, once the final Offshore Cable Corridor and Landfall locations are known, the potential for disturbance to seal haul-out sites will be reconsidered. If seal haul-out sites are not identified within close proximity to the Landfall, once the final Landfall is selected, disturbance at seal haul-out sites will be scoped out of further assessment. However, it is anticipated that the impacts associated with vessel activities during operation and maintenance would be similar to those during the construction phase, although the magnitude of effect (number of vessels) is likely to be lower.

398. The potential for any disturbance of seals at or from seal haul-out sites during operation has been scoped in and will be assessed in the EIA, taking into account the most recent and robust research, guidance and information available.

Changes to Prey Resource

399. As outlined in Section 2.5, the potential impacts on fish species and therefore the prey resource for marine mammals and marine turtles during operation and maintenance can result from:

- Permanent loss of habitat
- Introduction of hard substrate
- Underwater noise
- Maintenance activities
- EMF

400. The potential for any changes to the prey resource for marine mammals and marine turtles during operation and maintenance has been scoped in and will be assessed further in the EIA. Impacts will be based on the assessments in the Fish and Shellfish Ecology Chapter (see Section 2.5).

Physical Barrier Effects

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

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

porpoise and seals, have been known to forage within operational Windfarm Sites (with fixed foundation) (e.g. Lindeboom *et al.,* 2011; Russell *et al.,* 2014) indicating no restriction to movements.

403. As the spacing between moorings of the wind turbines is expected to be 1km, this would allow animals to move between devices and through the operational windfarm. In addition, the Project is not located on any known marine mammal migration routes.

404. However, as a precautionary approach the potential for any barrier effects as result of the physical presence of the windfarms has been scoped in and will be considered further in the EIA. Note that the potential for any acoustic barrier effects as a result of underwater noise during construction will be included as part of the underwater noise assessment.

Changes to Water Quality

405. Potential impacts to marine mammals, turtles and their prey related to changes in water quality during operation are scoped in for assessment. Impacts will be based on the assessments on the potential for water quality changes determined in the Marine Water and Sediment Quality Chapter (see Section 2.3), including the management measures that would be put in place.

Impacts of EMF

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

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

408. Harbour porpoise are known to move in and out of the Baltic Sea, over several operating subsea cables in the Skagerrak and western Baltic Sea with no apparent effect to their migratory movements. There is also no evidence to suggest that seal species respond to EMF (Gill *et al.,* 2005). In addition, as outlined above, data from a number of operational windfarms show no evidence of exclusion of marine mammals, including harbour porpoise and seals.

409. As a precautionary approach the potential for EMF to impact on marine mammal, marine turtles and their prey species is scoped in for further assessment in the EIA.

Potential impacts during decommissioning

410. It is anticipated that the decommissioning impacts would be similar in nature to those of construction, although the magnitude of impact is likely to be lower depending on the method used during decommissioning.

Potential cumulative impacts

411. The CIA will identify where the predicted impacts of the of the Project (during construction, operation, maintenance and decommissioning) could interact with impacts from different plans or projects.

412. The types of plans and projects to be taken into consideration are as listed in Section 1.9. Screening of the plans and projects will be considered based on the following key points:

- They are located in the relevant marine mammal MU
- There is the potential for cumulative impacts during the construction, operational or decommissioning of the proposed Project

413. The marine mammal CIA will consider projects, plans and activities which have sufficient information available to undertake the assessment.

414. The potential cumulative impacts that will be assessed further in the EIA in relation to marine mammals and marine turtles are:

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

Potential transboundary impacts

415. There is a significant level of marine development being undertaken or planned by Ireland in the Irish Sea, and in the English Channel (by France). Populations of marine mammals are highly mobile and there is potential for transboundary impacts especially when considering noise impacts.

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

417. The potential for transboundary impacts will be addressed by considering the reference populations (MUs) and potential linkages to international designated sites as identified through telemetry studies for seals and ranges and movements of cetacean species.

418. The assessment of the effect on the integrity of the transboundary European sites as a result of impacts on the designated marine mammal populations will be undertaken and presented in the information for the HRA.

419. Transboundary impacts will also be considered within the cumulative and in-combination assessment.

Inter-Relationships

420. For marine mammals and marine turtles, potential inter-relationships between impact pathways will be determined for the project. A signposting to relevant Chapters in the EIA where these potential inter-relationship impacts have been assessed will be provided.

Interactions

421. The impacts identified and assessed for marine mammals and marine turtles have the potential to interact with each other, which could give rise to synergistic impacts due to that interaction. The potential interactions of impacts for the project will be assessed for marine mammals and marine turtles in the EIA.

2.6.7 Mitigation Measures

422. Mitigation measures will be developed as site specific information becomes available, the project design is refined, and the EIA is prepared. A number of mitigation measures that may be appropriate could be embedded within the design and accounted for within the assessment of impacts. Further mitigation measures may be proposed in response to impact assessments. These will evolve as the project design develops and the EIA progresses, and/or in response to consultation.

423. A Marine Mammal Mitigation Protocol (MMMP) will be produced to reduce the risk of physical injury or permanent auditory injury (PTS) in marine mammals and potential mortality of marine turtles from underwater noise. A draft MMMP will be provided with the submitted ES. The final MMMP will be developed in the pre-construction period and based upon best available information, methodologies, industry best practice, latest scientific understanding, current guidance and detailed project design. The MMMP will be developed in consultation with the relevant stakeholders.

424. If required, a wildlife licence application will be submitted prior to construction, for the protection of cetacean species from injury or significant disturbance.

425. Potential mitigation measures will be consulted upon with stakeholders throughout the EIA process. The results of the EIA and HRA would inform the need for any additional mitigation requirements over and above the standard measures typically used for OWF construction. Examples of additional measures that could be considered include (noting that more options may be available in the future):

- Noise Abatement Systems (NAS) to reduce noise at source for piling and UXO
- Use of Acoustic Deterrent Devices (ADDs) to ensure marine mammals are not within any potential permanent auditory injury zone
- Lower impact methods of construction, such as low-order detonation for UXO, alternate foundations and piling installation techniques
- Seasonal restrictions/timing considerations for noisy activities

426. Monitoring requirements will be agreed with the relevant stakeholders. However, it is proposed that underwater noise monitoring will be undertaken during the installation of the mooring systems and during operation of the turbines to provide background noise profiles for the floating wind turbines (as undertaken on Kincardine offshore windfarm). The noise levels will be compared to ambient noise levels and predicted noise levels used in the assessments. This data will address data gaps on the underwater noise levels for the installation and operation of floating offshore windfarms, which will be beneficial to subsequent developments.

2.6.8 Approach to Assessment and Data Collection

Approach to Data Collection

427. Where possible, the potential impacts scoped in will be assessed based on the potential area of impact. Marine mammal density information from site specific surveys where possible (and the most recent and robust density information publicly available from other sources) will be used to determine the number of marine mammals that could potentially be impacted. Assessments will be put into the context of the relevant reference populations (MUs) in order to identify the potential for any population effects.

428. Table 2.15 provides the data sources that would be utilised to inform these quantitative assessments for marine mammals.

Table 2.15 Summary of data sources that will be used within the assessments for marine mammals

Species	Type / description of data	Source
Harbour porpoise, common dolphin, minke whale	Cetacean density estimates (worst-case density for each specific species would be used)	o SCANS-III: Estimates of cetacean abundance in European Atlantic waters in summer 2016 (Hammond *et al.,* 2017) o Revised Phase III data analysis of JCP data resources (Paxton *et al.,* 2016) o Distribution maps of cetacean and seabird populations in the North-East Atlantic (Waggitt *et al.,* 2019) o Site-specific surveys for the Windfarm Site (plus 4km buffer) (where possible)
	Cetacean population estimates	o Management Units for cetaceans in UK waters (IAMMWG, 2021)
Grey seal	Pinniped density estimates (worst-case density for each specific species would be used)	o UK seal at sea density estimates and usage maps (Russell *et al.,* 2017; Carter *et al.,* 2020) o Site-specific surveys for the Windfarm Site (plus 4km buffer) (where possible)
	Pinniped population estimates	o SCOS annual reporting of scientific advice on matters related to the management of seal populations (e.g. SCOS, 2020).

Consultation

429. Consultation is a key part of the EIA process. Consultation with key marine mammal stakeholders will be ongoing through the Evidence Plan Process, and will include discussion of the best available information to use, for example, to agree species density estimates and define reference populations for the assessments.

430. A schedule for the Marine Mammal meetings, and topics to be discussed, will be prepared following feedback on this scoping report.

Approach to Assessment of Impacts

Underwater noise modelling

431. Site specific underwater noise modelling will be undertaken for the Project for all potential underwater noise sources, as listed in the sections above.

432. Underwater noise modelling will be used to determine the potential risk of physical injury, auditory injury, disturbance and barrier effects resulting from the underwater noise for marine mammal species, marine turtles and fish / prey species. This will be undertaken using the latest and best available information, in particular relating to criteria and thresholds, for predicting the noise impact ranges for all species, including:

- Marine mammals:
  - The peak Sound Pressure Level (SPL_{peak}), Sound Exposure Level for a single strike (SEL_{ss}) and cumulative exposure (SEL_{cum}) thresholds based on Southall *et al.* (2019) criteria for PTS and TTS in porpoise, dolphin, whale, and seal species
  - Behavioural response of harbour porpoise using the Lucke *et al*. (2009) threshold
  - The SEL_{cum} scenarios for marine mammals will be completed assuming a fleeing receptor
- Marine turtles:
  - The SPL_{peak} and SEL_{cum} thresholds for mortality in turtles based on Popper *et al.,* (2014)
- Fish species:
  - The SPL_{peak}, SEL_{ss} and SEL_{cum} thresholds for mortality, recoverable injury and TTS in fish based on Popper *et al.,* (2014)
  - Behavioural response of fish using the Hawkins (2014) threshold
  - The SEL_{cum} scenarios for fish species will be completed assuming both a stationary and fleeing receptor

Impact assessment methodology for marine mammals

433. The overall approach to the EIA is presented in Section 1.9. The assessment for marine mammals follows this overall approach, with some specific references applicable to marine mammals where appropriate as outlined in this section.

Sensitivity and Value

434. The determination of sensitivity of marine mammals will follow the methodology as provided in Section 1.9. In addition, for some assessments the 'value' of a receptor may also be an element to add to the assessment where relevant – for instance if the receptor is designated or has an economic value.

435. The 'value' of the receptor forms an important element within the assessment, for instance, if the receptor is a protected species or habitat or has an economic value. In the case of marine mammals, most species are protected by a number of

international commitments as well as European and UK law and policy. All cetaceans and marine turtles in UK waters are European Protected Species (EPS) and, therefore, are internationally important. Harbour porpoise, bottlenose dolphin, grey seal and harbour seals are also afforded international protection through the designation of Natura 2000 sites. As such, all species of marine mammal and marine turtle can be considered to be of high value.

Magnitude

436. The thresholds for defining the potential magnitude of effect that could occur from a particular impact will be determined using expert judgement, current scientific understanding of marine mammal population biology, and JNCC *et al.* (2010) draft guidance on disturbance to EPS species. The JNCC *et al.* (2010) EPS draft guidance suggests definitions for a 'significant group' of individuals or proportion of the population for EPS species. As such this guidance has been considered in defining the thresholds for magnitude of effects.

437. The JNCC *et al.* (2010) draft guidance provides some indication on how many animals may be removed from a population without causing detrimental effects to the population at Favourable Conservation Status (FCS). The JNCC *et al.* (2010) draft guidance also provides limited consideration of temporary effects, with guidance reflecting consideration of permanent displacement.

438. Temporary effects are considered to be of medium magnitude at greater than 5% of the reference population. JNCC *et al.* (2010) draft guidance considered 4% as the maximum potential growth rate in harbour porpoise, and the 'default' rate for cetaceans. Therefore, beyond natural mortality, up to 4% of the population could theoretically be permanently removed before population growth could be halted. In assigning 5% to a temporary impact in this assessment, consideration is given to uncertainty of the individual consequences of temporary disturbance.

439. Permanent effects with a greater than 1% of the reference population being affected within a single year are considered to be high in magnitude in this assessment. This is based on Agreement on the Conservation of Small Cetaceans of the Baltic and North Seas (ASCOBANS) and Department for Environment, Food and Rural Affairs (Defra) advice (Defra, 2003; ASCOBANS, 2015) relating to impacts from fisheries by-catch (i.e. a permanent effect) on harbour porpoise. A threshold of 1.7% of the relevant harbour porpoise population above which a population decline is inevitable has been agreed with Parties to ASCOBANS, with an intermediate precautionary objective of reducing the impact to less than 1% of the population (Defra, 2003; ASCOBANS, 2015).

Table 2.16 Definitions of levels of magnitude for marine mammals

Magnitude	Definition
High	Permanent irreversible change to exposed receptors or feature(s) of the habitat which are of particular importance to the receptor. Assessment indicates that more than 1% of the reference population are anticipated to be exposed to the effect. OR Long-term effect for 10 years or more, but not permanent (e.g. limited to operational phase of the Projects). Assessment indicates that more than 5% of the reference population are anticipated to be exposed to the effect. OR Temporary effect (e.g. limited to the construction phase of development) to the exposed receptors or feature(s) of the habitat which are of particular importance to the receptor. Assessment indicates that more than 10% of the reference population are anticipated to be exposed to the effect.
Medium	Permanent irreversible change to exposed receptors or feature(s) of the habitat of particular importance to the receptor. Assessment indicates that between 0.01% and 1% of the reference population anticipated to be exposed to effect. OR Long-term effect for 10 years or more, but not permanent (e.g. limited to operational phase of the Projects). Assessment indicates that between 1% and 5% of the reference population are anticipated to be exposed to the effect. OR Temporary effect (e.g. limited to the construction phase of development) to the exposed receptors or feature(s) of the habitat which are of particular importance to the receptor. Assessment indicates that between 5% and 10% of the reference population anticipated to be exposed to effect.
Low	Permanent irreversible change to exposed receptors or feature(s) of the habitat of particular importance to the receptor. Assessment indicates that between 0.001% and 0.01% of the reference population anticipated to be exposed to effect. OR Long-term effect for 10 years or more, but not permanent (e.g. limited to operational phase of the Projects). Assessment indicates that between 0.01% and 1% of the reference population are anticipated to be exposed to the effect. OR Intermittent and temporary effect (e.g. limited to the construction phase of development) to the exposed receptors or feature(s) of the habitat which are of particular importance to the receptor.

Magnitude	Definition
	Assessment indicates that between 1% and 5% of the reference population anticipated to be exposed to effect.
Negligible	Permanent irreversible change to exposed receptors or feature(s) of the habitat of particular importance to the receptor. Assessment indicates that less than 0.001% of the reference population anticipated to be exposed to effect. OR Long-term effect for 10 years or more (but not permanent, e.g. limited to lifetime of the Projects). Assessment indicates that less than 0.01% of the reference population are anticipated to be exposed to the effect. OR Intermittent and temporary effect (limited to the construction phase of development or Project timeframe) to the exposed receptors or feature(s) of the habitat which are of particular importance to the receptor. Assessment indicates that less than 1% of the reference population anticipated to be exposed to effect.

Impact Significance

440. Following the identification of receptor sensitivity and the magnitude of the effect, the impact significance will be determined using the matrix approach as set out in Section 1.7.

2.6.9 Summary of Scoped In Impacts

441. Table 2.16 outlines the impacts which are proposed to be scoped into and/or out of the EIA. This may be refined as additional information and data become available.

Table 2.17 Summary of impacts relating to marine mammals and marine turtles

Potential Impact	Construction	Operation	Decommissioning
Underwater noise during UXO clearance	✓	x	x
Underwater noise during foundation installation	✓	x	x
Underwater noise from other activities (for example rock placement and cable laying)	✓	✓	✓
Underwater noise and presence of vessels	✓	✓	✓
Underwater noise from operational wind turbines	x	✓	x
Barrier effects from underwater noise	✓	✓	✓

Potential Impact	Construction	Operation	Decommissioning
Collision risk with vessels	✓	✓	✓
Entanglement	x	✓	x
Disturbance at seal haul-out sites	✓	✓	✓
Changes in water quality	✓	✓	✓
Changes to prey availability (including from habitat loss and EMF)	✓	✓	✓
Barrier effects from physical presence of windfarm	x	✓	✓
Electromagnetic fields direct and indirect effects	✓	✓	✓
Cumulative impacts from underwater noise	✓	✓	✓
Cumulative impacts from collision risk and entanglement	✓	✓	✓
Cumulative changes to prey availability (including habitat loss)	✓	✓	✓
Transboundary impacts	✓	✓	✓
Inter-relationships	✓	✓	✓
Interactions	✓	✓	✓

Key:
✓ Impact scoped in
✗ Impact scoped out

2.7 Offshore Ornithology

2.7.1 Introduction

442. The offshore ornithology impact assessment will consider potential effects on all offshore ornithology receptors, including seabirds and other bird species passing through offshore areas (migratory species), due to the construction, operation and decommissioning of the Project, both alone and cumulatively with other projects.

443. Offshore ornithology is a key potential constraint for OWFs. While individual developments may have relatively minor predicted impacts, the cumulative impacts of multiple projects may have population level effects on key populations of offshore ornithology receptors. It is expected that the Evidence Plan Process for offshore ornithology will include extensive discussions on a wide range of assessment approaches (e.g. apportioning, assessment of collision risk and displacement, and modelling to put these impacts into context). Whilst these will be based on industry

standard approaches used at other OWFs, details have not been included here and will be agreed with key stakeholders.

444. The assessment will be informed principally by analysis of site-specific survey data and expert understanding of the seabird species present in the vicinity of the Project. As well as consideration of the regional seabird and migratory species populations, the potential for connectivity to statutory sites designated for nature conservation, which have birds listed as qualifying features will be reviewed.

2.7.2 Policy, Legislation and Guidance

445. Section 1.5 describes the wider policy and legislative context for the Project. The assessment of potential impacts upon offshore ornithology will be made with specific reference to the relevant National Policy Statements (NPS). These are the principal decision-making documents for Nationally Significant Infrastructure Projects (NSIPs). Those relevant to the Project are:

- Overarching NPS for Energy (EN-1)
- NPS for Renewable Energy Infrastructure (EN-3)
- NPS for Electricity Networks Infrastructure (EN-5)

446. The most relevant EIA guidance for offshore ornithology receptors is CIEEM (2018). The EIA methodology that will be applied to the Project will be based on this guidance. In addition, approaches to assessment will take into account the latest advice from SNCBs (e.g. Natural England) from other ongoing OWF and NSIP projects. This is to ensure that the assessment is as robust as possible.

2.7.3 Study Area

447. The Study Area for the offshore ornithology baseline surveys encompasses the Project plus a 4km buffer.

448. In addition, the area of search for the export cable will require assessment for impacts. These are not covered by the baseline surveys. This is standard practice for offshore ornithology assessments, given that the aspect of the Project with the greatest potential for impacts on offshore ornithology receptors is the array itself.

2.7.4 Baseline Data

449. The primary source of information to inform the offshore ornithology baseline is a programme of 24 monthly aerial digital surveys of the study area. This is being undertaken by APEM Ltd. Surveys commenced in July 2020, and will be completed in June 2022. The survey method uses a grid-based survey design with nine

transects spaced 1.4km apart, flown at 1,300ft (396m) resulting in a 1.5cm ground sampling distance (GSD). The surveys achieve approximately 40% captured coverage. The data to be analysed will result in approximately 10% survey coverage.

450. The surveys are being carried out using a high-resolution camera system to capture digital still imagery to assess the abundance and distribution of offshore ornithology receptors within the study area. Information on species distribution, flight height and flight direction is also being recorded.

451. As the area of search for the export cable is largely outwith the study area for the baseline surveys, an assessment approach using existing data sources will be necessary, as is standard for the assessment of Export Cable Corridors for impacts on offshore ornithology receptors. Where the area of search for the export cable meets intertidal habitat and makes Landfall (in the Taw-Torridge Estuary), it is currently proposed to use British Trust for Ornithology (BTO) Wetland Bird Survey (WeBS) data as the primary data source to inform the baseline. The Taw-Torridge Estuary is divided into multiple count sectors, all of which have received multiple (up to ten) visits per year for five years or more. Further information on this approach will be made available separate to this report.

452. In addition, a desk study considering all known and available relevant literature will also be undertaken to ensure a comprehensive baseline is used for the assessment.

2.7.5 Baseline Environment

453. At the time of writing, information (including design-based density estimates) from 12 digital aerial surveys (July 2020 to June 2021) was available. In total, 12 offshore ornithology receptors were identified to species level. The following paragraphs summarise the findings of the July 2020 to June 2021 surveys across the study area (i.e. the Project plus 4km buffer) for receptors identified to species level. The final assessment will undertake a systematic and thorough review of all survey findings to inform the baseline, including consideration of densities within the Project itself, and apportioning of seabirds (particularly during the HRA) to particular breeding and non-breeding populations using the best available methodologies and evidence.

454. One of the most abundant species groups at certain times of year was shearwaters. Birds were recorded in July and August 2020, and March to June 2021. Almost all of these birds were Manx shearwaters, which breed at Skomer, Skokholm and the Seas off Pembrokeshire SPA, located approximately 65km to the north of the study area, or Lundy, located approximately 70km east of the study area. Based on the respective population sizes (349,663 pairs at Skokholm in 2018, and 5,505 pairs at

Lundy in 2017), and at-sea distributions from a multi-colony tracking study (Dean et al., 2015), it is anticipated that the majority of birds recorded will originate from Skomer, Skokholm and the Seas off Pembrokeshire SPA, of which Manx shearwater is a qualifying feature. Study area densities during the breeding season (April to August (Furness, 2015) ranged from 10 birds per km^2 to 100 birds per km^2, and were <5 birds per km^2 in September and March, which are months when migration is occurring. During the migration periods (August to early October and late March to May (Furness, 2015)), birds recorded belong to the UK Western Waters plus Channel BDMPS.

455. Auks (i.e. guillemots, razorbills and puffins) were recorded on each of the 12 surveys for which data were available. Peak guillemot densities (21 birds per km^2) were recorded across the study area in May 2021, though outside this survey, breeding season (March to August (Furness, 2015)), densities were lower; between 0 and 3 birds per km^2. This species breeds in similar numbers (circa 2,000-3,000 pairs) at Lundy (situated approximately 65km from the Project) and Skomer, Skokholm and the Seas off Pembrokeshire SPA (situated approximately 70km from the Project), though it is not a qualifying feature. Modelled at-sea breeding season distribution for this species indicates that generally speaking the study area is unimportant for this species at this time of year, since it lies outside the 95% utilisation distribution (Cleasby *et al*., 2018; Wakefield et al., 2017), though clearly, relatively high densities in the study area are possible. During the non-breeding season (September to February (Furness, 2015)), guillemot densities were <5 birds per km^2; birds recorded in the study area at this time of year form part of the UK Western Waters BDMPS (Furness, 2015). Razorbills were recorded at lower densities across the study area, with a clear peak during the non-breeding season (August to March (Furness, 2015)) in December 2020 and January 2021 of 2 to 2.5 birds per km^2. These birds belong to the UK Western Waters BDMPS (Furness, 2015). During the breeding season (April to July (Furness, 2015)), study area densities were low; <0.2 birds per km^2. It is possible that these birds were associated with colonies at Skomer, Skokholm and the Seas off Pembrokeshire SPA, or smaller colonies located on the north Cornwall coast. As per guillemot, modelled at-sea breeding season distribution for this species indicates that generally speaking the study area is unimportant for this species at this time of year, since it lies outside the 95% utilisation distribution (Cleasby et al., 2018; Wakefield et al., 2017). Puffin densities within the study area were also low; maximum recorded densities were 0.3 birds per km^2 during the non-breeding season (mid-August to March (Furness, 2015)) in November 2020, and 0.13 birds per km^2 during the breeding season (April to early August (Furness, 2015)) in May 2021. During the non-breeding season, birds present belong to the

UK Western Waters BDMPS (Furness, 2015). During the breeding season, birds are likely to originate from Lundy, where 375 individuals were recorded during the 2017 breeding season.

456. Gannets were encountered on all 12 surveys for which information was available. Peak densities were recorded during the breeding season (March to September (Furness, 2015)), with up to 3 birds per km^2 recorded across the study area. Outside the breeding season, densities fell to below 1 bird per km^2. Birds recorded during the breeding season will likely have been associated with the Grassholm SPA, for which gannet is a qualifying feature. This is based on modelled at-sea breeding season distribution (Wakefield et al., 2013), as well as the relative proximity of known breeding colonies to the study area. Outside the breeding season, birds will belong to the UK Western Waters BDMPS (Furness, 2015).

457. Kittiwakes occurred in peak density in the early part of their spring migration (January 2021; 6 birds per km^2). Birds present during the non-breeding season (September to February (Furness, 2015)) form part of the UK Western waters plus Channel BDMPS (Furness, 2015). Peak kittiwake densities were substantially lower during the breeding season (March to August (Furness, 2015)), with a peak of 0.6 birds per km^2 in March 2021). This indicates that the study area is of limited importance for this species during the breeding season, which is supported by modelled at-sea breeding season distribution of this species showing that parts of the study area fall within the 95% utilisation distribution, but not within hotspot areas (Cleasby *et al.*, 2018; Wakefield *et al.*, 2017).

458. Herring gull was recorded in peak densities of 0.69 birds per km^2 during the breeding season (March to August (Furness, 2015)) in June 2021, and 0.52 birds per km^2 during the non-breeding season (September to February (Furness, 2015)) in December 2020. During the breeding season, birds may have originated from a number of colonies including Lundy, smaller colonies on the north Devon and Cornwall coast, or the Skomer, Skokholm and the Seas off Pembrokeshire SPA. Herring gull is not a qualifying feature of this SPA. During the non-breeding season, birds recorded in the study area belong to the UK Western Waters BDMPS (Furness, 2015).

459. Two other gulls species were recorded in the study area during the breeding and non-breeding seasons at low density during the first year of baseline surveys. Great black-backed gull was present at densities of 0.1 birds per km^2 during the breeding season (late March to August (Furness, 2015)) in June 2021, and 0.4 birds per km^2 during the non-breeding season (September to March (Furness, 2015)) in December 2020. Lesser black-backed gull was recorded at peak densities of 0.07 birds per km^2

during the breeding season (April to August (Furness, 2015)) in May 2021, and 0.4 birds per km^2 during the non-breeding season (September to March (Furness, 2015)) in December 2020. No lesser black-backed gulls were recorded within the Project itself; all records were located within the 4km buffer.

460. Fulmars were recorded in the study area in seven of the 12 monthly surveys for which data were available, encompassing both breeding (January to August) and non-breeding (September to December) periods for this species (Furness, 2015). Densities were generally low; around 0.2 birds/km^2 or less for all months except one. During this month (December 2020), the density was 1.83 birds/km^2. Whilst occasionally present during surveys at higher density, it seems as though the study area is generally of limited importance to this species.

461. Sandwich tern and common tern were both recorded in the study area on a single occasion during the first 12 baseline surveys. The Sandwich tern record consisted of a single bird (density of 0.02 birds/km^2) recorded in September (autumn passage; (Furness, 2015)), whilst the common tern record consisted of four individuals and occurred in August (density of 0.09 birds/km^2. Whilst this is within the full breeding season for common tern, it also falls within the autumn passage period (Furness, 2015).

462. In addition to the offshore ornithology receptors identified to species level and reported above, a further nine species groups were identified. These were common or Arctic ("commic") tern, auk or shearwater, auk, black-backed gull, large gull, shearwater, small gull, storm-petrel and tern.

463. With respect to the area of search for the export cable meets intertidal habitat and makes Landfall, BTO WeBS core counts for the Taw-Torridge Estuary indicate that two species, sanderling and Mediterranean gull, exceeded the British National Importance threshold based on average counts undertaken between 2015/16 and 2019/20 (Frost et al., 2021). This means that >1% of the British national population is regularly found here. The most numerous species (though these were not present in nationally important numbers), were black-headed gull, lapwing, golden plover, oystercatcher, dunlin and herring gull. This is not a measure of how many birds occur in the zone of impact, but gives an indication of the species that are regularly present in the wider area.

2.7.6 Potential Impacts

464. The following impacts will all be screened into the assessment.

Potential impacts during construction

Disturbance, displacement and barrier effects

465. The construction phase will require the mobilisation of vessels (day or night), helicopters and equipment and the installation of turbines, inter-array and export cables, and other infrastructure. Construction will not occur across the whole of the Windfarm Site simultaneously or every day. Until wind turbines (and other structures) are installed, disturbance effects will occur only in the areas where construction traffic is operating at any given point.

466. During the construction phase, the Project therefore has the potential to impact offshore ornithology receptors through disturbance, leading to displacement of birds from construction sites and the areas that surround them. Barrier effects are also possible as turbines are installed. These potential impacts, which have the potential to last for the duration of the construction phase, effectively result in temporary habitat loss through reduction in the area available for behaviours such as foraging, loafing and moulting in the case of displacement, or commuting and migration in the case of barrier effects.

467. Offshore ornithology receptors differ considerably in their sensitivity to anthropogenic disturbance in the marine environment (Fliessbach et al., 2019; Furness et al., 2013; Furness and Wade, 2012; Garthe and Hüppop, 2004; MMO, 2018), though uncertainty also exists surrounding displacement effects (Wade et al., 2016).

468. Birds are considered to be most at risk from disturbance and displacement effects when they are resident in an area at any time of year, as opposed to birds on passage during migratory seasons. Birds that are resident in an area during the breeding season may regularly encounter and be displaced by an OWF that is under construction, during daily commuting trips to foraging areas from nest sites. No disturbance at breeding sites due to construction activities at the Project is anticipated since the nearest breeding colonies are located tens of kilometres from the site itself, and >2km from the export cable area of search.

469. Birds on passage may encounter (and potentially be displaced from) a particular OWF that is under construction only once during a given migration journey. The costs of one-off avoidances during migration have been calculated to be relatively small, accounting for less than 2% of available fat reserves (Masden et al., 2012, 2009; Speakman et al., 2009). Therefore, the impacts of construction disturbance,

displacement and barrier effects on birds that only migrate through the Project (including seabirds, waders and waterbirds on passage) will likely be small, though the assessment will consider this in greater detail.

Indirect effects

470. Indirect effects on offshore ornithology receptors may occur during the construction phase of the Project if there are impacts on prey species and/or their habitats. Potential indirect effects include those resulting from the production of underwater noise and the generation of suspended sediments that may cause injury or mortality to, or alter the behaviour or availability of prey species. Underwater noise may cause fish and mobile invertebrates to avoid the construction area and also affect their physiology and behaviour. Suspended sediments may cause fish and mobile invertebrates to avoid the construction area and may smother and hide immobile benthic prey. These mechanisms may result in less prey being available to offshore ornithology receptors within the impact zone surrounding the construction area.

471. Potential effects on benthic invertebrates and fish will be assessed in their respective chapters, and the conclusions of those assessments inform this assessment of indirect effects on offshore ornithology receptors.

Potential impacts during operation

Disturbance, displacement and barrier effects

472. Operational phase displacement is defined as a reduced number of birds occurring within or immediately adjacent to an OWF (Furness et al., 2013), and involves flying birds and those on the water (UK SNCBs, 2017). Birds that do not intend to utilise an operational OWF but would have previously flown through it on the way to a feeding, resting or nesting area, and which either stop short or detour around it, are subject to barrier effects (UK SNCBs, 2017).

473. These potential impacts would result in reduction in the area available for behaviours such as foraging, loafing and moulting in the case of displacement, or commuting and migration in the case of barrier effects, and have the potential to last for the duration of the operational phase of the Project. Displacement and barrier effects will begin as turbines are installed during the latter part of the construction period and will persist into the decommissioning period until turbines are removed. The primary cause of displacement from operational OWFs is considered to be visual cues due to the presence of operational turbines and other infrastructure.

474. Offshore ornithology receptors differ considerably in their sensitivity to anthropogenic disturbance in the marine environment (Fliessbach *et al*., 2019; Furness *et al*., 2013; Furness and Wade, 2012; Garthe and Hüppop, 2004; MMO, 2018), though uncertainty also exists surrounding displacement effects (Wade et al., 2016). As OWFs are relatively new features in the marine environment, there is limited robust empirical evidence regarding disturbance and displacement effects of the operational infrastructure in the long term, although the number of available studies is increasing. The most applicable evidence available will be utilised by the assessment.

475. Birds are considered to be most at risk from disturbance and displacement effects when they are resident in an area at any time of year, as opposed to birds on passage during migratory seasons. Birds that are resident in an area may regularly encounter and be displaced by an OWF, for example during daily commuting trips to foraging areas from nest sites. In this assessment, the effects of displacement and barrier effects on the key resident species are considered together. A study suggested that the energetic costs of extra flight during breeding season foraging trips to avoid an operational OWF appear to be much less than those imposed by low food abundance or adverse weather, though they would be additive *(Masden et al*., 2010).

476. Birds on passage may encounter (and potentially be displaced from) a particular OWF only once during a given migration journey. The costs of one-off avoidances during migration have been calculated to be relatively small, accounting for less than 2% of available fat reserves (Masden et al., 2012, 2009; Speakman et al., 2009). Therefore, the impacts on birds that only migrate through the site (including seabirds, waders and waterbirds on passage) are considered to be relatively small, though they will be considered in detail by the assessment.

Collision risk

477. During the operational phase, offshore ornithology receptors flying through the Project may collide with the rotor blades of operational wind turbines. This would result in fatalities during migration, whilst foraging, or commuting between breeding sites and resting or foraging areas.

Entanglement

478. During operation, there is a possibility that lost fishing equipment can become caught around mooring lines and cables associated with the Project. This could pose an entanglement risk to diving offshore ornithology receptors. Due to a lack of data this risk is currently considered difficult to quantify. However, the assessment will consider any information on the subject that can be identified.

Indirect effects

479. Indirect effects on offshore ornithology receptors may occur during the operational phase of the Project if there are impacts on prey species and/or their habitats. These effects include those resulting from the production of underwater noise (e.g. from the turning of the wind turbines), electromagnetic fields (EMF) and the generation of suspended sediments (e.g. due to scour or maintenance activities) that may alter the behaviour or availability of prey species. Underwater noise and EMF may cause fish and mobile invertebrates to avoid the operational area and also affect their physiology and behaviour. Suspended sediments may cause fish and mobile invertebrates to avoid particular areas and may smother and hide immobile benthic prey. All of these indirect effects could result in less prey being available within the Project to foraging seabirds. Changes in fish and invertebrate communities due to changes in presence of hard substrate (resulting in colonisation by epifauna) may also occur, and changes in fishing activity could influence the communities present.

480. Potential effects on benthic invertebrates and fish will be assessed in their respective chapters, and the conclusions of those assessments inform this assessment of indirect effects on offshore ornithology receptors.

Potential impacts during decommissioning

Disturbance, displacement and barrier effects

481. Disturbance and displacement is likely to occur due to the presence of working vessels and the movement, noise and light associated with these. This impact is expected to be similar in nature and magnitude to the corresponding impact occurring during the construction phase.

Indirect effects

482. Indirect effects such as displacement of seabird prey species are likely to occur during the decommissioning phase

Potential cumulative impacts

483. The cumulative assessment will identify which residual impacts assessed for the Project alone have the potential for a cumulative impact with other plans, projects and activities (described as 'impact screening'). The cumulative assessment will set out this information, together with a consideration of the confidence in the data that is available to inform a detailed assessment and the associated rationale. Sites and impacts that are screened in will be added together and assessed as per the impact assessment methodology for project alone impacts.

484. It is likely that the impact screening will identify that the potential for cumulative impacts in conjunction with other developments exists for disturbance, displacement

and barrier effects during the operation of the Project, and collision risk. The approach to cumulative assessment is set out in Section 1.9.2.

Potential transboundary impacts

485. Some of the offshore ornithology receptors considered within the project alone and cumulative impact assessments, may also experience further impacts at OWFs located outside UK territorial waters at certain times of year, giving the potential for transboundary impacts.

486. Insofar as the identification of impacts and sites, and quantification of potential effects, the methodology for transboundary assessment will be similar to that used for the cumulative impact assessment.

2.7.7 Mitigation Measures

487. Mitigation measures will be developed as site-specific information becomes available, as consultation with key stakeholders occurs, the project design is refined and the assessment is prepared.

2.7.8 Summary of Scoped In Impacts

Table 2.18 Summary of impacts relating to offshore ornithology

Potential Impact	Construction	Operation	Decommissioning
Disturbance, displacement covering work activity, vessel movements and lighting, as well as barrier effects due to presence of turbines and infrastructure (from erection of first turbines)	✓	✓	✓
Indirect effects through effects on habitats and prey species	✓	✓	✓
Displacement and barrier effects due to presence of turbines and infrastructure, as well as disturbance and displacement covering work activity, vessel movements and lighting	x	✓	x
Collision risk	x	✓	x
Entanglement	x	✓	x
Cumulative impacts	✓	✓	✓
Transboundary impacts	✓	✓	✓

Key:
✓ Impact scoped in
✗ Impact scoped out

2.8 Commercial Fisheries

2.8.1 Introduction

488. This section identifies the commercial fisheries receptors of relevance to the Project. It describes the potential effects from construction, operation (including maintenance) and decommissioning of the offshore components (i.e. seaward of MHWS) of the Project on commercial fisheries and sets out the proposed scope of the EIA. The proposed methods for the EIA are also presented.

489. This section should be read alongside the following chapters of this Scoping Report:

- Section 2.5 Fish and Shellfish Ecology: includes consideration of potential impacts on species of commercial importance
- Section 2.9 Shipping and Navigation: includes consideration of potential impacts on vessel routing and navigational safety
- Section 2.11.7: Infrastructure and Other Users includes consideration of potential impacts on charter angling businesses

2.8.2 Policy, Legislation and Guidance

490. Section 1.5 describes the wider policy and legislative context for the Project. here is no specific legislation which covers the scope of an impact assessment on commercial fisheries, although there is guidance which provides information on how to assess impacts to fisheries from offshore windfarms. Specific to commercial fisheries, the following guidance documents will also be considered:

- Best Practice Guidance for Fishing Industry Financial and Economic Impact Assessments (United Kingdom Fisheries Economic Network [UKFEN] and Seafish, 2012)
- Fisheries Liaison with Offshore Wind and Wet Renewables group (FLOWW) Recommendations for Fisheries Liaison: Best Practice guidance for offshore renewable developers (FLOWW, 2014 and BERR, 2008)
- FLOWW Best Practice Guidance for Offshore Renewables Developments: Recommendations for Fisheries Disruption Settlements and Community Funds (FLOWW, 2015)
- Options and opportunities for marine fisheries mitigation associated with wind farms (Blyth-Skyrme, 2010a)
- Developing guidance on fisheries Cumulative Impact Assessment for wind farm developers (Blyth-Skyrme, 2010b)
- Cumulative impact assessment guidelines, guiding principles for cumulative impacts assessments in offshore wind farms (RenewableUK, 2013)

- Guidelines for data acquisition to support marine environmental assessments of offshore renewable energy projects. Contract report: ME5403 (Cefas, 2012)
- Fisheries Liaison Guidelines - Issue 6 (UK Oil and Gas, 2015)
- Fishing and Submarine Cables - Working Together (International Cable Protection Committee, 2009)
- Offshore Wind Farms – Guidance note for Environmental Impact Assessment in respect of Food and Environment Protection Act (FEPA) and Coast Protection Act (CPA) requirements (Centre for Environment, Fisheries and Aquaculture Science [CEFAS], Marine Consents and Environment Unit [MCEU], Department for Environment, Food and Rural Affairs [DEFRA] and Department of Trade and Industry [DTI], 2004)

2.8.3 Study Area

491. The Offshore Development Area is located within the southern portion of the ICES Division 7g (Celtic Sea) statistical area[5]; within United Kingdom (UK) Exclusive Economic Zone (EEZ) waters. For the purpose of recording fisheries landings, ICES Division 7g is divided into statistical rectangles which are consistent across all Member States operating in the Celtic Sea.

492. The Windfarm Site is located outside the 12 NM territorial seas boundary, within ICES rectangle 31E4 with the majority of the Offshore Export Cable Corridor AoS within 31E5. Approximately 0.1 km^2 of the Offshore Export Cable Corridor AoS, near to Clovelly is within 30E5, however given the exceptionally small nature of this area, and its proximity to the intertidal zone, it has not been considered further in this Scoping Report. Thus, the Study Area encompasses the ICES rectangles 31E4 and 31E5 shown in Figure 1.7.1.

2.8.4 Baseline Data

493. Table 2.19 outlines the initial desk-based review of literature and data sources was undertaken to support this scoping exercise and also identifies additional sources of information that would be expected to inform the assessment in the ES.

[5]ICES standardise the division of sea areas to enable statistical analysis of data. ICES statistical areas are comprised of ICES statistical rectangles (each rectangle is'30 min latitude by 1-degree longitude' in size (approximately 30 x 30 nautical miles)).

Table 2.19 Key sources of commercial fisheries data.

Source	Summary	Coverage of study area
Landings statistics by ICES rectangle for the period 2016 to 2020. Sourced from the Marine Management Organisation (MMO)	Fisheries landings data for registered fishing vessels.	National dataset providing full coverage of the commercial fisheries study area
Vessel Monitoring System (VMS) data, for the period 2015-2019 Sourced from ICES (2017 data) and the MMO (2015-2019 data). Note that the most recent data (2017-2019) has been presented in this Scoping Report and is considered representative. Longer term datasets will be analysed within the ES.	VMS data for fishing vessels greater than 12 or 15m in length.	National dataset providing full coverage of the commercial fisheries study area.
Key species stock assessments. Sources includes ICES, the Devon and Cornwall IFCAs. Data yet to be sourced, but will be used to inform the ES.	Reports on the status of commercially fished species, which consider to what extent they are being exploited sustainably.	Coverage to be confirmed.
Regional offshore windfarm ES Scoping commercial fisheries assessments. Various sources.	Contextual information obtained from commercial fisheries impact assessment for other offshore windfarm located in proximity to the study area (e.g. Erebus).	Partial overlap with the commercial fisheries study area.

494. It should be noted that the quantitative datasets identified in Table 2.19 may not capture all fishing activity in the commercial fisheries study area. For instance, the VMS datasets only covers vessels ≥12m (ICES data) or ≥15m (MMO data) in length. However, other published data does provide a useful insight into fishing activity undertaken in inshore areas (e.g. including a number of IFCA publications and surveillance data) and consultation with fisheries stakeholders and industry is expected to further inform assessment in the ES. Consultation will be undertaken to seek to corroborate the findings of desk-based baseline data analysis and to provide insight into specific fishing grounds and activity of any vessels active in the area. Consultation will also be important to inform gear specifications for vessels active in the area, which will allow a full understanding of how they may be affected.

495. Variations and trends in commercial fisheries activity are an important aspect of the baseline assessment and is the principal reason for considering up to five years of key baseline data. Given the time periods considered in this scoping exercise (i.e. 2016 to 2020), existing baseline data captures potential changes in commercial fisheries activity resulting from the COVID pandemic, notable through changes in fishing effort from 2019 to 2020. However, changes in fishing patterns resulting from the withdrawal of the UK from the EU would be expected in future data sets, which include data for 2021. Long term environmental and climatic changes may be expected to be detectable within the five-year time series, but may benefit from longer-term analysis dependant on the target species. Inclusion of such longer term analysis will be informed by stakeholder consultation.

496. Following withdrawal, the UK and the EU have agreed to a Trade and Cooperation Agreement (TCA), applicable on a provisional basis from 1 January 2021. The TCA sets out fisheries rights and confirms that from 1 January 2021 and during a transition period until 30 June 2026, UK and EU vessels will continue to access respective EEZs, 12-2000 NM) to fish. In this period, EU vessels with historic access rights will also be able to fish in specified parts of UK waters between 6-12 NM.

497. Existing baseline data also does not account for the 2020-2021 period of the COVID pandemic and any potential changes in activity such temporarily affected market demand and supply chains.

498. The ES will further consider likely changes to the future baseline, primarily associated with withdrawal from the EU, taking into account planned changes in quota allocation.

2.8.5 Baseline Environment

499. Landings from ICES rectangle 31E4 and 31E5 by UK-registered vessels had an approximate average annual value of £2.63 million (based on five-years data from 2016 – 2020; MMO, 2021).

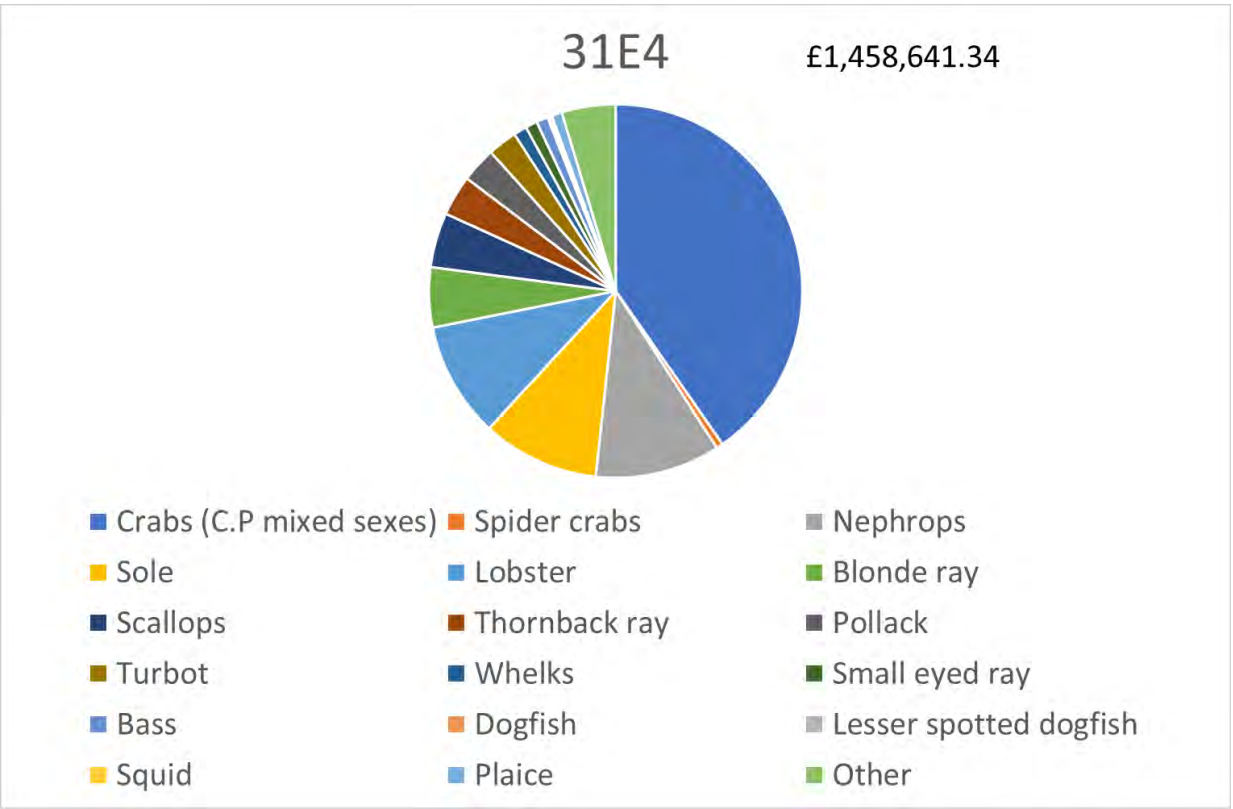
500. Plate 8 shows the key species landed by UK vessels from the study area by value; the proportion of value by species is shown. These landings statistics are published annually by the MMO and include vessels registered to the following UK administrations and British crown dependencies: England, Wales, Scotland, Northern Ireland, Isle of Man (IOM) and Jersey. Commercial fishing vessels that are registered to the IOM are required to hold both IOM and UK fishing licences. The MMO iFISH database therefore provides commercial landing statistics for all vessels registered to UK administrations and crown dependencies catching from the specified ICES rectangles and is included in the data presented in this section.

Furthermore, for fisheries statistics by ICES rectangle, the data indicates the nation that vessel is registered to, rather than where it is landed.

501. Landings of shellfish species account for over 70% of total landings values across the 2016 to 2020 period. Landings data indicate that whelks (*Buccinum undatum*) are primarily landed by Welsh-registered dredgers of under 10m length; brown crab (*Cancer pagurus*) by English-registered vessels over 10m deploying pots and traps and prawns (*Nephrops norvegicus*) by Northern Irish and Scottish-registered otter trawlers. Vessels registered in the Isle of Man and Jersey primarily target brown crab and lobsters. Pelagic and demersal species are landed by vessels using a variety of gear types, including fixed nets, pots and traps, gears using hooks and trawls.

502. The total value of fisheries in the Offshore Development Area between 2016 and 2020 is dominated by demersal trawls, with total value of catches between 2016 and 2020 of £3.35 million in 31E4 and 31E5. Dredging realised total value of catches between 2016 and 2020 of £1,610 in 31E5. Drift and fixed nets gave total catch values between 2016 and 2020 of £142,731 in 31E4 and £84,673 in 31E5. The total value of potting landings between 2016 and 2020 in 31E4 was £696.70. In 31E5 the total value between 2016 and 2020 was significantly higher at £12,773, demonstrating the inshore nature of these gears. Gears using hooks had the highest total value of landings between 2016 and 2020 of £92,628 in 31E5. Conversely, total landings in 31E4 were less than £5,000 during the five-year period between 2016 and 2020 and only from one record in 2016. This distribution of the value of landings by different gear types is shown in Plate 9.

503. Trends in the landed value of key species from the study area are shown in Plate 10. A spike in value of edible crab landings is noted in 2019 from 31E4, at almost £350,000, compared to less than £40,000 in 2020. The edible crabs in 2019 were landed by English and Welsh vessels targeting ICES rectangle 31E4 consistently throughout the whole year, with peaks in July, August and September. Also of note, the value of landings of whelk steadily decreased over the five-year period, from a value of over £1.3 million in 2016 to £538,045 in 2020, despite the value per kilo remain relatively stable.



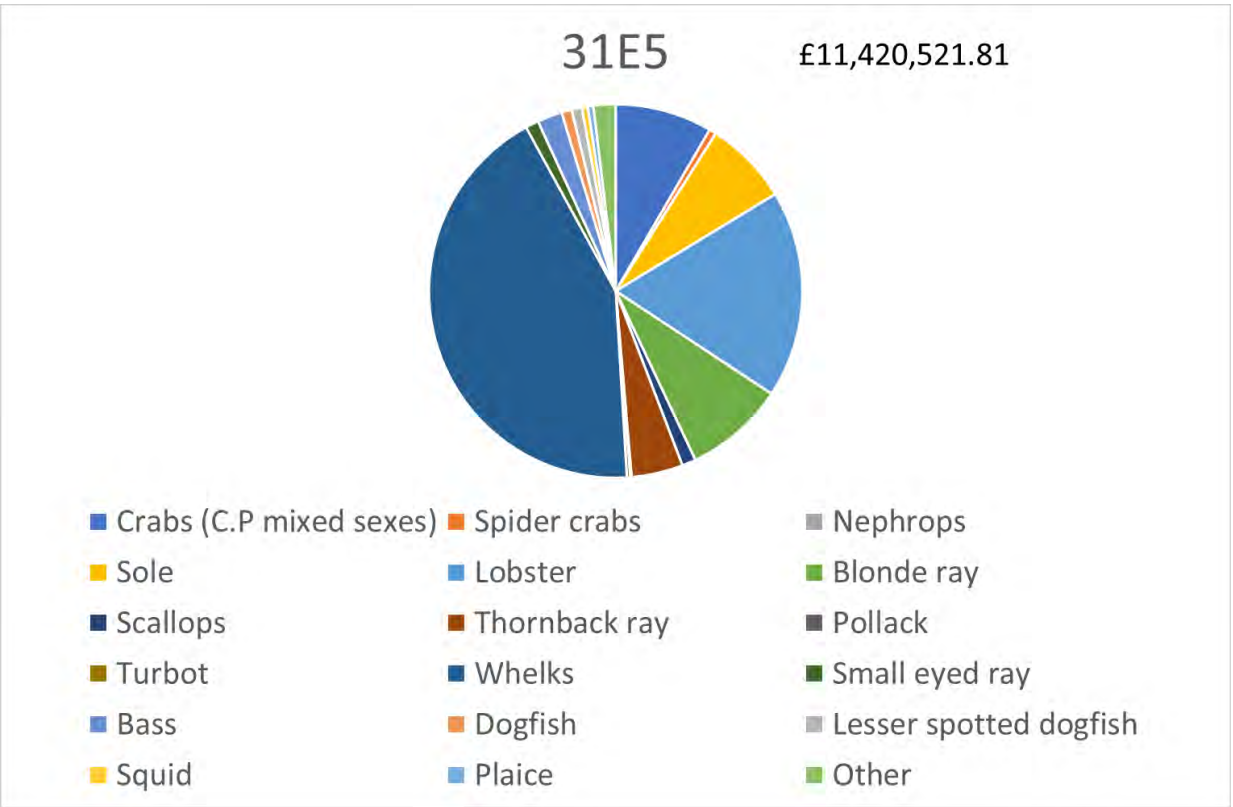
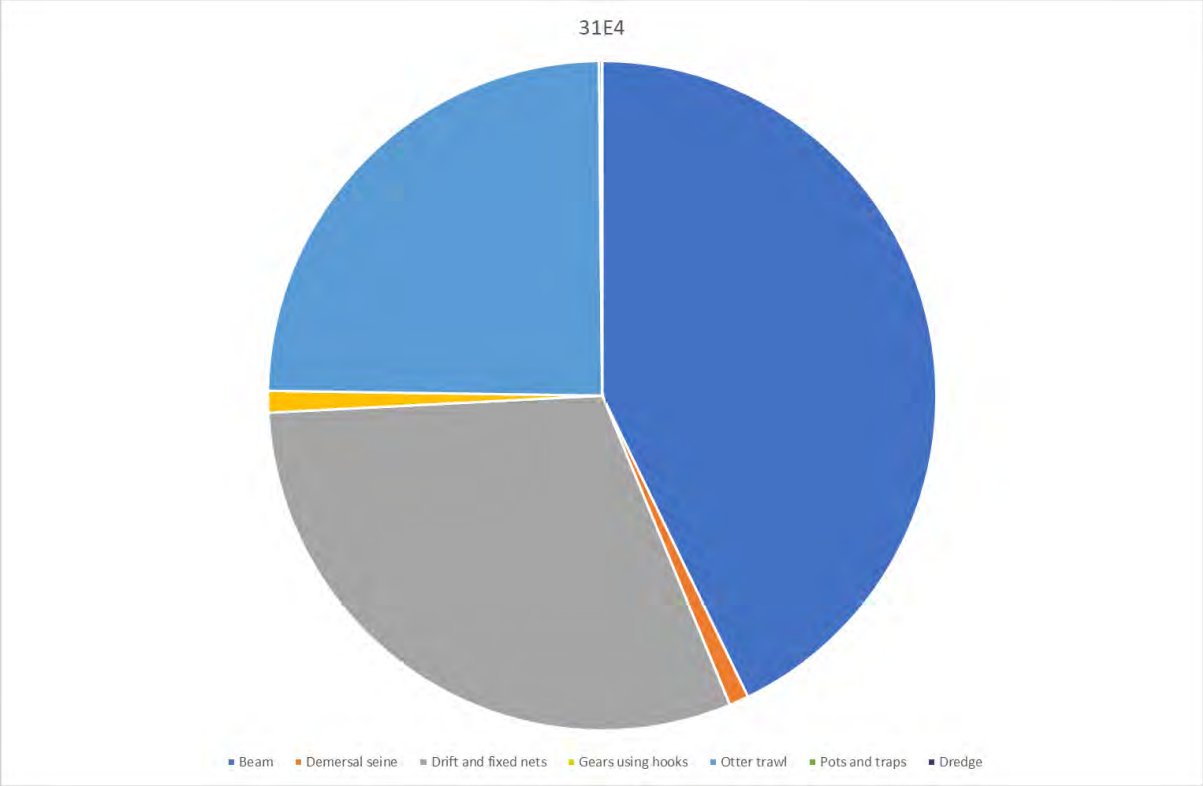


Plate 8 Average value of landings from 31E4 and 31E5 by species 2016-2020. Source: MMO, 2021.



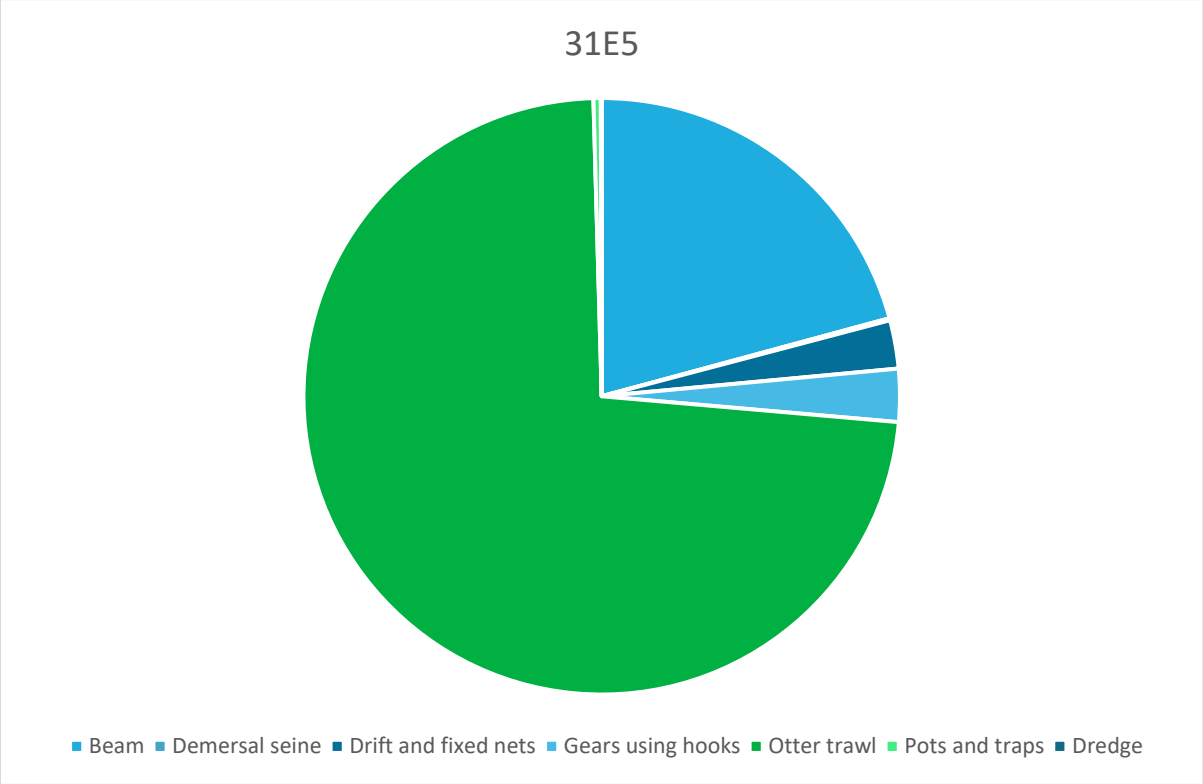
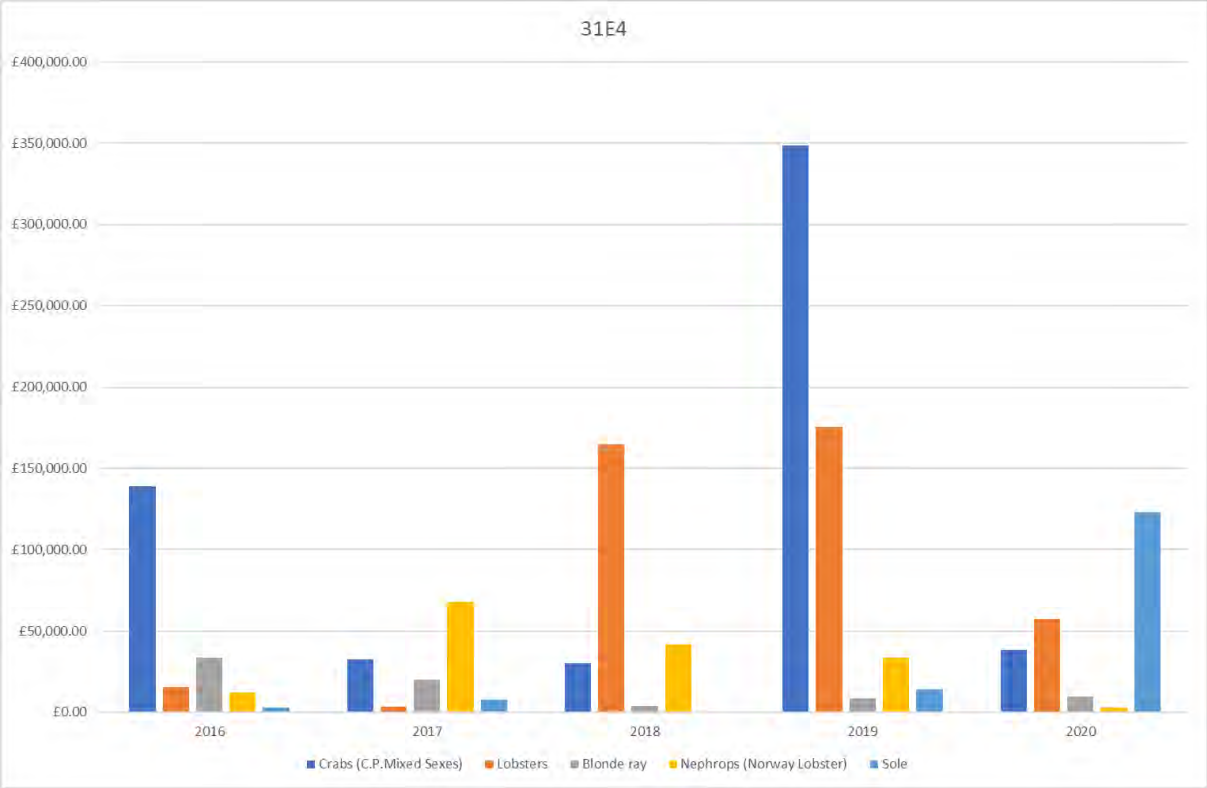


Plate 9 Landings value (£) by method (average 2016-2020) 31E4 and 31E5. Source, MMO 2021.



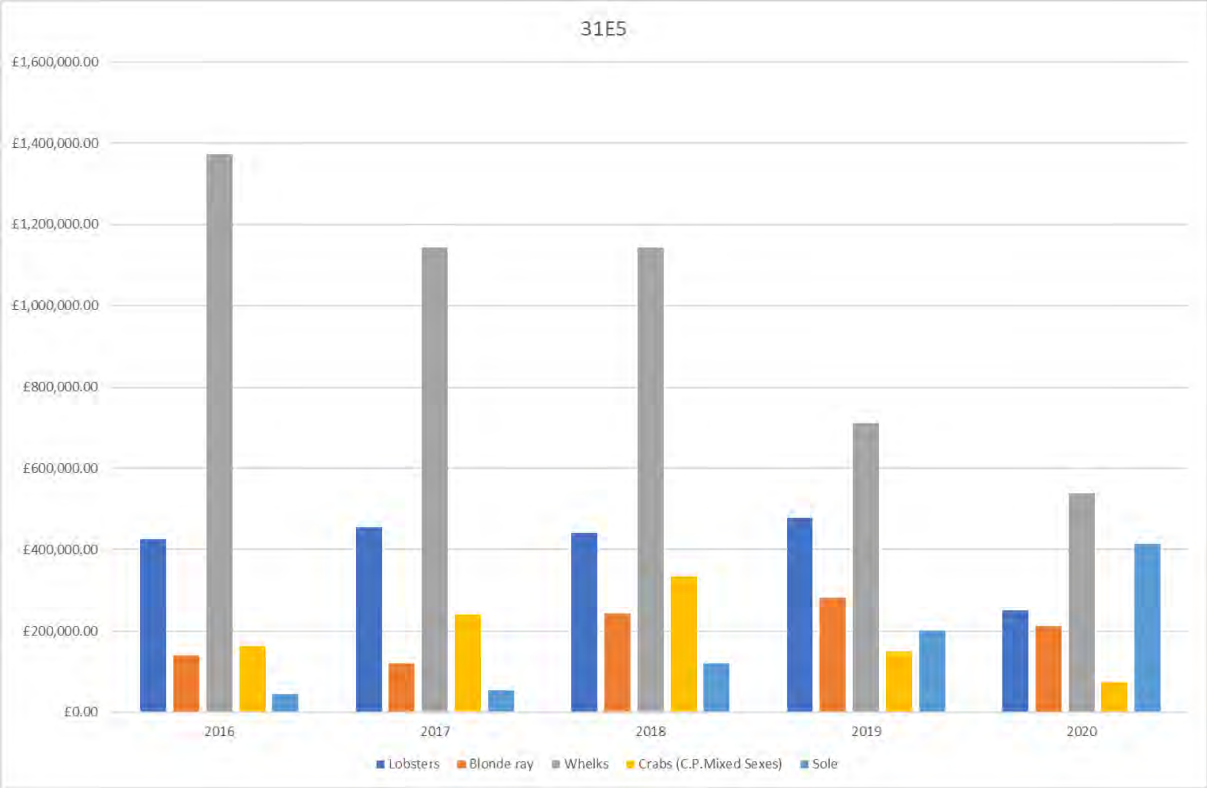


Plate 10 Annual value of landings from 31E4 and 31E5 by key species. Source: MMO, 2021.

504. In addition to landings data, VMS data from 2019 for UK-registered vessels (including crown dependencies) have also been obtained for the study area. The VMS data indicates that fishing activity by vessels over 15m in length takes place throughout the study area, with areas of relatively greater activity located south and southeast of the Windfarm Site. Figure 2.9.1 presents the VMS data, indicating higher levels of fishing vessel activity in the south of the Windfarm Site than the north. This is reflected in the total value if landings also presented in the figure.

505. The VMS dataset does not include vessels less than 15m in length, which form a significant portion of the UK and crown dependency fleets. Additional data (e.g. surveillance), together with stakeholder consultation will inform the assessment of impacts on fleets for the ES.

506. In summary, the key fleets operating across the study area include (in no particular order):

- UK, predominantly English and Welsh, but also Jersey, Scottish and Isle of Man vessels targeting whelks and crabs
- UK, predominantly English and Welsh, but also Scottish and Northern Irish trawler vessels targeting elasmobranchs, including rays and dogfish
- UK, predominantly Northern Irish and Scottish otter trawlers targeting Nephrops
- UK, predominantly English and Welsh inshore under 10m length fleet using mixed gears to target a variety of shellfish species

2.8.6 Potential impacts

507. A range of potential impacts on commercial fisheries have been identified which may occur during the construction, operation and maintenance, and decommissioning phases of the Project. These impacts include those issues identified as requiring consideration in the National Policy Statement for Renewable Energy Infrastructure (EN3) (DECC, July 2011) and in the guidance documents listed above.

Potential impacts during construction

508. The following potential impacts have been identified as relevant to the construction phase of the Project.

Reduction in access to, or exclusion from established fishing grounds

509. Installation activities and physical presence of constructed infrastructure may lead to reduction in access to, or exclusion from established fishing grounds. There is potential for some loss of fishing opportunities over the construction period,

though any effect is expected to be localised, and the operational range of relevant fleets will not typically be limited to the Offshore Development Area.

Displacement leading to gear conflict and increased fishing pressure on adjacent grounds

510. Fishing activity may be displaced from the Offshore Development Area, leading to gear conflict and increased fishing pressure on adjacent grounds. There is potential for displacement of fishing activity, though any effect is expected to be localised, and the operational range of relevant fleets will not typically be limited to the Offshore Development Area.

Displacement or disruption of commercially important fish and shellfish resources

511. Construction activities may lead to displacement or disruption of commercially important fish and shellfish resources. Assessment will be informed by the outcomes of the Fish and Shellfish Ecology impact assessment (see Section 2.5). Commercial fisheries may be affected as a result of any loss of resources. The conclusions presented in the Fish and Shellfish Ecology impact assessment regarding impact significance will be taken into account in determining the magnitude of impact on commercial fisheries.

Increased vessel traffic associated with the Project within fishing grounds leading to interference with fishing activity

512. Movement of vessels associated with the Project may add to the existing volume of marine traffic in the area, leading to interference with fishing activity. The assessment will be informed by the outcomes of the Shipping and Navigation impact assessment and the conclusions presented in the Shipping and Navigation impact assessment will be considered in determining the magnitude of impact on commercial fisheries.

Additional steaming to alternative fishing grounds for vessels that would otherwise fish within the Offshore Development Area

513. This effect will be localised to safety zones and construction activities and therefore limited deviations to steaming routes are expected. Assessment will be informed by consultation with the local fishing industry as to the nature and extent of alternative grounds and associated additional steaming requirements.

Potential impacts during operation and maintenance

514. The potential impacts identified as relevant to the operation and maintenance phase of the Project are as per those identified for the construction phase, with the addition of the potential for gear snagging.

Reduction in access to, or exclusion from established fishing grounds

515. Maintenance activities and physical presence of constructed infrastructure may lead to reduction in access to, or exclusion from established fishing grounds. It is assumed that fishing can resume to a degree within the Offshore Development Area. The effect will be long-term but localised, and the operational range of relevant fleets will not typically be limited to the Offshore Development Area.

Displacement leading to gear conflict and increased fishing pressure on adjacent grounds

516. Fishing activity may be displaced from the Offshore Development Area, leading to gear conflict and increased fishing pressure on adjacent grounds. It is assumed that fishing can resume to a degree within the Offshore Development Area. The effect will be long-term but localised, and the operational range of relevant fleets will not typically be limited to the Offshore Development Area.

Displacement or disruption of commercially important fish and shellfish resources

517. Maintenance activities may lead to displacement or disruption of commercially important fish and shellfish resources. Assessment will be informed by the outcomes of the Fish and Shellfish Ecology impact assessment (see Section 2.5) and it will be assumed that commercial fisheries will be affected as a result of any loss of resources. The conclusions presented in the Fish and Shellfish Ecology impact assessment regarding impact significance will be taken into account in determining the magnitude of impact on commercial fisheries.

Increased vessel traffic associated with the Project within fishing grounds leading to interference with fishing activity

518. Movement of vessels associated with the Project may add to the existing volume of marine traffic in the area, leading to interference with fishing activity. The assessment will be informed by the outcomes of the Shipping and Navigation impact assessment; the conclusions presented in the Shipping and Navigation impact assessment will be considered in determining the magnitude of impact on commercial fisheries.

Physical presence of infrastructure leading to gear snagging

519. Standard industry practice and protocol (e.g. seabed infrastructure will be buried where practicable and/or marked on nautical charts) will minimise the risk of gear snagging, but it remains likely to be an area of industry concern. This assessment will consider the loss or damage to fishing gear leading to reduced economic performance. Safety aspects associated with this impact, including potential loss of life as a result of snagging risk, will be assessed within the Shipping and Navigation impact assessment.

Additional steaming to alternative fishing grounds for vessels that would otherwise fish within the Offshore Development Area

520. This effect will be localised to safety zones and installed structures and therefore limited deviations to steaming routes are expected. The assessment will be informed by consultation with the local fishing industry as to the nature and extent of alternative grounds and associated additional steaming requirements.

Potential impacts during decommissioning

521. The potential impacts identified as relevant to the decommissioning phase of the Project are as per or similar to those identified for the construction phase, with the addition of the potential for gear snagging any infrastructure left in situ.

Potential cumulative impacts

522. There may be potential for cumulative impacts to occur on commercial fisheries as a result of the development of other offshore windfarms and other activities in the marine environment. The approach to cumulative assessment is set out in Section 1.9.2.

523. Offshore wind projects and other activities relevant to the assessment of cumulative impacts on commercial fisheries will be identified through a screening exercise. The potential impacts considered in the cumulative assessment as part of EIA will be in line with those described in Section 1.9.2 for the project-alone assessment, though it is possible that some will be screened out on the basis that the impacts are highly localised (i.e. they occur only within the Offshore Development Area boundary) or where management measures in place for the Project and other projects will reduce the risk of impacts occurring.

524. For the purposes of cumulative impact assessment, it will be assumed that active licensed activities constitute part of the existing baseline environment, as commercial fisheries would already be adapted to them and any effect they might have had will be reflected in the baseline characterisation undertaken to inform impact assessment.

525. There is the potential for other activities occurring in the region surrounding the Project to create cumulative impacts; these include aggregate dredging activity, oil and gas activity and infrastructure, and subsea cabling. As for offshore wind projects, the key cumulative impacts are expected to result from loss or restricted access to established fishing grounds and displacement of fishing activity.

Potential transboundary impacts

526. Baseline data presented here does not include foreign fishing vessels, however, these should be considered in the Scoping Report. Consultation with stakeholders in other relevant Member States, and data gathered from other relevant Member States, will inform the scope of any future transboundary impact assessment within the EIA.

2.8.7 Mitigation Measures

527. As part of the design process for the Project a number of designed-in measures are proposed to reduce the potential for impacts on commercial fisheries; these are summarised below.

528. OWL is committed to implementing these measures (noting they may evolve over the development process as the EIA progresses and in response to consultation), and also various standard sectoral practices and procedures. It is therefore considered that these measures are inherently part of the design of the Project.

529. Measures adopted as part of the Project will include:

- The Applicant is committed to ongoing liaison with fishermen throughout all stages of the Project, based upon FLOWW (2014, 2015) guidance and the following:
    - Appointment of a company Fisheries Liaison Officer (FLO) to maintain effective communications between the project and fishermen
    - Appropriate liaison with relevant fishing interests to ensure that they are fully informed of development planning and any offshore activities and works
    - Timely issue of notifications including Notice to Mariners (NtMs), Kingfisher Bulletin notifications and other navigational warnings to the fishing community to provide advance warning of project activities and associated Safety Zones and advisory safety distances
    - Development, prior to construction, of a fisheries liaison and co-existence plan, setting out in detail the planned approach to fisheries liaison and means of delivering any other relevant mitigation measures. It is intended that a draft of this plan be submitted at the point of consent application
- The Applicant is committed to marking and lighting the project in accordance with relevant industry guidance and as advised by relevant stakeholders including the Maritime and Coastguard Agency (MCA), Civil Aviation Authority

(CAA) and Trinity House. The Applicant will also ensure the project is adequately marked on nautical charts
- The Applicant will ensure that any objects dropped on the seabed during works associated with the project are reported and that objects are recovered where they pose a hazard to other marine users and where recovery is possible
- Where practicable, cable burial will be the preferred means of cable protection

530. Potential mitigation measures will be consulted upon with stakeholders throughout the EIA process.

2.8.8 Approach to Assessment and Data Collection

Approach to Data Collection

531. It is intended that during the EIA, full acquisition and analysis of the baseline data sources listed in Section 2.8.4 is completed. Data analysis will then be corroborated and expanded upon by consultation with the fishing industry and other relevant stakeholders, including the following:

- MMO
- National Federation of Fishermen's Organisations (NFFO)
- Welsh Fishermen's Association
- Scallop Industry Consultation Group
- Cornwall Inshore Fisheries and Conservation Authority (IFCA)
- Devon and Severn IFCA
- North Devon Fisherman's Association
- Cornish Fish Producers Association
- Any EU Member State representative organisations as identified during baseline data analysis
- Individual fishermen as identified by the Company Fisheries Liaison Officer/other means

532. Consultation will not only seek to validate the baseline, but also to identify any other additional data sources and understand stakeholder concerns to inform the impact assessment.

Approach to Assessment

533. Detailed analysis of baseline datasets will be undertaken to characterise long-term (i.e. over several years) patterns in commercial fisheries activity across the study area and predict potential impacts upon commercial fishing activities. Consultation with the commercial fishing industry will be undertaken to ground-truth available

baseline data and gain further understanding of fishing activity by smaller vessels across the inshore portion of the study area. Analysis of data and the results of consultation will provide an extended baseline characterisation of the study area, which will underpin impact assessment.

534. The commercial fisheries impact assessment will follow the EIA methodology set out in Section 1.9. Specific to commercial fisheries, the following guidance documents will also be considered:

- Best Practice Guidance for Fishing Industry Financial and Economic Impact Assessments (United Kingdom Fisheries Economic Network [UKFEN] and Seafish, 2012)
- Fisheries Liaison with Offshore Wind and Wet Renewables group (FLOWW) Recommendations for Fisheries Liaison: Best Practice guidance for offshore renewable developers (FLOWW, 2014 and BERR, 2008)
- FLOWW Best Practice Guidance for Offshore Renewables Developments: Recommendations for Fisheries Disruption Settlements and Community Funds (FLOWW, 2015)
- Options and opportunities for marine fisheries mitigation associated with windfarms (Blyth-Skyrme, 2010a)
- Developing guidance on fisheries Cumulative Impact Assessment for windfarm developers (Blyth-Skyrme, 2010b)
- Cumulative impact assessment guidelines, guiding principles for cumulative impacts assessments in offshore windfarms (RenewableUK, 2013)
- Guidelines for data acquisition to support marine environmental assessments of offshore renewable energy projects. Contract report: ME5403 (Cefas, 2012)
- Fisheries Liaison Guidelines - Issue 6 (UK Oil and Gas, 2015)
- Fishing and Submarine Cables - Working Together (International Cable Protection Committee, 2009)
- Offshore Windfarms – Guidance note for Environmental Impact Assessment in respect of Food and Environment Protection Act (FEPA) and Coast Protection Act (CPA) requirements (Centre for Environment, Fisheries and Aquaculture Science [CEFAS], Marine Consents and Environment Unit [MCEU], Department for Environment, Food and Rural Affairs [DEFRA] and Department of Trade and Industry [DTI], 2004)

535. Where relevant, impact assessment will be informed by the outcomes of the Fish and Shellfish Ecology and Shipping and Navigation assessments.

536. Impacts will be assessed for each relevant fleet/fishery active in the study area, and where relevant, impacts associated with the Windfarm Site and the Offshore Export Cable Corridor will be separately assessed.

537. Design assumptions used to inform assessments will be clearly identified in the project description, considering worst case parameters specifically for commercial fisheries receptors.

2.8.9 Summary of Scoped In Impacts

538. Table 2.20 outlines the impacts which are proposed to be scoped into and/or out of the EIA. This may be refined as additional information and data become available.

Table 2.20 Summary of impacts relating to Commercial Fisheries.

Potential Impact	Construction	Operation	Decommissioning
Reduction in access to, or exclusion from established fishing grounds	✓	✓	✓
Displacement leading to gear conflict and increased fishing pressure on adjacent grounds	✓	✓	✓
Displacement or disruption of commercially important fish and shellfish resources	✓	✓	✓
Increased vessel traffic associated with the Project within fishing grounds leading to interference with fishing activity	✓	✓	✓
Physical presence infrastructure leading to gear snagging	x	✓	✓
Additional steaming to alternative fishing grounds	✓	✓	✓
Cumulative impacts	✓	✓	✓
Transboundary impacts	✓	✓	✓

2.9 Shipping and Navigation

2.9.1 Introduction

539. This section of the Scoping Report identifies shipping and navigation receptors of relevance and considers the potential likely impacts on shipping and navigation receptors that may arise from the construction, operation and decommissioning of the Project. This section additionally describes datasets to be used within the Environmental Impact Assessment (EIA), and the methodology for how impacts will be assessed at EIA.

540. Shipping and navigation interfaces with several other topics and as such, it should be considered alongside the following chapters:

- Section 2.8 Commercial Fisheries: includes consideration of potential impacts on fishing vessel operations and gear snagging potential with cables and mooring lines
- Section 2.11: Civil and Military Aviation; includes consideration of potential impacts on aviation including Search and Rescue (SAR) in addition to marking and lighting requirements
- Section 2.11.7: Infrastructure and Other Users includes consideration of potential impacts to nearby developments/licensed activities including dredging and recreational activities including recreational boating and angling

2.9.2 Policy, Legislation and Guidance

541. Section 1.5 describes the wider policy and legislative context for the Project. The assessment of potential impacts upon shipping and navigation receptors will be made with specific reference to the relevant National Policy Statements (NPS). These are the principal decision-making documents for Nationally Significant Infrastructure Projects (NSIPs). Those relevant to the Project are:

- Overarching NPS for Energy (EN-1)
- NPS for Renewable Energy Infrastructure (EN-3)
- NPS for Electricity Networks Infrastructure (EN-5)

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

- Marine Guidance Note (MGN) 654 (Maritime and Coastguard Agency, 2021)
- Methodology for assessing marine navigational safety & emergency response risks of OREIs (MGN 654 Annex 1, MCA 2021)
- Regulatory expectations on moorings for floating wind and marine devices (Health and Safety Executive (HSE) & MCA, 2017)
- Revised Guidelines for Formal Safety Assessment (FSA) for use in the International Maritime Organisation (IMO) Rule-Making Process (IMO, 2018)

2.9.3 Study Area

543. The study area, as depicted in Figure 2.9.1 for the shipping and navigation assessment is ten nautical miles (nm) from the Windfarm Site in addition to the Offshore Export Cable Corridor Area of Search (AoS), in line with standard industry

approach and the study area utilised for the purposes of Navigation Risk Assessment.

2.9.4 Baseline Data

544. The data sources outlined in Table 2.21 have been analysed to establish the shipping and navigation baseline to inform the scoping report and will be utilised to inform the EIA.

545. The primary input data source is Automatic Identification System (AIS) Data, an automatic vessel tracking system for the monitoring of vessel movements worldwide. The International Maritime Organization's (IMO) International Convention for the Safety of Life at Sea (SOLAS) requires AIS to be fitted aboard international voyaging ships with 300 or more gross tonnage (GT), and all passenger ships regardless of size.

546. In addition to the data sources outlined in Table 2.21, up to date AIS, RADAR and visual survey data will be acquired via a 28-day survey which will be undertaken in 2022 (approach and timings to be agreed in consultation with the MCA) in accordance with Marine Guidance Note (MGN) 654 to inform the EIA. The survey will be undertaken as two separate 14-day surveys, one in winter and one in summer to capture seasonal traffic variations. The RADAR and visual survey data will be utilised particularly to supplement the fishing and recreational vessel datasets, where reliance on AIS alone may underrepresent small vessel activities.

2.9.5 Baseline Environment

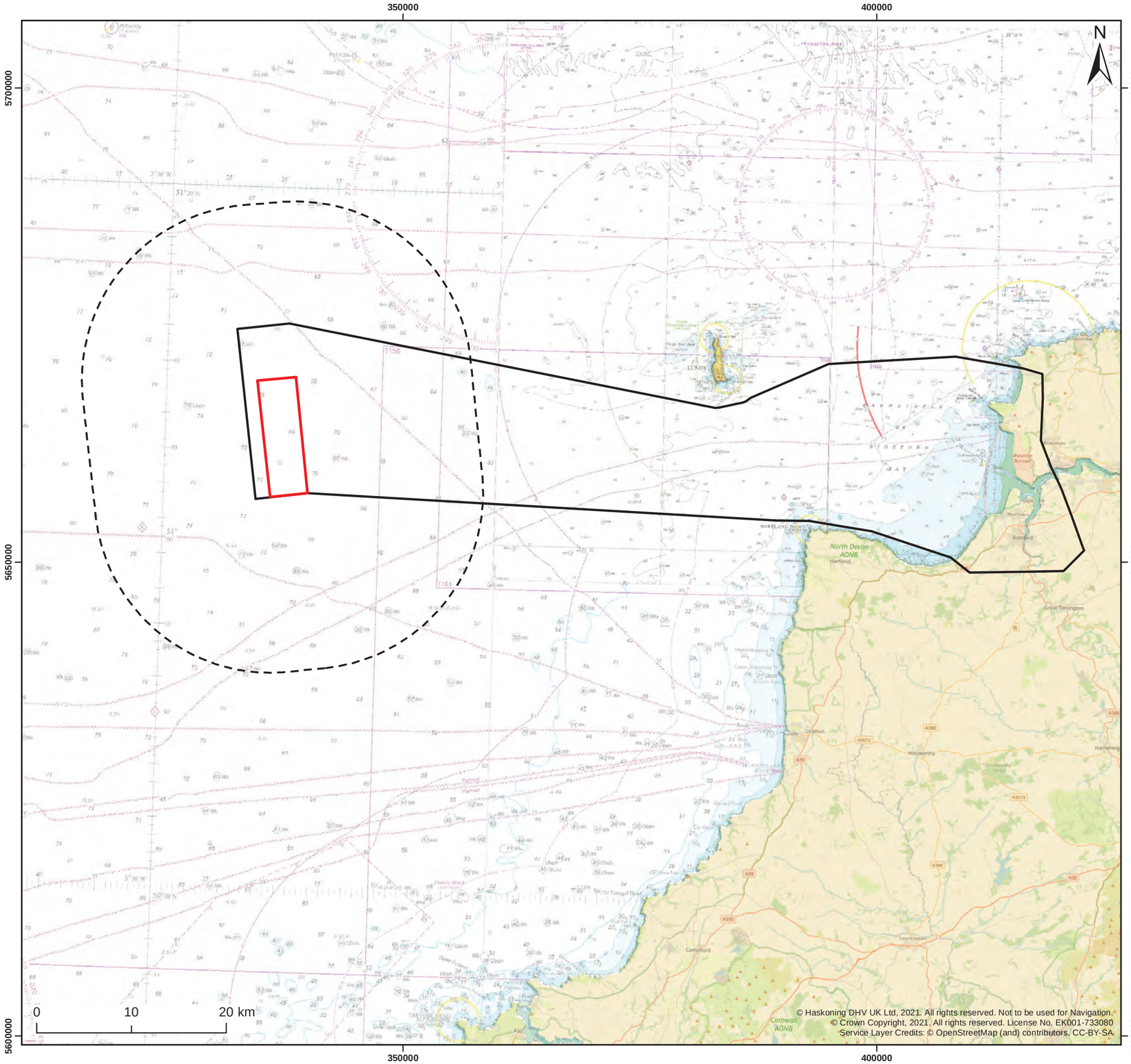
547. The Windfarm Site is located in the Celtic Sea, approximately 52km (28nm) west of the Devon coast and 50km (27nm) south west of the Pembrokeshire coast.

548. Water depths within the Windfarm Site are a minimum of 67m from Chart Datum (CD), with depths shallowing towards shore within the cable AoS.

549. Ports with greater than 120 vessel arrivals per year, or 10 per month, and with primary route approaches passing through or in proximity to the shipping and navigation study area are shown in Table 2.22.

Navigational Features

550. No IMO traffic schemes are present within the study area.



Legend:

- White Cross Offshore Windfarm
- Area of Search
- 10nm Study Area

Client:	Project:
Offshore Wind Ltd.	White Cross Offshore Windfarm

Title:

Shipping and Navigation Study Area

Figure: 2.9.1	Drawing No: PC2978-RHD-ZZ-XX-DR-Z-0089				
Revision:	Date:	Drawn:	Checked:	Size:	Scale:
P01	18/11/2021	GC	CB	A3	1:400,000

Co-ordinate system: WGS 1984 UTM Zone 30N

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Table 2.21 Data sources

Source	Duration	Description
UKHO Admiralty Charts 1156, 1160, 1164, 1165, 1178.	2020	Denoting natural and man-made features of significance to shipping and navigation.
AIS Data	2017	AIS data including all large commercial vessels (including passenger vessels), large fishing vessels and some recreational vessels allowing preliminary review of primary vessel routes. A further 28-day survey covering seasonal variations will be collected in 2022 to inform future assessments.
Royal National Lifeboat Institution (RNLI) Call-out Data	2008 to 2017	All RNLI call outs, for any purpose, within the study area.
MAIB incident data	2020	This data includes the locations and details of all marine incidents within the study area informing the baseline risk profile.
Royal Yachting Association (RYA) UK Coastal Atlas of Recreational Boating	Summer 2014 and summer 2017	RYA heat map of AIS derived data including; general boating areas, clubs, marinas and training centres.
Transport for London (TfL) UK Port Ship Arrivals (Data derived from Lloyds List Intelligence / Maritime and Coastguard Agency)	2009 - 2020	UK wide port arrivals by cargo vessels (including passenger vessels).
Marine Management Organisation (MMO) Vessel Monitoring Systems (VMS) data	2019	UK fishing monitoring data utilised by environmental and regulatory organisations to monitor commercial fishing vessel activities. Displayed by fishing effort per International Council for the Exploration of the Sea (ICES) rectangles.

551. There are two firing practice areas within the cable AoS in Bideford Bay which extend from the coastline to approximately 1.5nm offshore. The proposed Windfarm Site is situated within a military Practice and Exercise Areas (PEXA). There is a restricted area approximately 8nm to the north of the study area and a firing practice area located approximately 10nm to the south of the study area.

Table 2.22 Key ports in proximity to the study area

Port	Approximate distance from windfarm site (nm)	Ship arrivals (2020). Source: Transport for London (TfL)
Milford Haven	30	1,700
Bristol	100	1,045
Newport	95	429
Cardiff	90	204
Port Talbert	60	156
Swansea	58	135
Sharpness	>100	134

552. No active disposal sites are contained within the study area.

553. There are no aggregate production licences within the study area.

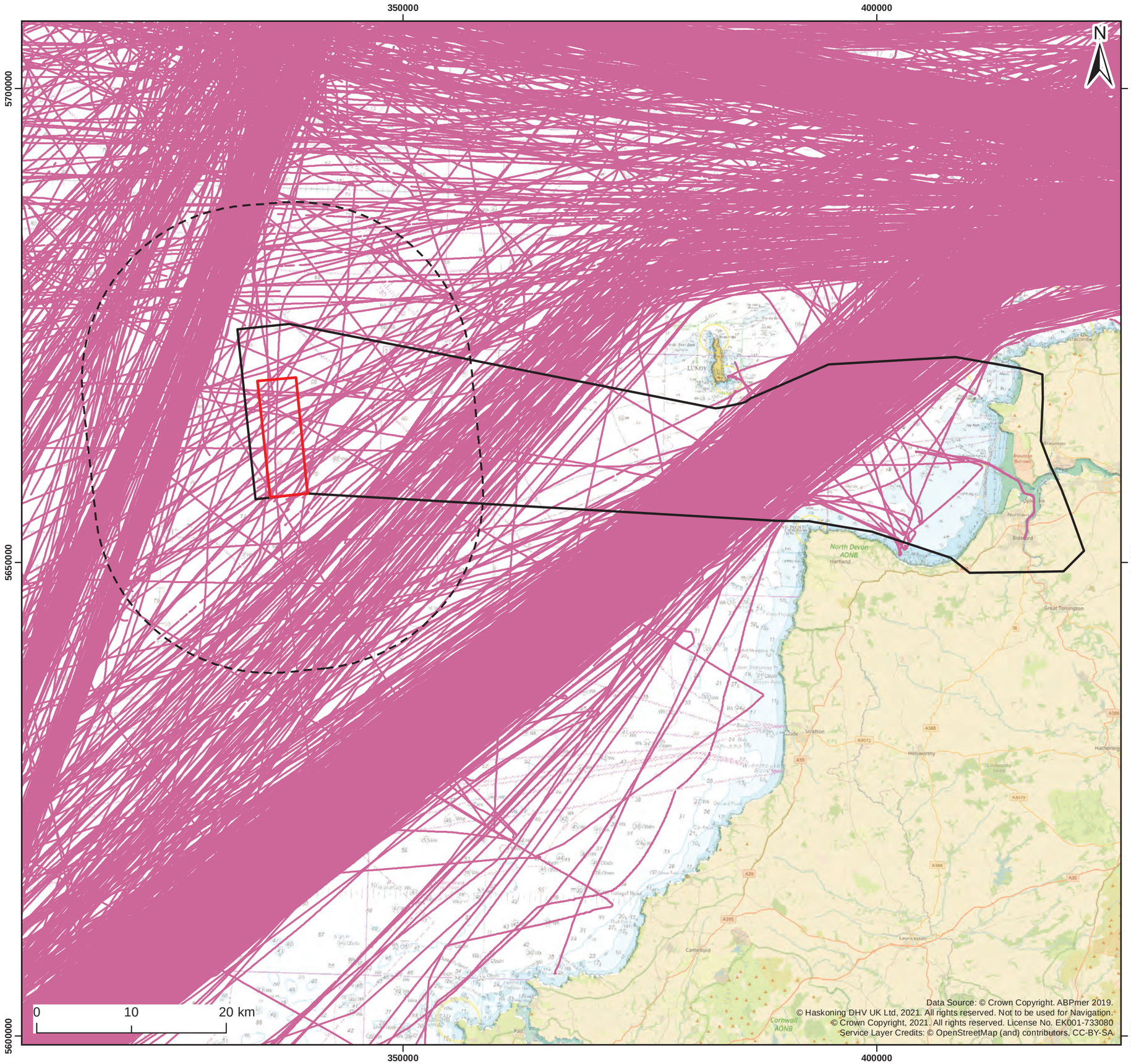
554. The Bideford pilot boarding station is located within the cable AoS approximately 2nm north west of the mouth of the River Taw. The sea stations for boarding and disembarking pilots from and to pilot boats for commercial vessels on route to and from Milford Haven and Bristol are both located outside of the study area.

555. The nearest RNLI lifeboat stations are the Appledore, Ilfracombe, Clovelly and Bude lifeboat stations to the east and Angle and Tenby lifeboat stations to the north.

Vessel Traffic

556. The primary data source for the analysis of vessel traffic is AIS data, an automatic vessel tracking system for the monitoring of vessel movements worldwide. The International Maritime Organization's (IMO) International Convention for the Safety of Life at Sea (SOLAS) requires AIS to be fitted aboard international voyaging ships with 300 or more gross tonnage (GT), and all passenger ships regardless of size.

557. Commercial cargo and tanker vessels tracks are shown in Figure 2.9.2. A number of shipping routes pass through the shipping and navigation study area. These are comprised primarily of vessels routeing to/from Milford Haven and ports in the Bristol Channel via the Off Land's End Traffic Separation Scheme (TSS) to the south and inside of the Area To Be Avoided (ATBA) between Smalls Lighthouse and Grassholme Island to the north. The commercial route approximately 5nm west of the Study Area is comprised of vessels operating between the Off Land's End TSS and Off Smalls TSS.



Legend:

- White Cross Offshore Windfarm
- Area of Search
- 10nm Study Area
- AIS 2017 Cargo and Tankers

Client:	Project:
Offshore Wind Ltd.	White Cross Offshore Windfarm

Title:

Cargo and Tanker Vessel Tracks (2017)

Figure: 2.9.2 | Drawing No: PC2978-RHD-ZZ-XX-DR-Z-0090

Revision:	Date:	Drawn:	Checked:	Size:	Scale:
P01	18/11/2021	GC	CB	A3	1:400,000

Co-ordinate system: WGS 1984 UTM Zone 30N

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558. Passenger vessel routes are shown in Figure 2.9.3. No Passenger vessel routes pass through the Windfarm Site. One low use passenger vessel route passes through the Offshore Development Area. This is likely Cruise Ships such as the *Marco Polo* on route to Bristol Cruise Terminal. There were 18 cruise vessel arrivals into Bristol Cruise Terminal in 2019. The Ilfracombe to Lundy ferry route passes immediately to the north of the cable AoS.

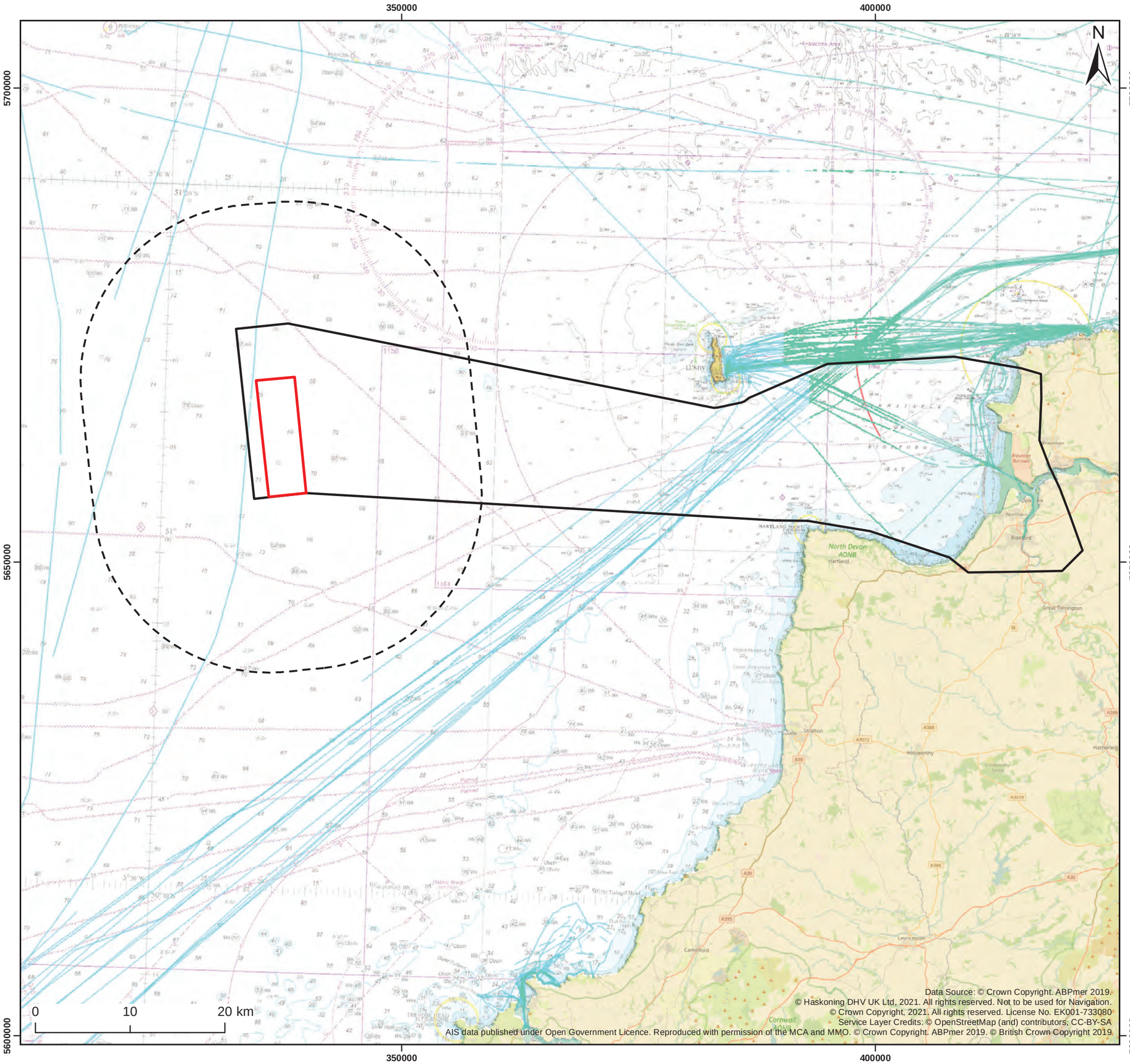
559. The AIS tracks of 'other' vessels, including port services vessels, dredgers, high-speed craft, SAR and law enforcement vessels are shown in Figure 2.9.4. Few 'other' vessels transited the study area during the assessed data period.

560. The tracks of AIS carrying fishing vessels are shown in Figure 2.9.5 alongside VMS fishing effort data. AIS carrying fishing vessels are evident actively fishing within the shipping and navigation study area. VMS fishing effort data indicates moderate fishing effort within the shipping and navigation study area with major commercial fishing areas located to the south off Land's End. Full RADAR traffic surveys will be undertaken to inform further assessments and to effectively map all (including non-AIS carrying) fishing vessel activity.

561. Recreational vessel transits of AIS carrying vessels are shown in Figure 2.9.6 overlaid on RYA Coastal Atlas of recreational boating intensity data. Recreational vessel activity is greatest outside of the Study Area, particularly to the south off Land's End and Padstow and to the north in vicinity of Milford Haven. Low intensity recreational routes pass through the study area between Milford Haven in the north and Land's End and Padstow in the south. There is one RYA designated General Boating Area within the study area which extends from Barnstaple along the River Taw to the north-west of the Bideford Bar. Full RADAR traffic surveys will be undertaken to inform further assessments to effectively map all, including non-AIS carrying, recreational vessel activity.

Maritime Incidents

562. There were no MAIB incidents within the study area during the assessed period. RNLI data between 2008 and 2020 shows that no callouts occurred within the Windfarm Site and 4 callouts occurred within 10nm of the Windfarm Site, all of which occurred to the east of the site. Of these 4 incidents, 3 callouts were attributed to machinery/equipment failure and 3 were in response to recreational craft.



Legend:

- White Cross Offshore Windfarm
- Area of Search
- 10nm Study Area
- AIS 2017 Passenger Vessels

Client:	Project:
Offshore Wind Ltd.	White Cross Offshore Windfarm

Title:

Passenger Vessel Tracks (2017)

Figure: 2.9.3	Drawing No: PC2978-RHD-ZZ-XX-DR-Z-0091				
Revision:	Date:	Drawn:	Checked:	Size:	Scale:
P01	18/11/2021	GC	CB	A3	1:400,000

Co-ordinate system: WGS 1984 UTM Zone 30N

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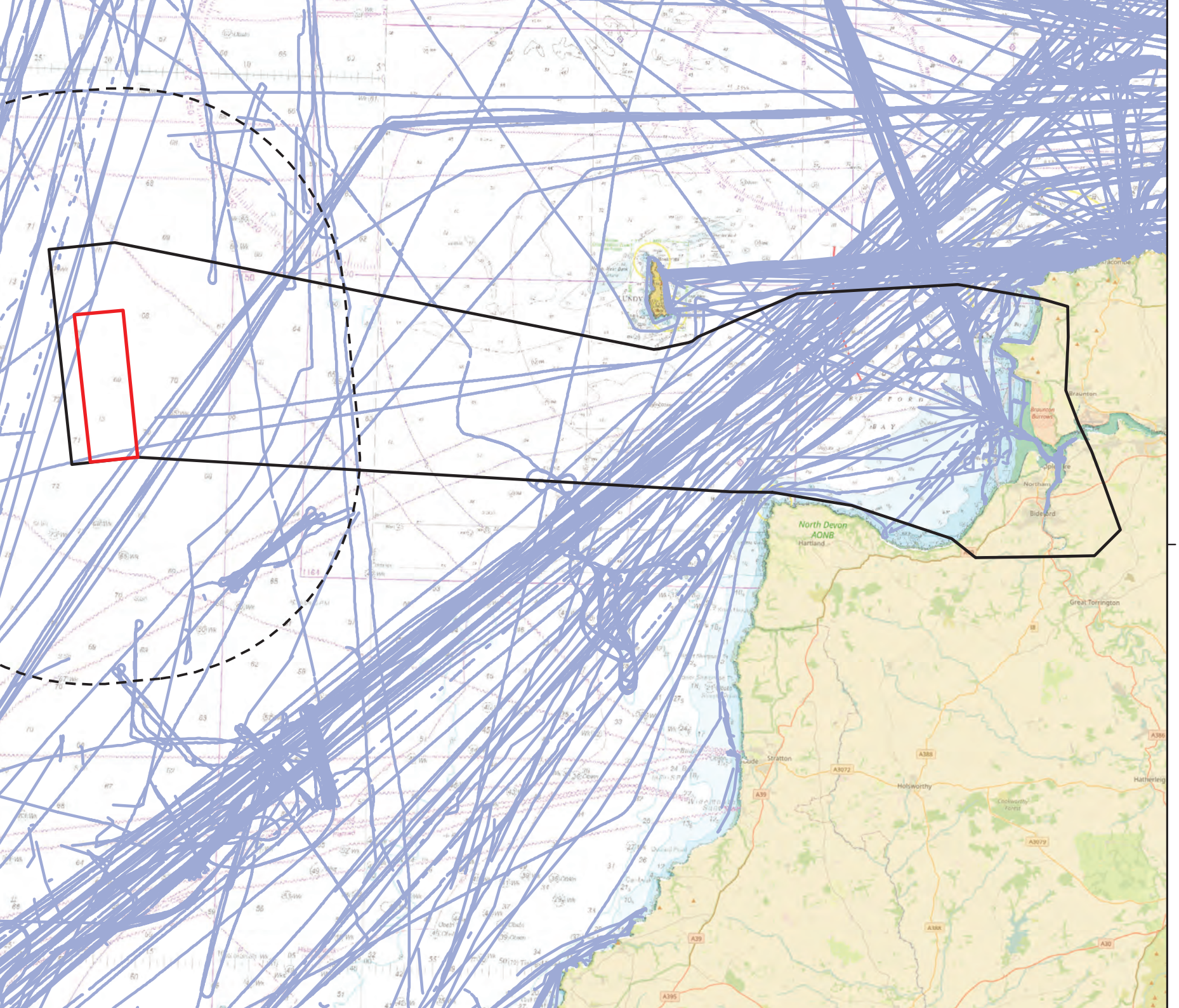


Legend:

- White Cross Offshore Windfa
- Area of Search
- 10nm Study Area
- AIS 2017 Other Vessels

Client:

Offshore Wind Ltd.

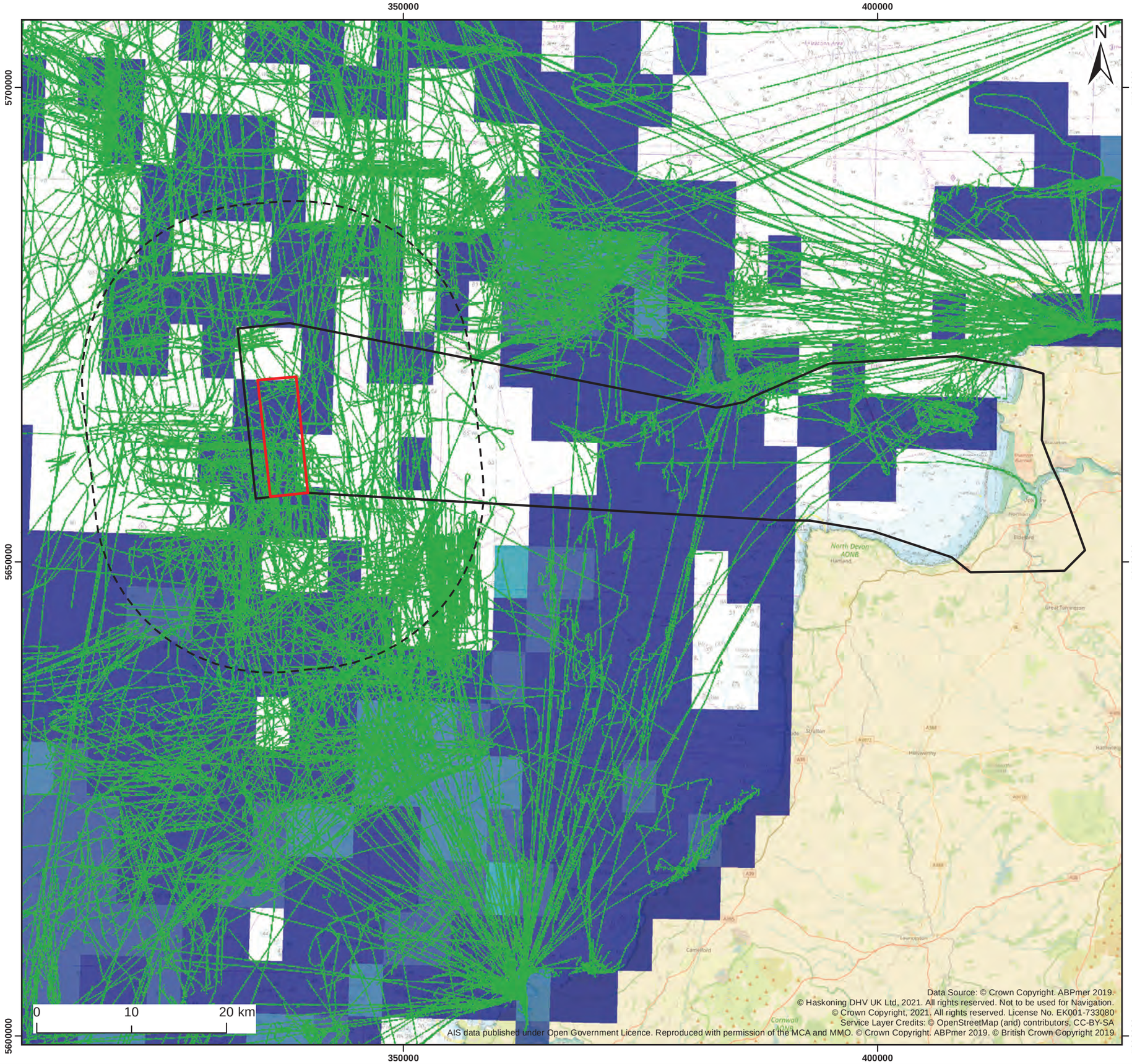
Title:

Other Vessel

Figure: 2.9.4	Drawing No: P

Revision:	Date:	Drawn
P01	18/11/2021	GC

Co-ordinate system: WGS 1984



Legend:

- White Cross Offshore Windfarm
- Area of Search
- 10nm Study Area
- AIS 2017 Fishing Vessels

Total Value of >15m UK Vessel Landings, all gears (2017)

- > £0 - £10,000
- > £10,000 - £20,000
- > £20,000 - £40,000
- > £40,000 - £80,000

Client:	Project:
Offshore Wind Ltd.	White Cross Offshore Windfarm

Title:

Fishing Vessel Activity 2017

Figure: 2.9.5 | Drawing No: PC2978-RHD-ZZ-XX-DR-Z-0093

Revision:	Date:	Drawn:	Checked:	Size:	Scale:
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Co-ordinate system: WGS 1984 UTM Zone 30N

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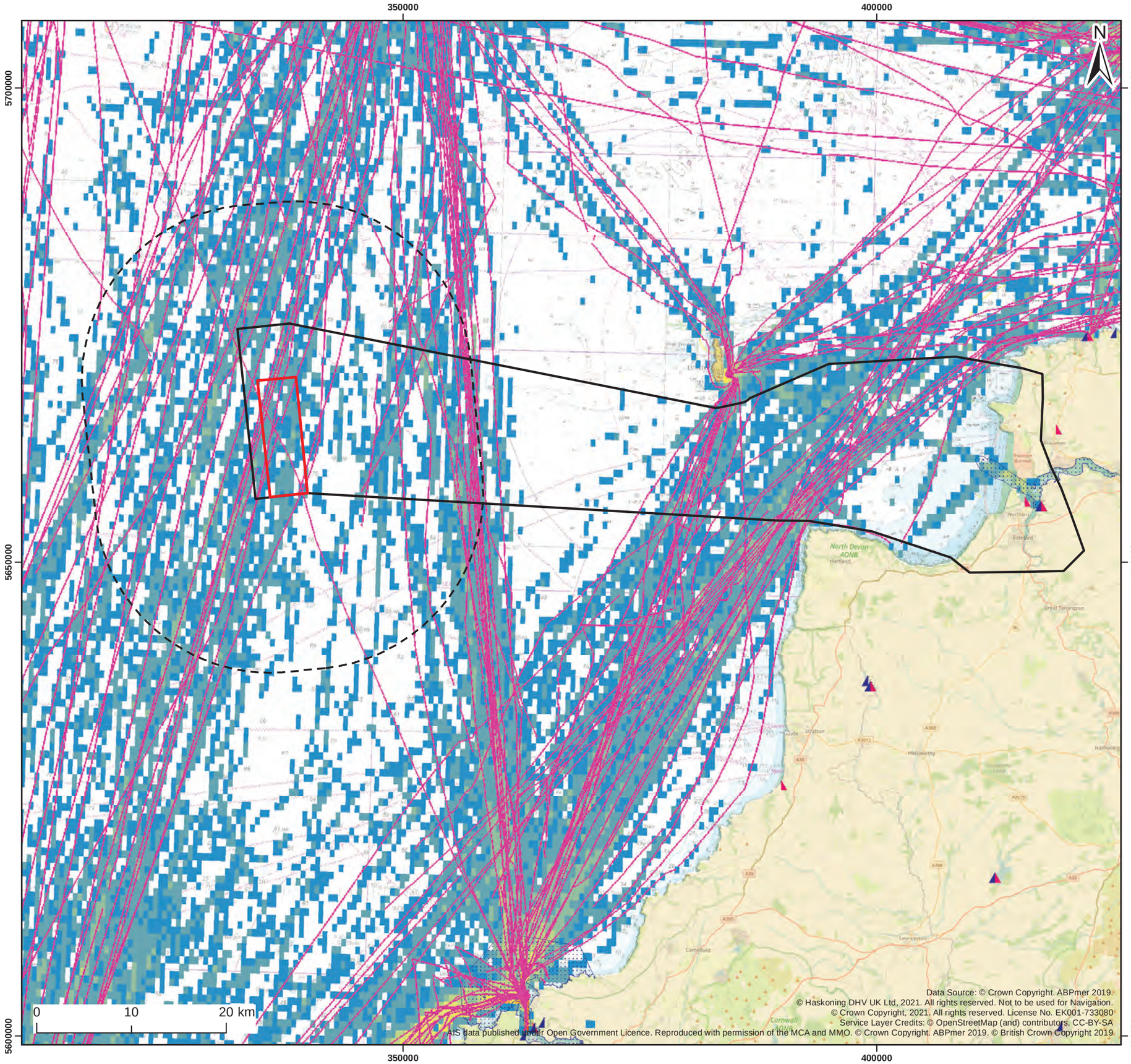

Legend:

- White Cross Offshore Windfarm
- Area of Search
- 10nm Study Area
- AIS 2017 Recreational Vessels
- General Boating Area
- RYA Club
- RYA Training Centre
- Marina

RYA UK Coastal Atlas of Recreational Boating AIS Intensity

- Low
- High

Client:	Project:
Offshore Wind Ltd.	White Cross Offshore Windfarm

Title:

Recreational Vessel Activity

Figure: 2.9.6 | Drawing No: PC2978-RHD-ZZ-XX-DR-Z-0094

Revision:	Date:	Drawn:	Checked:	Size:	Scale:
P01	18/11/2021	GC	CB	A3	1:400,000

Co-ordinate system: WGS 1984 UTM Zone 30N

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2.9.6 Potential Impacts

563. In line with regulations the EIA will consider impacts where there is a likely significant impact. The following section identifies effect-receptor pathways that may potentially lead to a significant impact. Where an effect-receptor pathway is assessed to not lead to a significant impact, recommendation may be made for the impact be scoped out from assessment at EIA, ensuring a proportionate EIA approach.

564. Receptors are identified in Section 2.9.5 and include commercial vessels (cargo, tanker and passenger vessels, including ferries and cruise ships), fishing vessels (commercial and recreational), port and offshore services vessels (associated with offshore industry), dredgers, high-speed craft, SAR vessels, law enforcement vessels, recreational vessels and vessels associated with the Project.

Potential impacts during construction

565. Impacts to shipping and navigation during the construction phase may result from the presence of the Project infrastructure and vessel traffic associated with construction activities potentially increasing collision risk between third party and, third-party and project vessels, and contact risk with Project infrastructure, partially constructed structures or stationary vessels engaged in construction activities. The presence of the structures and construction safety zones may additionally impact existing vessel routeing including commercial shipping routes and potentially poor weather routeing (Figure 2.9.2 and Figure 2.9.3) and access to other marine infrastructure potentially requiring deviations and altering transit times.

566. SAR emergency response capabilities may be impacted if adequate consideration is not given to the turbine layout. Turbine layouts must be designed to ensure safe transit of vessels (and aircraft) with consideration of multiple lines of orientation ensuring lines of sight are maintained in accordance with MGN 654 requirements. Structures and partially constructed structures should be appropriately marked as directed by Trinity House. Structure alignment in straight rows is preferred for the purposes of SAR. Additionally, the presence of the structures may impact on vessel radar, communications and navigation equipment.

567. The installation of cables/partially protected cables during construction may increase anchor and fishing gear snagging risk and reduce the navigable depth, particularly close to shore in decreased water depths. Consideration should be given to areas of critical depth in relation to under keel clearance with change tolerability agreed in consultation with the MCA.

568. The primary impacts scoped in for further assessment at EIA during the construction phase are:

- Impact on collision risk (third-party vessel to third-party vessel / third-party vessel to construction vessel)
- Impact on contact (allision) risk (stationary vessel or project/ non-project infrastructure)
- Impacts on commercial vessel routeing (including poor weather routeing)
- Impact on under keel clearance
- Impact on anchor / fishing gear snagging risk
- Impact on SAR
- Impact on radar, communications and vessel navigation equipment

569. No identified shipping and navigation impacts are proposed to be scoped out during the construction phase.

Potential impacts during operation

570. Impacts to shipping and navigation during the operational phase may result from the presence of Project infrastructure and vessel traffic associated with maintenance activities potentially increasing collision risk between third party vessels, and third party and project vessels. Further, in the event of a mooring failure, there is potential for Project infrastructure to become a navigational hazard to third party vessels and vessel routeing. The impact to contact (allision) risk may increase due to the presence of Project infrastructure and stationary vessels carrying out maintenance works. The presence of the structures and any safety zones (if required) may impact existing vessel routeing including commercial shipping routes and poor weather routeing (Figure 2.9.2 and Figure 2.9.3) and access to other marine infrastructure, potentially requiring deviations and altering transit times.

571. Turbine layouts must be designed to ensure safe transit of SAR vessels (and aircraft) with consideration of multiple lines of orientation ensuring lines of sight are maintained in accordance with MGN 654 requirements. Additionally, the presence of the structures could impact on vessel radar, communications and navigation equipment.

572. Cable and mooring systems may increase impacts associated with anchor and fishing gear snagging and reduce navigable depth. Inter-array and offshore export cables may also increase impacts associated with anchor and fishing gear snagging and reduce the navigable depth, particularly close to shore in decreased water depths. Consideration should be given to areas of critical depth in relation to under keel clearance and tolerability of changes agreed in consultation with the MCA.

573. The primary impacts scoped in for further assessment at EIA during the operational phase are:

- Impact on collision risk (third-party vessel to third-party vessel / third-party vessel to maintenance vessel)
- Impact on contact (allision) risk (stationary project vessel or project/non-project infrastructure)
- Impacts on commercial vessel routeing (including poor weather routeing)
- Impact on under keel clearance
- Impact on anchor / fishing gear snagging risk
- Impact on SAR
- Impact on radar, communications and vessel navigation equipment

574. No identified shipping and navigation impacts are proposed to be scoped out during the operational phase.

Potential impacts during decommissioning

575. The potential impacts during decommissioning are anticipated to be similar to those described above for the construction phase although certain impacts will likely be reduced owing to experience of navigating in vicinity of the project and along newly established routes where deviation was required.

Potential cumulative impacts

576. The cumulative assessment will identify where impacts during construction, operation and decommissioning of the Project in the context of other developments that are existing, consented, or at application stage. These will be agreed in advance with relevant stakeholders. Existing developments form part of the baseline conditions. The approach to cumulative assessment is set out in Section 1.9.2.

577. Projects to be considered within the cumulative assessment may include:

- Other windfarm developments
- Marine renewable energy developments
- Aggregate extraction and dredging licences
- Oil and gas platforms
- Potential port/harbour developments

578. The primary impacts for cumulative assessment at EIA are likely to include:

- Impact on collision risk
- Impact on contact (allision) risk
- Impacts on commercial vessel routeing (including poor weather routeing)

579. Localised impacts (for example, those associated with the presence of the cable) are likely to be scoped out of the cumulative assessment as their impacts are of limited spatial influence.

Potential transboundary impacts

580. Given the international nature of shipping and navigation transboundary effects are possible. A number of international passenger vessel routes operate from Rosslare, Ireland along a route approximately 25nm to the west of the Windfarm Site. Further, there are a number of marine developments being undertaken or planned in the Celtic and Irish Sea that could cumulatively impact upon international routes. Consultation with stakeholders including commercial vessel operators will further inform the scope of the EIA transboundary assessment.

2.9.7 Mitigation Measures

581. Mitigation measures will be developed as site specific information becomes available, the project design is refined, and the ES is prepared. A number of mitigation measures that may be appropriate for the Project ae discussed below. Further mitigation measures may be proposed within the Navigational Risk Assessment (NRA) (Section 2.9.8) and ES. These will evolve as the Project design develops and the EIA progresses, and/or in response to consultation.

582. Examples of mitigation measures which are likely to be considered within the EIA may include:

- Compliance with applicable national and international maritime law including COLREGS (IMO, 1972), SOLAS (IMO, 1974) and MGN 654
- Appropriate lighting and marking agreed in consultation with Trinity House, MCA, and the Civil Aviation Authority (CAA) with consideration of IALA O-139 (IALA, 2013)
- Development of an Aid to Navigation (AtoN) Management Plan
- Application for safety zones during the construction phase and during major maintenance
- Layout agreement in consultation with the MCA with consideration of MGN 654 Annex 5 Search and Rescue (SAR) requirements. Completion of SAR checklist
- Promulgation of information, for example, via Notice to Mariners (NtM) providing advance warning of project activities and vessel movements to stakeholders
- Development of an Emergency Response Cooperation Plan (ERCoP) in consultation with the MCA
- Update of navigational charts including the windfarm area and cables

- Cable burial risk assessment to ensure under keel clearance and burial/protection remains adequate to reduce snagging risk to anchors and fishing gear
- Agreement of construction and post-construction monitoring arrangements with the MCA
- Adherence to appropriate, internationally recognised standards and guidelines for mooring system design, manufacture and installation. Third-party verification of mooring systems

583. Mitigation measures will be consulted upon with stakeholders throughout the EIA process and any relevant or necessary additional mitigation identified.

2.9.8 Approach to Assessment and Data Gathering

584. The approach to assessment for shipping and navigation will be agreed with the MCA. An NRA will be undertaken to inform the EIA process. The key guidance document that will be considered within the NRA will be MGN 654 including Annex 1, Methodology for Assessing Marine Navigational Safety and Emergency Response. The NRA will be undertaken in accordance with IMO Formal Safety Assessment (FSA) methodology (2018) as required by the MCA, to inform impact identification within the ES. A full list of applicable legislation, policy and guidance is outlined within Section 2.9.2.

585. The NRA will additionally identify mitigation measures aimed at reducing any unacceptable hazards to As Low As Reasonably Practicable (ALARP). The NRA will be informed by stakeholder consultation, lessons learnt from other offshore wind projects, baseline data (including vessel traffic surveys) and quantitative modelling to identify and assess key hazards.

586. The primary data source will be AIS, supplemented by vessel traffic surveys each of a minimum 14-days duration in accordance with MGN 654 requirements. The survey timing will be such that seasonal traffic variations are captured. AIS, RADAR and visual data will be collected to ensure representation of all vessel types including non-AIS carrying vessels, such as small recreational and fishing vessels.

2.9.9 Summary of Scoped In Impacts

Table 2.23 Summary of impacts relating to Shipping and Navigation

Potential Impact	Construction	Operation	Decommissioning
Impact on collision risk	✓	✓	✓
Impact on contact (allision) risk	✓	✓	✓
Impact on vessel routeing	✓	✓	✓
Impact on under-keel-clearance	✓	✓	✓
Impact on snagging risk	✓	✓	✓
Impact on SAR	✓	✓	✓
Impact on marine navigation equipment	✓	✓	✓
Cumulative impact on collision risk	✓	✓	✓
Cumulative impact on contact (allision) risk	✓	✓	✓
Cumulative impact on vessel routeing	✓	✓	✓
Cumulative impact on under-keel-clearance	x	x	x
Cumulative impact on snagging risk	x	x	x
Cumulative impact on marine navigation equipment and SAR	x	x	x
Transboundary impacts	✓	✓	✓

Key:

✓ Impact scoped in

✗ Impact scoped out

2.10 Marine Archaeology and Cultural Heritage

2.10.1 Introduction

587. This section of the Scoping Report considers the potential effects of construction, operation and maintenance, and decommissioning of the Project on marine archaeology and cultural heritage receptors seawards of Mean High-Water Springs (MHWS). This will include any receptors in the intertidal zone.

588. All receptors landwards of MHWS are included within Section 3.7:

589. Onshore Archaeology and Cultural Heritage.

590. This section additionally describes datasets to be used within the Environmental Impact Assessment (EIA), and the methodology for how impacts will be assessed at EIA.

591. A high-level heritage appraisal (Appendix A) has been produced. This consists of a high-level assessment of the historic environment of both the onshore and offshore Area of Search in order to identify areas of higher archaeological potential. Both Areas of Search are defined in Section 1.7: Scoping Areas of Search.

2.10.2 Policy, Legislation and Guidance

592. Section 1.5 describes the wider policy and legislative context for the Project. The specific assessment requirements for marine archaeology and cultural heritage set out within the overarching National Policy Statement (NPS) for Energy (EN-1) and NPS for Renewable Energy infrastructure (EN-3). These are detailed in full in Appendix A along with relevant legislation.

593. The EIA assessment will also take account of guidance including:

- Joint Nautical Archaeology Policy Committee (JNAPC) Code of Practice for Seabed Development (JNAPC and The Crown Estate, 2006)
- Historic Environment Guidance for the Offshore Renewable Energy Sector (Wessex Archaeology, 2007)
- Guidance for Assessment of Cumulative Impacts on the Historic Environment from Offshore Renewable Energy (Oxford Archaeology, 2008)
- Chartered Institute for Archaeologists' Standard and Guidance for Historic Environment Desk-Based Assessments (2014a) and Code of Conduct (2014b)
- Draft National Policy Statement for Renewable Energy Infrastructure (EN-3) (2021)
- Institute of Environmental Management and Assessment (IEMA) Principles of Cultural Heritage Impact Assessment (2021)
- Archaeological Written Schemes of Investigation for Offshore Windfarm Projects (The Crown Estate, 2021)

2.10.3 Study Area

594. The Offshore study area for this report consists of the Offshore Area of Search, located within the Celtic Sea, towards the mouth of the Bristol Channel (Figure 1.7.1).

2.10.4 Baseline Data

595. This section has been prepared through a review of the following sources:

- United Kingdom Hydrographic Office (UKHO) wrecks and obstructions records
- Records from the National Heritage List for England maintained by Historic England
- Devon Historic Environment Record (HER)
- The West Coast Palaeolandscapes Survey (Fitch and Gaffney, 2011)
- Relevant information from previous archaeological assessments including the Atlantic Array Offshore Windfarm EIA and Erebus Floating Wind Demonstrator Project Scoping reports

2.10.5 Baseline Environment

596. Consideration of the marine and intertidal archaeology and cultural heritage baseline within the Offshore Area of Search includes:

- Palaeolandscape features and sub-seabed deposits of palaeoenvironmental interest
- Prehistoric occupation sites
- Wreck and aviation remains
- World War 2 (WW2) defensive remains
- Occupation activity related to all period of human activity within the intertidal zone

597. Further detail on the archaeological potential of the Offshore Area of Search is provided in the high-level heritage appraisal (Appendix A). A summary is provided below.

598. The Offshore Area of Search is located within an area of high prehistoric archaeological potential, within which, archaeological and palaeoenvironmental evidence related to human occupation of the UK may be preserved. The Offshore Area of Search has been shaped by three major glaciations over the past 970,000 years, leading to lower sea levels and, as a consequence, there have been long periods when these areas, and the wider Bristol Channel region, were exposed as land suitable for hominin occupation (Wenban-Smith, 2002).

599. The West Coast Palaeolandscapes Survey has mapped parts of the Celtic Sea and all of the Bristol Channel revealing a series of lakes, floodplains, river channels and seabed features (Figure 2.10.2) (Fitch and Gaffney, 2011). Sometime after 16,000

BC Britain was cut off from Ireland with some of the study area, largely the cable route, remaining dry land until c.7000 BC.

600. By the Mesolithic period the Bristol Channel changed drastically, with sea level rise causing the coastline to retreat further inland (Fitch and Gaffney, 2011). Lundy remained connected to the mainland at this time by a small promontory and was likely a centre for Mesolithic activity (Schofield, 1994). The scheduled monument Prehistoric settlement at North End, Lundy (List entry: 1016029) supports this with occupation evidence dating to 8000 BC.

601. The Devon HER records extensive evidence of Mesolithic occupation within the coastal regions of the study area namely the intertidal zone at Westward Ho!, around Croyde and around Northam. The records largely comprise large amounts of Mesolithic flints with Mesolithic finds at Westward Ho! including peat deposits, middens, flints, a whale bone harpoon and a submerged forest.

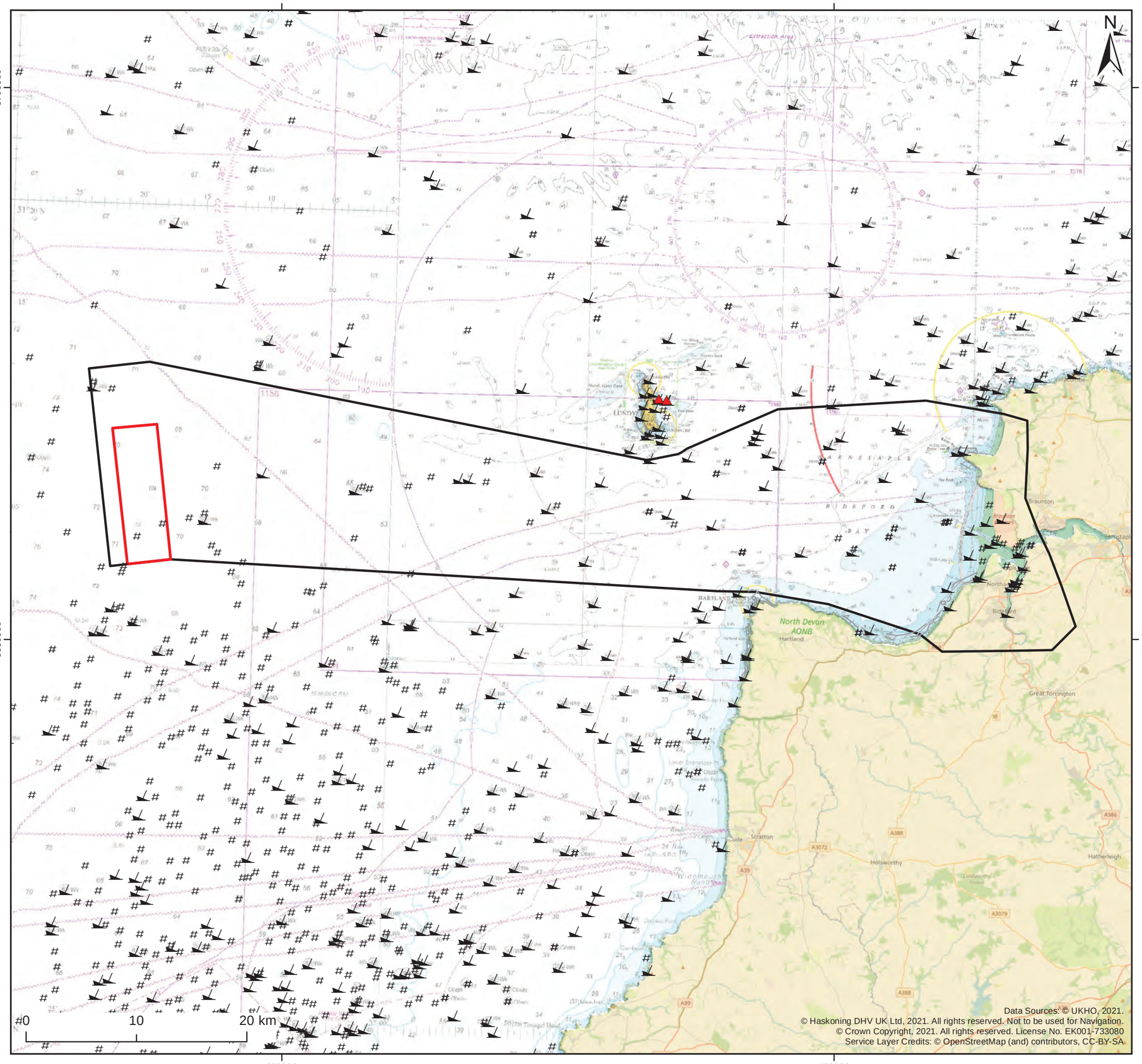
602. By the Neolithic period, the coastline around the UK was largely as it is today. As such, evidence from the Neolithic onwards is likely to be of an increasingly maritime nature. Examples of Neolithic log boats have been recorded in the UK and Ireland. Additionally, several Neolithic sites have been identified in the coastal regions of the AoS towards Northam, Westward Ho! and Croyde.

603. From the Bronze Age onwards, boat building technologies became more advanced, with sewn plank boat remains know from the UK (Van de Noort, 2003) however, log boats were still used during this period.

604. These advances continued throughout the Iron Age, Roman and medieval periods, with new technologies adopted and more seaworthy vessels constructed, with important coastal trade links and important trade links between the UK and Ireland. During the medieval period a flourishing pottery industry was established at Bideford with it becoming an important trade port, with trade links to Brittany.

605. From the post-medieval period onwards the evidence for maritime activity, both documentary and physical, increases. Improved ship building techniques allowed a diverse and specialised array of vessels and permitted more efficient and rapid maritime trade and transport (Timms, 1976). Bideford continued to thrive during this period with a shipbuilding industry established.

606. Bideford played an important part in the tobacco trade with America and the Newfoundland fishing industry (Timms, 1976). By the 19th century it built up a new business as an emigration port to North America.



Legend:

- White Cross Offshore Windfarm
- Area of Search
- Protected Wrecks
- # Obstruction
- Wreck
- Obstruction

Client:	Project:
Offshore Wind Ltd.	White Cross Offshore Windfarm

Title:

Marine Themes and UKHO Wrecks and Obstructions and Protected Wrecks

Figure: 2.10.1 | Drawing No: PC2978-RHD-ZZ-XX-DR-Z-0095

Revision:	Date:	Drawn:	Checked:	Size:	Scale:
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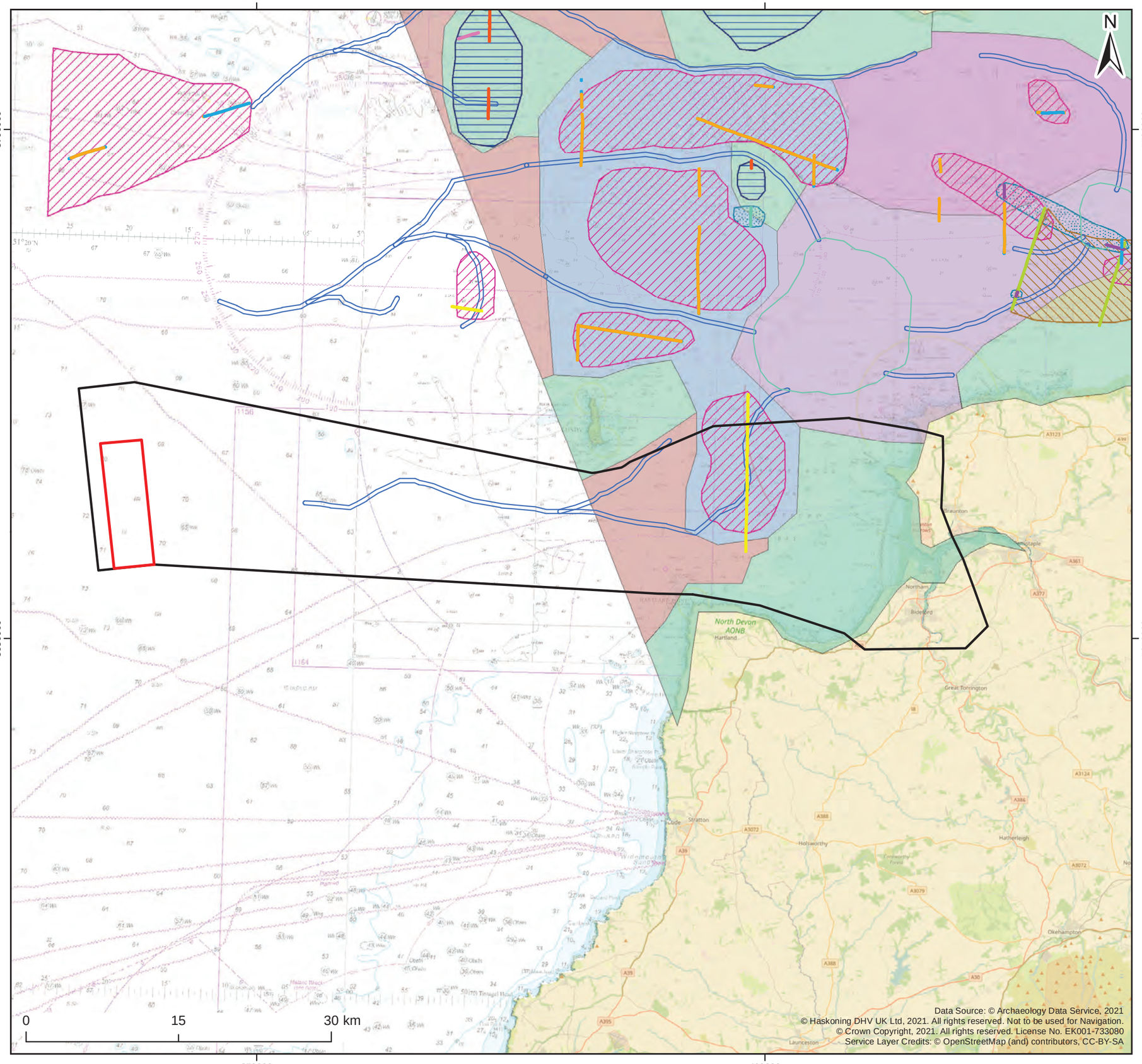

Legend:

White Cross Offshore Windfarm

Area of Search

2D Features

- Glacial lake deposit
- Holocene channel with layered infill
- Peat/organic
- Pleistocene channel
- Positive topography
- Sediement filled basin
- Thin lateral floodplain or organic layer deposit
- Wide channel, surface sands infilled - at the star

3D Features

- channels
- lakes

Broad Area Features

- floodplain
- pleistocene
- positive topography
- wide old channel

Landscape Characterisation

- Area of earlier channels
- Area of floodplain deposits and Pleistocene channel
- Early Holocene floodplains
- Latest Palaeolithic to Earliest Mesolithic plains
- Relative upland areas
- Zone of Holocene wetlands

Client:	Project:
Offshore Wind Ltd.	White Cross Offshore Windfarm

Title: West Coast Palaeolanscapes Survey

Figure: 2.10.2 | Drawing No: PC2978-RHD-ZZ-XX-DR-Z-0096

Revision:	Date:	Drawn:	Checked:	Size:	Scale:
P01	18/11/2021	GC	CB	A3	1:380,000

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607. Within the offshore Area of Search there are no wrecks designated under the Protection of Wrecks Act 1973 or under the Protection of Military Remains Act 1986.

608. Within the wider region, there are two wrecks protected under the Protection of Wrecks Act 1973 off the coast of Lundy Island. These are the *Gull Rock* wreck (List entry: 1000053) and *Iona II* (1000051).

609. Within the intertidal zone there are two scheduled monuments relating to wrecks, these are:

- Wreck off Northam Burrows (List entry: 1432949) - The wreck of a wooden sailing vessel, likely to be a Severn trow (a locally distinctive coastal sailing vessel of south-west England), lost off Northam Burrows between the mid-18th to early 19th centuries
- Wreck off Westward Ho! (List entry: 14324180) - The wreck of a pre-1840 wooden sailing vessel thought to have been built in the mid- to late 18th century and wrecked at Westward Ho!, probably within the same period, and likely to be that of the Sally, lost 1769.

610. Within the offshore Area of Search, there are 128 HER records relating to wrecks, including documented losses of vessels which are yet to be located, and 98 wrecks and obstructions recorded by the UKHO. These records largely date between the 18th and 21st centuries, with some dating earlier.

611. There is also potential for aviation remains within the offshore Area of Search largely relating to WW2. Within the intertidal zone the Devon HER records a large amount of WW2 defensive structures associated with a military training camp at Braunton Barrows and along the coast.

2.10.6 Potential Impacts

612. Heritage assets may be affected by direct physical changes or by changes to their setting (Historic England, 2015).

613. Direct impacts to heritage assets present on the seafloor, or buried within seabed sediments, may result in damage to, or the destruction of, any archaeological material, or the relationship between that material and the wider environment (stratigraphic context or setting). Relationships between archaeological material and the wider environment are crucial to developing a full understanding of such material. These impacts may occur if heritage assets or material are present within the footprint of the proposed scheme (i.e. anchors, foundations or cables) or from construction related activities (i.e. seabed preparation and vessel anchoring).

614. There is also the potential for the Project to change the local and regional hydrodynamic and sedimentary process regimes directly and indirectly, as outlined in Section 2.2: Marine Geology, Oceanography and Physical Processes, which can lead to the re-distribution of erosion and accretion patterns. For example, changes in tidal currents may affect the stability of nearby morphological and archaeological features.

615. Indirect impacts to heritage assets may occur if buried heritage assets become exposed to increased wave/tidal action, as these will deteriorate faster than assets protected by sediment. Conversely, if increased sedimentation results in an exposed site becoming buried, it may add some protection and be considered a beneficial impact.

616. Impacts to the significance of a heritage asset may also occur if a development changes the setting of the asset (the surrounding in which the heritage assets us located, experienced, and appreciated).

617. Similarly, historic character may also be affected if the proposed scheme results in a change to the prevailing character of the area and/or alters perceptions of the seascape.

Potential impacts during construction

618. Direct impacts may occur if archaeological material is present within the footprint of the proposed development (e.g. cabling, turbine moorings and mooring chains, footprint of jack-up vessels, Offshore Substation foundations).

619. Indirect impacts to heritage assets may occur if the physical presence of construction vessels and offshore infrastructure impacts the hydrodynamic regime. Similarly, if seabed preparation associated with foundation and cable installation and associated with anchors/moorings leads to localised effects upon sedimentary processes this could lead to indirect impacts to heritage assets. Similarly, indirect impacts to heritage assets may occur through cable protection measures such as rock dumping. This could lead to heritage assets being covered and crushed.

620. There would also be potential for impacts to the setting of heritage assets and to the historic seascape character from the presence of vessels associated with the installation of offshore infrastructure and activities at the Landfall.

Potential impacts during operation and maintenance

621. Direct impacts may occur if archaeological material is present within the footprint of works required for routine maintenance activities which disturb the seabed (for example, seabed contact by legs of jack-up vessels and/or anchors). Similarly, this can occur in exceptional circumstances such as the replacement of cabling.

622. However, given the areas where such activities would be undertaken would already have been disturbed during construction, there would be limited further impact.

623. Indirect impacts to heritage assets may occur if the physical presence of the installed infrastructure impacts the hydrodynamic or sedimentary regime. This includes the potential for increased scour around anchors or foundation infrastructure.

624. There would also be potential for impacts to the setting of heritage assets and to the historic seascape character from the presence of the installed infrastructure and ongoing maintenance activities.

Potential impacts during decommissioning

625. If cables and anchors/moorings are left in place there would be no potential for direct impact. However, if these and other infrastructure needed to be removed there would be potential for direct impacts.

626. Direct impacts to heritage assets may occur if the cables, anchors/moorings, and Offshore Substation infrastructure are removed. This is not anticipated as any remains at the locations of the installed infrastructure will already have been impacted/mitigated during the construction phase.

627. If archaeological material is present within the footprint of jack-ups or vessel anchors deployed during decommissioning activities, direct impacts may also occur.

Potential cumulative impacts

628. Individual heritage assets would not be subject to cumulative direct impacts from other known plans or projects as there would be no physical overlap of different infrastructure as individual assets are discrete. However, although individual assets are discrete, taken together they could have collective heritage significance. For example, if several vessels are known to have been lost in the same event across a large area the individual vessels could be impacted by different projects. As the vessels are known to have been lost in the same event, they would have a collective heritage significance. Therefore, multiple impacts upon similar assets could occur cumulatively.

629. In addition, there is potential for multiple developments to affect the larger-scale archaeological features such as palaeolandscapes. The setting of heritage assets and the historic seascape character of the Celtic Sea may also be affected.

630. There is also the potential for cumulative indirect impacts associated with changes to marine physical processes. There is, therefore, the potential for cumulative impacts to heritage assets. The approach to cumulative assessment is set out in Section 1.9.2.

Potential transboundary impacts

631. Direct transboundary impacts may occur during construction if wrecks or aircraft of non-British nationality are subject to impact from development. Such wrecks may fall within the jurisdiction of another country, and may include, for example, foreign warships lost in UK waters. Similarly, where palaeolandscapes within the Bristol Channel, Celtic Sea and Atlantic cross international boundaries, direct transboundary impacts may occur.

632. Indirect transboundary impacts, associated with changes to marine physical processes, where those changes cross an international boundary, are not expected to occur as the proposed scheme is located well within the European Economic Zone (EEZ) boundary. As such it is proposed to scope out indirect transboundary effects on Marine Archaeology and Cultural Heritage.

2.10.7 Approach to Assessment and Data Gathering

Data Sources

633. The data sources that will be accessed to characterise the existing historic environment with respect to offshore archaeology and cultural heritage are set out in Table 2.24.

Table 2.24 Data Sources to be Used for the Assessment of Offshore Archaeology and Cultural Heritage

Data source	Data contents
UKHO	Records of wrecks and obstructions data including 'dead' and salvaged wrecks that are no longer charted as navigational hazards.
Maritime records maintained by Historic England (National Marine Heritage Record (NMHR) currently under development by Historic England)	Maritime records, including documented losses of vessels, and records of terrestrial monuments and findspots, including the archaeological excavation index.

Data source	Data contents
National Heritage List of England (NHLE)	Records of designated heritage assets within England, maintained by Historic England. GIS data for all Protected Wrecks, Scheduled Monuments, Listed Buildings, Registered Parks and Gardens and Registered Battlefields.
Devon Historic Environment Record (HER)	Contains data on all recorded non-designated heritage assets, held Devon County Council. The data includes archaeological, historic landscape and historic building information. Information on previous events (archaeological surveys and investigations) will also be obtained.
British Geological Survey (BGS)	Historic borehole logs and the wider geological background for the region.
National Historic Seascape Characterisation	Geographic Information System (GIS) data and character texts for the Historic Seascape Character (HSC) of coastal and marine areas around England, mapped through a series of projects funded by Historic England and consolidated into a single national database.
Existing archaeological studies and published sources	Background information on the archaeology of the Celtic Sea and Bristol Channel, including the results of archaeological assessments carried out for Atlantic Array Offshore Wind the wider Bristol Channel, Celtic Sea and Atlantic.

634. In addition to the data presented in Table 2.24 the data presented in Table 2.26 will be collected for the EIA assessment.

Table 2.25 Surveys to be undertaken

Data Set	Spatial Coverage	Survey Timings
Geophysical (multibeam echosounder, side scan sonar, gradiometer/magnetometer & sub bottom profiling) survey	Windfarm Site	TBC
Grab sampling and drop-down video	Windfarm Site	TBC
Geophysical (multibeam echosounder, side scan sonar, gradiometer/magnetometer & sub bottom profiling) survey	Offshore Export Cable Corridor	TBC
Grab sampling and drop-down video	Offshore Export Cable Corridor	TBC

635. The marine geophysical survey data, which will be acquired to inform the EIA in 2022, will be subject to archaeological assessment by a qualified and experienced

archaeological contractor. This is in accordance with industry good practice set out in available guidance such as Marine Geophysics Data Acquisition, Processing, and Interpretation (Historic England, 2013).

636. The data acquired will consist of Side Scan Sonar (SSS), Sub Bottom Profiler (SBP), Magnetometer (Mag) and Multi-beam bathymetry. The SSS will be acquired at 100% coverage with other data acquired on the same lines.

637. With regard to geotechnical investigations if any engineering led boreholes are undertaken, allowance will be made for archaeological involvement in the planning of the survey and the samples will be made available for geoarchaeological assessment by a qualified and experienced archaeological contractor, if required.

Approach to Assessment

638. The specific assessment requirements for marine archaeology and cultural heritage set out within the overarching NPS for Energy (EN-1) and NPS for Renewable Energy infrastructure (EN-3) are summarised in Table X in Appendix A.

639. Design assumptions used to inform assessments will be clearly identified in the project design envelope (PDE), considering worst case parameters specifically for marine archaeology and cultural heritage receptors.

640. The marine archaeology assessment will be informed by the interpretation of the geophysical survey data (bathymetry and SSS data to identify seabed features, such as wrecks, magnetometry data to identify magnetic anomalies and SBP data to identify palaeolandscape features).

641. A marine Archaeological Desk-Based Assessment (ADBA) will be undertaken to establish the baseline for both known and potential heritage assets within the defined Offshore Development Area based upon the desk-based sources listed in Table 2.24. This may include a review of heritage assets which may require a setting assessment.

642. Dependent upon the results, a walkover survey of the coastal and intertidal areas of the Landfall may be carried out to ground truth existing records of heritage assets and identify any potential unrecorded heritage assets. This may also be required to inform an assessment of potential setting impacts upon heritage assets below MHWS within the intertidal zone.

643. The ADBA and assessment of geophysical data will be used to identify a strategy for mitigation including the avoidance of identified heritage assets through the application of Archaeological Exclusion Zones (AEZs) where appropriate.

644. The methodology of the assessment will also take account of the guidance summarised in Section 2.10.1.

2.10.8 Mitigation Measures

645. Mitigation measures will be developed as site specific information becomes available, and the project design ids refined. The ADBA and assessment of geophysical data will be used to identify a strategy for mitigation where required. Mitigation may will include:

- The avoidance of identified heritage assets through the application of AEZs where appropriate
- The acquisition and assessment of further geophysical survey post-consent
- The acquisition and assessment of additional geotechnical data
- Investigation of anomalies of potential archaeological interest using remotely operated vehicles (ROVs) (usually undertaken as part of UXO clearance)
- The implementation of a Protocol for Archaeological Discoveries

646. Any mitigation that is required will be discussed and agreed through ongoing consultation with the relevant heritage stakeholders, throughout the EIA process.

2.10.9 Summary of Scoped in Impacts

647. Table 2.26 outlines the impacts which are proposed to be scoped into the EIA. This may be refined through the Project Plan as additional information and data become available.

Table 2.26 Summary of impacts relating to marine archaeology and cultural heritage

Potential Impact	Construction	Operation	Decommissioning
Direct impacts to heritage assets	✓	✓	✓
Indirect impacts to heritage assets associated with changes to marine physical processes	✓	✓	✓
Change to the setting of heritage assets, which could affect their heritage significance	✓	✓	✓
Change to character which could affect perceptions of the HSC	✓	✓	✓
Cumulative impacts	✓	✓	✓
Transboundary impacts (direct)	✓	✓	✓
Transboundary impacts (indirect)	✗	✗	✗

Key:
✓ Impact scoped in
✗ Impact scoped out

2.11 Civil and Military Aviation

2.11.1 Introduction

648. Wind turbines have the potential to cause a variety of adverse effects on aviation interests. They can cause issues for the radars used by civilian and military air traffic controllers because the characteristics of moving turbine blades are similar to those of aircraft, leading to spurious returns, or clutter, on radar displays. This can affect the safe provision of air traffic services. Wind turbines can also present a physical obstruction for aviation activities such as military low flying.

2.11.1 Policy, Legislation and Guidance

649. Section 1.5 describes the wider policy and legislative context for the Project. The overarching assessment requirements relevant for civil and military aviation are set out within National Policy Statement (NPS) EN-1, with more specific requirements set out in paragraphs 5.4.10 to 5.4.13 of the NPS.

2.11.1 Study Area

650. The extent of the Study Area for the assessment of impacts on aviation and radar has been informed using the National Air Traffic Services (NATS) 'self-assessment maps' (NATS, 2017). The available spatial data layers illustrate any potential interactions with 54 air-ground-air (AGA) communication stations, 55 navigation aids and 20 secondary surveillance radar operated by NATS En Route plc (NERL) in the UK.

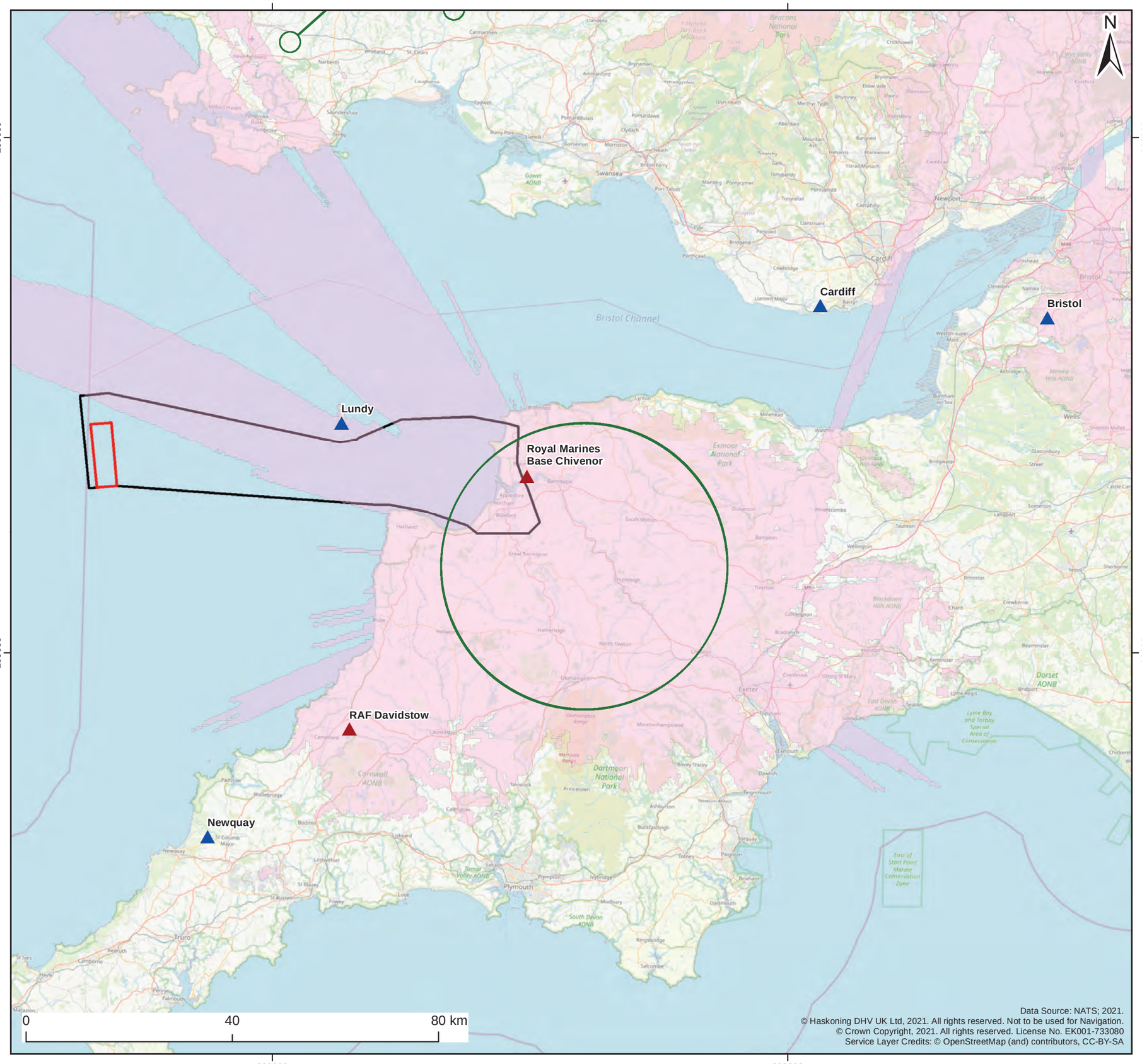
2.11.2 Baseline Data

651. Information on the location and type of aviation and radar receptors that may be impacted by the Project have been collated from the NATS sources. Information presented in the Erebus EIA Scoping Report (Intertek, 2019) has also been reviewed and presented, where appropriate.

2.11.3 Baseline Environment

Civil aviation

652. The UK civil airport nearest to the Windfarm Site is Newquay Airport, which is approximately 70km south of the Windfarm Site as shown on Figure 2.11.1. Lundy Airstrip is approximately 44km east of the Windfarm Site.



Legend:

- White Cross Offshore Windfarm
- Area of Search
- Primary Radar
- Secondary Radar

Airports/Airfields

- Civil
- Military

Client:	Project:
Offshore Wind Ltd.	White Cross Offshore Windfarm

Title:

Civil and Military Aviation

Figure: 2.11.1 | Drawing No: PC2978-RHD-ZZ-XX-DR-Z-0109

Revision:	Date:	Drawn:	Checked:	Size:	Scale:
P01	06/01/2022	AB	CB	A3	1:750,000

Co-ordinate system: British National Grid

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653. Airports with published Instrument Flight Procedures (IFPs) have associated Minimum Sector Altitudes (MSAs). An MSA defines the minimum safe altitude an aircraft can descend to within a sector of radius 25 nautical miles, approximately 46km. These Sectors provide obstacle clearance protection of at least 1,000ft to aircraft within that area. This allows pilots of aircraft flying under Instrument Flight Rules the reassurance of properly designated obstacle and terrain clearance protection whilst making an approach and landing at an airport in poor weather. No MSAs extend over the Windfarm Site.

654. A preliminary radar line of sight (RLoS) analysis indicates that no Primary Surveillance Radar (PSR) will have visibility across the Windfarm Site. There are three primary surveillance radars in the wider region, one located in Devon and two in Cornwall. NATS advises that effects on Secondary Surveillance Radars (SSRs) are only relevant to consider when Wind Turbine Generators are located less than 10km from the SSR. The Windfarm Site lies outside the area of interaction with any SSR.

655. The airspace above and adjacent to the Windfarm Site is used by civil and military aircraft and lies within the London Flight Information Region (FIR) for air traffic control, the airspace regulated by the UK Civil Aviation Authority (CAA).

Military aviation

656. The nearest PSR-equipped military airfields to the Windfarm Site are Royal Marines Base Chivenor (approximately 80km to the east) and RAF Davidstow (approximately 64km to the south east) of the Windfarm Site.

Helicopter operations

657. Commercial offshore helicopter operations in this region are limited to Search and Rescue (SAR) operations. In 2013, Bristow Helicopters Ltd won the UK Government national contract to deliver SAR operations on behalf of the Maritime and Coastguard Agency (MCA).

658. Bristow now operates on behalf of Her Majesty's Coastguard from 10 coastguard helicopter bases around the UK, responding to all SAR incidents for the whole of the UK. The closest SAR helicopter bases to the Windfarm Site is Newquay. SAR operations often involve flying at less than 1,500 ft (457 m). Assessment of potential impacts on SAR operations will be assessed within the project-specific Navigation Risk Assessment and will adhere to guidance set out in MCA guidance (MGN543).

2.11.4 Potential Impacts

659. In both construction and operational phases wind turbines have the potential to affect civil and military aviation (fixed-wing and helicopters), either through their physical dimensions limiting access and affecting safeguarding or safe passage, or through their effects on PSRs.

660. The creation of a new obstacle environment increases the risk of collision for military low flying aircraft and Search and Rescue operations.

661. Radar impacts are caused by the characteristics of rotating wind turbine blades being similar to aircraft, leading to spurious clutter on radar displays.

662. There is no requirement for helicopters as part of the Project. However, if required for unforeseen circumstances, all pilots would be expected to fly in compliance with the Rules of the Air regulations as stated in the UK Air Navigation Order (CAA, 2012), and any increase in air traffic would be managed by the existing Air Traffic Services infrastructure provided in accordance with regulatory requirements.

Potential impacts during construction

663. Potential impacts on civil and military aviation during the construction phase are associated with the presence of tall crane vessels and recently erected fully or partially constructed structures, increasing the risk of collision with low-flying aircraft.

Potential impacts during operation and maintenance

664. Potential impacts on civil and military aviation during operation are associated with the presence of wind turbines increasing the risk of collision with low-flying aircraft. A preliminary RLoS analysis indicates that no Primary Surveillance Radar (PSR) will have visibility across the Windfarm Site. However, this is will be confirmed with RLoS modelling in the EIA and is therefore scoped in.

Potential impacts during decommissioning

665. Potential impacts on civil and military aviation during the decommissioning phase are similar to those during construction and are associated with the presence of tall crane vessels and partially dismantled structures increasing the risk of collision with low-flying aircraft.

Potential cumulative impacts

666. The cumulative assessment will consider the impacts in combination with other offshore windfarms and associated aviation activities. The approach to cumulative assessment is set out in Section 1.9.2.

Potential transboundary impacts

667. The airspace around the Windfarm Site is used by international civil aviation. However, the potential impacts of wind turbines on aviation are localised. The Project is beyond the 60NM range of Ireland's PSRs and is outside the Ireland Aviation Authority's area of responsibility. As such, transboundary impacts will not exist. It is proposed that transboundary impacts are scoped out of the EIA.

2.11.5 Mitigation Measures

668. As discussed in Section 1.9, mitigation measures will be developed as site specific information becomes available, the project design is refined and the ES is prepared. A number of mitigation measures that may be appropriate for the Project could be embedded within the design and accounted for within the assessment of impacts. Further mitigation measures may be proposed in response to impact assessments. These will evolve as the Project design develops and the EIA progresses, and/or in response to consultation.

669. Examples of mitigation measures which are likely to be considered include:

- Technological solutions
- Implementing aids to navigation (including lighting) deployed in line with latest available industry guidance as advised by MCA, CAA and Ministry of Defence (MOD)
- Application of latest available industry guidance as advised by NATS and the CAA
- Potential change to the designation of the airspace above the Windfarm Site through agreement with the CAA
- An Offshore Decommissioning Plan will be developed and implemented

670. Potential mitigation measures for civil and military aviation will be consulted upon with stakeholders throughout the EIA process and will also reflect appropriate measures that are being discussed at an industry level.

2.11.6 Approach to Assessment and Data Collection

Approach to Data Collection

671. The primary source of aviation related data to be used during desk-based studies in support of the EIA is the UK Aeronautical Information Publication (AIP). The AIP contains details on airspace and en-route procedures as well as charts and other air navigation information. A summary of relevant data sources providing information

and guidance that will be considered as part of the EIA process is provided in Table 2.27.

Table 2.27 Data sources to inform the civil and military aviation assessment

Source	Summary
Civil Aviation Publication (CAP) 032: UK AIP (CAA, 2021)	Contains information on facilities, services, rules, regulations, and restrictions in UK airspace.
CAP 168: Licensing of Aerodromes (CAA, 2019)	Sets out the standards required at UK licensed aerodromes relating to management systems, operational procedures, physical characteristics, assessment and treatment of obstacles, and visual aids.
CAP 437: Standards for Offshore Helicopter Landing Areas (CAA, 2021)	Provides the criteria applied by the CAA in assessing offshore helicopter landing areas for worldwide use by helicopters registered in the UK.
CAP 670: Air Traffic Services Safety Requirements (CAA, 2019)	Highlights the requirements to be met by providers of civil air traffic services and other services in the UK in order to ensure that those services are safe for use by aircraft.
CAP 764: Policy and Guidelines on Wind Turbines (CAA, 2016)	Details the CAA policy and guidelines associated with wind turbine impacts on aviation that aviation stakeholders and wind energy developers need to consider when assessing a development's viability.
CAP 1616: Airspace Change (CAA, 2021)	Explains the CAA's regulatory process for changes to airspace.
CAP 2038A00: Air Navigation Order 2016 (CAA, 2021)	Sets out the Rules of the Air and includes the application of lighting to wind turbines in UK territorial waters (articles 222 and 223).
UK Military AIP (MOD, 2021)	The main resource for information and flight procedures at all military aerodromes.
MOD Obstruction Lighting Guidance (Low Flying Operations Flight, 2020)	Includes requirements for the lighting of offshore developments.
MCA Marine Guidance Note (MGN) 654: Safety of Navigation: OREIs – Guidance on UK Navigational Practice, Safety and Emergency Response (MCA, 2021)	Highlights issues to consider when assessing navigational safety and emergency response, caused by Offshore Renewable Energy Installation (OREI) developments.

Approach to Assessment

672. The EIA process will be supported by further desk-based studies, including RLoS modelling, that will identify and examine in greater detail sensitive aviation and radar receptors. Studies will be undertaken in parallel with consultation with relevant stakeholders to provide a detailed understanding of potential impacts. It is expected that consultation will be an iterative process, allowing for any concerns that are raised to be considered in the windfarm design optimisation process. Stakeholders to be consulted include NATS, the MoD, the Air Navigation Service and MCA.

673. Design assumptions used to inform assessments will be clearly identified in the project description, considering worst case parameters specifically for civil and military aviation receptors.

2.11.7 Summary of Scoped In Impacts

Table 2.28 Summary of impacts relating to Civil and Military Aviation

Potential Impact	Construction	Operation	Decommissioning
Impacts on civil and military PSR systems	x	✓	x
Impacts on SSR systems	x	x	x
Creation of an aviation obstacle environment for civil and military aircraft due to wind turbines	✓	✓	✓
Increased air traffic in the area related to windfarm activities	x	x	x
Cumulative impacts on civil and military radar systems	x	x	x
Cumulative creation of an aviation obstacle environment for civil and military aircraft	✓	✓	✓
Transboundary impacts	x	x	x

Key:
✓ Impact scoped in
✗ Impact scoped out

2.12 Infrastructure and Other Users

2.12.1 Introduction

674. This section of the Scoping Report identifies infrastructure and other users of relevance to the Project and considers the potential likely impacts on these receptors that may arise from the construction, operation and decommissioning of the Project.

675. Infrastructure and Other Users interfaces with several other topics and as such, it should be considered alongside the following chapters:

- Section 2.8: Commercial Fisheries
- Section 2.8: Shipping and Navigation
- Section 2.11: Civil and Military Aviation

2.12.2 Policy, Legislation and Guidance

676. Section 1.5 describes the wider policy and legislative context for the Project. The overarching assessment requirements relevant for infrastructure and other users are set out within National Policy Statement (NPS) EN-3, with more specific requirements set out in paragraphs 2.6.179 to 2.6.1888 of the NPS. The infrastructure and other users assessment will also give consideration to the specific policies set out in the South West Inshore and South West Offshore Marine Plans.

2.12.3 Baseline Data

677. Relevant GIS datasets used for this scoping assessment include:

- Oil & Gas Authority (2021) – Licenced blocks
- CEFAS (2021) – disposal sites
- The Crown Estate (2021) – aggregate sites
- UK Hydrological Office (2021) – Practice and Exercise Areas
- Marine Themes (2021) – all other infrastructure and other users data

2.12.4 Baseline Environment

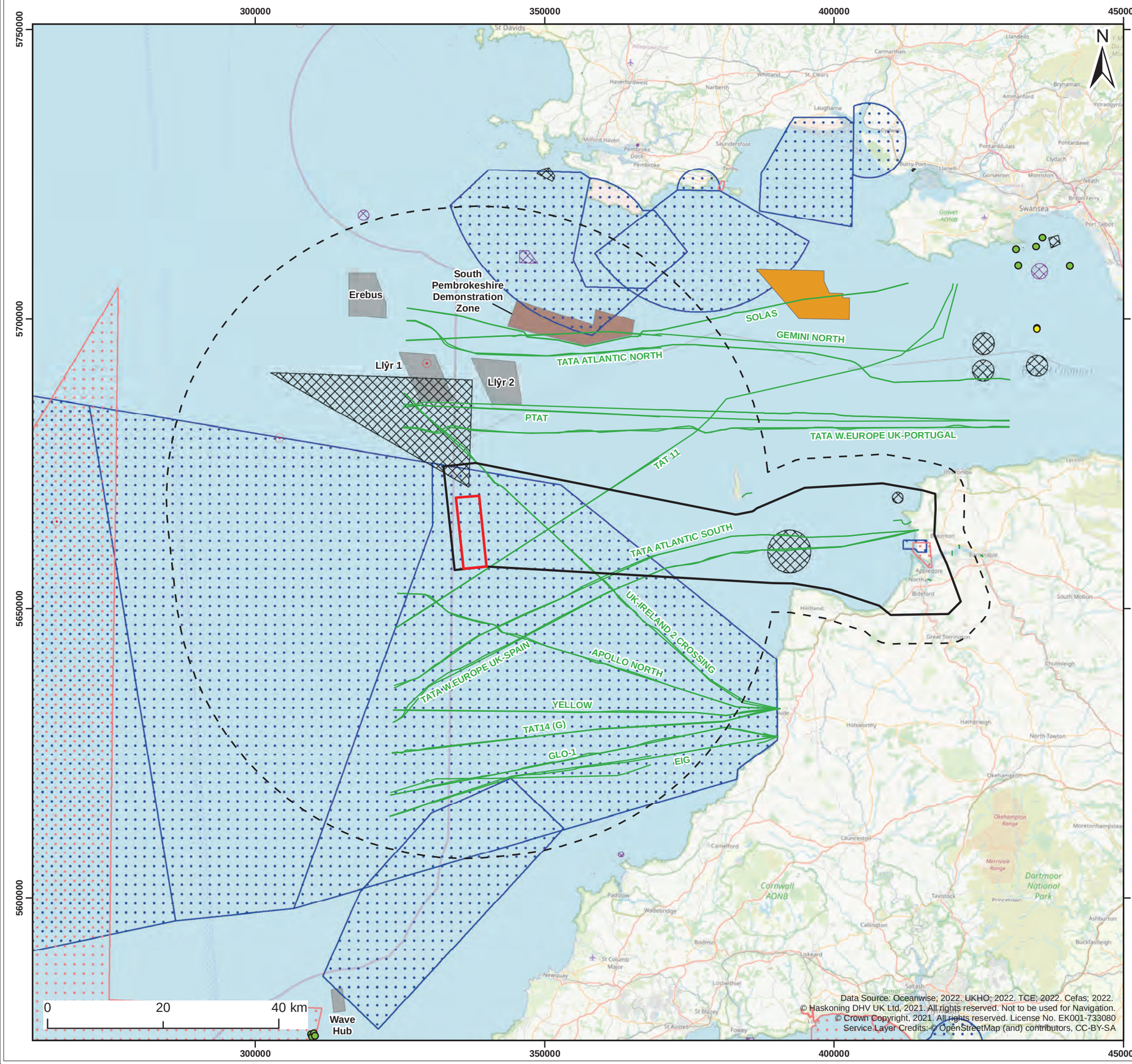
678. This section considers infrastructure and other users within the Celtic Sea and interactions with industries not already covered as EIA topics in their own right.

Offshore wind infrastructure

679. There are currently no operational offshore wind developments in the vicinity (50km buffer) of the Offshore Development Area. The following proposed projects are currently in the pre-application stage and are shown in Figure 2.12.1.

- Erebus – approx. 23km north-west of the Offshore Development Area
- The Llŷr projects
- South Pembrokeshire Demonstration Zone – approx. 24km north-east of the Offshore Development Area

680. There is also one onshore wind turbine located on Lundy Island.



Legend:

- White Cross Offshore Windfarm
- Area of Search
- Study Area
- Submarine Cables
- Wellhead
- Sub-Surface Infrastructure
- Surface Infrastructure
- PEXA Danger Area
- PEXA Non Danger Area
- Offshore Wave Site Agreement

Offshore Wind Farm Sites

- Pre-planning Application

Mineral Aggregates

- Production Agreement Area

Disposal Sites

- Open
- Closed

Client:	Project:
Offshore Wind Ltd.	White Cross Offshore Windfarm

Title: Infrastructure and Other Users

Figure: 2.12.1 | Drawing No: PC2978-RHD-ZZ-XX-DR-Z-0110

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Co-ordinate system: WGS 1984 UTM Zone 30N

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Oil and gas infrastructure

681. There is no oil and gas infrastructure within the Offshore Development Area. However, the is one historic exploratory wellhead located approximately 24km northwest of the Windfarm Site.

Sub-sea cables

682. The Celtic Sea has a significant number of cables, primarily telecommunication connections between the UK and north America and Europe. No cables are present within the Windfarm Site. However, four telecommunications cables traverse the Offshore Export Cable Corridor Area of Search (AoS), these include:

- Ormonde UK-Ireland 2 Crossing (Active)
- TAT 11 (Decommissioned)
- TATA Atlantic South (Active)
- TATA W.Europe UK-Spain (Active)

Sewage outfalls

683. There are several sewage outfall pipes have been identified extending from the coast into the sea which interact with the Offshore Export Cable Corridor AoS.

- One extends approx. 500m from the coast (west of Cornborough Sewage Treatment Works) to a diffuser (Lat: 51.028884, Long: -4.267128)
- One extends approx. 500m from the coast at Woolacombe to a diffuser (Lat: 51.174434, Long: -4.213058)
- Several perpendicular to the Torridge Road in Appledore

Dumping, disposal and aggregate sites

684. There are three closed disposal sites within the Offshore Development Area. These are Milford Haven Industrial (LU040), Morte Bay (LU030) and Hartland Point (LU020).

685. There are no aggregate licences within the Offshore Development Area.

Ministry of defence activities

686. Braunton Burrows is located within the Onshore Cable Corridor AoS and is a military training area. Activities include amphibious vehicle landings. The Royal marines Chivenor Base is located outside of the Onshore Cable Corridor AoS to the east of Braunton Burrows.

687. There is also potential for wartime unexploded ordnance (UXO) within the Celtic Sea. Exact locations of any UXO would be determined post-consent and mitigation agreed in consultation with Natural England and Marine Management Organisation.

Tourism and recreation

688. The Celtic Sea is a popular recreational boating area with cruising and racing routes from between points on the English, Welsh and Irish coasts. The Royal Yachting Association (RYA) atlas (RYA, 2019) identifies low intensity routes across the Celtic Sea and boating areas along the coastline.

689. Recreational fishing in the area includes shore anglers, private boat anglers and commercial charter boat operators. Commercial charter boats are vessels that can be hired by recreational anglers for fishing trips. Further information on commercial fishing in the Offshore Development Area can be found in Section 2.8.

2.12.5 Potential impacts

Potential impacts during construction

690. Construction works such as the installation of cables or wind turbine generators, Offshore Substation Platform foundations have the potential to impact on other marine infrastructure and users within the construction footprint or adjacent. The physical presence of infrastructure has the potential to disturb, displace, or exclude users from the area. The presence of increased vessel numbers during construction may also impact on other marine users. Cable crossings with cable owners and operators will also be required for which agreement will be sought.

691. There is one within the study area. oil and gas infrastructure.

Potential impacts during operation and maintenance

692. The presence of permanent offshore infrastructure has the potential to impact projects either within or adjacent to the Offshore Development Area. Vessel movements during operation and maintenance may also affect neighbouring activities.

Potential impacts during decommissioning

693. During decommissioning the potential impacts are anticipated to be similar to those described above for the construction phase although on a smaller scale.

Potential cumulative impacts

694. The potential impacts of the Project on infrastructure and other users are expected to be non-significant or able to be fully mitigated after consultation with the relevant parties (i.e. through the development of crossing agreements or similar). It is proposed that these impacts are scoped in at this stage but following consultation may be able to be scoped out at a later stage. The approach to cumulative assessment is set out in Section 1.9.2.

Potential transboundary impacts

695. The only potential transboundary receptors are cables owned by international operators, these will be covered in the assessments outlined above, and therefore there will be no separate transboundary assessment.

2.12.6 Mitigation Measures

696. As discussed in Section 1.9, mitigation measures will be developed as site specific information becomes available, the project design is refined, and the ES is prepared. A number of mitigation measures that may be appropriate for the Project could be embedded within the design and accounted for within the assessment of impacts. Further mitigation measures may be proposed in response to impact assessments. These will evolve as the Project design develops and the EIA progresses, and/or in response to consultation. Examples of mitigation measures which are likely to be considered include:

- Technological solutions
- A cable crossing agreement will be established with relevant cable operators
- Establishment of safety zones
- An Offshore Decommissioning Plan will be developed and implemented

2.12.7 Approach to Assessment and Data Collection

Approach to Data Collection

697. The Infrastructure and Other Users assessment will be informed by the latest Geographic Information System (GIS) datasets. Where there is potential for interactions with other users, the Applicant will liaise with the relevant infrastructure owners/operators. Relevant GIS datasets include:

- Oil & Gas Authority (2021) – Licenced blocks
- CEFAS (2021) – disposal sites
- The Crown Estate (2021) – aggregate sites
- UK Hydrological Office (2021) – Practice and Exercise Areas

- Marine Themes (2021) – all other infrastructure and other users data

698. Potential for UXO will be initially established through geophysical surveys pre consent and pre-construction surveys will be undertaken to identify exact locations and numbers of confirmed UXO.

Approach to Assessment

699. The specific assessment requirements for infrastructure and other users are in accordance with the overarching NPS for Energy EN-1 and NPS for Renewable Energy infrastructure (EN-3), of which draft versions have been published for consultation.

700. The Applicant will undertake consultation with all relevant developers, operators and marine users within the vicinity of the Project's Offshore Development Area to ascertain any concerns relating to the Project. Any areas of concern will be identified and considered within the EIA. However, it is likely that any impacts will either be non-significant or able to be fully mitigated after consultation with the relevant parties as discussed above.

701. The EIA will be based on existing data and supplementary information gathered through consultation. The EIA will focus on the Project Offshore Development Area and consider infrastructure or users that overlap with those boundaries. The assessment will consider agreed or best practice mitigation.

702. Design assumptions used to inform assessments will be clearly identified in the project description, considering worst case parameters specifically for other marine users.

2.12.8 Summary of Scoped In Impacts

703. Table 2.29 outlines the impacts which are proposed to be scoped into and/or out of the EIA. This may be refined as additional information and data become available.

Table 2.29 Summary of impacts relating to infrastructure and other users

Potential Impact	Construction	Operation	Decommissioning
Potential impacts on other windfarms	✓	✓	✓
Potential impacts on oil and gas infrastructure and future exploration	x	x	x

Potential Impact	Construction	Operation	Decommissioning
Physical impact on subsea cables and pipelines	✓	✓	✓
Potential impacts on disposal and aggregates sites	✓	✓	✓
Potential impact on tourism and recreation	✓	✓	✓
Potential impacts on MoD activities	x	x	x
Cumulative impacts	✓	✓	✓
Transboundary impacts	x	x	x

2.13 Offshore Seascape, Landscape and Visual Amenity

2.13.1 Introduction

704. This section of the Scoping Report identifies the seascape, landscape and visual receptors of relevance to the Offshore Development Area for the Project. It considers the potential seascape, landscape and visual impacts arising from the construction, operation, and maintenance, and decommissioning of the Project's offshore infrastructure and defines the proposed scope of the Seascape, Landscape and Visual Impact Assessment (SLVIA) and the proposed methodology.

705. The landscape, and visual impact assessment (LVIA) (Section 3.10) will consider effects of the onshore infrastructure and Section 2.10 covers the potential effects of the offshore components on Cultural Heritage.

706. Consideration of the Project is based on a 'Design Envelope' approach following the guidelines from Planning Inspectorate Advice Note Nine: Rochdale Envelope (2018). The utilisation of a Design Envelope is intended to identify key design parameters for the Project, setting out a realistic 'worst case scenario' for the different elements within the Offshore Development Area, in order for this to be assessed.

2.13.2 Policy, Legislation and Guidance

707. Section 1.5 describes the wider policy and legislative context for the Project. The specific assessment requirements for SLVIA are set out within the overarching National Policy Statement (NPS) for Energy (EN-1) and NPS for Renewable Energy infrastructure (EN-3).

National Planning Policy Framework

708. The revised (July 2021) National Planning Policy Framework (NPPF) sets out the Government's planning policies for England and how these are expected to be applied.

709. In relation to landscape and visual matters, Section 12: Conservation and enhancing the natural environment, paragraph 174, states that planning policies and decisions should contribute to and enhance the natural and local environment. Of relevance to the SLVIA is the need to protect and enhance valued landscapes, recognise the intrinsic character and beauty of the countryside, maintain the character of the undeveloped coast:

710. The NPPF states at paragraphs 176 and 177 that:

711. *[176] "Great weight should be given to conserving and enhancing landscape and scenic beauty in National Parks, the Broads and Areas of Outstanding Natural Beauty which have the highest status of protection in relation to these issues. The conservation and enhancement of wildlife and cultural heritage are also important considerations in these areas, and should be given great weight in National Parks. Where significant development of agricultural land is demonstrated to be necessary, areas of poorer quality land should be preferred to those of a higher quality…The scale and extent of development within all these designated areas should be limited, while development within their setting should be sensitively located and designed to avoid or minimise adverse impacts on the designated areas…"*

712. In relation to Heritage Coasts, paragraph 178 of the NPPF states:

713. *"Within areas defined as Heritage Coast (and that do not already fall within one of the designated areas mentioned in paragraph 176), planning policies and decisions should be consistent with the special character of the area and the importance of its conservation. Major development within a Heritage Coast is unlikely to be appropriate, unless it is compatible with its special character."*

National Planning Statements

714. National Planning Statements EN-1 and EN-3 set out the overarching policy for Energy and Renewable Energy Infrastructure respectively. Whilst reiterating the importance of nationally important landscapes and consideration of the effects on them it is noted at 5.9.13 of EN-1 that "*The fact that a proposed project will be visible from within a designated area should not in itself be a reason for refusing consent."* The importance of sensitive design given the various siting, operational, and other relevant constraints is also set out. The consultation drafts of the revised

versions of EN-1 and EN-3 make further reference to the importance of good design of new energy infrastructure projects.

715. The policy documents recognise that it is likely that offshore windfarm development may be visible at long distances and that mitigation of such effects may not be feasible without compromising the benefits the developments can provide. In addition, EN-1 states at 5.9.15 that it is the role of the Planning Inspectorate and the Secretary of State to *'judge whether any adverse impact on the landscape would be so damaging that it is not offset by the benefits (including need) of the project.'*

Legislation

716. Of relevance to the Project is primary legislation relating to National Parks and Areas of Outstanding Natural Beauty, provided by the 1949 National Parks and Access to the Countryside Act. The Environment Act (1995) reinforces the roles of certain bodies in relation to National Parks. The Countryside and Rights of Way (CRoW) Act 2000 subsumes and strengthens the 1949 Act in relation to AONBs.

717. The Marine and Coastal Access Act (2009) Provides the framework for marine planning across the United Kingdom. When considering the impact of an activity it states that the marine plan authority (MPA) *'should take into account existing character and quality, how highly it is valued and its capacity to accommodate change...'* (2.6.5.3).

718. UK Marine Planning Policy Statement (MPS) (2011) provides the UK's framework for preparing marine plans. The provides the UK's framework for preparing marine plans including the Welsh National Marine Plan.

719. Paragraph 2.6.5.4 states that: *"For any development proposed within or relatively close to nationally designated areas the marine plan authority should have regards to the specific statutory purposes of the designated areas. The design of a development should be taken into account as an aid to mitigation."*

720. Examples of nationally designated areas are given as AONBs, or National Parks. Heritage coasts are 'defined' rather than designated, so there isn't a statutory designation process like that associated with national parks and AONBs.

Guidance

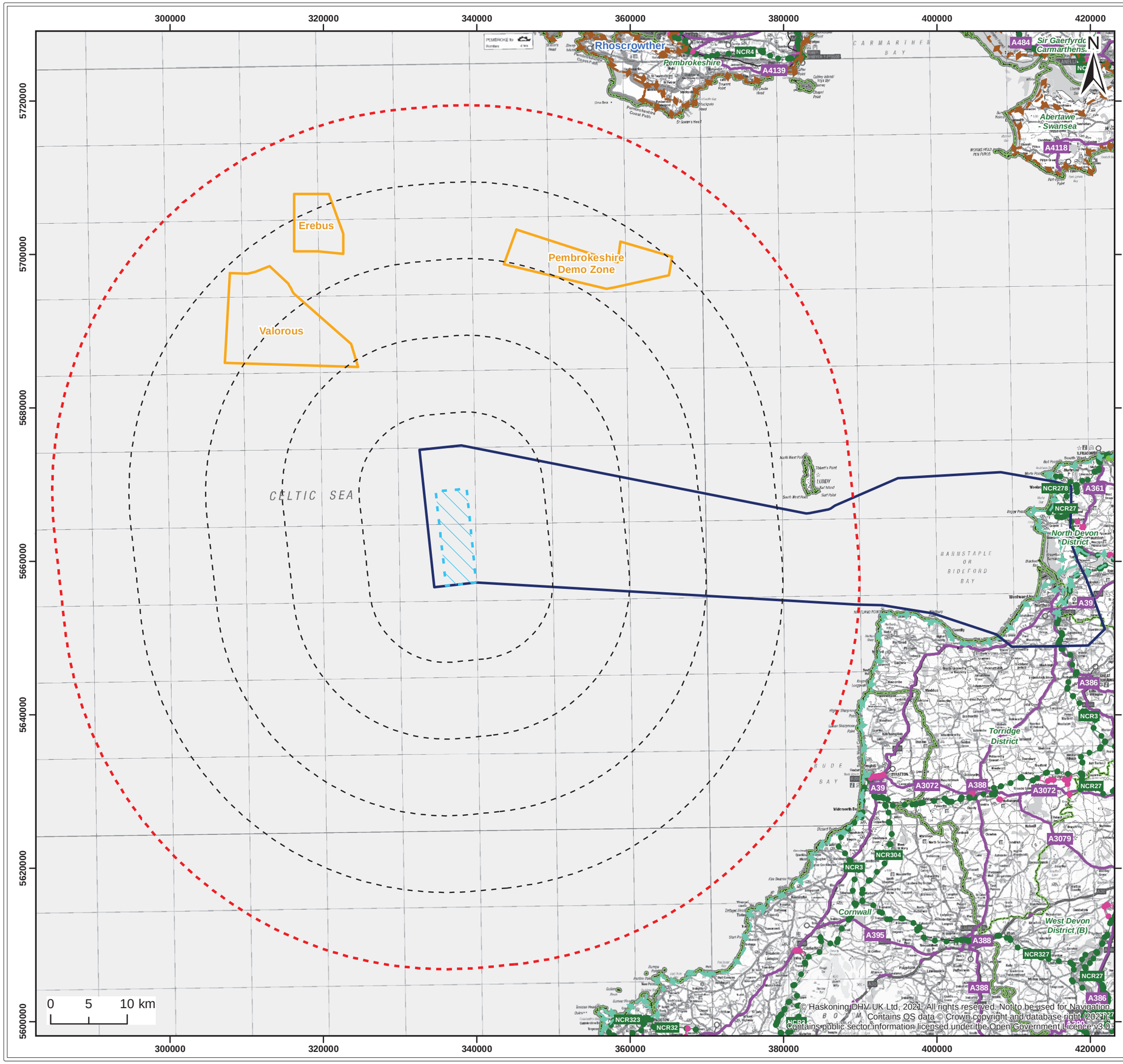
721. The assessment will be undertaken in accordance with the methods outlined in the following good practice guidance documents:

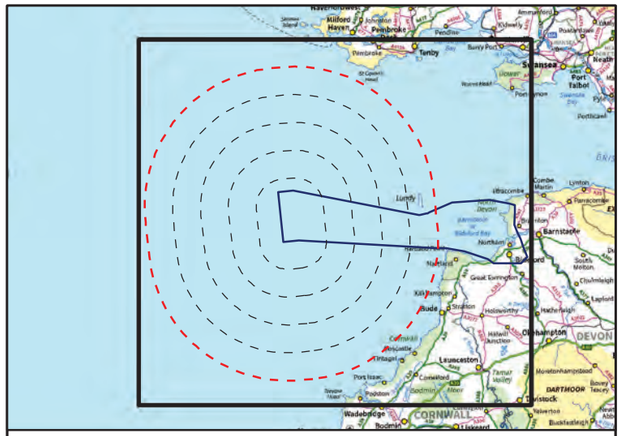
- The Landscape Institute with the Institute of Environmental Management and Assessment (2013). Guidelines for Landscape and Visual Impact Assessment. Third Edition
- Planning Inspectorate (2018) Advice Note Nine: Rochdale Envelope
- Planning Inspectorate (2019). Advice Note Seventeen: Cumulative effects assessment relevant to nationally significant infrastructure projects
- Natural England (2012). An Approach to Seascape Character Assessment
- Natural England (2014). An Approach to Landscape Character Assessment
- Landscape Institute (2019). Visual Representation of Development Proposals Technical Guidance Note 06/19
- Landscape Institute (2021). Assessing landscape value outside national designations
- NatureScot (2012). Assessing the Cumulative Impact of Onshore Wind Energy Developments
- NatureScot (2017). Visual Representation of Windfarms: Version 2.2
- Natural Resources Wales (2021). Guidance Note 046 Using LANDMAP in Landscape and Visual Impact Assessments (LVIA)
- NatureScot (2017) - Siting and Designing Windfarms in the Landscape, Guidance (Version 3)

722. Although some of this guidance has been derived from publications by bodies located in other UK nations it is commonly drawn on for work carried out in England and Wales where no equivalent guidance exists.

2.13.3 Study Area

723. It is proposed that the seascape, landscape and visual impact assessment (SLVIA) Study Area for the Project covers a radius of 50km from the proposed Windfarm Site, as illustrated in Figure 2.13.1. Beyond the boundary of the Windfarm Site, the SLVIA will generally focus on locations from where it may be possible to see the offshore wind turbines and other offshore components.





Legend:

- Windfarm Site
- 10km Radii
- 50km Study Area
- Area of Search
- South West Coast
- Wales Coastal Path
- National Cycle Network
- National Cycle Network Link
- Regional Cycle Network
- Railway
- RailwayTunnel
- Primary and A Road
- District Boundary
- County Boundary
- Appeal / Application
- Scoping / Pre-application Windfarm project

Client:	Project:
Offshore Wind Ltd.	White Cross Offshore Windfarm

Title: Offshore Seascape, Landscape & Visual Impact Assessment Study Area

Figure: 2.13.1 | Drawing No:

Revision:	Date:	Drawn:	Checked:	Size:	Scale:
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Co-ordinate system: WGS 1984 UTM Zone 30N

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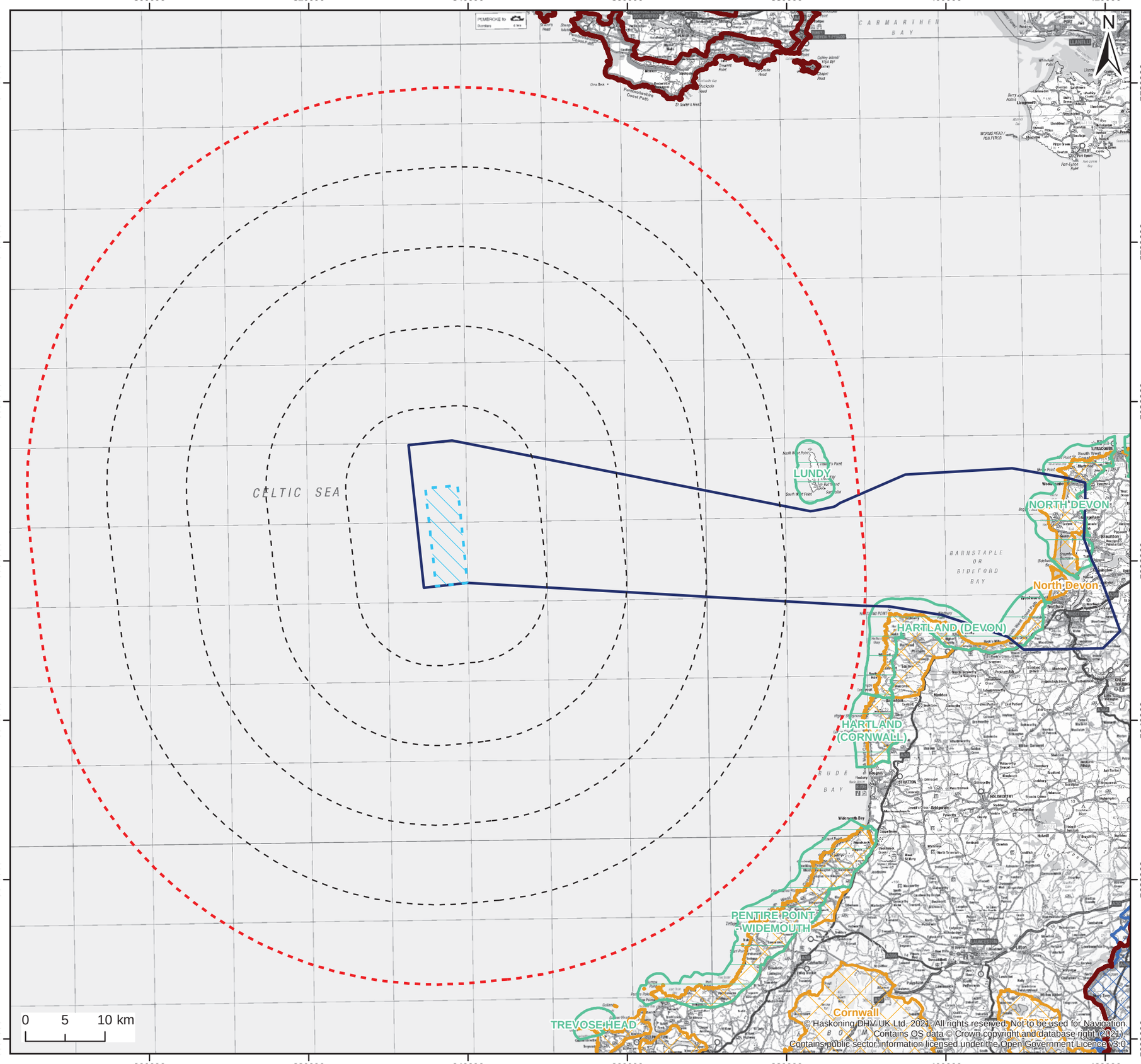
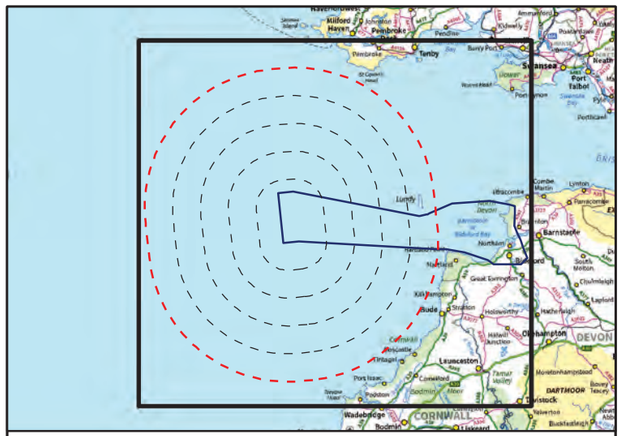
724. It has not been considered necessary to extend the Study Area to include the full extent of the Area of Search. The Offshore Export Cables will be constructed along the seabed and would therefore not be visible during operation. During the construction and decommissioning of the Offshore Export Cables the only effect on the seascape, landscape and visual resource would be the visibility of a small number of vessels out at sea, which are a common occurrence as part of the baseline character and views. It is considered that, even taking into account the designated status of the landscapes along the coastline closest to the Offshore Export Cable Corridor and at the Landfall (Figure 2.13.2), such temporary, short duration effects are not likely to give rise to a significant effect.

725. A 50km radius SLVIA Study Area has been selected for a number of reasons. Although wind turbines of the height proposed could theoretically be visible at distances beyond 50km, the EIA regulations require assessment of the 'likely significant effects' of the Project. Therefore, the SLVIA Study Area should extend far enough to include all areas within which likely significant effects may to occur. It need not cover all areas where there may be effects. In considering this, the sensitivity of the receiving landscape and visual receptors has been reviewed taking particular account of the Landscape Planning Designations and Defined Areas, as shown on Figure 2.13.2, and Visual Receptors (Figure 2.13.1) within the Study Area.

726. Blade tip Zone of Theoretical Visibility (ZTV) analysis has been generated by Geographical Information System (GIS) software (Figure 2.13.3). This demonstrates the relative number of wind turbines that may theoretically be seen from any point in the SLVIA Study Area and in this instance, shown slightly beyond the 50km radius. It is based on theoretical visibility of any part of a grid of turbines across the Windfarm Site and placed around the boundary using the maximum turbine tip height of 345m above Mean Sea Level (MSL). The ZTV then represents the area over which a wind turbine located in any part of the Windfarm Site could theoretically be visible. The purpose of the ZTV is to inform stakeholders of the approximate area within which it may be theoretically possible to have visibility of the Project. The ZTV illustrates where there would be no visibility at all or where there would be low to high numbers of turbines theoretically visible, but it does not indicate the extent to which each turbine may be visible. The ZTV illustrates the 'bare ground' situation and does not take into account the screening effects of vegetation, buildings, or other local features that may prevent or reduce visibility.





Legend:

- Windfarm Site
- 10km Radii
- 50km Study Area
- Area of Search
- National Park
- Heritage Coasts
- Area of Outstanding Natural Beauty
- Environmentally Sensitive Area

Client:	Project:
Offshore Wind Ltd.	White Cross Offshore Windfarm

Title:

Landscape Planning Designations

Figure: 2.13.2 | Drawing No:

Revision:	Date:	Drawn:	Checked:	Size:	Scale:
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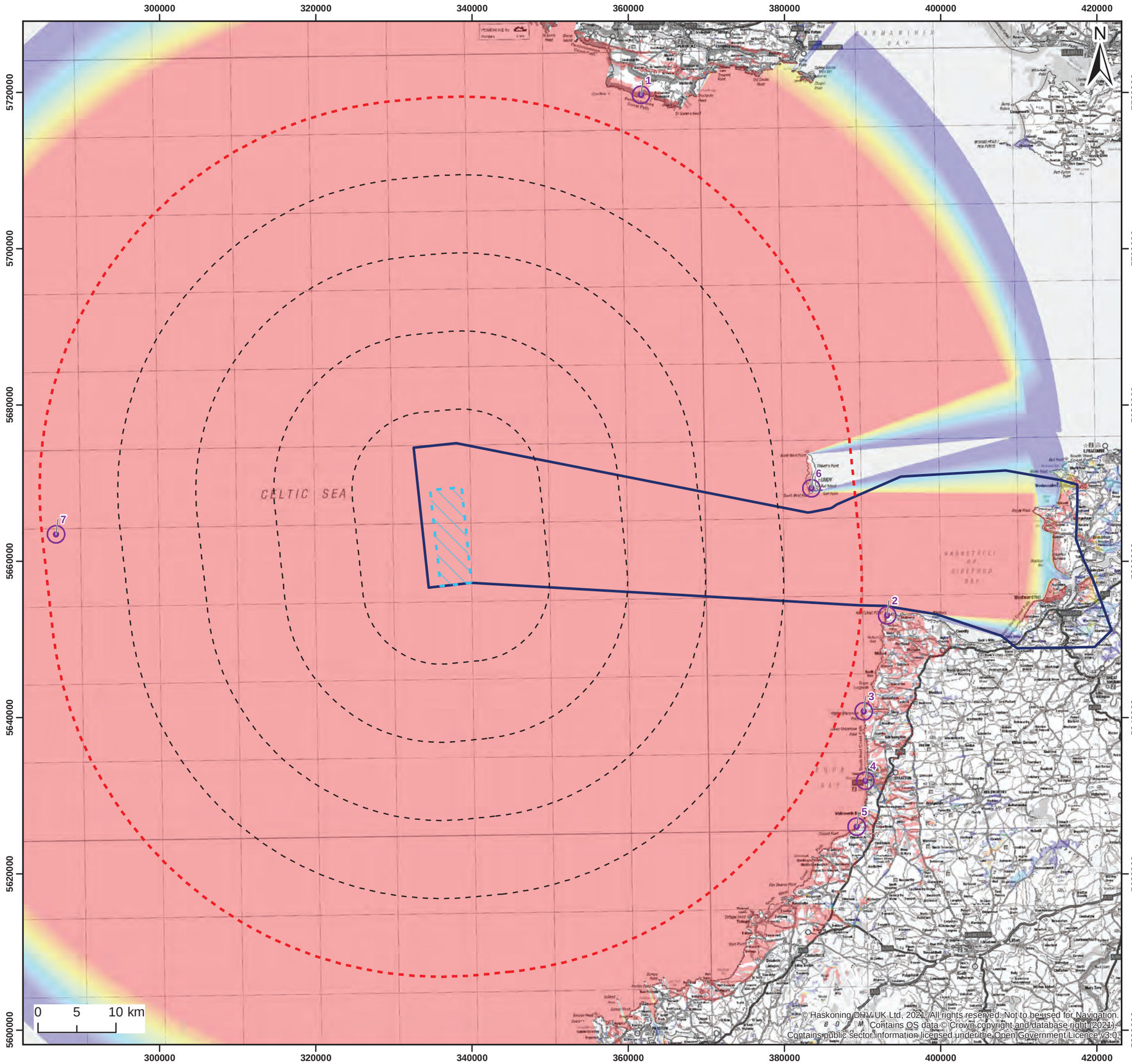

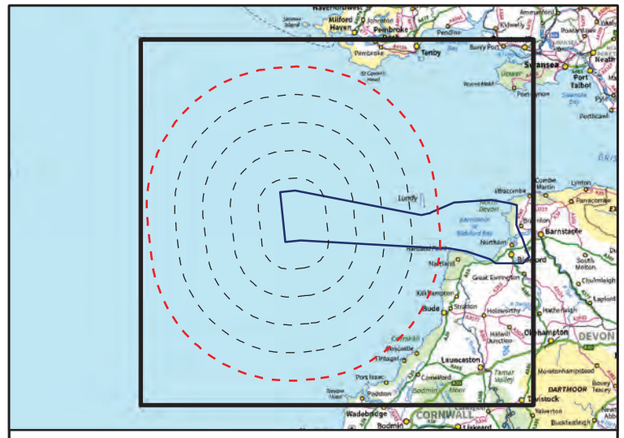

Legend:

- Windfarm Site
- 10km Radii
- 50km Study Area
- Area of Search

Zone of Theoretical Visibility

- Higher Visibility
- Lower Visibility

Viewpoint Location

1 - Stack Rocks
2 - Hartland Point
3 - Vicarage Cliff, west of Morwenstow
4 - Compass Point, Storm Tower, south of Bude
5 - Penhalt Cliff
6 - Lundy Island, south end
7 - Rosslare to Cherbourg ferry route

Blade tip:	345m above MSL	Observer height:	2m
DTM:	OS Terrain 50	Surface features:	Excluded
DTM resolution:	50m	Earth curvature:	Included

Client: Offshore Wind Ltd.

Project: White Cross Offshore Windfarm

Title: Blade Tip ZT with Viewpoint Locations

Figure: 2.13.3

Drawing No:

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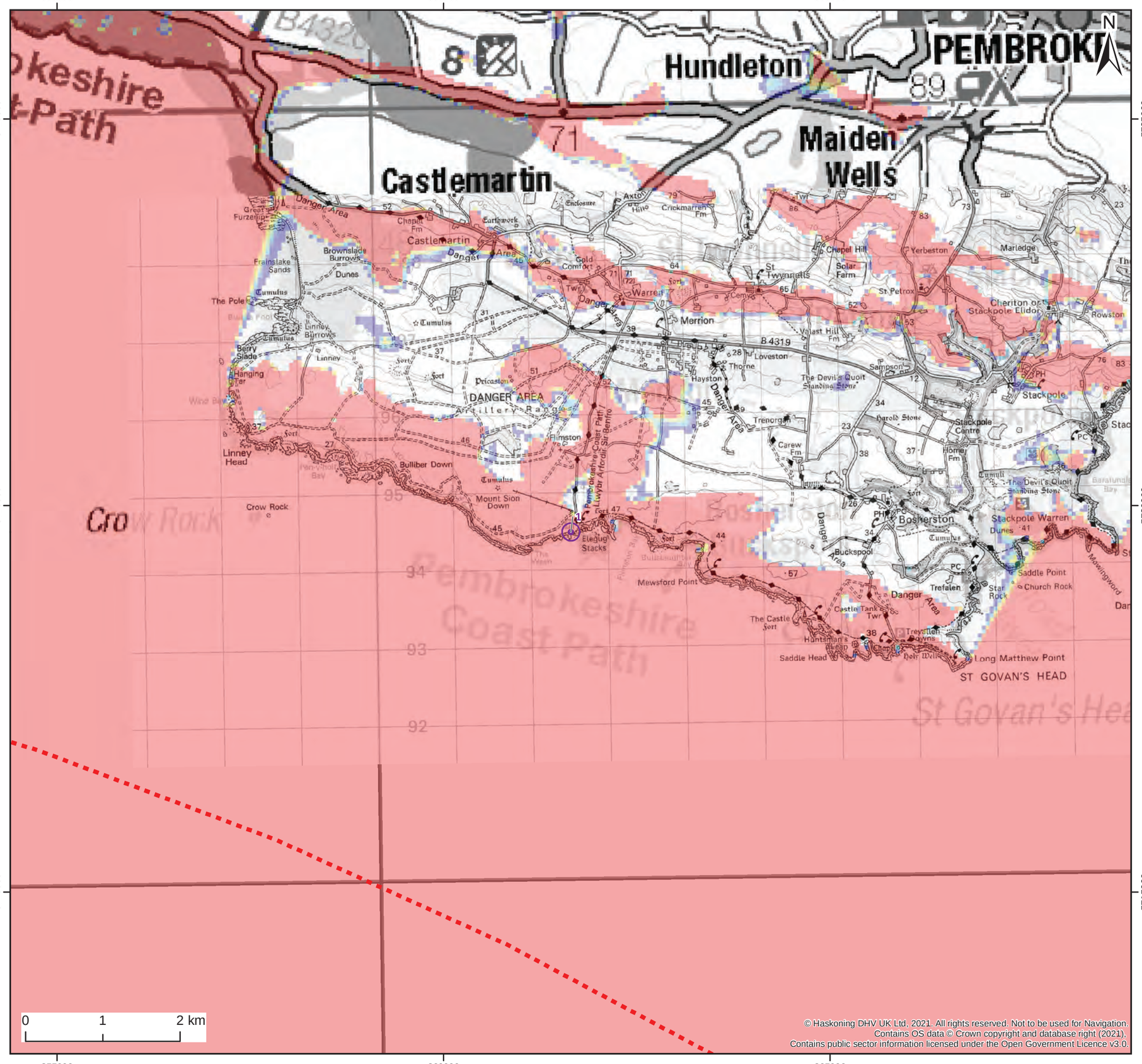

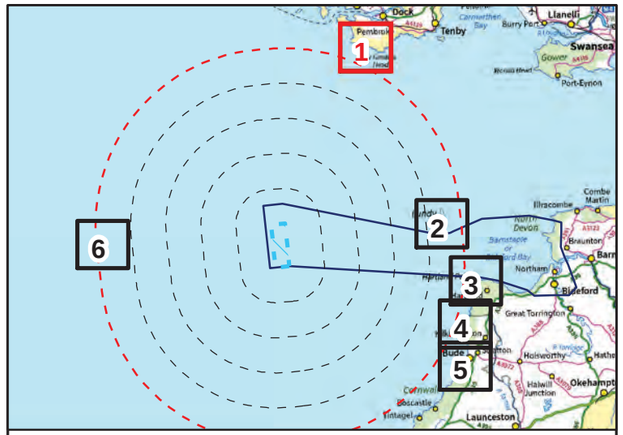

Legend:

- Windfarm Site
- 10km Radii
- 50km Study Area
- Area of Search

Zone of Theoretical Visibility

- Higher Visibility
- Lower Visibility

Viewpoint Location

1 - Stack Rocks

Blade tip:	345m above MSL	Observer height:	2m
DTM:	OS Terrain 50	Surface features:	Excluded
DTM resolution:	50m	Earth curvature:	Included

Client: Offshore Wind Ltd.

Project: White Cross Offshore Windfarm

Title: Blade Tip ZT with Viewpoint Locations Map 1 (of 6)

Figure: 2.13.4

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Revision:	Date:	Drawn:	Checked:	Size:	Scale:
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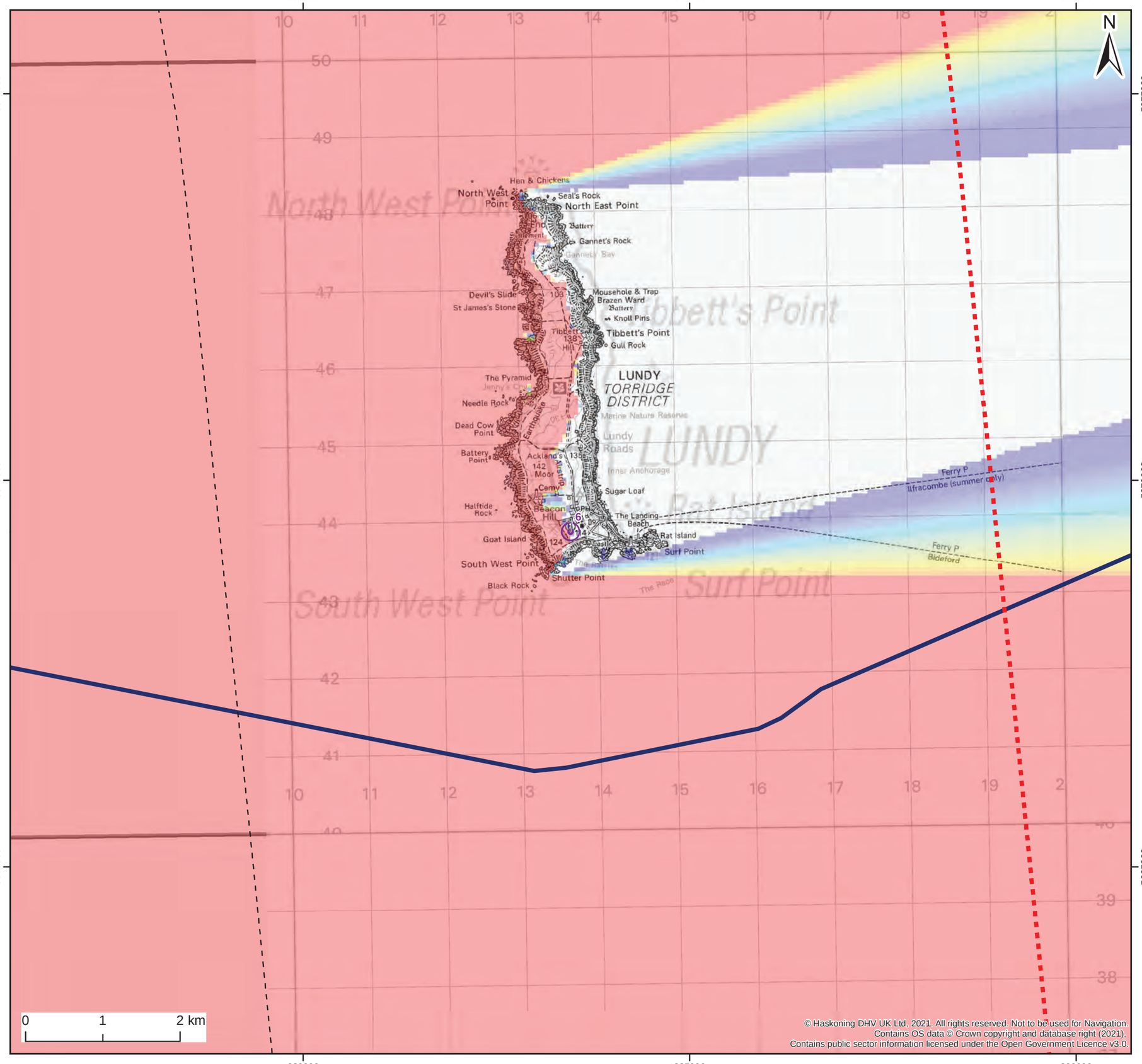

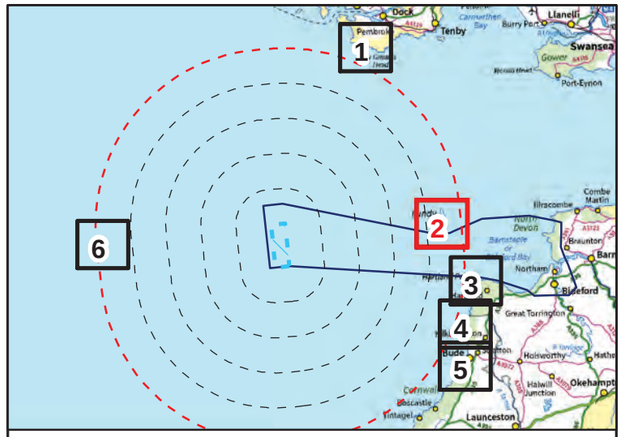

Legend:

- Windfarm Site
- 10km Radii
- 50km Study Area
- Area of Search

Zone of Theoretical Visibility

- Higher Visibility
- Lower Visibility

Viewpoint Location

6 - Lundy Island, south end

Blade tip:	345m above MSL	Observer height:	2m
DTM:	OS Terrain 50	Surface features:	Excluded
DTM resolution:	50m	Earth curvature:	Included

Client: Offshore Wind Ltd.

Project: White Cross Offshore Windfarm

Title: Blade Tip ZT with Viewpoint Locations Map 2 (of 6)

Figure: 2.13.4

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Revision:	Date:	Drawn:	Checked:	Size:	Scale:
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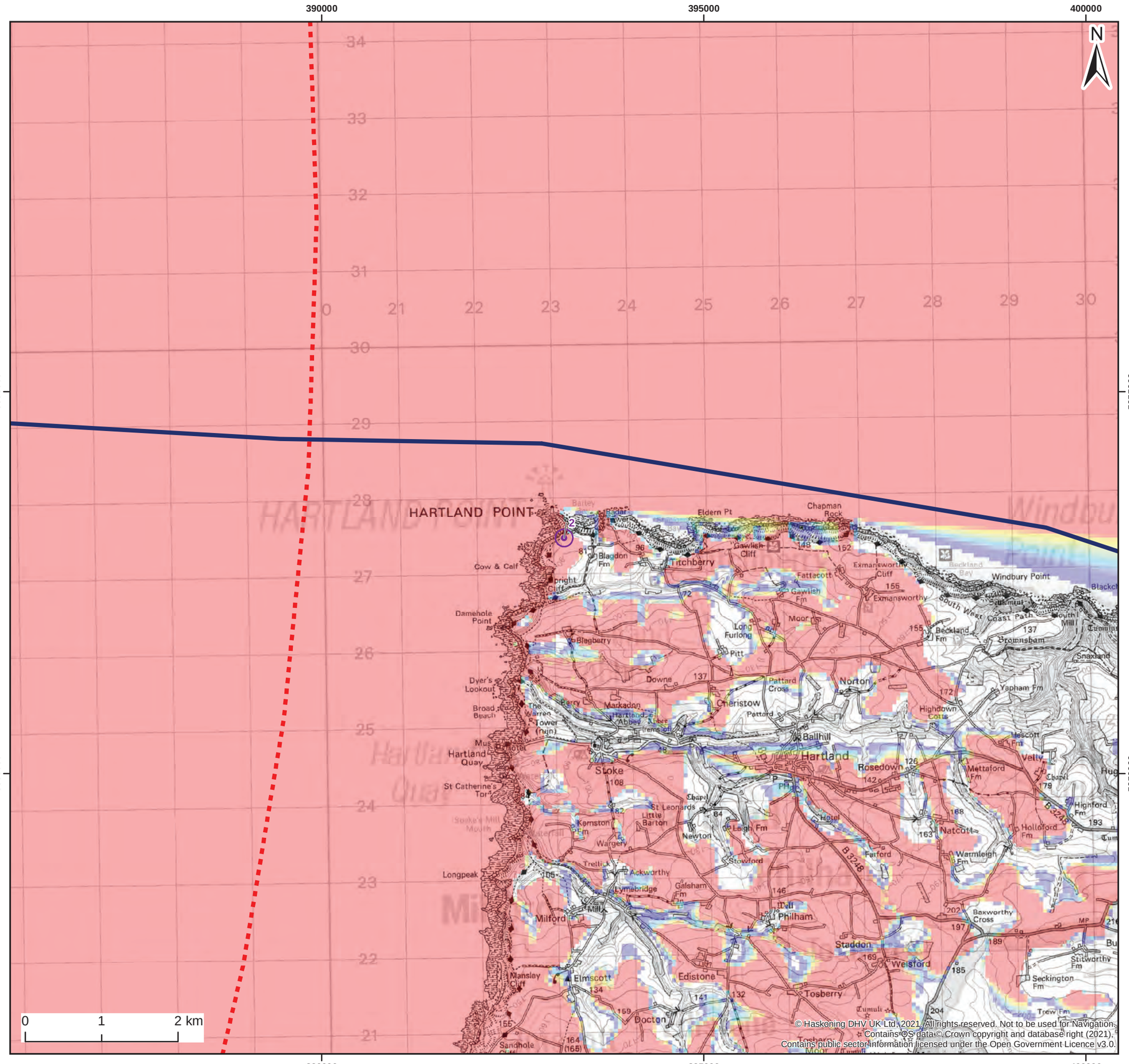

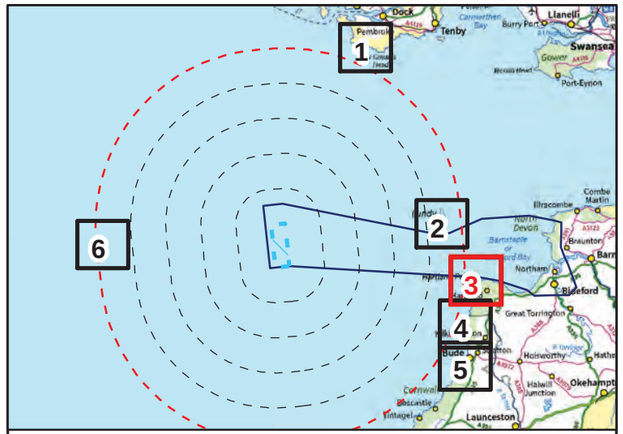

Legend:

- Windfarm Site
- 10km Radii
- 50km Study Area
- Area of Search

Zone of Theoretical Visibility

- Higher Visibility
- Lower Visibility

Viewpoint Location

2 - Hartland Point

Blade tip:	345m above MSL	Observer height:	2m
DTM:	OS Terrain 50	Surface features:	Excluded
DTM resolution:	50m	Earth curvature:	Included

Client: Offshore Wind Ltd.

Project: White Cross Offshore Windfarm

Title: Blade Tip ZT with Viewpoint Locations Map 3 (of 6)

Figure: 2.13.4

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Revision:	Date:	Drawn:	Checked:	Size:	Scale:
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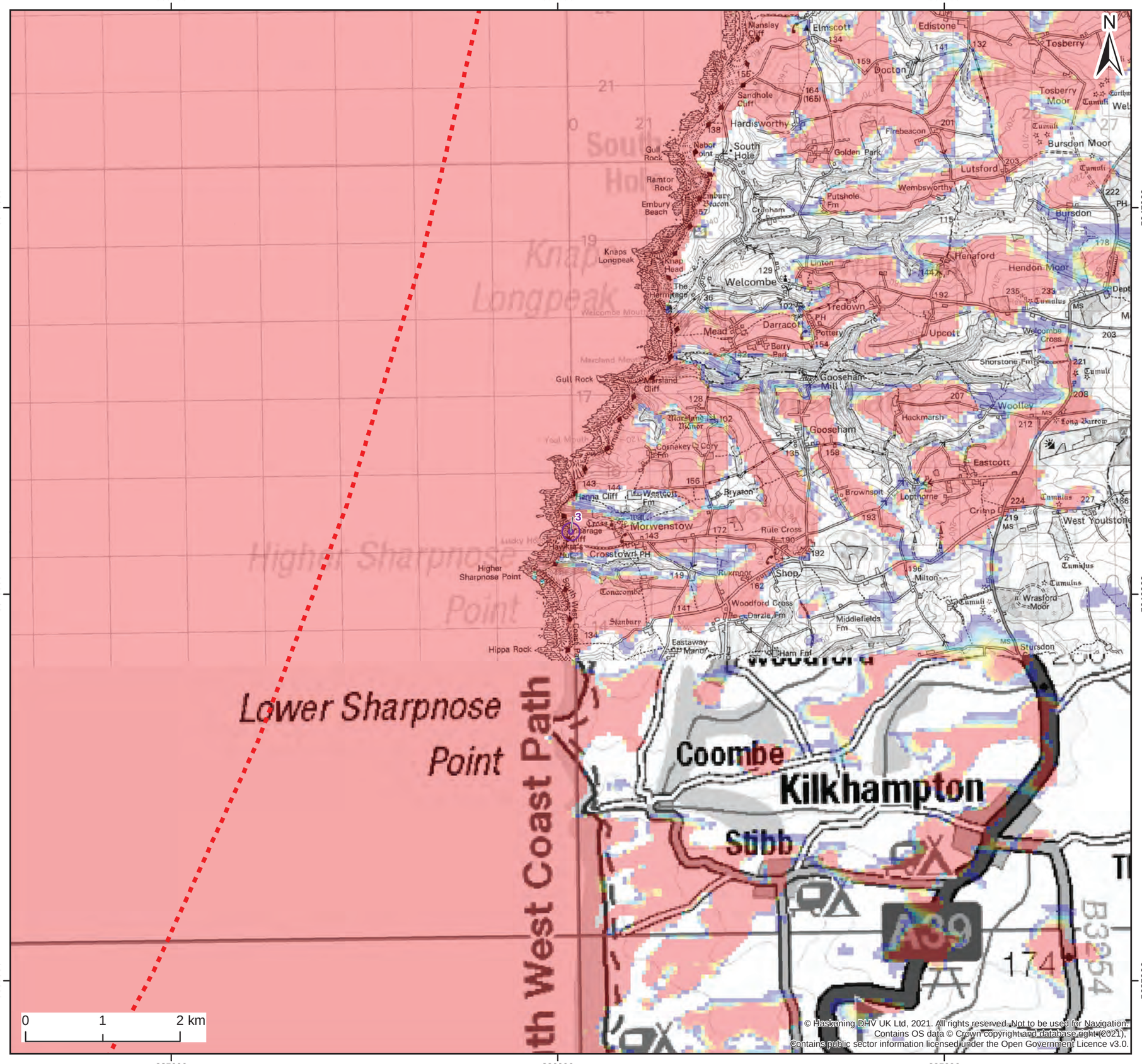

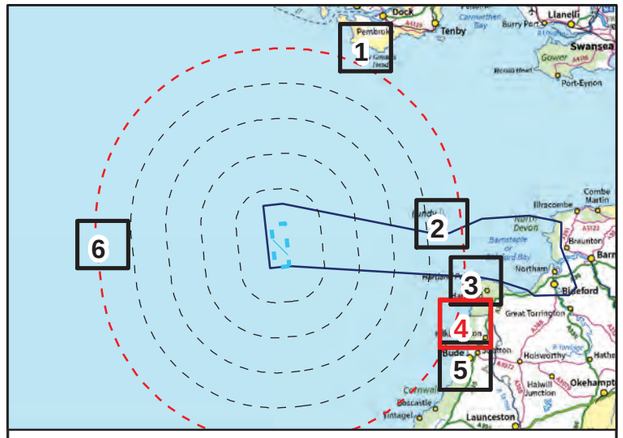

Legend:

- Windfarm Site
- 10km Radii
- 50km Study Area
- Area of Search

Zone of Theoretical Visibility

- Higher Visibility
- Lower Visibility

Viewpoint Location

3 - Vicarage Cliff, west of Morwenstow

Blade tip:	345m above MSL	Observer height:	2m
DTM:	OS Terrain 50	Surface features:	Excluded
DTM resolution:	50m	Earth curvature:	Included

Client: Offshore Wind Ltd.

Project: White Cross Offshore Windfarm

Title: Blade Tip ZT with Viewpoint Locations Map 4 (of 6)

Figure: 2.13.4

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Revision:	Date:	Drawn:	Checked:	Size:	Scale:
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Co-ordinate system: WGS 1984 UTM Zone 30N

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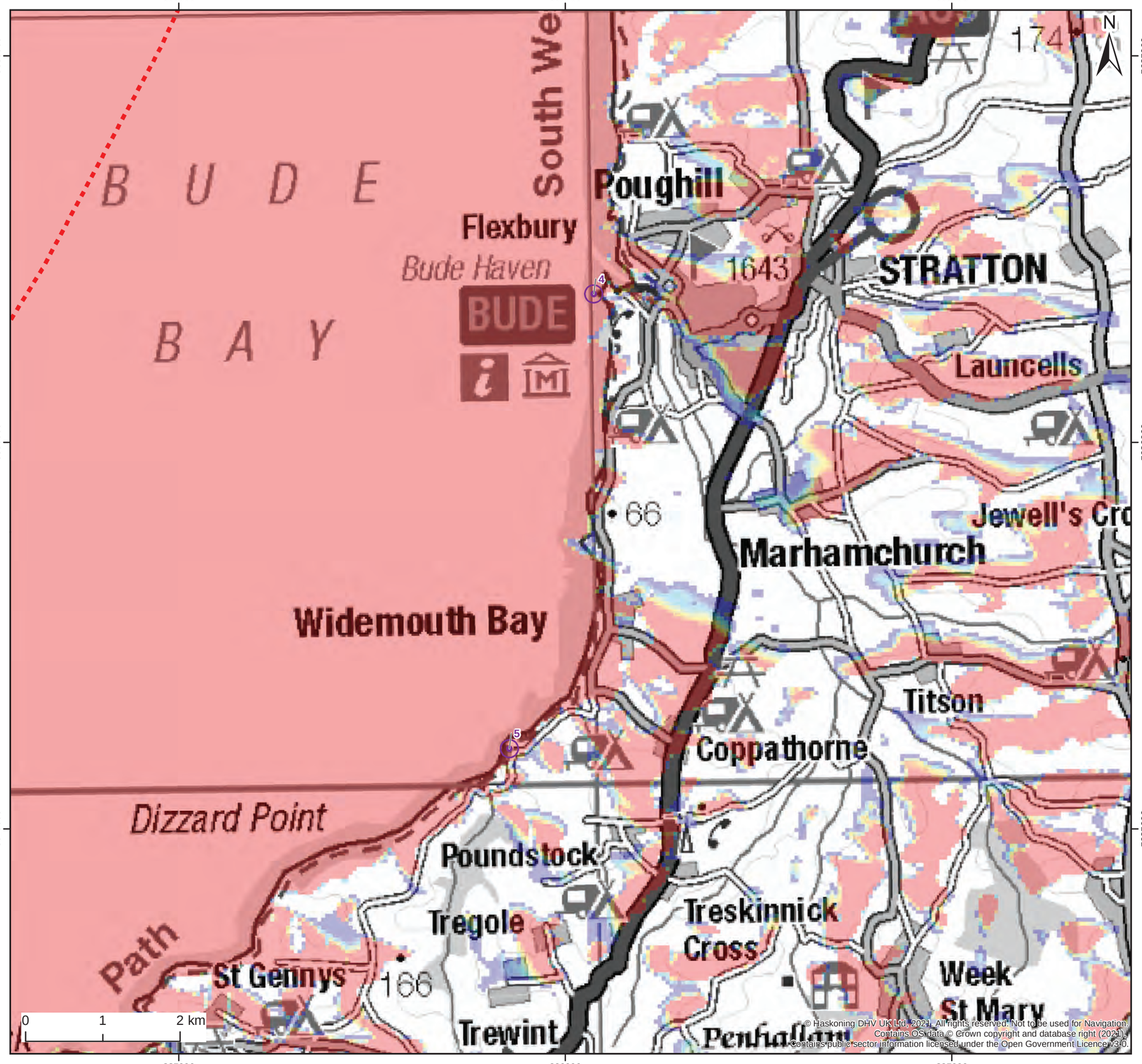

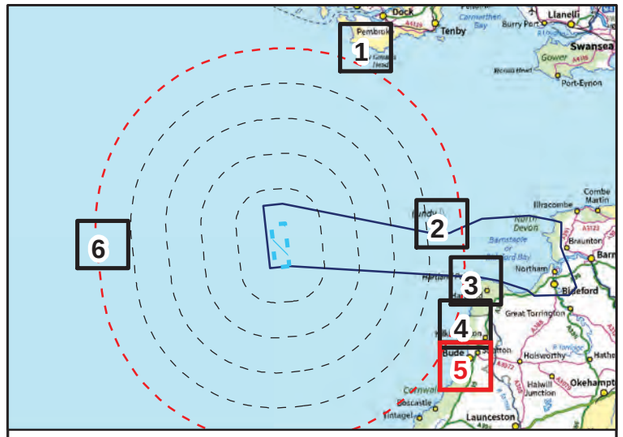

Legend:

- Windfarm Site
- 10km Radii
- 50km Study Area
- Area of Search

Zone of Theoretical Visibility

- Higher Visibility
- Lower Visibility

Viewpoint Location

4 - Compass Point, Storm Tower, south of Bude

5 - Penhalt Cliff

Blade tip:	345m above MSL	Observer height:	2m
DTM:	OS Terrain 50	Surface features:	Excluded
DTM resolution:	50m	Earth curvature:	Included

Client: Offshore Wind Ltd.

Project: White Cross Offshore Windfarm

Title: Blade Tip ZT with Viewpoint Locations Map 5 (of 6)

Figure: 2.13.4

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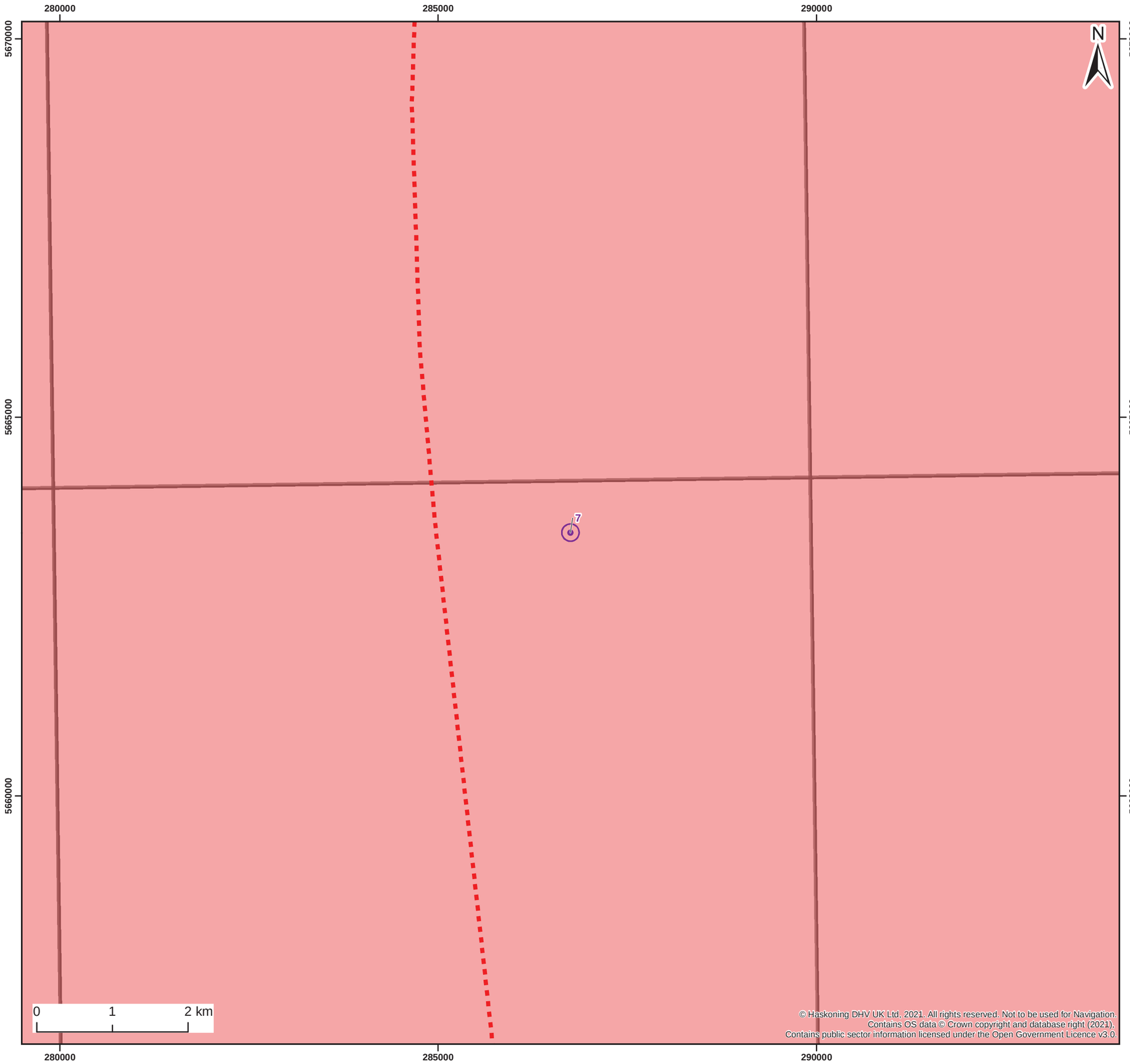

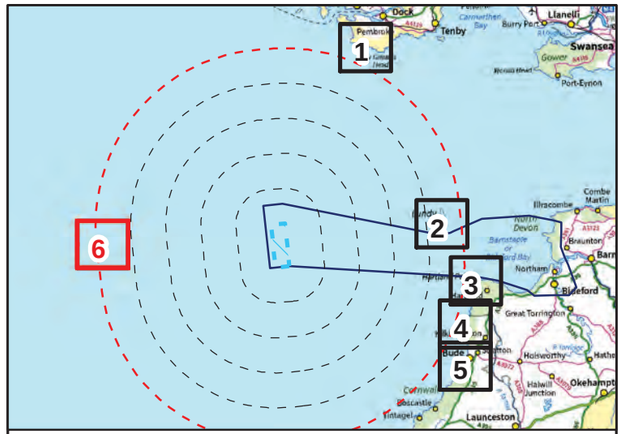

Legend:

- Windfarm Site
- 10km Radii
- 50km Study Area
- Area of Search

Zone of Theoretical Visibility

- Higher Visibility
- Lower Visibility

Viewpoint Location

7 - Rosslare to Cherbourg ferry route

Blade tip:	345m above MSL	Observer height:	2m
DTM:	OS Terrain 50	Surface features:	Excluded
DTM resolution:	50m	Earth curvature:	Included

Client: Offshore Wind Ltd.

Project: White Cross Offshore Windfarm

Title: Blade Tip ZT with Viewpoint Locations Map 6 (of 6)

Figure: 2.13.4

Drawing No:

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Co-ordinate system: WGS 1984 UTM Zone 30N

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727. Relevant guidance (White et al 2019), professional experience, ZTV analysis (Figure 2.13.3), published visibility studies (e.g. Bureau of Ocean Energy Management, 2013) and Met Office visibility frequency data all indicate that the threshold at which significant visual effects would diminish is likely to be within this proposed 50km radius area. In reality, significant seascape, landscape, and visual effects are more likely to occur from locations at closer proximity; and less likely to occur towards the outer edges of the SLVIA Study Area at long distances.

728. The blade tip ZTV (Figure 2.13.3) indicates that the visibility of the Project from the land will become very restricted and dispersed at distances beyond 50km. Furthermore, actual visibility from inland areas would be further fragmented by either landform, vegetation or built features/settlements that screen visibility of the Project. At distances over 50km, the lateral spread of the Windfarm Site will occupy a very small portion of available views. The vertical height of the wind turbines would appear relatively small, therefore significant visual effects are unlikely to arise at greater than this distance (even if the wind turbines are visible - in excellent visibility conditions, see paragraph 203).

729. Taking the above factors into account it is considered that the Project is unlikely to result in significant effects at distances over 50km, particularly away from the immediate coast. Seascape, landscape and visual effects as a result of the Project are proposed to be scoped out beyond 50km. This premise will be substantiated in the PEIR through the inclusion of visualisations from a small number of viewpoints located at the closest/ key locations along the coast as shown on Figure 2.13.3. Consideration will also be given to the potential for significant effects on views from within the seascape that may be experienced by people on vessels. It is proposed that a viewpoint wireline would be included for a location on the Rosslare to Cherbourg ferry route, which passes to the west of the Windfarm Site. Whilst there is also a ferry from Rosslare to Pembroke it is considered that the proposed viewpoint on the Pembrokeshire coast in Wales (Viewpoint 1: Stack Rocks) is sufficiently representative of such views.

730. Within the SLVIA Study Area, the assessment will focus primarily on the assessment of seascape and visual effects of the Project.

731. The SLVIA Study Area may be reviewed and revised following further consultation responses, as a result of any amendments to the Windfarm Site or the identification of additional constraints (environmental and / or engineering).

2.13.4 Baseline Data

732. Baseline data will be used to define and describe the seascape, landscape and visual receptors that will be considered in the SLVIA. Data will be gathered from official, reliable and up-to-date sources. These will include Ordnance Survey map-based data, as well as data on seascape and landscape characterisation, landscape designations and other Governmental and local authority data of relevance.

733. In addition, the EIAs for other relevant offshore windfarms may also be referred to.

Seascape character

734. A national level seascape character assessment for the English sector of the SLVIA Study Area has been prepared by Land Use Consultants (LUC) for the MMO namely MMO 1134: Seascape Character Assessment for the South West Inshore and Offshore marine plan areas, 2018.

735. Whilst the national scale seascape assessment is considered to be at a suitable scale for the seascape character assessment the National Trust, North Devon Coast AONB, Exmoor, Exmoor National Park Authority, North Devon Council, Torridge District Council and Natural England (2015) North Devon and Exmoor Seascape Character Assessment, Pembrokeshire Coast National Park Authority (2013) Seascape Character Assessment Supplementary Planning Guidance to the Local Development Plan 1 for the Pembrokeshire Coast National Park will be used to supplement the baseline information where relevant.

736. At a national scale, the Welsh part of the SLVIA Study Area is covered by the National Seascape Assessment for Wales, NRW Evidence Report No: 80, 2015. In addition, NRW has recently published the Seascape and visual sensitivity to offshore windfarms in Wales: Strategic assessment and guidance (White et al 2019).

737. It is these documents that will be used as the primary sources for the mapping and characterisation of the seascape.

Landscape character

738. The only area of land that lies within the Study Area is Lundy Island, Devon. Effects on this will be described and assessed with reference to Devon County Council (2017) Devon Landscape Character Areas and North Devon & Torridge District Councils, Devon County Council and Natural England (2010) Joint Landscape Character Assessment for North Devon & Torridge Districts. Prepared by LUC.

739. Consideration will also be given to Devon County Council (2017) Devon's Tranquil Areas: Towards an approach to understanding and accounting for tranquillity in planning and decision making.

Landscape planning designations

740. The following documents will inform the understanding of the baseline characteristics and qualities of the nationally designated areas of landscape that are located beyond the boundary of the proposed Study Area:

- North Devon Coast AONB partnership (2019) AONB Management Plan 2019-2024: North Devon Coast Areas of Outstanding Natural Beauty
- Pembrokeshire Coast National Park (2019) Pembrokeshire Coast National Park Management Plan 2020-2024
- Registered Parks and Gardens (RPGs) from the National Heritage List for England (NHLE)
- Local Development Plans
- LANDMAP Wales visual and sensory data

741. The value of these areas may increase their sensitivity to the Project, however, as noted previously it is anticipated that the effects on the majority of these designated areas would not be significant and would be scoped out of further assessment at PEIR stage largely as a result of their distance to the Windfarm Site of over 50km. This is with the exception of the Lundy Heritage Coast which is located at a distance of approximately 43km from the Windfarm Site.

Visual receptors

742. Visual receptors will be identified using ZTV analysis. Preliminary ZTV analysis has been conducted as shown in Figure 2.13.3. Figure 2.13.4 to Figure 2.13.8 show the ZTV analysis in greater detail.

743. The SLVIA will assess the Project Design Envelope which has the maximum effect on seascape, landscape and visual receptors and this will be agreed with relevant consultees.

744. The preliminary ZTV overlaid on OS mapping shows that the main areas from which the Project would theoretically be visible are at sea. The visual receptors within the Study Area are largely restricted to people on vessels and on Lundy Island at a range of approximately 45km.

745. To the north-north-east of the Windfarm Site the ZTV is seen to extend beyond the Study Area to the coast of Pembrokeshire at a range of approximately 55km. To the east and south-east the ZTV extends onto the coastal areas of Devon and Cornwall at a range of over 53km. Actual visibility of the Project from within these areas will be reviewed in the field, however, much of the visibility from inland areas is likely to be locally screened by intervening vegetation and built form. Where visible out to sea the Project would be viewed within an open area of the seascape to the sea horizon.

746. As well as OS mapping, the following datasets, information and stakeholder consultation will be used to inform the identification and analysis of visual receptors during the EIA:

- Local and County Planning Authorities
- Natural England
- Historic England
- NRW
- Sustrans UK
- PRoW maps
- Local Development Plans prepared by the Planning Authorities

747. Viewpoint photography will be taken at a number of representative viewpoints to be agreed with relevant consultees through the scoping process, further consultation and the Evidence Plan Process (EPP). The preliminary list of representative viewpoints is included in Table 2.30.

Table 2.30 Preliminary viewpoint list

No	Location	Designation	Easting	Northing	Distance to Windfarm Site (km)
1	Stack Rocks, Pembrokeshire	Pembrokeshire Coast National Park/ South Pembrokeshire Heritage Coast	192511	194494	55.19
2	Hartland Point, on South West Coast Path (SWCP)	North Devon AONB / Hartland Heritage Coast	223137	127478	53.42
3	Vicarage Cliff, west of Morwenstow on SWCP	Cornwall AONB / Hartland Heritage Coast	219965	115235	52.87

No	Location	Designation	Easting	Northing	Distance to Windfarm Site (km)
4	Compass Point, Storm Tower, south of Bude (on SWCP)	n/a	220044	106344	56.45
5	Penhalt Cliff Ordnance Survey Viewpoint	Cornwall AONB / Pentire Point - Widemouth Heritage Coast	218871	100477	58.40
6	Lundy Island	Lundy Heritage Coast	213642	143861	44.53
7	Rosslare to Cherbourg Ferry	n/a	116826	139316	48.25

Visibility

748. The Met Office visibility data collected from the Chivenor synoptic weather station on the Devon coast will be used to inform the assessment of the likelihood of effects.

749. The likelihood of the seascape, landscape and visual effects arising will be described in relation to the Met Office definitions for the different ranges of visibility. These are found on the Met Office website and range from 'very poor' to 'excellent' as follows:

- Very poor visibility - range is less than 1km
- Poor visibility - range is 1 to 4km
- Moderate visibility - range is 4 to 10km
- Good visibility - range is 10 to 20km
- Very good visibility - range is 20 - 40km
- Excellent visibility - range is over 40km

750. This suggests that from Lundy Island and the more distant coastal parts of the SLVIA Study Area there would require to be 'excellent visibility' conditions for the Project to be visible.

Cumulative windfarms and other relevant development

751. Figure 2.13.1 shows that there are other offshore windfarms at early planning stages within the Study Area.

752. Details regarding projects assessed as being relevant to the cumulative assessment will be obtained from the Crown Estate Offshore Windfarm locational mapping data, data obtained from planning portals, and data provided by Offshore Wind Limited (OWL) and other developers. These will be used to inform the cumulative windfarm mapping and assessment, where there is sufficient information available.

753. The key development types likely to be included for assessment are offshore windfarms, onshore windfarms, above sea oil and gas installations, offshore tidal and wave power developments.

2.13.5 Baseline Environment

Seascape character

754. The majority of the SLVIA Study Area is covered by the sea and consists of both English and Welsh National Marine Character Areas. Following the approach set out by Natural England (Natural England, 2012, p7, Box 1) the National Seascape Assessment for England includes the areas identified as being within the South West Inshore and South West Offshore Marine Plan Areas. The National Marine Character Areas for Wales are defined within the inshore waters and extend 12 nautical miles from the high water mark.

755. The Marine Management Organisation (MMO) (2018) Seascape Character Assessment for the South West Inshore and Offshore marine plan areas defines the Windfarm Site as lying within Marine Character Area (MCA) 51: Bristol Channel Approaches (England). The overall character of this area is described as:

756. "*The Bristol Channel Approaches MCA has a rich natural environment and important heritage. The deep offshore waters extend to Haig Fras, a submerged rock outcrop which locally reduces bathymetry to only 38m from 100m. This is one of several designated or proposed areas for MCZ due to their nationally and internationally important sediment habitats. Forming part of the Celtic Sea, the MCA has important historical connections with the Celtic nations of Wales and Ireland which are still apparent today with ferries, pleasure craft and submarine communication cables crossing from England to Ireland. Ship wrecks on the seafloor indicate the areas strategic positioning during periods of conflict, more recently during WWII.*"

757. Notably in relation to the SLVIA it is stated under the heading "*Adjacent and inter-visible nationally designated and defined landscapes*", that "*Although this MCA does not include an adjacent coastline, it may be possible to gain views across neighbouring MCAs to/from the North Devon AONB and parts of Cornwall AONB.*"

758. The Offshore Export Cable Corridor is shown to pass through MCA 43: Lundy and Outer Bristol Channel and MCA 44: Hartland Point to Port Isaac Bay where these lie to the north and south respectively. The section of the Offshore Export Cable Corridor closest to the coast and including the Landfall is MCA 42: Bideford Bay and Taw-Torridge Estuary. The overall character of this MCA is described as:

759. "*The sweeping north-west orientated Bideford Bay is characterised by a predominantly sandy seabed supporting rich commercial fisheries and attracting seabirds and cetaceans. Areas of biogenetic reef, sandy shores and rock pools form valued habitats, recognised within the Bideford to Foreland Point MCZ. Draining into the bay, the large combined Taw-Torridge Estuary is fringed by nationally important wetlands, supporting a range of bird and fish species, whilst the prominent internationally designated dunes at Braunton Burrows fringe the estuary mouth. Ship wrecks on the sea floor are testament to a long history of maritime trade and transport, including the timber trade between Newfoundland and Bideford (a working historic port on the banks of the estuary). The sheltered waters provide opportunities for a range of recreational activities, along with the popular sandy beaches at Woolacombe, Croyde, Saunton and Westward Ho!. The open bay is defined by its panoramic, uninterrupted views out to sea - featuring Lundy and distant glimpses of the Welsh coast. Seascape character is strongly influenced by visual and cultural links to the coastline surrounding the bay, with its complex and varied forms and coastal landmarks, including the prominent Hartland Point lighthouse.*"

760. Notably in relation to the SLVIA it is stated under the heading 'Adjacent and inter-visible nationally designated and defined landscapes', that

761. "*All of the adjacent coastline (apart from the inner estuary) falls within the North Devon AONB, with the vast majority also defined as Heritage Coast (North Devon to the north and Hartland to the south).*"

762. The part of the seascape that are included within the Welsh waters and defined and described in the NRW Evidence Report 80, LUC (2015) National Seascape Assessment for Wales does not include the outshore area to the north of the Windfarm Site. Areas within 12 nautical miles of the coast and included within the proposed 50km radius study area are MCA 23: South Pembrokeshire Open Waters at approximately 32km from the Windfarm Site and MCA 22: South Pembrokeshire Coastal and Inshore Waters which is located on the edge of the study area and extending to the Welsh coast.

763. The relevant Key Characteristics of the coastal MCA 22 describe it as a "*Diverse, rugged coast forming the southern edge of Pembrokeshire Coast National Park, with rocky sections, steep cliffs, arches and stacks interspersed with small coves, scalloped bays and sandy beaches. Popular with walkers using the Pembrokeshire Coast Path and network of footpaths with good access to beaches. The area is also popular with climbers and kayakers. Wide, unspoilt views out to sea and along the coastline from headlands and cliff tops, as well as from sections of the Pembrokeshire Coast Path, including views to Caldey Island, as well as Lundy Island and the North Devon coast.*

764. *Offshore waters are used by ferries, commercial shipping and fishing boats.*

765. *Very tranquil, remote and often wild coastline when the firing ranges are not operating. Long stretches of coastline have little or no settlement. Offshore open sea area with simple, consistent and unified marine character at a vast scale and a significant sense of openness, remoteness and exposure.*"

766. The English and Welsh National Marine Character Areas are complemented by the existing National Landscape Character Areas, which extend to the low water mark to provide seamless character assessment coverage between land and sea.

767. In order to ensure consistency with this approach and baseline characterisation and to include the intertidal area between the mean low and high water mark, the SLVIA will assess seascape effects on seascape character areas (SCAs) that are seaward of the high water mark, which include beaches and intertidal areas. Landscape effects will be assessed on landscape character areas (LCAs) lying to the landward side of the low water mark and coastlines within LCAs covering the coast and those LCAs covering inland terrestrial areas with views of the Project that may materially alter its character (Section 3.10).

Landscape character

768. There is a hierarchy of published Landscape Character Assessments that describe the baseline landscape character of the landscape in the SLVIA Study Area, at the national and local level.

769. The English and Welsh Landscape is classified at the national level by National Character Areas (NCA) and National Landscape Character Areas (NLCAs) respectively. The 159 NCAs, which cover England, have been revised and developed by Natural England into NCA profiles, which provide a recognised, national, spatial framework. Similarly, the descriptive profiles for the 48 individual NLCAs identified and described in Wales by Natural Resource Wales (NRW) highlight what

distinguishes one landscape from another, with reference to their regionally distinct natural, cultural and perceptual characteristics.

770. The only land area that is located within the study area lies within NCA 159: Lundy at a distance of approximately 43km from the Windfarm Site. It is described as follows:

771. "*Lundy is a flat-topped granite island surrounded by steep cliffs, up to 100m high, plunging into the Bristol Channel. The shore has caves, stacks and huge granitic blocks along the rugged western coastline, which has always presented a danger to shipping. The east coast is much more sheltered from prevailing winds and waves, and the vegetated slopes extend further towards sea level. The cliffs are topped by a bleak, open and windswept heathland plateau, grazed by a range of feral animals including Soay sheep and goats and by domestic stock. Wide views over what appears an apparently endless sea give a strong sense of isolation. Lundy's coastal links to Ilfracombe and Bideford in the Culm are vitally important – all food and supplies; save some meat are imported to the island, and the MS Oldenburg carries island staff and visitors to and from the mainland.*

772. *The granite that forms the bulk of Lundy was emplaced into Devonian Morte Slates during the Tertiary Period. Lundy's granite is unique because it is the southernmost British granite associated with the opening of the Atlantic Ocean. Lundy's small settlement, which includes a church and the Marisco Tavern, is built in locally quarried granite with slate roofs.*"

Landscape planning designations and defined areas

773. The Windfarm Site is not within the boundary of any area subject to international, national or regional landscape designation intended to protect landscape quality.

774. Certain landscapes found with and beyond the proposed offshore SLVIA Study Area have been designated or defined due to their scenic or valued historic landscapes as shown on Figure 2.13.2. Some of their defined special qualities relate to their setting, which may include seascape.

775. Lundy island and its immediate coastal seascape are within the defined Lundy Heritage Coast. The Planning section of the Devon County Council website describes the landscape, special qualities and strategy for the island. Of relevance to the SLVIA are the special qualities "*Important seascape feature visible from all along the North Devon coast, the church tower and old lighthouse forming prominent vertical elements above the plateau; the appearance and clarity of the island varies markedly in different weather conditions.*

776. *Island at the mercy of the elements, and defined by the ever-present influence of the sea – offers a challenging and exhilarating 'wilderness' experience to visitors from the mainland.*

777. *Very high levels of tranquillity and dark night skies across the whole island. Informal paths (with no signposting) and extensive access land enabling visitors to explore the island.*

778. *A unique cultural identity defined by a small close-knit working community, far removed from 21st century influences and with strong senses of isolation, self-sufficiency and spirituality."*

779. Beyond the boundary of the Offshore SLVIA study area the closest defined area is the Hartland Heritage Coast which runs across Devon and Cornwall. The landward, coastal part of Heritage Coast is part of the North Devon and the Cornwall Areas of Outstanding Natural Beauty (AONBs).

780. At a range of between 50km and 60km there are also the Pentire Point Widemouth and Trevose Head Heritage Coasts and on the Welsh coast the Pembrokeshire Coast National Park.

781. All of the identified areas, which lie beyond the proposed boundary of the Offshore SLVIA Study Area would be considered highly valued and therefore potentially highly sensitive to the Project. However, it is considered that, at a range of over 50km, the magnitude of change, which may occur as a result of the development within the Windfarm Site would result in effects which would be not significant.

Visual receptors

782. The principal visual receptors in the SLVIA Study Area are people on Lundy island and in vessels within the seascape, which includes several ferries as well as recreational vessels. These include people within the small cluster of properties and businesses which are located primarily in the south of Lundy, visitors to tourist facilities or historic environment assets and people engaged in recreational activity such as those using walking and cycle routes. A detailed assessment will be undertaken in the SLVIA for those visual receptors that are most susceptible to changes, which may experience significant visual effects as a result of the Project.

783. All other visual receptors are located beyond the proposed SLVIA Study Area radius along the English and Welsh coastline and immediate hinterland. These will be considered with reference to the proposed viewpoints. However, it is considered that at a range of over 55km the effects on even the highest sensitivity visual receptors would be not significant during the day and night.

2.13.6 Potential Impacts

Potential impacts during construction

784. There may be impacts on seascape character through the construction of the Project within the Offshore Development Area as well as views of this from the surrounding seascape.

785. Impacts may arise as a result of views of this construction from landscape, planning designations and visual resource within the study area.

786. Impacts on the seascape, landscape and visual resource would result only from above sea elements of the construction with the main impacts arising within the Windfarm Site where there would be a concentration of construction vessels as well as the Offshore Substation platform and wind turbines as they are constructed.

Potential impacts during operation

787. There may be impacts on seascape character through the operation of the Project within the Windfarm Site as well as views of this from the surrounding seascape.

788. Impacts may arise as a result of views of the operation of the Project from the landscape, planning designations and visual resource within the Study Area.

789. Impacts on visual receptors may arise during the day and at night due to lighting (see Sections 2.11 and 3.10) of the offshore infrastructure, which may include CAA and marine navigation lighting, which may affect night-time views.

790. Impacts would result only from above sea elements of the operation including aspects of the Project's maintenance and management.

Potential impacts during decommissioning

791. There may be impacts on seascape character through the decommissioning of the Project within the Offshore Development Area as well as views of this from the surrounding seascape.

792. Impacts may arise as a result of views of this decommissioning from the landscape, planning designations and visual resource within the Study Area.

793. Impacts on the seascape, landscape and visual resource would result only from above sea elements of the decommissioning. The main impacts would arise within the Windfarm Site where there would be a concentration of decommissioning vessels as well as the offshore substation platforms and wind turbines as they are decommissioned.

Potential cumulative impacts

794. The activities and structures located within the Windfarm Site will alter the seascape character of the Windfarm Site itself through alterations to it. This may result in cumulative effects on seascape character through the addition of the Project to a seascape affected by other cumulative offshore developments such as the Erebus, Valorous and Pembrokeshire Demonstration Zone offshore windfarms, or other offshore energy related development with substantial above sea surface elements, should these be taken forward within the Study Area. In addition, visibility of the addition of the Project to other cumulative development may result in cumulative impacts on landscape character and visual receptors within the SLVIA study area. The approach to cumulative assessment is set out in Section 1.9.2.

Potential transboundary impacts

795. There are unlikely to be any transboundary SLVIA impacts due to the distance of the Project from other jurisdictions i.e. over 50km.

Summary of potential impacts

796. The SLVIA will assess the effects on seascape character, landscape character, landscape planning designations and visual receptors during construction, operation and decommissioning. Daytime and night-time effects on visual receptors will be assessed during operation. The key impacts arise due to the above sea surface construction, operation and decommissioning within the Windfarm Site.

797. It is proposed to scope out the construction of the offshore cable route as this is unlikely to result in significant effects. The only evidence of this activity above the sea surface will be a small number of vessels within the seascape, which is not an uncommon feature of existing views.

798. Whilst it is proposed to scope in many of the potential impact types

799. it is likely that such impacts may only have the potential to be significant for a very limited number of landscape and visual receptors such as those on Lundy Island or in vessels. This is due to the substantial distance of the Windfarm Site from the coast of Wales and mainland England where the majority of receptors are located. It is anticipated that the majority of the receptors beyond the 50km radius study area will be scoped out of the assessment following an initial review of the likely effects and early stage consultation.

800. Whilst it is proposed to scope in many of the potential impacts it is likely that such impacts may only have the potential to be significant for a very limited number of landscape and visual receptors due to the distance of the Windfarm Site from the coast of Wales and mainland England.

2.13.7 Mitigation Measures

801. As discussed in Section 1.9, mitigation measures will be developed as site specific information becomes available, the project design is refined and the Preliminary Environmental Information Report (PEIR), and ultimately the Environmental Statement (ES), are prepared. A number of mitigation measures that may be appropriate for the Project could be embedded within the design and accounted for within the assessment of impacts. Further mitigation measures may be proposed in response to impact assessments. These will evolve as the Project design develops and the EIA progresses, and/or in response to consultation.

802. Mitigation of seascape, landscape and visual effects could occur through a reduction in the horizontal or vertical extent of the Project within the Windfarm Site or increasing the distance of the turbines from the coast within the Windfarm Site. These potential mitigation measures could constrain the Project and potentially reduce its renewable energy output and therefore its contribution to reducing climate change impacts.

803. Mitigation of the effects of civil aviation lighting may also be possible through agreement with the CAA and the MOD.

804. The requirement and feasibility of any mitigation measures will be consulted upon with relevant consultees throughout the EIA process.

2.13.8 Approach to Assessment and Data Gathering

805. Data to inform the SLVIA will be collected using both desk-based study and analysis and field work within the SLVIA Study Area and environs including photography for the preparation of visualisations and impact assessment using those visualisations as an aid to define seascape, landscape and visual effects.

806. The assessment will be undertaken in accordance with the methods outlined in the best practice guidance documents listed in Section 2.13.2.

807. Although some of this guidance has been derived from publications by bodies located in other UK nations it is commonly drawn on for work carried out in England and Wales where no equivalent guidance exists.

808. The objective of the seascape, landscape and visual assessment of the Project will be to predict the likely significant effects on the seascape, landscape and visual resource. In accordance with the EIA Regulations 2017, the SLVIA effects will be assessed to be either significant or not significant. The methodology to undertake the SLVIA will reflect the 'Guidelines for Landscape and Visual Impact Assessment: Third Edition' (Landscape Institute, 2013) (GLVIA 3).

809. The significance of effects will be assessed through a combination of two considerations – the sensitivity of the landscape or visual receptor/view and the magnitude of change that will result from the Project. In accordance with the Landscape Institute's GLVIA 3, the SLVIA methodology requires the application of professional judgement, but generally, the higher the sensitivity and the higher the magnitude of change the more likely that a significant effect will arise.

810. The objective of the cumulative SLVIA is to describe, visually represent and assess the ways in which the Project will have additional effects when considered together with other existing, consented or application stage developments and to identify related significant cumulative effects arising. The guiding principle in preparing the cumulative SLVIA will be to focus on the likely significant effects and in particular those which are likely to influence the outcome of the consenting process.

2.13.9 Summary of Scoped In Impacts

Table 2.31 Summary of impacts relating to Offshore Seascape, Landscape and Visual Amenity

Potential Impact	Construction	Operation	Decommissioning
Impact (daytime) of the Windfarm component of the Project on seascape character	✓	✓	✓
Impact of daytime visibility of the Windfarm component of the Project on landscape character of Lundy Island and Lundy Heritage Coast	✓	✓	✓
Impact of daytime visibility of the Windfarm component of the Project on people in vessels and on Lundy Island	✓	✓	✓
Impact of night-time visibility of the Windfarm component of the Project on people in vessels and on Lundy Island	✗	✓	✗

Potential Impact	Construction	Operation	Decommissioning
Cumulative impacts	✓	✓	✓

Key:
✓ Impact scoped in
✗ Impact scoped out

2.14 Offshore Air Quality

2.14.1 Introduction

811. Vessels used during all phases of the Project can generate emissions of air pollutants including nitrogen oxides (NOx), particulate matter (PM) and sulphur dioxide (SO_2). Potential air quality impacts from the offshore elements of the proposed Project will primarily occur from engine exhaust emissions from marine vessels used during construction, maintenance and operation. It is proposed that given these emissions will be emitted in the coastal or offshore environment, away from any major terrestrial emission sources, the emissions from the proposed Project are not expected to cause a deterioration in the local air quality.

2.14.2 Potential Impacts

812. It is expected that the number of vessels required during the construction, operation and decommissioning of the Project would be small in comparison to existing vessel activity within the Irish Sea. In addition, the majority of offshore works at the Windfarm Site would be undertaken 54km north of the Cornwall and Devon coastline; as such, these emissions would not impact upon receptors at the coastline.

813. Some works will be required closer to the shoreline to construct the Offshore Export Cable Corridor; however, these works would be relatively short-term in nature and due to shallower water depths, larger and more polluting vessels would not be used. As such, it is not expected that significant impacts would arise.

814. Vessels used for the Project will operate in line with the International Maritime Organisation's regulations to reduce vessel emissions (under Annex VI of the International Convention for the Prevention of Pollution from Ships (MARPOL)). The revised Annex VI of MARPOL introduced a more stringent sulphur limit in fuel globally from 1st January 2020 (known as 'IMO 2020') which required fuel to contain no more than 0.5% sulphur by mass.

815. Given the lack of potential impacts and the limitations on sulphur content in marine fuels, it is considered that impacts on human and ecological receptors as a result of

offshore activities would not be significant and it is proposed to scope offshore air quality impacts out of the EIA.

2.15 Offshore Airborne Noise

2.15.1 Existing environment

816. Two main sources of noise are considered to characterise the offshore environment:

- Natural – noise generated by wind, wave and precipitation
- Anthropogenic noise from vessel traffic and other users (oil and gas infrastructure)

2.15.2 Potential impacts

817. Construction, operation, maintenance and decommissioning activities have the potential to increase airborne noise within the Windfarm Site and Offshore Export Cable Corridor. The main sources of noise would be from increased vessel activity, cable laying and foundation installation and subsequent operation and maintenance of infrastructure.

818. The Windfarm site is approximately 30km from shore at its nearest point, and it is therefore highly unlikely that onshore receptors (i.e. coastal recreation users, coastal ecological designated sites and coastal settlements) will be affected by increases in noise from construction or operational activities in the Windfarm site, in the context of the existing noise sources. Disturbance to offshore biological receptors (including fish and marine mammals) from underwater noise will be considered within the relevant sections for these topics and disturbance to birds is covered in on and offshore ornithology.

819. Nearshore construction activities that will generate airborne noise onshore will be limited to installation of the offshore export cable, which will require ploughing, trenching or jetting the cable and Horizontal Directional Drilling (HDD) or open cut trenching at Landfall. The impact of nearshore works on onshore receptors will be assessed in the onshore noise and vibration assessment (see Section 3.8).

820. Due to the limited pathway for offshore airborne noise to impact receptors it is proposed that offshore airborne noise is scoped out of the EIA for further consideration. Noting that the main impacts from noise to ecological receptors occur from underwater noise, which is to be assessed in other relevant aspects chapters.

2.16 Offshore Inter-Relationships

821. The EIA will identify and assess inter-relationships which are likely to result from the construction, operation and decommissioning of the Project. The inter-relationships relevant to the offshore environment are outlined in Table 2.32.

Table 2.32 Offshore inter-relationships

Offshore Topic	Inter-relationships
Marine geology, oceanography and physical processes	Will have effects on: • Offshore archaeology and cultural heritage • Benthic and intertidal ecology • Marine water and sediment quality • Fish and shellfish ecology
Marine water and sediment quality	Is affected by: • Marine geology, oceanography and physical processes Will have effects on: • Benthic and intertidal ecology • Fish and shellfish ecology • Marine mammals
Benthic and intertidal ecology	Is affected by: • Marine geology, oceanography and physical processes • Marine water and sediment quality Will have effects on: • Fish and shellfish ecology
Fish and shellfish ecology	Is affected by: • Marine geology, oceanography and physical processes • Marine water and sediment quality • Benthic and intertidal ecology Will have effects on: • Commercial fisheries • Marine mammals • Offshore ornithology
Marine mammals	Is affected by: • Marine water and sediment quality • Fish and shellfish ecology • Shipping and navigation
Offshore ornithology	Is affected by: • Fish and shellfish ecology

Offshore Topic	Inter-relationships
Commercial fisheries	Is affected by: • Fish and shellfish ecology • Shipping and navigation Will have effects on: • Socio-economics
Shipping and navigation	Will have effects on: • Marine mammals • Commercial fisheries Will have effects on: • Socio-economics • Tourism and recreation
Marine archaeology and cultural heritage	Is affected by: • Marine geology, oceanography and physical processes • Offshore seascape, landscape and visual impact assessment
Civil and Military Aviation	N/A
Infrastructure and other users	N/A
Offshore seascape, landscape and visual impact assessment	Will have effects on: • Marine archaeology and cultural heritage
Offshore air quality	N/A
Offshore airborne noise	N/A

3. Part 3: Onshore

3.1 Introduction

822. This section of the Scoping Report details the existing environment, approach to data collection and assessment of potential impacts covered under the EIA regulations of the construction, operation and maintenance, and decommissioning of the Project on onshore receptors.

823. The offshore topics within the EIA will include all receptors landwards of Mean High Water Spring (MHWS).

824. It should be noted that Study Areas per topic are defined in the sections below based on the potential spatial and temporal considerations of the impacts on relevant receptors and are intended to cover the area within which an effect can be reasonably expected.

825. Part 3 of this Scoping Report considers the following onshore topics:

- Section 3.2: Ground Conditions and Contamination
- Section 3.3: Onshore Air Quality
- Section 3.4: Water Resources and Flood Risk
- Section 3.5: Land Use
- Section 3.6: Onshore Ecology and Ornithology
- Section 3.7: Onshore Archaeology and Cultural Heritage
- Section 3.8: Noise and Vibration
- Section 3.9: Traffic and Transport
- Section 3.10: Onshore Landscape and Visual Amenity
- Section 3.11: Onshore Inter-relationships

3.2 Ground Conditions and Contamination

3.2.1 Introduction

826. This section of the Scoping Report identifies the receptors related to onshore ground conditions and contamination that are relevant to the Project. The potential effects of construction, operation and maintenance as well as decommissioning on onshore ground conditions and contamination are considered throughout this section.

3.2.2 Policy, Legislation and Guidance

827. Section 1.5 describes the wider policy and legislative context for the Project. The assessment of potential impacts upon ground conditions and contamination will be made with specific reference to the relevant National Policy Statements (NPS). Those relevant to the project include:

- Overarching NPS for Energy (EN-1) (Department for Business, Energy and Industrial Strategy (BEIS) 2021)
- NPS for Renewable Energy Infrastructure (EN-3) (DECC 2011a)
- NPS for Electricity Networks Infrastructure (EN-5) (DECC 2011b)

3.2.3 Study Area

828. At this stage information to inform the baseline environment for the onshore Area of Study (AoS) has been reviewed within the redline boundary only. The AoS will be refined as part of the EIA process, once refined information within a buffer zone of up to 1km surrounding the redline boundary will be reviewed (see Section 3.2.8 for further details).

3.2.4 Baseline Data

829. The scoping assessment for ground conditions and contamination has been undertaken based on a desk-based assessment using existing available information to identify the ground conditions and potential sources of contamination within the AoS.

830. The following sources have been utilised to inform the baseline environment at this stage:

- Royal HaskoningDHV ArcGIS viewer
- British Geological Survey (BGS) Geoindex website [accessed October 2021]
- BGS Bideford and Lundy Island Solid and Drift map (Sheet number 292 & part of 275, 276, 291 & 308) 1977
- BGS Barnstaple Solid and Drift map (Sheet number 293) 1982
- BGS Devon (north) Mineral Resources map, 2006
- Devon County Council Environment Viewer (including mineral resource areas maps) [accessed October 2021]
- Multi Agency Government Information for the Countryside (MAGIC) map application [accessed October 2021]
- Natural England Designated Sites Citations [accessed October 2021]

831. As part of the EIA process, liaison with the Environment Agency and other relevant bodies will be undertaken to obtain further information on the following topics:

- Mineral Safeguarding Areas
- Mineral Resourcing Areas
- Groundwater and surface water abstractions
- Geological designated sites
- Historical and active landfills
- Potential sources of contamination / Part 2A designated land

3.2.5 Baseline Environment

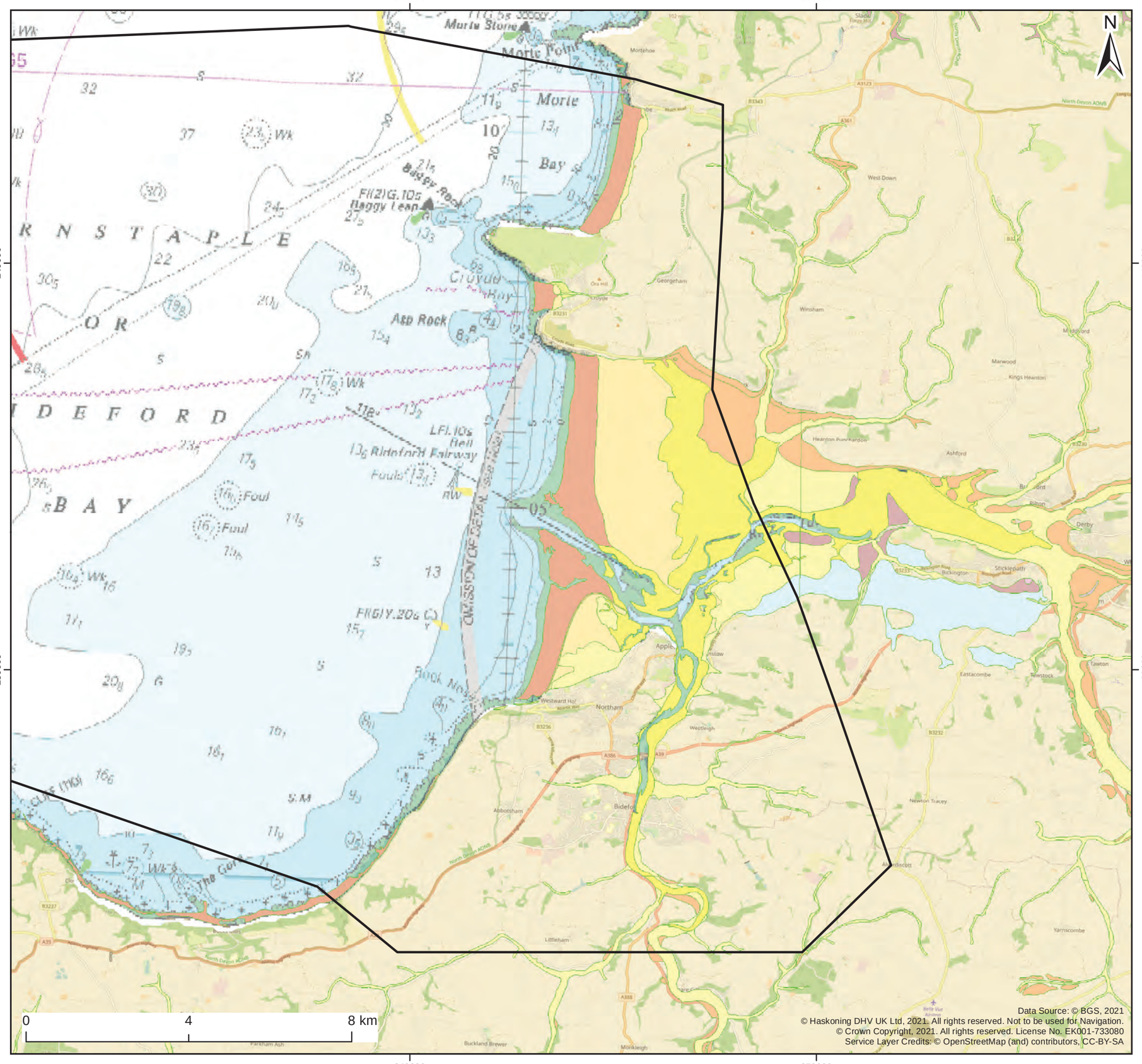
Geology and hydrogeology

832. A review of the published geological mapping available on the BGS Geoindex website and BGS solid and drift geological maps indicates the presence of very localised small areas of Made / Artificial Ground within the AoS. The following superficial deposits (Quaternary in age) are also present:

- Aeolian deposits: Blown Sand (Quaternary Period)
- Marine Beach Deposits (Quaternary Period)
- Intertidal deposits: Tidal Flat Deposits (Holocene Epoch)
- Beach Deposits Raised Beach Deposits (Holocene Epoch)
- Fluvial deposits: Alluvium (Holocene Epoch)
- River Terrace Deposits (Quaternary Period)
- Mass movement deposits: Head (Holocene Epoch)
- Glacial Till (Chomerian Stage to Ipswichian Stage)

833. It should be noted that the superficial deposits do not extend across the entire AoS and follow the low-lying coastline, river mouths and watercourses.

834. Superficial deposits are identified within Figure 3.2.1.



Legend:

Area of Search

Superficial Geology

- Alluvium - Clay and Silt
- Cover Sand - Clay, Silt and Sand
- Head - Diamicton
- Head - Gravel
- Head - Silt
- Interglacial Deposits - Clay and Silt
- Intertidal Deposits (Undifferentiated) - Clay and Silt
- Kesgrave Catchment Subgroup - Sand and Gravel
- Lowestoft Formation - Sand and Gravel
- River Terrace Deposits, 2 - Sand and Gravel
- River Terrace Deposits, 3 - Sand and Gravel
- Storm Beach Deposits - Sand and Gravel

Client:	Project:
Offshore Wind Ltd.	White Cross Offshore Windfarm

Title: Superficial Geology

Figure:	Drawing No:
3.2.1	PC2978-RHD-ZZ-XX-DR-Z-0097

Revision:	Date:	Drawn:	Checked:	Size:	Scale:
P01	18/11/2021	GC	CB	A3	1:95,000

Co-ordinate system: British National Grid

WHITE CROSS

Royal HaskoningDHV
Enhancing Society Together

835. Underlying the superficial deposits are the following bedrock formations (youngest to oldest):

- Halden Gravel Formation: Tower Wood Gravel Member (Eocene Epoch)
- New Red Sandstone Supergroup: Exeter Group (Cisuralian Epoch)
- Holsworthy Group: Bude Formation (Langsettian Substage to Bolsovian Substage)

Holsworthy Group: Bideford Formation (Langsettian Substage)

- Ashton Mudstone Member and Crackington Formation (Undifferentiated) (Namurian Stage to Langsettian Substage)
- Holsworthy Group: Crackington Formation (Arnsbergian Substage to Langsettian Substage)
- Doddiscombe Formation and Codden Hill Chert Formation (Undifferentiated) (Courceyan Substage to Brigantian Substage)
- Exmoor Group: Pilton Mudstone Formation (Farmennian Age – Tournaisian
- Exmoor Group: Baggy Sandstones Formation (Farmennian Age)
- Upcott Slates Formation (Farmennian Age)
- Pickwell Down Sandstone Formation (Farmennian Age)
- Morte Slates Formation (Frasnian Age – Farmennian Age)

836. Bedrock Geology is identified within Figure 3.2.2.

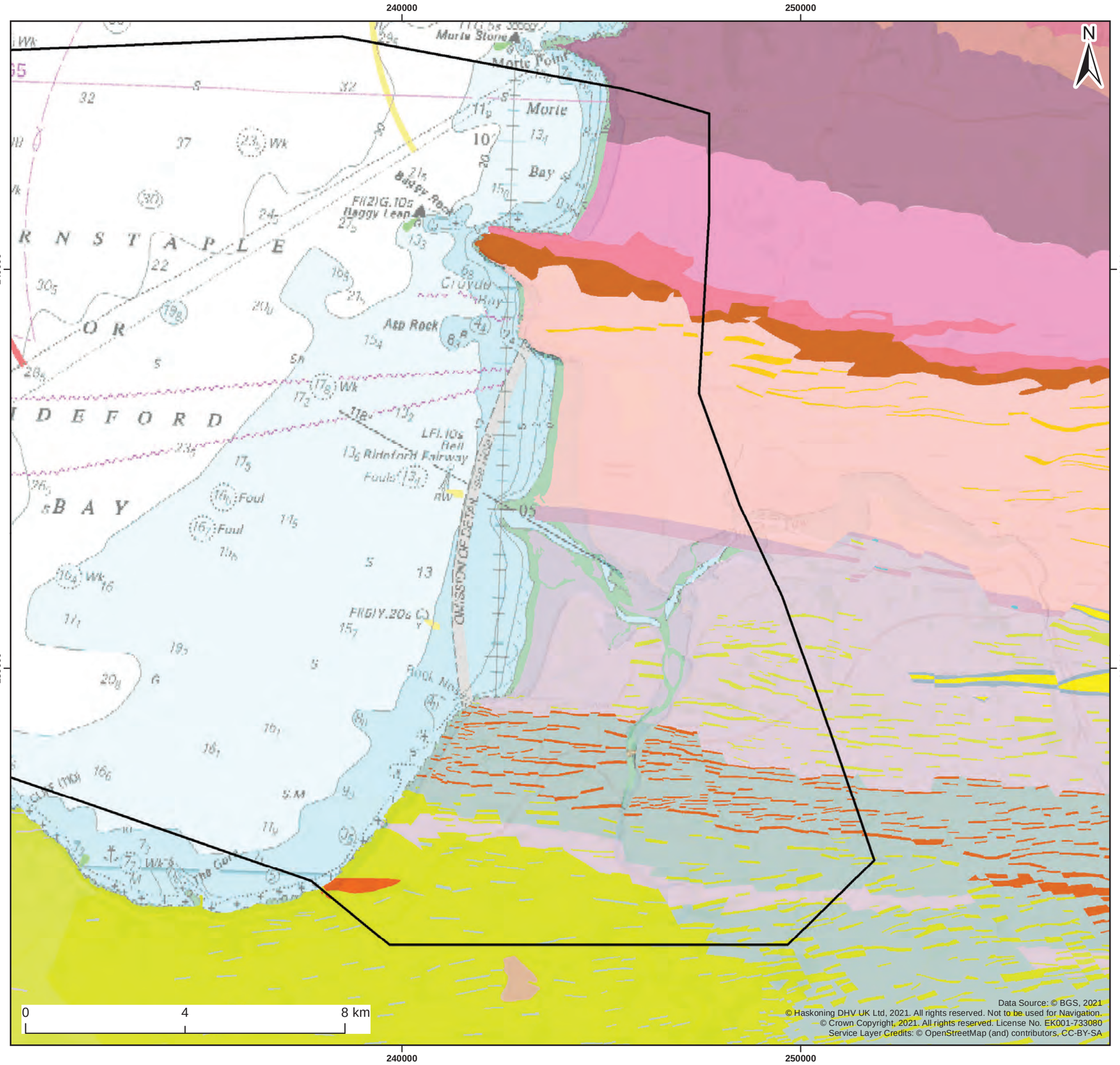
837. As with the superficial deposits, due to the complex geology of the AoS, the bedrock formations listed above are not present throughout the entire AoS.

838. The AoS is also heavily faulted with a range of orientations present due to the long and complex geological history of the bedrock formations.

839. A review of the Devon County Council Environment Viewer indicates the presence of several Mineral Safeguarding Areas (MSA) and Mineral Consultation Areas (MCA) throughout the AoS. The MSA and MCA appear to be associated with aggregate resources, this will be confirmed through liaison with North Devon Council as the EIA progresses.

840. A review of Source Protection Zones (SPZ) recorded on the MAGIC map application indicates that the majority of the AoS is not located within an SPZ. There are a small number of isolated SPZs I and II present located within the AoS.

841. Source protection zones are identified within Figure 3.2.3.



Legend:

Area of Search

Bedrock Geology

- Baggy Sandstones Formation - Sandstone, Siltstone And Mudstone
- Bideford Formation - Mudstone And Siltstone
- Bideford Formation - Sandstone
- Bude Formation - Sandstone
- Codden Hill Chert Formation - Chert
- Codden Hill Chert Formation - Mudstone
- Combe Martin Slates Member - Slate
- Crackington Formation - Mudstone And Siltstone
- Crackington Formation - Sandstone
- Doddiscombe Formation And Codden Hill Chert Formation - Mudstone
- Exeter Group - Breccia And Sandstone, Interbedded
- Kentisbury Slates Member - Slate
- Morte Slates Formation - Slate
- Pickwell Down Sandstones Formation - Sandstone
- Pilton Mudstone Formation - Mudstone
- Pilton Mudstone Formation - Sandstone
- Tower Wood Gravel Member - Clay And Gravel
- Upcott Slates Formation - Slate

Client:	Project:
Offshore Wind Ltd.	White Cross Offshore Windfarm

Title:

Bedrock Geology

Figure: 3.2.2 | Drawing No: PC2978-RHD-ZZ-XX-DR-Z-0098

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P01	18/11/2021	GC	CB	A3	1:95,000

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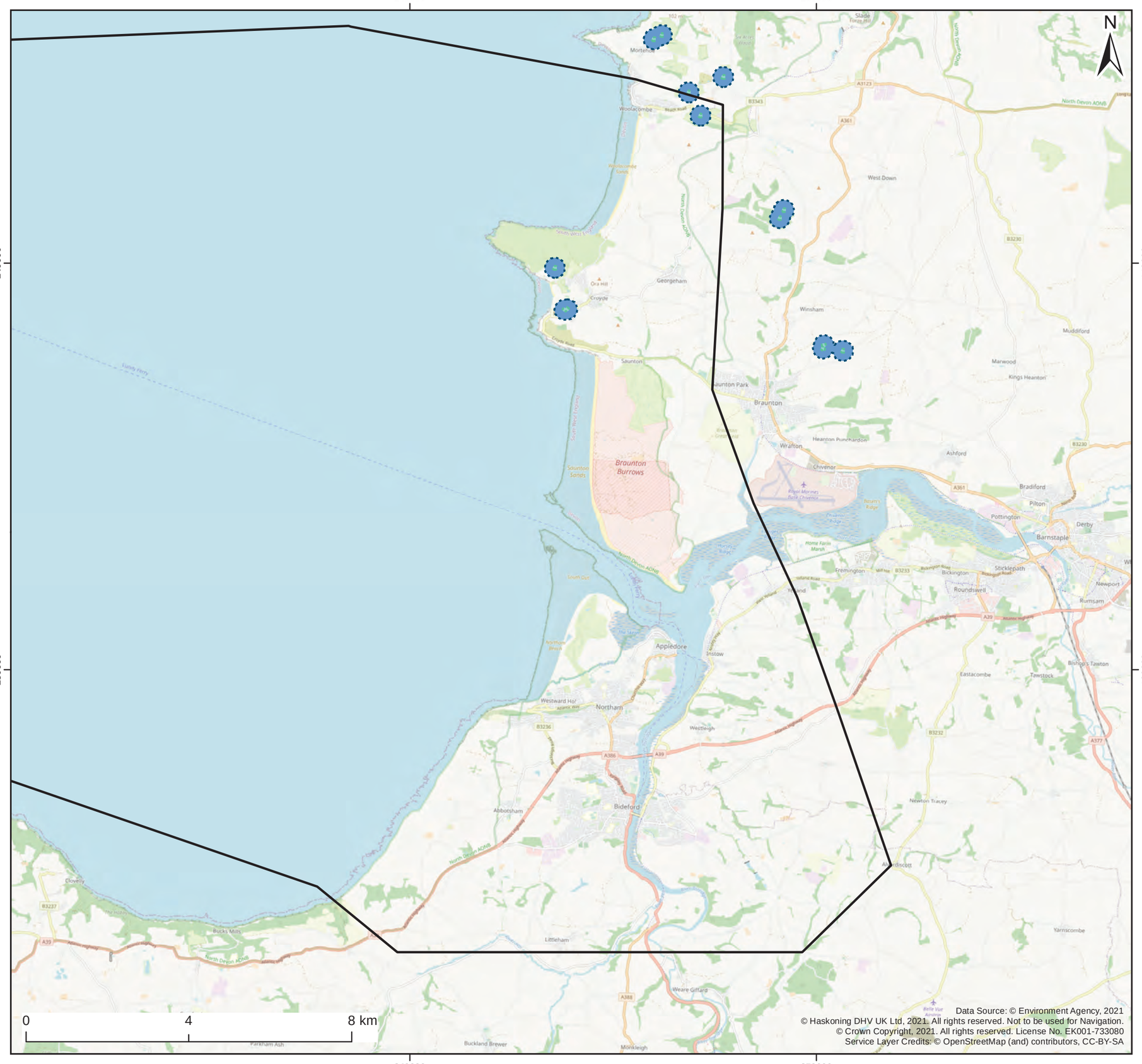

Legend:

Area of Search

Source Protection Zones (SPZ)

1

2

Client:	Project:
Offshore Wind Ltd.	White Cross Offshore Windfarm

Title:

Source Protection Zones

Figure: 3.2.3	Drawing No: PC2978-RHD-ZZ-XX-DR-Z-0099				
Revision:	Date:	Drawn:	Checked:	Size:	Scale:
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842. Information in relation to groundwater abstraction licences within the AoS (plus a 1km buffer) will be gathered through engagement with both the Environment Agency and local authority as part of the EIA process.

843. The aquifers supported by the geology within the AoS, as identified on the BGS GeoIndex and MAGIC map application, are detailed in Table 3.1.

Table 3.1 Summary of geology and aquifer designations within the onshore AoS

Stratum	Unit	Aquifer designation
Superficial deposits	Blown Sand	Secondary A Aquifer
	Marine Beach Deposits	Secondary A Aquifer
	Tidal Flat Deposits	Secondary Undifferentiated Aquifer
	Raised Beach Deposits	Secondary A Aquifer
	Alluvium	Secondary A Aquifer
	River Terrace Deposits	Secondary A Aquifer
	Head	Secondary Undifferentiated Aquifer
	Glacial Till	Secondary Undifferentiated Aquifer
Bedrock	Tower Wood Gravel Member	Secondary A Aquifer
	Exeter Group	Secondary A Aquifer
	Bude Formation	Secondary A Aquifer
	Bideford Formation	Secondary A Aquifer
	Ashton Mudstone Member and Crackington Formation (Undifferentiated)	Secondary A Aquifer
	Crackington Formation	Secondary A Aquifer
	Doddiscombe Formation and Codden Hill Chert Formation (Undifferentiated)	Secondary A Aquifer
	Pilton Mudstone Formation	Secondary A Aquifer
	Baggy Sandstones Formation	Secondary A Aquifer
	Upcott Slates Formation	Secondary A Aquifer
	Pickwell Down Sandstone Formation	Secondary A Aquifer
	Morte Slates Formation	Secondary A Aquifer

844. The Environment Agency's groundwater vulnerability map (Environment Agency, undated) indicates that the geology underlying the AoS has a groundwater vulnerability of medium to high. A high groundwater vulnerability designation indicates that the soil is easily able to transmit pollution to groundwater, which is characterised by high leaching potential in soils and the absence of low permeability superficial deposits.

Hydrology

845. A review of the Royal HaskoningDHV ArcGIS viewer indicates that there are several main rivers within the AoS, these include:

- River Torridge
- River Taw
- Fremington Pill
- Sir Arthur's Pill
- Braunton Pill
- River Caen
- Knowl Water
- Bradiford Water
- River Yeo

846. There are several unnamed watercourses within the AoS that may form tributaries to the rivers named above. In addition, there are multiple smaller watercourses (i.e. drainage ditches) and/or ponds located within the AoS.

847. Information in relation to surface water abstraction licences within the AoS will be gathered through engagement with both the Environment Agency and local authority as part of the EIA process.

848. Information relating to water resources and flood risks is considered in further detail in Section 3.4.

Designated sites

849. A review of the Royal HaskoningDHV ArcGIS viewer and Natural England citations indicates that the following designated geological sites are located within the AoS:

- Marsland to Clovelly Coast Site of Special Scientific Interest (SSSI) and Special Area of Conservation (SAC)
- Braunton Burrows SSSI and SAC
- Saunton to Baggy Point Coast SSSI
- Barricane Beach SSSI

- Mill Rock SSSI
- Fremington Claypit SSSI

850. Consultation with North Devon Council and local geological groups will be undertaken in order to establish the presence (or absence) of any Local Geological Sites (LGS) that are not included within the SSSI or SACs listed above.

851. Further information on designated sites for nature conservation is provided in Section 3.6.

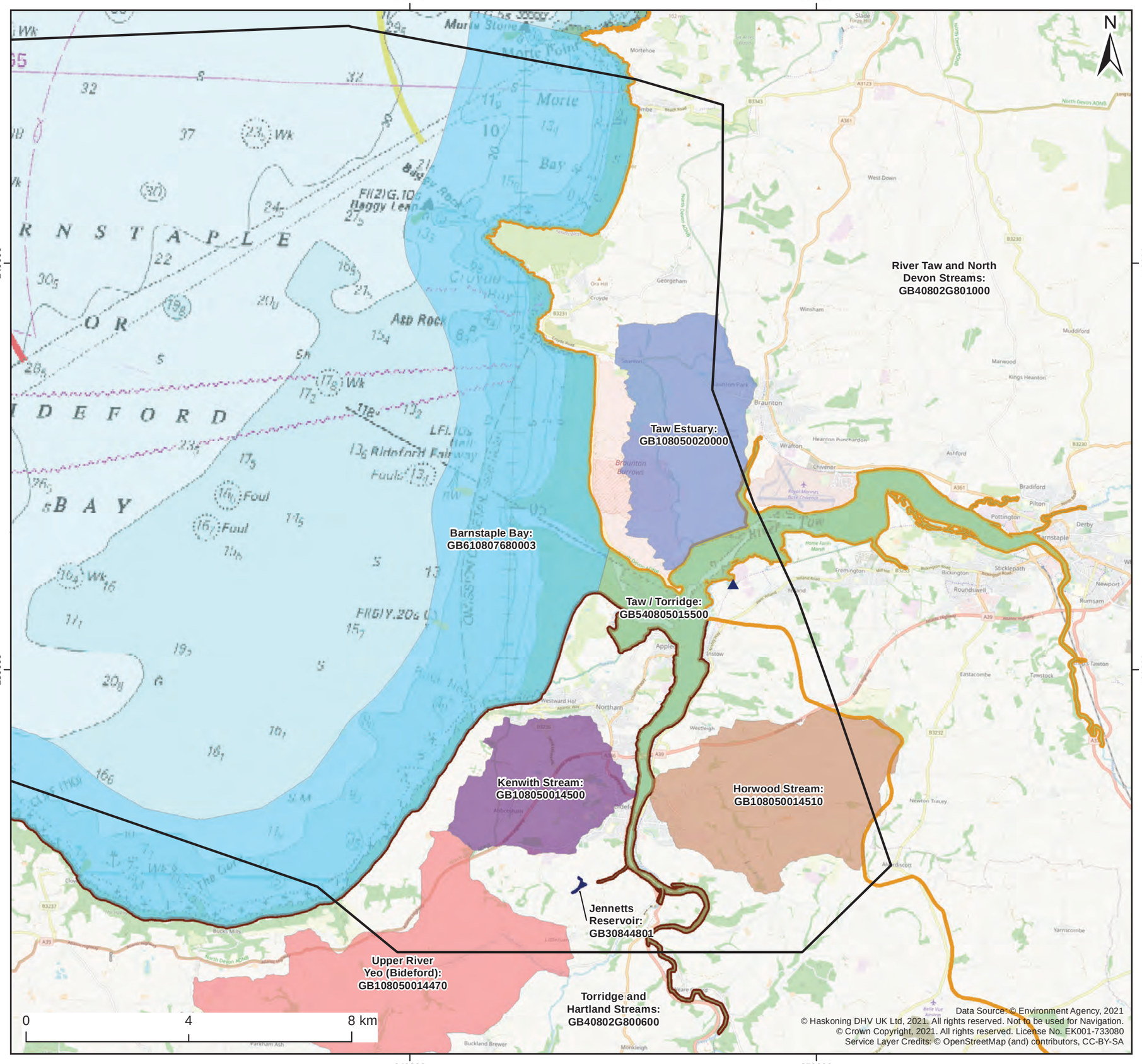
Land quality

852. A review of the Royal HaskoningDHV ArcGIS viewer indicates that the AoS is largely agricultural in nature. This may represent the potential for both diffuse and point sources of ground contamination to be present in relation to historical and current agricultural activities. Multiple settlements, such as Woolacombe, Braunton and Appledore have been identified following a review of the Royal HaskoningDHV ArcGIS viewer, as well as those listed below. The settlements and features identified below also have the potential to contain both historical and current sources of ground contamination:

- Royal Marines Base Chivenor
- Royal Air Force Search and Rescue Force
- Military training grounds (both World War II to present day)
- East Yellend Substation
- Former power station and associated infrastructure
- Mineral extraction sites
- Belle Vue airstrip
- Alverdiscott Substation
- Cleave Farm Solar Park
- Cornborough Sewage Treatment Works
- Horsacott Solar Park
- Ashford Sewage Treatment Works
- Royal Marines amphibious trials and training unit

853. A review of the Royal HaskoningDHV ArcGIS viewer indicates that there are a total of 13 historical landfills located within the onshore AoS, the majority of which are located to the south of the River Taw. Information relating to wastes accepted at these landfills will be obtained as part of the next stage of the EIA process.

854. Historic authorised landfills are identified within Figure 3.2.4.



Legend:

- Area of Search
- Potential Grid Connection Location

WFD River Water Body Catchments

- Horwood Stream
- Kenwith Stream
- Taw Estuary
- Upper River Yeo (Bideford)

WFD Lake

- Jennetts Reservoir

WFD Transitional Water Body

- Transitional

WFD Coastal Water Body

- Coastal

WFD Groundwater Bodies

- River Taw and North Devon Streams
- Torridge and Hartland Streams

Client:	Project:
Offshore Wind Ltd.	White Cross Offshore Windfarm

Title: WFD Water Bodies

Figure: 3.4.4 | Drawing No: PC2978-RHD-ZZ-XX-DR-Z-0104

Revision:	Date:	Drawn:	Checked:	Size:	Scale:
P01	22/11/2021	AB	CB	A3	1:95,000

Co-ordinate system: British National Grid

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3.2.6 Potential Impacts

Potential impacts during construction

855. The following potential construction stage impacts have been identified.

Impacts to groundwater

856. Direct impacts to the Secondary A and Secondary Undifferentiated Aquifers associated with the superficial deposits, and any potential groundwater abstractions, may occur due to the intrusive nature of the earthworks, trenching and piling (if required). The significance of the disturbance will be dependent on the depth of the aquifer unit in relation to the proposed depth of the intrusive works. During construction, surface layers will be excavated allowing increased infiltration of rainwater and surface run-off to the subsurface. This could potentially mobilise existing sources of contamination and create new pathways to the superficial aquifers. This could lead to a deterioration in groundwater quality.

857. Direct impacts to the Secondary A Aquifers and SPZs (where present) associated with the bedrock geology, and any potential groundwater abstractions, may occur from deep ground workings associated with trenchless crossings. There is the potential for drilling mud to migrate along the drill path, or from the immediate area, which could cause contamination and a deterioration of groundwater quality.

858. It is proposed the grid connection will be made at the existing East Yelland Substation, however, should this change, and a new Onshore Substation be constructed direct impacts to bedrock aquifers may occur as a result of piling activities. Piling has the potential to create new preferential pathways through superficial deposits allowing existing sources of contamination to migrate into the underlying bedrock aquifers. This may lead to a deterioration in groundwater quality.

Impacts to surface waters and ecological habitats

859. Direct impacts to surface water receptors and associated groundwater habitats (if present) may occur from existing sources of contamination. This may be a result of the creation of new pathways to surface waters via groundwater, installation of temporary drainage or surface water runoff that may occur during construction.

860. The construction works could also introduce new sources of contamination i.e. from the storage of fuels and chemicals or via spillages and leaks. These have the potential to migrate into the underlying aquifers or surface waters. Human receptors may also be directly exposed to these contaminants during construction works.

Impacts to human health

861. Excavation activities, including trenchless techniques, surface excavation and earthworks during cable laying and site preparation for onshore infrastructure has the potential to mobilise existing sources of ground contamination. This could result in impacts on human receptors through the generation of potentially contaminated dusts, vapours or ground gases released during construction works.

Impacts to designated geological sites and mineral safeguarding areas

862. Direct impacts to designated geological sites may occur through construction activities associated with Landfall and the Onshore Export Cable.

863. Construction activities also have the potential to result in direct impacts to MSAs and MCAs located within the AoS through the prevention of future extraction of identified reserves.

Potential impacts during operation

864. Installation of the Onshore Export Cable and the permanent footprint of Landfall would prevent future extraction of mineral resources within the permanent footprint (and associated easements) for the duration of the project's lifetime should they be located within either the MSAs or MCAs.

865. Indirect impacts along the Onshore Cable Corridor and permanent footprint of both Landfall and the Onshore Substation infrastructure may occur as a result of leakages of stored materials or spillages of materials during the operational phase.

866. Additional, significant impacts from the operation of the project are considered unlikely. Routine operation and maintenance activities will follow standard procedures therefore minimising any potential impacts.

Potential impacts during decommissioning

867. It is anticipated that the decommissioning impacts would be similar in nature to those of construction, although the magnitude of effect is likely to be lower. It is anticipated that there would be no additional impacts associated with mineral sterilisation during the decommissioning phase if the project interacts with the identified MSAs and MCAs.

Potential cumulative impacts

868. Cumulative effects on ground conditions and contamination resulting from the effects of the projects and other developments will be assessed in accordance with the approach to cumulative assessment is set out in Section 1.9.2. The assessment

will be dependent on the availability and accessibility of information for other developments.

Potential transboundary impacts

869. There are no anticipated transboundary impacts with regards to ground conditions and contamination as the onshore elements of the project would not be sited in proximity to any international boundaries. Transboundary impacts have therefore been scoped out of assessment and are not considered within the ground conditions and contamination chapter.

Summary of potential impacts

870. The greatest potential impacts to the receptors identified above is likely to be during the construction phase of the Project. Impacts during the operational phase of the project are thought to be minimal. Impacts during the decommissioning phase are considered to be similar to construction but with a lower magnitude of effect.

871. Due to the location of the AoS, there are no transboundary impacts associated with the onshore elements of the project.

3.2.7 Mitigation Measures

872. Mitigation measures will be developed as site specific information and data is gathered, the project design is refined, and the ES are prepared. There are a number of mitigation measures which may be appropriate for the project and embedded mitigation will be incorporated into the project design. Impacts will then be assessed with this mitigation in place.

873. As part of the design process for the project, a number of mitigation measures are proposed to reduce the potential for impacts on ground conditions and to reduce contamination. These will evolve over the project development process as the EIA progresses and in response to consultation.

874. Examples of mitigation measures likely to be considered include:

- Consideration of potentially significant sources of contamination, sensitive geological designations, groundwater and surface water abstractions, historical and active landfills and Mineral Safeguarding Areas, where practicable
- Avoidance of construction in areas of historical development, such as historical pits and areas of infilled land where practicable
- The development and implementation of a Code of Construction Practice (CoCP). The CoCP will include a Pollution Prevention Response Plan for

construction activities which will adhere to construction industry good practice guidance

875. All proposed mitigation measures will be consulted upon with stakeholders throughout the EIA process.

3.2.8 Approach to Assessment and Data Gathering

876. In order to further establish the baseline conditions discussed in Section 3.2.5 additional data sources will be sought, as set out in Table 3.2.

Table 3.2 Additional datasets

Data source	Data contents
Environmental Database Report	Historical maps, site sensitivity data, trade directory and regulatory information.
Public Health England	Radon gas risk.
Environment Agency	Historical landfill sites, permitted waste sites – authorised landfill site boundaries, aquifer designations, groundwater abstractions and groundwater SPZs.
Coal Authority	Closed mining sites.
BGS	Solid geology, superficial geology and borehole records. Mineral extraction sites.
Multi Agency Government Information for the Countryside (MAGIC) map application	Ramsar sites, SPAs, SACs, SSSI, National and Local Nature Reserves (with an emphasis on geological sites), groundwater vulnerability and aquifer designations – superficial deposits and bedrock.
North Devon Council and Devon County Council	Mineral Safeguarding Areas and areas of previous mineral extractions. Private groundwater abstractions, brownfield register, Part 2A sites determined as contaminated land.

877. Any additional datasets will be identified through ongoing consultation with stakeholders as part of the EIA process.

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

- Hydrology
- Geology and mineral resources
- Hydrogeology, aquifer designations and groundwater resources

- Historical land use and potential contamination sources
- Sensitive land uses

879. Additional datasets will be obtained to supplement and update (where needed) the existing environment baseline for ground conditions and contamination described in Section 3.2.5. A Land Quality Desk Study and Preliminary Risk Assessment (PRA) will be undertaken to develop a Preliminary Conceptual Site Model (PCSM) to aid in the identification of potential sources of contamination within the AoS and the risk they may pose to sensitive receptors that currently exist within the AoS or will be introduced e.g. construction workers. The PRA will include a refined AoS plus a 250m buffer zone to assess for potential sources of contamination, discharge consents, pollution incidents, landfills and contemporary trade entries. Historical maps will also be reviewed up to 250m to identify potential contaminant sources in the surrounding area. Both groundwater and surface water abstraction points within the 1km buffer zone will also be assessed as part of the PRA.

880. The key guidance which will be used to inform the assessment will include:

- Defra 'Environmental Protection Act 1990: Part 2A Contaminated Land Statutory Guidance', PB13735 (2012)
- North Devon Council Contaminated Land Strategy (currently being updated)
- North Devon and Torridge Local Plan (2018)
- The National Planning Policy Framework (NPPF) (2021)
- Environment Agency 'Land Contamination: Risk Management Framework (2021)
- Department of the Environment 'Industry Profiles for previously developed land' (1995)
- Construction Industry Research and Information Association (CIRIA) 'Assessing Risks Posed by Hazardous Ground Gases to Buildings', C665 (2007)
- British Standard 'Investigation of Potentially Contaminated Sites - Code of Practice', BS EN 10175:2011 +A2:2017
- British Standard 'Code of Practice for the Design of Protective Measures for Methane and Carbon Dioxide Ground Gases for New Buildings' BS8485:2015 +A1:2019
- British Standard 'Guidance on Investigations for Ground Gas -Permanent Gases and Volatile Organic Compounds (VOCs)', BS 8576:2013
- British Standard 'Code of Practice for Ground Investigations', BS 5930:2015+A1
- CIRIA 'Contaminated Land Risk Assessment - A Guide to Good Practice', C552 (2001)

881. The desk-based study forms the initial step in the assessment of ground conditions and contamination, as well as providing information for the design of intrusive ground investigation works that may be required in the event of the PRA identifying potentially unacceptable risks. The PRA will be progressed based on data obtained from an Environmental Database Report which incorporates historical maps, site sensitivity data, and regulatory information. This will be supplemented with information from those sources listed in Table 3.2.

882. Following site selection refinements to the project boundary, further liaison with stakeholders will be undertaken to agree the approach and methodology to data collection for EIA purposes and the specific assessment methodology through the EPP. Through the EPP, a detailed method statement will be presented and agreed with stakeholders.

3.2.9 Summary of Scoped In Impacts

Table 3.3 Summary of impacts relating to ground conditions and contamination

Potential Impact	Construction	Operation	Decommissioning
Impacts on human health both on and offsite from contamination sources	✓	✓	✓
Direct impacts on groundwater quality and groundwater resources from contamination sources and construction methods	✓	✓	✓
Impacts on surface water quality and the ecological habitats they support, from contamination	✓	✓	✓
Physical impacts to designated geological sites	✓	x	✓
Loss, damage or sterilisation of mineral resources	✓	✓	✓
Cumulative impacts	✓	✓	✓

Key:
✓ Impact scoped in
✗ Impact scoped out

3.3 Onshore Air Quality

3.3.1 Introduction

883. The Project has the potential to impact upon human and ecological receptors sensitive to air pollution as a result of emissions from land-based construction plant and vehicles, and as a result of emissions of dust and particulate matter. These impacts are considered within this section. Impacts relating to offshore air emissions are covered in Section 2.14.

3.3.2 Policy, Legislation and Guidance

884. Section 1.5 describes the wider policy and legislative context for the Project.

The Air Quality Strategy

885. The EU Air Quality Framework Directive 96/62/EC on Ambient Air Quality Assessment and Management entered into force in September 1996 (European Parliament, 1996). This was a framework for addressing air quality through setting European-wide air quality Limit Values in a series of Daughter Directives, prescribing how air quality should be assessed and managed by Member States. Directive 96/62/EC and the first three Daughter Directives were combined to form the new EU Directive 2008/50/EC (European Parliament, 2008) on Ambient Air Quality and Cleaner Air for Europe, which came into force in June 2008.

886. The 1995 Environment Act (Her Majesty's Stationery Office (HMSO), 1995) required the preparation of a national Air Quality Strategy (AQS) which set out the Government's Approach to meeting the air quality Standards and Objectives for specified pollutants. The Act also outlined measures to be taken by local planning authorities (LPAs) in relation to meeting these standards and Objectives (the Local Air Quality Management (LAQM) system).

887. The UK AQS was originally adopted in 1997 (Department of the Environment (DoE), 1997) and has been reviewed and updated to take account of the evolving EU Legislation, technical and policy developments and the latest information on health effects of air pollution. The strategy was revised and reissued in 2000 as the AQS for England, Scotland, Wales and Northern Ireland (Department of the Environment, Transport and the Regions (DETR), 2000). This was subsequently amended in 2003 (DETR, 2003) and was last updated in July 2007 (Defra, 2007).

888. The Government published its Clean Air Strategy in January 2019 (Defra, 2019a), which reset the focus for the first time since the 2007 Air Quality Strategy revision. The Clean Air Strategy identifies a series of 'new' air quality issues, including

biomass combustion, shipping emissions, and releases from agricultural activities. There is a recognition that the effects of pollutant deposition on sensitive ecosystems and habitats needs greater focus. The concept of an overall exposure reduction approach is raised, in recognition that numerical standards are not safe dividing lines between a risk and a safe exposure, within a population with a varying age and health profile.

889. The standards and Objectives relevant to the LAQM framework have been transposed through the Air Quality (England) Regulations (2000) (HMSO, 2000), and the Air Quality (England) (Amendment) Regulations 2002 (HMSO, 2002); the Air Quality Standards (England) Regulations 2010 set out the combined Daughter Directive Limit Values and Interim Targets for Member State compliance (HMSO, 2010). The Air Quality Standards (Amendment) Regulations 2016 (HMSO, 2016) were published on 6 December 2016.

890. Pollutant standards relate to ambient pollutant concentrations in air, based on medical and scientific evidence of how each pollutant affects human health. Pollutant Objectives incorporate target dates and averaging periods, which take into account economic considerations, practicability and technical feasibility.

891. Possible exceedances of air quality Objectives are usually assessed in relation to those locations where members of the public are likely to be regularly present and are likely to be exposed for a period of time appropriate to the averaging period of the Objective.

892. The current UK air quality standards and Objectives (for the purpose of LAQM) of relevance to this assessment are shown in Table 3.4.

Table 3.4 Air Quality Strategy Objectives (England)

Pollutant	Air Quality Objective		To be Achieved by
	Concentration	Measured as*	
Nitrogen dioxide (NO2)	200 µg.m^{-3}	1 hour mean not to be exceeded more than 18 times per year (equivalent to the 99.79th percentile of hourly means)	31/12/2005
	40µg.m^{-3}	Annual mean	31/12/2005

Pollutant	Air Quality Objective Concentration	Measured as*	To be Achieved by
Particles (PM10)	50µg.m^{-3}	24-hour mean not to be exceeded more than 35 times per year (equivalent to the 90.41st percentile of 24-hour means)	31/12/2004
	40µg.m^{-3}	Annual mean	31/12/2004
Particles (PM2.5)	25µg.m^{-3}	Annual mean (target)	2020
	15% cut in annual mean (urban background exposure)		2010 – 2020
Note: * how the Objectives are to be measured is set out in the UK Air Quality (England) Regulations (2000)			

893. National Air Quality Objectives also apply for the protection of vegetation and ecosystems, which are termed Critical Levels. These are shown in Table 3.5. Critical Levels apply irrespective of habitat type and are based on the concentration of the relevant pollutants in air.

Table 3.5 Critical Levels for the Protection of Vegetation and Ecosystems

Pollutant	Critical Level Concentration	Measured as
Oxides of Nitrogen (NOx)	30µg.m^{-3}	Annual Mean
	75µg.m^{-3} or 200µg.m^{-3} (depending on background levels of ozone and SO_2)	24-hour Mean
Sulphur Dioxide (SO2)	20µg.m^{-3}	Annual Mean
Ammonia (NH3)	3µg.m^{-3}	Annual Mean

894. Whilst Critical Levels apply regardless of habitat type, Critical Loads for habitat sites in the UK are habitat-specific and are published on the Air Pollution Information System (APIS) website (Centre for Ecology and Hydrology (CEH), 2021). These are the maximum levels of nutrient nitrogen and acid deposition that can be tolerated without increasing the risk of harm to the most sensitive features of these habitat sites. APIS states that marine-based ecological designations are unlikely to be sensitive to air pollution impacts, or they are usually dominated by other sources of inputs (Centre for CEH, 2021).

National Planning Policy Framework

895. The National Planning Policy Framework (NPPF) (MHCLG, 2021) was updated in July 2021 and refers to the LAQM process by recognising that:

896. "*Planning policies and decisions should sustain and contribute towards compliance with relevant limit values or national objectives for pollutants, taking into account the presence of Air Quality Management Areas and Clean Air Zones, and the cumulative impacts from individual sites in local areas*".

897. The NPPF identifies that local planning authorities should maintain consistency within the Local Air Quality Management process and states that:

898. "*Planning decisions should ensure that any new development within Air Quality Management Areas and Clean Air Zones is consistent with the local air quality action plan.*"

Air Quality Guidance

899. A number of guidance documents are relevant to air quality assessment. These include:

- Defra (2018) Local Air Quality Management Technical Guidance LAQM.TG(16)
- Institute of Air Quality Management (IAQM) (2016) Guidance on the Assessment of Dust from Demolition and Construction
- IAQM and Environmental Protection UK (EPUK) (2017) Land-Use Planning and Development Control: Planning for Air Quality
- IAQM (2020) A Guide to the Assessment of Air Quality Impacts on Designated Nature Conservation Sites
- Natural England (2018) Natural England's Approach to Advising Competent Authorities on the Assessment of Road Traffic Emissions under the Habitats Regulations

3.3.3 Study Area

900. The maximum extent of the air quality study area will be determined by the extent of the road network which is utilised by the Project, and could extend significantly further than the footprint of the onshore infrastructure. At this stage, the full extent of the road network that would be relevant to the project has yet to be determined, however the air quality study area will be defined as follows:

901. Impacts of construction dust and particulate matter will be considered at human receptors within 350m of construction works, and at ecological receptors within 200m of construction works. Impacts of the trackout of debris onto the road network

will be considered at human and ecological receptors within 50m of access routes, up to 500m from the site access(es).

902. Impacts of emissions from non-road mobile machinery (NRMM) on human and ecological receptors will be considered where there are receptors present in the vicinity of more intensive construction works (e.g. Horizontal Directional Drilling (HDD)), particularly where receptors are located downwind of construction activities.

903. Impacts of emissions from road traffic on human and ecological receptors will be considered where receptors are located within 200m of roads which experience significant increases in traffic volumes (i.e. those which exceed the traffic screening criteria provided in the Institute of Air Quality Management (IAQM) and Environmental Protection UK (EPUK) guidance (IAQM and EPUK, 2017) and Natural England guidance (Natural England, 2018)).

904. The air quality study area will be agreed with stakeholders prior to commencement of the assessment.

3.3.4 Baseline Data

905. The air quality assessment will utilise data from the sources detailed in Table 3.6.

Table 3.6 Data sources

Data Source	Description
North Devon District Council Torridge District Council	Latest Air Quality Annual Status Report (ASR) and air quality monitoring data
Centre for Ecology and Hydrology (CEH)	Air Pollution Information System (APIS) (CEH, 2021)
Defra UK Air Information Resource (AIR)	Air Quality Management Areas (AQMAs) Interactive Map
Defra's LAQM Support Tools	LAQM 1km x 1km grid background pollutant maps (Defra, 2020)

3.3.5 Baseline Environment

Baseline Air Quality

906. The onshore Area of Search lies within the jurisdiction of North Devon District Council (NDDC) and Torridge District Council (TDC). The Area of Search is predominantly rural in nature with few major pollution sources and therefore air quality can be considered to be generally good.

907. NDDC has declared a statutory Air Quality Management Area (AQMA) within the village of Braunton, declared for exceedances of the annual mean NO2 Objective relating to road traffic emissions. However, the annual mean NO2 Objective has not been exceeded anywhere in the district since 2015 (NNDC, 2020). Monitoring of PM_{10} and $PM_{2.5}$ has not identified any exceedances of the relevant Objectives.

908. TDC has not declared any statutory AQMAs within its area of jurisdiction, and across the last five years there have not been any exceedances of the annual mean NO2 Objective (TDC, 2020). TDC does not monitor PM_{10} or $PM_{2.5}$.

Sensitive Receptors

909. There are human receptors present at isolated residential properties and settlements across the Area of Search which are sensitive to air pollution. In addition, schools, hospitals and care homes would be considered to be sensitive receptors.

910. There are a number of coastal and land-based designated ecological sites and habitats within the Area of Search that are sensitive to the effects of air pollution. These include the following:

- Braunton Burrows Special Area of Conservation (SAC)
- Tintagel-Marsland-Clovelly Coast SAC
- Bristol Channel Approaches/Dynesfeydd Mor Hafren SAC
- Hobby to Peppercombe Site of Special Scientific Interest (SSSI)
- Braunton Swanpool SSSI
- Saunton to Baggy Point Coast SSSI
- Taw-Torridge Estuary SSSI
- Barricane Beach SSSI
- Braunton Burrows SSSI
- Mermaid's Pool to Rowden Gut SSSI
- Northam Burrows SSSI
- Greenaways and Freshmarsh, Braunton SSSI
- Mill Rock SSSI
- Westward Ho! Cliffs SSSI
- Kenwith Valley Local Nature Reserve (LNR)
- Kynoch's Foreshore LNR
- Northam Burrows Country Park
- Ancient woodlands present across much of the Area of Search
- Areas of saltmarsh within the Taw Estuary, including adjacent to the Onshore Substation

3.3.6 Potential Impacts

Potential impacts during construction

911. Impacts during construction may occur at human and ecological receptors as a result of the generation of dust and fine particulate matter (PM10 & PM2.5) during onshore construction works, e.g. from earthworks and stockpiling of soils. Impacts may also occur as a result of exhaust emissions from construction phase plant and road vehicle movements generated during construction. These emissions will add to existing pollutant concentrations at human receptors and pollutant concentrations and deposition levels at designated ecological sites.

Potential impacts during operation

912. It is expected that air quality impacts during the operational phase would be negligible. During operation, the Onshore Substation would not generate any emissions to air and maintenance activities would generate a nominal amount of additional road vehicles on a periodic basis, which would not give rise to any significant air quality effects. It is therefore proposed to scope operational phase air quality impacts out of the assessment.

Potential impacts during decommissioning

913. It is anticipated that air quality impacts associated with decommissioning would be similar in nature to those experienced during construction, although it is likely that impacts would be of a lower magnitude, particularly if some subsurface infrastructure is left in-situ.

Potential cumulative impacts

914. Cumulative effects of dust and construction plant emissions may occur as a result of concurrent construction activities associated with other plans or projects within the onshore study area, where they interact spatially with the Project. Cumulative effects may also occur as a result of traffic generated by other plans and projects which uses the road network along which Project-generated vehicles are expected to travel. These cumulative impacts may affect both human and ecological receptors. The approach to cumulative assessment is set out in Section 1.9.2.

Potential transboundary impacts

915. It is considered unlikely that there would be any significant impacts on air quality in EU Member States as a result of the Project due to the localised nature of the emission sources. In addition, impacts would be temporary as they would be experienced during construction or decommissioning only, with no significant long-

term, operational phase emission sources. It is therefore proposed to scope out transboundary air quality impacts.

Summary of potential impacts

916. In summary, air quality impacts may be experienced by human and ecological receptors during the construction and decommissioning phases. Cumulative impacts may also be experienced. It is not expected that significant operational phase or transboundary impacts would occur; as such, it is proposed to scope these out of the assessment.

3.3.7 Mitigation Measures

917. Good-practice mitigation measures are typically sufficient to minimise effects of dust and fine particulate matter generated during construction or decommissioning and ensure that impacts are not significant. The required mitigation measures would be commensurate with the identified risk of impacts, as detailed in IAQM guidance (IAQM, 2016).

918. The effects of emissions from construction plant and vehicles can be minimised using the following good-practice methods:

- Siting of plant and equipment away from sensitive receptors as far as practicable
- Use of modern, low-emission plant which complies with appropriate emissions standards
- Switching off plant when not in use and not allowing idling vehicles
- Ensuring that plant and vehicles are well maintained

919. Impacts of construction vehicles on the local road network can be minimised via implementation of a Construction Vehicle Management Plan.

3.3.8 Approach to Assessment and Data Gathering

920. Existing air quality conditions within the air quality study area will be characterised using the data sources as identified in Table 3.6. Receptors will be identified using OS mapping data for human receptors and the Defra MAGIC website for designated ecological sites.

921. It is expected that there would be sufficient data available from monitoring undertaken by NDDC and TDC as part of their statutory duties for use in the air quality assessment. As such, it is not proposed to collect any primary datasets (i.e. a project-specific air quality survey) for the assessment. However, this will be

reviewed once the air quality study area is refined to ensure that appropriate data are available.

922. An assessment of dust generated during construction will be undertaken in accordance with IAQM guidance (IAQM 2016). The assessment is risk-based, and the risk of dust impacts will be determined for both human and ecological receptors in proximity to the construction works. Mitigation measures will be recommended which are commensurate with the identified risk, to ensure that significant impacts would not occur.

923. During construction, (NRMM and plant can increase air emissions which may impact upon human and ecological receptors. Technical guidance provided by Defra (Defra 2018) states that emissions from NRMM on construction sites are typically unlikely to lead to significant air quality impacts. However, intensive construction activities, for example Horizontal Directional Drilling (HDD) works, may temporarily increase pollutant concentrations in the vicinity of receptors. The location of human and ecological receptors in relation to construction works will be reviewed to determine whether any further assessment of emissions from NRMM is required. If required, this assessment may be qualitative or quantitative depending on the scale and nature of activities, their duration and existing air quality conditions.

924. The increase in construction traffic flows generated by the Project will be screened using criteria in IAQM and EPUK (IAQM and EPUK 2017) and Natural England (Natural England 2018) guidance. Where traffic flows exceed the screening criteria and there are relevant human or ecological receptors located within 200m of the road, a detailed dispersion modelling assessment will be undertaken to consider impacts at these locations. Concentrations of NO2 and particulate matter with an aerodynamic diameter of 10 µm or less (PM10) and 2.5 µm or less (PM2.5) will be predicted at human receptors, and concentrations of NOx, ammonia and associated nutrient nitrogen and/or acid deposition will be calculated at ecological receptors. The significance of effects at human receptors will be determined in accordance with IAQM and EPUK guidance (IAQM and EPUK, 2017). The significance of impacts on ecological receptors will be considered by the project ecologists (IAQM, 2020).

925. The approach to the assessment would be discussed and agreed with stakeholders prior to commencement.

3.3.9 Summary of Scoped In Impacts

Table 3.7 Summary of impacts relating to onshore air quality

Potential Impact	Construction	Operation	Decommissioning
Impacts of emissions of dust on human and ecological receptors	✓	x	✓
Impacts of emissions from plant and machinery on human health and ecological sites	✓	x	✓
Impacts of emissions from road traffic on human health and ecological sites	✓	x	✓
Cumulative impacts	✓	x	✓
Transboundary impacts	x	x	x

Key:
✓ Impact scoped in
✗ Impact scoped out

3.4 Water Resources and Flood Risk

3.4.1 Introduction

926. This chapter describes the proposed approach to the assessment of potential impacts arising from The Project on the water environment, including surface water hydrology, quality and geomorphology, groundwater quality and quantity, and flood risk. The chapter considers potential impacts associated with construction, operation, maintenance, and decommissioning phases, as well as cumulative and transboundary impacts.

927. This chapter includes:

- A description of key policy and legislation with relevance to the water environment
- A concise summary of the baseline water environment
- A description of the potential impacts of The Project on the water environment
- A summary of any potential mitigation measures
- The proposed approach to assessment and data gathering
- A summary of scoped in impacts

3.4.2 Policy, Legislation and Guidance

928. Section 1.5 describes the wider policy and legislative context for the Project. Table 3.8 provides a summary of key policy and legislation which has informed the scope of the assessment.

Table 3.8 Water Policy, legislation and guidance

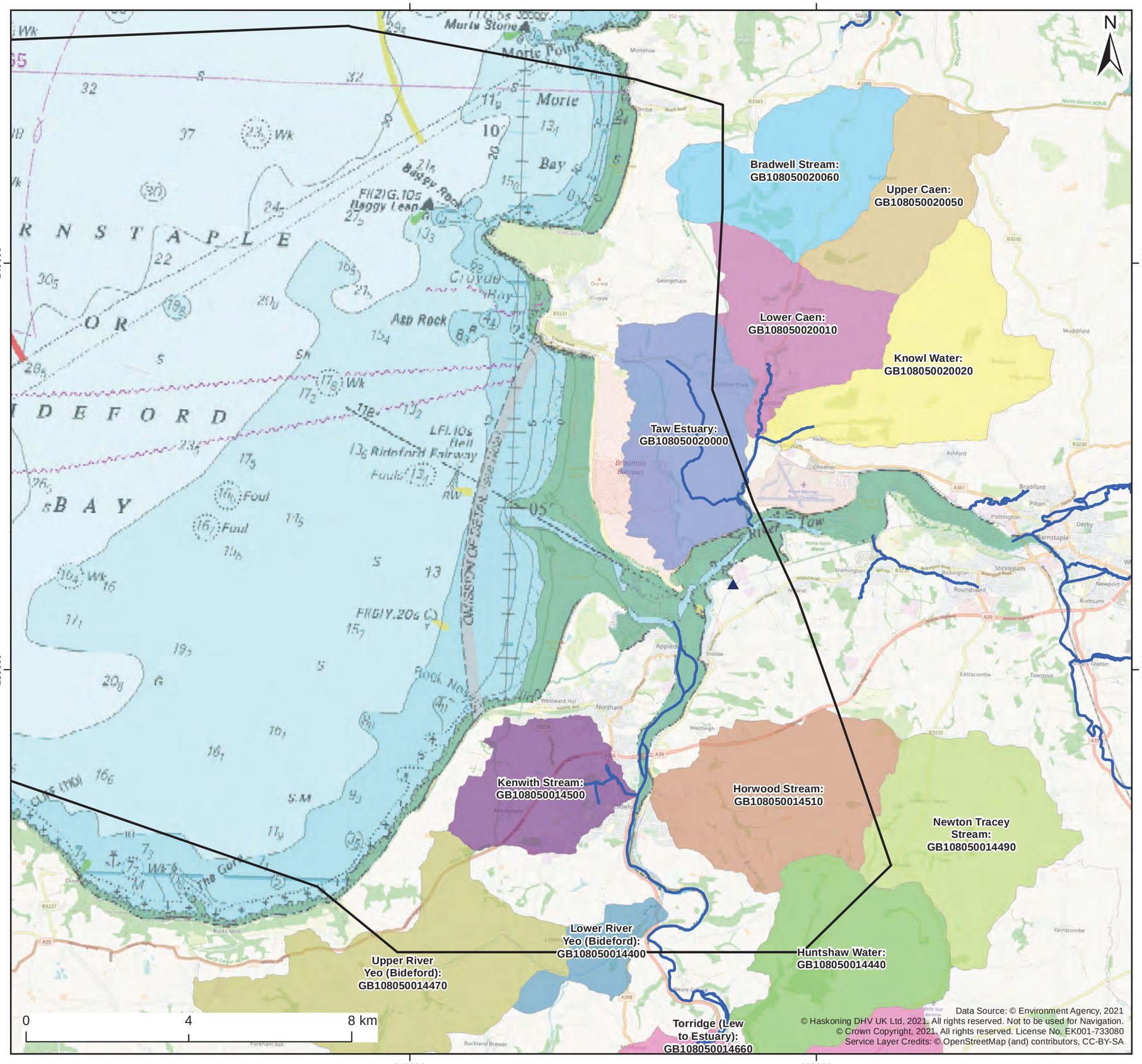
Relevant policy/legislation	Relevance to assessment
Legislation	
The Floods and Water (Amendment etc.) (EU Exit) Regulations 2019	The Floods and Water (Amendment etc.) (EU Exit) Regulations 2019 came into force on 1st January 2021. They ensure that key floods and water legislation continues to operate in the UK following its withdrawal from the EU.
Water Framework Directive (2000/60/EC) Water Environment (Water Framework Directive) (England and Wales) Regulations 2017	Directive 2000/60/EC of the European Parliament and of the Council 2000/60/EC establishing a framework for community action in the field of water policy (generally known as the Water Framework Directive (WFD) was adopted by the European Commission in December 2000. The WFD is transposed into national law by means of the Water Environment (Water Framework Directive) (England and Wales) Regulations 2017, which remain in place following the UK's withdrawal from the European Union under the Floods and Water (Amendment etc.) (EU Exit) Regulations 2019. The Regulations provide for the implementation of the WFD, from designation of all surface waters as water bodies, and set objectives for the achievement of Good Ecological Status (GES) or Good Ecological Potential (GEP). The WFD applies to all bodies of water, including those classed as artificial or heavily modified artificial.
Water Framework Directive (Standards and Classification) Directions (England and Wales) 2015	The standards used to determine the ecological or chemical status of a water body are provided in the WFD (Standards and Classification) Directions (England and Wales) 2015. This includes the thresholds for determining the status of the biological, hydromorphological, physico-chemical and chemical status of surface water bodies, and the quantitative and chemical status of groundwater bodies.

Relevant policy/legislation	Relevance to assessment
Floods Directive (2007/60/EC) Flood Risk Regulations 2009	The Floods Directive (Directive 2007/60/EC of the European Parliament and of the Council on the assessment and management of flood risks) came into force in November 2007. The Directive requires all EU Member States to assess and map flood risk, identify assets and people at risk within these areas, and establish flood risk management plans. The Floods Directive was transposed into UK law by the Flood Risk Regulations 2009, which remain in place following the UK's withdrawal from the European Union under the Floods and Water (Amendment etc.) (EU Exit) Regulations 2019. The flood risk regulations require the assessment and management of flood risk in England and Wales. The Regulations set out requirements related to the duties of the Environment Agency and Lead Local Flood Authorities regarding the preparation of Preliminary Flood Risk Assessments (PFRAs), flood hazard maps, flood risk maps, and flood risk management plans.
Flood and Water Management Act 2010	The Flood and Water Management Act (FWMA) aims to improve both flood risk management and the way we manage our water resources by creating clearer roles and responsibilities. This includes a lead role for local authorities in managing local flood risk (from surface water, ground water and ordinary watercourses) and a strategic overview role of all flood risk for the Environment Agency. The FWMA provides opportunities for a comprehensive, risk-based approach on land use planning and flood risk management by local authorities and other key partners.
Land Drainage Act 1991	The Land Drainage Act 1991 assigns landowners as the responsible parties for maintaining flows in watercourses. It provides Local Authorities with powers to compel landowners to maintain flows in watercourses.
Water Resources Act 1991 Water Act 2003 The Environmental Permitting (England and Wales) Regulations 2016	The Water Resources Act 1991 makes it an offence to cause or knowingly permit polluting, noxious, poisonous or any solid waste matter to enter controlled waters. The Act was revised by the Water Act 2003, which establishes regulatory controls for water abstraction, water impoundment and protection of water resources. The Environmental Permitting (England and Wales) Regulations 2016 establish provisions for the regulation of water discharges to controlled waters, which replaced provisions from the earlier Acts.

Relevant policy/legislation	Relevance to assessment
Policy	
National Planning Policy Framework (NPPF) and supporting National Planning Practice Guidance (2018)	The National Planning Policy Framework (NPPF) sets out the UK Government planning policies for England. The NPPF seeks to ensure that flood risk is considered at all stages in the planning and development process, to avoid inappropriate development in areas at risk of flooding and to direct development away from areas at risk of flooding. The National Planning Practice Guidance (NPPG) on Flood Risk and Coastal Change supports the NPPF with additional guidance on flood risk vulnerability classifications and managing residual risks. The NPPG makes use of the concepts of Flood Zones, Vulnerability Classifications and Compatibility to assess the suitability of a specific site for a certain type of development. The NPPF directs development away from areas at highest risk of flooding via the application of the Sequential Test. If, following application of the Sequential Test, it is not possible for the project to be located in zones with a lower probability of flooding; the Exception Test can be applied if appropriate.
North Devon Catchment Flood Management Plan (2012)	The Catchment Flood Management Plan (CFMP) is a strategic document published by the Environment Agency which gives an overview of flood risk in North Devon. It sets out the preferred plan and policies for the delivery of sustainable flood risk management over the next 50 to 100 years summarised in a series of sub-areas. It considers all types of inland flooding, including rivers, groundwater, surface water and tidal flooding. It does not include flooding directly from the sea (i.e. coastal flooding) which is covered by relevant Shoreline Management Plans.

3.4.3 Study Area

929. The study area for surface water resources and flood risk includes all surface hydrological catchments in the onshore scoping area, as well as those hydrologically connected to these catchments (i.e. directly upstream or downstream). The Environment Agency's WFD river water body catchments have been used to delineate the boundaries of hydrological receptors (Figure 3.4.1). Catchments that comprise the study area for surface water resources are described in detail in Section 3.4.3.



Legend:

- Area of Search
- Potential Grid Connection Location
- Statutory Main Rivers

WFD River Water Body Catchments

- Bradwell Stream
- Horwood Stream
- Huntshaw Water
- Kenwith Stream
- Knowl Water
- Lower Caen
- Lower River Yeo (Bideford)
- Newton Tracey Stream
- Taw Estuary
- Torridge (Lew to Estuary)
- Umber
- Upper Caen
- Upper River Yeo (Bideford)

Client:	Project:
Offshore Wind Ltd.	White Cross Offshore Windfarm

Title: Surface Water Features

Figure: 3.4.1 | Drawing No: PC2978-RHD-ZZ-XX-DR-Z-0101

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930. The study area for groundwater resources includes all the hydrogeological units that underlie The Project or are hydrologically connected to these units. The Environment Agency's WFD groundwater bodies are based on hydrogeological units and have therefore been used to delineate groundwater receptors (Figure 3.4.2). Groundwater units which comprise the study area for groundwater resources are described in Section 3.4.5.

3.4.4 Baseline Data

Baseline data sources used to inform this assessment are shown in Table 3.9.

Table 3.9 Baseline data sources

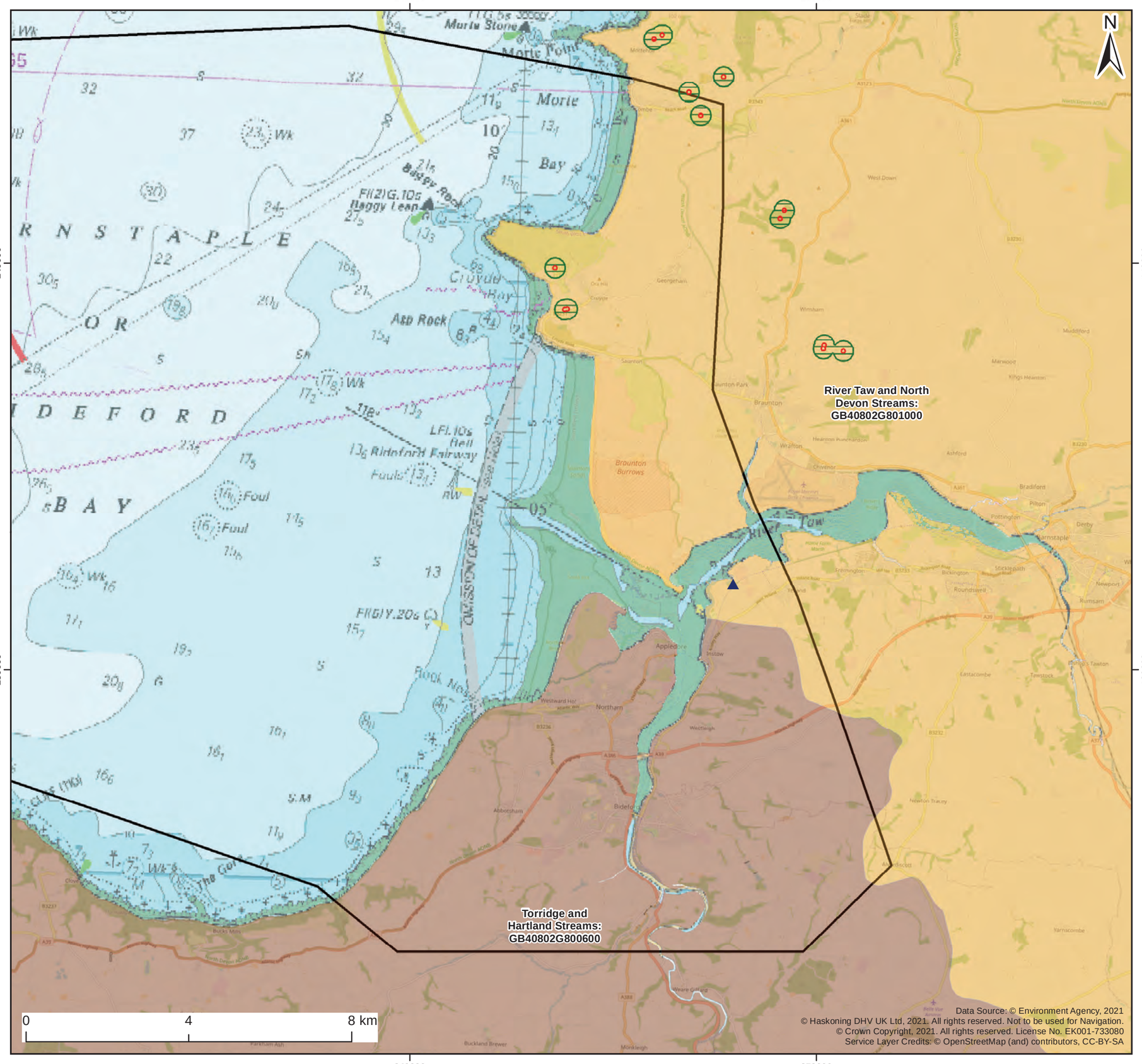
Data used to inform this assessment	Source
Risk of flooding from surface water	Environment Agency (data.gov.uk)
Risk of flooding from rivers and sea	Environment Agency (data.gov.uk)
WFD water body status objectives and classification data	Environment Agency Catchment Data Explorer (data.gov.uk)
Source protection zones	Environment Agency (data.gov.uk)
Aquifer designation (bedrock and superficial) mapping	Defra (magic.defra.gov.uk)
Groundwater vulnerability mapping	Defra (magic.defra.gov.uk)

3.4.5 Baseline Environment

Surface waters

931. Surface water drainage of the onshore scoping area is achieved by two major catchments (the River Taw and River Torridge) that combine to form the Taw-Torridge Estuary (Figure 3.4.2). South of the estuary, the main tributaries of the River Torridge are the River Yeo, River Duntz, Huntshaw Water, Dipple Water, Horwood Stream and Kenwith Stream. Melbury Reservoir is located in the Yeo catchment, and Gammaton upper and lower reservoirs are in Horwood Stream's catchment. Several short, steep (unnamed) watercourses drain direct to Bideford Bay from a narrow belt of high ground adjacent to the coast, between Clovelly and Babbacombe Mouth.

932. The Pill and associated drainage ditches drain Appledore and Northam Burrows at the coast. South of the estuary, the onshore scoping area also includes sections of the following watercourses that either drain inland as part of the Torridge catchment, or directly to the coast: Dipple Water, Clifford Water, Abbey River.



Data Source: © Environment Agency, 2021

Legend:

- Area of Search
- Potential Grid Connection Location

WFD Groundwater Bodies

- River Taw and North Devon Streams
- Torridge and Hartland Streams

Source Protection Zone

- Zone I - Inner Protection Zone
- Zone II - Outer Protection Zone

Client:	Project:
Offshore Wind Ltd.	White Cross Offshore Windfarm

Title: Groundwater Features

Figure: 3.4.2 | Drawing No: PC2978-RHD-ZZ-XX-DR-Z-0102

Revision:	Date:	Drawn:	Checked:	Size:	Scale:
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933. Downstream of Barnstaple the River Taw drains in a westerly direction towards the coast and the main north-south flowing tributaries are the River Caen and Knowl Water. Several short, steep (unnamed) watercourses also drain directly into the sea at Croyde Bay and Woolacombe Bay. At the coast, Braunton Pill, Sir Arthur's Pill, Boundary Drain, Flats Pill and Inner Marsh Pill drain Braunton Marsh. North of the estuary, the onshore scoping area also includes part of Bradiford Water.

934. Watercourses in the onshore scoping area are hydrologically connected to several designated sites, these are: Marsland to Clovelly Coast SSSI, Hobby to Peppercombe SSSI, Mermaid's Pool to Rowden Gut SSSI, Northam Burrows SSSI, Taw-Torridge Estuary SSSI, Braunton Swanpool SSSI, Greenaways and Freshmarsh SSSI, Tintagel-Marsland-Clovelly Coast SAC, North Devon AONB, Hartland Heritage Coast, North Devon Heritage Coast, Northam Burrows Country Park, Fremington LNR, Kynoch's Foreshore LNR, Kenwith Valley LNR.

935. Watercourses also connect to a range of priority habitats. Inland, this typically comprises deciduous woodland and coastal and floodplain grazing marsh. Extensive areas of the latter are located adjacent to The Pill at Appledore and Northam Burrows, and at Braunton Marsh. In estuarine locations priority habitats include mudflats and saltmarsh, and at the coast there are areas of marine cliff and slope near Clovelly.

936. Water quality in the onshore scoping area is adversely affected by poor livestock/nutrient management and sewage discharge (high phosphates).

Groundwater

937. Bedrock geology of the onshore scoping area is characterised by Carboniferous rocks south of the Taw-Torridge Estuary, and Upper Devonian rocks to the north. The former are typically mudstones, siltstones and sandstones and they support a Secondary A aquifer (permeable layers capable of supporting water supplies at a local rather than strategic scale) (Figure 3.4.2). North of the Taw-Torridge Estuary, geology is more varied but is mostly undifferentiated Upper Devonian rocks (mudstone, siltstone, sandstone and conglomerate) that support a Secondary A aquifer.

938. Superficial geology of the onshore scoping area is a mix of floodplain alluvium flanked by river terrace deposits (sands and gravels), tidal flats and blown sand (at Northam Burrows, Braunton Burrows and Morte Bay). Till and head deposits characterise hillslopes. Superficial geology supports Secondary A and Secondary (undifferentiated) aquifers. Secondary (undifferentiated) aquifers are not assigned to either Secondary A or B definition, because of variable rock type characteristics.

Water Framework Directive (WFD) water bodies

939. Table 3.10 identifies the names and status (2019) of WFD water bodies within the onshore scoping area and they are shown in Figure 3.4.1. River water bodies are typically at Moderate ecological status (most commonly this is due to high phosphates) and Fail for chemical status. Failing chemical status is related to priority hazardous substances (typically mercury and its compounds and polybrominated diphenyl ethers (PBDE)). Bradiford Water, the Upper River Yeo and Jennetts Reservoir are all at Poor ecological status due to Poor biological quality elements (fish, total phosphorus (Bradiford/upper Yeo)) and phytoplankton (Jennetts Reservoir). Only the Upper Caen is at Good Ecological status in the onshore scoping area.

Table 3.10 WFD status of water bodies in the onshore scoping area

Water Body	Type	Ecological Status	Chemical Status	Quantitative Status
Torridge (Source to Dipple Water) (GB108050014390)	River	Moderate	Fail	n/a
Torridge (Lew to Estuary) (GB108050014660)	River	Moderate	Fail	n/a
Kenwith Stream (GB108050014500)	River	Moderate	Fail	n/a
Horwood Stream (GB108050014510)	River	Moderate	Fail	n/a
Upper River Yeo (Bideford) (GB108050014470)	River	Poor	Fail	n/a
Lower River Yeo (Bideford) (GB108050014400)	River	Moderate	Fail	n/a
Huntshaw Water (GB108050014440)	River	Moderate	Fail	n/a
Duntz (GB108050014360)	River	Moderate	Fail	n/a
Taw Estuary (GB108050020000)	River	Moderate	Fail	n/a
Lower Caen (GB108050020010)	River	Moderate	Fail	n/a
Upper Caen (GB108050020050)	River	Good	Fail	n/a
Knowl Water	River	Moderate	Fail	n/a

Water Body	Type	Ecological Status	Chemical Status	Quantitative Status
(GB108050020020)				
Bradiford Water (GB108050020040)	River	Poor	Fail	n/a
Bradwell Stream (GB108050020060)	River	Moderate	Fail	n/a
Newton Tracey Stream (GB108050014490)	River	Moderate	Fail	n/a
Dipple Water (GB108050014370)	River	Moderate	Fail	n/a
Abbey River (GB108050014050)	River	Moderate	Fail	n/a
Jennetts Reservoir (GB30844801)	Lake	Poor	Fail	n/a
Melbury Reservoir (GB30845010)	Lake	Moderate	Fail	n/a
Gammaton Lower Reservoir (GB30844781)	Lake	Moderate	Fail	n/a
Gammaton Upper Reservoir (GB30844798)	Lake	Moderate	Fail	n/a
Taw/Torridge (GB540805015500)	Transitional	Moderate	Fail	n/a
River Taw and North Devon Streams (GB40802G801000)	Groundwater	n/a	Poor	Good
Torridge and Hartland Streams (GB40802G800600)	Groundwater	n/a	Poor	Good

940. Groundwater bodies are at Good quantitative status and failing chemical status – due to Poor chemical drinking water protected area status.

Flood risk

941. Due to the steep relief of the onshore scoping area, the majority of land occupies Flood Zone 1 (land with less than a 1 in 1,000 annual probability of river flooding (<0.1%)) (Figure 3.4.3). Over most of the scoping area, incised river valleys mean Flood Zones 2 (land between 1 in 100 and 1 in 1,000 annual probability of river flooding (1% to 0.1%)) and 3 (land that has a 1 in 100 or greater annual probability

of river flooding (>1%)) are restricted to narrow belts adjacent to river channels. In contrast, where steep and incised channels meet the coastal lowlands/estuarine environments, there are locally extensive areas of land that occupy higher flood risk categories (i.e. primarily Flood Zone 3). The most extensive areas being:

- A wide belt of flat land drained by Sir Arthur's Pill, Flats Pill, Inner March Pill, Boundary Drain (Braunton Marsh), and where these watercourses join the River Caen and Knowl Water. Part of this area benefits from flood defences
- The southern half of Northam Burrows Country Park
- Kenwith Stream and Horwood Stream. Part of the Kenwith valley is a flood storage area
- Land immediately adjacent to the Taw Estuary, most notably areas north of Yelland (this area benefits from flood defences) and immediately downstream of Barnstaple

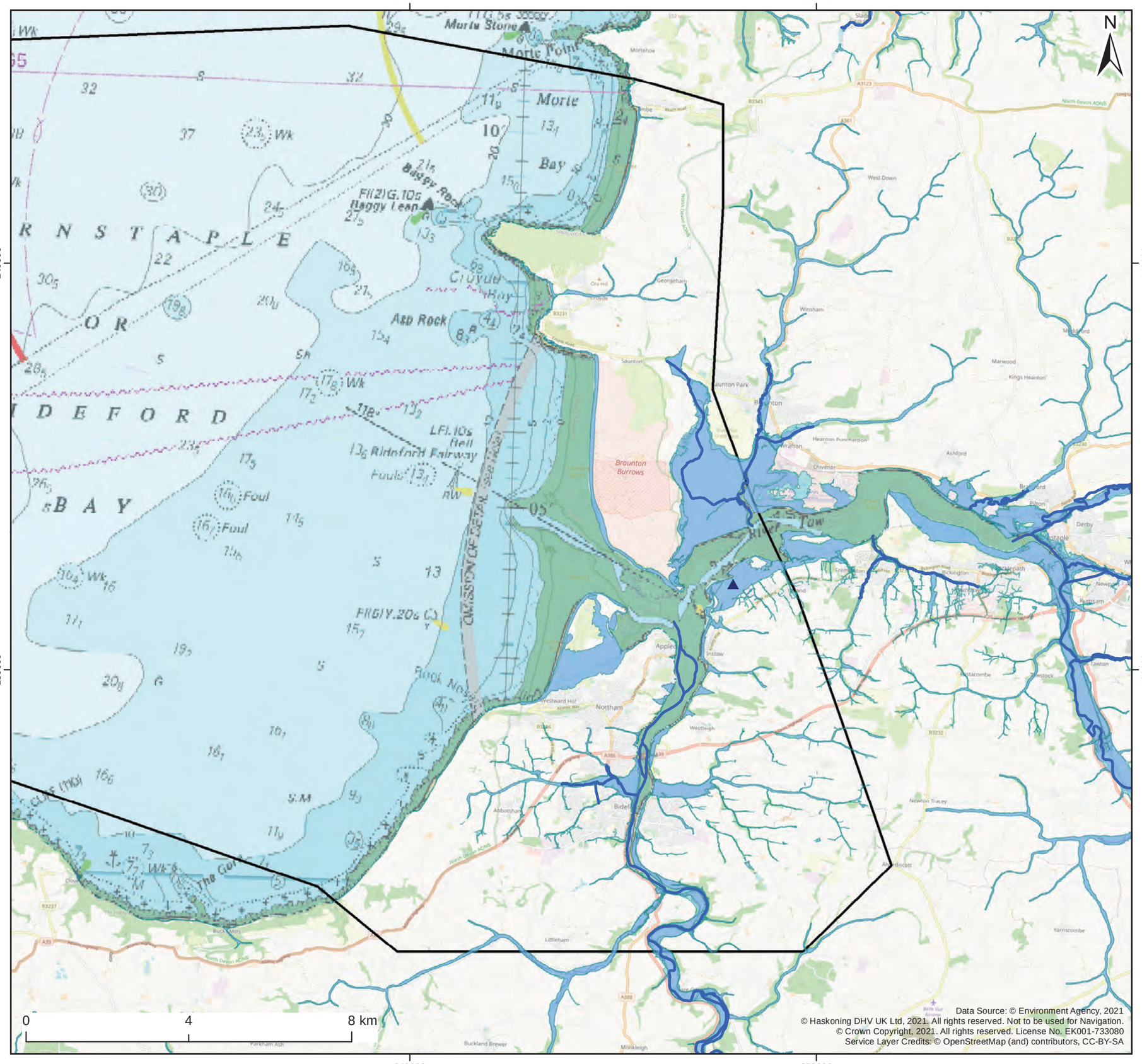
942. Surface water flood risk is constrained by steep relief of the scoping area. The most extensive medium to high-risk flow paths are located:

- On the River Yeo upstream of Landcross
- Either side of Bideford on Kenwith Stream and Horwood Stream
- Adjacent to The Pill at Northam Burrows
- Immediately north east of Yelland
- At Braunton Marsh west of Braunton
- Near Fremington Pill
- Along the lower reaches of Knowl Water

Water Framework Directive (WFD) water bodies

943. Table 3.10 identifies the names and status (2019) of WFD water bodies within the onshore scoping area and they are shown in Figure 3.4.4. River water bodies are typically at Moderate ecological status (most commonly this is due to high phosphates) and Fail for chemical status. Failing chemical status is related to priority hazardous substances (typically mercury and its compounds and polybrominated diphenyl ethers (PBDE)). Bradiford Water, the Upper River Yeo and Jennetts Reservoir are all at Poor ecological status due to Poor biological quality elements (fish, total phosphorus (Bradiford/upper Yeo)) and phytoplankton (Jennetts Reservoir). Only the Upper Caen is at Good Ecological status in the onshore scoping area.

944. Groundwater bodies are at Good quantitative status and failing chemical status – due to Poor chemical drinking water protected area status.



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Legend:

- Area of Search
- Potential Grid Connection Location
- Statutory Main Rivers
- Flood Zone 2
- Flood Zone 3

Client:	Project:
Offshore Wind Ltd.	White Cross Offshore Windfarm

Title: Flood Risk

Figure: 3.4.3 | Drawing No: PC2978-RHD-ZZ-XX-DR-Z-0103

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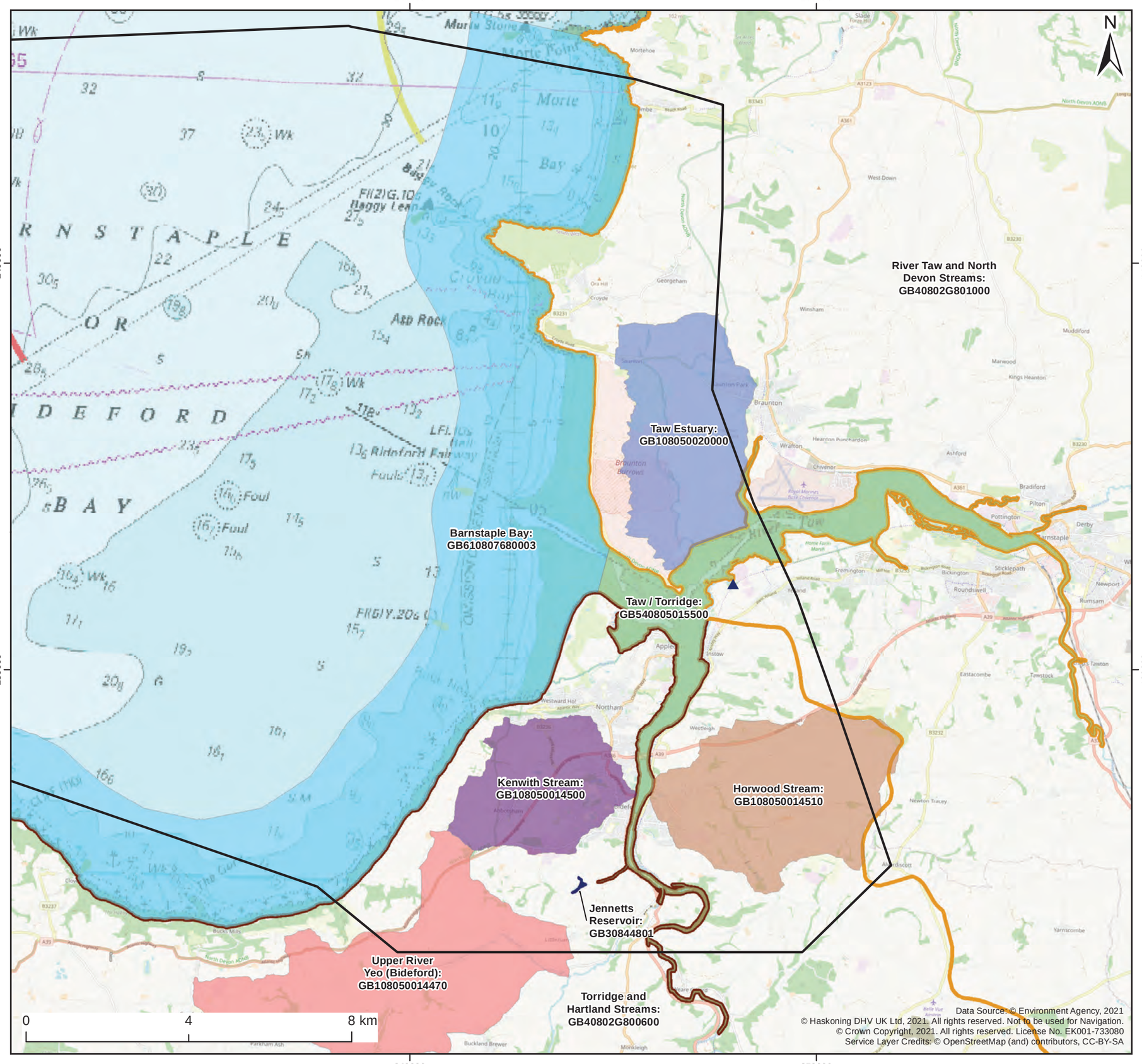

Legend:

- Area of Search
- Potential Grid Connection Location

WFD River Water Body Catchments

- Horwood Stream
- Kenwith Stream
- Taw Estuary
- Upper River Yeo (Bideford)

WFD Lake

- Jennetts Reservoir

WFD Transitional Water Body

- Transitional

WFD Coastal Water Body

- Coastal

WFD Groundwater Bodies

- River Taw and North Devon Streams
- Torridge and Hartland Streams

Client:	Project:
Offshore Wind Ltd.	White Cross Offshore Windfarm

Title: WFD Water Bodies

Figure: 3.4.4 | Drawing No: PC2978-RHD-ZZ-XX-DR-Z-0104

Revision:	Date:	Drawn:	Checked:	Size:	Scale:
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Table 3.11 WFD status of water bodies in the onshore scoping area

Water Body	Type	Ecological Status	Chemical Status	Quantitative Status
Torridge (Source to Dipple Water) (GB108050014390)	River	Moderate	Fail	n/a
Torridge (Lew to Estuary) (GB108050014660)	River	Moderate	Fail	n/a
Kenwith Stream (GB108050014500)	River	Moderate	Fail	n/a
Horwood Stream (GB108050014510)	River	Moderate	Fail	n/a
Upper River Yeo (Bideford) (GB108050014470)	River	Poor	Fail	n/a
Lower River Yeo (Bideford) (GB108050014400)	River	Moderate	Fail	n/a
Huntshaw Water (GB108050014440)	River	Moderate	Fail	n/a
Duntz (GB108050014360)	River	Moderate	Fail	n/a
Taw Estuary (GB108050020000)	River	Moderate	Fail	n/a
Lower Caen (GB108050020010)	River	Moderate	Fail	n/a
Upper Caen (GB108050020050)	River	Good	Fail	n/a
Knowl Water (GB108050020020)	River	Moderate	Fail	n/a
Bradiford Water (GB108050020040)	River	Poor	Fail	n/a
Bradwell Stream (GB108050020060)	River	Moderate	Fail	n/a
Newton Tracey Stream (GB108050014490)	River	Moderate	Fail	n/a
Dipple Water (GB108050014370)	River	Moderate	Fail	n/a
Abbey River (GB108050014050)	River	Moderate	Fail	n/a

Water Body	Type	Ecological Status	Chemical Status	Quantitative Status
Jennetts Reservoir (GB30844801)	Lake	Poor	Fail	n/a
Melbury Reservoir (GB30845010)	Lake	Moderate	Fail	n/a
Gammaton Lower Reservoir (GB30844781)	Lake	Moderate	Fail	n/a
Gammaton Upper Reservoir (GB30844798)	Lake	Moderate	Fail	n/a
Taw/Torridge (GB540805015500)	Transitional	Moderate	Fail	n/a
River Taw and North Devon Streams (GB40802G801000)	Groundwater	n/a	Poor	Good
Torridge and Hartland Streams (GB40802G800600)	Groundwater	n/a	Poor	Good

3.4.6 Potential Impacts

Potential impacts during construction

945. Direct disturbance of surface water bodies: Construction activities within the onshore scoping area could directly impact upon the geomorphology, hydrology, water quality and physical habitats of the surface water bodies identified. Disturbance could occur from the installation of buried electrical cables and associated infrastructure (e.g. temporary access crossings over surface watercourses). It could also occur in the event of an accidental release of drilling fluid (bentonite) during HDD activities used to install cables below sensitive watercourses.

946. Increased sediment supply: Construction activities could increase soil erosion and supply of fine sediment (e.g. clays, fine silts and sands) to surface watercourses. This could arise from earthworks and vegetation removal to construct the onshore cable route and temporary/permanent infrastructure. Increased sediment supply would increase turbidity levels within the water column, resulting in greater fine sediment deposition on the channel bed. This could, in turn, alter local geomorphological adjustment rates and impact upon in-channel morphological features. Higher sediment loads entering the channel could also smother bed

habitats, reduce light penetration, and decrease temperature and dissolved oxygen levels. These impacts could adversely affect stream biota, such as fish, macroinvertebrates and macrophytes.

947. Supply of contaminants to surface and groundwaters: The operation of construction machinery working in or adjacent to surface watercourses has the potential to accidentally release lubricants, fuels and oils into a surface water body. This could also be caused by spillage, leakage and in-wash from vehicle storage areas following rainfall, accidental release of foul waters (e.g. from welfare facilities) and construction materials, such as concrete and inert drilling fluids from trenchless crossings. Such contaminants could enter the aquatic system and adversely affect its physico-chemistry. This could have associated impacts upon stream biota. Any activities that disturb the ground, such as excavation or piling, could discharge contaminants below ground and potentially adversely affect groundwater quality elements.

948. Changes to surface and groundwater flows and flood risk: Site preparation and construction activities within the onshore study area could lead to an increase in surface water runoff due to alterations in surface drainage patterns and surface flows. Infiltration rates could be reduced because of soil compaction by construction vehicles and surface infrastructure. Increased surface runoff could have an adverse impact on the geomorphology of surface watercourses (e.g. through associated bed and bank scour and increase in fine sediment input). Flood risk could also be altered and/or increased, particularly to third-party land and property in the onshore study areas designated as Flood Zone 2 or 3. Subsurface flow patterns could also be altered due to potential changes in infiltration rates and surface flow patterns.

Potential impacts during operation

949. Supply of contaminants to surface and groundwaters: There is the potential for accidental release of contaminants to surface water during planned and unplanned operational maintenance. Activities could lead to accidental release of fine sediment, oils, fuels and lubricants to surface water bodies. This could adversely affect the geomorphology and water quality of the surface water drainage network. Accidental spillage or leakage of fuel oils or lubricants could also impact upon the surface water quality and connected groundwater quality. This in turn could impact on aquatic ecology and the use of water resources for abstractions.

950. Changes to surface runoff and flood risk: Permanent onshore infrastructure is likely to increase the impermeable area across the surface water catchments. This could decrease infiltration rates and permanently change surface runoff pathways

which may increase and/or alter flood risk. The greatest flood risk impact from these changes is likely to be in areas of the scoping area designated as Flood Zone 2 or 3.

Potential impacts during decommissioning

951. It is anticipated that decommissioning impacts would be similar in nature to those of construction. It is likely that the magnitude of the effects from decommissioning will be lower than that of construction impacts.

Potential cumulative impacts

952. Potential cumulative impacts related to water resources and flood risk are likely to include increased sediment supply if other projects are being constructed within 1km of the onshore construction area. The approach to cumulative assessment is set out in Section 1.9.2.

Potential transboundary impacts

953. There is no mechanism for impact.

Summary of potential impacts

954. Key potential impacts relate to the construction phase and direct disturbance to surface water bodies from infrastructure installation (e.g. trenching/drilling to install cables, other temporary/permanent infrastructure, vegetation clearance). These activities could increase soil erosion and fine sediment supply, which could impact in-channel geomorphology and related channel habitats. Contaminants could also be released to surface and groundwaters from on-site machinery (e.g. lubricants and fuels). Sites works and changes to ground conditions could also alter surface and subsurface runoff/flow paths, which may increase flood risk and affect in-channel processes (e.g. deposition and erosion).

955. Operation impacts include the accidental release of contaminants during maintenance works and changes to runoff and flood risk related to local increases in the area of impermeable surfaces. Decommissioning impacts would likely be similar to those for construction; cumulative impacts may arise if other projects are constructed within 1km of the onshore construction area. No transboundary impacts have been identified.

3.4.7 Mitigation Measures

956. To avoid any non-temporary direct impacts on larger watercourses (i.e. extending beyond the construction or decommissioning period), main river crossings will be undertaken with directional drilling/trenchless crossings where possible. This will

prevent direct disturbance of the bed and banks of the watercourse and prevent impacts to in-channel habitats. Furthermore, site-specific investigations will be undertaken, prior to implementation of any trenchless watercourse crossings, to identify appropriate locations for entry and exit pits, the optimal depth of pipe burial, and ensure that the breakout of inert drilling fluid does not occur. This will prevent adverse impacts on the hydromorphology, physico-chemistry and biology of the watercourses.

957. Best practice measures to minimise the runoff of sediment and contaminants from construction components will be implemented to prevent deterioration in water body status. These are likely to include:

- Avoidance of impact through cable route selection
- Development of a CoCP (construction code of practice) in line with relevant CIRIA (Construction Industry Research and Information Association) guidance and Pollution Prevention Guidelines, taking account of objectives of the WFD and the actions outlined in the River Basin Management Plan
- Application for any water resources licences
- Development of a draft drainage strategy to manage surface run-off during construction
- Development of a draft drainage strategy for permanent above-ground developments (i.e. substation, metalled roads)
- Reuse of as much of the local fill material as possible to avoid changes in soil chemistry, and ensure the chemistry of any imported material is as close to local conditions as reasonably possible
- Consideration of Sustainable Drainage Systems (SuDS) schemes in accordance with appropriate guidance including "Non-statutory technical standards for sustainable drainage systems" (Department for Environment, Food and Rural Affairs (2015))
- Bunding and appropriate storage of sediment
- Onsite treatment/polishing of silted water
- Use of sediment traps
- Regular cleaning of haul roads to prevent runoff from construction waste
- Appropriate storage and application of both hazardous and non-hazardous waste and chemicals (i.e. diesel)
- Application of onsite mitigation measures such as spill kits and barrier booms

958. These measures will prevent adverse impacts on biology, hydromorphology, physico-chemistry and chemistry by minimising the supply of fine sediment and other contaminants into the surface drainage network.

3.4.8 Approach to Assessment and Data Gathering

Approach to Assessment

959. The EIA will focus on potential impacts on two groups of receptors:

1. Water resources, including the hydrology, geomorphology and water quality of surface waters (e.g. rivers, canals, lakes and reservoirs); the quantity and quality of groundwater; abstractions from surface and groundwaters (e.g. Principal, Secondary A and Secondary Undifferentiated aquifers) and associated designated sites (e.g. Source Protection Zones (SPZs), Drinking Water Protected Areas); water-dependent habitats and groundwater-dependent terrestrial ecosystems, including designated sites (e.g. SAC, SPA, SSSI); and water supply infrastructure (including treatment plants, pumping stations and distribution networks) and surface and foul drainage infrastructure.
2. Flood risk to the projects from all sources, including fluvial, coastal, surface water, groundwater, sewer and reservoir flooding; and changes in flood risk from all sources (fluvial, coastal, surface water, groundwater, sewer and reservoir flooding) resulting from the projects.

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

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

Supporting assessments

962. The EIA will be supported by two additional assessments:

1. A Flood Risk Assessment (FRA) will be undertaken in accordance with the National Planning Policy Framework (MHCLG, 2019) and following suitable guidance (e.g. MHCLG, 2014) to assess the flood risk to the development and surrounding areas. This would inform the identification of any required mitigation measures.

2. A WFD Compliance Assessment will be required to assess compliance with the requirements of the WFD in line with The Water Environment (Water Framework Directive) (England and Wales) Regulations 2017. This would consist of three stages (screening, scoping and impact assessment), in accordance with the Planning Inspectorate's guidance (Planning Inspectorate, 2017). Appendix B contains the screening and scoping stages of the WFD Compliance Assessment.

Data gathering

963. The assessment will primarily be informed by a desk-based assessment using existing secondary data sets. Secondary data sets that will be used to inform the EIA are set out in Table 3.12.

Table 3.12 Secondary data to be used in the EIA

Data used to inform the assessment	Data Source
WFD water body status objectives and classification data	Environment Agency Catchment Data Explorer
Water quality data	Environment Agency Water Quality Data Archive
Aquatic ecology data	Environment Agency Ecology and Fish Data Explorer
Source Protection Zones (SPZs)	Environment Agency (data.gov.uk)
Aquifer designation (bedrock and superficial) mapping	Magic.defra.gov.uk
Groundwater vulnerability mapping	Magic.defra.gov.uk
Geological mapping	British Geological Survey
Licensed abstraction data	Environment Agency (available upon request)
Consented discharges	Environment Agency (available upon request)
Statutory and non-statutory designated sites	Natural England (data.gov.uk)
Flood Map for Planning	Environment Agency
Flood risk mapping (rivers and sea, surface water, reservoirs)	Environment Agency (data.gov.uk)
Detailed flood risk information (Product 4, 5 and 8)	Environment Agency (available upon request)
Historical flood incident information relating to highways, surface water and drainage flooding	Lead Local Flood Authority (LLFA) (available upon request)

964. Primary data will be also be collected to inform the EIA, as outlined in Table 3.13. A geomorphology baseline survey will be undertaken to acquire primary data on the

watercourses which are scoped into the next stage of the EIA. This will be undertaken in accordance with best practice geomorphological walkover methodologies. Agreement on the method and scope of the survey will be obtained from the Environment Agency prior to undertaking the survey.

965. The timing of the geomorphology baseline survey may be affected by COVID-19 lockdown restrictions. If so, the survey will be undertaken at the earliest opportunity when restrictions are relaxed.

Table 3.13 Primary data to be used in the EIA

Data content	Data information
Geomorphology baseline	The geomorphology baseline survey will collect information about the existing condition of watercourses within the onshore study area. It will specifically focus on reaches where crossings of main rivers or other sensitive watercourses are proposed.

3.4.9 Summary of Scoped In Impacts

Table 3.14 shows a summary of water resources and flood risk scoped-in impacts.

Table 3.14 Summary of impacts relating to water resources and flood risk

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

Key:
✓ Impact scoped in
✗ Impact scoped out

3.5 Land Use

3.5.1 Introduction

966. This chapter describes the proposed approach to the assessment of potential impacts arising from the Project on land use. The chapter considers potential impacts associated with construction, operation, maintenance, and decommissioning phases, as well as cumulative and transboundary impacts.

3.5.1 Policy, Legislation and Guidance

967. Section 1.5 describes the wider policy and legislative context for the Project. The assessment of potential impacts upon ground conditions and contamination will be made with specific reference to the relevant National Policy Statements (NPS). Those relevant to the project include:

- Overarching NPS for Energy (EN-1) (Department for Business, Energy and Industrial Strategy (BEIS) 2021) - paragraphs 5.10.5, 10.5.7 and 5.10.8.
- NPS for Renewable Energy Infrastructure (EN-3) (DECC 2011a) - paragraph 2.6.43
- National Planning Policy Framework (NPPF) and supporting National Planning Practice Guidance (2018)
- Local planning policy

3.5.2 Study Area

968. The study area incorporates the Onshore AoS of the Project as shown in Figure 1.7.2. The area extends from the Mean Low Water Mark (MLWM) and includes the preferred Landfall sites, onshore cable route options and proposed Onshore Substation locations. The Onshore AoS follows the coastline from Woolacombe down to Braunton Burrows reaching the River Taw. On the southern side of the River Taw the AoS continues on both sides of the River Torridge down to Littleham and going as far east as Alverdiscott.

969. The primary urban and suburban centres within or close to the Study Area are Braunton, Northam and Bideford. The Study Area is primarily rural in nature, but small residential areas are scattered across, which include Woolacombe, Georgeham, Croyde, Appledore, Instow, Horwood, Abbotsham and Littleham.

970. All of the coastline within the Onshore Study Area is within an AONB designation, including the whole of the Braunton Burrows area. All of the coastline, River Taw, River Torridge, Braunton Burrows and Appledore within the Onshore AoS have a SSSI designation. The Braunton Burrows area is also considered as a SAC, due to the multiple types of dune present providing habitat for petalwort (*Petalophyllum ralfsii*) (JNCC, 2021).

3.5.3 Baseline Data

971. The assessment is based on a desk top study utilising publicly available information and documents from the following sources:

- MAGICMap (Defra, 2021)

- South West Region Agricultural Land Classification (Natural England, 2010)

3.5.4 Baseline Environment

972. The scoping assessment for land use has been undertaken based on a desk-based assessment and using existing available information to identify the land uses within each Onshore AoS.

North Onshore AoS

Existing land uses

973. The land between the Northern onshore AoS border (Woolacombe) and the north side of the B3231, is predominantly agricultural land. Some of the other land cover types in this area include built-up urban areas, renewable energy sites, unimproved land, woodland and forestry. Watercourses and ponds are also present throughout the Northern part of the onshore AoS.

Agricultural land and soil quality

974. The agricultural land which comprises the majority of the Northern part of the Onshore AoS is considered in terms of its agricultural value using Natural England's Agricultural Land Classification (ALC) dataset. ALC grades agricultural land from Grade 1 (best quality) through to Grade 5 (poorest quality) based on factors including climate, nature of the soil and site-based factors. 'Best and Most Versatile' (BMV) agricultural land is defined as ALC Grades 1, 2 and 3a (Grade 3 is spilt into 3a and 3b). As Grade 3 is not split within Natural England's ALC mapping dataset, at this stage it has been assumed that all Grade 3 land could be Grade 3a.

975. The majority of the area is designated as Grade 3 agricultural land and Grade 5 land is concentrated along the coastal edge of the Northern part of the Onshore AoS. Just above the B3231, within Georgeham and land surrounding Croyde bay are areas that have grade 2 designations. Along the east border of the Northern part of the offshore AoS, land has grade 4 designations. There is no information associated with Post 1988 Agricultural Land Classifications within the area.

Green belt

976. A review of green belt location maps indicate that there is no designated green belt land within the Northern part of the Onshore AoS. Liaison with the local authority will be undertaken to confirm the absence (or presence) of designated green belt land within the Onshore AoS.

Utilities

977. Utilities are present within the Northern part of the Onshore AoS, including buried and above ground electricity cables. Telecommunications, sewers, gas, public water

mains and private water supplies are also present. Detailed utilities data has not been sought at this stage; detailed data will be sought once the Project has been refined during the EIA process.

Central Onshore AoS

Existing land uses

978. The land from south of the B3231, down to the river Taw, is split between agricultural land and unimproved non-agricultural land. Some of the other land cover types in this area include built-up urban areas and recreational sites.

Agricultural land and soil quality

979. The agricultural land which comprises the majority of the eastern side of the central area of the Onshore AoS is considered in terms of its agricultural value using Natural England's Agricultural Land Classification (ALC) dataset. ALC grades agricultural land from Grade 1 (best quality) through to Grade 5 (poorest quality) based on factors including climate, nature of the soil and site-based factors. 'Best and Most Versatile' (BMV) agricultural land is defined as ALC Grades 1, 2 and 3a (Grade 3 is spilt into 3a and 3b). As Grade 3 is not split within Natural England's ALC mapping dataset, at this stage it has been assumed that all Grade 3 land could be Grade 3a.

980. The majority of the agricultural land within the central area of the onshore AoS is designated as Grade 3 and 4. Just below the B3231, along the eastern side of the central onshore AoS is an area that has grade 2 agricultural land designations. On the western half of the central onshore AoS the majority is unimproved non-agricultural land, this covers majority of the Braunton Burrows area. There is no information associated with Post 1988 Agricultural Land Classifications within the area.

Green Belt

981. A review of green belt location maps indicate that there is no designated green belt land within the central part of the Onshore AoS. Liaison with the local authority will be undertaken to confirm the absence (or presence) of designated green belt land within the Onshore AoS.

Utilities

982. Utilities are present within the Northern part of the Onshore AoS, including buried and above ground onshore electricity cable routes. Detailed utilities data has not been sought at this stage; detailed data will be sought once the Project has been refined during the EIA process.

South Onshore AoS

Existing land uses

983. The land from the Southern side of the river Taw, down to Littleham and as far east as Alverdiscott within the Onshore AoS is predominantly agricultural land. Some of the other land cover types in this area include built-up urban areas, unimproved land, woodland, parks and gardens. There are multiple areas of Ancient woodland and Conservation Areas scattered across this portion of the Onshore AoS. Watercourses and ponds are also present throughout the Southern part of the onshore AoS.

Agricultural land and soil quality

984. The agricultural land which comprises the majority of the Southern part of the Onshore AoS is considered in terms of its agricultural value using Natural England's Agricultural Land Classification (ALC) dataset. ALC grades agricultural land from Grade 1 (best quality) through to Grade 5 (poorest quality) based on factors including climate, nature of the soil and site-based factors. 'Best and Most Versatile' (BMV) agricultural land is defined as ALC Grades 1, 2 and 3a (Grade 3 is spilt into 3a and 3b). As Grade 3 is not split within Natural England's ALC mapping dataset, at this stage it has been assumed that all Grade 3 land could be Grade 3a.

985. The majority of the area in the Southern Onshore AoS is designated as Grade 3 agricultural land, with several corridors of grade 4 designated land. Grade 5 designated land is seen within Appledore country park, but around Bideford area and near Yelland there are a couple of areas with grade 2 agricultural land designations. Within Appledore and surrounding Bideford and Northam, are built up urban areas. These areas also have Post 1988 Agricultural Land Classifications which range from Grade 2 to Grade 4 designations.

Green belt

986. A review of green belt location maps indicate that there is no designated green belt land within the Southern part of the Onshore AoS. Liaison with the local authority will be undertaken to confirm the absence (or presence) of designated green belt land within the Onshore AoS.

Utilities

987. Utilities are present within the Southern part of the Onshore AoS, including buried and above ground electricity cables. Telecommunications, sewers, gas, public water mains and private water supplies are also present. East Yelland substation is located within the Southern portion of the Onshore AoS, on the south side of the River Taw and adjacent to Yelland. On the south-eastern side of the Southern portion of the Onshore AoS, is where Alverdiscott substation and Cleave Farm Solar park is located.

Detailed utilities data has not been sought at this stage; detailed data will be sought once the Project has been refined during the EIA process.

3.5.5 Approach to assessment

988. The specific assessment requirements for land use are in accordance with the overarching NPS for Energy EN-1 and NPS for Renewable Energy infrastructure (EN-3), of which draft versions have been published for consultation.

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

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

990. Design assumptions used to inform assessments will be clearly identified in the project design envelope (PDE), considering worst case parameters specifically for land use.

3.5.6 Potential Impacts

Potential impacts during construction

Agricultural productivity

991. There is the potential for adverse impacts to soil structure (e.g. through compaction) and future agricultural productivity of soils impacted during the construction phase through the use of heavy machinery and disturbance.

Drainage

992. There is the potential for an adverse impact to the natural and artificial drainage systems (where present) during construction activity.

Existing utilities

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

Potential impacts during operation

Permanent loss of agricultural land

994. Permanent infrastructure at the Onshore Substation will be within the existing boundary of the East Yelland substation in the permanent loss of land. Therefore no loss of agricultural land will occur.

Soil heating

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

Drainage

996. Permanent infrastructure and hardstanding at the Project Onshore Substation, plus the presence of buried cables, has the potential to permanently impact upon land drainage. Impacts associated with drainage are considered further in Section 3.4.

997. Disruption to farming practices: There is the potential for farming practices to be restricted due to the presence of cables and access restrictions during the operational and maintenance phase of the Project.

Health and Safety

998. Public health and safety: Issues of public concern and health such as electromagnetic fields arising in relation to buried cables is considered further in Section 4.3.

Potential impacts during decommissioning

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

Potential cumulative impacts

1000. Potential cumulative impacts related to land use include other nearby development projects interacting with the same utilities or existing land uses with temporal overlaps with the Project's construction phase. The assessment will be dependent on the availability and accessibility of information for other developments. The approach to cumulative assessment is set out in Section 1.9.2.

3.5.7 Mitigation Measures

1001. Mitigation measures will be developed as site specific information becomes available, the project design is refined, and the ES is prepared. A number of mitigation measures that may be appropriate for the Project could be embedded within the design and accounted for within the assessment of impacts. Further mitigation measures may be proposed in response to impact assessments. These will evolve as the Project design develops and the EIA progresses, and/or in response to consultation.

1002. Examples of mitigation measures which are likely to be considered include:

- Consideration of existing land use during selection of Onshore Export Cable Corridor and Project Onshore Substation, where practicable
- Development and implementation of a Code of Construction Practice (CoCP). This will include a Pollution Prevention Response Plan for potentially polluting construction activities that will adhere to construction industry good practice guidance
- Development and implementation of a SWDP
- Stakeholder Management plan to guide engagement with local stakeholders, including details on the complaint's procedure
- Adoption of suitable land engagement and agreement processes for use of land/compensation

1003. All proposed mitigation measures will be consulted upon with stakeholders throughout the EIA process.

3.5.8 Approach to Assessment and Data Gathering

1004. The potential impacts on land use in and around the proposed onshore infrastructure will be further defined as the project design develops. Engagement with key onshore stakeholders to ensure that all local issues are discussed and, where appropriate, assessed fully via the EIA process.

1005. The existing environment will be characterised using the data sources set out in Table 3.15.

Table 3.15: Existing datasets

Data source	Data contents
Natural England	Agricultural land classification maps. Environmental stewardship schemes. Coastal Paths.

Data source	Data contents
Countryside and Rights of Way Act 2000 – Section 4 Conclusive Registered Common Land, Natural England	Common land.
Devon County Council	Planning policy adopted proposals maps. Public Rights of Way (PRoW).
Ordnance Survey mapping	'A' Roads, railway lines and urban areas.
Aerial photography	Public Right of Way (PRoW), bridleways, coastal paths.
Utilities records requested from local utilities suppliers	Utilities e.g. gas pipelines, electricity cables, telecommunications, water supplies and sewers.
HM Land Registry	Land ownership

1006. Any additional primary or secondary datasets will be identified through ongoing consultation with stakeholders. No specific land-use surveys are proposed to inform the assessment of impacts however information obtained from other surveys (such as but not limited to ecological field surveys) will be reviewed and used to inform the impact assessment relating to land-use receptors.

3.5.9 Summary of Scoped In Impacts

Table 3.16 Summary of impacts relating to Land Use

Potential Impact	Construction	Operation	Decommissioning
Agricultural productivity	✓	x	✓
Permanent loss of agricultural land	x	x	x
Existing utilities	✓	x	✓
Soil heating	x	✓	x
Drainage	✓	✓	✓
Public Health and Safety	x	✓	x
Cumulative impacts	✓	✓	✓

Key:
✓ Impact scoped in
✗ Impact scoped out

3.6 Onshore Ecology and Ornithology

3.6.1 Introduction

1007. This chapter presents the approach to the assessment of potential impacts arising from the Project on onshore ecology and ornithology receptors. The potential impacts associated with the construction, operation, maintenance and decommissioning phases of the Project has been informed through an ecological desk-based assessment and using existing available ecological information to identify the ecological receptors present within the Onshore Development Area.

1008. The data sources used to inform this ecological desk-based assessment are presented in Table 3.17.

Table 3.17: Ecological desk-study data sources

Data set	Data source	Date of data
European designated sites (SPA, SAC, Ramsar sites)	JNCC	2021
UK designated sites SSSI, NNR, Local Nature Reserve (LNR)	JNCC	2021
UK Habitats of Principal Importance	Natural England	2021
Protected and Notable species	JNCC	2021

1009. Once the onshore Study Area has been refined (as part of the route planning and site selection process), the biological records data will be obtained from the relevant local biological records centre. This information request will comprise the obtainment of records relating to protected, notable and non-native invasive species. Any additional data sets that may be identified through consultation with stakeholders in response to the submission of this Scoping Report will be obtained and used to inform the subsequent stages of the environmental impact assessment process.

3.6.2 Policy, Legislation and Guidance

1010. Section 1.5 describes the wider policy and legislative context for the Project. Table 3.18 provides a summary of key policy and legislation which has informed the scope of the assessment presented in this chapter.

Table 3.18: Onshore ecology policy, legislation and guidance

Relevant policy/legislation	Relevance to assessment
Legislation	
The Conservation of Habitats and Species Regulations 2017 **(or 'The Habitats Regulations 2017') (Conservation of** Habitats and Species Regulations, 2017)	These Regulations provide protection for specific habitats listed in Annex I and species listed in Annex II of the Habitats Directive. The Directive sets out decision making procedures for the protection of Special Areas of Conservation (SAC) and Special Protection Areas (SPA), implemented in the UK through The Conservation of Habitats and Species Regulations 2017. The Regulations make it an offence (subject to exceptions) to deliberately capture, injure, kill, disturb, or trade in the animals listed in Schedule 2, or pick, collect, cut, uproot, destroy, or trade in the plants listed in Schedule 5. The Regulations require competent authorities to consider or review planning permission, applied for or granted, affecting a National Site Network site, and, subject to certain exceptions, restrict or revoke permission where the integrity of the site would be adversely affected.
The Conservation of Habitats and Species (Amendment) (EU Exit) Regulations 2019.	Makes changes to the Conservation of Habitats and Species Regulations 2017 following the UK's exit from the European Union (EU).
Wildlife and Countryside Act 1981 (as amended) (WCA, 1981)	This Act makes it an offence (subject to certain exceptions) to intentionally: kill, injure, or take any wild bird; take, damage or destroy the nest of any wild bird while that nest is in use or being built; and take or destroy an egg of any wild bird. The Act makes it an offence to intentionally kill, injure or take any animal listed in Schedule 5 of the act and protects occupied and unoccupied places used for shelter or protection by such animals. The Act makes it an offence (subject to exceptions) to intentionally pick, uproot or destroy any wild plant listed in Schedule 8 of the Act. The Act makes it an offence to plant or otherwise cause to grow any non-native, invasive species listed under Part 2 of Schedule 9 of the Act. The Act makes provision for the notification and confirmation of SSSI.

Relevant policy/legislation	Relevance to assessment
The Protection of Badgers Act 1992 (Protection of Badgers Act, 1992)	The Act makes it an offence to wilfully kill, injure or take, or attempt to kill, injure or take a badger (*Meles meles*); and to cruelly ill-treat a badger. The Act makes it an offence to intentionally or recklessly damage, destroy or obstruct a badger sett, or to disturb a badger whilst in a sett.
Natural Environment and Rural Communities (NERC) Act 2006 (NERC, 2006)	Section 41 of the Act requires the SoS to compile a list of habitats and species of principal importance for the conservation of biodiversity in England (herein 'S41 species'). Decision makers of public bodies, in the execution of their duties, must have regard to the conservation of biodiversity in England, and the list is intended to guide them
The Hedgerow Regulations 1997 (Hedgerow Regulations, 1997)	The Regulations make it an offence to remove or destroy certain hedgerows without permission from the local planning authority and the local planning authority is the enforcement body for such offences.
Countryside and Rights of Way Act (CRoW)2000 (CRoW, 2000)	The Act amends the law relating to public rights of way including making provision for public access on foot to certain types of land. Amendments are made in relation to SSSIs to improve their management and protection, as well as to the Wildlife and Countryside Act 1981, to strengthen the legal protection for threatened species.
Policy	
National Planning Policy Framework (NPPF) and supporting National Planning Practice Guidance (2018)	The NPPF is the primary source of national planning guidance in England. Whilst the NPPF is not directly applicable to NSIPs, as Government policy it may be considered relevant and important. 3.3.2.2 Paragraph 8 of the NPPF states that there are three dimensions to sustainable development: economic, social and environmental, and that all three are mutually dependent and gains for all should be sought jointly and simultaneously through the planning system. 3.3.2.3 The environmental dimension is defined as "an environmental objective – to contribute to protecting and enhancing our natural, built and historic environment; including making effective use of land, helping to improve biodiversity, using natural resources prudently, minimising waste and pollution, and mitigating and adapting to climate change, including moving to a low carbon economy."

Relevant policy/legislation	Relevance to assessment
Natural Environment White Paper (2011)	The paper was the first White Paper produced by the government in 20 years. The paper contains plans to reconnect nature, connect people and nature for better quality of life and capture and improve the value of nature.
Biodiversity 2020: A Strategy **for England's Wildlife and** Ecosystem Services	The Strategy sets out how England will implement the 2010 Aichi Biodiversity Targets, the European Commission's 2011 EU Biodiversity Strategy and the recommendations of the 2011 Natural Environment White Paper. It contains the following relevant targets: • Better wildlife habitats with 90% of priority habitats in favourable or recovering condition and at least 50% of SSSIs in favourable condition, while maintaining at least 95% in favourable or recovering condition; • More, bigger and less fragmented areas for wildlife, with no net loss of priority habitat and an increase in the overall extent of priority habitats by at least 200,000 ha; • By 2020, at least 17% of land and inland water in England, especially areas of importance for biodiversity and ecosystem services, conserved through effective, integrated and joined up approaches to safeguard biodiversity and ecosystem services including through management of our existing systems of protected areas and the establishment of nature improvement areas; • Restoring at least 15% of degraded ecosystems as a contribution to climate change mitigation and adaptation; • By 2020, we will see an overall improvement in the status of our wildlife and will have prevented further human-induced extinctions of known threatened species; and • By 2020, significantly more people will be engaged in biodiversity issues, aware of its value and taking positive action.

1011. The Ecological Impact Assessment (EcIA) and associated surveying efforts will consider the following guidance and standards:

- Chartered Institute of Ecology and Environmental Management (CIEEM) (CIEEM 2018) Guidelines for Ecological Impact Assessment in the UK and Ireland: Terrestrial, Freshwater and Coastal
- British Standard (BS) 42020:2013 – Biodiversity. Code of Practice for planning and development
- Construction Industry Research and Information Association (CIRIA) C648 (2006) Control of water pollution from linear construction projects (CIRIA 2006)

- CIRIA Guidance note C692 Environmental Good Practice on Site Guide (3rd Edition – CIRIA 2010)

1012. The following species-specific guidance and standards will be used during the subsequent EcIA process:

- Standing advice on protected species (bats (all species), great crested newts (*Triturus cristatus*), badgers, water voles (*Arvicola amphibius*), otters *Lutra lutra*), reptiles, protected plants, invertebrates, white-clawed crayfish (*Austropotamobius pallipes*), ancient woodlands and veteran trees) (Natural England 2015)
- BS 5837: 2012 – Trees in relation to design, demolition and construction
- Bat Conservation Trust and Institute of Lighting Engineers (2018) Bats and Artificial Lighting in the UK (ILE 2018)
- The Water Vole Mitigation Handbook (The Mammal Society Guidance Series) (Dean et al 2016)
- Reptile Habitat Management Handbook (Edgar et al 2010)
- Great Crested Newt Mitigation Guidelines (English Nature 2001)
- Herpetofauna Worker's Manual (Joint Nature Conservation Committee (JNCC) 2003)
- Otters: surveys and mitigation for development projects. Natural England Standing Advice (Natural England 2014)
- Badgers: surveys and mitigation for development projects. Natural England Standing Advice (Natural England 2015)
- Bats: surveys and mitigation for development projects. Natural England Standing Advice (Natural England 2015)
- Great crested newts: surveys and mitigation for development projects. Natural England Standing Advice (Natural England 2015)
- Invertebrates: surveys and mitigation for development projects. Natural England Standing Advice (Natural England 2015)
- Reptiles: surveys and mitigation for development projects. Natural England Standing Advice (Natural England 2015)
- Water voles: surveys and mitigation for development projects. Natural England Standing Advice (Natural England 2015)
- Water Vole Conservation Handbook, 3rd Edition (Strachan and Moorhouse 2011)
- Great Britain (GB) Non-native Species Information (GB Non-native secretariat 2015)

3.6.3 Study Area

1013. The study area for onshore ecological receptors that have been applied for the desk-based assessment are presented in Table 3.19. Different study areas have been used for different receptors depending on their sensitivity and their habitat preferences. These study areas have been identified according to accepted industry guidance (CIEEM, 2018) and professional judgement and experience from similar projects.

Table 3.19 Study areas used for onshore ecology receptors for the desk-based assessment

Data/Survey	Study Area
Protected and notable species (excluding great crested newts, birds and bats)	Within and up to 2km from the Project boundaries.
Great crested newts	Within and up to 250m from the Project boundaries.
Bats and birds	Within and up to 5km from the Project boundaries.
Statutory and non-statutory designated sites	Within and up to 2km from the Project boundaries.
UK Habitats of Principal Importance (UKHPA) and Forestry habitats	Within and up to 2km from the Project boundaries.
Statutory sites and associated impact risk zones	Within and up to 2km from the Project boundaries.

3.6.4 Baseline Data

1014. The data sources used to inform this ecological desk-based assessment are presented in Table 3.20.

Table 3.20 Ecological desk-study data sources

Data set	Data source	Date of data
European designated sites (SPA, SAC, Ramsar sites)	MAGIC website and JNCC	2021
UK designated sites SSSI, NNR, Local Nature Reserve (LNR)	JNCC	2021
UK Habitats of Principal Importance	Natural England	2021
Protected and Notable species	JNCC	2021

1015. Once the onshore Study Area has been refined (as part of the route planning and site selection process), the biological records data will be obtained from the relevant local biological records centre. This information request will comprise the

obtainment of records relating to protected, notable and non-native invasive species. Any additional data sets that may be identified through consultation with stakeholders in response to the submission of this Scoping Report will be obtained and used to inform the subsequent stages of the environmental impact assessment process.

Terrestrial habitats

1016. UK Habitats of Principal Importance within the Middleton Onshore AoS include the following:

- Coastal sand dunes
- Maritime cliffs and slopes
- Mudflats
- Coastal and floodplain grazing marsh
- Lowland heathland
- Blanket bog
- Grass moorland
- Ancient woodland
- Semi-improved grassland

Protected, notable and non-native invasive species

1017. Following the high-level desk-based review, the following protected and notable species may be present within the Onshore Development Area.

- Badgers
- Bats
- Great crested newts
- Water vole
- Otter
- Terrestrial and aquatic invertebrates
- Reptiles
- Birds (breeding and over-wintering)

3.6.5 Baseline Environment

Designated sites

1018. Figure 3.6.1 show the location of the designated sites within or overlaps with the Onshore Development Area, which include the following:

- Braunton Burrows Special Area of Conservation (SAC)
- Trintagel-Marsland-Clovelly Coast SAC
- Bristol Channel Approaches/Dynesfeydd Mor Hafren SAC

- Hobby to Peppercombe Site of Special Scientific Interest (SSSI)
- Braunton Swanpool SSSI
- Saunton to Baggy Point Coast SSSI
- Taw-Torridge Estuary SSSI
- Barricane Beach SSSI
- Braunton Burrows SSSI
- Mermaid's Pool to Rowden Gut SSSI
- Northam Burrows SSSI
- Greenaways and Freshmarsh, Braunton SSSI
- Mill Rock SSSI
- Westward Ho! Cliffs SSSI
- Kenwith Valley Local Nature Reserve (LNR)
- Kynoch's Foreshore LNR
- Northam Burrows Country Park

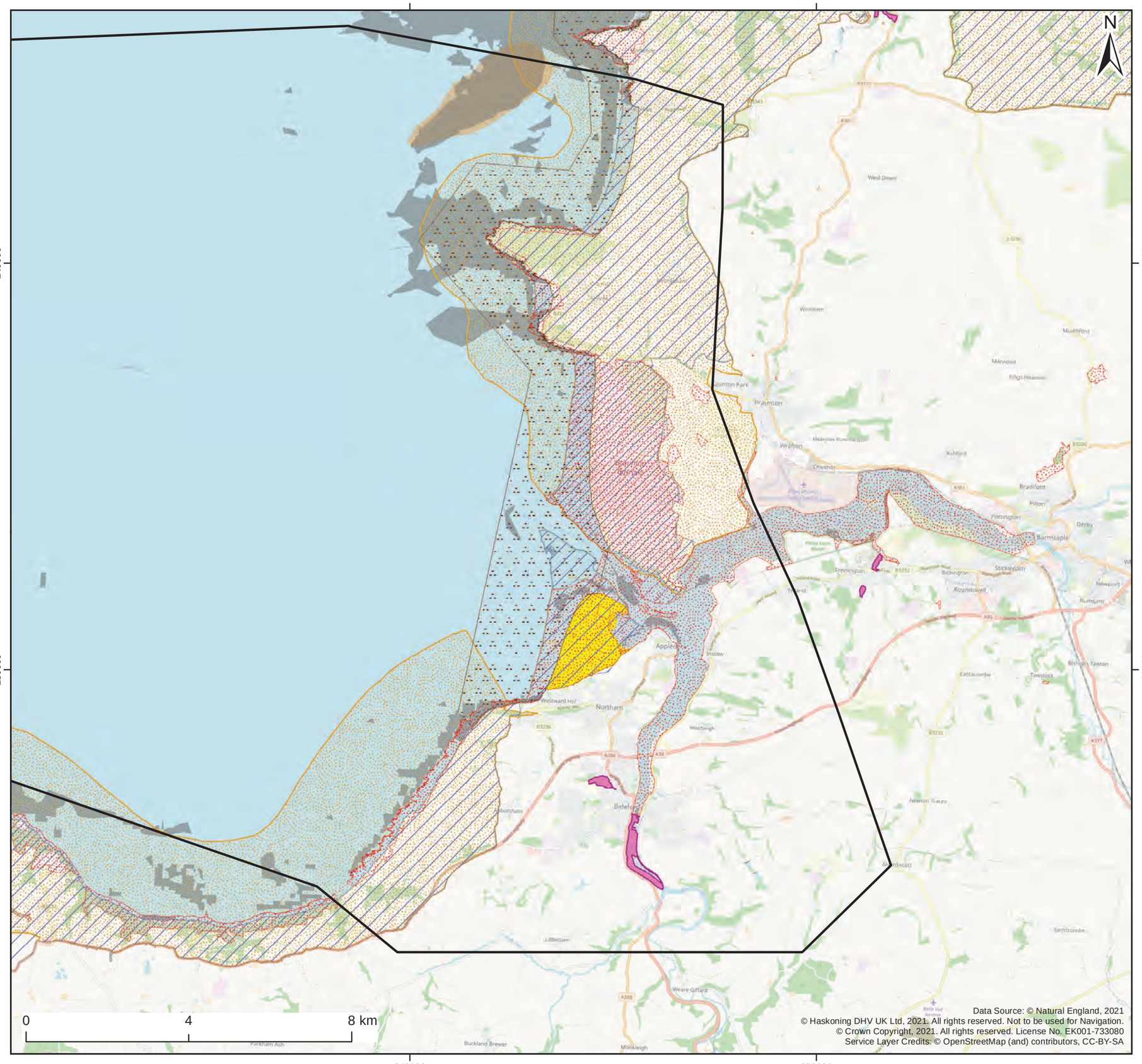
1019. There are additional designated sites that are outside the Onshore Development Area and these include:

- Lundy SAC
- Chapel Hill SSSI
- Caen Valley Bats SSSI
- Morte Point SSSI
- Fremington Quay Cliffs SSSI
- Marsland to Clovelly Coast SSSI
- Fremington LNR

Terrestrial habitats

1020. UK Habitats of Principal Importance within the Onshore Development Area are shown on Figure 3.6.2 and include the following:

- Coastal sand dunes
- Maritime cliffs and slopes
- Mudflats
- Coastal and floodplain grazing marsh
- Lowland heathland
- Blanket bog
- Grass moorland
- Ancient woodland
- Semi-improved grassland



Legend:

- Area of Search
- Marine Conservation Zones (MCZ)
- Sites of Special Scientific Interest (SSSI)
- Special Areas of Conservation (SAC)
- Areas of Outstanding Natural Beauty (AONB)
- Heritage Coast
- Country Parks
- Local Nature Reserves (LNR)
- Annex 1 Reef
- Annex 1 Sandbanks

Client:	Project:
Offshore Wind Ltd.	White Cross Offshore Windfarm

Title: Designated Nature Conservation Sites

Figure: 3.6.1 | Drawing No: PC2978-RHD-ZZ-XX-DR-Z-0105

Revision:	Date:	Drawn:	Checked:	Size:	Scale:
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Co-ordinate system: British National Grid

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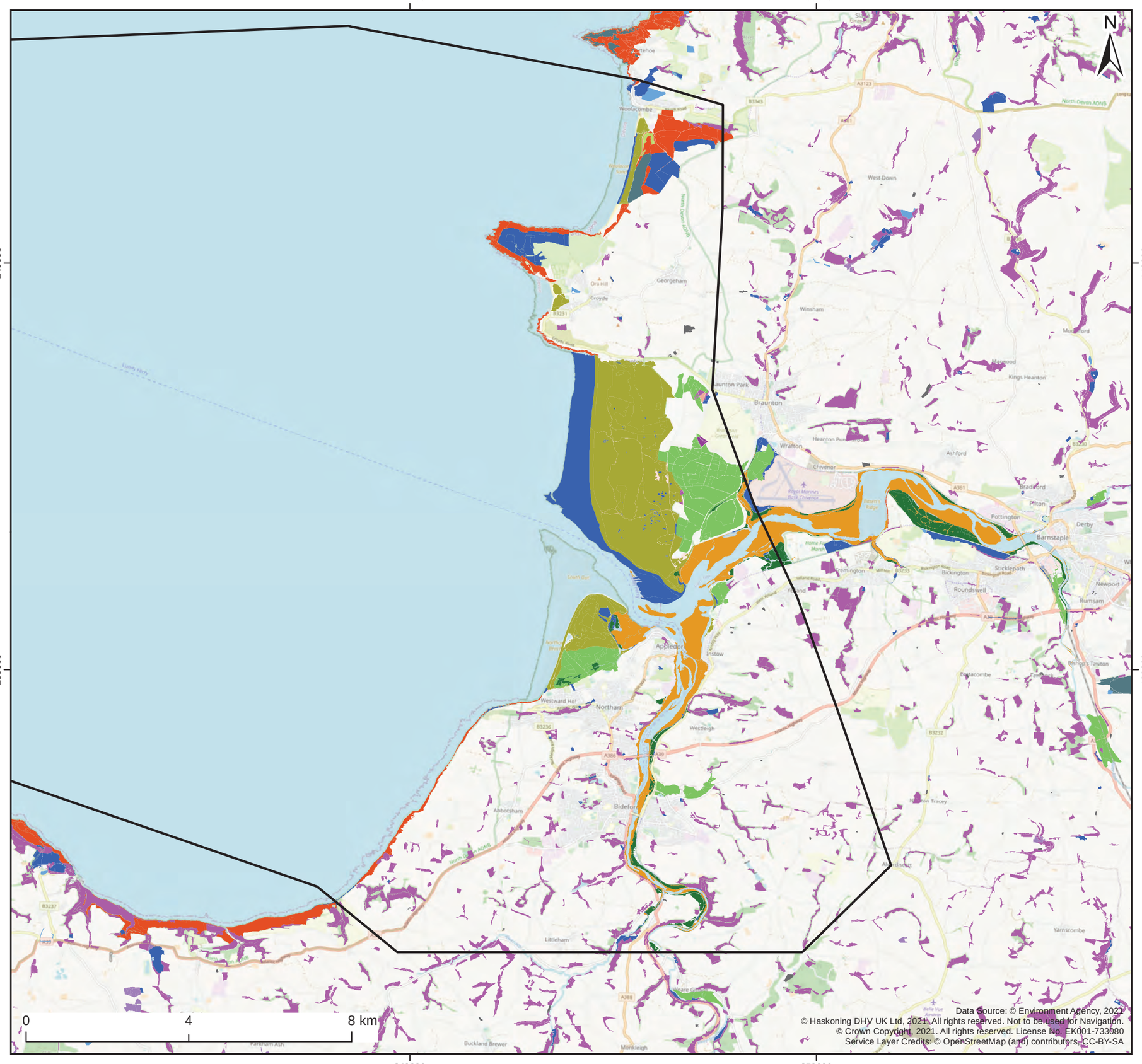

Legend:

Area of Search

Priority Habitats

- Coastal and floodplain grazing marsh
- Coastal saltmarsh
- Coastal sand dunes
- Deciduous woodland
- Good quality semi-improved grassland
- Lowland dry acid grassland
- Lowland fens
- Lowland heathland
- Maritime cliff and slope
- Mudflats
- No main habitat but additional habitats present
- Purple moor grass and rush pastures
- Reedbeds
- Traditional orchard

Client:	Project:
Offshore Wind Ltd.	White Cross Offshore Windfarm

Title:

Priority Habitats within Onshore Study Area

Figure: 3.6.2	Drawing No: PC2978-RHD-ZZ-XX-DR-Z-0106				
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Protected, notable and non-native invasive species

1021. Following the high-level desk-based review, the following protected and notable species may be present within the Onshore Development Area.

- Badgers
- Bats
- Great crested newts
- Water vole
- Otter
- Terrestrial and aquatic invertebrates
- Reptiles
- Birds (breeding and over-wintering)

3.6.6 Potential Impacts

1022. Potential impacts have been identified from the information available at the time of preparing this document and informed by the project description provided in Section 1.8.

Potential impacts during construction

1023. The key aspects of construction with respect to onshore ecology and ornithology receptors are:

- Construction works associated with the Project Onshore Substation
- Activities associated with the installation of the offshore/onshore cable jointing bay at the Landfall location, and Onshore Export Cable Route

Impacts to designated sites

1024. Where possible and through the site selection and transmission routing exercise, statutory and non-statutory designated sites for nature conservation will be avoided. The EcIA will consider direct effects on statutory designated sites should their avoidance not be possible. Potential indirect impacts on statutory and non-statutory designated sites that have been scoped into the ecological impact assessment include:

- Disturbance as a result of works associated with the Project Onshore Substation, Landfall and Onshore Export Cable Route due to activities which generate emissions, e.g. noise, dust, nitrogen and acid deposition
- Construction activities that may alter local drainage patterns
- Construction activities that may result in alterations in land use type within and adjacent to statutory and non-statutory designated sites

Permanent and temporary loss of habitats

1025. The construction activities associated with the Project are likely to result in the temporary loss of habitat, albeit that this will be dependent on the Project's final design and location of its onshore infrastructure. Wherever possible and through the site selection and transmission routing exercise, it is anticipated these impacts will be avoided where practicable and feasible to do so. However, potential impacts that have been scoped into the ecological impact assessment include the temporary loss of Habitats of Principal Importance during trenching activities, such as the removal of sections of hedgerows. The anticipated impacts on species are likely to be those which support protected and notable species such as bat (roosting and foraging/commuting), water vole, otter, badger, reptiles and great crested newt.

Temporary habitat fragmentation and species isolation

1026. There is the potential for the Project to result in temporary habitat fragmentation and isolation of species during the construction activities, particularly during the excavation and installation of the Onshore Export Cable Route. This impact particularly relates to linear habitats such as hedgerows for which foraging/commuting bats may use to navigate through the wider landscape.

Impacts on protected species or on their resting or breeding sites

1027. Legally protected and/or notable species may be impacted by construction activities associated with the onshore infrastructure, either physically or from disturbance. In the absence of findings from species specific surveys, as they are yet to be completed, all UK legally protected and notable species are assumed to be potentially present and therefore potentially affected by the Project. Consequently, potential impacts have been scoped into the ecological assessment with regard to protected species such as water vole, otter, bats (roosting and foraging/commuting), badger, great crested newt, reptiles and invertebrates (aquatic and terrestrial species).

Spread of non-native invasive species

1028. There is potential for non-native invasive species to spread by construction activities associated with the Project. Control of non-native invasive species, where required, will be included within a Project specific Outline Ecological Management Plan (EMP) that will be appended to the onshore ecology and ornithology ES Chapter.

Potential impacts during operation and maintenance

1029. Operational maintenance will be required at the Project Onshore Substation and/or infrastructure along the Onshore Export Cable Corridor. It is anticipated that planned maintenance works will be localised and therefore anticipated to result in minimal

disturbance to the adjacent habitats and/or species. During the operation of the Project Onshore Substation there may be a continuous operational noise level and lighting which may have the potential to result in disturbance and illumination on adjacent habitats and species.

1030. Any planting that may be included as part of the landscape mitigation planting proposals would result in a beneficial impact.

Potential impacts during decommissioning

1031. It is envisaged that impacts arising from the decommissioning activities will be similar in nature to those anticipated during the construction phase and on this basis, the following impacts have been scoped into the ecological impact assessment:

- Impacts to designated sites
- Impacts as a result of permanent and temporary habitat loss
- Impacts arising from habitat fragmentation
- Impacts to UK legally protected and notable species
- Impacts as a result of the spread of non-native invasive species

1032. The detail and scope of the decommissioning works will be determined by the relevant legislation and guidance at the time of decommissioning and agreed with the relevant regulator.

Potential cumulative impacts

1033. Cumulative impacts will be considered as part of the ongoing EIA process and will be assessed in accordance with the approach to cumulative assessment is set out in Section 1.9.2. The assessment will be dependent on the availability and accessibility of information for other developments.

1034. The cumulative assessment will consider the potential for significant cumulative impacts to arise as a result of the construction, operation and decommissioning of the onshore infrastructure in the context of other developments that are existing, consented or at an application stage.

Potential transboundary impacts

1035. There is no mechanism for impact.

3.6.7 Mitigation Measures

1036. Mitigation measures will be developed as site specific information becomes available, the project design is refined, and the ES is prepared. A number of

mitigation measures that may be appropriate for the Project could be embedded within the design and accounted for within the assessment of impacts. Further mitigation measures may be proposed in response to impact assessments. These will evolve as the Project design develops and the EIA progresses, and/or in response to consultation.

1037. Examples of mitigation measures which are likely to be considered include:

- Consideration of designated sites or areas of important habitat, woodland areas, water bodies and streams as far as possible during selection of Onshore Export Cable Corridor and Project Onshore Substation, where practicable
- Selection of methodologies (e.g. trenchless cable installation techniques at sensitive locations, such as river crossings and coastal designated sites) to minimise or avoid impacts, where practicable
- Adherence to seasonal constraints in relation to specific species where possible (for example undertaking vegetation clearance outside the bird nesting season) to minimise or avoid disturbance
- Development of species-specific mitigation if required based on findings of relevant surveys
- Reinstatement of habitats removed during construction of the Onshore Export Cable Route upon the completion of works
- Development and implementation of a CoCP. This will include a Pollution Prevention Response Plan for potentially polluting construction activities that will adhere to construction industry good practice guidance
- Development of implementation of an Ecological Management Plan (EMP)

1038. All proposed mitigation measures will be consulted upon with stakeholders throughout the EIA process.

3.6.8 Approach to Assessment and Data Gathering

Approach to Data Gathering

1039. A desk-based assessment has been undertaken to inform this scoping assessment. Further survey information is required to identify the potential impacts on onshore ecology and ornithology receptors. This information will be obtained from an Extended Phase 1 Habitat Survey, and where required by species-specific surveys. Information relating to habitats will be collated in accordance with the UK Habitat Classification system methodology, which in turn will be used to inform any potential Biodiversity Net Gain (BNG) opportunities.

1040. The results of the Extended Phase 1 Habitat Survey will underpin a suite of more detailed and targeted surveys to be undertaken which will provide more detail for the Ecological Impact Assessment (EcIA).

1041. Table 3.21 presents the proposed suite of onshore ecological and ornithology surveys that have been identified as potentially being required once the Onshore Cable Corridor is known. The list will be refined once route planning is completed and a preferred option selected.

Table 3.21 Proposed onshore ecology and ornithology surveys for the Project

Receptor survey	Proposed year of survey	Summary of proposed survey
Extended Phase 1 Habitat Survey	2022	Will cover the preferred Onshore Export Cable Corridor, Landfall location and Project Onshore Substation plus a 50m buffer and will include the mapping of habitats and identification of all UK protected species potential alongside recommendations for targeted species-specific Phase 2 surveys.
NOTE: Depending on the outcome of the Extended Phase 1 Habitat Survey and the biological records results, the following species-specific surveys may be required.		
Great crested newt presence/absence survey	2022	Will consist of a Habitat Suitability Index survey of all ponds within a 250m buffer of the Onshore Export Cable Route, Landfall and Project Onshore Substation, followed by an Environmental DNA (eDNA) survey of all suitable ponds to determine the presence or likely absence of Great crested newts.
Bat activity survey and bat roost survey	2022	Will consist of activity transect surveys of all suitable commuting/foraging habitats and all potential bat roosts that may be affected by the Project.
Water vole and otter survey	2022	Will cover all suitable aquatic habitats which may be affected by the Project.
Reptile survey	2022	Will cover all suitable habitats which may support significant populations of reptiles and which may be affected by the Project.
Dormice survey	2022	Will cover all suitable woodland habitats which may be affected by the Project.

Receptor survey	Proposed year of survey	Summary of proposed survey
Breeding bird survey	2022	Will cover all suitable habitats (including any functionally linked habitats) that may be affected by the Project and/or afforded protection for breeding birds.
Invertebrate survey (terrestrial and aquatic)	2022	Will cover all terrestrial and/or aquatic habitats which may support rare or notable invertebrates, and which may be affected by the Project.

1042. Any additional primary or secondary datasets will be identified through ongoing consultation with stakeholders through the Evidence Plan Process.

Approach to Assessment

1043. An EcIA will be undertaken in accordance with industry accepted guidance, namely the Charted Institute of Ecology and Environmental Management (CIEEM) Guidelines for Ecological Impact Assessment in the UK and Ireland: Terrestrial, Freshwater and Coastal (CIEEM, September 2018).

1044. The approach to the EcIA and data gathering will be discussed and agreed as part of the Evidence Plan Process (outlined in Section 1.4) prior to its completion. Consultation will be undertaken throughout the development of the Project and at key stages throughout the EIA process.

1045. The CIEEM guidelines aim to predict the residual impacts on important ecological features affected, either directly or indirectly by a development, once all the appropriate mitigation has been implemented.

1046. The approach to determining the significance of an impact will be undertaken in accordance with the CIEEM EcIA guidelines. This involves identifying, qualifying and, where possible, quantifying the sensitivity, value and magnitude of all ecological receptors which have been scoped into this assessment. Using this information, a significance of each potential impact can be determined.

1047. Although NSIPs do not have a mandatory requirement to deliver BNG, the Project will explore opportunities to achieve BNG and where possible include these within the Project's design. For those recognised BNG opportunities, these will be included within the EcIA and appended to the onshore ecology and ornithology ES Chapter.

3.6.9 Summary of Scoped In Impacts

1048. Key potential impacts relate to the construction phase and direct disturbance to species and/or habitat and loss of habitat associated with the permanent infrastructure associated with the Project. Potential impacts on habitat and species fragmentation may also occur as a result of the temporary or permanent removal of habitats during the construction phase.

1049. Operational impacts are predicted to be localised to the area within and immediately surrounding the Onshore Substation given that this will be the only area where works are permanent. All remaining areas are anticipated to comprise temporary works and therefore long-term impacts are not anticipated. Decommissioning impacts would likely be similar to those for construction; cumulative impacts may arise if other projects are constructed within 1km of the onshore connection area. No transboundary impacts have been identified.

1050. Table 3.22 outlines the impacts which are proposed to be scoped into the EIA. This may be refined as additional information and data become available.

Table 3.22: Summary of impacts relating to onshore ecology and ornithology

Potential Impact	Construction	Operation	Decommissioning
Impacts to designated statutory and non-statutory sites	✓	✓	✓
Permanent and temporary loss of habitats	✓	✓	✓
Temporary habitat fragmentation and isolation of species	✓	✓	✓
Impacts on protected species or on their resting or breeding sites	✓	✓	✓
Disturbance of bird populations	✓	✓	✓
Spread of non-native invasive species	✓	✓	✓
Cumulative impacts	✓	✓	✓

Key:
✓ Impact scoped in
✗ Impact scoped out

3.7 Onshore Archaeology and Cultural Heritage

3.7.1 Introduction

1051. The onshore archaeology and cultural heritage assessment will include all known receptors (heritage assets) landwards of MHWS, within the Area of Search AoS. All receptors (heritage assets) seawards of MHWS are included in the marine archaeology and cultural heritage assessment (Section 2.10).

3.7.2 Policy, Legislation and Guidance

1052. Section 1.5 describes the wider policy and legislative context for the Project. The impact assessment for the onshore archaeology and cultural heritage resource will follow a heritage significance-based approach to historic environment decision-making, as set out in the NPPF, Section 16: conserving and enhancing the historic environment (MHCLG, 2021), as well as Energy Policies EN1 and EN3 as the primary policy documents for the proposed development.

1053. These and other heritage legislation and policy including local planning policies are set out in full in Appendix A.

1054. The EIA assessment will also be undertaken in accordance with the following guidance:

- The Historic Environment in Local Plans: Historic Environment Good Practice Advice in Planning 1 (Historic England, 2015a)
- Managing Significance in Decision-Taking in the Historic Environment: Historic Environment Good Practice Advice in Planning 2 (Historic England, 2015b)
- The Setting of Heritage Assets: Historic Environment Good Practice Advice in Planning 3 (Historic England, 2017)
- Standard and guidance for historic environment desk-based assessment (CIfA, 2020)
- Code of Conduct (CIfA, 2019)
- Guidance for Assessment of Cumulative Impacts on the Historic Environment from Offshore Renewable Energy (Oxford Archaeology, 2008)
- Draft National Policy Statement for Renewable Energy Infrastructure (EN-3) (2021)
- Institute of Environmental Management and Assessment (IEMA) Principles of Cultural Heritage Impact Assessment (2021)

3.7.3 Study Area

1055. The onshore study area comprises all onshore elements and areas contained within the AoS.

3.7.4 Baseline Data

1056. The baseline summaries described below have been informed by the data sources presented in Table 3.23.

Table 3.23 Existing data sets

Data Source	Data contents
National Heritage List for England (NHLE)	Data on all designated heritage assets within England, maintained by Historic England. GIS data for all Scheduled Monuments, Listed Buildings, Registered Parks and Gardens and Registered Battlefields.
Devon HER	Contains data on all recorded non-designated heritage assets, held by Devon HER. The data includes archaeological, historic landscape character and historic building information. Information on previous events (archaeological surveys and investigations) will also be obtained.
Heritage records / information maintained by Historic England and held at the Historic England Archive	Maintained by Historic England and contains information derived from the former National Buildings Record and National Archaeological Record.
[Heritage] Conservation Areas	Various local authorities.
Existing archaeological studies and published sources	Background information on the archaeology of the regions/areas under consideration, including the results of previous archaeological assessments, evaluation and investigations, where available.

3.7.5 Baseline Environment

Designated Heritage Assets

1057. Within the AoS there are a large number of designated heritage assets these comprise:

- Eight Scheduled Monuments (SMs)
- 713 Listed Buildings (LBs)
- Two Registered Parks and Gardens (RPGs)
- 11 Conservation Areas (CAs)

1058. These are discussed in more detail in Appendix A and are shown in Figure 3.7.1.

Non-Designated Heritage Assets

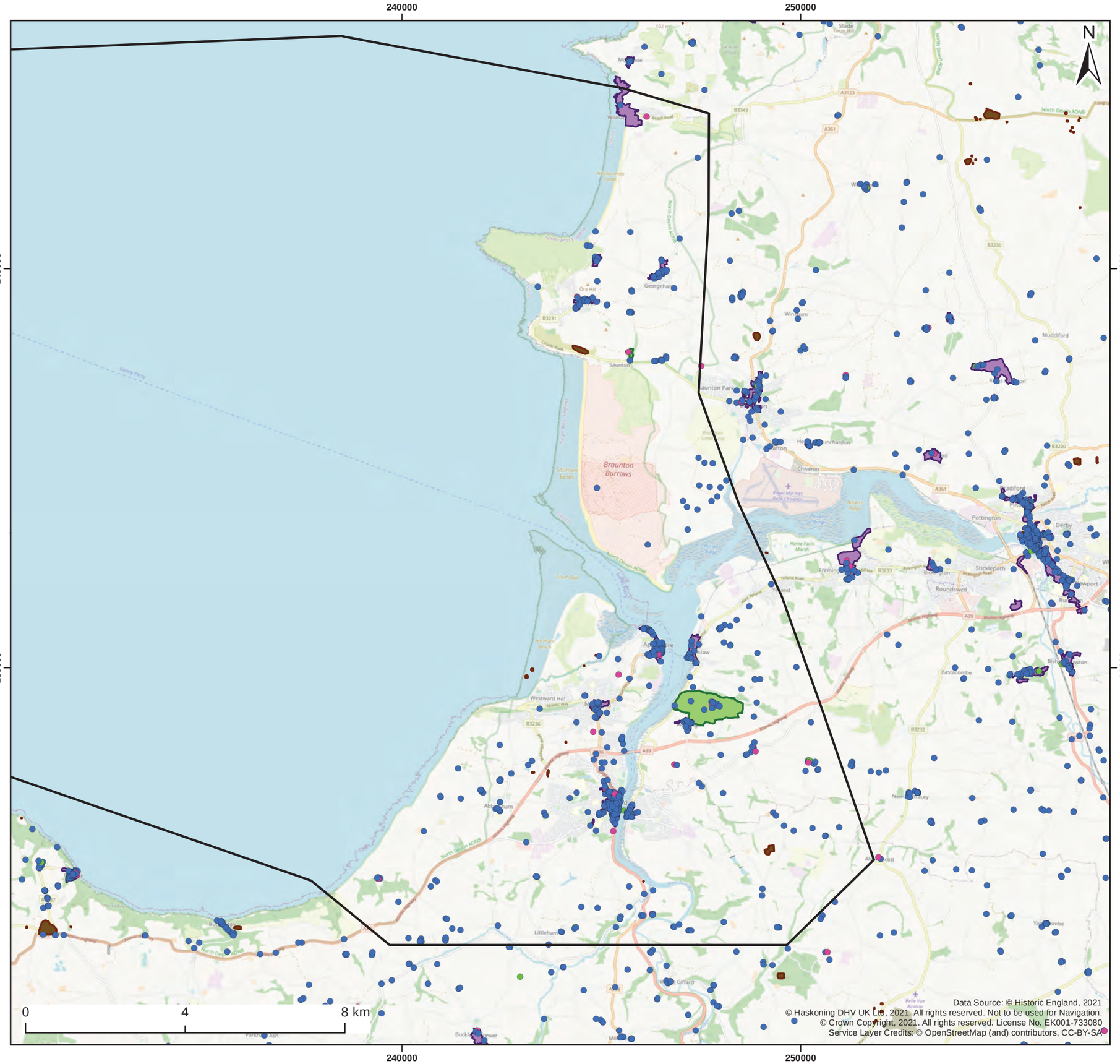
1059. Within the onshore AoS the Devon HER records a total of 3297 non-designated heritage assets. These comprise:

- 78 undefined prehistoric records
- 1 Palaeolithic records
- 53 Mesolithic records
- 24 Neolithic records
- 34 Bronze Age records
- 10 Iron Age records
- 13 Roman records
- 220 Early medieval/Saxon records
- 110 medieval records
- 1002 Post-medieval records
- 958 Modern records

1060. Evidence of Mesolithic and Neolithic occupation is extensive in the onshore areas with high concentrations of activity located at Baggy Point, Croyde and around Northam and Abbotsham.

1061. Records from these periods largely comprise flint scatters and flint working sites, with the largest of these found to the south of Cornborough comprising some 550 flints. Similarly, 251 prehistoric worked flints were found near Georgeham.

1062. Activity during the Bronze Age is largely concentrated around the same areas as the Mesolithic and Neolithic. However, an additional concentration emerges to the north of Gammaton Moor. Records from this period largely comprise earthworks and enclosures. These include the two SMs 'Lenwood bowl barrow, 50m south east of Lenwood Cottage' (list entry: 1016212) and 'Cross ridge dyke on Godborough Castle earthwork NW of Turner's Wood' (list entry: 1002640). Stray finds from this period are sparse, however, flint arrow heads and bronze palstave axes have been recorded across the area.



Legend:

- Area of Search

Listed Buildings

- Grade I
- Grade II
- Grade II*
- Scheduled Monuments
- Conservation Areas
- Parks And Gardens

Client:	Project:
Offshore Wind Ltd.	White Cross Offshore Windfarm

Title:

Designated Heritage Assets

Figure: 3.7.1 | Drawing No: PC2978-RHD-ZZ-XX-DR-Z-0107

Revision:	Date:	Drawn:	Checked:	Size:	Scale:
P01	18/11/2021	GC	CB	A3	1:95,000

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1063. Iron Age and Roman evidence is limited across the AoS. The main concentration of records is focused to the north of Gammaton and include the SM 'Iron Age enclosure and Roman marching camp' (list entry: 1004558). Other records comprise enclosures and field systems sparsely spread across the AoS. It is likely settlement during these periods was focused around the SMs with smaller agrarian landscapes throughout the AoS.

1064. There is significant Early Medieval and Medieval evidence during these periods, with most of the town and villages in the AoS formally emerging during these periods. As these towns and villages have continued to develop, evidence within them is limited with the majority of the records relating to agricultural settlements and practices towards the edges of these settlements.

1065. The picture is relatively similar in terms of the post-medieval period; however, a large number of built heritage assets are recorded within the towns and villages in the AOS. This is again similar for the modern period, with records outside of the built-up areas largely relating to agriculture. As discussed in Section 2.10, Bideford was important trading port with an established ship building industry throughout this period.

1066. There are a large number of WW2 records concentrated along the coast from Braunton Barrows to Woolacombe and largely relate to North Devon US Assault Training Centre. This includes the SM 'Two decoy targets at Northam Radar Station' (list entry: 1425448).

1067. A high-level appraisal and detailed baseline of the assets discussed above is presented in Appendix A.

3.7.6 Potential Impacts

1068. Potential impacts to heritage assets and the onshore historic environment as a whole include those of both a direct and indirect nature, as well as changes in the setting of heritage assets, which could affect heritage significance.

1069. A direct physical impact is one in which construction works involved with the projects (e.g. excavations and groundworks) result in a direct physical change to the fabric/form of a heritage asset (e.g. partial or complete removal and/or loss).

1070. Direct impacts can also include hydrological changes which may cause desiccation and drying out of wetland deposits and associated preserved waterlogged archaeological/geoarchaeological remains. Similarly, should a previously dry area become water inundated, this too can impact the preservation of heritage assets.

1071. An indirect (physical) impact occurs as a secondary consequence of construction or operation of the development but is not caused by direct (planned) intervention from the project's construction (e.g. vibration from groundworks/construction traffic affecting the fabric of a heritage asset or changes in ground conditions resulting in an effect on preservation conditions beyond the projects parameters). Indirect impacts can result in physical loss of heritage assets beyond the development footprint.

1072. Impacts to the significance of a heritage asset may also occur if a development changes the surroundings in which a heritage asset is located, experienced, and appreciated (i.e. its setting). Similarly, historic character may also be affected if the project results in a change to the prevailing character of the area.

1073. The onshore archaeology and cultural heritage assessment is likely to have key inter-relationships with Marine Archaeology and Cultural Heritage, Water Resources and Flood Risk, Noise and Vibration, Traffic and Transport, and LVIA/SLVIA. These will be considered where relevant.

Potential impacts during construction

1074. Construction activities which could affect the onshore archaeology and cultural heritage resource include:

- any intrusive groundworks, including directional drilling, piling, and open cut trench excavation
- construction of any temporary works areas or permanent above ground infrastructure
- general construction activities such as plant movement or increased traffic movements due to construction

1075. The potential impacts during construction that will be assessed are:

- Direct, physical impacts to designated heritage assets
- Direct, physical impacts to non-designated heritage assets (including archaeological, and geoarchaeological/palaeoenvironmental remains)
- Indirect, physical impacts to designated heritage assets

- Indirect, physical impacts to non-designated heritage assets (including archaeological, and geoarchaeological/palaeoenvironmental remains)
- 'Temporary' change to the setting of designated heritage asset, which could affect their heritage significance
- 'Temporary' change to the setting of non-designated heritage assets, which would affect their heritage significance

Potential impacts during operation

1076. As most of the projects onshore infrastructure is buried sub-surface (i.e. infrastructure associated with the buried cable systems), the operational phase will have limited potential to further impact the onshore archaeology and cultural heritage resource.

1077. Activity which could have an ongoing impact to onshore archaeology and cultural heritage will be the presence of the Project Onshore Substation. Any permanent above ground infrastructure has the potential to result in a change to the setting of heritage assets, which could affect heritage significance.

1078. The main potential impacts during operation are anticipated to be:

- 'Permanent' change to the setting of designated heritage assets, which could affect their heritage significance
- 'Permanent' change to the setting of non-designated heritage assets, which could affect their heritage significance

Potential impacts during decommissioning

1079. It is anticipated that the decommissioning impacts could be similar in nature to those of construction. This will depend on the extent and depths to which any further intrusive sub-surface decommissioning groundworks may occur. This will be considered in more detail as the EIA process progresses.

Potential cumulative impacts

1080. Cumulative impacts will be considered as part of the ongoing EIA process and will be assessed in accordance with the approach to cumulative assessment is set out in Section 1.9.2. The Project could interact cumulatively with other projects, which also have the potential for impacts associated with the onshore archaeology and cultural heritage resource. These cumulative impacts are considered primarily as:

- Direct, physical impact to the archaeological resource of the immediate and wider region
- Change in the setting of designated and/or non-designated heritage assets which could affect their heritage significance

1081. Where these impacts occur because of the projects, in combination with other developments within the area with similar associated impacts, there is the potential for the impacts to be of greater significance than when assessed individually.

Summary of potential impacts

1082. A summary of potential impact to onshore archaeology and cultural heritage assets is presented in Table 3.26.

3.7.7 Approach to Assessment and Data Gathering

Data Gathering

1083. The proposed data sources that will be accessed and enhanced to further characterise the existing historic environment with respect to onshore archaeology are the same as those presented in Table 3.23, but will also include the data sets presented in Table 3.24.

Table 3.24 Additional data sets

Data Source	Data contents
BGS	For any available historic borehole logs and the wider geological background for the region, with a focus on the study area(s).
Zone of Theoretical Visibility (ZTV) Model	Any ZTV produced by the Landscape Visualisation Impact Assessment (LVIA)/Seascape, Landscape Visualisation Impact Assessment (SLVIA) team will be assessed to help inform settings assessment.
Historic England Archive, other regional and local records offices	Aerial Photographs, LiDAR data and historic maps to assist in the detection and assessment of archaeological remains

1084. Table 3.25 presents the surveys that are proposed to be undertaken to inform the assessment in accordance with industry accepted guidance and good practice, and to be agreed in advance with the relevant historic environment stakeholders.

Table 3.25 Proposed Baseline Surveys Onshore Archaeology and Cultural Heritage

Survey/study	Timing	Spatial coverage
Walkover Surveys	2022	Targeted areas of the proposed application boundary (Onshore Development Area) will be visited to identify current land use and any potential unrecorded non-designated heritage assets, as well as ground truthing of certain previously recorded assets.
Setting Assessment Site Visits	2022/2023	Heritage assets identified as potentially being affected by the projects (through a change in their setting and associated heritage significance) will be visited to inform the setting assessment.
Priority Geophysical Survey	2022/2023	Initially targeted areas for geophysical survey, identified through desk-based baseline collation, e.g. Aerial photographic and LiDAR analysis. Techniques proposed for this survey include magnetometry, and other techniques to be considered where appropriate and proportionate, following the findings of the desk-based assessment work.
Archaeological and Geoarchaeological elements to any engineering-led site/ground investigation work	2022/2023	Bespoke approaches, including the possibility of onsite monitoring and watching brief associated with any engineering-led site/ground investigation work (SI/GI or equivalent), if/when applicable, e.g. test pits, boreholes etc.
Archaeological Trial Trenching	2023	Targeted trial trenching of areas of higher archaeological potential and / or at project related 'pinch points'. Scope to be discussed and agree with heritage stakeholders.

1085. Following these initial baseline surveys, consideration of the requirement for initial targeted archaeological evaluation (e.g. trial trenching) will be undertaken. Targeted trial trenching may be undertaken e.g. at areas where the baseline surveys have identified a high potential for buried archaeological remains to be present, and / or at project related 'pinch points'. The scope of this work, including timing and programme juncture, would be discussed and agreed with stakeholders.

1086. Any initial phase of targeted trial trenching to inform the application would, however, be highly dependent on relevant landowner access permissions being agreed. A more comprehensive (full and complete onshore project wide) approach to trial trenching is anticipated to take place in the early post-consent stages.

Approach to Assessment

1087. The specific assessment requirements for onshore archaeology and cultural heritage set out within the overarching NPS for Energy EN-1 and NPS for Renewable Energy infrastructure (EN-3) are summarised in Appendix A.

1088. Assessment of the onshore archaeology and cultural heritage resource will be an iterative and ongoing process that will be combined with ongoing site selection work to refine the Onshore AoS boundary.

1089. The existing baseline and proposed assessment methodologies for potential impacts below MHWS (including the intertidal zone) will be set out in the offshore archaeology and cultural heritage assessment (see Section 2.10).

1090. The impact assessment upon the onshore archaeology and cultural heritage resource will follow a heritage significance-based approach to historic environment decision-making, as set out in the NPPF, Section 16: conserving and enhancing the historic environment (MHCLG, 2021), as well as Energy Policies EN1 and EN3 as the primary policy documents for the proposed development.

1091. The assessment will also follow all relevant and appropriate guidance as produced by Historic England, e.g. The Historic Environment in Local Plans: Historic Environment Good Practice Advice in Planning 1 (Historic England, 2015a), Managing Significance in Decision-Taking in the Historic Environment: Historic Environment Good Practice Advice in Planning 2 (Historic England, 2015b) and The Setting of Heritage Assets: Historic Environment Good Practice Advice in Planning 3 (Historic England, 2017).

1092. As part of the EIA, a commercial search of the Lancashire HER will be undertaken, to provide the dataset on previously recorded non-designated heritage assets and events. Further research will also be undertaken to inform the baseline data, including assessment of archaeological archive reports, published archaeological articles, monographs and other sources.

1093. As part of the EIA process, the existing historic environment with respect to onshore archaeology and cultural heritage will be described, including, but not limited to the following:

- Designated heritage assets within 1km of the project's boundary and 3km of the Project Onshore Substation, as a starting point
  - This will inform a setting assessment of heritage assets identified as potentially being affected by the project onshore infrastructure through changes to their setting

Known non-designated heritage assets (including recorded buried archaeological remains/deposits and findspots) within 500m of the Onshore project boundary

1094. Identification of heritage assets potentially affected by the project onshore infrastructure will be undertaken through spatial analysis of the heritage data within a GIS framework.

1095. Initial consideration of the setting of heritage assets and any potential for impact upon their associated heritage significance will be undertaken as part of the setting assessment. This will be informed by site visits. A full consideration of, and conclusions regarding, setting impacts will be made in the final ES, following finalisation of the Project design.

1096. Identification of any areas which will potentially be subject to intrusive archaeological evaluation (as set out in Paragraph 1085) would be decided through consideration of the baseline data and non-intrusive surveys and would be discussed and agreed in consultation with the relevant Historic Environment Consultees.

1097. The EIA will be undertaken with reference to and/or in accordance with the following primary legislation, policy, standards and guidance:

- Ancient Monuments and Archaeological Areas Act 1979. (c.46)
- Planning (Listed Buildings and Conservations Areas) Act 1990). (c.9)
- NPPF Conserving and enhancing the historic environment. (Ministry of Housing, Communities & Local Government (2021)
- Planning Practice Guidance (PPG): Historic Environment (Ministry of Housing, Communities & Local Government (2019)
- The Historic Environment in Local Plans: Historic Environment Good Practice Advice in Planning 1 (Historic England, 2015a)
- Managing Significance in Decision-Taking in the Historic Environment: Historic Environment Good Practice Advice in Planning 2 (Historic England, 2015b)
- The Setting of Heritage Assets: Historic Environment Good Practice Advice in Planning 3 (Historic England, 2017)
- Standard and guidance for historic environment desk-based assessment (CIfA, 2020)
- Code of Conduct (CIfA, 2019)
- Principles of Cultural Heritage Impact Assessment in the UK, IEMA, IHBC and CIfA 2021

1098. The assessment will be supported by a series of related technical reports, annexes and appendices. The identification of these report requirements is ongoing. As a minimum these will include an Archaeological Desk Based Assessment (ADBA), undertaken to identify the currently recorded designated and non-designated heritage assets within defined study areas.

1099. The ADBA will include specialist sub-contractor assessment of aerial photography, LiDAR analysis and review of cartographic sources. This will include a historic map regression exercise of the Onshore Development Area and/or targeted parts of the Onshore Export Cable Route and Onshore Substation location.

1100. The map regression exercise will be undertaken to identify changes in land use throughout history and will provide further information on potential heritage assets to be present.

1101. Other technical reports to be produced which will inform the baseline environment, and ultimately inform assessment are:

- Priority Geophysical Survey(s)
- Initial Targeted Intrusive Evaluation (trial trenching), if/where required, relevant and undertaken pre-application:
    - This will be confirmed through progression of an iterative approach to survey work and ongoing consultation with the relevant Historic Environment Consultees
- Any archaeological and geoarchaeological approaches to be applied to engineering-led ground/site investigation, if/when applicable and undertaken:
    - For example: monitoring and/or watching briefs

1102. An initial settings assessment will also be undertaken as part of the ADBA, which will identify heritage assets and their associated heritage significance which could be affected by change in setting due to the project onshore infrastructure. This will follow the Historic England five-step approach (Historic England, 2017).

1103. Following the scoping stage, technical-level consultation with the relevant Historic Environment Consultees will begin. This will help to further identify and agree the primary methodologies and required surveys, present any initial findings and ensure potential historic environment issues are identified, discussed and considered during the EIA process.

3.7.8 Summary of Scoped In Impacts

1104. Table 3.26 outlines the impacts which are proposed to be scoped into the EIA. This may be refined as additional information and data become available.

Table 3.26 Summary of Potential Impacts Relating to Onshore Archaeology and Cultural Heritage.

Potential Impact	Construction	Operation	Decommissioning
Direct, physical, impacts to designated heritage assets	✓	x	✓
Direct, physical, impacts to non-designated heritage assets	✓	x	✓
Indirect, physical, impacts to designated heritage assets	✓	✓	
Indirect, physical, impacts to non-designated heritage assets	✓	✓	✓
Changes to the setting (temporary or more permanent) of designated heritage assets, which could affect their heritage significance.	✓	✓	✓
Changes to the setting (temporary or more permanent) of non-designated heritage assets, which could affect their heritage significance.	✓	✓	✓
Cumulative impacts	✓	✓	✓

Key:
✓ Impact scoped in
✗ Impact scoped out

3.8 Noise and Vibration

3.8.1 Introduction

1105. The Project has the potential to result in the following impacts upon onshore human and ecological receptors:

- Noise and vibration from the construction works
- Noise associated with increases in road traffic
- Noise from operation of the proposed Onshore Substation

1106. The above impacts on human receptors are considered within this section. Noise impacts on onshore ecological receptors are considered in Section 3.6.

3.8.2 Policy, Legislation and Guidance

1107. Section 1.5 describes the wider policy and legislative context for the Project. The noise and vibration assessment will be undertaken with due regard to the following national and local planning policy:

- Overarching NPS for Energy (EN-1) (DECC, 2011a)
- NPS for Renewable Energy Infrastructure (EN-3) (DECC, 2011b)
- NPS for Electricity Networks Infrastructure (EN-5) (DECC, 2011c)
- National Planning Policy Framework (UK Government, 2021)
- Noise Policy Statement for England (Defra, 2010)
- North Devon and Torridge Local Plan 2011 – 2031 (Torridge District Council, North Devon Council, 2018)

1108. The following legislation is potentially of relevance to the noise and vibration assessment:

- Environmental Noise (England) Regulations (Her Majesty's Stationary Office (HMSO), 2006)
- Environmental Protection Act (HMSO, 1990)
- Control of Pollution Act (HMSO, 1974)

1109. The noise and vibration assessment will be undertaken in accordance with the following standards and guidance:

- British Standard (BS) 4142:2014+A1:2019 – Method for Rating and Assessing Industrial and Commercial Sound (British Standards Institute (BSi), 2019)
- BS 8233:2014 Guidance on Sound Insulation and Noise Reduction for Buildings (BSi, 2014)
- BS 7445-1:2003 Description and measurement of environmental noise. Guide to quantities and procedures (BSi, 2003)
- BS 7445-2:1991 Description and measurement of environmental noise. Guide to the acquisition of data pertinent to land use (BSi, 1991)
- BS 5228-1:2009+A1:2014 Code of Practice for Noise and Vibration Control on Construction and Open Sites – Part 1: Noise (BSi, 2014)
- BS 5228-1:2009+A1:2014 Code of Practice for Noise and Vibration Control on Construction and Open Sites – Part 2: Vibration (BSi, 2014)
- BS 6472-1:2008 Guide to Evaluation of Human Exposure to Vibration in Buildings (BSi, 2008)

- Calculation of Road Traffic Noise (CRTN) (Department for Transport/Welsh Office, 1998)
- DMRB, LA111 Noise and Vibration, Revision 2 (Highways England, 2020)
- Guidelines for Community Noise (World Health Organisation (WHO), 1999)
- Night Noise Guidelines for Europe (WHO, 2009)
- Environmental Noise Guidelines for the European Region (WHO, 2018)

3.8.3 Study Area

1110. The maximum extent of the noise and vibration study area will be determined by the extent of the road network, which is utilised by the Project, and could extend significantly further than the footprint of the onshore infrastructure. At this stage, the full extent of the road network has yet to be determined, however the noise and vibration study area will be defined with reference to the DMRB as follows:

- Impacts of construction and operational noise will be considered at human receptors within 300m of construction works
- Impacts of construction vibration will be considered at human receptors within 100m of construction works
- Impacts of noise from road traffic will be considered where human receptors are located within 50m of roads which experience significant increases in traffic volumes (increase of 1dB in the Basic Noise Level as defined in the DMRB)

1111. The noise and vibration study area will be agreed with stakeholders prior to commencement of the assessment.

3.8.4 Baseline Data

1112. The noise and vibration assessment will utilise baseline data from the following sources:

- Baseline noise survey to be undertaken as part of the Project EIA
- Satellite imagery
- Ordnance survey mapping
- Strategic noise mapping (available to view at www.extrium.co.uk) undertaken under the requirements of the Environmental Noise (England) Regulations 2006
- Other information supplied by the Local Planning Authorities, such as details of any noise complaints or information from other planning applications in the vicinity

3.8.5 Baseline Environment

Baseline Noise

1113. The onshore study area lies within the jurisdiction of North Devon District Council (NDDC) and Torridge District Council (TDC). The study area is predominantly rural in nature with few major noise sources and therefore baseline noise levels are likely to be low. Baseline noise levels are likely to be higher at locations in proximity to the following identified noise sources across the study area:

- A39
- Royal Marines Barracks Chivenor

Sensitive Receptors

1114. Human sensitive receptors with respect to noise and vibration impacts are typically residential premises. It is also necessary to consider a wider range of receptors including schools, places of worship, noise sensitive commercial/industrial premises, historic buildings, spaces used for recreation. These receptors are classified according to their respective sensitivity in Table 3.27.

Table 3.27 Definitions of the different types and sensitivity levels for noise

Assigned Sensitivity	Definitions and Classification Type
High	Noise receptors have been categorised as high sensitivity where noise may be detrimental to vulnerable receptors. Such receptors include: Certain hospital wards (e.g. operating theatres or high dependency units) or care homes at night
Medium	Noise receptors have been categorised as medium sensitivity where noise may cause disturbance and a level of protection is required but a level of tolerance is expected. Such subgroups include: • Residential accommodation • Private gardens • Hospital wards • Care homes (during the day) • Schools • Universities • Research facilities • National parks (during the day) • Temporary holiday accommodation (including holiday lets)

Assigned Sensitivity	Definitions and Classification Type
Low	Noise receptors have been categorised as low sensitivity where noise may cause short duration effects in a recreational setting although particularly high noise levels may cause a moderate effect. Such subgroups include: • Offices • Shops (including cafes) • Outdoor amenity areas during the day (including recreation, public amenity space/play areas), long distance footpaths (including PRoW, dog walking routes, bird watching areas, footpaths and other walking routes, visitor attractions, cycling routes including rural roads) • Doctors' surgeries • Sports facilities • Places of worship
Negligible	Noise receptors have been categorised as negligible sensitivity where noise is not expected to be detrimental. Such subgroups include: • Warehouses • Light industry • Car parks • Agricultural land

1115. Noise and vibration sensitive receptors for the assessment of construction works impacts will be identified once the Onshore Export Cable Corridor is determined.

1116. Noise sensitive receptors for the assessment of construction traffic noise impacts will be identified once suitable traffic data is available.

1117. The nearest identified noise sensitive receptors to the proposed substation location are on the north side of West Yelland, over 400m away.

3.8.6 Potential Impacts

1118. The noise assessment is likely to have key inter-relationships with Seascape, Landscape and Visual, Air Quality, Onshore Ecology, Tourism and Recreation and Traffic and Transport. These will be considered where relevant.

Potential impacts during construction

1119. Noise and vibration emissions from the construction activities which could affect existing nearby noise sensitive receptors. Typically, noise and vibration generating activities are associated with:

- Earthworks
- Directional drilling

- Surface excavation and earth moving during cable laying and site preparation for the substation and other onshore infrastructure
- Temporary increases in Heavy Goods Vehicles (HGVs) delivering to site, operating in designated works areas and using haul routes
- Nearshore vessels and offshore cable laying activities
- Other general onshore construction activities

1120. Piling may also be used (if necessary) to provide a stable temporary platform for the drilling rigs at Landfall and along the onshore cable route at potential trenchless crossings.

1121. Construction noise effects will be temporary and will vary both spatially and temporally in nature across the onshore study area. The magnitude of impact is likely to depend on the scale of the proposed construction activities (e.g. number and type of plant and duration of works) and their proximity to noise and vibration sensitive receptors.

1122. Noise impacts can also occur due to changes in road traffic noise levels at noise sensitive receptors in proximity to routes used by construction traffic.

1123. It should be noted that the Onshore Substation for the Project is an existing substation at East Yelland. Therefore, the works associated with the construction of a substation is not required and is not considered within this noise assessment.

Potential impacts during operation

1124. Operational noise emissions from the proposed substation have the potential to impact on nearby sensitive receptors.

1125. The magnitude of impact depends on the proximity of the proposed onshore infrastructure to the noise sensitive receptors. As the nearest noise sensitive receptors are over 400m away from the proposed substation location, substation sound emissions are likely to be inaudible. Nevertheless, operational noise impacts have been scoped into the assessment.

1126. The operational vibration effects are considered negligible as industry standard requires the use of vibration isolation pads/mounts to prevent transmission of ground borne vibration. The Onshore Substation will be designed to achieve negligible levels of ground-borne vibration.

1127. Therefore, there will be no significant sources of vibration associated with the operational project and operational vibration impacts have been scoped out of the assessment.

Potential impacts during decommissioning

1128. It is anticipated that impacts associated with decommissioning would be similar in nature to those experienced during construction, although it is likely that there would be a lower magnitude of impact, particularly if some subsurface infrastructure is left in-situ. Hence, decommissioning noise impacts have been scoped out of the assessment.

Potential cumulative impacts

1129. Cumulative impacts will be considered as part of the ongoing EIA process and will be assessed in accordance with the approach to cumulative assessment is set out in Section 1.9.2. There is potential for cumulative effects at sensitive receptors where other schemes or activities within the project onshore scoping area occur at the same time as a result of:

- From construction phase road traffic noise and vibration on highway links used by the project and other schemes
- Site construction noise from other major infrastructure or road and rail projects in close proximity
- Noise or vibration impacts on proposed receptors which would be introduced by newly formed residential, commercial or industrial projects
- Operational noise impacts introduced by new industrial/commercial projects in proximity to receptors affected by Project operational noise

Potential transboundary impacts

1130. It is considered unlikely that there would be any significant noise impacts in EU Member States as a result of the Project, due to the localised nature of the noise sources. It is therefore proposed to scope out transboundary noise impacts.

Summary of potential impacts

1131. In summary, noise impacts may be experienced by human receptors during the construction and decommissioning phases which have the potential to be significant. Cumulative impacts may also be experienced. It is not expected that significant operational phase or transboundary impacts would occur; as such, it is proposed to scope these out of the assessment.

3.8.7 Mitigation Measures

Construction and Decommissioning Phases

1132. As a minimum, measures for the mitigation of construction impacts will comprise implementation of best practice mitigation measures by the construction contractor.

A Construction Environmental Management Plan (CEMP) will be prepared and implemented by the contractor, this will include the relevant noise criteria, proposed surveys and a range of best practice noise and vibration mitigation measures which are likely to include the following:

- Implementing processes to minimise noise before works begin and ensuring that BPM are being achieved throughout the construction programme, including the use of localised screening around significant noise producing plant and activities where appropriate
- Ensuring that modern plant is used, complying with the latest European noise emission requirements. Selection of inherently quiet plant where possible
- Use of lower noise and vibration piling (such as rotary bored or hydraulic jacking) rather than driven piling techniques if any piling is required, where possible
- Off-site pre-fabrication, where practical
- All plant and equipment being used for the works to be properly maintained, silenced where appropriate, operated to prevent excessive noise and switched off when not in use
- Ensuring contractors are made familiar with current legislation and the guidance in BS 5228 which should form a prerequisite of their appointment
- Loading and unloading of vehicles, dismantling of site equipment such as scaffolding or moving equipment or materials to be conducted in such a manner as to minimise noise generation
- Consultation with the Local Authority and local residents as appropriate to advise of potential noisy works that are due to take place
- Monitoring of any noise complaints and reporting to the contractor for immediate investigation

1133. During the construction phase, appropriate mechanisms to communicate with local residents should be set up to highlight potential periods of disruption (such as web-based, newsletters, newspapers or radio announcements), and an appropriate communication strategy should be developed.

1134. In addition, it is anticipated that the appointed contractor would be a member of the 'Considerate Constructors Scheme' which is an initiative open to all contractors undertaking building work.

1135. The preferred approach for controlling construction works noise and vibration is to reduce levels at source where possible, but with due regard to practicality. Sometimes a greater noise or vibration level may be acceptable if the overall construction/ demolition time, and therefore length of disruption, is reduced.

1136. Where feasible, alternative methods of working should be considered which may result in lower noise levels at receptors. Specifically, alternative methods of piling such as continuous flight auger or rotary bored piling should be considered.

1137. Where the assessment identifies the potential for significant adverse effects, additional site-specific measures should be considered. For example, localised solid site hoarding can be used to shield the receptors from the works. Solid hoarding can provide up to a 10 dB reduction in construction noise levels where the line of sight is completely blocked. At some locations it may not be feasible to install long-term hoarding due to the presence of individual accesses or the short duration of the activity. Therefore, temporary hoarding around individual plant / activities, combined with good communications with local residents, is considered the more practical approach.

1138. As with the best practice mitigation measures, any additional measures will be incorporated into the project CEMP.

1139. Impacts of construction vehicles on the local road network can be minimised via implementation of a Construction Traffic Management Plan.

1140. Mitigation measures applicable to the Project decommissioning phase are anticipated to be similar to those outlined for the construction phase. These will be determined at the time of the Project decommissioning and will depend on the definition of best practice measures at that time.

Operational Phase

1141. Operational noise impacts are likely to be controlled via a Project commitment including day and night-time noise level limits at the identified noise sensitive receptors which will be determined in accordance with BS 4142.

1142. Mitigation measures available to control the substation noise are as follows, presented in the preferred order of hierarchy:

- Select low noise equipment, to reduce noise at the source
- Tailor the detailed design layout to shield the surroundings from the noise
- Use local noise barriers in form of fences and/or mounds
- Noise enclosures for the equipment

1143. Details of the identified necessary noise mitigation measure (both engineered design measures, and additional noise mitigation measures if required) will be included in the final Project Design Plan.

3.8.8 Approach to Assessment and Data Gathering

Baseline Survey

1144. The baseline survey methodology and geographical extent will be discussed in advance with the relevant Environmental Health departments of the relevant Local Planning Authorities.

1145. Measurements will be undertaken in accordance with guidance detailed within BS 7445-2 and BS 4142.

1146. Survey locations will be representative of the potentially most affected noise sensitive receptors.

1147. Data collection will likely comprise a combination of short term attended and longer term (up to a week) unattended measurements. A weather station would also be deployed to identify site-specific meteorological conditions during the surveys.

Construction and decommissioning noise and vibration impact assessment

1148. The assessment of construction and decommissioning works noise and vibration impacts will refer to the guidance detailed in BS 5228 Part 1: Noise and Part 2: Vibration. The assessment will be based on the proposed construction phasing and associated activities, for example, cable installation, directional drilling works and piling.

1149. Noise levels at receptors due to the construction works will be calculated using the methods and guidance in BS 5228-1. This Standard provides methods for predicting receptor noise levels from construction works based on the number and type of construction plant and activities operating on site, with corrections to account for:

- The "on-time" of the plant, as a percentage of the assessment period
- Distance from source to receptor
- Acoustic screening by barriers, buildings or topography
- Ground type

1150. Vibration levels at receptors due to the construction works will be calculated where the works will be less than 100m away.

1151. Construction phase traffic noise impacts will be calculated as a Basic Noise Level (BNL) using the methodology detailed in CRTN. Impacts will be assessed using criteria from the DMRB.

Operational noise impact assessment

1152. Operational noise impacts will comprise emissions from the Onshore Substation. The assessment will be based on the guidance and methodology detailed in BS 4142. This standard details a method for rating the acceptability of increases in existing noise levels at noise-sensitive receptors affected by noise from fixed plant at proposed developments such as the reactors, filters, and transformers in the Onshore Substation. If details of fixed plant are not available, a recommendation of maximum noise levels from fixed plant based on measured background noise levels will be made.

3.8.9 Summary of Scoped In Impacts

Table 3.28 Summary of impacts relating to noise and vibration

Potential Impact	Construction	Operation	Decommissioning
Noise and vibration from works affecting human receptors	✓	x	✓
Road traffic noise affecting human receptors	✓	x	✓
Substation noise and vibration emissions affecting human receptors	x	✓	x
Cumulative impacts	✓	x	✓
Transboundary impacts	x	x	x

Key:
✓ Impact scoped in
✗ Impact scoped out

3.9 Traffic and Transport

3.9.1 Introduction

1153. This section of the Scoping Report identifies the potential effects of construction, operation and maintenance, and decommissioning of the Project on traffic and transport receptors.

3.9.2 Policy, Legislation and Guidance

1154. Section 1.5 describes the wider policy and legislative context for the Project. The Highways Act 1980 places the duties and powers on the highway authorities to manage the highway networks in England and Wales. This would be the primary legislation for governing the Projects traffic proposals.

1155. The Town and Country Planning (Environmental Impact Assessment) Regulations 2017 Sets out the statutory procedures for undertaking an Environmental Impact Assessment associated with a development application under the Town and Country Planning Act.

1156. The National Planning Policy Framework (NPPF) (Ministry of Housing, Communities and Local Government, updated July 2021) is the primary source of national planning guidance in England.

1157. Table 3.29 provides a summary of the relevant policy tests and how the application will be developed in response.

Table 3.29 Summary of NPPF Policy Relevant to Traffic and Transport

NPPF Paragraph	Response
Paragraph 111 of the NPPF states that "development should only be prevented or refused on highways grounds if there would be an unacceptable impact on highway safety, or the residual cumulative impacts on the road network would be severe.	An EIA Traffic and Transport Chapter will be produced in support of the application. The EIA will assess the Projects impacts (including highway safety and cumulative impacts) to ensure that residual impacts are not significant in EIA terms (i.e. no greater than minor adverse). It is reasoned that impacts that are assessed as minor adverse would not be considered to be severe.
Paragraph 113 of the NPPF states that "All developments that will generate significant amounts of movement should be required to provide a travel plan, and the application should be supported by a transport statement or transport assessment so that the likely impacts of the proposal can be assessed".	It is proposed that rather than produce a separate Transport Assessment/Statement, the application would be supported by an EIA traffic and transport Chapter. This chapter would include the requisite transport assessment detail as required by the relevant PPG. With regards to the requirements to provide a travel plan, Section 3.9.5 outlines that there would not be a significant operational traffic demand and as such, it would be proposed scope out this phase and not produce an operational travel plan. It would however be proposed to discuss with Devon County Council if a construction phase travel plan (commonly known as a Construction Traffic Management Plan) would be required to support the application, or whether this could be conditioned until such point as a contractor is appointed.

1158. The principal guidelines for the assessment of the environmental impacts of road traffic associated with new developments are the 'Guidelines for the Environmental Assessment of Road Traffic' (GEART) published by the Institute of Environmental Assessment in January 1993.

1159. The guidance provides a framework for the assessment of traffic borne environmental impacts (outlined in Section 3.9.7) supplemented by the technical transport guidance outlined in Table 3.30.

Table 3.30 Supplementary Technical Transport Guidance

Document	Purpose/Application
Planning Practice Guidance (PPG) - Travel Plans, Transport Assessment and Statements (Ministry of Housing Communities and Local Government, March 2014)	Provides overarching guidance upon the structure of transport assessments and travel plans.
Design Manual for Road and Bridge, CD 123 - Geometric design of at grade priority and signal-controlled junctions (Highways England, August 2020)	Provides the standards for the design of new points of access.
Manual for Streets (Department for Transport, September 2007) and Manual for Streets 2 (Chartered Institute of Highways and Transportation September 2010)	Guidance to inform the visibility requirements for new points of access where the speed limit or measured speeds are below 40mph.
Traffic Signs Manual Chapter 8 Traffic Safety Measures and Signs for Road Works and Temporary Situations Part 1: Design (Department for Transport, 2009)	Provides guidance upon temporary traffic management that will be used to inform the assessment of driver delay impacts related to temporary traffic management/ road closures.

3.9.3 Study Area

1160. The Windfarm Site is located approximately 52km off the North Devon coast (west-north-west of Hartland Point). The Offshore Export Cable will connect the Offshore Substation Platform to shore. The Export Cable will come ashore at a Landfall and then be routed underground to the Onshore Substation where it connects into the Western Power Distribution Network at the existing East Yelland connection point.

1161. At this scoping stage, a preferred port for the offshore construction and maintenance of the Project has yet to be selected. Therefore, the study area does not extend to the consideration of potential ports. Such facilities would typically be provided or brought into operation by means of one or more planning applications or as port operations with permitted development rights.

1162. The electricity generated by the Project would be transferred to shore by export cable to the Landfall location.

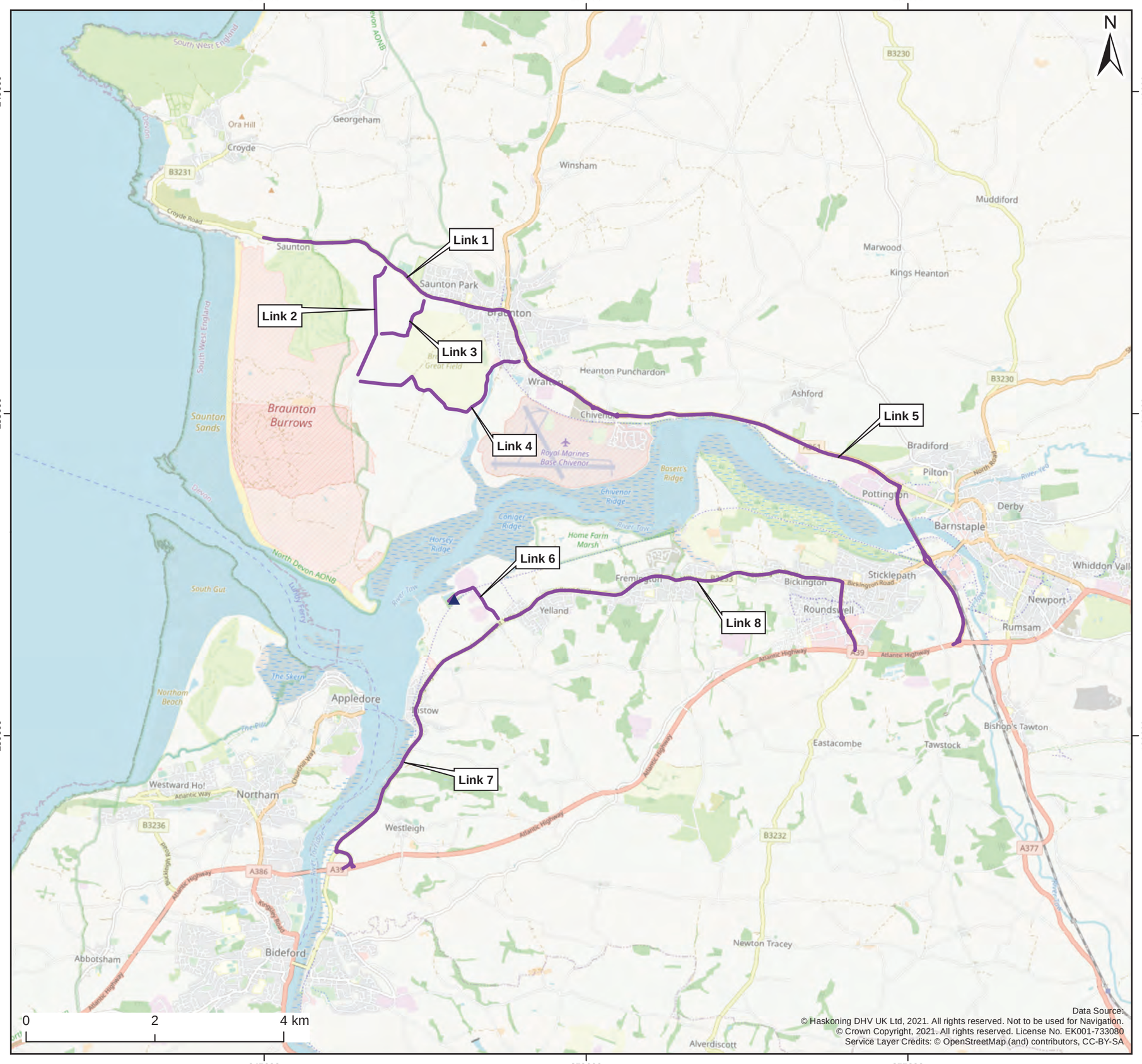
1163. Site selection is currently ongoing, however a proposed option is that the Offshore Export Cable would make Landfall close to Saunton Sands. The onshore cable would then continue in a southerly direction (parallel to Braunton Burrow) before crossing under the River Taw to connect to the existing Onshore Substation at East Yelland, where power would then be transferred to the distribution grid.

1164. An 'initial' traffic and transport study area is therefore proposed that includes key roads between the Landfall location and East Yelland. The key roads forming the initial traffic and transport study area and their intended function are outlined in Table 3.31. The initial traffic and transport study area is also depicted graphically in Figure 3.9.1.

1165. Section 3.9.7 includes details of the approach that would be adopted to refining the traffic and transport study area.

Table 3.31 Traffic and Transport Study Area

Link	Road Name	Purpose
1	B3231 Saunton Road.	The B3231 would provide the main access route for construction traffic to the Landfall works and the sections of onshore cable route to the north of the River Taw.
2	Blind Acres Lane/ Burrow Close Lane/ Sandy Lane	Links 2 – 4 all provide potential options to access the section of onshore cable route between the Landfall and River Taw. Access to the wider highway network would be provided from the B3231.
3	Moor Lane/ Sandy Lane	
4	Velator Road/ Sandy Lane	
5	A361	The A361 provides the main link from the B3231 to the wider highway network.
6	Unnamed Road	Link 6 would provide the main means of access to the Onshore Substation and site to install the onshore cable under the River Taw.
7	B3233 West Yelland (west of Link 6)	It is proposed that all HGV traffic travelling to link 6 would be expected to access the A39 via Instow.
8	B3233 West Yelland (east of Link 6)	It is forecast that a proportion of the employee traffic travelling to link 6 would be expected to access the A39 via Yelland, Fremington and Bickington.
9	A3125	Traffic travelling via link 8 would link to the A39 via the A3125.



Legend:

- Potential Grid Connection Location
- Links Forming the Traffic and Transport Study Area

Client:	Project:
Offshore Wind Ltd.	White Cross Offshore Windfarm

Title:

Traffic and Transport Study Area

Figure: 3.9.1 | Drawing No: PC2978-RHD-ZZ-XX-DR-Z-0108

Revision:	Date:	Drawn:	Checked:	Size:	Scale:
P01	16/12/2021	AB	CB	A3	1:60,000

Co-ordinate system: British National Grid

WHITE CROSS

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3.9.4 Baseline Environment and Data

1166. The following section provides a review of the baseline environment in relation to the initial traffic and transport study area. To date, the baseline environment has been characterised using the data sources set out in Table 3.32. Further evaluation of the existing environment would be undertaken once the traffic and transport study area is finalised and agreed.

Table 3.32 Data Sources Used to Define the Traffic and Transport Baseline Environment

Data Source	Data Contents
Department for Transport road traffic statistics - https://roadtraffic.dft.gov.uk	Annual average 2019 traffic counts for all main 'A' roads
Google Maps, Bing Maps, etc.	Online mapping
Sustrans – https://www.sustrans.org.uk/national-cycle-network	Details of national cycle routes

Highway Network

Link 1

1167. Link 1, the B3231 comprises of a main 'B' road from Saunton in the west to Braunton in the east. To the east of Saunton Sands the road is a single carriageway road subject to a 30 and 40 mph speed limit. No footway or cycleway is provided alongside the road until Braunton.

1168. Within the built up area of Braunton, the speed limit is 30mph and footways are provided initially on the northern side of the road and then on both sides of the road. On road cycle lanes are provided along the B3231 from Moor Lane to Field Lane. Within the centre of Braunton controlled pedestrian crossings are also provided.

Link 2, 3 and 4

1169. Three potential routes exist from the B3231 (link 1) to the section of cable route that would be located between the Landfall and the River Taw.

1170. All three routes comprise of narrow single-track roads with informal passing places. No footways or cycleways are provided along the links.

1171. Links 2, 3 and 4 all converge on to Sandy Lane which provides an access to the Sandy Lane car park. It is understood that the entrance to this car park forms the extent of the public highway and access beyond this would be via private access road (known as American Road).

1172. To the south of the Sandy Lane car park, American Road also comprises of the South West Coast Path (bridleway).

Link 5

1173. Link 5, the A361 comprises of a main A road from Braunton towards Barnstaple and the A39.

1174. To the south of Braunton the A361 is a single carriageway road subject to a 30mph speed limit with footways on both sides of the road linked by controlled and uncontrolled pedestrian crossings. There are also sections of on road cycleway along this section of the A361.

1175. The section of the A361 between Wrafton and Chivenor is subject to a 30mph speed limit and a footway is generally provided on the northern side of the road. East of Chivenor the A361 is initially a single carriageway road subject to a 40mph speed limit, before widening to a dual carriageway close to the junction with Strand Road. No footways or cycleways are provided along this section of the A361.

1176. The A361 proceeds south from its junction with Braunton Road across the River Taw (via a bridge) before linking to the A3125 and A39. Close to the A39, the A361 carries in the region of 24,608 vehicles per day of which 678 are HGVs.

1177. In addition to the existing footways and cycleways alongside the A361, National Cycle Route (NCR) 27 also runs parallel to the A361 along the route of an old railway line. NCR 27 provides an off-road shared use pedestrian footway from Braunton to Barnstaple and intersects with NCR 3 near Sticklepath.

Link 6

1178. Link 6 is an unnamed single carriageway road that runs north from the B3233 towards Yelland Quay, the East Yelland substation and the Sandbanks Business Park. A footway is provided along the eastern side of the road from the junction with the B3233.

1179. To the north of link 6, the road is crossed by the South West Coast Path and NCR 3. The South West Coast Path and NCR3 provide an off-road shared use footway cycleway that runs parallel to the B3233 and follows the alignment of an old railway.

Link 7

1180. Link 7 (the B3233) is a single carriageway B road that provides a link from Yelland west towards the A39. The B3233 carries in the region of 6,586 vehicles a day, of which 72 are HGVs.

1181. Within Yelland the road is subject to a 40mph speed limit and a footway is provided on the northern side of the road to its junction with Welch's Lane. South of Welch's Lane, an area of the carriageway is demarcated for pedestrians (by a white line) to its junction with Rectory Lane.

1182. Through the village of Instow the B3233 is subject to a 30mph speed limit and footways are generally provided on both sides of the road. To the south of Instow the speed limit increases to 60mph and no footways are provided.

Link 8

1183. Link 8, the B3233 is a single carriageway B road that provides a link from Yelland east towards the A3125.

1184. Within Yelland the road is subject to a 40mph speed limit and a footway is generally provided on both sides of the road.

1185. Within Fremington and Bickington, the speed limit is 30mph and there are footways along both sides of the road. These footways are also linked by a series of controlled and uncontrolled crossings.

Link 9

1186. Link 9, the A3125 comprises of a main A south from the B3233 to the A39 and carries in the region of 21,533 vehicles a day, of which 236 are HGVs.

1187. The A3125 is a single carriageway road subject to a 30mph speed limit. In the vicinity of the Rounds Well Retail Park, shared use footway cycleways are provided alongside the road, linked by a controlled Toucan crossing.

Rail and Sea

1188. Within the traffic and transport study area, there is an existing port facility at Yelland Quay, alongside the River Taw and adjacent to the East Yelland substation. It is considered that this facility could facilitate the movement of project cargoes by water rather than road.

1189. Given the location of Yelland Quay adjacent to the East Yelland substation, the use of the facility could reduce HGV movements associated with the import of materials for those works that are south of the River Taw. Works north of the River Taw would however require deliveries (to Yelland Quay by water) to be transported onwards by road.

1190. No other suitable ports or rail freight facilities have been identified within the vicinity of the traffic and transport study area.

3.9.5 Potential Impacts

Potential impacts during construction

1191. The construction phase will result in a requirement for the import/export of materials and plant, however, at this stage, no information is available with regards to final construction traffic numbers.

1192. Section 1.8 identifies that there is the potential for deliveries to the Onshore Substation and works south of the River Taw to be transported by water direct to Yelland Quay, thus potentially reducing HGV movements. However, in order to consider a worst case, it would be assumed that all deliveries would be by road.

1193. In addition to providing a potential source for deliveries to the works south of the River Taw, materials could also be delivered direct to Yelland Quay and then transported by road to construct the works north of the river. It is considered that these movements (via link 6 and 7) would be within the permitted development consents of the facility and would therefore not need to be assessed separately.

1194. With regards to employee movements, it would be assumed that as a worst case, all employees would drive themselves to and from work, i.e. no use of sustainable transport or car-sharing, etc.

1195. It would be assumed that all construction employees and HGV deliveries for the Project would have an origin and destination outside of the traffic and transport study area, i.e. arriving and departing via the A39.

1196. Table 3.33 sets out the potential construction traffic impacts and the likely user groups that would be affected.

Table 3.33 Potential Construction Traffic Impacts

Potential Impact	Potential Impact of Construction Traffic	Affected user groups
Driver delay	Increases in traffic leading to delays at junctions; and Construction traffic using narrow roads resulting in increased delays.	Commuters, visitors, and business users.
Road safety	Construction traffic impacting upon sites with a history of collisions and / or the introduction of new risks associated with the formation of new construction accesses.	Commuters, visitors, and business users.
Severance and Amenity	Increases in traffic impacting upon non-motorised users of the public highway.	Local communities and tourists in the area.

Potential Impact	Potential Impact of Construction Traffic	Affected user groups
Abnormal loads	Increases in large vehicle movements leading to delays to traffic and the suitability of the delivery routes to accommodate abnormal load deliveries.	Commuters, visitors, and business users.

1197. Traffic borne impacts upon noise and vibration and air quality are considered separately in Section 3.8 and Section 3.3 respectively.

1198. The preferred base port (or ports) for the offshore construction of the Project is not known and any decision would not be expected until post-consent.

1199. Such facilities would typically be provided or brought into operation by means of one or more planning applications or as port operations with permitted development rights. To ensure that any potential impacts associated with the Projects offshore construction and operational phases (including cumulative impacts) are assessed and mitigated, OWL would be willing to be conditioned to the production of a Port Traffic Management Plan once the final location of the preferred base port (or ports) is known.

1200. Recognising the commitment to producing a Port Traffic Management Plan, it is proposed to scope out of the assessment the onshore impacts of the traffic and transport impacts associated with offshore construction activities.

Potential impacts during operation

1201. The Onshore Substation is not expected to be permanently manned; however, the Onshore Substation will require periodic maintenance visits during the operational phase, this may be carried out by Western Power Distribution / OFTO. Depending on the type of inspection, maintenance or repair access will be achieved using either lightweight vehicles or HGVs.

1202. There is expected to be minimal maintenance of the Onshore Export Cable during the operational phase. Typically, every two to five years, there will be periodic testing of the cable which involves access to the link boxes along the entire onshore route. With regards to equipment, access can be achieved using lightweight vehicles.

1203. Considering the activities above, no significant traffic and transport impacts are anticipated during the operational phase and it is therefore proposed that this phase will be scoped out of the assessment.

1204. Similar to the construction phase, no decision has been made on a preferred base port for the offshore operation and maintenance of the Project. Therefore, it is proposed to scope out of the assessment the onshore traffic and transport impacts of offshore operation and maintenance activities.

Potential impacts during decommissioning

1205. No decision has been made regarding the final decommissioning policy for the substation, as it is recognised that industry best practice, rules and legislation change over time. However, the substation equipment will likely be removed and reused or recycled. The onshore cable could either be left in-situ or removed from ducts.

1206. The detail and scope of the decommissioning works will be determined by the relevant legislation and guidance at the time of decommissioning and agreed with the regulator. A decommissioning plan would be provided.

1207. It is anticipated that decommissioning impacts would be similar in nature to those of construction. It is likely that the magnitude of the effects from decommissioning will be lower than that of construction impacts.

Potential cumulative impacts

1208. Cumulative impacts will be considered as part of the ongoing EIA process and will be assessed in accordance with the approach to cumulative assessment is set out in Section 1.9.2. Consultation with Devon County Council (as the local highway authority) will seek to identify any significant developments that could have a cumulative impact with the construction phase, e.g. major road improvement schemes, Nationally Significant Infrastructure Projects, large residential development over 100 homes, etc.

1209. The assessment would consider the potential for significant cumulative impacts to arise because of the construction of the Project in the context of other developments that are existing, consented or at the application stage.

Potential transboundary impacts

1210. There are no transboundary impacts with regard to traffic and transport as the onshore infrastructure is within the UK and is not located near to any international boundaries. It is therefore proposed that transboundary impacts are scoped out of the assessment.

Summary of potential impacts

1211. A summary of potential impacts is provided in Section 3.9.8.

3.9.6 Mitigation Measures

1212. The transportation of materials and work force will be considered during the development of the Project. During the development of the Project, consideration will be given to in design mitigation (known as embedded mitigation) to reduce the potential impacts of the Project, examples could include:

- Developing an access strategy to ensure potential access locations are safe
- Considering the selection of delivery routes avoid the sensitive communities where possible
- Reducing peak traffic demand through stockpiling of materials and scheduling of activities
- Considering the potential for car-sharing or use of sustainable transport by employees

1213. Having applied the embedded mitigation measures to the Project, the EIA will determine the requirement for the implementation of any further mitigation measures to reduce the significance of the impact to transport receptors.

1214. If it is assessed that there is the potential for significant impacts to arise, mitigation measures could be introduced to reduce the significance of the impact to an acceptable level (however this will be fully investigated during the environmental assessment).

1215. Noting the temporal nature of the potential impacts, the following types of mitigation (if required) would be prioritised over hard engineering solutions (e.g. road widening and new junctions):

- Defining and enforcing delivery routes and avoiding sensitive periods, e.g. school start and finish times
- The use of pilot/escort vehicles to guide HGVs along narrow lanes, or improving/widening existing passing places
- Investigating the potential to transport construction materials by water rather than road
- Committing to the development of a Construction Traffic Management Plan to manage deliveries to avoid certain times, or use only defined routes
- Committing to repair or make good any damage caused to existing highways due to construction traffic movements

1216. The above list is not intended to represent an exhaustive list of potential mitigation measures; however, such mitigation measures have potential to effectively manage the impacts upon transport receptors.

3.9.7 Approach to Assessment and Data Gathering

Approach to Assessment

1217. GEART suggests the following rules to define the extent and scale of the assessment required:

- Rule 1: Include highway links where traffic flows are predicted to increase by more than 30% (or where the number of HGVs is predicted to increase by more than 30%)
- Rule 2: Include any other specifically sensitive areas where traffic flows, or the number of HGVs are predicted to increase by 10% or more

1218. The above criteria applied to the Projects traffic demand will dictate the extent of the final traffic and transport study area and the scale of the impact assessment. Changes in traffic flows below the GEART rules are assumed to result in negligible, environmental impacts and would not be assessed further.

1219. The exception to GEART Rule 1 and 2, is the consideration of the impacts upon driver delay and road safety. These impacts can be potentially significant when high baseline traffic flows are evident, and a lower change in traffic flow can be potentially significant and therefore GEART rules would not be applied.

Data Gathering

1220. To date, the existing baseline has been characterised using the data sources set out in Section 3.9.4.

1221. To facilitate the impact assessment, the following additional data will also be obtained:

- Baseline traffic flow data for all roads within the traffic and transport study area
- Details of sensitive receptors (as defined within Table 3.34)
- Collision data for the latest five-year period for all roads within the traffic and transport study area
- Existing pedestrian/ cycle/ bus routes
- Trip generation, including number and type of construction vehicles and employee trips

1222. To comply with Department for Transport (DfT) guidance, traffic surveys informing the EIA should be representative of typical neutral conditions (e.g. outside of school holidays). Thus, any traffic data obtained from the DfT Road Statistics website would utilise 2019 traffic data that would have been unaffected by the Covid-19 pandemic.

1223. It is considered that any additional baseline traffic surveys undertaken post November 2021 would be accepted as being representative of baseline conditions. It would therefore be proposed that no uplift factors are applied to this data to account for changes in traffic as a result of Covid-19. This is on the proviso that no future restrictions on travel are to be re-introduced such as 'Stay at Home' orders.

1224. It is proposed that the latest five-year period will be adopted for collision analysis to identify collision clusters and better understand any causation factors. It is considered that this should include years affected by Covid-19, as national evidence suggests that even though less total collisions occurred during Covid-19, a higher proportion of collisions involved vulnerable road users. This will be discussed and agreed with Devon County Council.

Identification of Sensitive Locations

1225. The sensitivity of a road can be defined by the type of user groups who may use it. GEART identifies that it is useful to identify particular groups or locations which may be sensitive to changes in traffic conditions and provides a checklist of sensitive locations and groups; however, the list is not exhaustive and can be added to by the assessor.

1226. Applying the GEART principles, Table 3.34 provides broad definitions of the different sensitivity levels that would be adopted for the assessment.

Table 3.34 Example Definitions of the Different Sensitivity Levels

Sensitivity	Severance and Amenity	Driver Delay	Highway Safety
High	High concentrations of sensitive receptors (e.g. hospitals, schools, areas with high footfall) and limited separation provided by the highway environment; or a low concentration of sensitive receptors and no separation from traffic provided by the highway environment.	Junctions operating at or over capacity and / or roads less than 5.5m wide with no passing places provided.	Links with collision rates above national averages and / or collisions clusters with emerging patterns of collisions.
Medium	A low concentration of sensitive receptors (e.g. residential dwellings, pedestrian desire lines, etc.) and some separation from traffic provided by the highway environment.	Junctions or links operating close to capacity and or roads less than 5.5m wide but with passing places provided.	Links with collision rates close to national averages and / or collision clusters.
Low	Few sensitive receptors and / or highway environment can	Junctions or links with spare capacity	Links with collision rates lower than

Sensitivity	Severance and Amenity	Driver Delay	Highway Safety
	accommodate changes in volumes of traffic.	and / or roads in excess of 5.5m in width.	national averages and / or no collision clusters.
Negligible	Links that fall below GEART Rule 1 and 2 screening thresholds and major 'A' roads or motorways with no pedestrian or cycle environment.		

Impact Assessment Process

1227. Construction traffic demand will be derived by way of a 'first principles' approach whereby traffic generation is calculated from an understanding of likely material demand and resourcing requirements.

1228. The Projects traffic demand would be assigned to the highway links within the traffic and transport study area and the increase in traffic flow to baseline conditions determined. This would facilitate an assessment of the magnitude of effect by applying the thresholds in Table 3.35 to inform a detailed evaluation of potential impacts.

Table 3.35 Magnitude of Effect Thresholds

Sensitivity	Severance and Amenity	Driver Delay	Highway Safety	
Severance	Change in total traffic flow of less than 30%	Change in total traffic flow of 30-60%	Change in total traffic flow of 60-90%	Change in total traffic flows of over 90%
Amenity	Change in traffic flow (or HGV component less than 100%)		Greater than 100% increase in traffic (or HGV component) and a review based upon the quantum of vehicles, vehicle speed and pedestrian footfall	
Driver delay	Informed by a review of the potential increase in peak hour traffic through sensitive junctions and links.			
Highway Safety	Informed by a review of existing collision records from within the traffic and transport study area and the forecast increase in traffic.			
Abnormal Loads	Informed by an assessment of the suitability of the access routes to accommodate abnormal loads.			

1229. The magnitude of effect (Table 3.35) would then be combined with the receptor sensitivity (Table 3.34) to determine the overall impact of the Projects traffic in accordance with the impact assessment matrix (Table 1.16).

3.9.8 Summary of Scoped In Impacts

1230. Based on the information available to date, the potential traffic and transport impacts to be assessed are presented in Table 3.36.

Table 3.36 Summary of impacts relating to Traffic and Transport

Potential Impact	Construction		Operation		Decommissioning	
	Onshore Works	Offshore Works	Onshore Works	Offshore Works	Onshore Works	Offshore Works
Severance	✓	x	x	x	✓	x
Amenity	✓	x	x	x	✓	x
Driver delay	✓	x	x	x	✓	x
Highway safety	✓	x	x	x	✓	x
Abnormal loads	✓	x	x	x	✓	x
Cumulative Impacts	✓	x	x	x	x	x
Transboundary Impacts	x	x	x	x	x	x

Key:
✓ Impact scoped in
✗ Impact scoped out

3.10 Onshore Landscape and Visual Amenity

3.10.1 Introduction

1231. This section of the Scoping Report identifies the landscape and visual receptors of relevance to the Onshore Development Area for the Project. It considers the potential landscape and visual impacts arising from the construction, operation (including maintenance), and decommissioning of the Project's onshore infrastructure and defines the proposed scope of the Landscape and Visual Impact Assessment (LVIA) and the proposed methodology.

1232. The Seascape, Landscape, and Visual Impact Assessment (SLVIA) (Section 2.12.8) will consider effects of the Offshore Windfarm components.

1233. The LVIA is intended to determine the effects that the Project would have on the landscape and visual resource. For the purpose of assessment, the potential effects on the landscape and visual resource are grouped as follows.

- Physical effects: physical effects are restricted to within the Onshore Development Area and are also referred to as 'direct' effects. This category of effects is made up of landscape elements and features, which are the components of the landscape fabric
- Effects on landscape character and landscape planning designations: landscape character is the distinct and recognisable pattern of elements that occurs consistently in a particular type of landscape and the way that this pattern is perceived. Effects on landscape character arise either through the introduction of new elements that physically alter this pattern of elements or through visibility of the Project that may alter the way in which the pattern of elements is perceived
- Effects on key visual receptors and views: the assessment of the effects on views is an assessment of how the introduction of the Project would affect views throughout the Study Area. The LVIA will include a baseline assessment of the relevant key visual receptors and assess the potential impacts of the onshore infrastructure in respect of the different types of viewers. The visual assessment will be based on a series of representative viewpoints. These viewpoints will be chosen to provide a cross-section of receptor types and locations within the Study Area, focused on those with the potential for significant effects

3.10.2 Policy, Legislation and Guidance

Policy

National Planning Policy Framework

1234. The revised (July 2021) National Planning Policy Framework (NPPF) sets out the Government's planning policies for England and how these are expected to be applied.

1235. In relation to landscape and visual matters, Section 12: Conservation and enhancing the natural environment, paragraph 174, states that planning policies and decisions should contribute to and enhance the natural and local environment by:

> "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);

b) recognising the intrinsic character and beauty of the countryside, and the wider benefits from natural capital and ecosystem services – including the economic and other benefits of the best and most versatile agricultural land, and of trees and woodland;
c) maintaining the character of the undeveloped coast, while improving public access to it where appropriate;
d) minimising impacts on and providing net gains for biodiversity, including by establishing coherent ecological networks that are more resilient to current and future pressures;
e) preventing new and existing development from contributing to, being put at unacceptable risk from, or being adversely affected by, unacceptable levels of soil, air, water or noise pollution or land instability. Development should, wherever possible, help to improve local environmental conditions such as air and water quality, taking into account relevant information such as river basin management plans; and
f) remediating and mitigating despoiled, degraded, derelict, contaminated and unstable land, where appropriate."

1236. The NPPF states at paragraph 175:

"Plans should: distinguish between the hierarchy of international, national and locally designated sites; allocate land with the least environmental or amenity value, where consistent with other policies in this Framework; take a strategic approach to maintaining and enhancing networks of habitats and green infrastructure; and plan for the enhancement of natural capital at a catchment or landscape scale across local authority boundaries."

1237. In relation to nationally designated landscapes, paragraphs 176 and 177 state:

[176] Great weight should be given to conserving and enhancing landscape and scenic beauty in National Parks, the Broads and Areas of Outstanding Natural Beauty which have the highest status of protection in relation to these issues. The conservation and enhancement of wildlife and cultural heritage are also important considerations in these areas, and should be given great weight in National Parks. Where significant development of agricultural land is demonstrated to be necessary, areas of poorer quality land should be preferred to those of a higher quality…The scale and extent of development within all these designated areas should be limited, while development within their setting should be sensitively located and designed to avoid or minimise adverse impacts on the designated areas…

[177] When considering applications for development within National Parks, the Broads and Areas of Outstanding Natural Beauty, permission should be refused for major development other than in exceptional circumstances, and where it can be demonstrated that the development is in the public interest. Consideration of such applications should include an assessment of:

a) the need for the development, including in terms of any national considerations, and the impact of permitting it, or refusing it, upon the local economy;

b) the cost of, and scope for, developing outside the designated area, or meeting the need for it in some other way; and

c) any detrimental effect on the environment, the landscape and recreational opportunities, and the extent to which that could be moderated."

1238. In relation to Heritage Coasts, paragraph 178 of the NPPF states:

"Within areas defined as Heritage Coast (and that do not already fall within one of the designated areas mentioned in paragraph 176), planning policies and decisions should be consistent with the special character of the area and the importance of its conservation. Major development within a Heritage Coast is unlikely to be appropriate, unless it is compatible with its special character."

1239. In respect of Ancient Woodland, NPPF paragraph 180 (c) states:

"…development resulting in the loss or deterioration of irreplaceable habitats (such as ancient woodland and ancient or veteran trees) should be refused, unless there are wholly exceptional reasons and a suitable compensation strategy exists…"

National Planning Statements

1240. National Planning Statements EN-1 and EN-3 set out the overarching policy for Energy and Renewable Energy Infrastructure respectively. Whilst reiterating the importance of nationally important landscapes and consideration of the effects on them it is noted at 5.9.13 of EN-1 that "*The fact that a proposed project will be visible from within a designated area should not in itself be a reason for refusing consent.*" The importance of sensitive design given the various siting, operational, and other relevant constraints is also set out. The consultation drafts of the revised versions of EN-1 and EN-3 make further reference to the importance of good design of new energy infrastructure projects.

Local Planning Policy

1241. At the local level, the Local Development Plan for the onshore LVIA Study Area is the North Devon and Torridge Local Plan 2011-2031, which was formally adopted by North Devon Council and Torridge District Council on 29th October 2019.

Legislation

1242. The relevant regulations for carrying out EIA are set out in the Town and County Planning (Environmental Impact Assessment) Regulations 2017 (as amended) (the 'EIA Regulations').

1243. Of relevance to the Project is primary legislation relating to Areas of Outstanding Natural Beauty, provided by the 1949 National Parks and Access to the Countryside Act. The Countryside and Rights of Way (CRoW) Act 2000 subsumes and strengthens the 1949 Act.

Guidance

1244. The assessment will be undertaken in accordance with the methods outlined in the following good practice documents:

- The Landscape Institute and Institute of Environmental Management and Assessment (2013) Guidelines for the Assessment of Landscape and Visual Impacts. Third Edition (GLVIA 3)
- Landscape Institute (2019) Visual Representation of Development Proposals, Technical Guidance Note 06/19 (TGN 06/19)
- Landscape Institute (2021) Assessing landscape value outside national designations (TGN 02/21)
- Planning Inspectorate (2018) Advice Note Nine: Rochdale Envelope
- Planning Inspectorate (2019). Advice Note Seventeen: Cumulative effects assessment relevant to nationally significant infrastructure projects
- Natural England (2014) An Approach to Landscape Character Assessment
- Natural England (2012) An Approach to Seascape Character Assessment
- Natural England (2019) An approach to landscape sensitivity assessment – to inform spatial planning and land management

3.10.3 Study Area

1245. In respect of defining the LVIA Study Area for the onshore elements of the Project, the GLVIA 3 provides the following guidance: "*The study area should include the site itself and the full extent of the wider landscape around it which the proposed development may influence in a significant manner*". GLVIA 3 requires that Study Areas be agreed with the competent authority, albeit with recognition that these

may change through the course of a project in response to findings of fieldwork or design changes.

1246. In line with this guidance, the indicative extent of the LVIA Study Area for the onshore elements of the Project is presented as part of this Scoping Report and covers the following:

- 1km radius Study Area around the area of search for the Landfall and Onshore Export Cable Corridor

1247. The LVIA Scoping Report Study Area is shown on Figure 3.10.1.

1248. Based on a review of the landscape and visual context, the current understanding of the Project and professional experience, it is considered that whilst the Project onshore infrastructure may be visible at greater distances, significant effects on the landscape and visual resource will not occur beyond the boundaries of the Study Area presented.

1249. The Study Area for the LVIA will be revised once the preferred Landfall and Onshore Export Cable Corridor have been identified to ensure it is considered appropriate in relation to these more specific locations. Any refinement of this approach in the context of landscape and visual receptors will be addressed in the EIA.

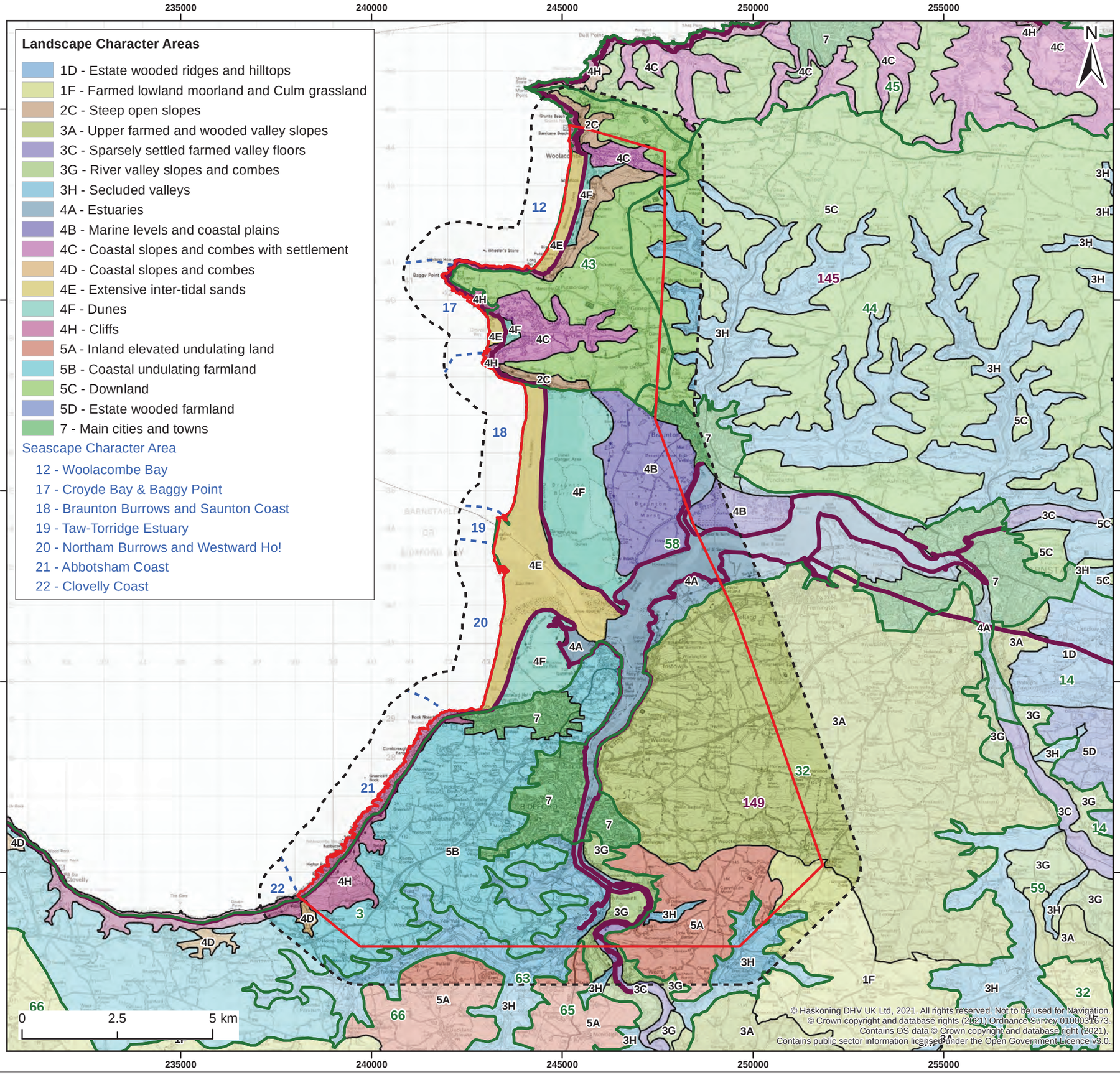
1250. The Project will utilise the existing East Yelland substation. Subject to the final design work being undertaken, limited alterations to East Yelland substation are anticipated are proposed as part of the Project. Therefore no landscape and visual impacts would arise from this element of the Project, and so no associated study area is required.

3.10.4 Baseline Data

1251. Data to inform the LVIA will be collected using both desk-based study and analysis and field work within the Study Area including photography for the as an aid to define potential landscape and visual effects.

1252. Baseline data will be used to define and describe the landscape and visual receptors that will be considered in the LVIA. Data will be gathered from official, reliable, and up-to-date sources. These will include Ordnance Survey map-based data, as well as data on landscape characterisation, landscape designations and other Governmental and local authority data of relevance.

1253. In addition, the Environmental Impact Assessments (EIAs) for other developments may also be referred to.



Legend:

- Onshore Export Cable Corridor Area of Search
- Onshore Export Cable Corridor Study Area
- Natural England National Character Areas
  - 145 - Exmoor
  - 149 - The Culm
- Devon Landscape Character Types
  - 3 - Bideford Bay Coast
  - 14 - Codden Hill and Wooded Estates
  - 32 - High Culm Ridges
  - 43 - North Devon Coastal Downs
  - 44 - North Devon Downs
  - 45 - North Devon High Coast
  - 58 - Taw-Torridge Estuary
  - 59 - Taw Valley
  - 63 - Torridge Valley
  - 65 - West Torridge Upland Farmland
  - 66 - Western Culm Plateau

Client:	Project:
Offshore Wind Ltd.	White Cross Offshore Windfarm

Title: Landscape and Seascape Character

Figure: 3.10.1 | Drawing No:

Revision:	Date:	Drawn:	Checked:	Size:	Scale:
P01	06/01/2022	JM	CW	A3	1:100,000

Co-ordinate system: British National Grid

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Landscape and Seascape Character

1254. The landscape of the onshore parts of the Study Area will be described and assessed in relation to the following documented landscape and seascape character assessments and other reference material:

- Natural England (2012) National Character Area Profile: 145 Exmoor (NE342)
- Natural England (2013) National Character Area Profile: 149 The Culm (NE389)
- Marine Management Organisation (2018) MMO 1134: Seascape Character Assessment for the South West Inshore and Offshore marine plan areas. Prepared by Land Use Consultants
- Devon County Council (2017) Devon Landscape Character Areas
- North Devon & Torridge District Councils, Devon County Council and Natural England (2010) Joint Landscape Character Assessment for North Devon & Torridge Districts. Prepared by Land Use Consultants
- National Trust, North Devon Coast AONB, Exmoor, Exmoor National Park Authority, North Devon Council, Torridge District Council and Natural England (2015) North Devon and Exmoor Seascape Character Assessment
- Devon County Council (consultation draft 2013) Devon Landscape Policy Group Advice Note 3: Principles of defining and maintaining the character of Devon's undeveloped coast
- Devon County Council (2017) Devon's Tranquil Areas: Towards an approach to understanding and accounting for tranquillity in planning and decision making

Landscape Planning Designations

1255. The following documents will inform the understanding of the baseline characteristics and qualities of designated areas of landscape.

- North Devon Coast AONB partnership (2019) AONB Management Plan 2019-2024: North Devon Coast Areas of Outstanding Natural Beauty
- Registered Parks and Gardens (RPGs) from the National Heritage List for England (NHLE)
- North Devon and Torridge Local Plan 2011-2031

3.10.5 Baseline Environment

Existing environment

1256. An initial review of the baseline environment has been undertaken through desk-based research to establish the landscape and visual resources of the Study Area.

1257. The following baseline information has been used to provide a description of potential landscape and visual receptors, indicating their characteristics and value, against which the potential change arising from the Project onshore infrastructure will be assessed.

1258. Key sources of information for the baseline environment study include:

- Ordnance Survey (OS) mapping, and aerial photography
- The Multi-Agency Geographical Information for the Countryside (MAGIC) website, managed by Natural England
- Adopted local planning policy documents: North Devon and Torridge Local Plan 2011-2031
- Published landscape and seascape character assessments

1259. Consultation will be held with relevant stakeholders early in the LVIA process. This will help to inform detailed baseline survey and data collection, to refine the Study Area, to agree the location of representative viewpoints that will form the basis of the visual assessment, and to agree the approach to landscape mitigation measures and reinstatement.

Landscape character

1260. There is a hierarchy of published Landscape Character Assessments that describe the baseline landscape character of the landscape in the LVIA Study Area, at the national, regional, and local level.

1261. The landscape is classified at the national level by National Character Areas (NCA). The 159 NCAs, which cover England, have been revised and developed by Natural England into NCA profiles, which provide a recognised, national, spatial framework.

1262. The northern landscape within the Study Area includes part of NCA 145: Exmoor. The western parts of this NCA terminate at Barnstaple / Bideford Bay and the Torridge Estuary. Amongst its 'Key Characteristics' are its complex coastline of headlands, steep cliffs, waterfalls and covers with dramatic exposures of folded strata accessible via the South West Coast Path. Features of this NCA include the longest stretch of coastal woodland in England, the vast dune system at Braunton Burrows and Woolacombe, high quality saltmarsh, mudflats, and sandbanks at the Taw / Torridge Estuary. Villages and farmsteads lie in sheltered valley bottoms, often at river crossings. Woodlands cloaks the steep coastal combes and inland valleys.

1263. The southern part of the Study Area lies within NCA 149: The Culm. The NCA profile describes the rolling ridges and plateaux of the Culm extend across north-west Devon and north-east Cornwall, reaching from the foot of Dartmoor in the south-west and the edge of the Cornish Killas in the west, to the spectacular Atlantic coast of cliffs and sandy beaches in the north. North-eastwards they meet the Exmoor landscape and stand high above the Devon Redlands. The open, often treeless, ridges are separated by an intricate pattern of small valleys forming the catchments of the Rivers Taw, Torridge, and Mole. This is largely a remote and sparsely populated landscape.

1264. At the regional level, the Devon County Council (2012, revised 2017) Devon Landscape Character Assessment classifies the landscape into 68 Devon Character Areas, which are then subdivided into 37 Landscape Character Types (LCTs).

1265. Due to the relatively limited geographic extent of the Landfall and Onshore Export Cable Corridor and the largely temporary nature of the construction stage impacts of the underground cables it is considered that significant effects on the landscape character of the NCAs and regional-scale Devon Character Areas would not arise as a result of the Project; therefore, it is proposed that they will not be assessed in the LVIA.

1266. At the local level, landscape character is identified in the North Devon & Torridge District Councils, Devon County Council and Natural England (2010) Joint Landscape Character Assessment for North Devon & Torridge Districts. Prepared by Land Use Consultants (JLCA).

1267. The JLCA identifies 22 of the county-wide LCTs within the North Devon and Torridge district boundaries. LCTs within the Study Area are shown on Figure 3.10.1.

1268. The relevant JLCA LCTs will be used as the basis of the assessment of potential effects on landscape character, supplemented with information collected during fieldwork.

Seascape character

1269. Following the approach set out by Natural England (2012) MMO Seascape Character Assessment for England (MMO 1134), the National Seascape Assessment for England includes the areas identified as being within the South West Inshore and Offshore marine plan areas. A national level seascape character assessment for the Study Area was prepared for the Marine Management Organisation (MMO) in

2018 namely, MMO 1134: Seascape Character Assessment for the South West Inshore and Offshore marine plan areas.

1270. The MMO (2018) characterises the seascape into Marine Character Areas (MCA). MCA 42: Bideford Bay and Taw-Torridge Estuary lies within the onshore LVIA Study Area.

1271. At a local level, the seascape has been characterised by National Trust, North Devon Coast AONB, Exmoor, Exmoor National Park Authority, North Devon Council, Torridge District Council and Natural England (2015) North Devon and Exmoor Seascape Character Assessment (NDESCA).

1272. The 2015 NDESCA identifies 27 Seascape Character Areas (SCAs) for North Devon and Exmoor, covering coastal, intertidal, and marine areas. The boundaries of the SCAs seaward of the low water mark are indicated on Figure 3.10.1. The SCAs have then been divided into 27 distinct and more detailed Seascape Character Types (SCTs).

1273. The SCA and SCT boundaries of the NDESCA have been devised to work with the LCT boundaries of the 2010 JLCA to ensure that areas of coast with the strongest immediate relationship with the seas were included in the assessment.

1274. Effects will be assessed on LCTs lying to the landward side of the low water mark. The relationship between seascape and landscape character will be described where relevant.

Landscape Planning Designations and Defined Areas

1275. Certain landscapes and coastal areas found within the onshore LVIA Study Area have been designated or defined due to their scenic landscape as shown on Figure 3.10.2 and some of their defined special qualities relate to their setting.

1276. At the national level, the North Devon Coast Area of Outstanding Natural Beauty (NDCAONB), from Buck's Mills in the south, to Woolacombe in the north, falls within the onshore LVIA study area.

1277. The NDCAONB is described in the (2019) AONB Management Plan 2019-2024 Statement of Significance as, "*The North Devon coast has a wide diversity of scenery including some of the of the finest cliff scenery in the country, the primary reason for its designation. Tall, rugged cliffs and wave-cut platforms contrast with wide, sandy bays and sand dunes. In the north, steeply dipping rocks form hogsback cliffs at varied heights in a natural continuation of Exmoor's coastline. To the south, facing the full force of the Atlantic, sheer crags and razor-like reefs present the coast at its*

most rugged and beautiful. The AONB reaches inland to the Hartland plateau, scored by deep valleys, which reach the coast as steep hanging gaps in the cliffs, often with spectacular waterfalls. In contrast, the broad sweep of Bideford and Barnstaple Bay is a mixture of low cliffs, long sandy beaches and the dunes at Braunton Burrows. Inland a pastoral landscape of hedged fields complements the steep-sided wooded combes and valleys where villages shelter from the Atlantic winds. Whilst skirting larger settlements such as Ilfracombe and Westward Ho!, the AONB boundary takes in bustling seaside resorts such as Woolacombe and Croyde and picturesque fishing villages such as Clovelly and Bucks Mills along this spectacular coast." (p.7)

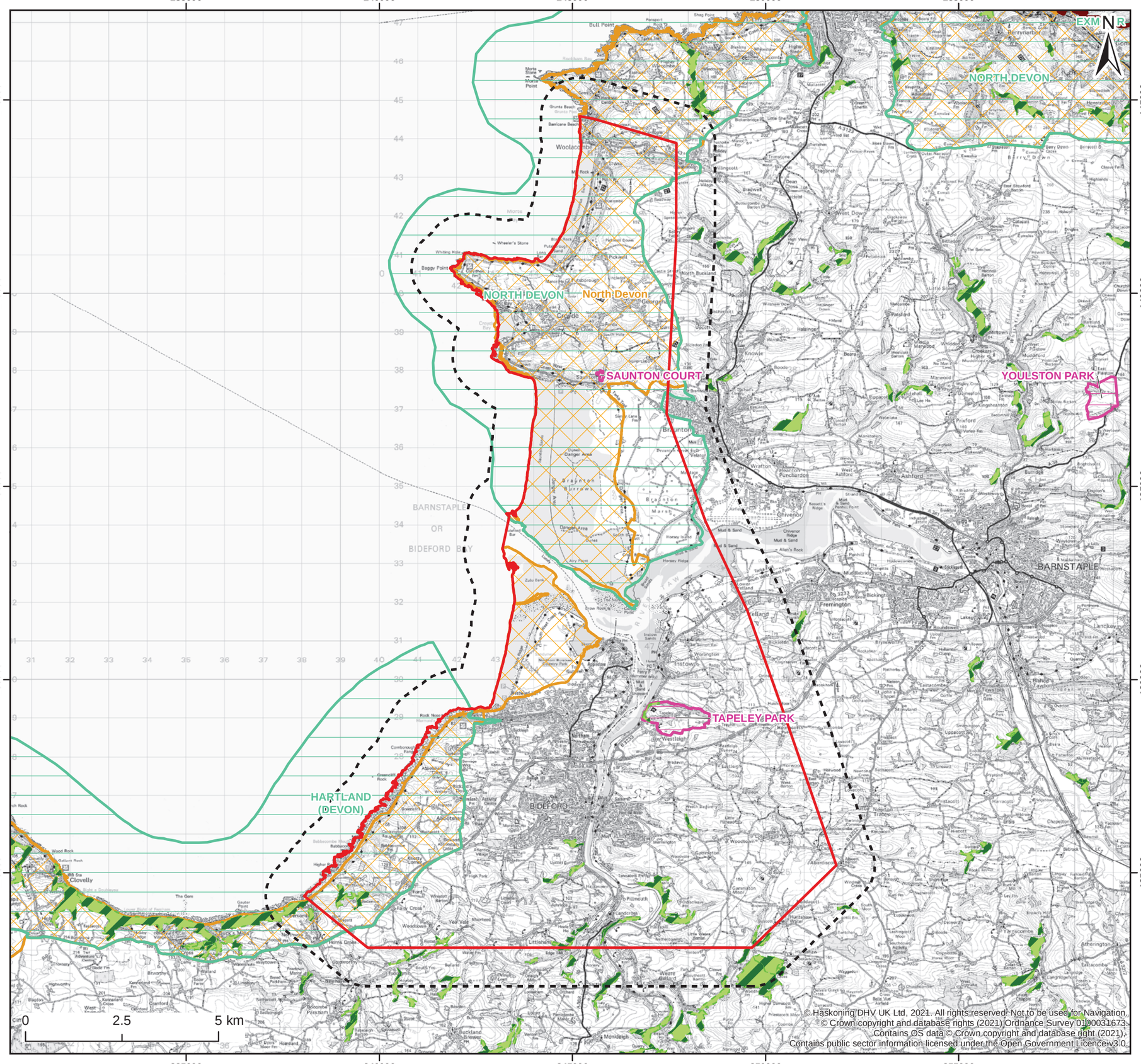
1278. The (2019) North Devon and Torridge Local Plan 2011-2031 states that a future extension to the North Devon Coast Areas of Outstanding Natural Beauty including Braunton Marsh and Great Field will be supported (para, 6.11). A full boundary review of the Area of Outstanding Natural Beauty boundary will be sought during the lifetime of the Local Plan.

1279. There are two sections of Heritage Coast within the onshore LVIA study area. To the north is the North Devon Heritage Coast, which extends from the north of the River Taw to Ilfracombe. To the south is the Hartland Heritage Coast, which extends from Westward Ho! to Bude, Cornwall. The inland boundaries of the Heritage Coasts coincide with that of the NDCAONB; the seaward boundary varies but typically extends circa 1.5-1.8km offshore, which is not part of the AONB. There are no statutory requirements or powers associated with the Heritage Coast definition. However, reference will be made in the assessment of the effects of the Project in relation to the North Devon and Torridge Local Plan 2011-2031.

1280. There are two Registered Parks and Gardens (RPG) within the onshore LVIA Study Area (Figure 3.10.2), including:

- Tapeley Park (Grade II*)
- Saunton Court (Grade II)

1281. The key reference material for consideration of these receptors is the Historic England 'Register of Parks and Gardens of Special Historic Interest in England'. This is an on-line resource that can be accessed through the National Heritage List for England (NHLE).



Legend:

- Onshore Export Cable Corridor Area of Search
- Onshore Export Cable Corridor Study Area
- National Park
- Heritage Coast
- Area of Outstanding Natural Beauty
- Ancient Woodland
- Registered Park and Garden

Client:	Project:
Offshore Wind Ltd.	White Cross Offshore Windfarm

Title:

Landscape Planning Designations

Figure: 3.10.2 | Drawing No:

Revision:	Date:	Drawn:	Checked:	Size:	Scale:
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1282. The LVIA will undertake an assessment of the visual effects on the registered RPG only where access to the public is provided. The Cultural Heritage assessment in the EIA will consider the effects on the historic and cultural aspects of RPGs and their settings.

1283. There are several parcels of Ancient Woodland within the Study Area, within the River Torridge valley, steep coastal combes, and inland valleys to the south of the River Taw. The NPPF (2021), para. 180, considers Ancient Woodland to be an irreplaceable habitat and that any loss or deterioration of these landscape features should be refused, unless there are wholly exceptional reasons, and a suitable compensation strategy exists.

1284. No parts of the onshore LVIA Study Area are identified as local landscape designations through the adopted North Devon and Torridge Local Plan 2011-2031. The Local Plan places emphasis on the importance of protecting and enhancing northern Devon's natural environment, including (inter alia) green infrastructure, critical environmental capital, and through opportunities to provide biodiversity net gain. Although not protected by formal designations, parts of the Study Area include heritage assets that contribute to an appreciation of the historic dimension of the landscape, including the Braunton Great Field (medieval field pattern).

Visual receptors

1285. The key visual receptors in the onshore LVIA Study Area include people within settlements, driving on roads, visitors to tourist facilities or historic environment assets and people engaged in recreational activity such as those using walking and cycle routes. A detailed assessment will be undertaken in the LVIA for those visual receptors that are most susceptible to changes, which may experience significant visual effects as a result of the Project.

1286. Key visual receptors are identified on Figure 3.10.3. Other visual receptors that have potential to experience views of the construction of Landfalls, and/or the Onshore Export Cable Corridor include:

- Larger settlement, including the towns of Bideford, and Northam; and smaller settlement including the villages of Westward Ho!, Appledore, Yelland, Woolacombe, Croyde, Braunton, Abbotsham, Mortehoe, and Georgeham. The extent to which people in these settlements would be affected would depend on their proximity to the final Landfall and Onshore Export Cable Corridor route that is selected
- People living in scattered properties, farmsteads, and small clusters of dwellings within the wider landscape

- Recreational receptors/places of interest, including beaches and tourist facilities, parking facilities for visitors to the coastal strip, caravan and holiday parks, nature reserves, golf clubs and Country Parks
- The South West Coast Path national trail and Tarka Trail long-distance recreational routes, the National Cycle Network (NCN), Open Access Land (CRoW Act 2000), and Public Rights of Way (PRoWs)

1287. Users of the local road network and transport routes including the A39 and A386, 'B' roads, unclassified roads, users of recreational watercraft, and ferry passengers to Lundy.

3.10.6 Potential Impacts

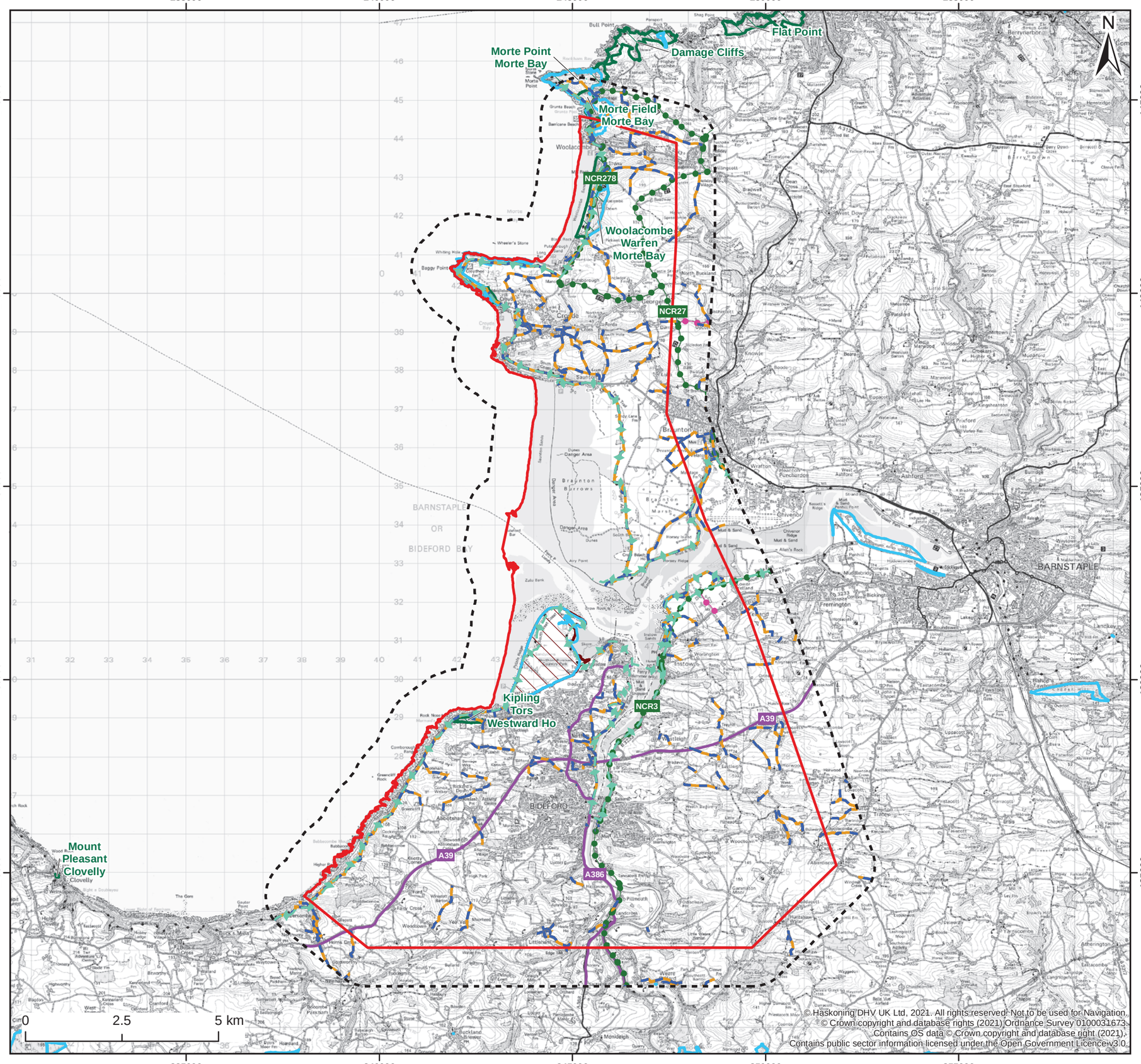
1288. The potential impacts of the onshore elements of the Project are based on an appreciation of information contained in Section 1.8. The description of the Project is based on the Design Envelope, which is not fixed at this stage. This gives rise to a degree of uncertainty in terms of the final design and layout of the Project.

1289. The Project will utilise the existing East Yelland substation. No alterations to the substation are proposed as part of the Project and therefore no landscape and / or visual impacts would arise from this element of the Project.

Potential impacts during construction

1290. Potential impacts during construction would relate to a combination of the presence of the associated plant, materials and other temporary structures, and the activity associated with the Onshore Export Cable construction process.

1291. Assessment will be made in the field to determine the potential impact of the Landfall, considering the size and extent of the layout and the construction processes that would be undertaken. Mapping showing the extent and layout of the Landfall components, associated construction compound and access roads, will be considered on-site to understand the potential magnitude of the influence on each landscape and visual receptor, considering the screening effect of existing built form, landform, vegetation, and any proposed mitigation planting. This will be combined with the rating for sensitivity to determine the significance of the effect on each landscape and visual receptor.



Legend:

- Onshore Export Cable Corridor Area of Search
- Onshore Export Cable Corridor Study Area
- South West Coast Path
- Public Rights of Way
- National Cycle Network
- National Cycle Network Link
- Railway
- A Road
- National Trust Land
- Open Access Land
- Country Park

Client:	Project:
Offshore Wind Ltd.	White Cross Offshore Windfarm

Title: Key Visual Receptors

Figure: 3.10.3 | Drawing No:

Revision:	Date:	Drawn:	Checked:	Size:	Scale:
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1292. Assessment will be made in the field to determine the potential impact of the Onshore Export Cable Corridor, considering the location and width of the cable corridor, the location, size and content of the mobilisation areas and the construction processes that would be undertaken. Mapping showing the extent and layout of the Onshore Export Cable Route components, associated construction compound and access roads, will be considered on-site to understand the potential magnitude of influence on each landscape and visual receptor, considering the screening effect of existing built form, landform, vegetation, and any proposed mitigation planting. This will be combined with the rating for sensitivity to determine the significance of the effect on each landscape and visual receptor.

Potential impacts during operation and maintenance

1293. The underground location of most the Landfall and Onshore Export Cables, means that their potential impact on landscape and visual receptors would be very limited. Visible components would be limited to smaller scale forms such as signage and link boxes as well as permanent and temporary removal of vegetation. Given the temporary and theoretically reversible effects of the majority of these aspects of the Project, it is proposed that operational effects of the Onshore Export Cables be scoped out of the LVIA.

Potential impacts during decommissioning

1294. It is anticipated that the decommissioning impacts would be similar in nature to those of construction but would be more limited in geographical extent and timescale.

1295. Decommissioning would include potential impacts on the landscape character and visual amenity. The impacts would relate principally to the decommissioning process, associated plant, materials, infrastructure, and temporary structures, as well as the presence of dismantled structures, where they would be visible above ground. There may be some short-term, localised impacts along the Onshore Export Cable Corridor should the cable not remain in-situ.

Potential cumulative impacts

1296. In respect of the Landfall and Onshore Export Cable Corridor, the relatively localised, temporary, impacts of the construction and decommissioning operations would limit the potential for significant cumulative impacts to arise.

1297. Considering the separating distances involved between the Offshore Windfarm and onshore infrastructure, and the relatively short duration of the Landfall and Onshore Export Cable Route construction at coastal locations where there may be

intervisibility of both offshore and onshore infrastructure, the potential for significant cumulative landscape and / or visual effects between these aspects of the Project is considered to be limited. It is therefore proposed that these impacts would be scoped out of the LVIA.

Potential transboundary impacts

1298. There are unlikely to be any transboundary landscape and visual impacts due to the distance of the Project from other jurisdictions.

Summary of potential impacts

1299. The underground location of the majority of the components of the Landfall and Onshore Export Cables, means that their potential impact on landscape and visual receptors would be very limited and principally associated with the construction phase of the Project's onshore infrastructure.

3.10.7 Mitigation Measures

1300. As discussed in Section 1.9, mitigation measures will be developed as site specific information becomes available, the project design is refined and the EIA is prepared. A number of mitigation measures that may be appropriate for the Project could be embedded within the design and accounted for within the assessment of impacts. Further mitigation measures may be proposed in response to impact assessments. These will evolve as the Project design develops and the EIA progresses, and/or in response to consultation.

1301. Key designed-in mitigation for the Project's onshore infrastructure relate to the routeing and site-selection process. This will include the siting of Landfall and sensitive routeing of the Onshore Export Cable Corridor to avoid important landscape features or elements (e.g. areas of woodland, mature trees, and important hedgerows) where possible.

1302. Secondary mitigation measures are those that seek to further reduce potential effects that could not be entirely designed out and are informed by the detailed assessment stage. Measures adopted as part of the Project could include:

- Reinstatement and restoration of vegetation at Landfall, and within the Onshore Export Cable Corridor following the construction phase
- Development of, and adherence to, a decommissioning plan

1303. The requirement and feasibility of any mitigation measures will be consulted upon with relevant stakeholders throughout the EIA process.

3.10.8 Approach to Assessment and Data Gathering

Approach to Assessment

1304. The LVIA will focus on likely significant impacts, rather than assessing all potential impacts. This will allow determination of the key residual impacts resulting from the Project and inform proposed mitigation. In accordance with the EIA Regulations 2017, the LVIA effects will be assessed to be either significant or not significant.

1305. The LVIA will be undertaken in accordance with the methods outlined in Section 3.10.2.

1306. A detailed methodology will be agreed with relevant stakeholders and set out in the EIA. The following section describes the broad principles and approach that will be applied. The key assessment stages will be:

- Confirming the scope of the assessments, in terms of Study Area extent, representative viewpoint locations, worst case scenarios for assessment, LVIA content, and cumulative considerations
- An iterative approach to the mitigation of potentially significant adverse impacts through the assessment process
- Preparation of the LVIA and accompanying figures
- The LVIA will include judgements in relation to the susceptibility, value and sensitivity of landscape and visual receptors, the predicted magnitude of change, and the predicted level of effect and whether these will be significant

Landscape and seascape assessment

1307. The assessment of potential landscape effects will concentrate on the refined Study Area for the LVIA. A character assessment will establish the baseline landscape and seascape conditions and examine the sensitivity of the landscape / seascape context to the potential changes associated with the Project's onshore infrastructure.

1308. The assessment will require a combination of desk study and fieldwork. The desk study and baseline assessment will include analysis of published information on landscape character and landscape designations. This will inform judgements in relation to the value, susceptibility, and sensitivity of receptors.

1309. The landscape assessment will use the published character assessments, reviewed through fieldwork, to establish the existing baseline landscape and seascape character of the Study Area. The location, use, landscape elements, scale, nature of views and landscape quality of LCTs, SCAs and SCTs will be described. Landscape character will be assessed, and potential impacts identified based on the principles

set out in GLVIA 3. A review of published information has identified several key documents that inform this, as set out above in Section 3.10.4. The LVIA will take into consideration the potential impacts of the proposal on relevant landscape designations.

1310. The assessment will identify key characteristics of the landscape and visual context that may inform the siting and routeing of the Project. The emphasis of the baseline study will be the recording and describing of existing features that are important in the local context and their contribution to character.

1311. The significance of the potential landscape impacts will be determined using professional judgement and a robust method. The evaluation of potential impacts will focus on impacts on landscape features and elements, and the perception of landscape character.

Visual assessment

1312. The visual assessment will be based on:

- Field survey to review potential visibility and the changes that will occur
- Views from agreed representative viewpoint locations chosen to represent sensitive visual receptors within the Study Area at a range of distances and directions from the Project

1313. The viewpoint assessment will be carried out to determine the potential impacts of the proposed development on specific receptors and representative viewpoints within the LVIA Study Area. However, important viewpoints beyond this will also be considered if appropriate. Representative viewpoints proposed for inclusion in the assessment will be agreed through consultation with relevant stakeholders through the scoping process, and further consultation.

1314. The representative viewpoints will allow an assessment of the Project to be made from a range of locations within the Study Area. It is also expected that viewpoints will be selected to support the assessment of impacts on the cultural heritage assets, these may be specific to the cultural heritage assessment or used in both this and the LVIA.

1315. No visualisations will be prepared for the Landfall and Onshore Export Cable Corridor since these aspects of the Project's onshore infrastructure are predicted to result in temporary impacts during construction and would be underground following reinstatement of the landscape and through the operational life of the Project. The existing view will be described and illustrated using photography. A 35mm equivalent camera (i.e. a full frame digital single lens reflex camera) with a

50mm lens is the chosen format for recording the viewpoint photography, which is endorsed as the most suitable camera combination/focal length for landscape and visual impact assessment work.

1316. As with the assessment of landscape impacts, the significance of the potential visual impacts will be determined using professional judgement and a robust method. The evaluation of potential impacts will focus on how changes resulting from the project are predicted to affect visual amenity within the Study Area.

Cumulative assessment

1317. Onshore cumulative impacts will be considered as part of the EIA process. Projects of a similar type, nature, and scale will be identified and a list of cumulative developments to be considered in the LVIA will be consulted upon and agreed with statutory stakeholders.

1318. The LVIA will consider the potential for significant cumulative impacts to arise during the construction phase of the Onshore Export Cable Corridor, in the context of other developments that are either existing, consented/under construction, or at application stage.

1319. In respect of the Landfall, the relatively localised impacts of the construction and decommissioning operations would limit the potential for significant cumulative impacts to arise and it is proposed that this will be scoped out of the LVIA.

Data Gathering

1320. The Applicant will be undertaking consultation with relevant stakeholders as part of the Scoping process, including relevant Local Planning Authorities and Natural England, to define the scope of the LVIA required for the Project. This will be based on key landscape and visual receptors considered relevant to the assessment, from data sources outlined in Section 3.10.4.

1321. Data to inform the LVIA will be collected using both desk-based study and analysis and field work within the Study Area.

1322. Data will be gathered from official, reliable and the most up-to-date sources. This will include Ordnance Survey map-based data, as well as data on landscape characterisation, landscape designations and other governmental and local authority data of relevance.

1323. In addition, relevant EIAs for nearby developments may also be referred to.

3.10.9 Summary of Scoped in Impacts

Table 3.37 Summary of impacts relating to Onshore Landscape and Visual Amenity

Potential Impact	Construction	Operation	Decommissioning
Landscape and visual impacts of Landfall	✓	×	×
Landscape and visual impacts of Onshore Cable Export Corridor	✓	×	×
Landscape and visual impacts of Onshore Project Substation	×	×	×
Cumulative impacts of Landfall	×	×	×
Cumulative impacts of Onshore Export Cable Corridor	✓	×	×
Cumulative impacts of Onshore Project Substation	×	×	×
Landscape, visual and cumulative impacts of offshore components	×	×	×

Key:
✓ Impact scoped in
✗ Impact scoped out

3.11 Onshore Inter-Relationships

1324. The EIA will identify and assess inter-relationships which are likely to result from the construction, operation and decommissioning of the Project onshore infrastructure. The inter-relationships relevant to the onshore environment are outlined in Table 3.38.

Table 3.38 Onshore inter-relationships

Onshore topic	Inter-relationships
Ground conditions and contamination	Will have effects on: • Land use • Onshore ecology • Water resources and flood risk
Air quality	Is affected by: • Traffic and transport Will have effects on: • Human health • Onshore ecology • Onshore ornithology

Onshore topic	Inter-relationships
Water resources and flood risk	Is affected by: • Ground conditions and contamination Will have effects on: • Human health • Onshore Ecology • Onshore Ornithology
Land use	Is affected by: • Ground conditions and contamination • Traffic and transport • Socio-economics
Onshore ecology and onshore ornithology	Is affected by: • Water resources and flood risk • Air quality • Noise and vibration • Ground Conditions and Contamination
Onshore archaeology and cultural heritage	Is affected by: • Landscape and visual • Noise and vibration
Noise and vibration	Is affected by: • Traffic and transport Will have effects on: • Onshore ecology • Onshore ornithology • Onshore archaeology and cultural heritage • Human Health
Traffic and transport	Will have effects on: • Noise and vibration • Air quality • Land Use • Human health • Tourism and recreation
Landscape and Visual Impact Assessment	Is affected by: • Onshore archaeology and cultural heritage

4. Part 4: Wider Scheme Aspects

4.1 Introduction

1325. Part 4 of this Scoping Report considers the following wider scheme aspects:

- Section 4.2: Socio-Economics (including Tourism and Recreation)
- Section 4.3: Human Health
- Section 4.4: Climate Change
- Section 4.5: Accidents and Disasters
- Section 4.6: Inter-relationships OF Wider Scheme Aspects

4.2 Socio-Economics (including Tourism and Recreation)

4.2.1 Introduction

1326. This section considers the potential effects of the Project in relation to social and economic change within the local and regional population (including tourism and recreation sectors and receptors). Impacts derive primarily from one of three sources:

- the creation of direct or indirect employment through project expenditure
- this may lead to in-migration which may change the population demographic temporarily or permanently
- physical changes leading to impacts on a community's quality of life or economic (including the tourism and recreation sector) processes such as business operations or access

1327. Socio-economics is also a determinant in human health which will be included in the Population and Human Health assessment.

4.2.2 Policy, Legislation and Guidance

1328. Section 1.5 describes the wider policy and legislative context for the Project. The relevant planning policies, guidance and legislation which underpin the proposed assessment methodology for socio-economics are set out in this section.

1329. Considerations for socio-economics set out within the National Planning Policy Framework (NPPF) (MHCLG, revised in 2021) are detailed in Table 4.1. The purpose of the planning system is to contribute to the achievement of sustainable development, by having three overarching objectives, economic objective, a social objective, and an environmental objective.

Table 4.1 NPPF requirements for socio-economics

Policy Consideration	Relevance to White Cross Socio-economics
Section 2, Paragraph 8(a)	a) an economic objective – to help build a strong, responsive and competitive economy, by ensuring that sufficient land of the right types is available in the right places and at the right time to support growth, innovation and improved productivity; and by identifying and coordinating the provision of infrastructure.
Section 4, Paragraph 38	Local planning authorities should approach decisions on proposed development in a positive and creative way. They should use the full range of planning tools available, including brownfield registers and permission in principle, and work proactively with applicants to secure developments that will improve the economic, social and environmental conditions of the area. Decision-makers at every level should seek to approve applications for sustainable development where possible.
Section 6, Paragraphs 81-83, 85	The Government's commitment to creating jobs and prosperity through continued economic growth is defined within the NPPF, which sets out the importance of: • local and regional economic market business needs (paragraphs 81, 85); • setting out a clear economic vision and planning for economic development (paragraph 82); and • provision and accessibility of new jobs (paragraph 83).
Section 8, Paragraph 93	To provide the social, recreational and cultural facilities and services the community needs, planning policies and decisions should: a) plan positively for the provision and use of shared spaces, community facilities (such as local shops, meeting places, sports venues, open space, cultural buildings, public houses and places of worship) and other local services to enhance the sustainability of communities and residential environments; b) take into account and support the delivery of local strategies to improve health, social and cultural well-being for all sections of the community; c) guard against the unnecessary loss of valued facilities and services, particularly where this would reduce the community's ability to meet its day-to-day needs; d) ensure that established shops, facilities and services are able to develop and modernise, and are retained for the benefit of the community; and e) ensure an integrated approach to considering the location of housing, economic uses and community facilities and services.

Policy Consideration	Relevance to White Cross Socio-economics
Section 8, Paragraph 100	Planning policies and decisions should protect and enhance public rights of way and access, including taking opportunities to provide better facilities for users, for example by adding links to existing rights of way networks including National Trails.
Section 16, Paragraph 197	In determining applications, local planning authorities should take account of: [...] b) the positive contribution that conservation of heritage assets can make to sustainable communities including their economic vitality.

1330. Further policy considerations have been made that are relevant to socio-economics, outside of the NPPF are provided in Table 4.2.

Table 4.2 Summary of further national planning and policy considerations relevant to socio-economics

Policy Consideration	Relevance to White Cross socio-economics
UK Government, UK Industrial Strategy, White Paper, 2017	• Emphasises importance of investment in low carbon infrastructure • Identifies clean growth as one of the four grand challenges which includes clean energy • Offshore Wind is also identified as an area where the UK has world-leading capabilities • Aims to maximise the share of the global markets taken up by UK businesses in the sector
Sector Deal, Department for Business, Energy and Industrial Strategy, 2019	• Commitment to increasing UK content to 60% of value associated with offshore windfarm activity by 2030 • £250m industry investment in building a stronger UK supply chain to support productivity and increase competitiveness

1331. There are a range of policies relating to socio-economics, tourism, recreation and amenity in the North Devon District and Torridge District local plans. In addition, the Heart of the South-West (HotSW) Local Enterprise Partnership (LEP) leads economic growth and job creation within the region by specifying local economic priorities. The regional and local policy considerations that are relevant to socio-economics are shown in Table 4.3.

Table 4.3 Summary of local and regional policy considerations relevant to socio-economics

Organisation	Relevance policies
North Devon District Council and Torridge District Council Joint Local Plan (2018)	Policy ST09: Coast and Estuary Strategy (1) The sustainability of coastal communities will be maintained and enhanced with regard to their distinctive cultural heritage, diverse maritime economy, landscape setting and regeneration opportunities. The separate identity of these settlements will be maintained and enhanced. (2) Priority will be given to employment uses and waterside infrastructure requiring a coastal location. Such uses will be directed to previously developed sites around the coastline and the Taw-Torridge estuary with existing jetties and wharves. These sites should be safeguarded for employment uses requiring a waterside location. Facilities at Appledore and Yelland Quay will be protected for their value as landing stages for marine aggregates and for other marine employment uses. Loss of traditional boating facilities that are part of the fabric of coastal communities will be discouraged. (5) The integrity of the coast and estuary as an important wildlife corridor will be protected and enhanced. The importance of the undeveloped coastal, estuarine and marine environments, including the North Devon Coast Areas of Outstanding Natural Beauty, will be recognised through supporting designations, plans and policies. The undeveloped character of the Heritage Coasts will be protected. (7) Development within the Undeveloped Coast and estuary will be supported where it does not detract from the unspoilt character, appearance and tranquillity of the area, nor the undeveloped character of the Heritage Coasts, and it is required because it cannot reasonably be located outside the Undeveloped Coast and estuary. (10) Delivery of onshore facilities for operational servicing of offshore renewable energy proposals will be facilitated in existing ports and at existing jetties and wharves where they: (a) do not harm identified environmental and heritage assets; and (b) do not prejudice the current operational effectiveness of the port. (11) The continuity of the South West Coast Path and the Tarka Trail will be protected and a network of connecting routes will be improved. Improvements to coastal and estuarine access will be sought where rundown waterfront areas are regenerated. The Tarka Trail link between Ilfracombe and Braunton will be completed.

Organisation	Relevance policies
North Devon District Council and Torridge District Council Joint Local Plan (2018)	Policy ST14: Enhancing Environmental Assets The quality of northern Devon's natural environment will be protected and enhanced by ensuring that development contributes to: (b) protecting the hierarchy of designated sites in accordance with their status; (c) conserving European protected species and the habitats on which they depend; (d) conserving northern Devon's geodiversity and its best and most versatile agricultural land; (e) conserving the setting and special character and qualities of the North Devon Coast Areas of Outstanding Natural Beauty whilst fostering the social and economic wellbeing of the area; (f) ensuring development conserves and enhances northern Devon's local distinctiveness including its tranquillity, and the setting and special qualities of Exmoor National Park including its dark night skies; (g) protecting and enhancing local landscape and seascape character, taking into account the key characteristics, the historical dimension of the landscape and their sensitivity to change; (h) recognising the importance of the undeveloped coastal, estuarine and marine environments through supporting designations, plans and policies that aim to protect and enhance northern Devon's coastline; (j) increasing opportunities for access, education and appreciation of all aspects of northern Devon's environment, for all sections of the community;
North Devon District Council and Torridge District Council Joint Local Plan (2018)	Policy ST15: Conserving Heritage Assets Great weight will be given to the desirability of preserving and enhancing northern Devon's historic environment by: (b) conserving cultural, built, historic and archaeological features of national and local importance and their settings, including those that are not formally designated. (c) identifying and protecting locally important buildings that contribute to the area's local character and identity;

Organisation	Relevance policies
North Devon District Council and Torridge District Council Joint Local Plan (2018)	Policy ST22: Community Services and Facilities (3) Development that involves the loss of community services and facilities will not be supported unless there is compelling evidence to demonstrate: (a) the existing use is no longer commercially viable or could not be made commercially viable; or (b) there is alternative local provision that is accessible to the local community by walking or cycling; and in either case (c) the premises are no longer required to meet the needs of the local community.
North Devon District Council and Torridge District Council Joint Local Plan (2018)	Policy DM01: Amenity Considerations Development will be supported where: (a) it would not significantly harm the amenities of any neighbouring occupiers or uses; and (b) the intended occupants of the proposed development would not be harmed as a result of existing or allocated uses.
North Devon District Council and Torridge District Council Joint Local Plan (2018)	Policy DM09: Safeguarding Green Infrastructure Development involving the loss of green infrastructure including public open space will only be supported where: (a) alternative green infrastructure is provided of at least equivalent size, quality and accessibility to that being lost; or (b) the green infrastructure network in the locality can be retained or enhanced through redevelopment of a small part of the site; and in either case (c) there is no net loss in sustainable travel options.
North Devon District Council and Torridge District Council Joint Local Plan (2018)	Policy DM13: Safeguarding Employment Land In order to maintain a range of suitable and available sites and buildings for employment, non-employment development uses will not be supported on allocated sites or in buildings previously used for employment or in buildings currently used for employment unless.....
North Devon District Council and Torridge District Council Joint Local Plan (2018)	Policy FRE02: Yelland Quay A site of about 30 hectares north of the Tarka Trail at Yelland Quay, as identified on Policies Map 4, is allocated for a high quality, mixed-use development that will deliver the following site specific development principles: (a) redevelopment in a comprehensive manner in accordance with an agreed master plan; (e) retention of the existing jetty and wharf and provision of associated operational land, including a safeguarded vehicular access to it;

Organisation	Relevance policies
Heart of the South West Local Industrial Strategy (undated)	States that: *'The Heart of the South West will increase the critical mass of businesses operating within or supplying to the energy sector in order to create a globally recognised cluster by 2038.'* *'This priority is focused on seizing the future opportunities for clean growth associated with:…* *next generation marine renewables – building on the substantial natural capital, research and commercial assets that already exist in the area which have the potential to provide a clean growth dividend for the area and the UK'.*

1332. There is no legislation, other than that previously mentioned, that is applicable to socio-economics. The following guidance will be used in the assessment

- Social Impact Assessment: Guidance for assessing and managing the social impact of projects (International Association for Impact Assessment, 2015)
- Methods of Environmental and Social Impact Assessment (Natural and Built Environment Series) (Therivel and Wood, 2017)
- Social and Economic Assessment Requirements for Development Projects Affecting the Marine Environment (Productive Seas Evidence Group, 2015)
- Measuring the Economic Impact of an Intervention or Investment (Office for National Statistics, 2010)

4.2.3 Study Area

1333. The main study area for the socio-economics assessment will be based on the districts within which the Project is located, along with a disturbance zone to accommodate indirect impacts as a result of noise, air quality, traffic and visual impacts during construction and operation. Consequently the local study impact area comprises the North Devon District Council area and the Torridge District Council area, though it is noted that facilities may be used across South Wales, Devon and Cornwall.

1334. A national study area will also be considered when assessing the economic and employment effects which could arise. The larger scale is relevant to construction expenditure and supply chain effects.

1335. Economic impacts are typically considered regionally due to the potential commuting distance. Social impacts are typically considered locally due to the fact that direct impacts are generally caused by loss of or obstruction to a social asset, or indirect impacts as a result of noise, dust and traffic disturbance on social assets.

4.2.4 Baseline Data

1336. Baseline data was obtained from the following sources:

- Office for National Statistics (ONS)
- National Online Manpower Information System (NOMIS)
- Devon County Council
- North Devon District Council
- Torridge District Council
- Heart of the South West LEP
- OS mapping
- Visit Britain / Visit Devon
- Other online sources

4.2.5 Baseline Environment

1337. The existing environment relevant to the EIA will consider two receptor groups:

- Economic receptors, essentially people or businesses that would benefit from or be adversely affected by the Project and associated development
- Social receptors, which are the social infrastructure relevant to a community, that would benefit from or be adversely affected by the Project and associated development. Impacts on social receptors subsequently impact on the population often in ways that influence their health and wellbeing

1338. The Windfarm Site is situated off the north Devon and Cornwall coastline. The offshore area is primarily used by commercial fisheries and shipping. Impacts to shipping and navigation are considered in Section 2.8 and commercial fishing is considered in Section 2.8. Impacts on sensitive landscape receptors within 50km of the Windfarm Site are considered in Section 3.9.

1339. The Onshore AoS is located across North Devon District Council's Local Planning Authority (LPA) area and part within the Torridge District Council LPA area.

North Devon District

1340. The total population within North Devon District in 2020 is estimated to be 98,200 people. Of the population, 57.1% is aged between 16 and 64 (compared to the UK

average of 62.4%) and of those 83.3% are employed and 3.4% are unemployed (compared to the UK average of 74.4% and 5.0%)[6].

1341. Skilled trades, technical and professionals comprise 48.5% of employment, the remainder being retail, leisure, caring, plant and process, and elementary and unskilled occupations[7]. The biggest employment sectors are wholesale and retail trade (including repair of motor vehicles), human health and social work, and manufacturing and accommodation and food service activities (accounting for 65.8% of employees).

1342. North Devon has areas that are in the top 10% most deprived[8], though these areas are located around Barnstaple and outside the Area of Search.

Torridge District

1343. The total population within Torridge District in 2020 is estimated to be 68,700 people. Of the population, 56.0% is aged between 16 and 64 (compared to the UK average of 62.4%) and of those 79.6% are employed and 3.4% are unemployed (compared to the UK average of 74.4% and 5.0%)[9].

1344. Skilled trades, technical and professionals comprise 46.8% of employment, the remainder being retail, leisure, caring, plant and process, and elementary and unskilled occupations[10]. The biggest employment sectors are wholesale and retail trade (including repair of motor vehicles), accommodation and food service activities, education, and human health and social work (accounting for 52.8% of employees).

1345. Torridge does not have any area that are in the top 10% most deprived[11], though the most deprived area within Torridge District is in Bideford.

Social and Economic Receptors

1346. Businesses within the onshore AoS include retail, light industry, tourist attractions (see below), tourist accommodation including caravan parks, cafes and restaurants,

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[6] https://www.nomisweb.co.uk/reports/lmp/la/1946157361/printable.aspx
[7] https://www.nomisweb.co.uk/reports/lmp/la/1946157361/printable.aspx
[8]https://www.devon.gov.uk/factsandfigures/dataset/indices-of-deprivation-2019/?parent=E07000043&areaType=lsoa
[9] https://www.nomisweb.co.uk/reports/lmp/la/1946157364/report.aspx?town=torridge
[10] https://www.nomisweb.co.uk/reports/lmp/la/1946157364/report.aspx?town=torridge
[11]https://www.devon.gov.uk/factsandfigures/dataset/indices-of-deprivation-2019/?parent=E07000046&areaType=lsoa

agriculture and recreational facilities (e.g. golf courses). Agricultural activity within the onshore AoS is predominantly pastoral agriculture.

1347. Tourism is a significant economic sector within the Area of Search. Key tourist attractions within the Area of Search include the South West Coast Path, Atlantis Adventure Park, Ultimate Adventure Centre (Abbotsham), Church of St Mary (Bideford), Bideford Pannier Market, the Sports Ground (Bideford), Burton Art Gallery (Bideford), Victoria Park (Bideford), Church of St Margaret of Antioch (Bideford), Hockings Dairy Ice Creams (Bideford), North Devon Maritime Museum (Bideford), Seagreen of Appledore, St Mary's Church (Appledore), Kipling Tors (National Trust), Northam Burrows Country Park, Appledore and Northam Burrows, Royal North Devon Golf Club, Tapeley (and Tapeley Park), the Tarka Trail, Instow Sands, North Devon Cricket Club (Instow), RSPB Isley Marsh, Braunton Burrows, Saunton Sands, Saunton Golf Club, Croyde Sand, Baggy Point (National Trust), Putsborough Sand, and Woolacombe Sand, and Woolacombe Down (National Trust). Many of the beaches and coastal areas are served by a number of car parks owned and managed privately or by the local authorities, and many area particularly along the coast are well served and accessible by foot along numerous coastal path and footpaths.

1348. Watersports are abundantly carried out throughout the Area of Search, with the beaches at Northam, Saunton Sands, Croyde, Putsborough, and Woolacombe extremely well used for surfing, wind surfing, kite surfing and other watersports. There are a number of slipways for boating and other watercraft at Westward Ho!, West Appledore, Instow (the Quay and Land's End), and Horsey Island.

1349. Tourist accommodation is served by a large number of holiday parks, camping sites, hotels and bed and breakfasts, as well as privately rented accommodation throughout the Area of Search.

4.2.6 Potential Impacts

Potential impacts during construction

Economic expenditure

1350. The construction of offshore windfarms can have beneficial socio-economic effects in terms of continuing to develop the wind energy market and sector at a national level, i.e. encouraging wind energy manufacturers to be based in the UK.

1351. There would be direct economic benefit through the supply chain required for the Project, including spending on local goods and services supplied by local businesses, such as use of local suppliers and supporting contractors catering, and

accommodation facilities. Whilst resulting in positive impacts, given the requirement for fabrication by specialists who are not present in the UK, the overall local and national expenditure whilst positive will be short-term in nature, and given the negligible scale at a national level this impact is scoped out.

Employment

1352. Construction of the Project would result in an increase in employment (direct) in the travel to work catchment area as well as at the national level. In addition, indirect employment could arise due to the expenditure by those employed during construction. Both would represent positive impacts albeit short-term in nature, and given the negligible scale at a regional level this impact is scoped out.

Demographic changes and pressure on social infrastructure

1353. Demographic change associated with the construction of the proposed Project could drive impacts on housing and local services, and socio-cultural change. However, given the transient and short-term nature of the construction phase, coupled with the study area being heavily influenced by annual tourism movements, the scale of any potential change would be negligible. As such this impact is scoped out.

Economic and social infrastructure

1354. There is the potential for adverse impacts on economic and social infrastructure where construction activities can result in physical obstruction or disturbance to specific economic and social receptors. Where possible potentially significant impacts would be avoided through micro-siting, as well as other potential mitigation measures.

1355. Loss of, or disruption to onshore and offshore activities (including tourism and recreation) which contribute to the existing social and economic characteristics of the study area could also occur. This could include disturbance as a result of potential air quality, noise, visual, and traffic impacts on economic and social receptors.

Potential impacts during operation

Economic expenditure

1356. The potential operation phase impacts are likely to be similar for those described for the construction phase, albeit of longer timescale albeit reduced magnitude. As has been seen from the other offshore windfarms in the Celtic Sea the operation and maintenance activities associated with maintaining a windfarm is considerable and create opportunities for training and long-term employment across a number of sectors. That coupled with recent statement from The Crown Estate for up to

4GW of generating capacity in the Celtic Sea will help create a renewable hub associated with the O&M bases.

Employment

1357. The operation phase of the project would result in an increase in employment (direct) related to maintenance and other requirements. Currently the likely operational and maintenance (O&M) port location is unknown but most potential employment would be within the travel to work catchment area of the O&M port. In addition, indirect employment could arise due to the expenditure by those employed in jobs created in the long-term and through expansion of materials and services expenditure across the supply chain. Both would represent positive impacts. As the potential indirect expenditure is highly dependent on many factors, given that it would not be at as large a scale as the direct employment, indirect employment is scoped out. The direct employment will be quantified, but the value added would be in identifying opportunities for the developer to target recruitment and training to reduce unemployment in local areas, and thus reduce local unemployment and deprivation and enhance opportunities for youth education.

Demographic changes and pressure on social infrastructure

1358. Demographic change associated with the operation of the proposed Project could drive impacts on housing and local services, and socio-cultural change. However, given these would be located predominantly in the area of the O&M hub and given the fairly small scale of likely operational staff compared to coastal areas and their transient population linked to tourism, the scale of any potential change would be negligible. As such this impact is scoped out.

Economic and social infrastructure

1359. There is the potential for adverse impacts on economic and social infrastructure where operational activities or Project design can result in physical obstruction or disturbance to specific economic and social receptors. Where possible potentially significant impacts would be avoided through Project design as well as other potential mitigation measures.

1360. Whilst there is less potential for loss of, or disruption to onshore and offshore activities (including tourism and recreation), some operational and maintenance related activities could result in disturbance due to air quality, noise, visual, and traffic impacts.

Potential impacts during decommissioning

1361. It is anticipated that the decommissioning impacts would be similar in nature to those of construction, although the magnitude of effect is likely to be lower. The detail and scope of the decommissioning works will be determined by the relevant legislation and guidance at the time of decommissioning and agreed with the relevant regulator.

Potential cumulative impacts

1362. Cumulative impacts will be considered as part of the ongoing EIA process and will be assessed in accordance with the approach to cumulative assessment is set out in Section 1.9.2. There is potential for the Project to bring socio-economic benefits, for example by providing opportunities for business, jobs and training. The project is one of the earliest projects commencing in the Celtic Sea (see above note regarding The Crown Estate) which could lead to clustering of offshore windfarm developments in the Celtic Sea and thus will provide longer term opportunities for the supply chain and skills sectors than a single development. However, there is also potential to cumulatively impact upon other industries negatively as a result of displacement of workers currently employed in other industries.

1363. The chapter brings together the potential cumulative impacts on economic and social receptors inherently as it is examining all impacts upon them.

Potential transboundary impacts

1364. There is no potential for social or economic impacts to extend outside UK boundary given the localised nature of the work and distance to nearest non-UK country (i.e. Ireland). Transboundary impacts are therefore scoped out.

4.2.7 Mitigation Measures

1365. Mitigation measures will be developed as site specific information becomes available and as the project design is refined and in response to ongoing consultation. Some mitigation measures that may be appropriate for the Project could be embedded within the design and accounted for within the assessment of impacts. Further mitigation measures may be proposed in response to the impacts as they are assessed.

1366. Examples of mitigation measures which are likely to be considered include:

- Development and implementation of a Code of Construction Practice (CoCP) which will adhere to construction industry good practice guidance

- Implementation of traffic management measures will be applied to manage the construction phase traffic set out in a Traffic Management Plans including
  - Construction Traffic Management Plan (CTMP)
  - Travel Plan (TP) to endeavour to minimise the impact of vehicle movements associated with construction workers, including the promotion of public transport and car sharing
  - Port Traffic Management Plan (PTMP) once the final location of the preferred base port (or ports) is known

1367. All proposed mitigation measures will be consulted upon with stakeholders throughout the EIA process.

4.2.8 Approach to Assessment and Data Gathering

Approach to data collection

1368. A review of the socio-economic baseline features will be undertaken and presented, and this will include:

- Regional and local labour market and trends
- High level indication of temporary and rented accommodation supply and trends
- Current workforce
- Local and regional population and trends
- Local and regional employment and trends
- Education (including special educational needs and school standards)
- Skills

1369. Social data relating to crime, health and leisure will also be considered where this is available, along with the identification of social infrastructure such as schools, nurseries, libraries, doctors, dentists, pharmacies, social care homes, post offices, pubs, community halls, churches and other places of worship. Data on health is presented in Section 4.3. Data sources for this baseline review would include:

- Office for National Statistics (ONS)
- National Online Manpower Information System (NOMIS)

1370. All data will be linked to the Lower Layer Super Output Areas (LLSOAs) for the areas within the relevant disturbance zone of the likely impacts, whether they are direct impacts (physical footprint of any construction or operational activities) or indirect impacts (arising from transport and access, noise, air / dust and visual). All

LLSOAs for North Devon District and Torridge District will be linked to the tabulated dated on social and economic data listed above.

1371. The existing environment with respect to tourism, recreation and amenity will be characterised by the following:

- General information on tourism within the study area (i.e. Devon)
- Google maps to locate attractions within the Project area
- OS Maps to search for tourism assets within the development area, including PRoWs and cycle paths
- UK Coastal Atlas of Recreational Boating (RYA, 2021)
- Cefas Sea Angling in the UK in 2016 & 2017 (Defra, 2020)
- SeaSearch
- Finstrokes dive sites
- Tourism, and recreation research commissioned by tourism and local authorities
- Visit England Accommodation Stock Audit
- Local Nature Reserves and Country Parks from Defra
- Geospatial information
- Blue flag beaches
- Accommodation locations by survey of online booking websites such as Expedia, Booking.com, and Airbnb
- Visit Devon
- VisitBritain/VisitEngland (2020) Annual Survey of Visits to Visitor Attractions: Latest results

1372. Any additional primary or secondary datasets will be identified through ongoing consultation with stakeholders, in particular consultation with the local communities and landowners will be relevant to further understand features of importance for local tourism.

Approach to Assessment

1373. Where a project is likely to have an impact on socio-economics at a local or national scale the assessment should consider all relevant impacts, including those listed earlier in this section.

1374. Whilst there is no set of recognised standards for the assessment of socio-economic impacts, there is a variety of guidance (see Section 4.2.2) to provide a framework for the qualitative and where possible quantitative assessment of the anticipated impacts and benefits, their extent and when they are expected to occur.

1375. Economic impacts will be dependent on a range of factors which will be considered in the EIA where possible, such as:

- The technologies and infrastructure to be deployed onshore and offshore
- Construction, operation and maintenance and decommissioning
- Methodologies
- Procurement/contracting strategy
- Availability and capacity of the supply chain
- Number of workers
- Where the workers come from
- The duration of employment

1376. The absolute scale of the economic impacts, both beneficial (e.g. the number of jobs which construction, operation and maintenance, and decommissioning activity is expected to support) and adverse (e.g. disruption to activities) would be calculated based on a worst-case scenario, using an approach consistent with methods for economic impact assessment set out in HM Treasury Green Book (2020). The magnitude of change (or impact) on the receptors will be assessed by the deviation from the baseline conditions (considering scale and sensitivity), using professional judgement informed by experience from other similar projects to develop a range of magnitude criteria dependent on the receptors present.

1377. Spatial data will be used to inform the assessment, particularly in relation to community assets and tourism and recreation, derived from the assessment on other topics such as noise, air quality, transport, and landscape and visual. The potential disturbance outcomes from direct (physical footprint or obstruction) and indirect effects (noise, air quality, traffic, and visual) will be used to identify the magnitude of social impacts which will be assessed by the deviation from baseline conditions (considering scale and sensitivity), using professional judgement informed by experience from other similar projects to develop a range of magnitude criteria dependent on the receptors present.

1378. Where any significant adverse impacts are predicted, there will need to be discussion with key stakeholders (e.g. landowners) to identify and agree potentially suitable and appropriate mitigation measures.

4.2.9 Summary of Scoped In Impacts

Table 4.4 Summary of scoped in impacts relating to socio-economics

Potential Impact	Construction	Operation	Decommissioning
Direct economic benefit (supply chain)	✗	✓	✗
Increased employment	✗	✓	✗
Demographics and pressure on local services and infrastructure	✗	✗	✗
Effects on local businesses	✓	✓	✓
Loss, disruption, or disturbance (noise, air, visual, and traffic) to economic and social infrastructure	✓	✓	✓
Cumulative impacts	✓	✓	✓
Transboundary impacts	✗	✗	✗

Key
✓ Impact scoped in
✗ Impact scoped out

4.3 Human Health

4.3.1 Introduction

1379. This section sets out the methodology to be adopted in the assessment of impacts relating to human health and wellbeing ('health') and considers the potential health effects on both the general population and vulnerable population groups, at both a local and regional level. The health assessment will bring together the conclusions of the assessments made in other relevant chapters of the EIA. The key inter-relationships occur in relation to marine sediment and water quality, water resources and flood risk, land use, ground conditions and ground quality, air quality, noise, traffic, navigation and marine transport, landscape and visual amenity, and socio-economics.

1380. This section considers the World Health Organisation (WHO) definition of health, which states that health is "*a state of complete physical, mental and social wellbeing and not merely the absence of disease or infirmity*". The focus of this topic is on community health and wellbeing and not on occupation health and safety which will be dealt with in Major Accidents and Disasters (Section 4.5).

4.3.2 Policy, Legislation and Guidance

1381. Section 1.5 describes the wider policy and legislative context for the Project. The relevant planning policies, guidance, and legislation which underpin the assessment methodology for human health are set out in this section.

1382. Considerations for health set out within the National Planning Policy Framework (NPPF) (Ministry for Housing, Communities and Local Government (MHCLG), revised in 2021) are detailed in Table 4.5.

Table 4.5 NPPF Requirements for health

Paragraph/Section	NPPF Requirement
Section 2, Paragraph 8	Achieving sustainable development means that the planning system has three overarching objectives, which are interdependent and need to be pursued in mutually supportive ways (so that opportunities can be taken to secure net gains across each of the different objectives): [...] b) a social objective – to support strong, vibrant and healthy communities, by ensuring that a sufficient number and range of homes can be provided to meet the needs of present and future generations; and by fostering a well-designed, beautiful and safe places, with accessible services and open spaces that reflect current and future needs and support communities' health, social and cultural well-being
Section 8, Paragraph 92	Planning policies and decisions should aim to achieve healthy, inclusive and safe places which: [...] c) enable and support healthy lifestyles, especially where this would address identified local health and well-being needs – for example through the provision of safe and accessible green infrastructure, sports facilities, local shops, access to healthier food, allotments and layouts that encourage walking and cycling
Section 8, Paragraph 93	To provide the social, recreational and cultural facilities and services the community needs, planning policies and decisions should: [...] b) take into account and support the delivery of local strategies to improve health, social and cultural well-being for all sections of the community
Section 11, Paragraph 119	Planning policies and decisions should promote an effective use of land in meeting the need for homes and other uses, while safeguarding and improving the environment and ensuring safe and healthy living conditions. Strategic policies should set out a clear strategy for accommodating objectively assessed needs, in a way that makes as much use as possible of previously-developed or 'brownfield' land.

Paragraph/Section	NPPF Requirement
Section 11, Paragraph 124	Planning policies and decisions should support development that makes efficient use of land, taking into account: [...] e) the importance of securing well-designed, attractive and healthy places.
Section 12, Paragraph 130	Planning polices and decisions should ensure that developments: [....] f) create places that are safe, inclusive and accessible and which promote health and well-being, with a high standard of amenity for existing and future users; and where crime and disorder, and the fear of crime, do not undermine the quality of life or community cohesion and resilience.
Section 15, Paragraph 185	Planning policies and decisions should also ensure that new development is appropriate for its location taking into account the likely effects (including cumulative effects) of pollution on health, living conditions and the natural environment, as well as the potential sensitivity of the site or the wider area to impacts that could arise from the development. In doing so they should: a) mitigate and reduce to a minimum potential adverse impacts resulting from noise from new development – and avoid noise giving rise to significant adverse impacts on health and the quality of life.
Section 17, Paragraph 210	Planning policies should: [...] f) set out criteria or requirements to ensure that permitted and proposed operations do not have unacceptable adverse impacts on the natural and historic environment or human health, taking into account the cumulative effects of multiple impacts from individual sites and/or a number of sites in a locality

1383. There are a range of policies relating to health in the North Devon District and Torridge District Joint Local Plan, and these are shown in Table 4.6.

Table 4.6 Summary of local and regional policy considerations relevant to human health

Organisation	Relevance policies
North Devon District Council and Torridge District Council Joint Local Plan (2018)	Policy DM02: Environmental Protection Hazards (1) Development will be supported where it does not cause an unacceptable risk to public health and safety due to: (a) coastal erosion or land instability; (b) its siting on known or suspected contaminated land which is unsuitable for the use proposed; or

Organisation	Relevance policies
	(c) the storage or use of hazardous substance; unless taking account of appropriate remedial, preventative or precautionary measures to remove, reduce or mitigate risk to an acceptable level. (2) Development will be supported where it does not result in unacceptable impacts to: (a) atmospheric pollution by gas or particulates, including smell, fumes, dust, grit, smoke and soot; (b) pollution of surface or ground water (fresh and salt) including rivers, canals, other watercourses, water bodies, wetlands, water gathering grounds including catchment areas, aquifers, groundwater protection areas, harbours, estuaries or the sea; (c) noise or vibration; and (d) light pollution (sky glow, light intrusion and light spillage), where light overspills on to areas not intended to be lit. Areas particularly sensitive to light pollution include tranquil areas of open countryside, in particular areas of nature conservation value and Exmoor National Park's Dark Sky Reserve. Air Quality Management Area North Devon and Torridge Local Plan 2011-2031. (3) Development and traffic proposals that help to deliver measures identified within a Local Air Quality Action Plan or improved overall air quality will be supported.

1384. The requirement to consider health within the Environmental Impact Assessment (EIA) process was made explicit in The Infrastructure Planning (Environmental Impact Assessment) Regulations 2017 (the 'EIA Regulations'). Legislation relating to human health is generally driven by a wide range of acts and regulations linked to specific health related topics (e.g. noise, air quality, etc), and includes the following:

- Air Quality (England) Regulations (2000) (as amended)
- Air Quality Standards Regulations (2010)
- Environment Act (1995)
- Environmental Protection Act 1990
- The Environmental Permitting (England and Wales) Regulations 2016 (as amended)
- Water Resources Act (1991) as amended by the Water Act (2003)
- The Waste (England and Wales) Regulations 2011
- The Hazardous Waste Regulations (HWR) (Hazardous Waste (England and Wales) Regulations 2005 SI 894 as amended

- Noise Insulation Regulations 1975 and Noise Insulation (Amendment) Regulations1988
- Control of Pollution Act 1974
- Noise and Statutory Nuisance Act 1993
- The Environmental Noise (England) Regulations 2006
- The Highways Act 1980

1385. The Planning Practice Guidance on EIA (MHCLG, 2020) or 'promoting healthy and safe communities' (MHCLG, 2019) does not provide additional information on defining the scope or assessment of 'population and human health' in EIA (as is required to be considered in the amended 2017 EIA Regulations (HMSO, 2017)), therefore the following guidance (inclusive of relevant UK guidance on HIA outside of England) will be considered where appropriate in the assessment of the development on human health:

- Health Impact Assessment in Planning: Thought pieces from UK practice. In Institute of Environmental Management and Assessment (IEMA) Impact Assessment Outlook Journal, Volume 8, October 2020
- Institute of Environmental Management and Assessment (IEMA) – Health in Environment Assessment: A Primer for a Proportionate Approach (Cave *et al.*, 2017a)
- Health and Environmental Impact Assessment: A Briefing for Public Health Teams in England (Cave *et al.*, 2017b)
- Health Impact Assessment in spatial planning: A guide for local authority public health and planning teams (PHE, 2020a)
- Health Impact Assessment of Government Policy: A guide to carrying out a Health Impact Assessment of new policy as part of the Impact Assessment process (Department of Health, 2010)
- Healthy Urban Planning Checklist (London Health Urban Development Unit (HUDU), 2017b; 2019)

4.3.3 Study Area

1386. The study area for the assessment on human health will focus on a site specific (Project limits) study area, local study area (Torridge District and North Devon District), regional study area (i.e. Devon), and national study area. The assessment will also be informed by the zones of influence and receptors impacted or potentially impacted in the marine sediment and water quality, water resources and flood risk, land use, ground conditions and ground quality, air quality, noise, traffic, navigation and marine transport, landscape and visual amenity, and socio-economics. This will

enable the effects on health to be understood. However, these study areas do not necessarily define the boundaries of potential health effects. Therefore, the assessment will use study areas from other topics to broadly define representative population groups instead of setting boundaries on the extent of potential effects.

4.3.4 Baseline Data

1387. The assessment will focus on the local population within the study area. Existing baseline statistics were obtained from publicly available data, such as from the Office of National Statistics (ONS) and Public Health England (PHE) and other publicly available sources, to provide information on population health (both general and vulnerable groups) in the study area.

4.3.5 Baseline Environment

1388. The following tables (Table 4.7 to Table 4.13) present of demographic and health related data for the local study area compared to the county and national statistics.

Table 4.7 Population age distribution (2020)

Area	Median age	Under 16	Working age	Pensionable age
Torridge	*46.6*	*16.0%*	*56.0%*	*28.0%*
North Devon	*45.0*	*17.2%*	*57.2%*	*25.6%*
Devon	44.8	16.3%	58.1%	25.6%
England	*40.4*	*19.2%*	*62.3%*	*18.5%*

Table 4.8 Life expectancy (based on 2018 – 2020 data)

Age	Remaining Life Expectancy (years)							
	England		Devon		North Devon		Torridge	
	Males	Females	Males	Females	Males	Females	Males	Females
At age 65	18.6	21.1	19.6	22.3	19.3	21.8	19.2	21.2

Table 4.9 Approximate proportion of people entitled to Disability Living Allowance aged 65+ (%) (from 2019/20 Q4 to 2021/22 Q1)

England	Devon	North Devon	Torridge
4.1 (Mean)	n/a	3.2%	3.4%

Table 4.10 Health Deprivation and Disability district rank (2019) for Torridge

England	Devon	North Devon	Torridge
157 (Mean)	n/a	113	110

Table 4.11 Number of people in bad or very bad health (2001 and 2011)

England (Mean)	Devon	North Devon	Torridge
9,421	38,810	5,258	3,967

Table 4.12 Deaths (standardised mortality ratio)

Cause of Death	England (Mean)	Devon	North Devon	Torridge
All causes				
All cancers (2013-2017)	99.0	94.5	98.1	100.3
Stroke (2013-2017)	99.1	112.3	145.9	154.8
Circulatory disease	99.1	94.6	109.9	114.8
Coronary heart disease	98.8	90.6	99.3	103.9
Dementia (deaths per 100,000) to 2020	623.44	525.41	537.4	483.12
Fraction of mortality attributable to particulate air pollution (2014 – 2019)	5.0%	3.6%	3.5%	3.3%
Alcohol related (2016 – 2019) - total	80	287	35	31
Cumulative Covid deaths (to 5/11/2021)	212	491	35	36

Table 4.13 Deaths from road transport accidents (2016 - 2018)

Killed and seriously injured per 100,000 population			
England	Devon	North Devon	Torridge
50.3	50.3	55.5	43.7

4.3.6 Potential Impacts

1389. This section considers the potential impacts on human health which are likely to be associated with the Project. The considerations also build on many recent Development Consent Order (DCO) projects that have been consented for offshore windfarms, which indicate that these types of project generally have no significant health impacts due to the predominantly short-term and temporary nature of the

majority of the disturbances to health determinants within the local area (and no national level health impacts have been identified other than the overarching positive impacts derived from renewable energy sources avoiding the need for non-renewable energy sources (e.g. gas) which emit large quantities of gaseous pollutants.

1390. Consequently, this scoping considers:

- Recent projects
- Scientific literature
- Baseline conditions
- Health priorities
- Consultation responses
- Regulatory standards
- Policy context

1391. Table 4.14 presents the key impact sources that are potential determinants of health that could arise because of the project.

Table 4.14 Potential impact sources that could be determinants of health because of the project

Potential Source	Construction	Operation
Obstruction to PRoW from works and scheme footprint	Yes	Yes
Increased road traffic (severance and road safety)	Yes	Yes
Increased marine traffic / Navigation risk	Yes	Yes
Visual disturbance from groundworks, plant and personnel	Yes	Yes
Emissions to air (ground disturbance)	Yes	Yes
Noise (vehicles and plant)	Yes	Yes
Disturbance to contaminated land / marine sediment	Yes	Yes
Discharge of pollutants to waters	Yes	Yes
Reduction in permeable land / obstruction to flood paths	Yes	Yes
Electro-magnetic fields (EMF)	No	Yes
Increased employment	Yes	Yes
Influx of non-resident workforce (and loss of or increased pressure on existing health, education, recreation, or other community infrastructure or public services)	Yes	Yes

Potential impacts during construction

1392. The potential impacts that may occur during construction of the proposed project would be determined through the topic specific assessments, but are expected to include those detailed in Table 4.15.

Table 4.15 Scoping of potential impacts on human health during construction

Theme	Impact and description
Traffic and Transport (Active travel)	Opportunities for active travel: potential impacts on Public Rights of Way (PRoWs) have the potential to causes changes in access footpath, cycleway and bridleway networks. However, given that any impacts on rights of way would be short-term and temporary and diversions would be required. The resident population at risk is generally low across the areas where the project route occurs, and where there are significant routes (such as the South West Coast Path and Tarka Trail) these would not be closed as works would require HDD at these locations. Overall, with limited population to be affected and short-term and temporary disturbance at worse, and on the basis of previous consented projects, no significant health effect is likely, and this is therefore scoped out from further assessment noting that Land Use and Socio-economics topics will be considering any relevant mitigation measures in the event of any potential PRoWs are likely to be affected.
Traffic and Transport (Active travel)	Traffic safety and severance/connectivity: increased traffic associated with construction may give rise to impacts on highway safety and severance/connectivity. It is likely that some construction traffic will use minor roads and some increased traffic would occur on these and on major highways in the study area. However, it is noted that in relation to traffic volumes there are wide ranges throughout the year due to the area being a highly used area for tourism and recreation. Consequently, the short-term and temporary increases in traffic are not expected to result in any measurable increase in severance / connectivity issues. Whilst there is potential for increased impacts on highway safety during construction, as well as the above point that there is a wide influx of non-resident drivers throughout the year, whilst construction traffic (and drivers) are highly trained and also require through their employers increased levels of consideration to local road users be they pedestrians, cyclists, equestrians, or vehicles. Overall, given the above and on the basis of previous consented projects, no significant health effect is likely, and this is therefore scoped out from further assessment noting that the Traffic and Transport topic will consider local impacts on specific roads and junctions and incorporate any relevant mitigation measures to ensure improved road safety during construction.

Theme	Impact and description
Traffic and Transport (Active travel)	Marine traffic and navigation risk: there would be increased marine traffic immediately offshore of the coast as well as further out (70km) to the Windfarm Site during construction. The potential receptors at risk are the recreational boating community and all commercial mariners. There are extensive guidelines and rules regarding navigation with more increased requirements and regulations to maintain safe navigation and avoidance of potential 'conflict' such as collisions. Given the existence of significant rules and regulations as well as Notices to Mariners of potential static or related marine traffic activities, and on the basis of previous consented projects no significant health effects are expected and health impacts to receptors due to increased vessel activity are scoped out.
Land Use (Healthy Environment)	Construction: construction works associated with the project have the potential to cause impacts on wellbeing through stress and visual disturbance. The construction works associated with the Landfall and onshore cable corridor installation result in short-term and temporary visual disturbance and presence of workers and associated plant and machinery. Furthermore the cable route will need to avoid residential developments (as they cannot be trenched or HDD'ed through a residence) and given the limited number of residences throughout the areas expected to be suitable cable routes the number of potential receptors is also small. Overall, with the limited population available to be affected and a short-term and temporary disturbance at worse, and on the basis of previous consented projects, no significant health effect is likely, and this is therefore scoped out from further assessment noting that the Landscape and Visual topic will be considering any relevant mitigation measures to prevent significant localised visual impacts arising.
Land Use (Healthy Environment)	Air quality: construction works have the potential to impact air quality from the generation of construction dust and pollutant emissions and thereby cause nuisance soiling and an increase in local air pollution which may affect vulnerable people. The construction works associated with the Landfall and onshore cable corridor installation result in very short-term and temporary ground disturbance. Given this the potential scale of any impact is negligible. Furthermore the cable route will need to avoid residential developments (as they cannot be trenched or HDD'ed through a residence) and given the limited number of residences throughout the areas expected to be suitable cable routes the number of potential receptors is also small. Overall, with limited population available to be affected and very short-term and temporary disturbance at worse, and on the basis of previous consented projects, no significant health effect is likely, and this is therefore scoped out from further assessment noting that the Air Quality topic will be considering any relevant mitigation measures to prevent air quality impacts arising.

Theme	Impact and description
Land Use (Healthy Environment)	Noise: noise emissions have the potential to cause disturbance and affect local resident's health and wellbeing. The construction works associated with the Landfall and onshore cable corridor installation result in short-term and temporary construction noise. Given this the potential scale of any impact is limited particularly as works would be carried out in the day except at the Landfall though works there are in general distant from aggregated areas of residences. Furthermore the cable route will need to avoid residential developments (as they cannot be trenched or HDD'ed through a residence) and given the limited number of residences throughout the areas expected to be suitable cable routes the number of potential receptors is also small. Overall, with limited population available to be affected and a short-term and temporary disturbance at worse, and on the basis of previous consented projects, no significant health effect is likely, and this is therefore scoped out from further assessment noting that the Noise topic will be considering any relevant mitigation measures to prevent significant localised noise impacts arising.
Land Use (Healthy Environment)	Contaminated land and water: contaminated land (if found to be present) could be disturbed during construction and result in health effects through ingestion (or pollution of agricultural land and food health), inhalation or contact with liberated contamination. Given the uncertainty in the presence of potential contaminants, though constrained by the limited number of residences present along the areas likely to be proposed for the cable corridor and Landfall, and the potential for impact on agricultural land and thus health of those that could ingest that food, this impact is scoped in. However, nearshore works could result in disturbance to marine sediments which could potentially be contaminated (though unlikely as the majority of the inshore areas along the open coast are sand (which does not bind contaminants to it). Given the very temporary nature of any disturbance, the existing high energy environment with extensive dilution and dispersal, and the limited potential for receptors to be present (within the marine environment – even in Bathing water beaches) and ingest sediment disturbed at specific times for a temporary duration, no long-term health effects are expected in the marine environment. Consequently, contaminated marine sediment impacts are scoped out. The very limited and temporary disturbance to marine sediment and water quality in localised areas could affect aquaculture, however as described below in relation to marine water quality, storm induced disturbances would result in the same scale of disturbance indicates that the impacts would fall within the range of natural processes and no additional impacts on aquaculture resources (fish and shellfish) would occur in terms of potential contaminants even discounting for the extensive dilution and dispersion of any disturbed sediment along this coastline. Consequently, mariculture / aquaculture impacts are scoped out.

Theme	Impact and description
Land Use (Healthy Environment)	Pollution of surface or groundwater bodies which are subsequently used as a potable source could result in health effects. Given the uncertainty in the relation to the potential for polluting events albeit of short-term and temporary nature, the potential pathways and receptors are not fully understood at this stage along with the potential severity of the impact and as such this impact is scoped in. Nearshore works could result in disturbance to sediments and related water quality deterioration. However, the very temporary nature of the disturbance and the limited potential for receptors to be present (within the marine environment – even in Bathing Water beaches) and the nature of storm induced disturbances which would result in the same scale of disturbance indicates that, given there is no permanent human presence and at most extremely limited presence if at all, no long-term health effects are expected. Consequently, water quality impacts are scoped out. Mariculture / aquaculture impacts are also scoped out for these reasons and those described above with regard to contaminated sediment.
Land Use (Healthy Environment)	Climate change and flood risk: climate change and increase flood risk could affect the wellbeing of local residents. During construction no barriers or impermeable ground will be installed and there would be no obstruction to flood paths or increased displacement of flood water. Therefore climate change is scoped out from further consideration.
Socio-economics (Vibrant Neighbourhoods)	Employment opportunities: beneficial impacts are anticipated in relation to enabling workforces in the local area to access employment opportunities through construction activities. Whilst construction would result in an increase in employment it would represent only a short-term and wide scale negligible positive impact, as the majority of the employment would be across the Region as a minimum and thus limited. As such given the negligible scale and thus benefit on the local population this impact is scoped out.
Socio-economics (Vibrant Neighbourhoods)	Non-resident workforce: potential negative impacts could be associated with a non-resident workforce within the study area including increased pressure on health resources. Whilst most of the construction workforce is likely to originate from contractors outside the local area, this could result in pressure on local accommodation and local health services, as well as socio-cultural change. However, given the transient and short-term nature of the construction phase, coupled with the study area being heavily influenced by extensive annual tourism movements, the scale of any potential change would be negligible. As such this impact is scoped out.

Potential impacts during operation

1393. The potential impacts that may occur during the operation of the proposed project would be determined through the topic specific assessments, but are expected to include those detailed in Table 4.16.

Table 4.16 Scoping of potential impacts on human health during operation

Theme	Impact and description
Traffic and Transport (Active travel)	Opportunities for active travel: potential impacts on Public Rights of Way (PRoWs) have the potential to causes changes in access footpath, cycleway and bridleway networks. Given there will be no extant structures above ground level as a result of the scheme, there would be no obstruction or diversion to PRoWs and therefore potential impacts on human health would not arise, this is therefore scoped out from further assessment.
Traffic and Transport (Active travel)	Traffic safety and severance/connectivity: increased traffic associated with construction may give rise to impacts on highway safety and severance/connectivity. The amount of traffic generated during the operation phase would be insignificant and limited to occasional vehicles carrying out monitoring, and thus significantly smaller in number than that for construction. Overall therefore, given the reasons described for the construction phase and on the basis of previous consented projects, no significant health effect is likely, and this is therefore scoped out from further assessment.
Traffic and Transport (Active travel)	Marine traffic and navigation risk: there would be increased marine traffic predominantly around the Windfarm Site (70km) for the purposes of maintenance activities and limited monitoring along the cable corridor, with the number of vessels being significantly smaller than that during the construction phase. The potential receptors at risk are the recreational boating community and all commercial mariners. There are extensive guidelines and rules regarding navigation with more increased requirements and regulations to maintain safe navigation and avoidance of potential 'conflict' such as collisions. Given the existence of significant rules and regulations as well as Notices to Mariners of potential static or related marine traffic activities, no measurable health risks are expected and health impacts to receptors due to increased vessel activity during operation are scoped out from further assessment.

Theme	Impact and description
Land Use (Healthy Environment)	Air quality: operation of the proposed SRO has the potential to impact air quality from the generation of pollutant emissions and thereby result in an increase in local air pollution which may affect vulnerable people. There would be no planned ground disturbance works during the operation phase, and traffic volumes would be very low and intermittent for monitoring purposes only. Given the high variability in traffic within the local study area due to the tourism and recreation assets and influences no measurable impact on air quality is identified. Therefore air quality impacts on human health are scoped out from further assessment.
Land Use (Healthy Environment)	Noise: noise emissions have the potential to cause disturbance and affect local resident's health and wellbeing. There would be no planned ground disturbance works (and thus plant and machinery noise) during the operation phase, and traffic volumes would be very low and intermittent carrying out monitoring. Given the high variability in traffic within the local study area due to the tourism and recreation assets and influences no measurable impact on noise is identified. Therefore noise impacts on human health are scoped out from further assessment.
Land Use (Healthy Environment)	Contaminated land and water: pollution of surface or groundwater bodies which are subsequently used as a potable source could result in health effects. There would be no planned ground disturbance works or nearshore disturbance works during the operation phase, therefore ground contamination impacts or marine contamination impacts on human health are scoped out from further assessment.
Land Use (Healthy Environment)	Pollution of surface or groundwater bodies which are subsequently used as a potable source could result in health effects. There would be no planned disturbance works or nearshore disturbance works during the operation phase, therefore pollution impacts on marine, freshwater or terrestrial receptor impacts on human health are scoped out from further assessment.
Land Use (Healthy Environment)	Climate change and flood risk: climate change and increased flood risk could affect the wellbeing of local residents. Given there will be no extant structures above ground level as a result of the scheme (the substation is already present and not part of the Project), there would be no obstruction to flood paths or increased displacement of flood water. Therefore climate change is scoped out from further consideration.

Theme	Impact and description
Land Use (Healthy Environment)	Electro-Magnetic Fields (EMF): Electric and magnetic fields are produced wherever electricity is used, in the home, office, or anywhere else. Electric fields are produced by voltage and magnetic fields by current (it should also be noted that the people are constantly exposed to the earth's magnetic field). The UK policy is to comply with the 1998 ICNIRP12 guidelines in the terms of the 1999 EU Recommendation and the electrical industry has a policy of complying with these guidelines. This limits exposure to magnetic fields of 360µT and electric fields of 9kV/m. In 2004 the National Radiological Protection Board (NRPB now part of PHE) produced Advice on Limiting Exposure to Electromagnetic Fields[13]. In this NRPB concluded that "the results of epidemiological studies, taken individually or as collectively reviewed by expert groups, cannot currently be used as a basis for restrictions on exposure to EMFs". Due to the fact that all project electrical infrastructure will be built to comply with current standards and is buried (the substation already exists and has been operating for decades) and that there is little scientific evidence linking EMF exposure to adverse health effects as indicated in many recent DCO project and the application decisions. It is further noted that the marine environment contains no permanent human residences and thus no receptors are present within the marine environment (with the exception of any divers who would only be present near any cables for very short durations). EMF is therefore scoped out.
Socio-economics (Vibrant Neighbourhoods)	Employment opportunities: beneficial impacts are anticipated in relation to enabling workforces in the local area to access employment opportunities throughout the duration of operation. Whilst operation would result in an increase in employment from the operation and maintenance activities these are more likely to be located in relevant O&M port locations and TTWAs. Given that and the relative negligible scale when considering local and regional employment (and unemployment) numbers, given the negligible scale this impact is scoped out.

[12] International Commission on Non-Ionizing Radiation Protection

[13] Available at: https://webarchive.nationalarchives.gov.uk/20140714093648/http://www.hpa.org.uk/Publications/Radiation/NPRBArchive/DocumentsOfTheNRPB/Absd1502/

Theme	Impact and description
Socio-economics (Vibrant Neighbourhoods)	Non-resident workforce: potential negative impacts could be associated with a non-resident workforce within the study area including increased pressure on health resources. Whilst most of the operation phase workforce is likely to originate outside the local area, their presence could result in pressure on local accommodation and local health services, as well as socio-cultural change. However, given the transient and short-term nature of the intermittent O&M activity coupled with the study area being heavily influenced by extensive annual tourism movements, the scale of any potential change would be negligible. As such this impact is scoped out.

Potential impacts during decommissioning

1394. At this stage, the nature of works required for decommissioning is unknown; however it is anticipated that impacts during decommissioning would be similar in nature to those during construction. The scope of potential impacts during decommissioning will therefore be defined at the scoping stage on the basis of the scoped in construction and operational impacts.

Potential cumulative impacts

1395. Whilst individual impacts are considered to be negligible and not significant and thus scoped out (barring the potential contaminant issues identified during construction and the potential health pathways), the combined effects of for example visual, noise, air quality, and traffic impacts could affect specific sensitive (and particularly vulnerable) receptors. Therefore it is considered that at a cumulative assessment covering the specific receptor populations is carried out to ensure there are no locally significant impacts. A project cumulative assessment is therefore scoped in for all phases of the Project. Cumulative impacts will be assessed in accordance with the approach to cumulative assessment is set out in Section 1.9.2.

Potential transboundary impacts

1396. There is no potential for impacts on human health to extend outside the local study area given the localised nature of the work (and potential impacts) and the distance to the nearest non-UK country (i.e. Ireland) over 130km away. Transboundary impacts are therefore **scoped out**.

4.3.7 Mitigation Measures

1397. As the health assessment will be based on the findings from other technical assessments (marine sediment and water quality, water resources and flood risk, land use, ground conditions and ground quality, air quality, noise, traffic, navigation and marine transport, landscape and visual amenity, and socio-economics), mitigation measures will be proposed in those assessments where relevant to reduce impacts on human health and wellbeing.

4.3.8 Approach to Assessment and Data Gathering

1398. In line with industry guidance (PHE, 2020a), 'health determinants' are considered, to describe the potential effects of human health and wellbeing and inform the assessment on human health.

1399. A wide variety of direct and indirect factors can influence human health. These vary from controllable factors (e.g. lifestyle) to uncontrollable factors (e.g. genetics). The influences and effects can be wide-ranging and are likely to vary between individuals. External contributary factors (known as 'determinants') are considered in determining 'physical, mental and social wellbeing' and are a reflection of a mix of influences from an individual's society and environment.

1400. The 'wider determinants of health' model (Barton and Grant, 2006) is used to conceptualise how human health spans environmental, social and economic aspects. Influences that result in a change in determinants have the potential to cause beneficial or adverse effects on health, either directly or indirectly. The degree to which these determinants influence health varies, given the degree of personal choice, location, mobility and exposure.

1401. The key steps in the assessment are:

- Consider the likelihood of the project having an effect, and such an effect should be both plausible and probable. This should identify health pathways using the source-pathway-receptor model to transparently identify the likely effects
- Determine the significance of the effects, by characterising sensitivity of the receptors affected (described in detail in Section 7.8.3.2) and then determining whether a change in a population's (or population group's) health would arise that is significant (described in detail in Section 7.8.3.3)

1402. In line with good practice, the assessment process will include the identification and review of the potential public health impacts of the full life-cycle (i.e. construction, operation and decommissioning) of the project's features, including

any emissions. The findings will be taken from individual relevant technical chapters from the ES and collated in the health assessment. In addition, feedback will be sought from consultees on potential health impacts, with reference to the Health and Safety Executive (HSE) and PHE.

1403. The anticipated impacts associated with the construction and operation of any of the proposed project has been guided by the wider determinants of health and wellbeing 'themes' included in PHEs 'Health Impact Assessment in spatial planning' guidance (PHE, 2020) and also referenced in the NHS' 'Healthy Urban Planning Checklist' (NHS, 2017). The themes include 'traffic and transport' (active travel), 'land use' (healthy environments) and 'socio-economics' (vibrant neighbourhoods) (PHE, 2020; NHS, 2017).

Sensitive Receptors

Types of Receptors

1404. Health impacts will be assessed across geographic population groups (i.e. site-specific, local, regional and national) and at potentially vulnerable groups (i.e. children and young people, older people, people with existing poor health and people living in deprivation, including those on low incomes).

Sensitivity of Receptors

1405. The factors that characterise sensitivity for human health are outlined in Table 4.17. A formulaic matrix approach to determining sensitivity has been avoided in line with best practise. The sensitivity score can be high, medium, low or negligible. The 'higher' and 'lower' characterisations used in Table 4.17 represent instructive positions on a spectrum. It is likely that situations will have a mix of higher and lower factors. As such, an expert view of sensitivity should be taken.

Table 4.17 Factors characterising population sensitivity (Cave et al., 2017a)

Factor	Lower sensitivity	Higher sensitivity
Inequalities	Low levels of inequities or Inequalities.	High levels of inequities or Inequalities.
Deprivation	Overall deprivation levels low or low for a relevant sub-domain of the indices of multiple deprivation. Good access to financial, social or political resources.	Overall deprivation levels high or high for a relevant sub-domain of the indices of multiple deprivation. Poor access to financial, social or political resources.
Health status	Low levels of poor health and/or low levels of disability. Low reliance, or high capacity, for healthcare facilities, staff or resources.	High levels of poor health and/or disability (particularly multiple or complex long-term health conditions). High reliance, or low capacity, for healthcare facilities, staff or resources.

Factor	Lower sensitivity	Higher sensitivity
Life stage	Predominantly a working age population in steady, good quality employment.	Presence of various dependents (particularly children or elderly), pregnant women, shift workers or the economically inactive.
Outlook	No indication that strong views are held about the project. People are well informed of the issues and potential effects.	Existence of groups with strong views and/or a large amount of uncertainty about the project. These groups may anticipate risks to their health and thus be affected by not only actual changes, but also by the possibility of change.

Definition of Impact Magnitude and Significance

1406. The factors that characterise magnitude for human health are outlined in Table 4.18. A formulaic matrix approach to determining sensitivity has been avoided in line with best practise. Instead this assessment relies upon specific factors that relate directly to population groups as demonstrated in Table 4.18. The magnitude score can be large, moderate, small or negligible. The 'larger' and 'smaller' characterisations used in Table 4.18 represent instructive positions on a spectrum.

Table 4.18 Factors characterising population magnitude (Cave et al., 2017a)

Factor	Smaller magnitude	Larger magnitude
Severity	Small change in symptoms, quality of life or day-to-day functioning. Small change in the risk of developing a new health condition (or injury) or in the progression of an existing condition. Small change in inequalities.	Large change in symptoms, quality of life or day-to-day functioning. Large change in the risk of developing a new health condition (or injury). Large change in the progression of an existing condition. Large change in inequalities.
Extent	Few members of the relevant population. Little change in population.	Most members of the relevant population affected or vulnerable. Substantial population displacement or influx.
Frequency	Monthly or yearly affects with acute (short term) changes in health outcomes.	Continuous or daily effects with chronic (long term) changes in health outcomes.
Reversibility	Change in health outcomes reverses once the project change ceases. No intergenerational effects.	Permanent change in health outcomes. Intergenerational effects.
Exposure	A low concentration over a short time. Low exposure to a small population. A low degree	A low concentration over a long time, or a high concentration over a short time. Low exposure to a large population or high exposure to a small population. A

Factor	Smaller magnitude	Larger magnitude
	of resource sharing with the project.	high degree of resource sharing with the project.

1407. Once a source, pathway and receptor for a plausible health effect have been identified, and the sensitivity and magnitude considered, a professional judgement is made as to whether the change in a population's health is significant. The characterisation of sensitivity and magnitude is consistent with other EIA topics. However, other relevant information sources also feed into the professional judgement on significance. This ensures the conclusions on population health outcomes are reasoned and robust.

Supporting Technical Assessments

1408. No supporting technical assessments are required for health, though this assessment will be informed by the detailed technical assessments for relevant topics within the EIA, notably marine sediment and water quality, water resources and flood risk, land use, ground conditions and ground quality, air quality, noise, traffic, navigation and marine transport, landscape and visual amenity, and socio-economics.

Baseline Data Collection

1409. No baseline human health surveys or monitoring is proposed to be undertaken as part of the assessment.

1410. The following data sources will be used to inform the baseline for the health assessment:

- PHE's Public Health Outcomes Framework (PHE, 2021a)
- PHE's Wider Determinants of Health (PHE, 2021b) and Health Profiles (PHE, 2021c)
- The Office for National Statistics
- Nomis official labour market statistics
- Index of Multiple Deprivation (IMD) (MHCLG)

1411. More recent statistics will also be collected for some socio-economic variables including the latest census data where available.

4.3.9 Summary of Scoped in Impacts

Table 4.19 Summary of impacts scope in or out relating to human health

Potential Impact	Construction	Operation	Decommissioning
Obstruction to PRoW	✗	✗	✗
Increased road traffic (severance and road safety)	✗	✗	✗
Increased marine traffic / navigation risk	✗	✗	✗
Visual disturbance	✗	✗	✗
Emissions to air	✗	✗	✗
Noise	✗	✗	✗
Ingestion of contaminants	✓	✗	✓
Climate resilience / flood risk	✗	✗	✗
Electro-magnetic fields (EMF)	✗	✗	✗
Increased employment	✗	✗	✗
Influx of non-resident workforce (and loss of or increased pressure on existing health, education, recreation, or other community infrastructure or public services)	✗	✗	✗
Cumulative impacts	✓	✓	✓
Transboundary impacts	✗	✗	✗

Key:
✓ Impact scoped in
✗ Impact scoped out

4.4 Climate Change

4.4.1 Introduction

1412. Climate change was included as a required topic as part of the EIA Directive 2014/52/EU, which was implemented into UK regulations in May 2017. The climate change chapter will include consideration of the effect of the Project to climate change (net change in greenhouse gas (GHG) emissions), and the impact of climate change to the Project (vulnerability of infrastructure and assets).

1413. The climate change assessment will therefore comprise two separate assessments, an assessment which quantifies the GHG emissions released from activities associated with the Projects. This will also determine the 'net' effect of the provision

of renewable energy to the UK grid. In addition, a climate resilience assessment of the infrastructure to the projected effects of climate change will be carried out.

4.4.2 Policy, Legislation and Guidance

1414. Section 1.5 describes the wider policy and legislative context for the Project. Existing GHG emissions for UK local authorities are available from BEIS (BEIS, 2021). GHG emissions within the identified local authority regions currently arise from a number of different sectors, but are likely to be dominated by road transport, industrial installations, and domestic sources such as electricity and gas consumption.

1415. The Climate Change Act 2008 provides a framework for the UK to meet its long-term goals of reducing GHG emissions to 'net-zero' (i.e. at least a 100% reduction) by 2050 ('climate mitigation'). This target was introduced by the Climate Change Act 2008 (2050 Target Amendment) Order 2019, which amended the previous 2050 GHG target of an 80% reduction compared to 1990 levels.

1416. The Climate Change Act 2008 was enacted as part of the UK's responsibility and obligations as a signatory of the Kyoto Protocol 1997 (which did not become binding until 2005). The UK target covers the six main GHGs referenced in the Kyoto Protocol.

1417. The Climate Change Act 2008 requires the Government to set 'Carbon Budgets' to provide a constraint of GHG emissions in a given time period. The Carbon Budgets are set by the Committee for Climate Change (CCC) and provide a legally binding five-year limit for GHG emissions in the UK. The six Carbon Budgets that have been placed into legislation and will run up to 2037 and are identified in Table 4.20.

1418. The first Carbon Budget was met, and the UK is set to outperform on the second and third budgets. However, current projections suggest that the fourth carbon budget will not be met.

1419. The sixth Carbon Budget was published by the CCC in December 2020, which set out the level of GHG emissions that the UK can release from 2033 to 2037 (CCC, 2020). It was the first Carbon Budget to set out the path to the net-zero carbon emissions target.

1420. Emissions from the energy sector have already decreased by 68% since 1990, the majority of which occurred in the last decade as a result of a shift from coal towards gas and low-carbon generation (CCC, 2020). The sector was responsible for 65 MtCO2 in 2018, 15% of the UK's emissions (CCC, 2020).

Table 4.20 UK Carbon Budgets

Budget	Carbon Budget Level (MTCO2e)	Reduction Below 1990 Levels
1st Carbon Budget (2008 to 2012)	3,018	25%
2nd Carbon Budget (2013 to 2017)	2,782	31%
3rd Carbon Budget (2018 to 2022)	2,544	37% by 2020
4th Carbon Budget (2023 to 2027)	1,950	51% by 2025
5th Carbon Budget (2028 to 2032)	1,725	57% by 2030
6th Carbon Budget (2033 to 2037)	965	78% by 2035

1421. Offshore wind is considered to be able to meet a substantial share of future energy demand and be an integral component for reaching close to zero GHG emissions for the sector in 2050 (CCC, 2020).

4.4.3 Baseline Environment

1422. The south west coastline of England currently experiences a temperate 'maritime' climate which is typical of the UK. As the project will be situated off the South West coast of the UK, the study areas are likely to display average UK climate with typically warm summers and cool to cold winters. Rainfall on average falls evenly throughout the year.

4.4.4 Potential Impacts

1423. As detailed above the Climate Change Chapter will comprise two separate sub assessments. Firstly, a GHG assessment will be carried out to determine the impact of the project to climate change. In addition, a climate resilience assessment will be undertaken to consider the potential impacts of climate change to the project.

Potential impacts during construction

1424. Net emissions arising from the project will be assessed across its full lifespan, encompassing construction (including fabrication), operation and decommissioning where information is available. It is expected that the project will result in a net positive impact on the UK's attempts to meet the targets set out in the 2008 Climate

Change Act and the Sixth Carbon Budget (CCC, 2020), however, this will need to be demonstrated through the GHG assessment.

1425. As the construction phase is anticipated to occur within the next 10 years, the impact of effects arising from climate change on construction activities to the project is considered to be unlikely and is scoped out of the assessment.

Potential impacts during operation

1426. As noted above, operational activities associated with the project will be considered as part of a GHG assessment. The assessment will quantify emissions generated by operational activities and account for the emissions saving from the provision of renewable electricity to the electricity distribution network.

1427. Operational infrastructure associated with the project could be vulnerable to the projected effects of climate change, in particular in relation to flood risk and coastal erosion.

Potential impacts during decommissioning

1428. As noted above, decommissioning will be considered as part of the GHG assessment. To do this, information for likely emission sources during decommissioning of the project will be obtained from relevant literature.

Potential cumulative impacts

1429. Potential cumulative impacts on climate resilience may arise from other projects which have the potential to exacerbate the vulnerability of the project to the effects of climate change, for example other projects giving rise to increased flood risk or coastal erosion.

1430. As the project will be responsible for GHG emissions associated with its activities only, a cumulative assessment with other projects has been scoped out of this aspect of the assessment. This approach is in line with IEMA guidance 'Assessing Greenhouse Gas Emissions and Evaluating their Significance' (IEMA, 2017). Cumulative impacts will be assessed in accordance with the approach to cumulative assessment is set out in Section 1.9.2.

Potential transboundary impacts

1431. The effects of climate change are by definition transboundary, in that they are felt not in proximity to the sources of emission, and that all releases of GHG's contribute to climate change. However, to proportionately frame the assessment, the GHG assessment will contextualise emissions from the project using the UK's most recent Carbon Budget (CCC, 2020). In this sense, the impacts will not be transboundary

but national, in the degree to which they contribute to the UK climate targets. Transboundary impacts are therefore scoped out of this assessment.

4.4.5 Approach to Assessment and Data Gathering

1432. The following information has been considered during the production of this Scoping Report and will be considered further within the ES where relevant matters are scoped into the EIA process.

1433. Activity data, including forecast construction and operational emissions data, will be used for the GHG assessment. Emission factors will be obtained from suitable sources, such as BEIS (2021) and the Inventory of Carbon and Energy (ICE, 2019).

1434. The climate change resilience assessment will be informed by future climate projection data from the UK Climate Projection (UKCP18) database (Met Office, 2018). No surveys are proposed to inform the assessment of impacts related to climate change.

Approach to Assessment

1435. The GHG emissions assessment will be carried out in accordance with the Greenhouse Gas Protocol (2015), an international standard for corporate reporting. GHG emissions arising from activities associated with the construction, operation and decommissioning of the project will be quantified. In addition, the 'net' effect of the project will be determined, which will consider the effect of the provision of renewable energy onto the UK electricity grid against the project's lifetime emissions.

1436. Significance criteria for the assessment will be utilised from IEMA guidance 'Assessing Greenhouse Gas Emissions and Evaluating their Significance' (IEMA, 2017).

1437. The climate resilience assessment will use sector-specific guidance and literature to determine the likely climate hazards, based on the UKCP18 climate database, that could affect the operation of the project. The climate resilience assessment will use the output of other work streams, such as the FRA, to provide an assessment of the vulnerability of the project's infrastructure to climate change.

1438. The methodology for the assessment will be informed by IEMA guidance, Environmental Impact Assessment Guide to: Climate Change Resilience & Adaptation (IEMA, 2020).

4.4.6 Summary of Scoped in Impacts

1439. Table 4.21 summarises the impacts scoped in or out for further assessment during the EIA.

Table 4.21 Summary of Impacts Relating to Climate Change

Potential Impact	Construction	Operation	Decommissioning
Net contribution to the UK's climate targets	✓	✓	✓
Vulnerability of infrastructure to climate change	x	✓	x

Key:
✓ Impact scoped in
✗ Impact scoped out

4.5 Accidents and Disasters

4.5.1 Introduction

1440. It is proposed that consideration of major accidents and disasters within the EIA process for the Project is based on assessments conducted within individual technical chapters, where this can be adequate covered by the scope of these chapters.

4.5.2 Policy, Legislation and Guidance

1441. Section 1.5 describes the wider policy and legislative context for the Project. The EIA Regulations require that the EIA considers the vulnerability of the Project to Major Accidents and Disasters. The proposed approach follows guidance published by IEMA on Major Accidents and Disasters in EIA (IEMA, 2020).

4.5.3 Potential Impacts

1442. Following a review of the potential major accidents and disasters which may interact with, or arise from the Project, the following have been identified:

- Coastal erosion and flood risk (considered within the 'Marine Geology, Oceanography and Physical Processes', 'Water Resources and Flood Risk' and 'Climate Change' EIA Chapters)
- Accidental spills of hazardous material (considered within the 'Marine Water and Sediment Quality', and 'Human Health' EIA Chapters)
- Vessel collision (considered within the 'Shipping and Navigation' EIA Chapter)

- Exposed cables leading to vessel snagging (considered within the 'Shipping Navigation' Chapter and 'Commercial Fisheries' EIA Chapters)

1443. As the impacts of these accidents / disasters are being considered individually within technical EIA chapters, a separate Major Accidents and Disasters Chapter is not considered to add to the EIA, and the topic is therefore proposed to be scoped out of further assessment

4.5.4 Summary of Scoped in Impacts

Table 4.22 Summary of impacts relating to Accidents and Disasters

Potential Impact	Construction	Operation	Decommissioning
Net contribution to the UK's climate targets	X	✓	✓

4.6 Inter-relationships of Wider Scheme Aspects

1444. The EIA will identify the full range of inter-relationships which are likely to result from the construction, operation and decommissioning of the Project. The Project-wide impacts of landscape and visual, socio-economics, and tourism and recreation are all closely interlinked. Inter-relationships between impacts associated with the offshore and onshore Project areas will also be considered as outlined in Sections 2.16 and 3.11.

Table 4.23 Onshore inter-relationships

Onshore Topic	Inter-relationships
Health	Is affected by: • Water resources and flood risk • Air quality • Noise and vibration • Traffic and transport • Tourism and recreation • Socio-economics
Tourism and recreation	Is affected by: • Traffic and transport • Landscape and visual • Noise and vibration Will have effects on: • Health • Socio-economics

Onshore Topic	Inter-relationships
Socio-economics	Is affected by: • Traffic and transport • Landscape and visual • Noise and vibration • Tourism and recreation Will have effects on: • Health • Land Use

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Appendix A High Level Heritage Appraisal

White Cross Offshore Wind Farm
High Level Heritage Appraisal

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Version Number:	3.0	
Date:	17/01/2022	
Prepared by:	*GSP*	
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Version Number	Reason for Issue / Major Changes
V 1.0	Draft for client review
V 2.0	Final
V 3.0	Final for Issue

Executive Summary

White Cross Offshore Windfarm (the Project) is a proposed floating offshore windfarm located in the Celtic Sea (Figure 1 -1) with a capacity of up to 100MW. The Project is being developed by Offshore Wind Ltd (OWL) a joint venture between Cobra Instalaciones Servicios, S.A., and Flotation Energy plc.

The Project will help achieve the UK Government's commitment to net zero by 2050 and tackle the climate emergency by producing electricity from renewable energy. The Project was awarded as a floating wind farm demonstrator project by The Crown Estate.

This high-level heritage appraisal has been produced to provide a characterisation and assessment of the Historic Environment baseline within the Area of Search. This has been done to support the initial scoping assessment and to aid in site selection.

In this way, areas of higher archaeological potential have been identified and characterised in both the onshore and offshore Areas of Search. A series of recommendations and mitigation measures have been provided to further aid the decision-making process. This appraisal forms a technical Appendix to the scoping report and will inform further assessment undertaken for the EIA assessment.

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Glossary of Acronyms

Acronym	Definition
AEZ	Archaeological Exclusion Zone
ADBA	Archaeological Desk Based Assessment
AOD	Above Ordnance Datum
AoS	Area of Search
BGS	British Geological Society
CA	Conservation Area
CIA	Cumulative Impact Assessment
CIfA	Chartered Institute of Archaeologists
DCMS	Department for Culture, Media & Sport
DCO	Development Consent Order
DECC	Department for Energy and Climate Change
EEA	European Economic Area
EIA	Environmental Impact Assessment
ES	Environmental Statement
EU	European Union
GIS	Geographical Information System
GPS	Global Positioning System
ha	Hectare
HER	Historic Environment Record
HDD	Horizontal Directional Drilling
IEMA	Institute of Environmental Management and Assessment
JNAPC	Joint Nautical Archaeology Policy Committee
JNCC	Joint Nature Conservancy Council
km	Kilometre
LB	Listed Building
MGN	Marine Guidance Note
MHCLG	The Ministry of Housing, Communities and Local Government's
MHWS	Mean High Water Springs
MMO	Marine Management Organisation
MoD	Ministry of Defence
MPS	Marine Policy Statement
MSFD	Marine Strategy Framework Directive
MW	Megawatts
NHLE	National Heritage List for England
NPS	National Policy Statement
NPPG	The National Planning Practice Guidance
OS	Ordnance Survey

Acronym	Definition
OWL	Offshore Wind Ltd
PAD	Protocol for Archaeological Discoveries
PPG	Planning Practice Guidance
PRoW	Public Right of Way
RPG	Royal Parks and Gardens
SLVIA	Seascape, Landscape and Visual Impact Assessment
SM	Scheduled Monument
TCE	The Crown Estate
TJB	Transition Joint Bay
UKHO	UK Hydrographic Office
UXO	Unexploded Ordnance
WCPS	West Coast Palaeolandscapes Survey
WTG	Wind Turbine Generator
WW2	World War 2
ZTV	Zone of Theoretical Visibility

1. Introduction

1.1 Project Background

1. White Cross Offshore Windfarm (the Project) is a proposed floating offshore windfarm located in the Celtic Sea (see **Figure 1.1.1 in the EIA Scoping Report**) with a capacity of up to 100MW. The Project is being developed by Offshore Wind Ltd (OWL) a joint venture between Cobra Instalaciones Servicios, S.A., and Flotation Energy plc.

2. The Project will help achieve the UK Government's commitment to net zero by 2050 and tackle the climate emergency by producing electricity from renewable energy. The Project was awarded as a floating wind farm demonstrator project by The Crown Estate.

3. The Windfarm Site is located approximately 52km off the North Cornwall coast (west-north-west of Hartland Point). The Offshore Export Cable will connect the Offshore Substation Platform to shore. Onshore, the grid connection is confirmed as East Yelland (see **Figure 1.1.2 in the EIA Scoping Report)** The Export Cable will come ashore at a landfall and then routed underground to the onshore substation where it connects into the WSP Network.

1.2 Purpose of this Document

4. This report provides a high-level characterisation of the historic environment baseline for the White Cross Offshore Windfarm within Offshore Areas and Onshore Areas of Search (AoS).

5. It is technical appendix accompanying the White Cross Offshore Windfarm ES Scoping report. The aim of the report is to provide a more detailed level of assessment and to flag any areas of high archaeological potential, so that these may be avoided and/or potential impacts better understood.

1.3 Report Structure

6. The key sections of this report are:

   - **Methodology**: outlines the methodologies, aims and objectives for this report (baseline data procurement, study area etc.)
   - **Legislation, Policy & Guidance:** sets out the framework of relevant legislation, policy and guidance for the protection of the historic environment relevant to the proposed site
   - **Baseline Data**: details all data collated for this report, including non-designated assets (HER data), designated asset data (scheduled monuments,

listed buildings, registered parks and gardens, conservation areas) and other relevant information (previous geotechnical and archaeological investigations)

- **Potential Impacts**: identifies the potential impacts of the project upon the historic environment
- **Discussion**: details the potential mitigation measures identified to minimise the effect of any impacts upon the historic environment

2. Methodology

2.1 Study Area

7. For the purpose of this document the Study Area comprises the onshore AoS (everything within the AoS above Mean High Water Springs (MHWS)) and the offshore AoS (everything within the AoS below MHWS).

2.2 Aims and Objectives

8. The main aim of this report is to establish the historic environment baseline within the AoS to identify any areas of higher archaeological potential to aid site selection and establish an appropriate mitigation plan.

9. The objectives are to:

- To produce a broad narrative of the archaeological and historic background within the AoS
- Identify and characterise all designated and non-designated heritage assets as recorded by the United Kingdom Hydrographic Office (UKHO), National Heritage List for England (NHLE) and the Devon Historic Environment Record (DHER)
- Identify areas of higher archaeological potential within the AoS to aid site selection so these maybe avoided and mitigation measure established

2.3 Data Sources

10. The data sources used to establish the baseline environment are presented in **Table 2.1**.

Table 2.1 Data Sources

Source	Details
UKHO	Records of wrecks and obstructions data including 'dead' and salvaged wrecks that are no longer charted as navigational hazards.
National Heritage List of England (NHLE)	Records of designated heritage assets within England, maintained by Historic England. GIS data for all Protected Wrecks, Scheduled Monuments, Listed buildings, Registered parks and gardens and Registered Battlefields.
Devon Historic Environment Record (HER)	Contains data on all recorded non-designated heritage assets, held Devon County Council. The data includes archaeological, historic landscape and historic building information. Information on previous events (archaeological surveys and investigations) will also be obtained.

Source	Details
West Coast Palaeolandscapes Survey	Study mapping submerged landscapes contained within an area of the Irish Sea using wide variety of seismic data sources.
Existing archaeological studies and published sources	Background information on the archaeology of the Celtic Sea and Bristol Channel, including the results of archaeological assessments carried out for Atlantic Array Offshore Wind the wider Bristol Channel, Celtic Sea and Atlantic.

2.4 Assumptions and Limitations

11. The DHER is not a complete record, as it relies on non-designated assets being recorded and reported. Dependant on how many archaeological investigations and surveys have been undertaken in an area and whether findspots have been reported limits the number and detail of records contained within the HER.

12. Similarly, unknown heritage assets are continually identified, through either commercial archaeological work associated with new developments or through local amateur or academic research. As such, the HER is not a final record and does not preclude further assets being found in the future.

13. In terms of the offshore data sets (UKHO and), these are regularly updated with additional information added as surveys are undertaken.

2.5 Chronology

14. As referenced in the text, the main archaeological periods are broadly defined by the following date ranges:

    - Lower Palaeolithic: 500,000 – 150,000 BC.
    - Middle Palaeolithic: 150,000 – 30,000 BC.
    - Upper Palaeolithic: 30,000 – 10,000 BC.
    - Mesolithic: 10,000 – 4,000 BC.
    - Neolithic: 4,000 – 2,200 BC.
    - Bronze Age: 2,200 – 700 BC.
    - Iron Age: 700 BC – AD 43.
    - Romano-British: AD 43 – 410.
    - Saxon (Early Medieval): AD 410 – 1066.
    - Medieval: AD 1066 – 1499.
    - Post-medieval: AD 1500 – 1799.
    - Modern: AD 1800 – present day.

2.6 Good Practice

15. This Historic Environment Assessment has been undertaken in general accordance with the guidelines and parameters set out by the Chartered Institute for Archaeologists (CIfA) Standard and guidance for historic environment desk-based assessment (CIfA, updated January 2017).

2.7 Copyright

16. This report may contain material that is non-Royal HaskoningDHV copyright (e.g., Ordnance Survey, British Geological Survey, Crown Copyright), or the intellectual property of third parties, which is for non-public reproduction. Users remain bound by the conditions of the Copyright, Designs and Patents Act 1988 with regard to multiple copying and electronic dissemination of the report within the public realm.

3. Policy and Legislative Context

3.1 Onshore

3.1.1 Legislation

Ancient Monuments and Archaeological Areas Act (1979) (as amended)

17. Under the terms of the Act, an archaeological site or historic building of national importance can be designated as a Scheduled Monument and is registered with the Department of Culture, Media and Sport (DCMS). Any development that might physically affect a Scheduled Monument is subject to the granting of Scheduled Monument Consent. HE advises the government on individual cases for consent and offers advice on the management of Scheduled monuments

Planning (Listed Building and Conservation areas) Act (1990)

18. Statutory protection for Listed buildings and Conservation areas, and their settings, is provided under the Planning (Listed buildings and Conservation areas) Act. A Listed Building is that which is seen to be of special architectural or historic interest, and a Conservation Area comprises an area of special architectural or historic interest, the character or appearance of which is desirable to preserve or enhance.

19. A Listed Building may not be demolished, altered or extended in any manner which would affect its character without Listed Building Consent being granted by either HE (who are responsible for Grade I and II* Listed buildings, and proposals relating to demolition of Grade II Listed buildings) or the relevant Local Planning Authority's Conservation Officer, or equivalent (who is / are responsible for Grade II Listed buildings). There are three grades of listing (in descending order):

    - Grade I: buildings of exceptional interest
    - Grade II*: particularly important buildings of more than special interest
    - Grade II: buildings of special interest, warranting every effort to preserve them

Historic England Register of Parks and Gardens

20. The Historic Buildings and Ancient Monuments Act (1953) makes provision for the compilation of a register of gardens and other land which is considered to be of special historic interest. The Act covers the designation of Registered parks and gardens and Registered Battlefields.

21. The Register of Parks and Gardens is held by Historic England which grades registered parks and gardens as Grade I, II* or II, along the same lines as listed buildings. The NPPF defines them as a designated heritage asset and as such their

conservation is an objective of sustainable development and given great weight by planning authorities.

3.1.2 Policy

National Planning Policy Framework

22. The NPPF was published in March 2012, replacing Planning Policy Statement 5, and was subsequently updated in 2018 and again in 2019. Provision for the historic environment is principally given in Section 16: Conserving and enhancing the historic environment, which directs Local Planning Authorities to set out "*a positive strategy for the conservation and enjoyment of the historic environment, including heritage assets most at risk through neglect, decay or other threats*" (MHCLG, 2019a; 54).

23. The aim of NPPF Section 16 is to ensure that Regional Planning Bodies and Local Planning Authorities, developers and owners of heritage assets adopt a consistent and holistic approach to their conservation and to reduce complexity in planning policy relating to proposals that affect them.

24. To summarise, government guidance provides a framework which:

    - recognises that heritage assets are an irreplaceable resource
    - requires applicants to provide proportionate information on the significance of heritage assets affected by the proposals and an impact assessment of the proposed development on that significance
    - takes into account the desirability of sustaining and enhancing the significance of heritage assets and their setting
    - places weight on the conservation of designated heritage assets (which include World Heritage Sites, Scheduled Monuments, Listed Buildings, Protected Wreck Sites, Registered Parks and Gardens, Registered Battlefields or Conservation areas)
    - requires developers to record and advance understanding of the significance of any heritage assets to be lost (wholly or in part) in a manner proportionate to their importance and impact, and to make this evidence (and any archive generated) publicly accessible

25. Local planning authorities are urged to request applicants to describe the significance of any heritage assets affected by a proposed development, including any contribution to the assets' significance made by their setting. The level of detail required in the assessment should be proportionate to the assets' importance and no more than is sufficient to understand the potential impact of the proposal on their significance.

26. Further information and guidance on how national planning policy is to be interpreted and applied locally is provided in the Planning Practice Guide (PPG) under the section Historic Environment (MHCLG, 2019b).

National Policy Statements

27. This high-level heritage appraisal was carried out in support of the ES Scoping Report which has been undertaken in a manner consistent with the National Policy Statement (NPS) for energy infrastructure, including the Overarching NPS for Energy (EN-1) (Department of Energy and Climate Change, 2011a) and the NPS for Renewable Energy Infrastructure (EN-3) (Department of Energy and Climate Change, 2011b).

28. EN-1 sets out national policy for energy infrastructure, and the importance of archaeological assessment in the development process.

29. EN-3, considered in conjunction with the overarching NPS (EN-1), provides the primary basis for decisions by the Planning Inspectorate on renewable energy infrastructure development applications. EN-3 sets out the importance of the historic environment and the ways in which it can be impacted by development and outlines guidance for application assessments, Planning Inspectorate decision-making and mitigation measures.

Local policy

30. The onshore AoS is located within the North Devon District and Torridge District. The two district councils adopted the North Devon and Torridge Local Plan 2011-2031 in October 2018. This contains the following policy relating to heritage assets.

Policy ST15: Conserving Heritage Assets

31. Weight will be given to the desirability of preserving and enhancing northern Devon's historic environment by:

- conserving the historic dimension of the landscape
- conserving cultural, built, historic and archaeological features of national and local importance and their settings, including those that are not formally designated
- identifying and protecting locally important buildings that contribute to the area's local character and identity
- increasing opportunities for access, education, and appreciation of all aspects of northern Devon's historic environment, for all sections of the community

3.1.3 Guidance

32. The EIA assessment will also be undertaken in accordance with the following guidance:

- The Historic Environment in Local Plans: Historic Environment Good Practice Advice in Planning 1 (Historic England, 2015a)
- Managing Significance in Decision-Taking in the Historic Environment: Historic Environment Good Practice Advice in Planning 2 (Historic England, 2015b)
- The Setting of Heritage Assets: Historic Environment Good Practice Advice in Planning 3 (Historic England, 2017)
- Standard and guidance for historic environment desk-based assessment (CIfA, 2020)
- Code of Conduct (CIfA, 2019)
- Guidance for Assessment of Cumulative Impacts on the Historic Environment from Offshore Renewable Energy (Oxford Archaeology, 2008).
- Draft National Policy Statement for Renewable Energy Infrastructure (EN-3) (2021)
- Institute of Environmental Management and Assessment (IEMA) Principles of Cultural Heritage Impact Assessment (2021)

3.2 Offshore

3.2.1 Legislation

Protection of Wrecks Act 1973

33. The Protection of Wrecks Act 1973 allows the Secretary of State for Digital, Culture, Media and Sport to designate a restricted area around the site of a vessel lying on or in the seabed in UK territorial waters if he/she is satisfied that, on account of the historical, archaeological or artistic importance of the vessel, or its contents or former contents, the site ought to be protected from unauthorised interference. There are currently 52 protected wreck sites in England (62 in the UK).

Protection of Military Remains Act 1986

34. The Protection of Military Remains Act 1986 provides protection for the wreckage of military aircraft and certain military wrecks. Administered by the Ministry of Defence, designations can be either as a Controlled Site or Protected Place where access may be permitted but any operations which may disturb the site are illegal unless licensed by the Ministry of Defence. There are currently six Controlled Sites and 450 Protected Places (including 434 recorded aircraft) in England's territorial waters.

3.2.2 Policy

35. The specific assessment requirements for marine archaeology and cultural heritage set out within the overarching NPS for Energy EN-1 and NPS for Renewable Energy infrastructure (EN-3) and are summarised in **Table 3.1**.

Table 3.1 NPS Guidance for the Historic Environment

NPS Requirement	NPS Reference
EN-1 Overarching NPS for Energy	
As part of the ES the applicant should provide a description of the significance of the heritage assets affected by the proposed development and the contribution of their setting to that significance. The level of detail should be proportionate to the importance of the heritage assets and no more than is sufficient to understand the potential impact of the proposal on the significance of the heritage asset.	Paragraph 5.8.8
Where a development site includes, or the available evidence suggests it has the potential to include, heritage assets with an archaeological interest, the applicant should carry out appropriate desk-based assessment and, where such desk-based research is insufficient to properly assess the interest, a field evaluation. Where proposed development will affect the setting of a heritage asset, representative visualisations may be necessary to explain the impact.	Paragraph 5.8.9
The applicant should ensure that the extent of the impact of the proposed development on the significance of any heritage assets affected can be adequately understood from the application and supporting documents.	Paragraph 5.8.10
EN-3 NPS for Renewable Energy Infrastructure	
Consultation with the relevant statutory consultees (including Historic England or Cadw) should be undertaken by the applicants at an early stage of the development.	Paragraph 2.6.140
Assessment should be undertaken as set out in section 5.8 of EN-1. Desk-based studies should take into account any geotechnical or geophysical surveys that have been undertaken to aid the windfarm design.	Paragraph 2.6.142
Where elements of an application (whether offshore or onshore) interact with features of historic maritime significance that are located onshore, the effects should be assessed in accordance with the policy at section 5.8 of EN-1	Paragraph 2.6.143

36. In addition, the South West Inshore and South West Offshore Marine Plans published in June 2021 includes policy relating to heritage assets. This is summarised in **Table 3.2**.

Table 3.2 the South West Inshore and South West Offshore Plans policy relating to Heritage Assets

Policy code	Policy text	Policy aim
SW-HER-1	Proposals that demonstrate they will conserve and enhance the significance of heritage assets will be supported. Where proposals may cause harm to the significance of heritage assets, proponents must demonstrate that they will, in order of preference: a) avoid b) minimise c) mitigate - any harm to the significance of heritage assets. If it is not possible to mitigate, then public benefits for proceeding with the proposal must outweigh the harm to the significance of heritage assets	This policy aims to conserve and enhance marine and coastal heritage assets by considering the potential for harm to their significance. This consideration will not be limited to designated assets and extends to those non-designated assets that are, or have the potential to become, significant. The policy will ensure that assets are considered in the decision-making process and will make provisions for those assets that are discovered during developments.

37. The EIA assessment will also take account of guidance including:

- Joint Nautical Archaeology Policy Committee (JNAPC) Code of Practice for Seabed Development (JNAPC and The Crown Estate, 2006)
- Historic Environment Guidance for the Offshore Renewable Energy Sector (Wessex Archaeology, 2007)
- Guidance for Assessment of Cumulative Impacts on the Historic Environment from Offshore Renewable Energy (Oxford Archaeology, 2008)
- Chartered Institute for Archaeologists' Standard and Guidance for Historic Environment Desk-Based Assessments (2014a) and Code of Conduct (2014b)
- Draft National Policy Statement for Renewable Energy Infrastructure (EN-3) (2021)
- Institute of Environmental Management and Assessment (IEMA) Principles of Cultural Heritage Impact Assessment (2021)
- Archaeological Written Schemes of Investigation for Offshore Wind Farm Projects (The Crown Estate, 2021)

4. Existing Environment

38. The existing baseline has been informed by **Table 2.1**. In terms of the Devon HER and UKHO these were transferred into gazetteers to inform the baseline. However, due to the amount of data are not presented in the report.

39. Once the final layout has been determined, the gazetteers will be further refined and be included as appendices to the EIA assessment.

4.1 Onshore

4.1.1 Designated Assets

40. Within the onshore Area of Search there are a total of 734 designated assets. These comprise:

- 8 scheduled monuments (SMs)
- 713 listed buildings (LBs)
- 2 registered parks and gardens (RPGs)
- 11 conservation areas (CAs)

Scheduled Monuments

41. The eight scheduled monuments located within the onshore AoS are summarised in **Table 4.1.**

Table 4.1 Summary of Scheduled monuments

Name	List entry	Description	Location
Cross ridge dyke on Godborough Castle earthwork NW of Turner's Wood	1002640	Part of a cross dyke known as Goodborough Castle	c.180m north of Bideford
Kenwith Castle 330yds (300m) SE of Kenwith	1002639	An 18th century garden feature known as Kenwith Castle	c.460m north west of Bideford
Hallsannery limekiln	1004578	19th century lime kiln situated on the western bank of the River Torridge	c.1.4km south east of Bideford
Iron Age enclosure and Roman marching camp	1004558	Iron Age defended settlement and Roman camp 125m east of Higher Kingdon Barn	c.2.4km east of Bideford

Name	List entry	Description	Location
Lenwood bowl barrow, 50m south east of Lenwood Cottage	1016212	The monument includes a Bronze Age bowl barrow situated in an elevated position with commanding views over Bideford	c.370m north west of Bideford
Churchyard cross socket stone 1.6m south of St Andrew's Church tower	1013731	14th or 15th century churchyard cross socket stone situated 1.6m south of the church tower of St Andrew's Church, Alwington	Alwington
Two decoy targets at Northam Radar Station	1425448	The earthwork remains of two Second World War decoy targets at Northam radar station	c.580m north of Northam
Lynchets approximately 34m north-west of Saunton Sands Hotel	1424711	The earthwork and buried remains of agricultural terraces of probable medieval date	c.870m south of Croyde

Conservation Areas

42. At this stage it was only possible to obtain North Devon District conservation area shapefile data, however, the Devon County Council Environment Viewer was used to access the Torridge District conservation areas within the AoS. The 11 conservation areas are summarised as:

- Bideford
- Bideford (Clovelly Road)
- Bideford East
- Northam
- Westleigh
- Appledore
- Instow
- Croyde
- Putborough
- Woolacombe

43. Each conservation area contains a large number of listed buildings and non-designate built heritage assets. They have been designated as conservation areas due to their architectural and historic character and the information this hold regarding the historic development of these towns.

Listed Buildings

44. The 713 LBs within the onshore Area of Search comprise nine Grade I LBs, 679 Grade II LBs and 25 Grade II* LBs.

45. The highest concentrations of listed buildings are located within the conservation areas within the main settlements. The buildings largely date between the 17th and 21st centuries, with buildings in towns largely comprising houses and churches, with farms and farm buildings within the rural areas. A number of military structures are also listed near Northam and Braunton Barrows.

Registered Park and Gardens

46. The two RPGs located within the onshore AoS are summarised as follows:

- **Tapley Park** (list entry:1000704) – Grade II* Listed early 20th Century formal terraced garden designed by Sir John Belcher and mid-19th Century pleasure grounds and lake, set within parkland of 18th Century origins
- **Saunton Court** (list entry: 1000700) – Grade II Listed early 20th Century formal terraced garden and kitchen garden designed by Sir Edwin Lutyens surrounding a medieval manor house which he remodelled and extended in 1932, together with informal 20th Century gardens

4.1.2 Non-Designated Assets

47. Within the onshore Area of Search the Devon HER records a total of 3028 non-designated heritage assets. These comprise:

- 525 undated records
- 78 undefined prehistoric records
- 1 Palaeolithic records
- 53 Mesolithic records
- 24 Neolithic records
- 34 Bronze Age records
- 10 Iron Age records
- 13 Roman records
- 220 Early medieval/Saxon records
- 110 medieval records
- 1002 Post-medieval records
- 958 Modern records

Early Prehistoric (Palaeolithic – Neolithic)

48. Within the onshore Area of Search there is one record relating to the Palaeolithic period. This is a natural rocky outcrop (MDV4437) on the edge of Westward Ho! near Kipling Tors. The feature is natural but was initially identified as a barrow.

49. There are a large number of Mesolithic records within the Area of Search, with all but one of the records comprising concentrations of flint artefacts or flint working sites.

50. These sites are concentrated in two main areas, one to the west and north west of Abbotsham, and the other at Baggy Point and along the Croyde Coast, with a smattering of record across the AoS. The largest of these findspots was found to the south of Cornborough comprising 550 flints.

51. Similarly, there are a large number of Neolithic records which largely comprise flint artefact scatter. The largest of these was found near Georgeham comprising 251 items including, leaf-shaped arrowheads, oblique arrowheads, transverse arrowheads, triangular arrowheads, fabricators, hollow-based arrowheads and 5 barbed and tanged arrowheads. These a largely located within the same two areas as the Mesolithic records, with a smattering of records throughout the AoS.

52. A large number of updated prehistoric records are also located across the AoS. As with the Mesolithic and Neolithic, these are largely concentrated around Abbotsham and around Croyde.

53. These concentrations could be a result of these being areas where more archaeological work has been done, of could represent areas of continued prehistoric settlement. Certainly, during the Mesolithic period these areas would have been located on high ground, overlooking a valley abundant in wildlife (Fitch and Gaffney, 2011). As such, these concentrations likely represent the remains of settlement established in the Mesolithic which saw continued occupation into the Neolithic.

54. As for the other records located these may represent more nucleated settlements within the AoS. Most of the are located along the River Torridge which would have provided a source of fresh water and food.

55. Overall, the AoS has a generally moderate to high potential for early prehistoric remains, however, some areas have higher potential that other. Within the areas where the tow concentrations have been identified the potential is assessed as high. Along the River Torridge the potential is assessed as moderate, while the rural areas across the remainder of the AoS are assessed as low.

Bronze Age

56. There are 37 Bronze Age records across the AoS and while fewer in number than the Early Prehistoric records, they largely mirror the concentrations and groupings identified above. These are the areas around Croyde and Northam/Abbotsham.

57. Towards Croyde, the records largely comprise enclosures and earthworks with several stray finds comprising two flint barbed and tanged arrow heads (MDV2542 & MDV12394).

58. To the south of Northam, a large number of features including field boundaries, track and field systems were identified during geophysical survey (MDV113797). This in turn contains two features which may be round houses (MDV113798). This likely represents the remains of a Bronze Age settlement.

59. To the south of this possible settlement are two SMs 'Lenwood bowl barrow, 50m south east of Lenwood Cottage' (list entry: 1016212) and 'Cross dyke on Godborough Castle earthwork NW of Turner's Wood' (list entry: 1002640). The bowl barrow has been dated to the Bronze Age with commanding views over Bideford. Likewise, Cross dyke ridge contains the remains of a Bronze Age dyke.

60. In addition, there are a number of enclosures and earthworks to the south of Westward Ho!/Northam (MDV43938, MDV102155, MDV102156, MDV102159 and MDV11732). The correspond to the large number of undefined Prehistoric flints and flint scatter identified in these areas.

61. These grouping likely represent a continuation of settlements from the Mesolithic through to the Bronze Age.

62. A concentration of Bronze Age records have also been identified to the north of Gammaton Moor (MDV17624, MDV44256, MDV37451 & MDV44258). These comprise earthworks and enclosures. A prehistoric field system is also recorded here. As such, these remains likely represent the remains of a Bronze Age settlement.

63. In general, there is a moderate potential for further Bronze Age remains in the be present within the AoS, however, certain areas have a higher potential than others. Based on the concentrations of remains recorded by the HER, the potential for remains to be present near Northam is considered moderate to high, while the potential towards Croyde is considered moderate. Additionally, the potential towards Gammaton Moor is considered moderate.

Iron Age

64. Within the onshore AoS there are 10 Iron Age records with no real concentrations identified with the scattered across the AoS. The records largely comprise former enclosures, features and filed systems, however, a possible Persian coin (MDV103638) was found near Alwington.

65. The most significant of the Iron Age records are MDV112414 'Archaeological Anomalies, Alverdiscott' and MDV11758 'Iron Age Enclosure at Alverdiscott'. The

former comprises a number of archaeological anomalies identified during geophysical survey while the latter comprises a triple-ditched Iron Age enclosure. These are significant as they correspond to the SM 'Iron Age enclosure and Roman marching camp' (list entry: 1004558).

66. The Iron Age elements of the SM comprise an 'Iron Age defended settlement…. situated close to the summit of one of the most prominent ridges to the east of the Torridge Valley just north of Gammaton Moor' (NHLE list entry). As such, these remains likely represent a larger centralised settlement, with the enclosures, features and filed systems, representing the remains of small nucleated and dispersed farmsteads and settlements within the AoS.

67. Additionally, as discussed Bronze Age remains were identified around and near the SM. As such, it is likely a Bronze Age settlement was here which saw continued settlement into the Iron Age.

68. Stray finds of palstave axes (MDV76970, MDV14590, MDV30175, MDV11888 & MDV11744) have been found scattered across the AoS.

69. Based on number and types of records within the AoS the overall potential for Iron Age remains is generally considered to be low, with a higher potential around the SM.

Roman

70. There are 13 Roman records within the AoS. The most significant of these being the SM 'Iron Age enclosure and Roman marching camp' (list entry: 1004558) located north of Gammaton Manor. The Roman marching camp seems to have been built on the Iron Age defensive settlement due to its strategic position in the landscape.

71. The remaining records largely comprise stray finds of pottery (MDV11908 & MDV11684), coins (MDV57958, MDV11911, MDV11875, MDV11874 & MDV11740) with a few enclosures scattered across the landscape (MDV41904 & MDV11735).

72. The remains of a Roman watch tower (MDV131155) have also been identified to the east of Bideford. This and the marching camp suggest that the sparsity of Roman remains is because this area was a Roman occupied area with ongoing conflict. The settlements of the local population are likely to have been centred on settlements established in earlier periods.

73. Based on the above the AoS is considered to have a generally low potential for Roman remains with a slightly higher potential in the area of the Roman camp.

Saxon/Early Medieval

74. Within the AoS, there are 223 Saxon/Early medieval records. These are largely located in rural areas or at the edge the towns and villages within the AoS.

75. The majority of records from this period relate to former agricultural practices and rural activities. Of particular interest are several field systems (MDV29778 & MDV14409) as these are located near to Roman Camp, possibly indicating a continuation of settlement from the Roman period.

76. Additionally, Bideford. Instow, Croyde, Appledore Landcross, Northam and Alwington either have etymological origins during this period or are recoded within the Domesday book. As such, these settlements are likely to have emerged during this period.

77. Based on the above, there is a low to moderate potential for early medieval remains in the AoS. These will likely be agricultural in nature.

Medieval

78. By the medieval period, the majority of settlement within this area had been established. As such, records from the towns and villages in the AoS are limited as they will have developed from this period onwards.

79. The majority of medieval remains within the AoS largely comprise former field systems, agricultural enclosures and lynchets surrounding Croyde, Yelland, Bideford, Eastleigh, Landcross, Littleham, Ford, Abbottsham and Georgeham. Other records included churches, manor sites and stray finds of pottery.

80. Of particular note is the SM 'Lynchets approximately 34m north-west of Saunton Sands Hotel' (list entry: 1424711). This contain the remains of well-preserved medieval lynchets which have been undamaged by later farming activities.

81. Within the onshore AoS the overall potential for unknown remains is considered to be moderate. These are likely to be focused around the towns and villages discussed above and will likely relate to agrarian activity and settlement.

Post-medieval

82. Within the onshore AoS there are a large number of post-medieval remains and are largely concentrated around Georgeham, Croyde, Northam, Appledore, Bideford with another concentration along the coast of the south western area of the AoS.

83. Towards the built-up areas and town these records largely relate to built heritage, while in the rural areas they relate to agricultural buildings and former field systems. These records date between the 16th and 18th centuries.

84. Within the rural areas of the AoS there is a moderate potential for unknown post-medieval remains. These will likely relate to former agricultural activities and practices. Within the built-up areas there is a low potential for unknown remains in these areas are well recorded.

Modern

85. A large number of Modern records have been identified in the onshore AoS. The majority of these are concentrated along the coast from Westward Ho! to Woolacombe and relate to the North Devon US Assault Training Centre (MDV73990).

86. The Assault Training Centre covered eleven separate areas. The brief of the Assault Training Centre was to train combat units under realistic battle conditions in preparation for D-Day. This included overcoming on and offshore obstacles, reduction of fortifications, repulsing of counter attacks and establishing of the beach head.

87. Facilities included a full-scale German-type 'Hedgehog' and full-scale obstacles and individual fortifications of various types sited along the sheltered beaches (including Croyde and Woolacombe). Also, mock-ups of various types of landing craft, obstacle courses, combat ranges and observation towers. Accommodation was in tent cities at Braunton and Croyde and at the hutted Braunton Camp.

88. The SM 'Two decoy targets at Northam Radar Station' (list entry: 1425448) are also located in this area, to the north of Northam, along with the former radar.

89. Towards the built-up areas and town records largely relate to built heritage assets such as houses and churches. In the more rural areas they relate to agricultural buildings and infrastructure. Former industrial sites and commercial wharfs and quays are recorded along the River Torridge.

90. Based on the above, the highest potential for modern remains are those associated with the Assault Training Centre. However, as remains from this period are fairly recent the potential for encountering unknown remains in limited as they are generally well recorded.

Undated

91. A large number of undated records have been identified throughout the AoS. 253 of these relate to built heritage assets located within the town and villages in the AoS. The largest concentration of these is at Appledore.

92. There are also a large number of cropmarks, features identified during geophysical survey, possible field systems and enclosures throughout the AoS.

93. The concentrations of these records largely mirror the concentrations of records identified above for the other periods i.e. around Bideford, Georgeham, Croyde, Appledore, Littleham/Landcross and Gammaton Moor. As such, it is likely that where undated records have been identified, they correspond to the know periods where the highest densities have been identified.

4.2 Offshore

4.2.1 Designated Assets

94. Within the intertidal zone there are two scheduled monuments located within the AoS, these are:

- **Wreck off Northam Burrows** (List entry: 1432949) - The wreck of a wooden sailing vessel, likely to be a Severn trow (a locally distinctive coastal sailing vessel of south-west England), lost off Northam Burrows between the mid-18th to early 19th centuries
- **Wreck off Westward Ho**! (List entry: 14324180) - The wreck of a pre-1840 wooden sailing vessel thought to have been built in the mid- to late 18th century and wrecked at Westward Ho!, probably within the same period, and likely to be that of the Sally, lost 1769

95. There are no wrecks protected under the Protection of Wrecks Act 1973 or the Protection of Military Remains Act 1986 within the AoS. The nearest wrecks protected under either of these are:

- the ***Gull Rock*** wreck (list entry: 1000053) – the remains of a wreck thought to be of fifteenth- to sixteenth-century date indicated by an assemblage of cannon and shot on the site
- the ***Iona II*** located (list entry: 1000051) – the remains of a 1864 American paddle steamer

96. These two wrecks are designated under the Protection of Wrecks Act 1973 and located off the eastern coast of Lundy Island approximately 5km north of the offshore AoS and approximately 46km west of the Array Site.

4.2.2 Non-Designated Assets

97. Within the offshore (including intertidal) AoS the Devon HER records the following assets:

- 6 undefined prehistoric records
- 1 Palaeolithic records
- 18 Mesolithic records
- 5 Neolithic records

- 1 Bronze Age records
- 3 Roman records
- 7 Early medieval/Saxon records
- 3 medieval records
- 51 Post-medieval records
- 73 Modern records
- 28 Undated records

98. Additionally, some are duplicates records related to the offshore AoS and some records have offshore and onshore elements.

Palaeolithic and Mesolithic

99. Within this area, archaeological and palaeoenvironmental evidence related to human occupation of the UK may be preserved. Research indicates that hominin (humans and their early ancestors) populations were present in Britain from approximately 970,000 years Before the Present (BP) (Parfitt et al., 2010). This is the start of the British Palaeolithic and is the earliest known evidence for hominins in northern Europe.

100. The study area has been shaped by three major glaciations have been shaped by three major glaciations over the past 970,000 years, leading to lower sea levels and, as a consequence, there have been long periods when these areas, and the wider Bristol Channel region, were exposed as land suitable for hominin occupation (Wenban-Smith, 2002). Sometime after 16,000 BC Britain was cut off from Ireland with some of the study, largely the cable route, site remaining dry land until c.7000 BC.

101. The West Coast Palaeolandscapes Survey has mapped parts of the Celtic Sea and all of the Bristol Channel revealing a series of lakes, floodplains, river channels and seabed features (Fitch and Gaffney, 2011).

102. During the Late Upper Palaeolithic, the area of the Bristol Channel valley was largely open tundra covered with herbs and grasses (Fitch and Gaffney, 2011). The area would not have been affected by the last ice sheet, however, would have faced periglacial conditions ahead of it.

103. The landscape would have supported much wildlife, with its lakes, rivers, shrubs, herbs and grasses. Which would have supported animal life and in turn early humans (Fitch and Gaffney, 2011). Towards the end of the Upper Palaeolithic, permafrost would have set in leading to a greater reliance in the animals that inhabited the valley for food and resources.

104. The topography of the area, with its low-lying valley bounded on either side by the higher ground of what is now Somerset and South Wales would have provided the

ideal landscape for early humans to hunt (Fitch and Gaffney, 2011). The elevated landscape provided excellent vantage points for hunting migratory animals and the valley would have constricted herd migration routes. In some areas there may have been access to networks of caves.

105. Early evidence of such activity comes from the Red Lady of Paviland an Upper Palaeolithic partial male skeleton Dyed in red ochre, buried in 33,000 BP (Richards and Trinkaus, 2009). It was found in a limestone cave on the Gower Peninsula in South Wales along with a seashell necklace, jewellery of decorated mammoth tusk and bison and horse bones.

106. As temperatures rose, animals would have been plentiful. Not just animals associated with the new climate, but also large animals associated with the last cold stage who may not have been used to human predation (Fitch and Gaffney, 2011). Data suggests there was limited exploitation of coastal resources during this period as communities are likely to have lived c.100km from the coast. However, some exploitation of this resource must have occurred as the Red Lady of Paviland was found with a seashell necklace.

107. During this period, the area of the proposed array site and the western end of the cable corridor seem to have been located within the Celtic Sea or at least low-lying coastal regions. As such, the potential for palaeolithic occupation sites within these areas is low.

108. However, much of the cable corridor was located within dry land during this period. The West Coast Palaeolandscapes Survey maps various river channels and floodplains within the cable corridor. These are presented on **Figure 1.1.1 in the EIA Scoping Report**. As shown, the concentration of features is great the higher up the cable corridor. Therefore, the potential for this period increases further in shore.

109. The Devon HER records submerged forests, peat deposits and deposits of blue clay at Northam Beach and Westward Ho! (MDV107446, MDV107325, MDV63742, MDV107434, MDV107428, MDV107430, MDV107425, MDV102445, MDV107372 and MDV107435) a possible Palaeolithic flint at the Skern (MDV582259), along with Tusks and Antlers (MDV107314) dredged from Barnstaple bay which may date from this period. These records are all located in the intertidal zone or the nearshore. The peat deposits and submerged forests are all undated, however, may date from this period.

110. By the Mesolithic period the Bristol Channel changed drastically, with sea level rise causing the coastline to retreat further inland (Fitch and Gaffney, 2011). Lundy remained connected to the mainland at this time by a small promontory and was likely a centre for Mesolithic activity (Schofield, 1994).

111. The scheduled monument Prehistoric settlement at North End, Lundy (List entry: 1016029) supports this. Occupation evidence dates back as far as 8000 BC.

112. During this period, population living in the landscape would have seen a rapid spread of open mixed deciduous forest (Fitch and Gaffney, 2011). This in turn brought a variety of new plant and animal species. This low-lying valley with an abundance of food with high points at what is now the coast, would have provided a perfect environment for Mesolithic population to live and hunt.

113. The Devon HER records extensive evidence of Mesolithic occupation within the coastal regions of the AoS. As discussed above in **Section 4.1.2** a large number of Mesolithic finds have been recovered from the clifftop areas at Baggy Point, Northam, Abbotsham and Croyde. In addition, a large number of Mesolithic sites have been found within the intertidal zone and nearshore areas. The largest concentration of these are located at Westward Ho! beach. These consist of:

- Peat deposits (MVD10743)
- Shell middens (MDV107377, MDV107373 & MDV14854)
- A whalebone harpoon (MDV59277)
- Submerged forests (MDV10374, MDV107373 & MDV44568)
- Flint tool (MDV468 & MDV76285)

114. In addition to these, flint tools have been recovered from the intertidal zone at Baggy Point (MDV14507), Croyde (MDV57445), Abbotsham (MDV11720 & MDV25585), Instow (MDV11887) and Yelland (MDV59965). Organic peat deposits have also been recorded at Yelland (MDV107436) and by Torridge Bridge (MDV28354).

115. The West Coast Palaeolandscapes Project has determine that the areas occupied by the nearshore and intertidal AoS has a very high potential for the survival of deposits containing archaeology (Fitch and Gaffney, 2011). This is because in these areas there are areas of sandwaves and megaripples and Quaternary deposits possibly protecting underlying deposits, in combination with relatively low tidal stresses.

116. Based on the above, the offshore AoS has a high potential for Palaeolithic features in the Cable Corridor where these have been mapped by the West Coast Palaeolandscapes Project, while the array site has a low potential. Similarly, in the intertidal and nearshore there is a high potential for Mesolithic remains at Northam and Westward Ho! beaches, with a moderate potential towards Yelland.

Neolithic

117. By the Neolithic period, the coastline around the UK was largely as it is today. As such, evidence from the Neolithic onwards is likely to be of an increasingly maritime nature. Examples of Neolithic log boats have been recorded in the UK and Ireland; however, none have been recorded within the AoS or the wider North Devon region.

118. In addition to the Neolithic sites discussed in **Section 4.1.2**, a number of sites are recorded within the intertidal zone. At Westward Ho! peat deposits (MDV107429), two lines of wooden stakes, one semi-circular and one curving (MDV44569) and sherds or Beaker pottery and Peterborough ware (MDV70164 & MDV77890) were recorded. Similarly, a greenstone axe was found under Torridge Bridge.

119. Within the array site and offshore cable corridor there is a generally low potential for Neolithic remains, as these areas would have been inundated. Within the intertidal zone and nearshore there is a high potential for Neolithic remains at Westward Ho! beach, with a moderate potential towards Torridge Bridge.

Bronze Age

120. A single Bronze Age record has been identified within the intertidal zone. This a cremation burial (MDV11915) found in the cliff face at Barracane Beach, Woolacombe.

121. As discussed above in **Section 4.1.2**, settlement during this period this period seems to have been located further in land the main area located to the north of Gammaton more, with more dispersed agrarian site scattered throughout the landscape.

122. In addition, as the coastline in the AoS was much like it is today, records in the offshore are likely to be of a maritime nature. From the Bronze Age onwards, boat building technologies became more advanced, with sewn plank boat remains know from the UK (Van de Noort 2003), however, log boats were still used during this period. No boat remains from this period have been identified within the AoS, however, sewn boats have been located at Caldicot, Goldcliff and Shapwick (Van de Noort, 2014).

123. Based on the above, the AoS as a whole has a generally low area for Bronze Age archaeological remains.

Iron Age & Roman

124. Only two Roman records have been identified within the AoS, while no Iron Age records have been identified.

125. The two Roman records comprise wooden stakes (MDV44570) and peat deposits containing animal bone (MDV50845). These were identified at Westward Ho! beach.

126. In terms of boat remains, none have been recorded within the scoping area and in general very few Iron Age or Roman boats have been recorded in the UK. During these periods, advances in boast technology continued with new larger seaworthy vessels adopted (McGrail, 2001). Important coastal trade links and important trade links between the UK and Ireland would have existed during these periods.

127. Based on the above, the potential remains dating from these periods to be present within the AoS is generally low, with a higher potential at Westward Ho! Beach.

Early medieval/Saxon & medieval

128. Within the intertidal zone seven Early medieval/Saxon and three medieval records. Records from these periods are summarised as:

- The remains of three possible fish weirs (MDV66207, MDV103069 & MDV103068) at Yelland
- The site of a Maltese Cross (MDV498) at Torridge Bridge lost in 1638
- Instow quay jetty (MDV32602)
- Amphora recovered near Appledore of Mediterranean origin (MDV24862)
- Salt works at Instow recorded in the Domesday Book (MDV18930)
- Hoof Prints at Northam Burrows (MDV76315)
- A timber found near Torridge Bridge (MDV55379), possibly from an earlier bridge
- The site of All Saint Chapel, Bideford built in c.1280 and demolished in 1835 (MDV14254)

129. Vessels during this period continued to develop with clinker-built technologies and later carvel-built technologies adopted (McGrail, 2001). During this period, Bideford had a growing pottery industry and was a flourishing seaport by 1132 (Devon HER entry MDV18 and Timms, 1976).

130. In 1420 Bideford was named as one of three seaports on the Devon coast along with Ilfracombe and Barnstaple. By 1442, imports from Brittany were being received at Bideford.

131. Based on the known records the AoS has relatively low potential for further remains from these periods. However, there is a higher theoretical around Bideford due to it being an important port.

Post-medieval & Modern

132. Within the AoS there are 55 records identified as post-medieval, and 108 modern records. The majority of the modern remains are associated with former military remains in turn associated with the North Devon US Assault Training Centre (MDV73990) discussed above in full in **Section 4.1.2**.

133. In terms of post-medieval remains, some of these towards Yelland and Braunton Barrows comprise former fishing apparatus such as fish weirs and crab plates. Along the River Torridge, records relate to shipyards (MDV112081, MDV55996, MDV43292 and MDV43276) and commercial quays and wharves (MDV43274, MDV58460, MDV43277, MDV553377 and MDV43283).

134. During the post-medieval period, the Bideford pottery industry established during the medieval period continued to thrive, with Bideford establishing a thriving shipbuilding industry by the 16th century (Timms, 1976). Its interest in maritime trade increased in the 17th century with the result of Bideford becoming independent from the Port of Exeter in 1672 with its own customs house.

135. Its trade continued to increase becoming a leading port in the tobacco industry as well as an active participant in the Newfoundland fishing industry (Timms, 1976). In 1717 Bideford was third only to Plymouth and Exeter in overseas trading and it was to remain very active until the general decline in foreign trade at the end of 18th century.

136. In the early 19th century Bideford built up an important new business as an emigration port for travellers to North America (Timms, 1976). Following the decline in emigration some coastal trade continued.

137. The HER records at least 12 wrecked vessels along the River Torridge dating to this period. These and other wrecks within the offshore AoS as discussed below.

138. Overall, the offshore AoS has a moderate potential for remains dating from these periods with a high potential for post-medieval wreck remains along the River Torridge and a high potential for Modern remains within the intertidal zone along Braunton Barrows and Northam Beach.

Maritime and Aviation

139. Within the offshore AoS the following assets have been recorded:

- 133 wrecks recorded by Devon HER:
  - 95 recorded sites
  - 38 where remains are visible
- 98 wrecks and obstructions recorded by UKHO:
  - 93 within the cable corridor

- 5 within the array site

140. 52 of the UKHO records are recorded as 'dead' wrecks. These are wrecks which have not been detected by multiple surveys and are therefore considered to exits.

141. These records largely date between the 18th and 21st centuries, with some dating earlier. Of the UKHO records 29 are associated with named vessels. These are summarised in **Table 4.2**.

Table 4.2 Summary of named UKHO records

UKHO Wreck ID	Wreck Type	Name	Status
69948	ketch	Alfred Emma	lifted
12196	N/A	Alpha	N/A
12195	steam ship	Balvenie (Possibly)	N/A
12218	sailing vessel	Bessie Stephens	dead
12351	fishing vessel	Carmarand	dead
12227	N/A	Ceres	dead
12381	trawler	Charlynne Ii (Probably)	N/A
12216	steam ship	City Of Exeter	dead
12328	motor vessel	Eva V	dead
12217	hospital ship	Glenart Castle	dead
11859	hospital ship	Glenart Castle	N/A
12208	steam ship	Gurli	dead
12221	drifter	HMS Annie Smith	dead
12226	sloop	HMS Weazle	dead
12373	N/A	Hodd	N/A
12234	sailing vessel	Inversnaid (Possibly)	dead
69861	barge	Julie Pile	dead
12205	fishing vessel	My Diane	dead
69922	barge	Nellie Ann	dead
11862	fishing vessel	Noordzee	dead
12210	steam ship	Pallion (Probably)	N/A
12215	sailing vessel	Queen Victoria	dead
12206	sailing vessel	Rajah	dead
12203	yacht	Rossekop Ii	N/A
12229	trawler	Sarla	N/A
12372	fishing vessel	Sarla (Possibly)	dead
12212	N/A	Temptress	dead
12339	steam ship	Thistlemor	N/A
12193	trawler	Unity	dead

142. In terms of the HER wrecks where remains are visible, these are largely concentrated along the River Torridge or along the cost. The highest concentration is within the intertidal and nearshore zone off Northam Beach.

143. The potential for wreck remains within the array site cable corridor is relatively unknown, as it is not certain which of the UKHO records are associated with wreck related remains. In terms of the intertidal zone there is high potential, especially along Northam Beach and along the River Torridge.

144. In terms of aviation remains, none are recorded within the AoS. Aviation remains are most likely to be associated with WW2. Raids in Devon were carried out by the Luftwaffe in Devon, particularly Exeter in 1942 (Thomas, 2010) and Plymouth between 1941 and 1942 (Gould, 2010). WW2 aircraft remains are recorded near the AoS, with the remains of two Heinkel III H-5 bombers which crash landed on Lundy Island in 1941.

145. Based on the above, there is potential for unrecorded aviation remains to be present within the offshore AoS.

5. Conclusions and recommendations

146. As the onshore and offshore cable routes have not been finalised these conclusions and recommendations provide a general overview based on the characterisation of the baseline presented above.

147. Additionally, an initial impact assessment, specific mitigation measures and recommendations for further assessment have been presented within the scoping report.

148. As the grid connection has been confirmed at East Yelland, it is assumed there will be no direct impacts as a result of the construction of an onshore substation. However, indirect impacts may occur due to temporary changes to the setting of heritage assets when the onshore cable corridor is installed.

149. Similarly, as the windfarm will be a floating windfarm, impacts to the seabed in the array site will be limited to the placement of anchors/moorings. As such, impact to the offshore assets will largely be confined to the instillation of the cable and offshore substation.

5.1 Onshore

150. Eight scheduled monuments have been identified within the AoS. These should be avoided by onshore infrastructure as they are nationally designated and protected by the Protection of Ancient Areas Act 1979. As such, development within the scheduled areas is prohibited. Consideration should also be given to the proximity

of the onshore infrastructure to scheduled monuments as construction related activities could result in detrimental impacts to their fabric.

151. 713 listed buildings, 11 conservation areas and a large number of non-designated buildings have been identified in the AoS. The majority of these are located within the villages and towns in the AoS. While the grid connection has been confirmed at East Yelland, meaning there will be no impacts to the setting of heritage assets due to the construction of an onshore substation, temporary impacts to setting may occur through the cable installation. As such, it is recommended that a setting assessment site visit be undertaken in the first instance once cable routes are finalised to determine which assets may be affected.

152. Within the onshore area extensive remains dating to the Mesolithic, Neolithic and general prehistoric period have been identified at Baggy Point, Croyde, Abbottsham and Northam, possibly indicating settlement during these periods. Therefore, these areas are considered to have a high potential for further remains of the same date.

153. Similarly, there is a high potential for WW2 remains located at Northam Beach and along the coast to Woolacombe associated with the North Devon US Assault Training Centre (MDV73990).

154. Where areas of high potential have been identified, it is recommended that if possible, these areas be avoided by onshore infrastructure where intrusive ground works are required. If not possible further investigation and assessment would be required, initially targeted geophysical survey to identify concentrations of features, followed by targeted trial trenching and set piece excavations if required.

155. In areas of lower potential, these mitigation measures are still likely to be required, however, as the remains are anticipated to be less extensive, the extent of these mitigation measures is likely to be less.

5.2 Offshore

156. Extensive Mesolithic, Neolithic and WW2 remains have been identified in the intertidal zone at Westward Ho! Beach, Northam Beach and along the coast to Woolacombe. Additionally, a series of wreck remains have been identified at Northam Beach and along the Torridge River. As such, it is recommended that these areas be avoided, however, if this is not possible impacts will be limited with the use of HDD drilling for the cable instillation.

157. Within the offshore areas there is low potential for preserved Palaeolandscapes or prehistoric remains in the array as it lies beyond the limit of when sea level was at its lowest.

158. The West Coast Palaeolandscape project records two former channels and a floodplain within the cable corridor and has identified a high to very potential within the nearshore area for deposits containing archaeological material. This is because in the nearshore of the cable corridor there are areas of sandwaves and megaripples and Quaternary deposits possibly protecting underlying deposits.

159. This potential or lack of potential could be confirmed by the assessment of engineering led geotechnical and geophysical data by a suitably qualified archaeological sub-contractor if required.

160. In terms of wreck remains there are large numbers of UKHO records within the cable corridor, with only a few within the array site. In addition to these records, there is high potential for unrecorded or fragmentary wreck remains within the cable corridor and array site as there were important trade routes between Bideford and America in this area during the post-medieval and modern periods. In addition, there is potential for unrecorded aviation remains to be present within both areas.

161. As such, it is recommended that any engineering led geophysical data that is acquired be made available to a suitably qualified archaeological sub-contractor. This will allow for the identification of any such remains so these can be avoided where possible and investigated where not possible.

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Appendix B Water Framework Directive Compliance Assessment

WHITE CROSS

White Cross Water Framework Directive Compliance Assessment

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V 1.0	Draft for client review
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V 3.0	Final for issue

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1. Introduction

1.1 Purpose of this document

1. White Cross Offshore Windfarm (the Project) is a proposed offshore windfarm located in the Celtic Sea with a capacity of up to 100MW. The Project is being developed by Offshore Wind Ltd (OWL), which is a joint venture between Cobra Instalaciones Servicios, S.A., and Flotation Energy plc. The Project will help achieve the UK Government's commitment to net zero by 2050 and tackle the climate emergency by producing electricity from renewable energy sources. The Project was selected in 2021 as part of The Crown Estate's Test and Demonstration leasing opportunity. The Windfarm Site is located approximately 52km north of the Cornwall and Devon coast. The Offshore Export Cable will connect the Offshore Substation Platform to shore. Onshore, the grid connection is confirmed as East Yelland. The Export Cable will come ashore at a landfall and then routed underground to the Onshore Substation, where it will connect to Western Power Distribution's network.

2. Assessment Method

2. There is no detailed published methodology to assess whether strategies and plans are compliant with the requirements of the WFD and supporting UK legislation. There are, however, several sets of guidance that have been developed to support these assessments at project level in the different water body types, predominantly written by the Environment Agency. The following are the most relevant to the proposed project:

   - Planning Inspectorate (2017) Advice Note 18: The WFD, which provides an overview of the WFD and provides an outline methodology for considering WFD as part of the Development Consent Order (DCO) process
   - Environment Agency (2017) Clearing the waters for all, which outlines a detailed methodology for assessing impacts on transitional and coastal water bodies
   - Environment Agency (2016a) WFD risk assessment: How to assess the risk of your activity, which provides guidance for bodies planning to undertake activities that would require a flood risk activity permit
   - Environment Agency (2016b) Protecting and improving the water environment: WFD compliance of physical works in rivers and associated supplementary guidance (Environment Agency 2016c), which provides more detailed guidance for assessing WF compliance of various activities in river water bodies

3. For the purposes of this assessment, the broad methodologies outlined in the guidance documents listed above have been brought together to develop an assessment methodology that can be used for strategies in all types of water bodies. The assessment process therefore covers the following stages, which are described in more detail in the subsequent sections:

   - Stage 1: Screening Assessment

- Stage 2: Scoping Assessment

4. A Stage 3 detailed compliance assessment will be undertaken when the design of the Project has been finalised (i.e., following final site selection for the landfall and Onshore Substation, and selection of the preferred onshore cable corridor route).

2.1 Stage 1: Screening Assessment

5. This stage consists of an initial screening exercise to identify relevant water bodies in the proposed Onshore Development Area. Water bodies will be selected for inclusion in the early stages of the compliance assessment using the following criteria, with reference to the South West River Basin Management Plan (RBMP) (as presented in the online Catchment Data Explorer; Environment Agency 2021):

   - All surface water bodies that could potentially be directly impacted by the Project
   - Any surface water bodies that have direct connectivity (e.g., upstream and downstream) that could potentially be affected by the Project
   - Any groundwater bodies that underlie the Project

2.2 Stage 2: Scoping Assessment

6. This stage identifies whether there is potential for deterioration in water body status or failure to comply with WFD objectives for any of the water bodies identified in Stage 1. This stage considers potential non-temporary impacts of the Project and impacts on critical or sensitive habitats. Potential impacts on water body mitigation measures are also evaluated.

7. Water bodies and activities can be scoped out of further assessment if it can be satisfactorily demonstrated that there will be no impacts. If impacts are predicted, it will be necessary to undertake a detailed compliance assessment.

8. The water body and activity under assessment will be progressed to the detailed compliance assessment (Stage 3) if potential impacts on WFD quality elements cannot be ruled out. Conversely, if sufficient information can be provided at this stage to demonstrate that impacts on WFD quality elements would not occur, the quality element is scoped out of further assessment.

9. The water body and activity under assessment will be progressed to the detailed compliance assessment (Stage 3) if the answer to one or more of the scoping questions is 'Yes', but only for those quality elements that could potentially be impacted. Conversely, if the answer to a scoping question is 'No' or enough information can be provided at this stage to scope the issue out, the quality element is scoped out of further assessment.

3. Stage 1: Screening

3.1 Description of activity

10. The Project comprises the following components that have been screened to identify potentially affected water bodies:

    - Offshore transmission:
        - Export Cable route standard working width (cable corridor): Minimum 22m, maximum 50m
    - Landfall

11. Landfall installation method: Horizontal Directional Drilling (HDD) and/or open trench where no obstruction

    - Number of transition bays: 1
    - Transition bay dimensions: 20 x 10m (indicative dimensions):
        - Transition bay dimensions depth: 2m
        - HDD compound area (length x width): ~ 200m x 200m (indicative dimensions)
    - Onshore Substation:
        - Construction compound area (temporary works): 4ha (indicative area)
        - Substation Footprint (permanent including maintenance activities): 1ha
        - This is not a new substation – the existing substation will be refurbished and upgraded
    - Onshore transmission (Cable corridor construction):
        - Cable construction width at trenchless crossings: 60m
        - Depth to top of buried infrastructure (ducts): >1m
        - Trenchless (HDD) crossings: at least Sandy Lane and River Taw
        - Trenchless (HDD) crossings compound (length x width): 200 x 200m (indicative dimensions)
        - Typical jointing bay frequency: every ~300m – 1000m (indicative frequency)
        - Jointing bay dimensions (length x width x height): 20 x 10 x 1.5m
        - Depth to top of jointing bay (m): >1m
        - Link box frequency: Every ~300m – 1000m (indicative frequency)
        - Link box (length x width): 2m x 2m

12. WFD river, lake, groundwater, transitional and coastal water bodies that could potentially be affected by the Project are listed in **Table 3.1**. Water bodies have been screened into the assessment in response to the proposed works being within close proximity and/or hydrologically connected to water bodies.

Table 3.1 WFD water bodies screening assessment

Water Body Name	Water Body Type	Description	Screened in/out?	Reason for screening decision
Kenwith Stream (GB108050014500)	River	Not designated artificial or heavily modified. At Moderate Ecological Status due to Moderate phosphates and Moderate macrophytes and phytobenthos combined. Failed chemical status due to high levels of polybrominated diphenyl ethers (PBDE) and mercury and its compounds. Overall objective of Good Ecological Status by 2027.	In	Screened in because components of the Project could be located within the catchment of this water body.
Horwood Stream (GB108050014510)	River	Not designated artificial or heavily modified. At Moderate Ecological Status due to Moderate macrophytes and phytobenthos combined. Failed chemical status due to high levels of PBDE and mercury and its compounds. Overall objective of Good Ecological Status by 2027.	In	Screened in because components of the Project could be located within the catchment of this water body.
Upper River Yeo (Bideford) (GB108050014470)	River	Not designated artificial or heavily modified. At Poor Ecological Status due to Poor fish status, Moderate macrophytes and phytobenthos combined and Moderate phosphates. Failed chemical status due to high levels of PBDE and mercury and its compounds. Overall objective of Good Ecological Status by 2021.	In	Screened in because components of the Project could be located within the catchment of this water body.
Taw Estuary (GB108050020000)	River	Heavily modified water body at Moderate Ecological Potential due to Bad invertebrate status and Bad dissolved oxygen. Failed Chemical status due to high levels of PBDE and mercury and its compounds. Overall status objective of Good for 2027.	In	Screened in because components of the Project could be located within the catchment of this water body.
Jennetts Reservoir (GB30844801)	Lake	Designated artificial. At Poor Ecological Potential due to Poor phytoplankton, Poor total phosphorus, Moderate total nitrogen, and High specific pollutants (copper). Failed chemical status due to high levels of PBDE and mercury and its compounds. Overall objective of Good by 2027.	In	Screened in because components of the Project could be located within the catchment of this water body.

Water Body Name	Water Body Type	Description	Screened in/out?	Reason for screening decision
Gammaton Lower Reservoir (GB30844781)	Lake	Designated artificial. At Moderate Ecological Potential due to Moderate phytoplankton, Moderate supporting elements (surface water), high salinity and Poor total nitrogen. Failed chemical status due to high levels of PBDE and mercury and its compounds. Overall objective of Good by 2027.	Out	Long list cable corridor route crosses the minor watercourse that drains from the lake water body. Screened out because the component is downstream of the water body and no mechanism for upstream impacts has been identified.
Gammaton Upper Reservoir (GB30844798)	Lake	Designated artificial. At Moderate Ecological Potential due to Moderate supporting elements (surface water), Failed chemical status due to high levels of PBDE and mercury and its compounds. Overall objective of Good by 2027.	Out	Long list cable corridor route crosses the minor watercourse that drains from the lake water body. Screened out because the component is downstream of the water body and no mechanism for upstream impacts has been identified.
Taw/Torridge (GB540805015500)	Transitional	Designated heavily modified. At Moderate Ecological Potential due to Moderate dissolved inorganic nitrogen and Moderate supporting elements (surface water), as well as High classification for a range of specific pollutants (e.g., arsenic). Failed chemical status due to high levels of benzo(g-h-i)perylene, PBDE and mercury and its compounds. Good biological quality elements and supporting elements (Surface Water) objectives by 2027.	In	Screened in because components of the Project could be located within the catchment of this water body.

Water Body Name	Water Body Type	Description	Screened in/out?	Reason for screening decision
Barnstaple Bay (GB610807680003)	Coastal	Not designated artificial or heavily modified. At Good Ecological Status. Failed chemical status due to high levels of PBDE and mercury and its compounds. No overall water body objective beyond 2015.	In	Screened in because components of the Project will be located within this water body.
River Taw and North Devon Streams (GB40802G801000)	Groundwater	The water body underlies the search area. It is at Good Quantitative Status and Poor Chemical Status. Overall water body objective of Good by 2021.	In	Screened in because components the Project could be underlain by this water body. The Project could affect the quality and quantity of groundwater.
Torridge and Hartland Streams (GB40802G800600)	Groundwater	The water body underlies the search area. It is at Good Quantitative Status and Poor Chemical Status. Overall water body objective of Good by 2021.	In	Screened in because components the Project could be underlain by this water body. The Project could affect the quality and quantity of groundwater.

4. Stage 2: Scoping

13. The aim of this section is to highlight the quality elements within each water body that could be impacted by the Project, as identified in Stage 1 of the WFD compliance assessment (**Table 3.1**). This assessment therefore determines the scope for any future detailed compliance assessment (Stage 3) which may be required for the Project.

14. Potential impacts of the Project on WFD quality elements for river, lake, transitional, coastal and groundwater bodies are presented in **Table 4.1, Table 4.2, Table 4.3, Table 4.4** and **Table 4.5**. WFD water bodies are shown in **Figure 3.4.4 of the EIA Scoping Report**. **Section 4.1** evaluates impacts on RBMP improvement and mitigation measures, and **Section 4.2** discusses protected areas that could be affected by the Project. **Section 5** provides a summary of Stage 2 scoping.

Table 4.1 Scoping assessment for river water bodies

Parameter	Scoping question	Scoping assessment	Scoping decision
River water bodies assessed: Kenwith Stream (GB108050014500); Horwood Stream (GB108050014510), Upper River Yeo (Bideford) (GB108050014470), Taw Estuary (GB108050020000)			
Project components assessed: Onshore Substation; onshore transmission			
Biology	Could the activity change the hydromorphology and/or physico-chemistry of the water body, or lead to the direct loss or modification of habitats for aquatic plants?	Impacts from the use of temporary construction compounds, refurbishment of the existing Onshore Substation and ground disturbance for cable trenching (open-cut and HDD) could increase the amount of fine sediment in the water bodies. This could smother bed habitats and reduce light penetration. This could also lead to the loss or modification of aquatic flora communities. Changes to physico chemistry from proposed onshore construction activities could also lead to loss or modification of habitats for aquatic plants. Operational maintenance impacts would be similar (e.g., ground disturbance, increased fine sediment loads).	In
	Could the activity change the hydromorphology and/or physico-chemistry of the water body, or lead to the direct loss or modification of habitats for aquatic invertebrates?	Increased fine sediment inputs to the water body originating from temporary construction compounds, refurbishment of the existing Onshore Substation and ground disturbance for cable trenching (open-cut and HDD), could smother bed habitats and reduce light penetration. This could lead to the loss or modification of habitats which support benthic invertebrates. Changes to physico-chemistry from onshore construction activities could also lead to loss or modification of aquatic invertebrate habitat. Operational maintenance impacts would be similar (e.g., ground disturbance, increased fine sediment loads).	In
	Could the activity change the hydromorphology and/or physico-chemistry of the water body, or lead to the direct loss or modification of shelter, feeding and spawning habitats for fish?	Increased turbidity due to increased fine sediment loads from onshore construction activities could alter niche habitats and lead to the loss or modification of shelter, feeding and spawning habitats for fish. Furthermore, potential changes to physico-chemistry could also reduce the capacity of the water body to support feeding and spawning fish. Operational maintenance impacts would be similar (e.g., ground disturbance, increased fine sediment loads).	In

Parameter	Scoping question	Scoping assessment	Scoping decision
Hydromorphology	Could the activity change the volume, energy or distribution of flows in the water body?	Ground disturbance for cable trenching (open-cut and HDD) and changes to land use from temporary construction areas and refurbishment of the existing Onshore Substation construction could potentially alter the hydrological regime of river water bodies screened into the assessment. More impermeable surfaces and disturbed ground could alter surface water drainage pathways, resulting in changes to the volume, energy or distribution of flows. Any operational maintenance impacts on flows would be minor and temporary.	In
	Could the activity change the width, depth, bank conditions, bed substrates and structure of the riparian zone?	Ground disturbance for cable trenching (open-cut and HDD) and changes to land use from temporary construction areas and refurbishment of the existing Onshore Substation are likely to increase fine sediment input to water bodies, which could have impacts on hydromorphology. Any increase in surface runoff has the potential to increase scour to the bed and banks. Any operational maintenance impacts on the riparian zone would be minor and temporary.	In
	Could the activity create a permanent barrier to the downstream movement of water and/or sediment, or the upstream movement of fish?	No mechanism for impact identified. Onshore infrastructure (construction and operation) will not create a permanent barrier to the downstream movement of water or sediment, or the upstream movement of fish. Although temporary barriers to river continuity may be required during construction (e.g., to facilitate watercourse crossings), they would be removed following construction and any effects would be reversed.	Out
Physio-chemistry	Could the activity change the temperature, pH, oxygenation, salinity or nutrient concentrations in the water body?	There is potential for increased sediment supply, which could impact on turbidity levels and oxygenation within the water body. There will also be increased risk of contaminant supply to water bodies, from accidental spillage or leakage of fuel oils or lubricants from construction vehicles. This has the potential to impact on physico chemistry. Operational maintenance impacts would be similar (e.g., ground disturbance, increased fine sediment loads).	In
	Could the activity dangerous chemicals into the water body?	The operation of construction machinery in or adjacent to water bodies has the potential to accidentally release lubricants, fuels and oils into a surface water body. This could also be caused by spillage, leakage and in-wash from vehicle storage areas following rainfall, accidental release of foul waters (e.g., from welfare facilities) and construction materials, such as concrete and inert drilling fluids from trenchless crossings. Operational maintenance activities could lead to the accidental release of similar dangerous chemicals.	In

Table 4.2 Scoping assessment for lake water bodies

Parameter	Scoping question	Scoping assessment	Scoping decision
Lake water body assessed: Jennetts Reservoir (GB30844801)			
Project components assessed: Onshore transmission			
Biology	Could the activity change the hydromorphology and/or physico-chemistry of the water body, or lead to the direct changes to the composition, abundance and biomass of phytoplankton?	A potential cable corridor route crosses the catchment upstream of the waterbody. Impacts from construction and ground disturbance for cable trenching (open-cut and HDD) could increase fine sediment in the water body. This could reduce light penetration and alter physico chemistry, resulting in the loss or modification of aquatic flora communities and could alter the composition, abundance and biomass of phytoplankton. Operational maintenance impacts would be similar (e.g., ground disturbance, increased fine sediment loads).	In
	Could the activity change the hydromorphology and/or physico-chemistry of the water body, or lead to the direct changes to the composition and abundance of other aquatic flora?	A potential cable corridor route crosses the catchment upstream of the waterbody. Impacts from construction and ground disturbance for cable trenching (open-cut and HDD) could increase fine sediment in the water body. This could smother bed habitats and reduce light penetration. This could also lead to loss or modification of aquatic flora communities. Operational maintenance impacts would be similar (e.g., ground disturbance, increased fine sediment loads).	In
	Could the activity change the hydromorphology and/or physico-chemistry of the water body, or lead to the direct changes to the composition and abundance of benthic invertebrate fauna?	A potential cable corridor route crosses the catchment upstream of the waterbody. Impacts from construction and ground disturbance for cable trenching (open-cut and HDD) could increase fine sediment in the water body. This could smother bed habitats and reduce light penetration. This could lead to the loss or modification of habitats which support benthic invertebrates. Changes to physico-chemistry from construction activities (ground disturbance for cable trenching (open-cut and HDD)) could also lead to loss or modification of aquatic invertebrate habitat. Operational maintenance impacts would be similar (e.g., ground disturbance, increased fine sediment loads).	In
	Could the activity change the hydromorphology and/or physico-chemistry of the water body, or lead to the direct changes to the	A potential cable corridor route crosses the catchment upstream of the waterbody. Impacts from construction and ground disturbance for cable trenching (open-cut and HDD) could increase fine sediment in the water body. This could smother bed habitats and reduce light	In

Parameter	Scoping question	Scoping assessment	Scoping decision
	composition, abundance and age structure of fish fauna?	penetration. Potential changes to physico-chemistry could also reduce the capacity of the water body to support feeding and spawning fish. Operational maintenance impacts would be similar (e.g., ground disturbance, increased fine sediment loads).	
Hydromorphology	Could the activity change the quantity and dynamics of water flow, residence time or connection to the groundwater body?	A potential cable corridor route crosses the catchment upstream of the waterbody. Temporary changes in land use (impacts from construction and ground disturbance for cable trenching (open-cut and HDD)) could lead to increased surface runoff and changes to the quantity and dynamics of flows entering the water body. Operational maintenance impacts would be similar (e.g., ground disturbance, increased fine sediment loads). No groundwater impacts are expected (see Table 4.5 Table 4.5).	In
	Could the activity change the lake depth variation, quantity, structure and substrate of the lake bed, or the structure of the lake shore?	A potential cable corridor route crosses the catchment upstream of the waterbody. Temporary changes in land use (impacts from construction and ground disturbance for cable trenching (open-cut and HDD)) could lead to increased surface runoff, erosion and increased sediment yield to the water body. This could smother the bed with sediment, alter the substrate of the lake bed and lead to changes in water depth (although any depth changes would likely be very minor). Operational maintenance impacts would be similar (e.g., ground disturbance, increased fine sediment loads).	In
Physio-chemistry	Could the activity change the transparency, thermal conditions, oxygenation conditions, salinity, acidification status or nutrient conditions in the water body?	There is potential for impacts on water clarity, oxygenation conditions, salinity and acidification status of the water body as a result of the supply of fine sediment associated with construction activity. Accidental spillage or leakage of fuel oils or lubricants from construction vehicles could also impact physico-chemistry of the water body. Operational maintenance impacts would be similar (e.g., ground disturbance, increased fine sediment loads, accidental spillages).	In
	Could the activity release dangerous chemicals into the water body?	Onshore construction activities could potentially release dangerous chemicals from construction materials (e.g., concrete) and construction machinery (e.g., fuels and lubricants) into the water body. Operational maintenance activities could lead to the accidental release dangerous chemicals.	In

Table 4.3 Scoping assessment for transitional water bodies

Parameter	Scoping question	Scoping assessment	Scoping decision
Transitional water body assessed: Taw/Torridge (GB540805015500)			
Project components assessed: Landfall, Onshore Substation, onshore transmission			
Biology	Could the activity change the hydromorphology and/or physico-chemistry of the water body, or lead to the direct loss or modification of habitats for aquatic plants, invertebrates or fish?	Impacts from temporary construction compounds, refurbishment of the existing Onshore Substation and ground disturbance for cable trenching (open-cut and HDD) could adversely impact the water body through increased fine sediment input. This could smother bed habitats and reduce light penetration, as well as lead to the loss or modification of aquatic flora communities. Increased fine sediment loads could also lead to the loss or modification of habitats which support invertebrates. Increased turbidity could alter niche habitats – this could lead to the loss or modification of shelter, feeding and spawning habitats for fish. Furthermore, potential changes to physico-chemistry could also reduce the capacity of the water body to support feeding and spawning fish. Operational maintenance impacts would be similar (e.g., ground disturbance, increased fine sediment loads).	In
Hydromorphology	Could the activity change the hydrological regime or morphological conditions of the water body, or create a permanent barrier to upstream continuity?	Alteration of surface water flows, as a result temporary construction work and increase in impermeable surfaces, could locally alter surface and subsurface runoff pathways and rates. This could lead alter morphological conditions (e.g., erosion and deposition). Impoundment by temporary dams or culverts during the works in the water bodies could also impact the hydrology of the surface water system, change patterns of erosion and sedimentation, and impede river continuity. Operational maintenance impacts would be similar (e.g., increased runoff and temporary work structures)	In

Parameter	Scoping question	Scoping assessment	Scoping decision
Physico-chemistry	Could the activity change water clarity, temperature, salinity, oxygen levels, nutrients or microbial patterns continuously for longer than a spring neap tidal cycle (c. 14 days)?	There is potential for impacts on water clarity, oxygenation conditions, salinity and acidification status of the water body as a result of the supply of fine sediment associated with construction activity. Accidental spillage or leakage of fuel oils or lubricants from construction vehicles could also impact physico-chemistry of the water body. Operational maintenance impacts would be similar (e.g., ground disturbance, increased fine sediment loads).	In
	Could the activity release pollutants into the water body?	The operation of construction machinery in or adjacent to the water body has the potential to accidentally release lubricants, fuels and oils into the water body Operational maintenance activities could lead to the accidental release dangerous chemicals.	In
	Could the activity release priority substances or priority hazardous substances into the water body?	The operation of construction machinery in or adjacent to the water body has the potential to accidentally release lubricants, fuels and oils into a surface water body. This could also be caused by spillage, leakage and in-wash from vehicle storage areas following rainfall, accidental release of foul waters (e.g., from welfare facilities) and construction materials, such as concrete and inert drilling fluids from trenchless crossings. Operational maintenance activities could lead to the accidental release priority substances and priority hazardous substances.	In

Table 4.4 Scoping assessment for coastal water bodies

Parameter	Scoping question	Scoping assessment	Scoping decision
Coastal water body assessed: Barnstaple Bay (GB610807680003)			
Project components assessed: Offshore transmission			
Biology	Is the footprint of the activity 0.5 km^2 or larger	The cable corridor footprint within the coastal water body is approximately 0.14 km^2 (based on a mean width of 36m (20 min; 50 max) extending to the edge of the coastal water body (~4km).	Out
	Is the area of either activity greater than 1% or more of the water body's area	The area of the costal water body occupied by the Offshore Cable Corridor is ~0.13% (water body measures 111.141km^2).	Out
	Within 500m of any higher sensitivity habitat?	The site is within 500m of high sensitivity habitat in the Bideford to Foreland Point MCZ and Braunton Burrows SAC.	In
	1% or more of any lower sensitivity habitat	Most of the coastal water body in is characterised by subtidal and intertidal soft sediment and the Project is unlikely to affect more than 1% of the total habitat area. However, if the northern or southern landfall options are progressed, there are smaller areas of subtidal rocky reef and rocky shore habitats in these locations. the Project could affect more than 1% of these environments.	In
	Is in an estuary and could affect fish in the estuary, outside the estuary but could delay or prevent fish entering it or could affect fish migrating through the estuary	The coastal water body is directly connected to the Taw/Torridge transitional water body. There will be an increase in suspended sediment concentrations because of transition pit works associated with subtidal HDD exit point and cable burial techniques to facilitate cable installation. However, this effect will be short-lived and likely to be within natural baseline sediment movement. Any operational maintenance impacts would be temporary and minor.	Out
	Could impact on normal fish behaviour like movement, migration or spawning (for example creating a physical barrier, noise, chemical change or a change in depth or flow)	The area of construction work within the water body would be small scale and would occur in an open area of coastline. This would therefore not create a physical barrier to fish.	Out
	Could cause entrainment or impingement of fish	No mechanism for fish entrainment or impingement has been identified.	Out
	Could introduce or spread Invasive non-native species (INNS)	Works have the potential to release invasive species if materials and equipment used in the process have not been properly cleaned after use at a previous location that may have had invasive species present. However, good practice measures will be employed to ensure all equipment is cleaned and checked before use.	Out

Parameter	Scoping question	Scoping assessment	Scoping decision
Hydromorphology	Could impact on the hydromorphology (for example morphology or tidal patterns) of a water body at high status?	The water body is at High WFD status for hydromorphological supporting elements. The small scale of proposed works (and possible maintenance) in relation to overall water body size mean that impacts on morphology or tidal patterns are unlikely.	Out
	Could significantly impact the hydromorphology of any water body?	The Export Cables would be brought ashore and jointed to the onshore cables within transition pits using horizontal directional drilling (HDD) and duct installation. The HDD would then be drilled from an onshore construction compound and will exit the seabed in an exit pit. Given the use of HDD, effects inshore are not predicted.	Out
	Is in a water body that is heavily modified for the same use as your activity?	No – the water body is not designated artificial or heavily modified.	Out
Physico-chemistry	Could affect water clarity, temperature, salinity, oxygen levels, nutrients or microbial patterns continuously for longer than a spring neap tidal cycle (about 14 days)	There will be an increase in suspended sediment concentrations because of transition pit works associated with subtidal HDD exit point and cable burial techniques to facilitate cable installation. These activities could increase turbidity and alter oxygen and nutrient levels. However, these effects will be short-lived and likely to be within natural baselines already experienced in the water body. Operational maintenance works would have similar temporary impacts.	Out
	Is in a water body with a phytoplankton status of moderate, poor or bad	No – status is good.	Out
	Is in a water body with a history of harmful algae	Not monitored.	Out
	The chemicals are on the Environmental Quality Standards Directive (EQSD) list	No chemicals would be directly released from potential works associated with the Project. Best practice measures will be used to reduce the likelihood of spillages.	Out
	It disturbs sediment with contaminants above Cefas Action Level 1	Awaiting detailed site information.	TBC

Table 4.5 Scoping assessment for groundwater bodies

Parameter	Scoping question	Scoping assessment	Scoping decision
Groundwater bodies assessed: North Devon Streams (GB40802G801000), Torridge and Hartland Streams (GB40802G800600)			
Project components assessed: Onshore Substation, onshore transmission			
Groundwater quantity	Will the activity change groundwater levels be affecting Groundwater Dependent Terrestrial Ecosystems (GWDTEs) or dependent surface water features?	During construction of the onshore cable corridor, the subsurface HDD method used to traverse watercourses, could have localized changes to groundwater flows. There may be local changes to infiltration rates into the groundwater bodies due to installation of buried infrastructure causing alterations to subsurface flow routes. However, these changes are not expected to have permanent impacts on GWDTEs or dependent surface water features.	Out
	Will the level of proposed groundwater abstraction exceed recharge at a water body scale?	No consumptive abstraction is planned, and there will be no mechanism for impact on groundwater recharge. Any groundwater abstraction would be limited to localised dewatering of near-surface groundwaters during subsurface excavations in the construction phase.	Out
	Could the activity lead to saline intrusion?	No construction or operational activities will abstract any water from the groundwater bodies identified, and therefore, will not result in saline intrusion.	Out
	Could the activity lead to an additional surface water body that will become noncompliant and lead to failure of the dependent surface water test?	No construction or operational activities will abstract any water from the groundwater bodies identified.	Out
	Could the activity result in additional abstraction that will exceed any groundwater body scale headroom between the fully licensed quantity and the limit imposed by the total recharge?	No consumptive abstraction is planned, and there will be no mechanism for impact on groundwater recharge. Any groundwater abstraction would be limited to localised dewatering of near-surface groundwaters during subsurface excavations in the construction phase.	Out

Parameter	Scoping question	Scoping assessment	Scoping decision
Groundwater quality	Will the activities have the potential to result in or exacerbate widespread diffuse pollution at a water body scale?	If any pollution from project construction (onshore cable corridor, temporary construction areas) and operation does occur, this will be limited to a small proportion of both groundwater bodies identified.	Out
	Will the activities have the potential to result in pollution of GWDTEs or cause deterioration in the quality of a drinking water abstraction?	The activities such as HDD and open cut trench excavations to construct the onshore cable corridor could potentially introduce contaminants into the groundwater bodies identified, which could subsequently be transferred to GWDTEs.	In
	Could the activities have the potential to result in increasing trends in pollutant concentrations or reduce the ability of the water body being able to reverse significant trends in groundwater pollutants?	Construction of the onshore Export Cable from open cut trench excavations and HDD could potentially introduce contaminants into groundwater. This could lead to an increase in pollutant concentrations within the groundwater bodies identified.	In
	Will the activity lead to saline intrusion?	No construction or operational activities will abstract any water from the groundwater bodies identified, and therefore, will not result in saline intrusion.	Out

4.1 Impacts on RBMP improvement and mitigation measures

15. The Environment Agency has not published any details of improvement measures that are required to improve the status water bodies that have been scoped in. However, the Environment Agency has identified the mitigation measures that are required to achieve Good Ecological Potential in the Taw Estuary (GB108050020000) river water body and Taw/Torridge (GB540805015500) transitional water body. These are listed in **Table 4.6.**

Table 4.6 Measures identified in the RBMP for the Taw Estuary and Taw/Torridge water bodies

Measure	Status	Water Body
Realign flood defence	Not in place	Taw/Torridge
Remove obsolete structure	Not in place	Taw/Torridge; Taw Estuary
Enhance ecology	Not in place	Taw/Torridge; Taw Estuary
Flood bunds	Not in place	Taw Estuary
Set-back embankments	Not in place	Taw Estuary
Floodplain connectivity	Not in place	Taw Estuary
Fish passes	Not in place	Taw Estuary
Reduce fish entrainment	Not in place	Taw Estuary
Remove obsolete structure	Not in place	Taw Estuary
Changes to locks etc	Not in place	Taw Estuary
Selective vegetation control	Not in place	Taw Estuary
Vegetation control	Not in place	Taw Estuary
Vegetation control timing	Not in place	Taw Estuary
Invasive species techniques	Not in place	Taw Estuary
Retain habitats	Not in place	Taw Estuary
Sediment management strategy	Not in place	Taw Estuary
Maintenance – minimise habitat impact	Not in place	Taw Estuary
Remove or soften hard bank	Not in place	Taw Estuary
Maintenance – prevent sediment transfer	Not in place	Taw Estuary

Measure	Status	Water Body
Water level management	Not in place	Taw Estuary
Align and attenuate flow	Not in place	Taw Estuary
Preserve or restore habitats	Not in place	Taw Estuary
Educate landowners	Not in place	Taw Estuary
In-channel morph diversity	Not in place	Taw Estuary
Re-opening culverts	Not in place	Taw Estuary
Alter culvert channel bed	Not in place	Taw Estuary
Educate landowners	Not in place	Taw Estuary

16. Measures in the Taw/Torridge transitional water body are intended to address physical modification pressures associated with flood protection use (i.e., the reason why the water body was designated as heavily modified). Measures in the Taw Estuary river water body are intended to address physical modification pressures associated with both flood protection use and land drainage. Although the Project involves localised construction works within these water bodies, the future implementation or effectiveness of mitigation measures will not be affected.

4.2 Protected areas

17. Water-dependent protected areas identified by the Environment Agency on the Catchment Data Explorer for scoped in water bodies are shown in **Table 4.7** and evaluated below.

Nitrates

18. With respect to the Nitrates Directive, foul water generated in construction site compounds could release nitrates and other nutrients if discharged, untreated to the water environment. However, all foul waters generated during construction would be contained and/or adequately treated to ensure that the Project activities would not result in the release of significant quantities of nitrates and other nutrients. Several of the NVZs are located a considerable distance from the Project and there is no mechanism for impact. **Impacts on NVZs, urban waste water and drinking water protected areas are scoped out of the assessment.**

Shellfish

19. Construction and operational maintenance works could release fine sediment and pollutants into the water body, which could affect shellfish habitat in coastal and transitional water bodies. Best practise mitigation measures will ensure any

additional fine sediment input will be kept to a minimum and will likely be within the range of normal conditions associated with subtidal and intertidal soft sediments. These environments characterise the transitional and coastal water bodies. Onshore construction activities could accidentally release dangerous chemicals from construction materials and machinery, and these could have serious adverse effects on shellfish. Shellfish waters are scoped into the assessment.

Bathing Waters

20. Accidental spillage of dangerous chemicals from construction materials and machinery could adversely affect bathing water quality – bathing waters are scoped into the assessment.

SACs

21. WFD compliance assessments require the consideration of the potential effects on WFD quality elements (hydromorphological, physico-chemical, chemical and biological), many of which support ecological interest features for which the Natura 2000 Protected Areas are designated. The Shadow Habitats Regulations Assessment Report (HRA) therefore builds on the output of this assessment to assess the potential effects on designated site interest features. To avoid duplication, impacts on the designated site interest features themselves are not considered here.

Table 4.7 Protected areas associated with each water body

Water body	Protected area
Horwood Stream (GB108050014510)	Gammaton Lower Reservoir Eutrophic lake NVZ (EL122)
Taw Estuary (GB108050020000)	Braunton Burrows SAC Taw Estuary Shellfish Waters Taw Estuary NVZ (ET6)
Jennetts Reservoir (GB30844801)	Jennetts Reservoir Eutrophic lake NVZ (EL118)
Taw/Torridge (GB540805015500)	Torridge Estuary Shellfish Waters Taw Estuary Shellfish Waters Taw Estuary NVZ (ET6) Taw Estuary Urban Waste Water Treatment Directive Braunton Burrows SAC
Torridge and Hartland streams (GB40802G800600)	Mid Devon NVZ (G18) Taw Estuary NVZ (ET6) Tamar Lakes Eutrophic lake NVZ (EL126) Jennetts reservoir Eutrophic lake NVZ (EL118) Torridge and Hartland Streams Drinking Water Protected Area Gammaton Lower Reservoir Eutrophic lake NVZ (EL122)

Water body	Protected area
North Devon Streams (GB40802G801000)	Mid Devon NVZ (G18) Taw Estuary NVZ (ET6) Slade Lower Reservoir Eutrophic lake NVZ (EL120) River Taw and North Devon Streams Drinking Water Protected Area
Barnstaple Bay (GB610807680003)	Tintagel-Marsland-Clovelly Coast SAC Braunton Burrows SAC Taw-Torridge Estuary Shellfish Waters Putsborough Bathing Waters Westward Ho! Bathing waters Combesgate Beach, Woolacombe Bathing Waters Saunton Sands Bathing Waters Woolacombe Village Bathing Waters Croyde Bay Bathing Waters

5. Stage 2 Summary

22. Stage 2 scoping has established that activities associated with the Project in the following water bodies should be taken forward to Stage 3 Detailed Compliance Assessment:

    - River water bodies (all quality elements):
        - Kenwith Stream (GB108050014500)
        - Upper Yeo (Bideford) (GB108050014470)
        - Horwood Stream (GB108050014510)
        - Taw Estuary (GB108050020000)
    - Lake water body (all quality elements):
        - Jennetts Reservoir (GB30844801)
    - Groundwater bodies (only groundwater quality element):
        - Torridge and Hartland streams (GB40802G800600)
        - North Devon Streams (GB40802G801000)
    - Transitional water body (all quality elements):
        - Taw/Torridge (GB540805015500)
    - Coastal water body (only biology quality element):
        - Barnstaple Bay (GB610807680003)

23. The accidental spillage of dangerous chemicals from construction materials and machinery could adversely affect shellfish waters and bathing waters protected areas, which are scoped into the assessment.

24. Once the final landfall location and cable corridor route is known it will be necessary to rescreen water bodies, as some may no longer be relevant.

Appendix C Habitats Regulations Assessment Screening

White Cross Offshore Wind Farm
HRA Screening Report

Document Code:	PC2978-RHD-ZZ-XX-RP-Z-0010	
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Date:	17/01/2022	
Prepared by:	*RI, GS, KF, CS*	
Checked by:	*PT*	
Approved by:	*EF*	

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Version Number	Reason for Issue / Major Changes
V 1.0	Draft for client review
V 2.0	Final
V 3.0	Final for issue

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Glossary of Acronyms

Term	Definition
AA	Appropriate Assessment
AC	Alternating Current
AfL	Agreement for Lease
AOD	Above Ordnance Datum
AoS	Area of Search
BAS	Burial Assessment Study
BDMPS	Biologically Defined Minimum Population Scales
BEIS	Department for Business, Energy and Industrial Strategy
CBRA	Cable Burial Risk Assessment
CI	Confidence Interval
CIS	Celtic and Irish Seas
CSGRT	Cornwall Seal Group Research Trust
CV	Coefficient of Variation
DCO	Development Consent Order
DECC	Department for Energy and Climate Change
EEC	European Economic Community
EIA	Environmental Impact Assessment
EMF	Electromagnetic Field
EU	European Union
FPSO	Floating Production Storage and Offloading
GBS	Gravity Based Structure
GIS	Geographic Imaging Systems
ha	Hectare
HDD	Horizontal Directional Drilling
HRA	Habitats Regulation Assessment
HVAC	High Voltage Alternating Current
IAMMWG	Inter-Agency Marine Mammal Working Group
JNCC	Joint Nature Conservancy Council
kJ	Kilo Joule
km	Kilometre
kV	Kilo Volt
LSE	Likely Significant Effect
m	Metre
MLWS	Mean Low Water Springs
MMMP	Marine Mammal Mitigation Protocol
MPS	Marine Policy Statement
MSL	Mean Sea Level

Term	Definition
MU	Management Units
MW	Mega Watt
O&M	Operation and Maintenance
OCSW	Offshore Channel and SW England
Ofgem	Office of Gas and Electricity Markets
OFTO	Offshore Transmission Operator
OHL	Overhead Line
OS	Ordnance Survey
OWF	Offshore Wind Farm
OWL	Offshore Wind Limited
PINS	The Planning Inspectorate
PTS	Permanent Threshold Shift
RIGS	Regionally Important Geological Sites
RSPB	Royal Society for the Protection of Birds
SAC	Special Area of Conservation
SCANS	Small Cetaceans in the European Atlantic and North Sea
SMRU	Sea Mammal Research Unit
SNCB	Statutory Nature Conservation Body
SPA	Special Protection Area
SSC	Suspended Sediment Concentrations
TTS	Temporary Threshold Shift
UK	United Kingdom
UXO	Unexploded Ordnance
WTG	Wind Turbine Generator
ZOI	Zone of Influence

1. Introduction

1.1 Purpose of this document

1. White Cross Offshore Windfarm (the Project) is a proposed floating offshore windfarm located in the Celtic Sea (Figure 1.1) with a capacity of up to 100MW. The Project is being developed by Offshore Wind Ltd (OWL) a joint venture between Cobra Instalaciones Servicios, S.A., and Flotation Energy plc.

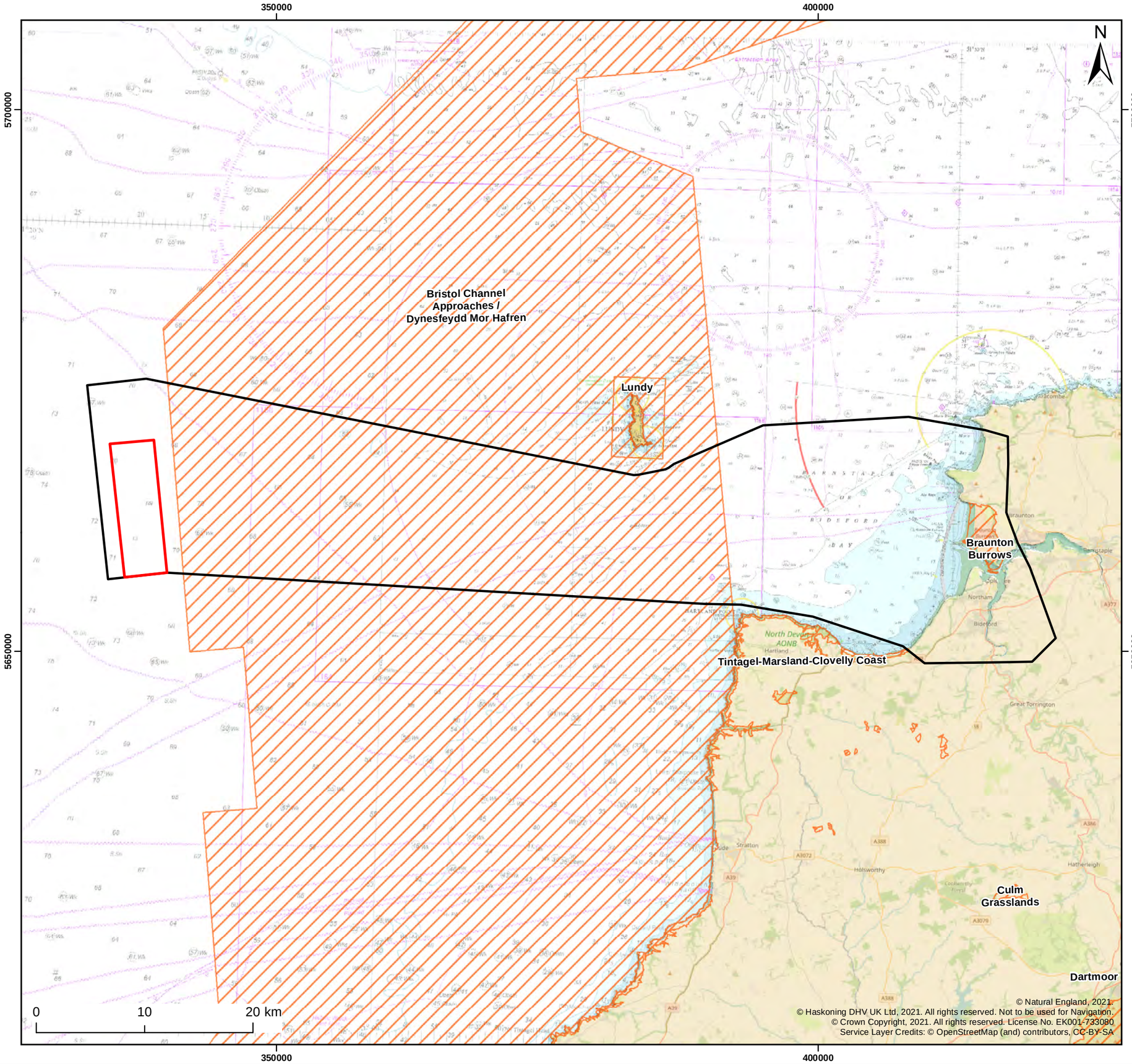
2. This document has been produced to inform the Habitats Regulations Assessment (HRA) process for the Project. It provides information to enable the screening of the project with respect to its potential to have a likely significant effect (LSE) on National Site Network and Ramsar sites of nature conservation importance. This step in the process and associated reporting requirements are further described in the following sections.

3. The assessment provided in this document is based on the understanding of the baseline environment (Section 4) and the scope and nature of the proposed project activities.

1.2 Structure of this document

4. This HRA Screening Report is set out in a number of stages as follow:

- A brief summary of the main components of the Project (Section 2)
- A brief summary of the Habitats Regulations Assessment Process (Section 3)
- A summary description of the environmental baseline relevant to the screening process (Section 4)
- Screening - an assessment of the potential for LSE to arise for the project alone with regard to the designated features of the National Site Network sites under consideration (Section 5)
- Screening in-combination assessment (Section 6)
- A summary of the National Site Network sites and features for which the screening process has identified potential for LSE (Section 7)
- References (Section 8)



Legend:

- White Cross Offshore Windfarm
- Area of Search
- Special Area of Conservation (SAC)

Client:	Project:
Offshore Wind Ltd.	White Cross Offshore Windfarm

Title: White Cross Offshore Windfarm

Figure: 1.1 | Drawing No: PC2978-RHD-ZZ-XX-DR-Z-0111

Revision:	Date:	Drawn:	Checked:	Size:	Scale:
P01	25/11/2021	AB	PT	A3	1:350,000

Co-ordinate system: WGS 1984 UTM Zone 30N

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2. Description of the Project

2.1 Project overview

5. The White Cross Offshore Windfarm Site is located approximately 52km north of the Cornwall and Devon coast. The Offshore Export Cable will connect the Offshore Substation Platform to shore. Onshore, the grid connection is confirmed as East Yelland, see Figure 2.1. The Export Cable will come ashore at a landfall and then routed underground to the Onshore Substation where it connects into the National Grid Network. A more detailed description of the Project is provided within Section 1.8 of the Environmental Impact Assessment Scoping Report.

6. The main components of the Project are detailed in Table 2.1.

Table 2.1 Project infrastructure

Component	Overview
Wind Turbine Generators (WTG)	The wind turbines convert wind energy to electricity. Key components include rotor blades, gearboxes (in some cases), transformers, power electronics and control equipment. Offshore turbine models are continuously evolving and improving. Therefore the exact wind turbine model will be selected post-consent from the range of models available at the point of procurement.
Transition Piece	The transition piece includes various functionalities such as access for maintenance, cable connection for the energy of the turbine and the corrosion protection of the entire foundation.
Mooring system	The mooring system is designed to address station-keeping issues (it does not need to contribute to the platform's stability) and enables simple connection-disconnection procedures that can be performed by widely available tug vessels.
Array cables	Array cables will connect the wind turbines to the Offshore Substation. Cables will be buried wherever possible.
Offshore Substation	One substation will convert the power to higher voltages to transmit the power more efficiently (reduced electrical losses) to shore.
Offshore Export Cable	Cable connecting the Offshore Substation to the landfall. The cable can be delivered in sections and jointed in-situ or be delivered in one length (factory joined).

Component	Overview
	If seabed conditions make burial unfeasible, as well as in the immediate proximity of turbine foundations, cable may be protected by a hard-protective layer such as rock or concrete mattresses.
Landfall	The location at which the offshore export cable will come ashore.
Onshore Export Cable	The buried cable will connect the landfall to the Onshore Substation. The cable will be delivered in sections and buried in trenches. Sections will be connected within jointing bays.
Onshore substation	The project will connect directly with an existing Western Power Distribution substation which is unused due to decommissioning of the attendant power station. The substation may require updating of the electrical and auxiliary equipment.
Grid connection	The Project will connect to the Western Power Distribution Network through the East Yelland substation.

2.2 Offshore

Lease area

7. The Agreement for Lease (AfL) area is illustrated in the map in Figure 1.1. The key characteristics of the AfL area are summarised in Table 2.2.

Table 2.2 White Cross Offshore Windfarm Site Overview

Area	Parameters	Values
AfL/windfarm site	Area	50km^2
	Closest distance to shore	52km
	Water depth	60m - 80m

Wind Turbine Generators

8. The size and capacity of the wind turbines will be decided at a later stage, prior to final investment decision. Technology develops rapidly and the available sizes of turbines are expected to increase over the coming years. The current wind turbine design envelope for the Project is outlined in Table 2.3.

Table 2.3 Wind Turbine Design Envelope

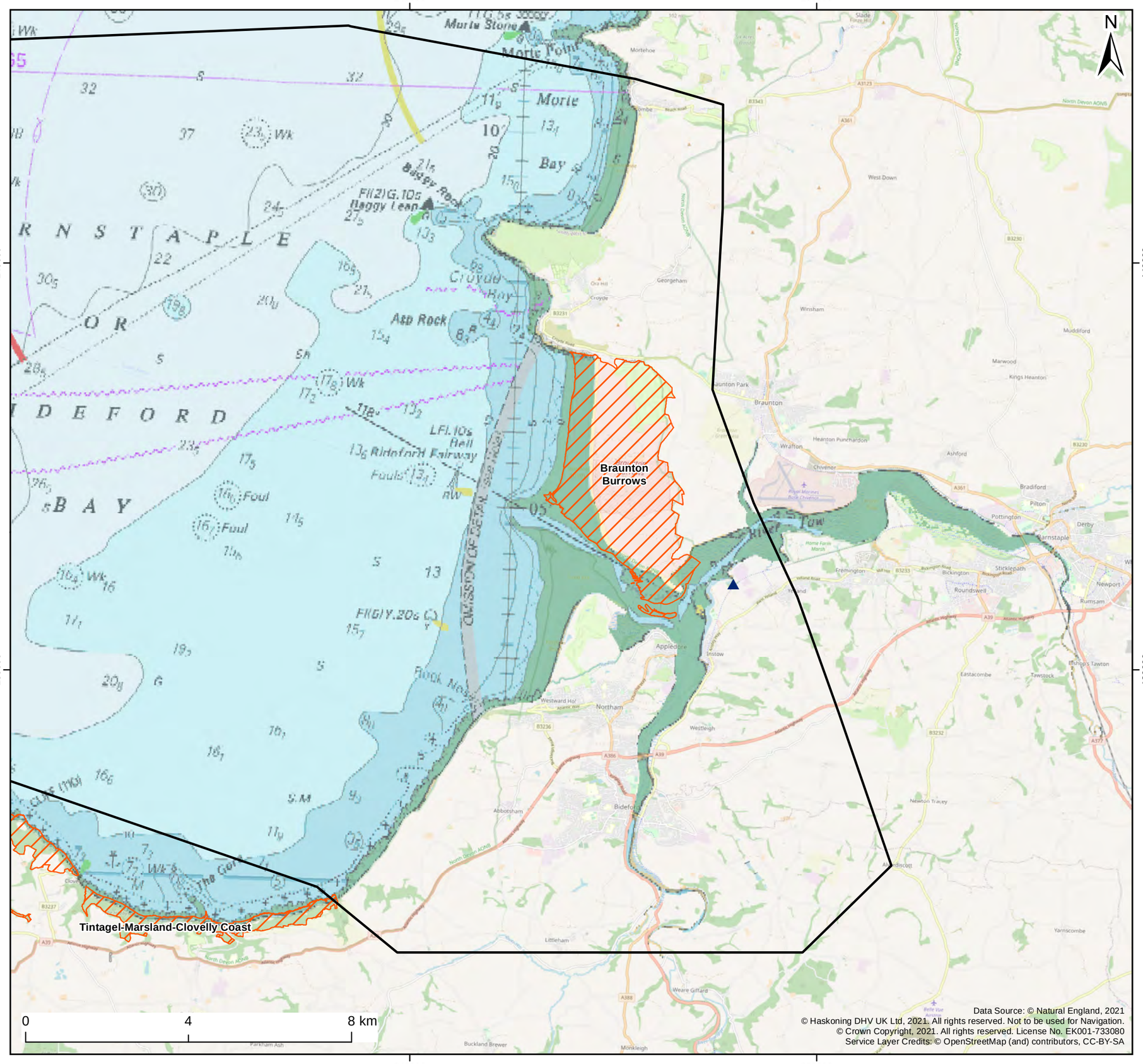
Wind Turbine Generator Parameter	Range to be considered
WTG capacity (MW)	12 – 24
Turbine type	3-bladed, with horizontal axis
Rotor Diameter (m)	220-300
Number of wind turbines	6 - 8
Individual Rotor swept area (m^2)	38,000 – 70,700
Total Rotor swept area (km^2)	~0.304km^2 (based on 8 x 220m diameter turbines)
Max Tip Height (m) above Mean Sea Level (MSL)	~345
Air Gap above MSL	22m
Indicative separation distance between turbines (inter-row)	~1000m (subject to yield assessment)

Wind Turbine Floating Substructure

9. The floating substructure provides a base for the installation of the wind turbine. The substructure as defined here has three key components: (1) the mooring system, which anchors the structure to the seabed; (2) the substructure, a floating structure that supports the wind turbine; and (3) the transition, which provides the connection from the substructure to the wind turbine tower. Substructures are typically made of tubular steel columns.

10. Conventional fixed substructures are less suitable for deeper waters (>50m), and floating substructures, where water depth presents less of an issue, could be a viable option. In addition to allowing turbines to be installed in deeper waters further from shore, floating structures offer benefits in that their construction is largely yard based, with significantly less offshore construction activity, therefore reducing the impacts of offshore construction, the cost and scheduling uncertainties traditionally associated with more conventional windfarm construction.

11. The substructure is constructed and the turbine installed in a dry dock or inshore (tension leg/submersible only), thus reducing the high costs of assembly and installation at sea. Once complete it is towed to site where it is attached to the pre-installed moorings and interarray cables. The substructure is then fully ballasted by pumping water, moorings are picked up and tensioned, the electrical cable head pulled-in and the Wind Turbine commissioned.



Legend:

- Area of Search
- Potential Grid Connection Location
- Special Area of Conservation (SAC)

Client:	Project:
Offshore Wind Ltd.	White Cross Offshore Windfarm

Title:

Substation Connection at East Yelland

Figure:	Drawing No:
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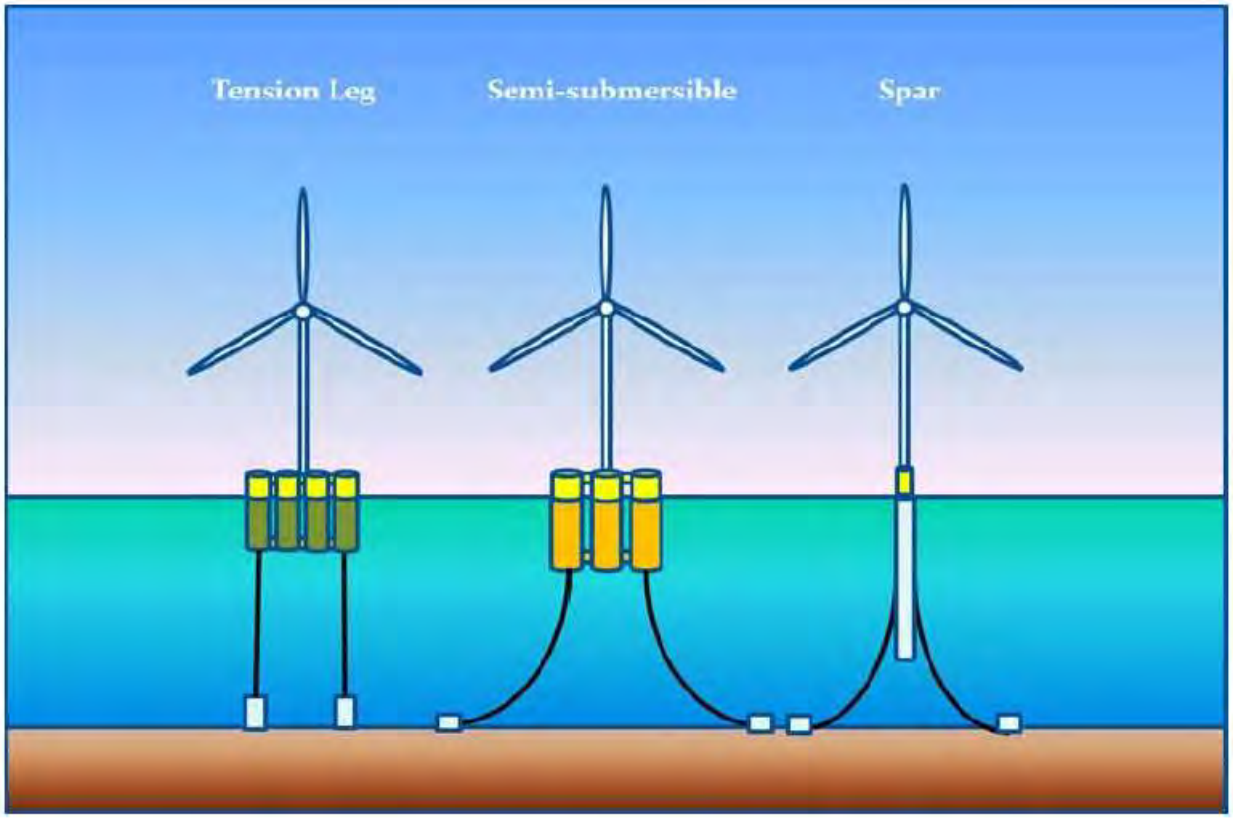
Tension leg platform (TLP)

12. A semi-submerged buoyant structure, anchored to the seabed with tensioned mooring lines, which provide stability (see illustration in Plate 1). The shallow draft and tension stability allows for a smaller and lighter structure, but this design increases stresses on the tendon and anchor system. There are also challenges with the installation process and increased operational risks if a tendon fails. Examples include: PelaStar (by Glosten); Blue H TLP (by Blue H Group); Eco TLP (by DBD Systems); GICON-SOF (by GICON).

Plate 1: Types of floating offshore windfarm systems - Tension leg, Semi-sub and Spar Buoy



Semi-submersible platform

13. Buoyancy stabilised platform which floats semi-submerged on the surface of the ocean whilst anchored to the seabed with catenary mooring lines (see illustration in Plate 1). Often requires a large and heavy structure to maintain stability, but a low draft allows for more flexible application and simpler installation. Examples include: WindFloat (by Principle Power); Damping Pool (by IDEOL); SeaReed (by DCNS).

Spar-buoy

14. A cylindrical ballast-stabilised structure which gains its stability from having the centre of gravity lower in the water than the centre of buoyancy (see illustration in

Plate 1). Thus, while the lower parts of the structure are heavy, the upper parts are usually lighter, thereby raising the centre of buoyancy. The simple structure of the spar-buoy is typically easy to fabricate and provides good stability, but the large draft requirement can create logistical challenges during assembly, transportation, and installation (and decommissioning), and can constrain deployment to waters >100m depth. Examples include: Hywind (by Statoil); Sway (by Sway); Advanced Spar (by Japan Marine United).

15. Currently the selection of the floating substructure is defined by the water depths that each substructure requires for safe operation and the suitable construction ports/locations where the proposed development is located. The Carbon Trust (2015) document highlights the key strengths of each system (Table 2.4).

Table 2.4 Key strengths and weaknesses of each substructure type

Technology	Strengths	Weaknesses
Tension Leg (water depth +100m)	• Low Structural mass. • Onshore turbine assembly. • Few moving parts (no active ballast required). • Stability.	• High loads on the mooring and anchoring system. • Challenging installation process. • Bespoke installation barge often required.
Semi-submersible (water depth +40m)	• Flexible application due to the ability to operate in shallow water depths. • Low vessel requirement- only basic tugboats required. • Onshore turbine assembly. • Amendable to port-side major repairs.	• High structural mass to provide sufficient buoyancy and stability. • Complex steel structures with many welded joints - can be difficult to fabricate. • Potentially costly active ballast systems.
Spar-buoy (water depth +120m)	• Simple design is amenable to serial fabrication processes. • Few moving parts (No active ballast required). • Excellent stability.	• High loads on the mooring and anchoring system. • Challenging installation process. • Bespoke installation barge often required. • Challenging manufacturing and assembly process.

16. Given the depth of the Windfarm Site, OWL is likely to use the semi-submersible technology type.

17. Table 2.5 presents the envelope for the floating substructure.

Table 2.5 Wind Turbine Floating Substructure Envelope

Turbine Floating Substructure Parameters*	Parameter
Overall length of each face (m)	~100
Water depth in operation (m)	12 – 18 (indicative range)
Freeboard (in operation) (m)	10 – 16 (indicative range)
Total substructure unit height (m)	22 – 34 (indicative range)

*The baseline assumption is that the type of floating substructure used will be semi-submersible. However, until sufficient engineering has been completed, other floating substructure types cannot be ruled out.

Wind Turbine Anchors and Mooring

18. The floating substructures described require moorings to anchor the turbine to the seabed in order to maintain position. The type and number of anchors and moorings used for the Project will depend on the type of floating substructure, loads imposed on the mooring system by the substructure/WTG assembly in the metocean conditions prevailing on site, in addition to geotechnical and environmental considerations. The anchoring system options being considered are detailed in Table 2.6 and Table 2.7 presents the key parameters of the anchoring systems.

Table 2.6 Wind Turbine Anchoring Options

Wind Turbine Substructure Anchoring Options	Maximum (unless specified)
Sub-structure types	Tension Leg, Semi-sub and Spar-buoy
Number of mooring lines	Depends on sub structure type
Mooring types	Depends on sub structure type
Anchor types	Drag Embedment Anchors, Torpedo Anchors, Gravity Based Anchors, Suction Anchors and Micro-piling (if required for TLP)
Anchor mass	To be determined
Mooring line type	Anchor chain, Mooring cables, polyester mooring lines
Pennant wires/buoys	Temporary surface buoys during construction, Permanent submersible buoys at seabed for ROV recovery
Mooring line radius	To be determined

Table 2.7 Wind Turbine Anchoring Systems Parameters

Turbine Anchoring Options Parameters	Parameter
Weight (tonnes)	15 – 20 tonnes per anchor
Estimated length of mooring line	Up to 800m
No. of anchors and mooring lines per turbine	3 – 6 per turbine

Windfarm Site Layout

19. The wind turbines will be arranged subject to prevailing meteorological conditions in addition to geotechnical and environmental considerations. It may also be influenced by navigational and Search and Rescue safety requirements.

2.3 Electrical system

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

Array cables

21. Array cables connect the turbines to each other and to the Offshore Substation. The array cables are expected to be 66KV to 132kV alternating current (AC). The length of each array cable will depend on the final layout. A realistic maximum distance of array cables will be defined for the purposes of the EIA and used as the basis for the assessments.

22. The inter-array cables will be buried in the seabed, typically to a depth of 1m, but may range from 0.5m - 3m, and can be buried via several techniques depending on the seabed conditions along the route. The depth will be determined by a Burial Assessment Study (BAS) and a Cable Burial Risk Assessment (CBRA). These techniques can be ploughing, jetting, trenching or post-lay burial. Where cable burial is not possible alternative cable protection measures could be used. This includes rock placement, grout / sandbags, concrete mattresses and polyethylene ducting, but no protection will also be considered.

Offshore Substation

23. It is assumed that the cables from turbines will be brought to an Offshore Substation Platform, located appropriately to optimise the array cable and export cable lengths. The current assumption for the Project is that one substation is required. This may

change depending on the outcome of electrical studies. At the substation, the generated power will be stepped up to a higher AC voltage. This higher voltage will be determined by detailed studies, although it expected that the substation will step up the 66kV or 132kV array cable voltage to up to 220kV for the export cabling.

24. The Offshore Substation platform will typically include components including but not limited to transformers, batteries, generators, switchgear, fire systems, and modular facilities for operational and maintenance activities.

25. The typical footprint plan of the Offshore Substation will be in the region of 80m x 60m with the topsides comprised of several layers / decks stacked on top of another as required. The Offshore Substation foundation type will likely be a jacket or possibly a Gravity Based Structure (GBS) foundation. The jacket foundation will have 4 or 6 legs with up to three piles at each leg or one suction bucket at each leg. Leg spacing at the seabed will be up to 40m. In case of a GBS foundation the diameter of the foundation at seabed will be up to 50m. Table 2.8 describes the Offshore Substation foundation parameters for jacket and GBS options as well as a number of other potential options. A floating substation option will also be investigated.

Table 2.8 Offshore Substation Foundation Options Parameters

Offshore Substation Foundation Options Parameters	Parameter	Maximum (unless specified)
Jacket with piling	Leg spacing	<30m
	Hammer size	<3000kJ
	Pile Diameter	3m - 5m per pile
Tripod	Leg spacing	<30m
	Hammer size	<3000kJ
	Pile Diameter	3m - 5m per pile
Suction bucket	Leg spacing	<35m
	Bucket diameter	<20m
Gravity based structure	Diameter	<50m
	Diameter of seabed levelling	100m
Monopile	Diameter	14m
	Hammer size	5000kJ

26. The typical footprint plan of the Offshore Substation will be in the region of 80m x 60m with the topsides comprised of several layers / decks stacked on top of another as required. The Offshore Substation foundation type will likely be a jacket or possibly a Gravity Based Structure (GBS) foundation. The jacket foundation will have 4 or 6 legs with up to three piles at each leg or one suction bucket at each leg. Leg

spacing at the seabed will be up to 40m. In case of a GBS foundation the diameter of the foundation at seabed will be up to 50m.

Offshore export cable

27. Electricity from the Offshore Substation will be transmitted via one subsea export cable to shore. The export cable (up to 220kV AC) is likely to run from the Offshore Substation to a transition joint bay at the landfall. The transition joint bay connects the offshore cable and onshore export cable. The export cable will be installed in an individual trench and protected in line with good industry practice. Table 2.9 describes the main cable parameters.

Table 2.9 Offshore cable parameters (based on an HVAC export cable system)

Item	Indicative parameters
Substation	1
Number of array cables	2 - 3 per wind turbine
Export cable/trench	1
Fibre optic cables	Bundled in export cable
Export cable route standard working width (cable corridor)	Minimum 22m, maximum 50m
Array cables length	Dependent upon distance between turbines
Export cable	70km

* The baseline assumption is that one offshore substation will be required. However, once sufficient engineering has been completed, OWL will consider options to remove the need for an offshore substation from the Project.

28. The cable will be buried where possible to ensure that the cable is protected from damage by external factors. Typical burial depth is 1m but may range from 0.5m - 3m. The depth will be determined by a BAS and a CBRA. Where cable burial is not possible alternative cable protection measures could be used. This includes rock placement, grout / sandbags, concrete mattresses and polyethylene ducting, but no protection option will also be considered. The appropriate level of protection will be determined based on an assessment of the risks posed to the Project in specific areas.

29. It is likely that the export cable will have to cross other cables and/or pipelines. Formal agreements with regards to existing cable crossings will be entered into by OWL and the existing owners / operators, with the installation techniques discussed and agreed to ensure integrity of the existing infrastructure and any new cables associated with the Project. Several techniques can be utilised, include tubular products, concrete mattresses, and rock placement.

30. Pre-lay intervention activities may be required prior to the installation of cables including boulder removal, sandwave clearance, installation of equipment at crossings and the cutting and removal of any out-of-service cables.

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

2.4 Landfall

32. Table 2.10 shows the main construction parameters for the landfall site. Final landfall location will be selected during the route selection and subsequent EIA process. The configuration at the landfall will be location specific and will involve an onshore-offshore jointing pit.

Table 2.10 Landfall construction parameters

Landfall	Indicative parameters
Landfall installation method	Horizontal Directional Drilling (HDD) and/or open trench where no obstruction
Number of transition bays	1
Transition bay dimensions (length x width)	20 x 10m
Transition bay dimensions depth	2m
HDD compound area (length x width)	~200m x 200m

33. Cable installation methodology at the landfall will be selected based on a comparative assessment of impacts. It is assumed that suitable technologies will include a mix of open cut trenching and horizontal directional drilling (HDD). The offshore and onshore cable will be jointed in one transition bay onshore.

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

35. If HDD is chosen as the appropriate installation methodology at the landfall, the HDD is drilled from an onshore construction compound and will exit the seabed in an exit pit at a suitable water depth. The length of the HDD will depend upon factors such as water depth, seabed topography, shallow geology/soil conditions and environmental constraints. The onshore construction compound will be temporary in nature and reinstated after completion of the Project.

36. The exit pit is likely to be 3m wide at the bottom to allow collection of drilling fluids. The total length will be approximately 10m, while the depth of the exit pit will reflect the depth at which the export cable will continue further offshore. However, it is

likely that the exit pit depth will be less than 1m. The export cable is generally protected in the HDD exit pit and in the offshore export cable trench. However, additional permanent protection measures in the form of rock protection where the export cable is not naturally protected may be required. For the purposes of the EIA appropriate protective measures will be identified and discussed with key stakeholders prior to submission of the application.

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

2.5 Onshore

Onshore Export System

38. Table 2.11 shows the main parameters for the onshore cable and its construction. The standard temporary working width of the onshore cable corridor will typically be 50m and comprises the trench or trenches, storage of excavated material (split into segregated subsoil and topsoil) and a haul road. At specific locations along the onshore corridor the working width may require widening to accommodate access at crossings or specific specialist equipment associated with HDD or micro-tunnelling or indeed decreasing at pinch points to around 20m.

Table 2.11 Onshore cable parameters

Onshore cable corridor	Indicative parameters
Electrical connection	High Voltage Alternating Current (HVAC)
Number of cable circuits / trenches	1 circuit
Cable construction width (onshore corridor)	50m
Cable construction width at trenchless crossings	60m
Depth to top of buried infrastructure (ducts)	>1m
Trenchless (HDD) crossings	At least Sandy Lane and River Taw
Trenchless (HDD) crossings compound (length x width)	200 x 200m
Typical jointing bay frequency	Every ~300m – 1000m
Jointing bay dimensions (length x width x height)	20 x 10 x 1.5m
Depth to top of jointing bay (m)	>1m
Link box frequency	Every ~300m – 1000m
Link box (length x width)	2m x 2m

39. The onshore underground cable system will be installed in one trench with one circuit. The circuit consists of three high voltage cables and one fibre optical cable. The trench holding the circuit may be up to 2.5m wide.

40. Jointing bays will be used to pull the cable into the ducts and/or to join the cable lengths to each other. Link boxes are used for earthing cables and will be installed inside a protective concrete chamber. The jointing bays are subsurface structures, while the link boxes will require access (for inspections) from the surface during operations and will therefore be located at or above ground level. At each jointing location there will be one link box for the circuit. The frequency of jointing bays and link boxes will vary between 300m – 1,000m.

Onshore Substation and Grid Connection

41. The onshore cable would connect to an existing onshore substation at East Yelland where it would connect the Project to the transmission grid. The substation supported a previous power station which came to the end of its like and has been decommissioned and dismantled. The existing overhead power line (OHL) remains in place and is not required to be altered. It is not yet known whether the existing substation will require updating if it does it would require the installation of necessary electrical and auxiliary equipment and components for transforming the power from the wind farm for connection to the distribution grid.

3. The Habitats Regulations Assessment Process

3.1 Legislative Context

42. The Conservation of Habitats and Species Regulations 2017 (2017 No. 1012) (as amended), The Conservation of Offshore Marine Habitats and Species Regulations 2017 (2017 No. 1013) (as amended) are the principal pieces of secondary legislation which, prior to the UK's departure from the European Union, transposed the terrestrial and offshore marine aspects of the EU Habitats Directive (Council Directive 92/43/EEC) and certain elements of the EU Wild Birds Directive (Directive 2009/147/EC) into the domestic law. Together, these regulations are collectively known as the "Habitats Regulations". The Conservation of Habitats and Species (Amendment) (EU Exit) Regulations 2019 (2019 No. 579) set out the changes that apply now that the UK has left the European Union. These confirmed that:

- All protected sites and species retain the same level of protection
- Among other things, the requirement for HRA to be undertaken continues to apply

43. Unless the UK government implements further legislative changes, the obligations, process and terminology of the Habitats Regulations will, for the purposes of this report, remain as set out in existing legislation and regulations.

3.2 The HRA Process

Overview of HRA Process

44. The HRA process is carried out in a sequential manner by the MMO, acting on behalf of the Secretary of State for BEIS (the competent authority). The HRA process is informed and assisted by OWL as the Applicant. It is the responsibility of the Applicant to include 'sufficient information' within the application to inform the HRA.

45. The HRA process consists of up to four stages that are described in more detail below. For all plans and projects which are not wholly directly connected with, or necessary to the conservation management of a site's qualifying features, this will include formal screening for any LSE either alone or in-combination with other plans or projects. The role of the European Commission is now taken by UK Ministers.

Stage 1 – HRA Screening – this document

46. In the initial stage of the HRA process, we have undertaken an assessment to consider whether a HRA should be carried out in relation to the project. This document represents the initial screening assessment for the Project. The results of the initial year of aerial surveys at the site and desk-based data collection have been used to assess what can be scoped out prior to undertaking Stage 2 (Appropriate Assessment). OWL will seek advice from the appropriate bodies at this screening

stage. This will aim to enable an efficient assessment by the Competent Authority for this project.

Stage 2 – Appropriate Assessment

47. The Habitats Regulations require that wherever a project that is not directly connected to, or necessary for, the management of a National Site Network site is likely to have a significant effect on the conservation objectives of the site (directly, indirectly, alone or in- combination with other plans or projects) then an 'Appropriate Assessment' (AA) must be undertaken by the Competent Authority (Regulation 61 of the Habitats Regulations). The Appropriate Assessment must be carried out before consent or authorisation can be given for the project. To enable the Competent Authority to undertake this assessment, the following information will be provided:

- Identification of the area of the development and the possible receptors for the area (aerial data to be used to confirm bird and marine mammal activity at site)
- Identification of the possible impacts the development could have on birds e.g. collision risk, possible disturbance and displacement
- Identification of key species (from aerial survey data) that could be impacted by the development in a regional setting
- Identification of key onsite activities associated with the project development (construction, O&M and decommissioning)
- Identification of seasonal variations in designated features at the site
- Assess whether the impact from development would have an adverse impact on the interest features of National Site Network sites in the region

Stage 3 – Assessment of Alternatives

48. At Stage 3 OWL will investigate the alternatives that could be applied to reduce the potential for effects. Alternative solutions can include a proposal of a different scale, a different location and an option of not having the scheme at all – the 'do nothing' approach. Provided this test for alternatives is achieved, then the HRA will proceed to Stage 4.

Stage 4 – Assessment of Imperative Reasons of Overriding Public Interest (IROPI)

49. If it is demonstrated that there are no alternative solutions to the proposal that would have a lesser effect or avoid an adverse effect on the integrity of the site(s), then a case will be prepared that the scheme should be carried out for IROPI. The IROPI justification must relate to either:

- Human health, public safety or beneficial consequences of primary importance to the environment
- Having due regard to any opinion from the appropriate authority, any other imperative reasons of overriding public interest

50. If the conclusion of Stages 3 and 4 is that there is no alternative and that the project has demonstrated IROPI, then the Project may proceed with a requirement that appropriate compensatory measures are delivered.

3.3 Approach to Screening

51. Screening should provide the following (European Commission, 2001):

- Determine whether the project (or plan) is directly connected with or necessary for the management of Natura 2000 sites
- Describe the project (or plan) and describe and characterise any other plans or projects which, in combination, have the potential for having significant effects on Natura 2000 sites
- Identify the potential effects on Natura 2000 sites
- Assess the likely significance of any effects on Natura 2000 sites

52. HRA Screening needs to determine whether the project may have the potential for a significant effect on National Site Network sites and, therefore, if they will require an Appropriate Assessment. Judgements regarding significance should be made in relation to the qualifying interests for which the site is designated as being of international importance for and the achievement of its conservation objectives. In considering whether the project is likely to have a significant effect or has the potential for a likely significant effect (LSE) on a National Site Network site, the following precautionary approach has been adopted:

- The project has been considered 'likely' to have a significant effect if it is not possible (on the basis of objective information) to exclude the possibility that it could have significant effects on the National Site Network site or any of its qualifying features, either alone or in combination with other projects or plans
- An effect has been considered to be 'significant' in this context if it is judged that it could undermine the National Site Network site's conservation objectives. This judgement has been made in the light of factors such as the characteristics and specific environmental conditions of the National Site Network site(s) in question
- LSE is, in this context, any effect that may be reasonably predicted as a consequence of the project that may affect the conservation objectives of the features for which the site was designated, but excluding trivial or inconsequential effects. In determining significance the assessment should also take note of the Waddenzee Ruling in which the European Court of Justice (Case C-127/02) which states "...any *plan or project not directly connected with or necessary to the management of the site is to be subject to an appropriate assessment of its implications for the site in view of the site's conservation objectives if it cannot be excluded, on the basis of objective information, that it*

will have a significant effect on that site, either individually or in combination with other plans or projects" [and that a plan or project may only be authorised] "*where no reasonable scientific doubt remains as to the absence of such effects*"

- In order to undertake the HRA screening it is necessary to determine the range of likely effects that could arise as a result of the Project. This would then enable the distance and 'zone of influence' of the potential effects to be identified, within which the relevant National Site Network sites should then be considered. Therefore, an initial boundary extent has been determined on the basis of the potential range of physical disturbances and the nature of the habitats present and their ability to support species that are a designated feature of sites in the area. The fullest extent of any potential effects is estimated to be no more than 1km overland and 5km over water. In terms of potential terrestrial species that may exploit or use the site (mobile species) and assumed distance of 10km was used
- The different approaches to highly mobile species such as marine mammals and birds are described below

3.3.1 Marine mammals

53. For marine mammals, the approach to HRA screening primarily focuses on the potential for connectivity between individual marine mammals from designated populations and the offshore project area (i.e. demonstration of a clear source-pathway-receptor relationship). This is based on the distance of the Project site from the designated site(s), the range of each effect, and the potential for marine mammals from a designated site to be within range of an effect.

54. The HRA screening exercise therefore considers designated sites which meet the following criteria:

- The distance between the potential effect of the proposed Project and a designated site with marine mammals as a qualifying feature is within the range for which there could be an interaction (for example, the pathway is not too long for significant noise propagation and therefore the site is within the Zone of Influence (ZOI) for underwater noise effects)
- The distance between the proposed Project and resources on which the qualifying marine mammal feature depends (i.e. an indirect effect acting though prey or access to habitat) is within the potential ZOI (for example the pathway is not too long)
- The likelihood that a foraging area or a migratory route occurs within the ZOI of the proposed project (applies to mobile interest features when outside the designated site)

55. Designated sites that did meet these criteria have been screened out from further assessment.

56. The approach taken was informed by HRA screening reports for OWFs recently submitted to The Planning Inspectorate (PINS) (principally North Falls, Dudgeon and Sheringham Shoal Extensions, East Anglia ONE North and East Anglia TWO), along with corresponding stakeholder feedback.

57. Assessment of species-specific risk to potential effects of OWFs is informed by industry standard advice and guidance, relevant scientific papers, and representations from both applicants stakeholders during DCO examinations for OWFs.

58. Information on SACs with marine mammals as a qualifying features is taken from SAC citations/Natura 2000 forms, conservation objectives, and other relevant information as published by the relevant Statutory Nature Conservation Bodies (SNCBs). Advice on operations for Marine Protected Areas were not considered necessary for screening but will be referred to as required for appropriate assessment.

59. Distances between the Project and SAC sites were measured in GIS (the shortest straight-line distance) using shapefiles downloaded from SNCB websites.

3.3.2 Ornithology

60. Offshore ornithology receptors potentially affected by the construction, operation and decommissioning of the Project will be predominantly seabirds, defined for this report as auks, gulls, terns, gannets, skuas, shearwaters, petrels and divers. These species have the potential to be present during the breeding season and non-breeding season (including spring/autumn migration/passage periods). Other bird species that may be affected by the project include waterfowl (e.g. swans, geese, ducks and waders) and other bird species which may fly through the Project during spring and/or autumn migration/passage periods.

61. The HRA screening for offshore ornithology considers SPAs and Ramsar sites which meet at least one of the following criteria in relation to the Project (including the array areas and offshore export cable corridor to Mean Low Water Springs (MLWS) at the landfall):

    - Part of the Project overlaps directly with an SPA/Ramsar site, or is located in close proximity to the boundary such that there may be an effect on one or more qualifying species within the SPA
    - The Project is within a distance of an SPA/Ramsar site which means there could be an interaction between the Project and qualifying features of the SPA/Ramsar site (i.e. the pathway is not too long), discussed in further detail in Section 4

- For seabirds during the breeding season this is informed by published information on the mean maximum foraging ranges from breeding colonies (Woodward *et al*., 2019)
- For seabirds during the non-breeding season, Biologically Defined Minimum Population Scales (BDMPS) from Furness (2015) have been used to produce estimates of the proportion of a given SPA population which is present at the Project and a 1% criterion is used for screening
- For migratory birds other than seabirds, SPAs within 100km of the Project are considered

- The distance between the Project and resources on which the qualifying feature depends (i.e. an indirect effect acting through prey or access to habitat) is within the range for which there could be an interaction (i.e. the pathway is not too long), applying professional judgment

62. The approach taken was informed by HRA screening reports for OWFs recently submitted to The Planning Inspectorate (PINS) (principally North Falls, Dudgeon and Sheringham Shoal Extensions, East Anglia ONE North and East Anglia TWO), along with corresponding stakeholder feedback.

63. Assessment of species-specific risk to potential effects of OWFs is informed by industry standard advice and guidance, relevant scientific papers, and representations from both applicants stakeholders during DCO examinations for OWFs.

64. Information on SPAs, Ramsar sites and their qualifying features is taken from SPA citations/Natura 2000 forms, conservation objectives, departmental briefs and Ramsar site lists and Information Sheets as published by the Statutory Nature Conservation Bodies (SNCBs), including Natural England's Designated Sites View[1], NatureScot's Sitelink[2] and JNCC links to Ramsar Information Sheets[3]. Advice on operations for Marine Protected Areas were not considered necessary for screening but will be referred to as required for appropriate assessment.

65. Distances between the Project and SPAs/Ramsar sites were measured in GIS (the shortest straight-line distance) using shapefiles downloaded from SNCB websites.

66. The first 12 months of baseline survey data (July 2020 to June 2021) were available to inform this report. It is recognised that an update to this report will be required with the full 24-month baseline dataset once it is available.

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[1] https://designatedsites.naturalengland.org.uk/
[2] https://sitelink.nature.scot/home
[3] https://jncc.gov.uk/our-work/ramsar-sites/

3.3.3 Assessment of Likely Significant Effect

67. Following the identification of the distance within which to identify the National Site Network sites that should be considered in this screening, the consideration of whether the likely effects would be trivial or inconsequential (i.e. de minimis) would then be undertaken. For the purposes of this screening exercise, three categories of LSE are defined and have been utilised, as follows:

- No likely significant effect – based on the information that is currently available on the baseline environment, the activities proposed and their predicted effects, it is considered that there will be no likely significant effect with respect to the identified feature and site
- Potential for a likely significant effect – based on information available, the possibility of a likely significant effect cannot be ruled out
- Likely significant effect – based on information available it is apparent that the project activities could have an impact upon designated features and could lead to significant adverse temporary or long-term change

3.3.4 Assessment **in relation to sites' conservation objectives**

68. Judgements of likely significant effect need to be based upon assessment of potential effects on the features for which the National Site Network site was designated and taking into account their conservation objectives.

69. The conservation objectives set out what is needed to ensure Favourable Condition of the designated feature. The term 'favourable condition' is used to represent the concept of Favourable Conservation Status for the interest features of an individual SAC / SPA. Conservation objectives are used as the basis from which management measures and monitoring programmes may be developed for the designated sites. Conservation Objectives are also utilised to inform appropriate assessment under the Habitats Regulations and in this respect it is important to ensure that the assessment of potential project effects is undertaken with reference to available site objectives.

70. In order to deal with the large number of sites being assessed for LSE, a generic set of conservation objectives that typically apply to the types of features (Annex I habitats, Annex II species populations and SPA designated bird populations) have been used as a reference against which to determine whether LSE may arise. This approach also enables candidate SACs and potential SPAs, for which conservation objectives will not have been developed, to be screened. These objectives are as follows:

71. For SAC Annex I habitats and associated communities:

- Subject to natural change, maintain / restore the feature in / to favourable condition, such that the:
  - Natural environmental quality is maintained
  - Natural environmental processes are maintained
  - The extent, physical structure, diversity, community structure and typical species representative of the feature are maintained / restored

72. For SAC Annex II species populations:

- Subject to natural change, maintain in favourable condition the species feature. Favourable condition for migratory / mobile species is normally based upon ensuring that specific conditions are met. These conditions relate to maintenance of migratory passage, population size, abundance / presence of prey species and other environmental parameters (e.g. water quality) where this may affect the designated features/populations

73. For designated bird populations of SPAs / Ramsar sites:

- Overall, it can be stated that the SPA conservation objective is aimed at maintaining bird populations or the diversity of species within a defined assemblage through the protection of habitats supporting them and management against negative impacts of disturbance. In respect of favourable condition, two key attributes of bird features are applied - population size of individual species or groups of species and extent of habitats used by the birds in the site for nesting, roosting, feeding etc. Attributes relating to the maintenance of habitat quality (e.g. food availability) and preventing / managing activities that may cause disturbance to designated populations are also generally applied

3.3.5 Screening for likely significant effect (LSE)

74. Consideration of the potential impacts of development in relation to these objectives for the screened features listed (site by site) has been undertaken at a high level and the outcomes are described in subsequent sections under three categories of sites and features (see below):

- SACs that contain coastal or offshore habitat interest features and / or non-mobile species interest features and SPA / Ramsar sites containing habitats supporting bird interest features
- SACs designated for mobile species populations (e.g. migratory fish, marine mammals)
- SPAs and Ramsar sites designated for bird populations

3.3.6 Consideration of In-Combination Effect

75. The findings of this stage would then need to be considered against other projects and plans within the area of influence for the identified National Site Network sites for inclusion in the screening process. It will therefore be necessary to look for plans or projects at the following stages:

- Applications lodged but not yet determined
- Projects subject to periodic review e.g. annual licences, during the time that their renewal is under consideration
- Refusals subject to appeal procedures and not yet determined
- Projects authorised but not yet started
- Projects started but not yet completed
- Known projects that do not require external authorisation
- Proposals in adopted plans
- Proposals in finalised draft plans formally published or submitted for final consultation, examination or adoption

76. Currently there are several projects either in consenting stages or early construction within the Celtic Sea and Bristol Channel. These include:

- Erebus Floating Wind Demonstrator Project
- The Llŷr projects (floating offshore wind)
- South Pembrokeshire Demonstration Zone (floating offshore wind and wave)
- Wave Hub (floating offshore wind)
- Marine Energy Test Area (META) (tidal and wave energy)
- ORE Catapult (innovation and research centre for wind, wave and tidal energy)
- NOBEL Banks (aggregate extraction)
- Culver Extension (aggregate extraction)
- Area 470 Extension (aggregate extraction)
- North Bristol Deep (aggregate extraction)
- North Middle Ground (aggregate extraction)

77. Ongoing consultation during the EIA process will determine if there are other projects or plans with the potential for in-combination effects to be identified and considered.

4. Environmental Baseline

4.1.1 Introduction

78. The following sections describe the baseline characteristics of the study area on the basis of the information currently available.

4.1.2 Terrestrial Ecology

79. Large areas of the Project AoS (AoS) comprise urban and agricultural land interspersed with a range of habitats from mudflats, coastal sand dune, maritime cliffs and slopes, coastal and floodplain grazing marsh, semi-improved grassland, ancient woodland, lowland heathland, grass moorland, and blanket bog.

80. The following designated sites are within or overlap with the Onshore Development Area include the following:

- Braunton Burrows Special Area of Conservation (SAC)
- Trintagel-Marsland-Clovelly Coast SAC
- Bristol Channel Approaches/Dynesfeydd Mor Hafren SAC
- Hobby to Peppercombe Site of Special Scientific Interest (SSSI)
- Braunton Swanpool SSSI
- Saunton to Baggy Point Coast SSSI
- Taw-Torridge Estuary SSSI
- Braunton Burrows SSSI
- Northam Burrows SSSI
- Greenaways and Freshmarsh, Braunton SSSI
- Mill Rock SSSI
- Kenwith Valley Local Nature Reserve (LNR)
- Kynoch's Foreshore LNR
- Northam Burrows Country Park

81. There are additional designated sites that are outside the Onshore Development Area and these include:

- Lundy SAC
- Chapel Hill SSSI
- Caen Valley Bats SSSI
- Morte Point SSSI
- Fremington Quay Cliffs SSSI
- Marsland to Clovelly Coast SSSI
- Fremington LNR

82. The following protected and notable species may be present within the Onshore Development Area:

- Badgers
- Bats
- Great crested newts
- Water vole
- Otter
- Terrestrial and aquatic invertebrates
- Reptiles
- Birds (breeding and over-wintering)

4.1.3 Benthic and Intertidal Ecology

83. A review of EMODnet's EUSeaMAP (2021) broadscale predictive habitat map which uses EUNIS habitat classifications has been undertaken. This shows that the intertidal, infralittoral and shallow circalittoral area of the Project AoS are is predominantly sand, with small areas of mud and sandy mud or muddy sand. There are indications of Annex I bedrock and/or stony reef present along the coastline overlapping the Project AoS for the offshore cable corridor.

84. The EUSeaMAP (2021) shows that the subtidal environment is mainly circalittoral coarse sediment along the Project AoS, with deep circalittoral sand occurring further offshore along the Project AoS and overlapping the project boundary. There are discrete areas of mixed sediment, and rock or other hard substrate occurs around Lundy Island to the North of the Project AoS. EMODnet also shows discrete records of Annex I bedrock and/or stony reefs and Annex I sandbanks which overlap with the Project AoS for the offshore cable corridor. The sandbanks surround Lundy Island; and the Annex I bedrock and/or stony reef are present across the Project AoS in discrete locations.

85. Designated sites that are within a 10km radius of the project boundary and AoS for the Offshore Export Cable Corridor and designated to protect benthic and intertidal species or habitats are:

- Marine Conservation Zones:
  - Bideford to Foreland Point MCZ
  - Hartland Point to Tintagel MCZ
  - Morte Platform MCZ
  - South West Approaches to Bristol Channel MCZ
  - North West of Lundy MCZ

- Special Areas of Conservation:
  - Braunton Burrows SAC
  - Tintagel-Marsland-Clovelly Coast SAC
  - Lundy SAC
- Sites of Special Scientific Interest:
  - Saunton to Baggy Point Coast SSSI
  - Braunton Burrows SSSI
  - Taw-Torridge Estuary SSSI
  - Northam Burrows SSSI
  - Hobby to Peppercombe SSSI
  - Morte Point SSSI
  - Marsland to Clovelly Coast SSSI
  - Lundy SSSI

86. Further information on the designated sites with benthic or intertidal designated features can be found within Table 2.9 of the EIA Scoping Report.

4.1.4 Marine Mammals

87. Initial assessments of the distribution of marine mammals throughout the Irish Sea and Southwest England waters have identified three marine mammal species listed under Annex II that occur throughout the region and throughout the Project site and surrounding area. These include:

- Harbour porpoise (*Phocoena phocoena*)
- Bottlenose dolphin (*Tursiops truncates*)
- Grey seal (Halichoerus grypus)

88. Harbour seal (*Phoca vitulina*) have very little to no presence recorded in the Southwest and Wales Management Units (MU) (SCOS, 2020; Carter *et al.*, 2020), and no harbour seal were recorded within the first year of site-specific aerial surveys.

89. The typical and average foraging range for harbour seal is 50km to 80km (SCOS, 2017). Tracking studies have shown that harbour seals travel 50km to 100km offshore and can travel 200km between haul-out sites (Lowry *et al.*, 2001; Sharples *et al.*, 2012). The range of these trips varies depending on the location and surrounding marine habitat.

90. There are no designated sites where harbour seal is a listed feature within foraging distance of the Project site. As such, harbour seal has been screened out of further assessment within the HRA.

Harbour porpoise

91. In the Irish Sea, the harbour porpoise is the most commonly observed odontocete. Harbour porpoise are widely distributed throughout the Celtic and Irish Seas during most months of the year (Reid *et al.,* 2003; Mackey *et al.,* 2004; Baines and Evans, 2012; Hammond *et al.,* 2013, 2017, 2021; Rogan *et al.,* 2018).

92. Harbour porpoise within the eastern North Atlantic are generally considered to be part of a continuous biological population that extends from the French coastline of the Bay of Biscay to northern Norway and Iceland (Tolley and Rosel, 2006; Fontaine *et al.,* 2007, 2014; IAMMWG, 2015, 2021). However, for conservation and management purposes, it is necessary to consider this population as smaller MUs. MUs provide an indication of the spatial scales at which effects of plans and projects alone, and in combination, need to be assessed for the key cetacean species (IAMMWG, 2015, 2021).

93. The Project area is located in the Celtic and Irish Seas (CIS) MU, which has an estimated harbour porpoise abundance of 62,517 (IAMMWG, 2021), based on the Small Cetaceans in the European Atlantic and North Sea (SCANS)-III survey (Hammond *et al*., 2021) and aerial surveys of cetaceans and seabirds in Irish waters (Rogan, *et al*., 2018). The CIS MU for harbour porpoise is shown in Figure 4.1.

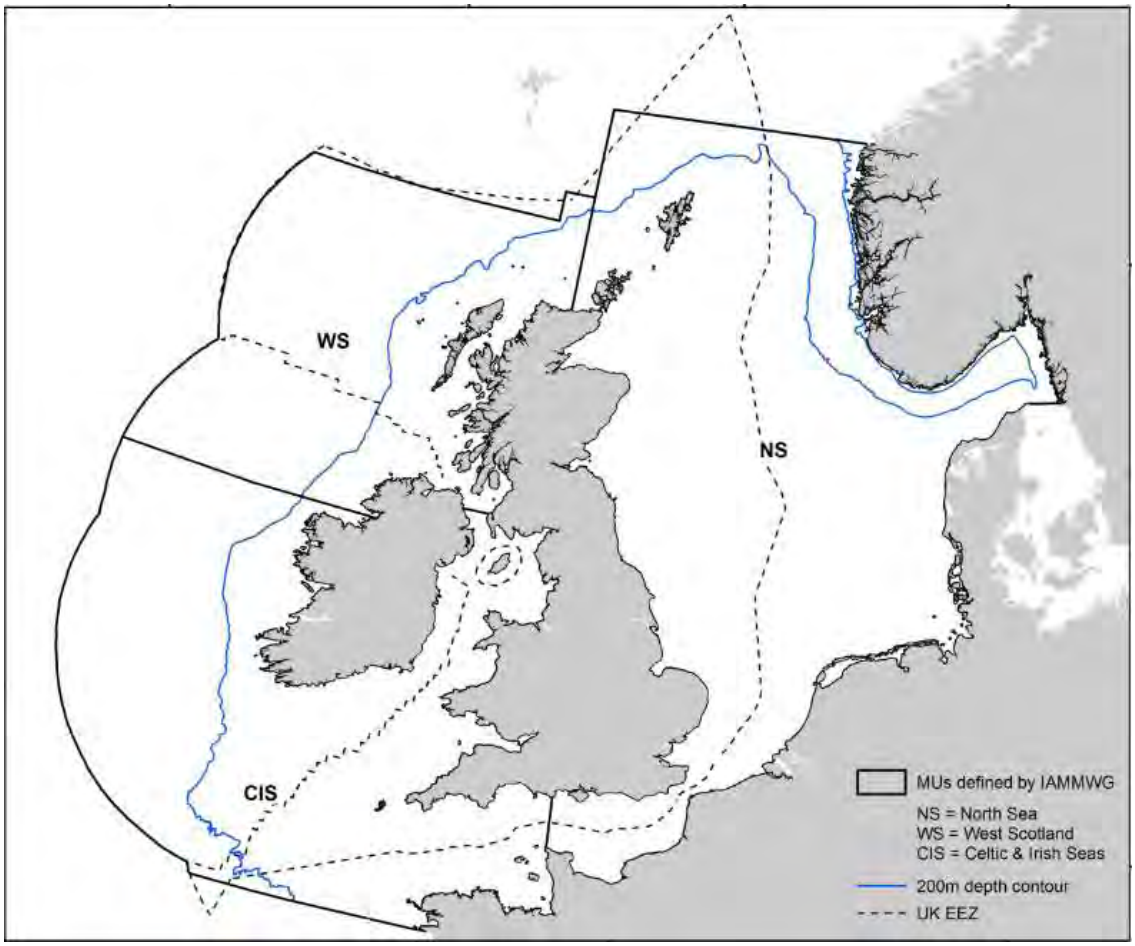
94. SCANS-III, a large-scale survey for cetaceans across European waters, was undertaken in the summer of 2016, and included areas from the Strait of Gibraltar in the south to 62°N in the north and extending west to the 200 nautical miles (nm) limits of all EU Member States (Hammond *et al.,* 2021). For the entire SCANS-III survey area, harbour porpoise abundance in the summer of 2016 was estimated to be 424,245 with an overall estimated density of 0.351/ km^2 (Coefficient of Variation CV = 0.172; 95% Confidence Interval (CI) CI = 313,151 - 596,827; Hammond *et al*., 2021).

95. The SCANS-III survey estimated that the abundance of harbour porpoise in survey Block D, which is located in the Irish Sea and includes the proposed survey area, was 5,734 individuals and the density was estimated to be 0.118 harbour porpoise per km^2, with a mean group size of 1.35 (CV = 0.489; 95% CI = 1,697– 12,452; Hammond *et al*., 2021).

Bottlenose dolphin

96. In the Irish Sea, bottlenose dolphin have a predominantly coastal distribution, with higher concentrations off west Wales (particularly Cardigan Bay) and off the coast of County Wexford in southeast Ireland. They are also regularly sighted in summer off the Galloway coast of southwest Scotland and around the Isle of Man (Hammond *et al.,* 2005, Baines and Evans, 2012; DECC, 2016).

Figure 4.1 The MU for harbour porpoise (Celtic and Irish Sea MU). (IAMWWG, 2021)



97. A number of inshore groups of bottlenose dolphin have been identified in UK and Irish waters and there appears to be limited interchange between these groups (Robinson *et al*., 2012; Cheney *et al*., 2013; ICES, 2014; IAMMWG, 2015).

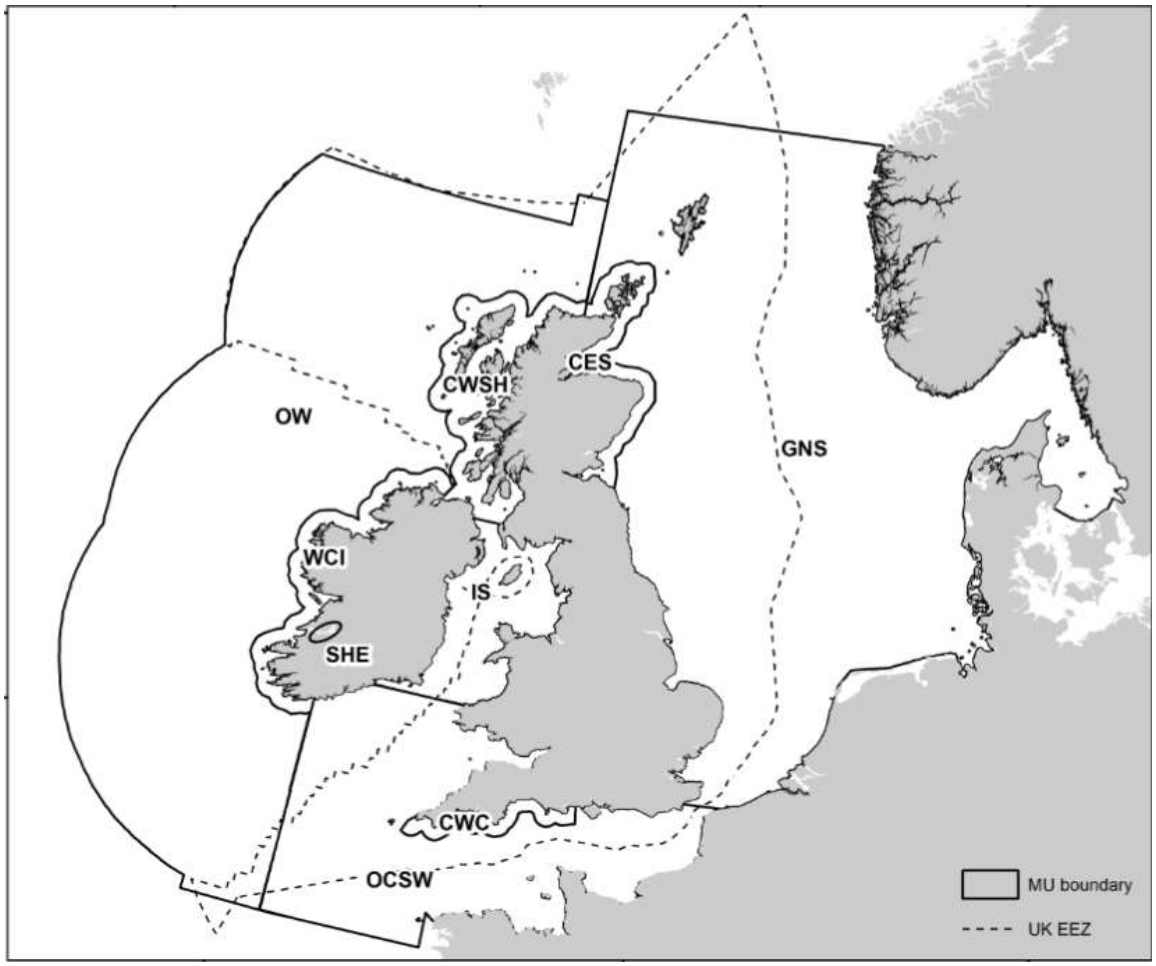
98. The Project site is located in the Offshore Channel and SW England (OCSW) MU (see Figure 4.2), which has an estimated bottlenose dolphin abundance of 10,947 (CV = 0.25; 95% CI = 1,974 – 7,572; IAMMWG, 2021). The Project also borders the Irish Sea MU which has an estimated bottlenose dolphin abundance of 293 (CV = 0.54; 95% CI = 70 – 492; IAMMWG, 2021).

99. For the entire SCANS-III survey area, bottlenose dolphin abundance in the summer of 2016 was estimated to be 19,201 with an overall estimated density of 0.016/ km^2 (CV = 0.242; 95% CI = 11,404 – 29,670; Hammond *et al*., 2021).

100. The SCANS-III survey estimated that the abundance of bottlenose dolphin in survey block D, which is located in the Irish Sea and includes the proposed survey area, was 2,938 individuals and the density was estimated to be 0.060 bottlenose dolphin

per km^2, with a mean group size of 2.60 (CV = 0.447; 95% CI = 914 - 5,867; Hammond *et al.*, 2021).

Figure 4.2 The MUs for bottlenose dolphin (Offshore Channel, Celtic Sea, & South West England, and Irish Sea MU). (IAMWWG, 2021)

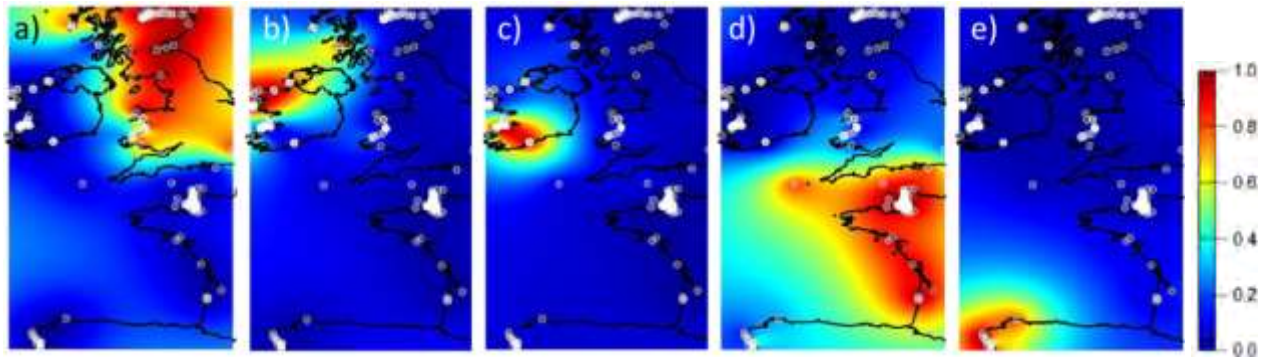


101. The results of genetic analysis (Nykänen *et al.,* 2019) has revealed that there are five clusters of genetically distinct coastal bottlenose dolphin populations in the UK and the north of continental Europe (Figure 4.3). There is the potential for individuals within the Project AoS to be from two of those cluster: east and west Scotland, and English Channel.

Grey seal

102. Grey seals only occur in the North Atlantic, Barents and Baltic Sea with their main concentrations on the east coast of Canada and United States of America and in north-west Europe (Special Committee on Seals (SCOS), 2019). Grey seals are present year-round on both the Irish and Welsh coasts and are known to move between the two, for example between the southeast coast of Ireland and the southwest coast of Wales (Kiely *et al.,* 2000).

Figure 4.3 Maps of individual assignment probabilities per population [scale bar indicates the assignment probabilities: (a) east and west Scotland, Wales and Galicia; (b) west Ireland; (c) Shannon estuary, Ireland; and (d) English Channel, France]



103. Grey seals are wide ranging and can breed and forage in different areas (Russell *et al.*, 2013). They generally travel between known foraging areas and back to the same haul-out site but will occasionally move to a new site. For example, movements have been recorded between haul-out sites on the east coast of England and the Outer Hebrides (SCOS, 2018), and tags deployed on grey seals at Donna Nook and Blakeney Point in May 2015 indicated that they used multiple haul-outs sites; with one hauling out in the Netherlands and one in Northern France (Russell, 2016).

104. Marine Scotland commissioned Sea Mammal Research Unit (SMRU) to produce maps of grey seal distribution (Russell *et al.*, 2017). These maps were produced by combining information about the movement patterns of electronically tagged seals with survey counts of seals at haul-out sites. The resulting maps show estimates of mean seal usage (seals per 5km x 5km grid cell). The maps indicate relatively higher usage in some areas of the Celtic and Irish Sea along coastal locations of Ireland, Wales and Cornwall, for example, the waters surrounding Lundy Island in the Bristol Channel and Llŷn Peninsula and West Hoyle Bank in Wales, as well as the south-east tip (Saltee Islands) of Ireland.

105. The Project site is located in the Southwest England which has August counts of grey seals of 500 seals for 2016-2019 period; monitoring of seals in this MU is primarily conducted by Cornwall Seal Group Research Trust (CSGRT) and the Lundy Company. The main breeding colony in Devon is on Lundy (43 pups in 2019; Jones, 2020), with only a few (5; Sayer and Witt, 2017) recorded on the mainland. The Project site also borders the Wales MU which is split into two areas: North Wales (Dee Estuary- Aberystwyth) and West Wales (Aberystwyth - Caldey Island). There are no or very few grey seals in south Wales (Caldey Island – Bristol Channel) (SCOS, 2020). The Wales MU has an August counts of grey seals 900 seals for recent count of 2016-2019 period (SCOS, 2020).

106. Grey seals will typically forage in the open sea and return regularly to land to haul-out, although they may frequently travel up to 100km between haul-out sites. Foraging trips generally occur within 100km of their haul-out sites, although grey seal can travel up to several hundred kilometres offshore to forage (SCOS, 2020).

107. The CSGRT has been undertaking a long-term research programme on grey seal in the south-west of the UK, to better understand their movements and abundances in the region (Sayer *et al*., 2018). A Photo-ID catalogue was developed to locate and monitor the movements of individual seals over time. Photos of seals at 54 haul-out sites between south-west Wales and Britany (France), between 2004 and 2014, were analysed. The results of this movement analysis is shown in Figure 4.4, which also shows the haul-out sites. Relevant to the Project site are grey seal movements between Pembrokeshire Marine SAC and north Cornwall, Lundy SAC, and north Devon. There are also extensive movements of grey seal from the north Devon coast, west to north Cornwall and Land's End (Sayer *et al*., 2018).

4.1.5 Offshore Ornithology

108. The offshore ornithology baseline will be largely informed through a programme of 24 monthly aerial digital surveys of the study area. This is being undertaken by APEM Ltd. Surveys commenced in July 2020 and will be completed in June 2022. A single survey comprised of nine transects. Survey data for July 2020 to June 2021 (i.e. 12 surveys) was available at the time of writing. It is proposed to review the second year of survey data once it has been collected and update this screening report as required.

109. In total, 12 offshore ornithology receptors were identified to species level. These are presented in Table 4.1, along with the published biologically relevant seasons for each species. These were taken from Furness (2015).

110. At the time of writing, data from 12 surveys (July 2020 to June 2021) was available and has been analysed to provide design-based density estimates. In total, 12 offshore ornithology receptors were identified to species level. The following paragraphs summarise the findings of the July 2020 to June 2021 surveys across the study area (i.e. the Project plus 4km buffer) for receptors identified to species level. The final assessment will undertake a systematic and thorough review of all survey findings to inform the baseline, including consideration of densities within the Project itself, and apportioning of seabirds (particularly during the HRA) to particular breeding and non-breeding populations using the best available methodologies and evidence.

Figure 4.4 Photo-ID connections of grey seal in south-west UK (Sayer et al., 2018)

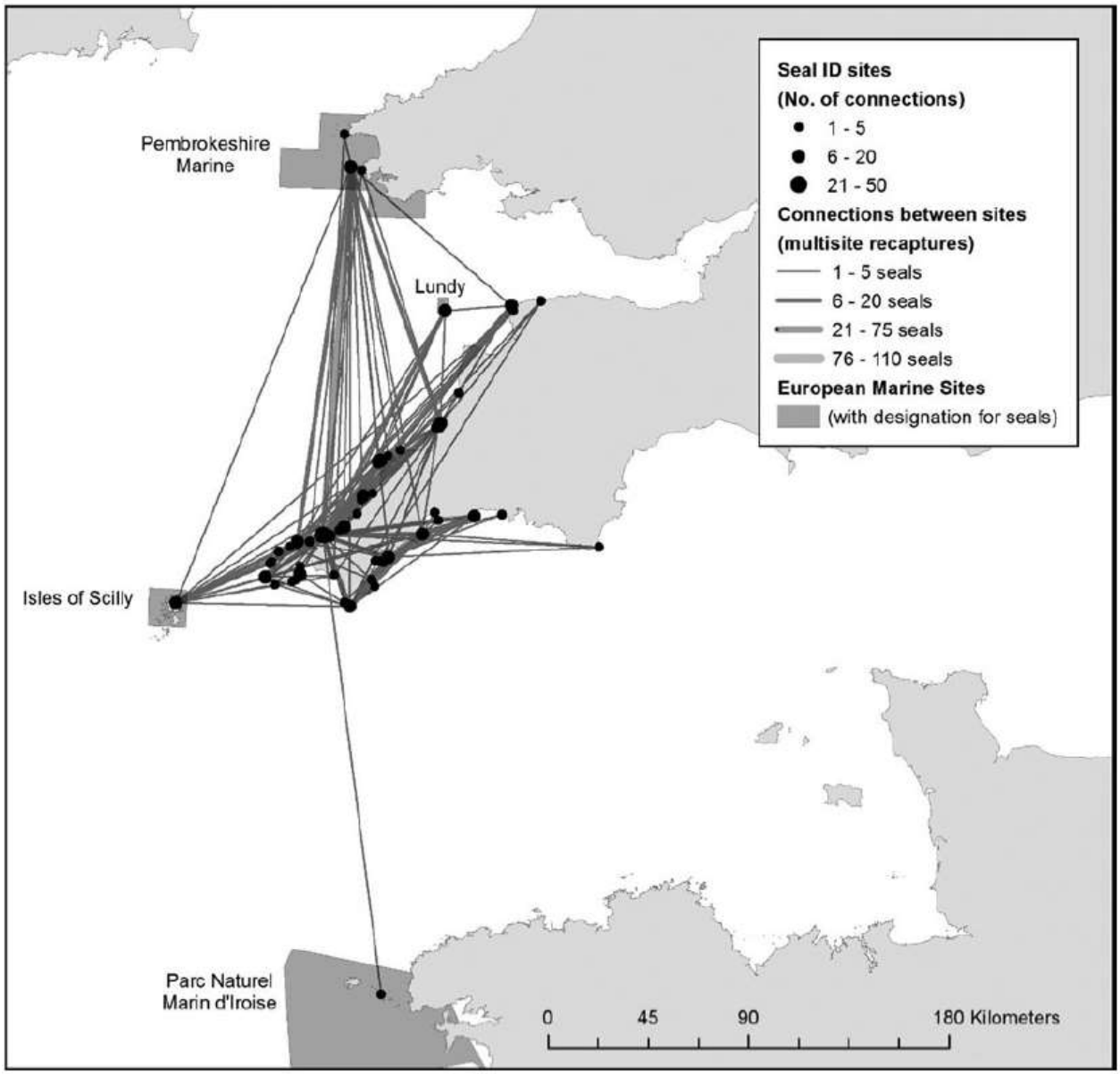


Table 4.1 Offshore ornithology receptors identified to species level during July 2020 to June 2021 baseline surveys

Species	Season*				
	Full breeding	Migration free breeding	Autumn migration	Winter / non-breeding	Spring migration
Common tern	May - Aug	Jun - mid Jul	Late Jul - early Sep	n/a	Apr - May
Fulmar	Jan - Aug	Apr - Aug	Sep - Oct	Nov	Dec - Mar

Species	Season*				
	Full breeding	Migration free breeding	Autumn migration	Winter / non-breeding	Spring migration
Gannet	Mar - Sep	Apr - Aug	Sep - Nov	n/a	Dec - Mar
Great black-backed gull	Late Mar - Aug	n/a	n/a	Sep - Mar	n/a
Guillemot	Mar - Jul	n/a	n/a	Aug - Feb	n/a
Herring gull	Mar - Aug	n/a	n/a	Sep - Feb	n/a
Kittiwake	Mar - Aug	May - Jul	Aug - Dec	n/a	Jan - Apr
Lesser black-backed gull	Apr - Aug	May - Jul	Aug - Oct	Nov – Feb	Mar - Apr
Manx shearwater	Apr - Aug	Jun - Jul	Aug - early Oct	n/a	Late Mar - May
Puffin	Apr - early Aug	n/a	n/a	Mid Aug - Mar	n/a
Razorbill	Apr - Jul	Apr - Jun	Aug - Oct	Nov - Dec	Jan - Mar
Sandwich tern	Apr - Aug	Jun	Jul - Sep	n/a	Mar - May
Note: Seasons within which species were recorded are coloured in red					

111. One of the most abundant species groups at certain times of year was shearwaters. Birds were recorded in July and August 2020, and March to June 2021. Almost all of these birds were Manx shearwaters, which breed at Skomer, Skokholm and the Seas off Pembrokeshire SPA, located 33km to the west-northwest of the Project site, or Lundy, located situated over 42.5km from the Project site (though the Project AoS runs 1km from the Lundy SAC). Based on the respective population sizes (349,663 pairs at Skokholm in 2018, and 5,505 pairs at Lundy in 2017), and at-sea distributions from a multi-colony tracking study (Dean *et al.*, 2015), it is anticipated that the majority of birds recorded will originate from Skomer, Skokholm and the Seas off Pembrokeshire SPA, of which Manx shearwater is a qualifying feature. Study area densities during the breeding season (April to August (Furness, 2015) ranged from 10 birds per km^2 to 100 birds per km^2, and were <5 birds per km^2 in September and March, which are months when migration is occurring. During the migration periods (August to early October and late March to May (Furness, 2015)), birds recorded belong to the UK Western Waters plus Channel Biologically Defined Minimum Population Scales (BDMPS).

112. Auks (i.e. guillemots, razorbills and puffins) were recorded on each of the 12 surveys for which data were available. Peak guillemot densities (21 birds per km^2) were recorded across the study area in May 2021, though outside this survey, breeding season (March to August (Furness, 2015)), densities were lower; between 0 and 3 birds per km^2. This species breeds in similar numbers (circa 2,000-3,000 pairs) at Lundy (situated over 42.5km from the Project site, though the Project AoS runs 1km from the Lundy SAC) and Skomer, Skokholm and the Seas off Pembrokeshire SPA (located 33km to the west-northwest of the Project site), though it is not a qualifying feature. Modelled at-sea breeding season distribution for this species indicates that generally speaking the study area is unimportant for this species at this time of year, since it lies outside the 95% utilisation distribution (Cleasby *et al.*, 2018; Wakefield *et al.*, 2017), though clearly, relatively high densities in the study area are possible.

113. During the non-breeding season (September to February (Furness, 2015)), guillemot densities were <5 birds per km^2; birds recorded in the study area at this time of year form part of the UK Western Waters BDMPS (Furness, 2015), which the study area is within.

114. Razorbills were recorded at lower densities across the study area, with a clear peak during the non-breeding season (August to March (Furness, 2015)) in December 2020 and January 2021 of 2 to 2.5 birds per km^2. These birds belong to the UK Western Waters BDMPS (Furness, 2015). During the breeding season (April to July (Furness, 2015)), study area densities were low; <0.2 birds per km^2. It is possible that these birds were associated with colonies at Skomer, Skokholm and the Seas off Pembrokeshire SPA, or smaller colonies located on the north Cornwall coast. As per guillemot, modelled at-sea breeding season distribution for this species indicates that generally speaking the study area is unimportant for this species at this time of year, since it lies outside the 95% utilisation distribution (Cleasby *et al.*, 2018; Wakefield *et al.*, 2017).

115. Puffin densities within the study area were also low; maximum recorded densities were 0.3 birds per km^2 during the non-breeding season (mid-August to March (Furness, 2015)) in November 2020, and 0.13 birds per km^2 during the breeding season (April to early August (Furness, 2015)) in May 2021. During the non-breeding season, birds present belong to the UK Western Waters BDMPS (Furness, 2015). During the breeding season, birds are likely to originate from Lundy, where 375 individuals were recorded during the 2017 breeding season.

116. Gannets were encountered on all 12 surveys for which information was available. Peak densities were recorded during the breeding season (March to September (Furness, 2015)), with up to 3 birds per km^2 recorded across the study area. Outside the breeding season, densities fell to below 1 bird per km^2. Birds recorded during the breeding season will likely have been associated with the Grassholm SPA, for

which gannet is a qualifying feature. This is based on modelled at-sea breeding season distribution (Wakefield *et al*., 2013), as well as the relative proximity of known breeding colonies to the study area. Outside the breeding season, birds will belong to the UK Western Waters BDMPS (Furness, 2015).

117. Kittiwakes occurred in peak density in the early part of their spring migration (January 2021; 6 birds per km^2). Birds present during the non-breeding season (September to February (Furness, 2015)) form part of the UK Western waters plus Channel BDMPS (Furness, 2015). Peak kittiwake densities were substantially lower during the breeding season (March to August (Furness, 2015)), with a peak of 0.6 birds per km^2 in March 2021). This indicates that the study area is of limited importance for this species during the breeding season, which is supported by modelled at-sea breeding season distribution of this species showing that parts of the study area fall within the 95% utilisation distribution, but not within hotspot areas (Cleasby et al., 2018; Wakefield *et al*., 2017).

118. Herring gull were recorded in peak densities of 0.69 birds per km^2 during the breeding season (March to August (Furness, 2015)) in June 2021, and 0.52 birds per km^2 during the non-breeding season (September to February (Furness, 2015)) in December 2020. During the breeding season, birds may have originated from a number of colonies including Lundy, smaller colonies on the north Devon and Cornwall coast, or the Skomer, Skokholm and the Seas off Pembrokeshire SPA. Herring gull is not a qualifying feature of this SPA. During the non-breeding season, birds recorded in the study area belong to the UK Western Waters BDMPS (Furness, 2015).

119. Two other gulls species were recorded in the study area during the breeding and non-breeding seasons at low density during the first year of baseline surveys:

- Great black-backed gull were present at densities of 0.1 birds per km^2 during the breeding season (late March to August (Furness, 2015)) in June 2021, and 0.4 birds per km^2 during the non-breeding season (September to March (Furness, 2015)) in December 2020
- Lesser black-backed gull were recorded at peak densities of 0.07 birds per km^2 during the breeding season (April to August (Furness, 2015)) in May 2021, and 0.4 birds per km^2 during the non-breeding season (September to March (Furness, 2015)) in December 2020. No lesser black-backed gulls were recorded within the Project itself; all records were located within the 4km buffer

120. Fulmars were recorded in the study area in seven of the 12 monthly surveys for which data were available, encompassing both breeding (January to August) and non-breeding (September to December) periods for this species (Furness, 2015). Densities were generally low; around 0.2 birds/km^2 or less for all months except one. During this month (December 2020), the density was 1.83 birds/km^2.

121. Sandwich tern and common tern were both recorded in the study area on a single occasion during the first 12 baseline surveys. The Sandwich tern record consisted of a single bird (density of 0.02 birds/km^2) recorded in September (autumn passage; (Furness, 2015)), whilst the common tern record consisted of four individuals and occurred in August (density of 0.09 birds/km^2. Whilst this is within the full breeding season for common tern, it also falls within the autumn passage period (Furness, 2015).

122. In addition to the offshore ornithology receptors identified to species level and reported above, a further nine species groups were identified. These were common or Arctic ("commic") tern, auk or shearwater, auk, black-backed gull, large gull, shearwater, small gull, storm-petrel and tern.

4.1.6 Migratory Fish

123. The variable seabed conditions across the southwest coast of England and Wales support a number of ecologically important fish and shellfish species. The Project area overlaps or is in close proximity to a number of fish spawning and nursery grounds for sandeel, sole (*Solea solea*), plaice (*Pleuronectes plattessa*), cod (*Gadhus morhua*), whiting (*Merlangius merlangus*), mackerel (*Scomber scombrus*), and ling (*Molva molva*). It is noted that herring spawning grounds, while not overlapping the Project site, are in the vicinity to the southwest of the Project (Coull *et al*. 1998). The wider Celtic Sea area also supports populations of elasmobranchs (sharks, skates and rays), including basking sharks and thornback ray.

124. The Devon and North Cornwall coast is a historically important nursery ground for juvenile edible crabs (Pawson and Robson, 1996). Alongside edible crab (*Cancer pagurus*), lobster (*Homarus gammarus*), and spider crabs (*Maja squinado*) are found along most of the exposed or rocky shorelines of the region. Spiny lobster (*Palinurus elephas*) has been recorded around Lundy and the adults are likely to be associated with rocky and stony seabed habitats. Brown shrimp (*Crangon crangon*) are found in the area but are more common in sandier estuaries.

125. Mussels (*Mytilus edulis*) occur from the mid-shore to the sub-tidal zone on all areas exposed to currents along the costs of the region, attaching themselves to bedrock, sand, gravel or pebble substrata. Exploitable populations of mussel are recorded in the Taw-Torridge estuary (Pawson and Robson, 1996). Ocean quahog (*Arctica islandica*) may occur in the Project area; however, densities of the bivalve are much lower on the Devon and north Cornwall coast compared to the south Cornwall coast (Pawson and Robson, 1996). Cuttlefish (*Sepia officinalis*) are largely concentrated in the centre of the western channel over winter and move into coastal areas of the region to spawn during spring/summer. Squid are also found offshore seasonally

moving into the coastal waters of the region to spawn during the spring (Pawson and Robson, 1996).

126. UK and European marine waters have been designated for or support populations of the following Annex II fish species:

- twaite shad (*Alosa fallax*)
- allis shad (*Alosa*)
- Atlantic salmon (*Salmo salar*)
- sea lamprey (Petromyzon marinus)
- river lamprey (Lampetra fluviatilis)

127. Atlantic salmon have a widespread distribution in UK coastal seas and are present in the rivers which drain into the Bristol channel (Aprahamian and Robson, 1996). The Taw-Torridge estuary is also a known salmon and river (Environment Agency, 2019). The Bristol Channel and Severn Estuary also contain the only viable population of allis shad and twaite shad in UK waters, in addition to populations of river lamprey and sea lamprey (Aprahamian and Robson, 1996). However, it is noted that the only recent record of spawning allis shad was in the Tamar Estuary but rivers in the Severn catchment may no longer support viable breeding populations (Carstairs, 2000). It is possible therefore that these Annex II fish species may be present in the Project area. The remaining Annex II fish species (brook lamprey, spined loach, bullhead) are not expected to be present in the Project area.

128. European eel (*Anguilla anguilla*) have a widespread distribution in UK coastal seas and are present in the rivers which drain into the Bristol channel (Aprahamian and Robson, 1996). Although European eel are not designated under the Habitats Directive, they are protected species under the Ramsar Convention and European eel are therefore being considered within this HRA screening.

129. Sites designated for Annex II diadromous fish comprise estuaries, through which fish migrate and the freshwater reaches of rivers, which provide spawning grounds. There are no SACs designated for Annex II species surrounding the Project or within a 10km radius of the Project AoS. However, as there have been Annex II fish species recorded in the Bristol Channel and Severn Estuary, and the Taw-Torridge estuary which overlaps the site there is potentially for those migratory fish species to overlap with the Project. These species include Atlantic salmon, allis shad, twaite shad, river lamprey and sea lamprey.

5. Consideration of Likely Significant Effect (LSE)

5.1 Introduction

130. The following sub-sections present the consideration of LSE on the National Site Network sites, within the zones of influence of the Project, on the various habitats and species as described in Section 3.3.

5.2 Annex I Habitats (and associated designated floral or faunal species)

131. Table 5.1 presents the National Site Network sites that are located within the Project AoS and a buffer zone of 10km offshore and 2km onshore, along with the designated features.

Table 5.1 National Site Network sites designated for Annex I habitat features (and Annex II species that are a designated feature of the site)

Designated site	Distance from Project	Designated features
Braunton Burrows SAC	0km. Overlaps the AoS for the offshore export cable corridor	2120 "Shifting dunes along the shoreline with *Ammophila arenaria* (""white dunes"")"; 2130 "Fixed coastal dunes with herbaceous vegetation (""grey dunes"")"; 2170 Dunes with *Salix repens* ssp. *argentea Salicion arenariae*; 2190 Humid dune slacks; 1140 Mudflats and sandflats not covered by seawater at low tide; 1395 Petalwort.
Tintagel-Marsland-Clovelly Coast SAC	0km. Overlaps the AoS for the offshore export cable corridor	1230 Vegetated sea cliffs of the Atlantic and Baltic Coasts; 91A0 Old sessile oak woods with Ilex and Blechnum in the British Isles; 4030 European dry heaths.
Lundy SAC	1km from AoS for the offshore export cable corridor	1170 Reefs; 1110 Sandbanks which are slightly covered by sea water all the time; 8330 Submerged or partially submerged sea caves; 1364 Grey seal (*Halichoerus grypus*).

5.2.1 Braunton Burrows SAC

Direct Habitat Loss

132. The Project AoS covers Braunton Burrows SAC. Any cable route or landfall within or through the SAC could result in presence of manmade structures (such as extant manhole covers) and therefore direct loss of habitat features (depending on location within the site) for which the site is designated. No structures are expected to be standing above the seabed thus limiting the potential for loss of or alteration to habitat in the nearshore during the operation phase. However, at this stage there is uncertainty over the potential exposure of buried cable during the lifetime of the project and consequently at this stage a potential remains for exposure of cable to occur and thus resulting loss of habitat. As such a likely significant effect could arise, therefore this site is screened in for this impact during operation on all of the designated features of the site.

Disturbance to Habitats

133. The Project AoS covers Braunton Burrows SAC. Any cable route or landfall within the SAC could result in disturbance and/or alteration to the habitats during construction, operation, and decommissioning phases, which could impact on the extent, physical structure, diversity, community structure and typical species representative of the habitat features for which the site is designated. As such a likely significant effect could arise, therefore this site is screened in for this impact during construction and operation on all of the designated features of the site.

Alteration to Habitats

134. The presence of construction (and decommissioning) infrastructure (such as jack-up barges, vessels and cable installation works) has the potential to result in temporary localised (i.e. within a few tens of metres) influences on the hydrodynamic regime. Whilst localised these influences could extend into the SAC and impact on the mudflat, sandflat, and shoreline dune habitats. This could impact on the extent, physical structure, diversity, community structure and typical species representative of these habitats. As such a likely significant effect could arise, therefore this site is screened in for this impact on these designated features of the site.

135. Whilst no structures are expected to be standing above the seabed within the SAC during operation, exposure of cable could result in further hydrodynamic change, which though localised could impact on or extend into the SAC and impact on the mudflat, sandflat, and over time the shoreline dune habitats. This could impact on the extent, physical structure, diversity, community structure and typical species representative of these habitats. As such a potential likely significant effect could arise, therefore this site is screened in for this impact on these designated features of the site.

136. Installation of the export cable (and any seabed disturbance works during decommissioning) will disturb the seabed and lead to an increase in suspended sediment concentrations in the water column. The scale of this disturbance will vary depending on the substrate and scale of the activity. However, this could result in changes within the mudflat and sandflat habitat in the nearshore. This could impact on the extent, physical structure, diversity, community structure and typical species representative of these habitats. As such a likely significant effect could arise, therefore this site is screened in for this impact on these designated features of the site.

137. During the operation phase, exposure of the cable and subsequent hydrodynamic change could result in localised increase in the re-suspension of sediments in the water column. Whilst the scale of this disturbance will vary depending on the substrate and scale of the erosion this could result in changes within the mudflat and sandflat habitat in the nearshore. This could impact on the extent, physical structure, diversity, community structure and typical species representative of these habitats. As such a potential likely significant effect could arise, therefore this site is screened in for this impact on these designated features of the site.

138. The construction process has the potential to result in the re-suspension into the water column of contaminated sediments or the release of chemicals used during the construction process. These could impact directly or indirectly on the habitats and result in changes to the extent, physical structure, diversity, community structure and typical species representative of these habitats for which the site is designated. As such a likely significant effect could arise, therefore this site is screened in for this impact on all of the designated features of the site.

5.2.2 Tintagel-Marsland-Clovelly Coast SAC

Direct Habitat Loss

139. The Project AoS covers part of the Tintagel-Marsland-Clovelly Coast SAC. Any cable route or landfall within or through the SAC could result in presence of manmade structures (such as extant manhole covers) and therefore direct loss of habitat features (depending on location within the site) for which the site is designated. As such a likely significant effect would arise, therefore this site is screened in for this impact on all of the designated features of the site.

Disturbance to Habitats

140. The Project AoS covers part of the Tintagel-Marsland-Clovelly Coast SAC. Any cable route or landfall within the SAC could result in disturbance and/or alteration to the habitats during construction and decommissioning, which could impact on the extent, physical structure, diversity, community structure and typical species representative of the habitat features for which the site is designated. As such a

likely significant effect could arise, therefore this site is screened in for this impact on all of the designated features of the site.

141. No disturbance activities will occur along the cable route in the operation phase as the cable will be buried, therefore no impact could occur on the habitats for which the site is designated. Therefore the site is screened out for operational disturbance to all of the designated features of the site.

Alteration to Habitats

142. There is a risk of accidental or incidental discharges of liquids or solids within the site during construction and decommissioning if the cable route and landfall occur within or adjacent to the site. These discharges could affect flora and fauna associated with the designated features of the site, resulting in the potential alteration to the extent, physical structure, diversity, community structure and typical species representative of these habitats. As such a potential likely significant effect could arise, therefore this site is screened in for this impact on all of the designated features of the site.

143. There are no identified activities that could result in the risk of accidental or incidental discharges of liquids or solids within the site during operation, and no impact could occur on the habitats for which the site is designated. Therefore the site is screened out for operational pollutant discharges to all of the designated features of the site.

144. The construction and decommissioning activities could result in changes to landform which could impact on drainage and surface water flow, resulting in the potential alteration to the extent, physical structure, diversity, community structure and typical species representative of these habitats. As such a potential likely significant effect could arise, therefore this site is screened in for this impact on all of the designated features of the site.

145. Ground disturbance during construction and (less so for) decommissioning could result in the remobilisation of contaminated sediments. Whilst unlikely within the site the potential remains as no evidence of absence has been identified. Re-mobilised contaminants could affect flora and fauna associated with the designated features of the site, resulting in the potential alteration to the extent, physical structure, diversity, community structure and typical species representative of these habitats. As such a potential likely significant effect could arise, therefore this site is screened in for this impact on all of the designated features of the site.

5.2.3 Lundy SAC

146. Grey seal are considered in Section 5.3, therefore this section considers the reefs, sandbanks which are slightly covered by sea water all the time, and submerged or partially submerged sea caves habitats and associated communities.

Direct Habitat Loss

147. The Project AoS is 1km from the site boundary. There will be no cable route or activity within or through the SAC therefore no habitat loss will occur for any of the designated features for which the site is designated. As such the site is screened out for construction operation, or decommissioning related habitat loss to all of the designated features of the site.

Disturbance to Habitats

148. The Project AoS is 1km from the site boundary. There will be no cable route or activity within or through the SAC therefore no direct or indirect physical disturbance to habitats will occur for any of the designated features for which the site is designated. As such the site is screened out for construction, operation, or decommissioning related habitat disturbance to all of the designated features of the site.

Alteration to Habitats

149. The presence of construction (and decommissioning) infrastructure (such as jack-up barges, vessels and cable installation works) has the potential to result in temporary localised (i.e. within a few tens of metres) influences on the hydrodynamic regime. It is not likely given the highly localised scale of these influences that an impact could extend into the SAC 1km away (as a minimum) and impact on the habitat features for which the site is designated. As such the site is screened out for alteration to habitat from hydrodynamic change during construction or during and after decommissioning for all of the designated features of the site.

150. Whilst no structures are expected to be standing above the seabed, exposure of cable or rock protection (or other forms of protection) could result in hydrodynamic change, which though localised could potentially extend into the SAC and impact on the habitats for which the site is designated. This could impact on the extent, physical structure, diversity, community structure and typical species representative of these habitats. As such a potential likely significant effect could arise, therefore this site is screened in for this impact on these designated features of the site.

151. Installation of the export cable, or any seabed disturbance during decommissioning, will disturb the seabed and lead to an increase in suspended sediment concentrations in the water column. The scale of this disturbance will vary depending on the substrate and scale of the activity, and thus whether they will

extend into the SAC. However, this could result in changes within the habitats for which the site is designated. This could impact on the extent, physical structure, diversity, community structure and typical species representative of these habitats. As such a likely significant effect could arise, therefore this site is screened in for this impact on all of the designated features of the site.

152. During the operation phase, exposure of the cable or presence of rock armour or other forms of cable protection could result in hydrodynamic change and subsequent localised increase in the re-suspension of sediments in the water column. Whilst the scale of this disturbance will vary depending on the substrate and scale of the erosion this could extend into and result in changes within the habitats for which the site is designated. This could impact on the extent, physical structure, diversity, community structure and typical species representative of these habitats. As such a potential likely significant effect could arise, therefore this site is screened in for this impact on these designated features of the site.

153. The construction and decommissioning process have the potential to result in the re-suspension into the water column of contaminated sediments or the release of chemicals used during the construction process. These could extend into and impact indirectly (where they are driven across the site by tidal currents and waves) on the habitats for which the site is designated and result in changes to the extent, physical structure, diversity, community structure and typical species representative of these habitats. As such a potential likely significant effect could arise, therefore this site is screened in for this operational phase impact on all of the designated features of the site.

5.2.4 Transboundary European sites

154. Given that the Project AoS and a conservative buffer zone to account for indirect pathways to transboundary European sites designated for Annex I habitats and associated Annex II species (excluding ornithology, marine mammals, and migratory fish) are in excess of 30km distance, all other possible sites in other countries are considered to be too geographically distant for a potential LSE to arise on their qualifying features. Therefore, transboundary impacts sites designated for Annex I habitats have been screened out.

5.3 Annex II Species - Marine mammals

155. The key factors that will be considered during the HRA screening process for marine mammals are:

- Potential effects (source)
- Proximity of source to feature (distance between the proposed development and SACs, migration routes) (pathway and receptor)

5.3.1 Potential Effects (Source)

156. The potential effects during the construction, operation, maintenance and decommissioning phases are outlined below, and summarised in Table 5.2.

Table 5.2 Summary of potential effects to marine mammals screened into HRA

Potential Effects	Construction	O&M	Decommissioning
Underwater noise including barrier effects (all potential sources during operation, O&M and decommissioning)	✓	✓	✓
Collision risk with vessels	✓	✓	✓
Entanglement	x	✓	x
Disturbance at seal haul-out sites	✓	✓	✓
Barrier effects due to the physical presence of offshore infrastructure	x	✓	x
Changes in water quality	x	x	x
Changes to prey availability	✓	✓	✓
EMF (direct effects)	x	x	x
In-combination effects from underwater noise	✓	✓	✓
In-combination effects from collision risk and entanglement	✓	✓	✓
In-combination effects from disturbance at seal haul-out sites	✓	✓	✓
In-combination effects to prey availability (including habitat loss)	✓	✓	✓
Transboundary effects	✓	✓	✓

157. In addition, the potential for cumulative and transboundary effects between effects for the Project will also be determined and assessed.

158. Table 5.2 presents potential effects during construction, operation and maintenance (O&M), and decommissioning considered in the HRA process.

Potential effects during construction

159. The potential effects for marine mammals during construction that are screened in for Likely Significant Effect (LSE) are:

- Underwater noise
- Vessel interaction
- Disturbance at seal haul-out sites
- Change to water quality
- Changes to prey resources

Underwater noise

160. The key potential effects during construction for marine mammals are expected to be those from underwater noise, which has the potential for the following effects:

- Physical injury
- Permanent auditory injury / permanent loss of hearing sensitivity (Permanent Threshold Shift (PTS))
- Temporary auditory injury / temporary loss in hearing sensitivity (Temporary Threshold Shift (TTS))
- Disturbance and behavioural effects
- Effects on prey species
- Barrier effects

161. Activities that have the potential to generate underwater noise associated with the construction of the Project are:

- Clearance of unexploded ordnance (UXO), if required, at the Project site and along the cable route
- Piling of the pin-piles for the Offshore Substation
- Installation of foundations (depending on method used) for the Offshore Substation
- Other construction activities such as seabed preparation, cable laying and rock placement
- Vessels

162. Site specific underwater noise modelling will be undertaken for all potential noise sources that could affect marine mammals.

163. The potential effects associated with underwater noise are screened in and will be assessed in the HRA, taking into account the most recent and robust research, guidance and information available.

164. Whilst not taken into consideration in screening assessment, a Marine Mammal Mitigation Protocol (MMMP) will be produced to reduce the risk of physical injury or permanent auditory injury (PTS) in marine mammals from underwater noise.

Vessel Interaction

165. Despite the potential for marine mammals to detect and avoid vessels, ship strikes are known to occur (Wilson *et al.,* 2007). An increase in vessels could potentially lead to an increase in vessel collision risk. Therefore, the potential for interactions / an increase in collision risk with construction vessels during the construction phase is also screened in for LSE.

166. The increased risk of collision with marine mammals will be assessed further in the HRA, taking into account the most recent and robust research, guidance and information available.

Disturbance at Seal Haul-Out Sites

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

168. Disturbance from vessel transits to and from the Project and the local port also has the potential to disturb seals at haul-out sites, depending on the route and proximity to the haul-out sites. Depending on the landfall selected and the vessel routes, there is the potential for disturbance at seal haul-out sites (i.e. at the nearby Lundy Island). The potential for disturbance at seal haul-out sites has been screened in and will therefore be assessed further in the HRA, taking into account finalised export cable corridors.

169. The potential for any disturbance of seals from haul-out sites foraging at sea has also been screened in and will be assessed further in the HRA.

Changes to Water Quality

170. The increases in suspended sediments and for the accidental release of contamination during construction has the potential to effect marine mammals and their prey. Any changes to water quality would be localised and short lived, and the potential for any effects from changes in water quality on marine mammals or their prey is expected not to be significant.

171. Potential effects related to changes in water quality have the potential for LSE, and are therefore screened in for assessment. The assessment will be based on the assessments for potential water quality changes, including the potential for suspended sediments, and the release of contaminants, including the management measures that will be put in place.

Changes to Prey Resource

172. The potential effects on fish species and therefore the prey resource for marine mammals during construction can result from:

- Physical disturbance and temporary habitat loss of seabed habitat, spawning or nursery grounds or migration
- Permanent habitat loss
- Increased suspended sediments and sediment re-deposition
- Re-mobilisation of contaminated sediment
- Underwater noise effects to hearing sensitive species during pile driving and other activities (vessels, seabed preparation, cable installation etc)
- Introduction of anchors, foundations, scour protection and hard substrate and associated fish aggregation
- Cumulative effects from underwater noise, permanent habitat loss, and changes to seabed habitat

173. Therefore, the potential for any changes to the prey resource for marine mammals during construction will screened in.

Potential effects during operation

174. The potential effects for marine mammals during operation and maintenance (O&M) with the potential for LSE:

- Underwater noise
- Entanglement
- Vessel interaction
- Disturbance at seal haul-out sites
- Physical barrier effects
- Changes to water quality
- Electromagnetic Fields (EMFs)
- Changes to prey resources

Underwater Noise

175. Potential sources of underwater noise during the operation and maintenance phase include:

- Operational noise from WTGs and from movement of floating turbine moorings on the seabed
- Maintenance activities, such as cable re-burial and any additional rock placement
- Operation and maintenance vessel activity

176. The potential for disturbance from underwater noise during the operation and maintenance phase will be based on the underwater noise modelling and assessment of similar activities for the construction phase. If suitable underwater noise data is not available for noise levels associated with the underwater noise from the floating operational turbines, then a suitable proxy such as dredging will be used.

177. The potential effects associated with underwater noise during operation and maintenance (including PTS, TTS, disturbance and behavioural effects, effects on prey species and barrier effects) have the potential for LSE, and will be considered further in the HRA, taking into account the most recent and robust research, guidance and information available.

Entanglement

178. Depending on the method used, there is the perceived potential for entanglement in the mooring systems for floating offshore wind turbines. To date, there have been no recorded instances of marine mammal entanglement from mooring systems of renewable devices (Sparling *et al.,* 2013; Isaacman and Daborn, 2011), or for anchored FPSO vessels in the oil and gas industry (Bejamins *et al.,* 2014) with similar mooring lines as proposed for floating turbine structures.

179. The level of risk to become entangled varies with species (Benjamins *et al.,* 2014), these varying factors include body size, flexibility of movement, the ability to detect mooring lines, and the feeding ecology of the species.

180. Toothed whales have a lower risk than baleen whales, primarily due to their small size and manoeuvrability. Seal species have a similar risk level to small, toothed cetaceans, with an increase in manoeuvrability.

181. Given the size and physical characteristics of the mooring systems required for floating OWF, it is unlikely that upon encountering them, a marine mammal of any size would become directly entangled in the moorings themselves (note that the mooring system will be under enough tension that no loops could be formed, as seen in fishing gear, will ever be formed to allow entanglement with the mooring system). Mooring systems in the offshore renewables industry typically have greater diameter (Benjamins *et al.,* 2014), compared to fishing gear, which has been identified as a major entanglement risk for whales (NMFS, 2018).Therefore, the greatest risk is most likely to be from indirect entanglement in anthropogenic debris, such as the lost, abandoned or discarded fishing gear and other marine debris, caught in the mooring lines.

182. The potential for entanglement has been screened in with the potential for LSE, taking into account the risk to each marine mammal species and the worst-case parameters for the mooring lines of the floating turbines.

Vessel Interaction

183. It is anticipated that the effects associated with vessel activities during operation and maintenance would be similar to, or less than those during the construction phase, due to the presence of a lower number of vessels. Therefore, as outlined for construction, the increased risk of collision with marine mammals will be given further consideration in the HRA, as there is the potential for LSE.

Disturbance at Seal Haul-Out Sites

184. As outlined for construction, depending on the vessel routes, there is the potential for disturbance at seal haul-out sites (i.e. at Lundy). As for construction, once the final offshore cable corridor and landfall locations are known, the potential for disturbance to seal haul-out sites will be reconsidered. If seal haul-out sites are not identified within close proximity to the landfall, once the final landfall is selected, disturbance at seal haul-out sites will be screened out of further assessment.

185. However, it is anticipated that the effects associated with vessel activities during operation and maintenance would be similar to those during the construction phase, although the magnitude of effect (number of vessels) is likely to be lower, and there is the potential for LSE as a result of disturbance to seal haul-out sites.

Physical Barrier Effects

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

187. Data from operational windfarms show no evidence of exclusion of marine mammals, including harbour porpoise and seals (for example, Diederichs *et al.,* 2008; Lindeboom *et al.,* 2011; Marine Scotland, 2012; McConnell *et al.,* 2012; Russell *et al*., 2014; Scheidat *et al.,* 2011; Teilmann *et al.,* 2006; Tougaard *et al.,* 2005, 2009a, 2009b). In addition, marine mammal species, including harbour porpoise and seals, have been known to forage within operational windfarm sites (with fixed foundation) (e.g. Lindeboom *et al.,* 2011; Russell *et al.,* 2014) indicating no restriction to movements.

188. As the spacing between moorings of the wind turbines is expected to be 1km, this would allow animals to move between devices and through the operational windfarm. In addition, the Project is not located on any known marine mammal migration routes.

189. However, as a precautionary approach, it is considered that there is the potential for LSE to marine mammals as a result of the physical presence of the windfarms. Note that the potential for any acoustic barrier effects as a result of underwater

noise during construction will be included as part of the underwater noise assessment.

Changes to Water Quality

190. Potential effects related to changes in water quality have the potential for LSE. The assessment of effects will be based on the assessments for water quality changes, and the release of contaminants, including the management measures that would be put in place.

Direct effects of EMF

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

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

193. Harbour porpoise are known to move in and out of the Baltic Sea, over several operating subsea cables in the Skagerrak and western Baltic Sea with no apparent effect to their migratory movements. There is also no evidence to suggest that seal species respond to EMF (Gill *et al.,* 2005). In addition, as outlined above, data from a number of operational windfarms show no evidence of exclusion of marine mammals, including harbour porpoise and seals. However, cables within a floating wind farm would not all be buried (with some floating), and therefore these studies may not be representative for the Project.

194. Therefore, as a precautionary approach, it is considered that there is the potential for LSE on marine mammal species as a result of EMF, and this will be screened in for further assessment in the HRA.

Changes to Prey Resource

195. There is the potential for LSE to marine mammal species, as a result of effects on prey species. The potential effects on fish species (therefore the prey resource for marine mammals) during operation and maintenance can result from:

- Permanent loss of habitat
- Introduction of hard substrate
- Underwater noise
- Maintenance activities
- EMF

196. The potential for any changes to the prey resource for marine mammals during operation and maintenance will be assessed further in the HRA.

Potential effects during decommissioning

197. It is anticipated that the decommissioning effects would be similar in nature to those of construction, although the magnitude of effect is likely to be lower depending on the method used during decommissioning.

198. Potential effects during decommissioning screened in for further assessment include:

- Physical and auditory injury and behavioural effects resulting from underwater noise
- Disturbance from vessels and barrier effects due to underwater noise
- Disturbance at seal haul-out sites and to foraging at sea
- Increase in risk of collision due to vessel interaction
- Changes to prey resource
- Changes to water quality

Potential in-combination effects

199. The in-combination assessment will identify where the predicted effects of the construction, operation, maintenance and decommissioning of the Project could interact with effects from different plans or projects within the same region and affect marine mammals.

200. The types of plans and projects to be taken into consideration are as listed in Section 3.3.6. Screening of the plans and projects will be considered based on the following key points:

- They are located in the relevant marine mammal MU
- There is the potential for cumulative effects during the construction, operational or decommissioning of the proposed Project

201. The marine mammal in-combination assessment will consider projects, plans and activities which have sufficient information available to undertake the assessment, and will include the potential effects of:

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

Potential transboundary effects

202. There is a significant level of marine development being undertaken or planned by Ireland in the Irish Sea, and in the English Channel (by France). Populations of marine mammals are highly mobile and there is potential for transboundary effects especially when considering noise impacts.

203. Transboundary effects will be assessed, where possible, in consultation with developers in other Member States to obtain up to date project information to feed into the assessment.

204. The potential for transboundary effects will be addressed by considering the reference populations (MUs) and potential linkages to international designated sites as identified through telemetry studies for seals and ranges and movements of cetacean species.

205. The assessment of the effect on the integrity of the transboundary European sites as a result of effects on the designated marine mammal populations will be undertaken and presented in the information for the HRA.

206. Transboundary effects will also be considered within the in-combination assessment.

5.3.2 Connectivity with Designated Sites for Marine Mammals

207. The following sections describe the process used to define the list of sites for which there is possible connectivity and therefore potential for a source – pathway – receptor relationship for marine mammal qualifying SAC features, i.e. harbour porpoise, bottlenose dolphin, and grey seal.

Harbour Porpoise

208. For harbour porpoise, connectivity is considered potentially possible between the Project and any designated sites within the CIS MU (IAMMWG, 2021) where harbour porpoise are listed as a qualifying feature. Therefore, all designated sites outwith the CIS MU have been screened out from further consideration.

209. This HRA screening considers any designated sites within the harbour porpoise CIS MU, where the species is considered as a grade A, B or C feature. Grade D indicates a non-significant population (JNCC, 2009) and have therefore not been considered further.

210. Appendix 1 provides the list of designated sites for harbour porpoise considered in the HRA screening.

211. As harbour porpoise are wide-ranging, no discrete population can be assigned to an individual designated site. It is, therefore, assumed that at any one time, harbour porpoise within or in the vicinity of the Project area are associated with the nearest SAC, the Bristol Channel Approaches SAC (as they cannot simultaneously be part of the population of multiple designated sites, although all are part of the larger MU population).

Bottlenose Dolphin

212. For bottlenose dolphin, connectivity is considered potentially possible between the Project site and any designated sites within the OCSW and IS MUs (Figure 4.2; IAMMWG, 2021) where bottlenose dolphin are listed as a qualifying feature. Therefore, all designated sites outwith these MUs have been screened out from further consideration.

213. This HRA screening considers any designated sites where bottlenose dolphin is considered as a grade A, B or C feature. Grade D indicates a non-significant population (JNCC, 2009) and have therefore not been considered further.

214. Appendix 1 provides the list of designated sites for bottlenose dolphin considered in the HRA screening.

215. As a precautionary approach, it is assumed that all bottlenose dolphin in the vicinity of the Project are from the Cardigan Bay SAC, as this is the closest designated site within the relevant MUs.

Grey Seal

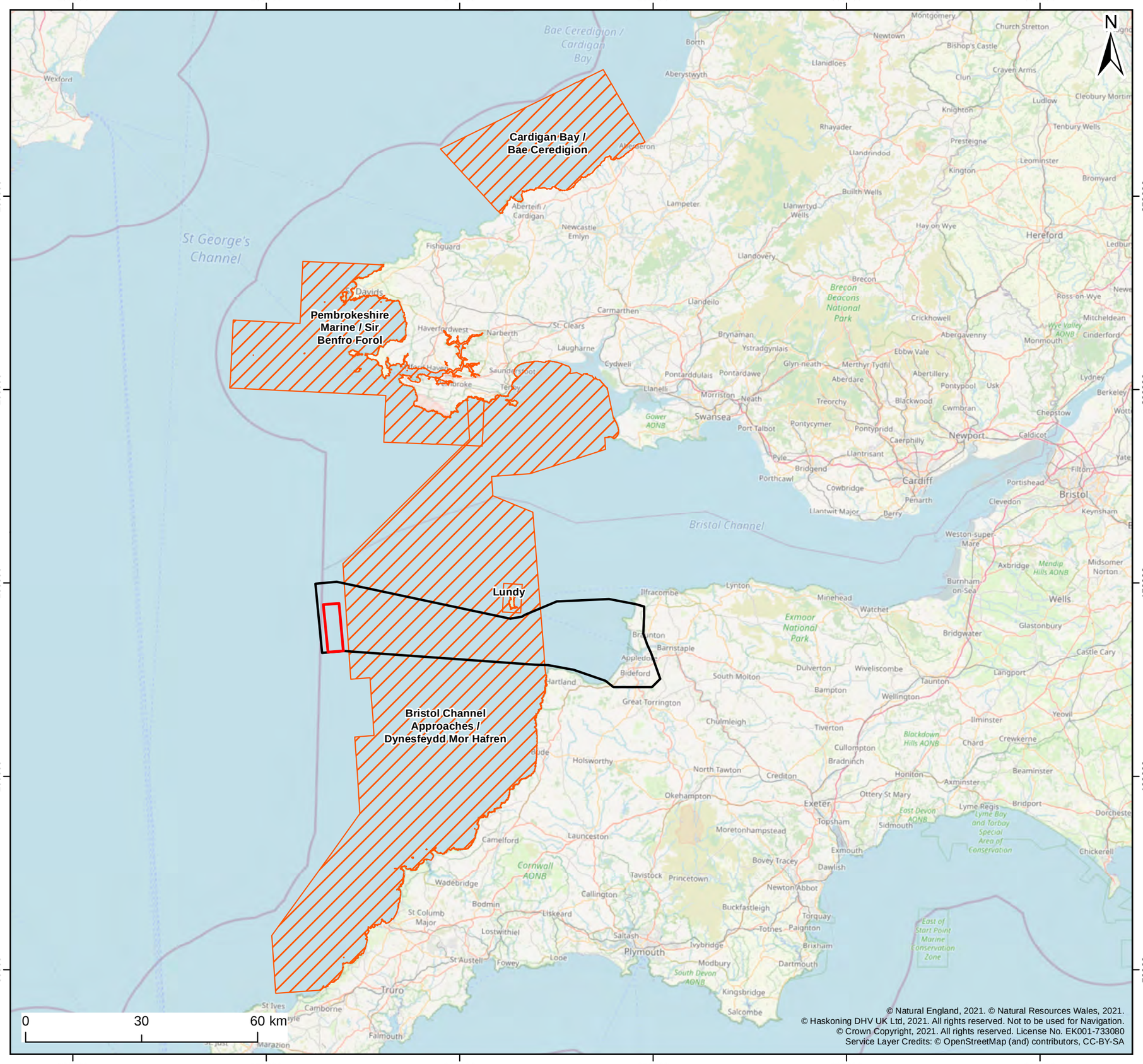
216. To take into account the wide range and movements of grey seal, all designated sites where grey seal are a qualifying feature in the Irish and Celtic Sea area, as well as the south coast of the Republic of Ireland, north-west coast of France, were considered. All designated sites out with this region were screened out from further consideration. For grey seal, the screening process includes any designated site where the species is a grade A, B or C feature.

217. Grey seals could come from any of the designated sites considered to have potential connectivity, due to their large foraging ranges and movements (i.e. within the 100km foraging range of grey seals). As a result, it will be assumed within the assessments that any grey seal within the Project area, or within the potential disturbance ranges of the Project, could be from a designated site. Therefore, any potential effects to grey seal will be assessed based on them being from the nearest designated site, and they have travelled away from the site in order to forage.

218. The Lundy SAC and Pembrokeshire Marine SAC, both designated for grey seal, have been screened in for further assessment, taking into account the movements and forging ranges of grey seal, (see Appendix 1).

Sites Screened In for Marine Mammals

219. Appendix 1 provides the screening assessment for all designated sites in the Celtic Sea area, with either harbour porpoise, bottlenose dolphin or grey seal listed as a qualifying feature with a population grade of A, B, or C, within the relevant screening areas. The sites screened in are shown on Figure 5.1.



Legend:

- White Cross Offshore Windfarm
- Area of Search
- Special Area of Conservation (SAC)

Client:	Project:
Offshore Wind Ltd.	White Cross Offshore Windfarm

Title: White Cross Offshore Windfarm

Figure: 5.1 | Drawing No: PC2978-RHD-ZZ-XX-DR-Z-0113

Revision:	Date:	Drawn:	Checked:	Size:	Scale:
P01	25/11/2021	AB	PT	A3	1:1,000,000

Co-ordinate system: British National Grid

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5.4 Annex II Species - Ornithology

5.4.1 Potential Impacts

220. Screening of SPAs and Ramsar sites takes account of the potential effect(s) of the project on each qualifying feature, as listed below. Direct or indirect effects to offshore ornithology receptors in offshore waters may arise from temporary and permanent infrastructure and activities associated with the construction, operation and decommissioning of the project. Where an SPA/Ramsar site and qualifying species are screened in for LSE, the potential effect(s) that are relevant (e.g. where a species is considered vulnerable to collision) are also stated.

- In the construction phase:
  - Impact 1: Disturbance and displacement covering work activity, vessel movements and lighting, as well as barrier effects due to presence of turbines and infrastructure (from erection of first turbines)
  - Impact 2: Indirect impacts through effects on habitats and prey species
- In the operational phase:
  - Impact 3: Displacement and barrier effects due to presence of turbines and infrastructure, as well as disturbance and displacement covering work activity, vessel movements and lighting
  - Impact 4: Collision risk
  - Impact 5: Entanglement with lost fishing gear caught around mooring lines and cables
  - Impact 6: Indirect impacts through effects on habitats and prey species
- In the decommissioning phase:
  - Impact 7: Disturbance and displacement covering work activity, vessel movements, lighting, as well as barrier effects due to presence of turbines and infrastructure (until final turbine is removed)
  - Impact 8: Indirect impacts through effects on habitats and prey species

221. Further detail regarding potential impacts to offshore ornithology are described in Section 2.7 of the EIA Scoping Report.

5.4.2 Identification of Sites and Features for Screening

Seabirds: Breeding Season

222. The breeding season is the time of year when breeding adult seabirds are constrained to habitat within the foraging ranges of their colony. For offshore ornithology receptors within the foraging range of the Project, this is the time of year when they are most likely to be susceptible to effects due to the construction, operation and decommissioning of the Project. For SPAs for breeding seabirds,

published information on breeding season foraging ranges (Woodward et al., 2019) were used to establish the likelihood of connectivity between the qualifying features of the SPA and the Project. The published foraging ranges for the breeding seabird species considered by the HRA Screening, along with whether they were recorded in the study area (i.e. the Project plus 4km buffer) during the baseline surveys for which data were available are presented in Table 5.3.

Table 5.3 Mean maximum and maximum foraging ranges (Woodward et al., 2019) from breeding colonies for seabird species considered in the HRA screening for the Project

Species	Recorded in study area during July 2020 to June 2021 baseline surveys	Mean maximum foraging range (km ± standard deviation)[1]	Maximum foraging range (km)
Arctic skua (*Stercorarius parasiticus*)	No	N/A	N/A
Arctic tern (*Sterna paradisaea*)	No	25.7±14.8	46
Black-throated diver (*Gavia arctica*)	No	N/A	N/A
Common scoter (*Melanitta nigra*)	No	N/A	N/A
Common tern (*Sterna hirundo*)	Yes	18.0 (± 8.9)	30
Cormorant (*Phalacrocorax carbo*)	No	25.6±8.3	35
Fulmar (*Fulmarus glacialis*)	Yes	542.3 (± 657.9)	2,736
Gannet *Morus bassanus*)	Yes	315.2 (± 194.2)	709
Great black-backed gull (*Larus marinus*)	Yes	73 (no s.d.)	73
Great skua (*Stercorarius skua*)	No	443.3±487.9	1,003
Guillemot (*Uria aalge*)	Yes	73.2 (± 80.5)	338
Herring gull (*Larus argentatus*)	Yes	58.8 (± 26.8)	92
Kittiwake (*Rissa tridactyla*)	Yes	156.1 (± 144.5)	770
Leach's petrel (*Oceanodroma leucorhoa*)	No	N/A	N/A
Lesser black-backed gull (*Larus fuscus*)	Yes	127.0 (± 109)	533

Species	Recorded in study area during July 2020 to June 2021 baseline surveys	Mean maximum foraging range (km ± standard deviation)[1]	Maximum foraging range (km)
Little tern (*Sternula albifrons*)	No	5 (no s.d.)	5
Manx shearwater (*Puffinus puffinus*)	Yes	1,346.8 (± 1,018.7)	2,890
Puffin (*Fratercula arctica*)	Yes	137.1 (± 128.3)	383
Razorbill (*Alca torda*)	Yes	88.7 (± 75.9)	313
Red-throated diver (*Gavia stellata*)	No	9 (no s.d.)	9
Roseate tern (*Sterna dougallii*)	No	12.6±10.6	24
Sandwich tern (*Thalasseus sandvicensis*)	Yes	34.3 (± 23.2)	80
Shag (*Phalacrocorax aristotelis*)	No	13.2±10.	46
Storm Petrel (*Hydrobates pelagicus*)	No	336 (no s.d.)	336

[1]the mean maximum foraging range is the mean of the maximum foraging ranges recorded from each breeding colony for which foraging range data were available (Woodward *et al.*, 2019).

223. The mean maximum foraging range for a species is generally considered to be the most appropriate measure in identifying spatial overlap between an OWF and the probable foraging grounds of a breeding seabird colony. It is therefore used to establish whether there is connectivity between the colony and the habitat where the OWF is located. Breeding seabird species which are qualifying features of SPAs and Ramsar sites within the species-specific mean maximum foraging range of the Project, and which were recorded in the survey area during the breeding season, are screened in. The exception is where there is a justifiable biological reason for them being screened out. The primary reason for this is the availability of information which suggests that kittiwakes, gannets and guillemots from a given colony would be unlikely to occur at the Project due to parapatric competition. This means that the foraging areas of birds from different colonies do not tend to overlap (Cleasby *et al.*, 2020, 2018; Wakefield *et al.*, 2017, 2013). Any qualifying feature screened in for breeding season impacts is automatically screening in for non-breeding season impacts.

224. The AoS for SPAs for which connectivity with the Project could exist during the breeding season was the area roughly covered by Western Waters Biologically Defined Minimum Population Scales (BDMPS); from around the Isles of Scilly, up the west coast of the UK, as far north and east as the Orkney Isles.

225. Whilst species within the mean maximum foraging range which were not recorded during the first 12 months of surveys are currently screened out, these conclusions will be assessed again once the full baseline dataset is available.

226. Several species that are breeding qualifying features of several SPAs under consideration are highly unlikely to be at risk of impacts as a result of the Project during construction, operation, or decommissioning. This may be because regular migration is not undertaken by either the entire population, or the majority of it, and/or because the feature is simply considered highly unlikely to occur at the Project in sufficient numbers for LSE to be possible. These are chough (*Pyrrhocorax pyrrhocorax*), Dartford warbler (*Sylvia undata*), Fair Isle wren (*Troglodytes troglodytes fridariensis*), golden eagle (*Aquila chrysaetos*) peregrine (*Falco peregrinus*, short-eared owl (*Asio flammeus*) (with the exception of the qualifying feature of the Sgomer, Sgogwm a Moroedd Penfro / Skomer, Skokholm and the Seas off Pembrokeshire, which is located near enough to the Project for the feature to be screened in), and red kite (*Milvus milvus*). As a result, there is no mechanism by which the Project could impact these species. For this reason, they are not considered further by the assessment and do not appear in the main screening tables (Appendix 2 and Appendix 3).

Seabirds: Non-breeding Season

227. Outside the breeding season seabirds are unconstrained by requirements to attend nests, and disperse over much greater distances than breeding season foraging ranges from their colonies allow. During the non-breeding season, breeding adults from SPA colonies which are more distant from the Project may utilise habitats in and around the Project, meaning that they are at risk of impacts during construction, operation and/or decommissioning, which would not have presented such a risk during the breeding season. These breeding adults are assumed to mix evenly with non-breeding birds which may be immature or sub-adults (most seabirds take several years to reach breeding age so that large proportions of the populations are sub-adult). In turn, this population is then assumed to mix evenly with seabirds from other colonies. BDMPS and total population estimates for UK seabirds outside the breeding season are described by Furness (2015), along with approximate seasonal movement patterns. BDMPS areas are extensive and overall population sizes for individual species are generally large, consisting of the combined populations of many seabird colonies from both the UK and overseas.

228. For most seabird species, there are two general BDMPS regions defined within UK waters, the main division being between the North Sea and western waters. For some species, however, there are up to five BDMPS regions (Furness, 2015).

229. For seabird species covered by Furness (2015), the non-breeding season BDMPS region was used to identify the AoS for UK SPAs and Ramsar sites with potential connectivity with the Project. For these species, the contributions of UK (SPA and non-SPA) and overseas populations to the relevant BDMPS, from Furness (2015), was used to estimate the proportion of the peak seasonal population at the Project that would comprise breeding adults from a given SPA, and the percentage of the SPA population estimated to be present at the Project during the non-breeding season. These are presented in Table 5.4. BDMPS region totals for some species differ seasonally (e.g. some species have different totals for autumn and spring passage periods and winter periods); therefore, where the contribution of a given SPA population towards the BDMPS total varies by season, the highest value is reported.

230. As a conservative approach, potential connectivity has been assumed for any SPA population which contributes to 1% or more of the BDMPS region total, and therefore 1% or more of the birds recorded at the Project during all or part of the non-breeding season. These populations, which are coloured in red in the table, are included in the main screening table (see Appendix 2), and for completeness, are assessed during the breeding and non-breeding season, along with other qualifying features of the SPA in question. Those populations where the 1% threshold is not met are not considered further by the assessment and do not appear in the main screening table (see Appendix 2).

Migratory birds other than seabirds

231. In addition to seabirds, other offshore ornithology receptors that migrate across areas of open sea may encounter the Project and be at risk of collision if they fly through the turbine array, or barrier effects if they avoid the turbine array. No such species were detected during the first 12 baseline surveys. However, as with surveys at all OWFs in UK waters, the design of the baseline surveys is such that the numbers of a given migratory species passing through a site may be underestimated or undetected. This is because non-seabird species may migrate across offshore areas in large numbers over relatively restricted time periods (a few days or weeks), at high altitude and/or at night. It is therefore likely that the majority of migratory species passing through an offshore area will not be captured by monthly surveys during daylight hours.

Table 5.4 SPA population contributions to the relevant BDMPS population total (%)

SPA	Manx shearwater	Guillemot	Razorbill	Puffin	Gannet	Lesser black-backed gull	Herring gull	Great black-backed gull	Kittiwake	Fulmar	Sandwich tern	Common tern
Ailsa Craig		1.6			16.4	0.2	0.2		0.2			
Alde-Ore Estuary						0.1	0.0					
Bowland Fells						5.2						
Breydon Water												0.1
Buchan Ness to Collieston Coast							0.0		1.7	0.1		
Calf of Eday		0.1							0.1	0.1		
Canna and Sanday		1.1		0.1			0.1		0.3			
Cape Wrath		7.8	1.1	0.2					3.4	0.8		
Carlingford Loch												0.5
Copinsay		0.1							0.1	0.1		
Coquet Island				0.7								1.4
Cromarty Firth												0.1
Dungeness to Pett Level												0.1
East Caithness Cliffs			0.2	0.0			0.0		5.6	1.1		
Fair Isle		0.1	0.0	0.7	0.6		0.0		0.1	2.4		
Farne Islands				2.4					0.5			0.1
Fetlar										0.7		

SPA	Manx shearwater	Guillemot	Razorbill	Puffin	Gannet	Lesser black-backed gull	Herring gull	Great black-backed gull	Kittiwake	Fulmar	Sandwich tern	Common tern
Flamborough and Filey Coast			0.1	0.1	1.8				5.2	0.1		
Flannan Isles		2.8	0.6	2.1					0.5	2.6		
Forth Islands			0.0	3.7	9.1	0.1	0.0		0.4	0.1		0.0
Foula		0.2	0.0	1.5					0.0	1.6		
Foulness												0.0
Fowlsheugh			0.1				0.0		1.3	0.0		
Glannau Aberdaron ac Ynys Enlli / Aberdaron Coast and Bardsey Island	3.3											
Glas Eileanan												0.1
Grassholm					23.7							
Handa		10.8	2.8						0.6	0.7		
Hermaness, Saxavord and Valla Field		0.0		1.6	4.0				0.1	0.6		
Hoy		0.1		0.2					0.0	1.6		
Imperial Dock Lock Leith												1.1
Isles of Scilly						5.4		18.1				
Larne Lough											6.9	0.9
Lough Neagh and Loch Beg						0.6						0.3

SPA	Manx shearwater	Guillemot	Razorbill	Puffin	Gannet	Lesser black-backed gull	Herring gull	Great black-backed gull	Kittiwake	Fulmar	Sandwich tern	Common tern
Marwick Head		0.1							0.1			
Mingulay and Berneray		3.8	5.5	0.4					0.7	3.3		
Morecambe Bay and Duddon Estuary						5.7	3.1				0.1	
Morwenoliaid Ynys Môn / Anglesey Terns												0.7
North Caithness Cliffs		0.5	0.0	0.1					1.4	1.1		
North Colonsay and Western Cliffs		4.0							1.9			
North Norfolk Coast												0.3
North Rona and Sula Sgeir		1.4	0.6	0.7	5.0			0.3	0.4	1.8		
Noss		0.1		0.1	1.6				0.1	0.4		
Poole Harbour												0.2
Rathlin Island		26.1	8.4	0.1		0.1	0.1		2.6	0.5		
Ribble and Alt Estuaries						9.4						0.4
Rousay		0.1							0.2	0.1		
Rum	24.1	0.5							0.3			
Sgomer, Sgogwm a Moroedd Penfro / Skomer, Skokholm and the Seas off Pembrokeshire	70.3	4.3	3.3	3.2		11.5			0.3			
Shiant Isles		1.5	2.3	8.6					0.2	1.6		

SPA	Manx shearwater	Guillemot	Razorbill	Puffin	Gannet	Lesser black-backed gull	Herring gull	Great black-backed gull	Kittiwake	Fulmar	Sandwich tern	Common tern
Solent and Southampton Water												0.4
St Abbs to Fast Castle			0.0				0.0		0.5			
St Kilda	1.0	4.5	0.9	18.8	32.0				0.3	23.9		
Strangford Loch											20.6	1.4
Sule Skerry and Sule Stack		2.2		7.8	2.5							
Sumburgh		0.0							0.0	0.0		
The Dee Estuary												0.7
The Wash												0.3
Troup, Pennan and Lion's Head			0.0				0.0		2.1	0.1		
West Westray		0.3	0.0						1.7	0.1		
Ythan Estuary, Sands of Forvie												0.0

Note: Red text indicates where the SPA population exceeds 1% of the BDMPS population total.

232. Screening considered qualifying features of coastal, wetland and marine SPAs and Ramsar sites within 100km of the Project array (not the export cable AoS, since no impacts on migratory species are anticipated due to the construction, operation and decommissioning of the export cable). It was considered that 100km represents a reasonable cut-off point. The probability that a large enough number of waders, wildfowl or other migrants, from a particular SPA located in excess of 100km from the Project could pass through the site in numbers sufficient to result in an LSE is considered to be highly remote, based on the expert opinion of the authors of this document.

Transboundary European sites

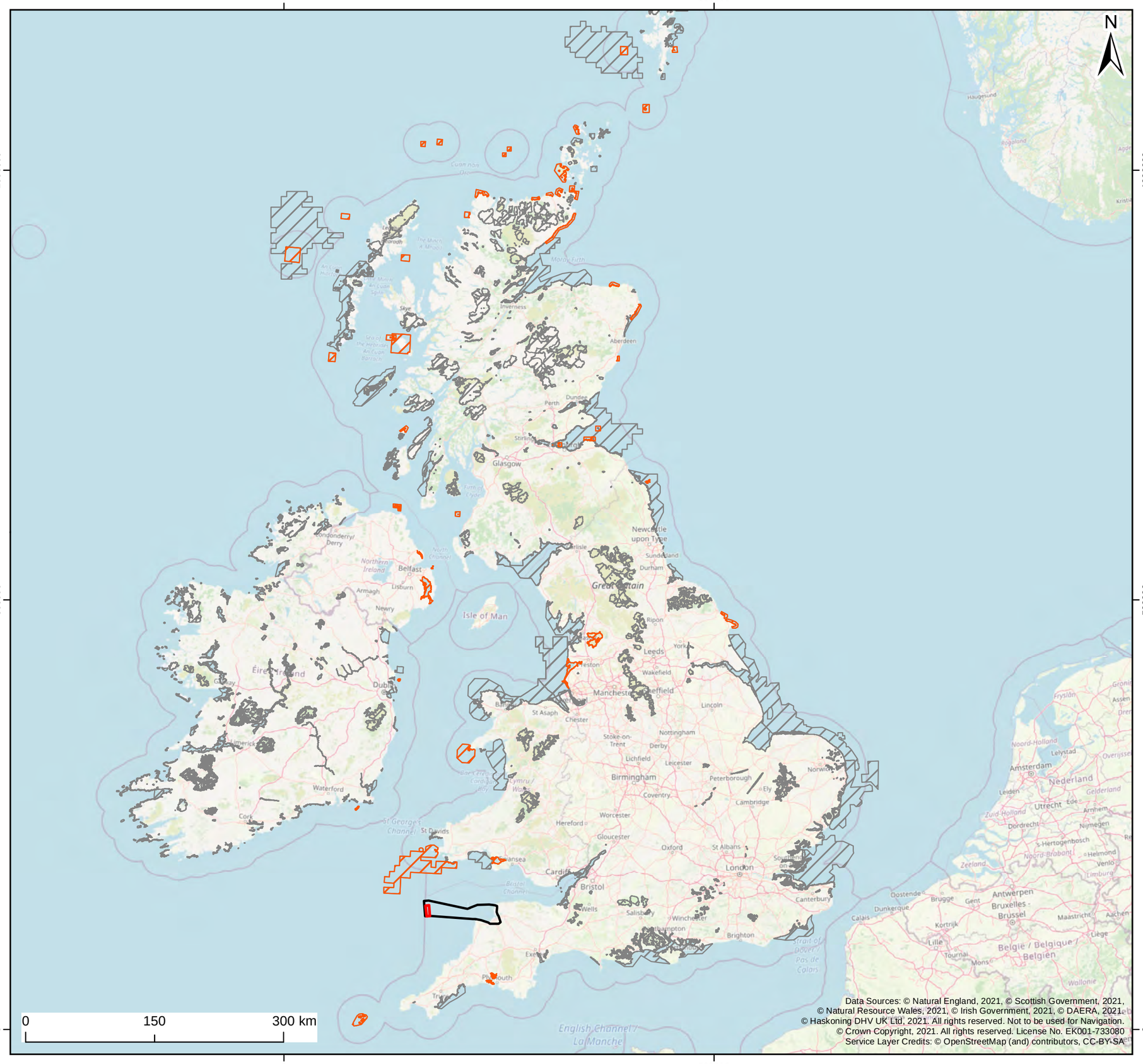
233. As well as UK SPAs and Ramsar sites, Screening considered Transboundary European sites designated by other European countries for birds, where the distance between the Transboundary site and the Project was such that an effect might be possible based on the criteria identified above. Given the location of the Project, SPAs in the Republic of Ireland have been considered. All other sites in other countries are considered to be too geographically distant for LSE on their qualifying features to be a realistic possibility at any time of the year.

5.4.3 Screening

234. The list of SPAs and Ramsar sites considered in screening for LSE is included in Appendix 2 for UK sites and Appendix 3 for Transboundary sites. These SPAs and Ramsar sites are listed in order of increasing distance from the Project.

235. SPAs and Ramsar sites are screened in where LSE cannot be ruled out for one or more qualifying features and screened out where LSE can be ruled out for all qualifying features. A rationale is given for each SPA or Ramsar site and qualifying feature to explain the screening decision. Figure 5.2 shows the sites screened in and out from further assessment.

236. It should be noted that the relatively small area occupied by the Project, when considered alongside the foraging ranges of the offshore ornithology features under consideration (Table 5.3), suggest that LSE due to indirect effects within the array areas or offshore export cable corridor on these features is highly unlikely for foraging birds. These are therefore not included in the assessment tables in Appendix 2 and Appendix 3, although they have been considered and screened out.



Legend:

- White Cross Offshore Windfarm
- Area of Search
- Special Protection Areas (SPA) Screened In
- Special Protection Areas (SPA) Screened Out

Client:	Project:
Offshore Wind Ltd.	White Cross Offshore Windfarm

Title:

Special Protection Areas near to White Cross Windfarm and AoS

Figure: 5.2 | Drawing No: PC2978-RHD-ZZ-XX-DR-Z-0114

Revision:	Date:	Drawn:	Checked:	Size:	Scale:
P01	18/11/2021	GC	CB	A3	1:4,500,000

Co-ordinate system: British National Grid

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5.5 Annex II Species – Migratory Fish

237. As stated in Section 4 there are a number of Annex II fish species that have been recorded in the vicinity of The Project and therefore have the potential to be impacted during the construction, operation and decommissioning phases of The Project. the development. The Annex II species recorded in the areas surrounding the Development, including in the Bristol Channel, Severn Estuary and Taw-Torridge estuary include (Atlantic salmon, allis shad, twaite shad, river lamprey, and sea lamprey). Furthermore, migratory European eel are recorded within and migrating through the Severn Estuary and Bristol Channel.

238. Although the SACs overlapping and surrounding the Project AoS are not designated for Annex II fish species the fish species could be present and may constitute qualifying species of other SACs beyond the boundaries of The Project.

239. The potential impacts of The Project on these Annex II fish species include the following:

- Temporary habitat loss and physical disturbance (during construction, operation and decommissioning)
- Long term/ permanent habitat loss (during operation and decommissioning)
- Increased SSC and sediment re-deposition (including mobilisation of contaminated sediments) during all project phases
- Underwater noise and vibration (particularly during construction phase due to pile driving)
- Electromagnetic fields from cables (during the operational phase)
- Barrier effects (during all project phases)
- Ghost fishing (during operational phase)
- Fish aggregation (during the operational phase)
- Deterioration of water quality (during all project phases)

240. Due to the potential for Atlantic salmon, allis shad, twaite shad, river lamprey and sea lamprey to be present in the vicinity of the Project AoS, there is potential for these Annex II species to be impacted by The Project. Therefore it is proposed these Annex II fish species are screened into Appropriate Assessment. The following designated sites (shown on Figure 5.3) connect to the Bristol Channel and the Celtic Sea and thus have a connection with the Project AoS and any potential for impacts (as listed above) on migratory fish populations associated with these sites, and as such have been screened in for further consideration:

- Atlantic salmon:
  - River Wye/ Afon Gwy SAC
  - River Usk/ Afon Wysg SAC
  - Severn Estuary Ramsar

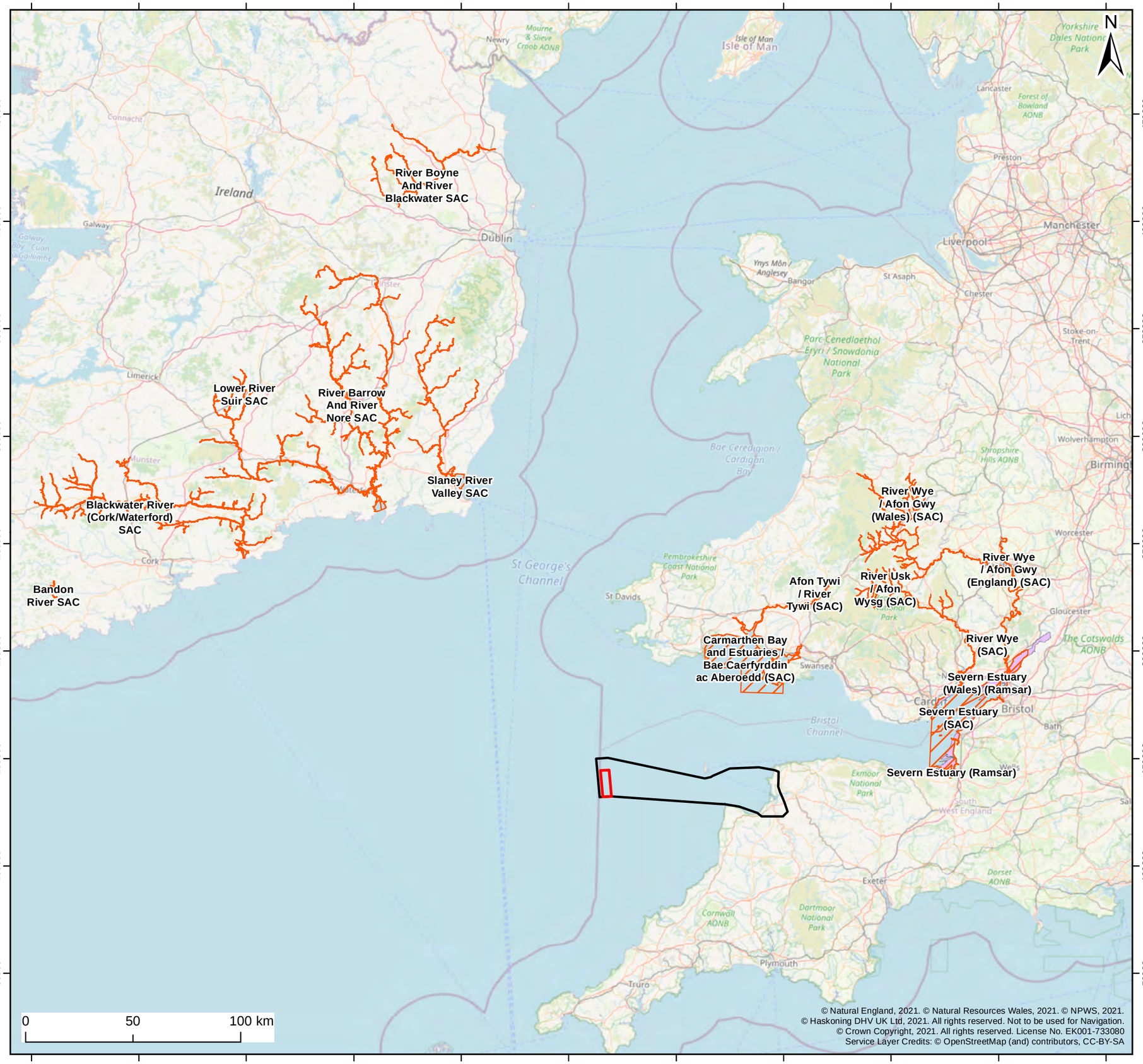
- Sea lamprey:
  - River Wye/ Afon Gwy SAC
  - River Usk/ Afon Wysg SAC
  - Severn Estuary/ Môr Hafren SAC
  - Severn Estuary Ramsar
  - Carmarthen Bay and Estuaries/ Bae Caerfyrddin ac Aberoedd SAC
  - Afon Tywi/ River Tywi SAC
- River lamprey:
  - River Wye/ Afon Gwy SAC
  - River Usk/ Afon Wysg SAC
  - Severn Estuary/ Môr Hafren SAC
  - Severn Estuary Ramsar
  - Carmarthen Bay and Estuaries/ Bae Caerfyrddin ac Aberoedd SAC
  - Afon Tywi/ River Tywi SAC
- Twaite shad:
  - River Wye/ Afon Gwy SAC
  - River Usk/ Afon Wysg SAC
  - Severn Estuary/ Môr Hafren SAC
  - Severn Estuary Ramsar
  - Carmarthen Bay and Estuaries/ Bae Caerfyrddin ac Aberoedd SAC
  - Afon Tywi/ River Tywi SAC
- Allis shad:
  - River Wye / Afon Gwy SAC
  - River Usk/ Afon Wysg SAC
  - Severn Estuary Ramsar
  - Carmarthen Bay and Estuaries/ Bae Caerfyrddin ac Aberoedd SAC
  - Afon Tywi/ River Tywi SAC
- European eel:
  - Severn Estuary Ramsar

5.5.1 Transboundary Sites

241. The nearest sites within the nearest country (Ireland) that are designated for Atlantic salmon, sea lamprey, river lamprey, and twaite shad are in excess of 148km from the Project AoS. There is currently no evidence to discount the connectivity of the following sites with the Project AoS, therefore these transboundary sites have been screened in for further assessment:

- Atlantic salmon:
  - River Slaney SAC

  - River Barrow and River Nore SAC
  - Lower River Suir SAC
  - Blackwater River (Cork/Waterford SAC)
- Sea lamprey:
  - River Slaney SAC
  - River Barrow and River Nore SAC
  - Lower River Suir SAC
  - Blackwater River (Cork/Waterford SAC)
- River lamprey:
  - River Slaney SAC
  - River Barrow and River Nore SAC
  - Lower River Suir SAC
  - Blackwater River (Cork/Waterford SAC)
- Twaite shad:
  - River Slaney SAC
  - River Barrow and River Nore SAC
  - Lower River Suir SAC
  - Blackwater River (Cork/Waterford SAC)



Legend:

- White Cross Offshore Windfarm
- Area of Search
- Special Area of Conservation (SAC)
- Ramsar

Client:	Project:
Offshore Wind Ltd.	White Cross Offshore Windfarm

Title: Location of SACs and Ramsar sites with migratory fish or eels

Figure: 5.3 | Drawing No: PC2978-RHD-ZZ-XX-DR-Z-0115

Revision:	Date:	Drawn:	Checked:	Size:	Scale:
P02	06/12/2021	AB	PT	A3	1:1,800,000
P01	25/11/2021	AB	PT	A3	1:1,800,000

Co-ordinate system: British National Grid

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6. The Screening Process for the Project In-combination

6.1 Annex I Habitats (and associated Annex II species)

242. Section 3.3.6 identifies the current known projects within the Celtic Sea but there are likely to be many others to be determined during the stakeholder engagement being carried out. Consequently, this section provides an initial discussion of those impacts that were screened out for sites designated for their Annex I habitats (and associated Annex II species) in Section 5.2 to determine whether any of the impacts screened out will need to be considered in-combination with the current known projects. Grey seal are considered within the Annex II Marine Mammals in Section 6.2.

6.1.1 Braunton Burrows SAC

243. All potential impacts were screened in for Braunton Burrows SAC therefore any current or identified projects will be screened for in-combination in the next stage (appropriate assessment). The projects will be screened and considered on basis of distance in particular and whether there is a potential for impacts from those projects to extend to the site. If any do, they will be considered and assessed in detail.

6.1.2 Tintagel-Marsland-Clovelly Coast SAC

244. The potential impacts of habitat disturbance during the operational phase of the Project were screened out for the Project alone. As it will not result in any disturbance during operation and none of the projects identified occur anywhere near to the site (and all are tens of km offshore) there would be no in-combination impacts relating to habitat disturbance in the operational phase. Therefore the site is screened out for operational habitat disturbance to all of the designated features of the site alone and in-combination with other projects.

245. The potential impacts associated with the risk of accidental or incidental discharges of liquids or solids within or adjacent to the site during operation were screened out for the Project alone. As it will not result in any habitat alteration during operation and none of the projects identified occur anywhere near to the site (and all are tens of km offshore) there would be no in-combination impacts relating to habitat alteration in the operational phase. Therefore the site is screened out for operational habitat alteration to all of the designated features of the site alone and in-combination with other projects.

6.1.3 Lundy SAC

Direct Habitat Loss

246. The potential impacts of habitat loss during the construction operation, or decommissioning phase of the Project were screened out for the Project alone due to any Project activities or elements being some distance from the site. As it will not result in any habitat loss during construction or operation and none of the projects identified occur anywhere near to the site (and all are tens of km offshore) there would be no in-combination impacts relating to direct habitat loss in the construction or operation phase. Therefore the site is screened out for habitat loss to all of the designated features of the site alone and in-combination with other projects for all stages of the Project.

Disturbance to Habitats

247. The potential impacts of habitat loss during the construction operation, or decommissioning phase of the Project were screened out for the Project alone due to any Project activities or elements being some distance from the site. As it will not result in any habitat disturbance during construction or operation and none of the projects identified occur anywhere near to the site (and all are tens of km offshore) there would be no in-combination impacts relating to habitat disturbance in the construction or operation phase. Therefore the site is screened out for habitat disturbance to all of the designated features of the site alone and in-combination with other projects for all stages of the Project.

Alteration to Habitats

248. The potential impacts of changes to the hydrodynamic regime extending into the site during the construction, operation, or decommissioning phase of the Project were screened out for the Project alone due to distance from the site and very localised nature of any potential effects. As it will not result in any habitat alteration during construction or operation and none of the projects identified occur anywhere near to the site (and all are tens of km offshore) there would be no in-combination impacts relating to habitat alteration in the construction or operation phase. Therefore the site is screened out for habitat alteration to all of the designated features of the site alone and in-combination with other projects for all stages of the Project.

6.2 Annex II Species - Marine Mammals

249. The in-combination assessment will consider plans or projects where the predicted effects have the potential to interact with effects from the proposed construction, operation and maintenance or decommissioning of the Project.

250. The in-combination assessment considers potential effects from all stages of any plan or project where there is the potential for any in-combination effects with the proposed Project.

251. The plans and projects assessed for potential in-combination effects are located within (i) the relevant MU boundary for harbour porpoise, bottlenose dolphin or grey seal and (ii) there is the potential for connectivity and clear pathway for the in-combination effect and marine mammals from the designated sites, e.g. the distance between the potential effect and a designated site with marine mammals as a qualifying feature is within the range for which there could be an interaction.

252. The types of plans and projects to be taken into consideration are:

- Offshore windfarms
- Marine renewable energy (MRE) developments
- Aggregate extraction and dredging
- Licenced disposal sites
- Shipping and navigation
- Planned construction sub-sea cables and pipelines
- Potential port/harbour development
- Oil and gas development, operation and decommissioning, including seismic surveys
- UXO clearance

253. The projects identified for potential in-combination assessment will be agreed during meetings with relevant stakeholders.

6.3 Annex II Species - Offshore Ornithology

254. All of the potential projects identified within the Celtic Sea and offshore wind farm projects from a much wider area are expected to fall within migratory route for the designated sites and their qualifying species identified in Section 5.4. Therefore the in-combination assessment will consider the projects listed in Section 3.3.6, and more following consultation, against those in Section 5.4.

6.4 Annex II Species - Migratory Fish

255. All of the potential projects identified within the Celtic Sea area are expected to fall within the zone of influence or areas of supporting habitat for the migratory fish species and sites listed in Section 5.5. Therefore the in-combination assessment will consider the projects listed in Section 3.3.6 against those in Section 5.5.

7. Summary of the Potential for Likely Significant Effect (LSE)

256. The following sub-sections summarise the qualifying features and designated sites that have been screened in for further assessment for any potential adverse effects resulting from the project alone or in-combination with other projects or activities. The potential for adverse effects on the integrity of the sites have been considered in relation to the conservation objectives of each site.

7.1 Annex I Habitats (and associated Annex II species)

257. The sites designated for Annex I habitats and associated Annex II species (excluding marine mammals, ornithology, and migratory fish) qualifying features that have been screened in for further assessment are listed in Table 7.1. The potential adverse effects on the integrity of the sites resulting from the project alone or in-combination with other projects or activities are considered in relation to the conservation objectives of each site.

Table 7.1 Designated sites where Annex I habitats and associated Annex II species screened into the HRA for further assessment

Designated site	Features	Reason for screening in
Braunton Burrows SAC	Shifting dunes along the shoreline with *Ammophila arenaria* ("white dunes") Fixed coastal dunes with herbaceous vegetation ("grey dunes") Dunes with *Salix repens* ssp. *argentea Salicion arenariae* Humid dune slacks Mudflats and sandflats not covered by seawater at low tide Petalwort	Habitat loss (operation)
		Disturbance to habitats (construction and operation)
		Alteration to habitats (disturbance to contaminants and accidental / incidental discharges during construction)
		in-combination effects regarding all the above.
	Shifting dunes along the shoreline with *Ammophila arenaria* ("white dunes")	Alteration to habitats (coastal process change during construction)
	Mudflats and sandflats not covered by seawater at low tide	Alteration to habitats (coastal process change during operation)
	Mudflats and sandflats not covered by seawater at low tide	Alteration to habitats (suspended sediment and deposition during construction)

Designated site	Features	Reason for screening in
		Alteration to habitats (suspended sediment and deposition during operation)
Tintagel-Marsland-Clovelly Coast SAC	Vegetated sea cliffs of the Atlantic and Baltic Coasts Old sessile oak woods with Ilex and Blechnum in the British Isles European dry heaths	Habitat loss (operation)
		Disturbance to habitats (during construction)
		Alteration to habitats (accidental / incidental pollution discharges during construction)
		Alteration to habitats (topography change resulting in drainage and surface water flow alteration)
		Alteration to habitats (mobilisation of contaminants during construction)
		in-combination effects regarding all the above.
Lundy SAC	Reefs Sandbanks which are slightly covered by sea water all the time Submerged or partially submerged sea caves	Alteration to habitats (coastal process change during operation)
		Alteration to habitats (suspended sediment and deposition during construction)
		Alteration to habitats (suspended sediment and deposition during operation)
		Alteration to habitats (disturbance to contaminants and accidental / incidental discharges during construction)
		in-combination effects regarding all the above.
	Grey seal	See Table 7.2

7.2 Annex II Species - Marine Mammals

258. The designated sites and the specific marine mammal qualifying features that have been screened in for further assessment to determine the potential for any adverse effects on the integrity of the sites in relation to the conservation objectives as result of the project alone or in-combination with other projects and activities are listed in Table 7.2.

7.3 Annex II Species - Offshore Ornithology

259. The designated sites and the specific ornithological qualifying features that have been screened in for further assessment to determine the potential for any adverse effects on the integrity of the sites in relation to the conservation objectives as result of the project alone or in-combination with other projects and activities are listed in Table 7.3.

Table 7.2 Designated sites where marine mammals are a qualifying feature (or feature of interest) screened into the HRA for further assessment

Designated site	Species	Reason for screening in
Bristol Channel Approaches SAC Roaring water Bay and Islands SAC Blasket Islands SAC Rockabill to Dalkey Island SAC Quessant-Molène Nord Bretagne DH Mers Celtiques -Talus du golfe de Gascogne Abers -Côte des legends Baie de Morlaix Côte de Granit rose-Sept-Iles Tregor Goëlo Chaussée de Sein	Harbour porpoise	Potential effects from: • underwater noise • vessel interactions • entanglement • Barrier effects due to the physical presence of offshore infrastructure • changes to prey resources • changes to water quality • EMF • In-combination effects
Cardigan Bay SAC Ouessant-Molène Nord Bretagne DH Mers Celtiques -Talus du golfe de Gascogne Abers -Côte des legends Côte de Granit rose-Sept-Iles Tregor Goëlo Côte de Cancale à Paramé Chausey Baie du Mont Saint-Michel Banc et récifs de Surtainville Anse de Vauville Récifs et landes de la Hague Récifs et marais arrière-littoraux du Cap Lévi à la Pointe de Saire Baie de Seine occidentale	Bottlenose dolphin	Potential effects from: • underwater noise • vessel interactions • entanglement • Barrier effects due to the physical presence of offshore infrastructure • changes to prey resources • changes to water quality • in-combination effects

Designated site	Species	Reason for screening in
Lundy SAC Pembrokeshire Marine SAC	Grey seal	Potential effects from: • underwater noise • vessel interactions • entanglement • Barrier effects due to the physical presence of offshore infrastructure • disturbance at seal haul-out sites • changes to prey resources • changes to water quality • in-combination effects

Table 7.3 Designated sites where bird species are a qualifying feature (or feature of interest) screened into the HRA for further assessment. Suffixes at the end of the species name indicate either breeding qualifying feature (b) or non-breeding qualifying feature (nb)

Site	Qualifying feature(s) screened in
Sgomer, Sgogwm a Moroedd Penfro / Skomer, Skokholm and the Seas off Pembrokeshire	Lesser black-backed gull, b Manx shearwater, b Puffin, b Seabird assemblage, b
Grassholm	Gannet, b
Burry Inlet	Arctic tern, passage Black tern, passage Common tern, passage Curlew, nb Dunlin, nb Greenshank, passage Grey plover, nb Knot, nb Little tern, passage Oystercatcher, nb Pintail, nb Redshank, nb Sandwich tern, passage Shelduck, nb Shoveler, nb Teal, nb Turnstone, nb Whimbrel, passage Wigeon, nb

Site	Qualifying feature(s) screened in
Tamar Estuaries Complex	Avocet, nb Little egret, nb
Isles of Scilly	Great black-backed gull, b Lesser black-backed gull, b
Glannau Aberdaron ac Ynys Enlli / Aberdaron Coast and Bardsey Island	Manx shearwater, b
Ribble and Alt Estuaries	Lesser black-backed gull, b
Strangford Loch	Sandwich tern, b
Bowland Fells	Lesser black-backed gull, b
Copeland Islands	Manx shearwater, b
Larne Lough	Sandwich tern, b
Ailsa Craig	Gannet, b Guillemot, b
Rathlin Island	Guillemot, b Kittiwake, b Razorbill, b
Flamborough and Filey Coast	Gannet, b Kittiwake, b
North Colonsay and Western Cliffs	Guillemot, b Kittiwake, b
Farne Islands	Puffin, b
Forth Islands	Gannet, b Puffin, b
Mingulay and Berneray	Guillemot, b Kittiwake, b Razorbill, b
Rum	Manx shearwater, b
Canna and Sanday	Guillemot, b
Fowlsheugh	Kittiwake, b
Buchan Ness to Collieston Coast	Kittiwake, b
Shiant Isles	Fulmar, b Guillemot, b Puffin, b Razorbill, b
Troup, Pennan and Lion's Heads	Kittiwake, b

Site	Qualifying feature(s) screened in
St Kilda	Fulmar, b Gannet, b Guillemot, b Manx shearwater, b Puffin, b
East Caithness Cliffs	Fulmar, b Kittiwake, b
Handa	Guillemot, b Razorbill, b
Flannan Isles	Fulmar, b Guillemot, b Puffin, b
Cape Wrath	Guillemot, b Kittiwake, b Razorbill, b
North Caithness Cliffs	Fulmar, b Kittiwake, b
Hoy	Fulmar, b
Sule Skerry and Sule Stack	Gannet, b Guillemot, b Puffin, b
North Rona and Sula Sgeir	Fulmar, b Gannet, b Guillemot, b
West Westray	Kittiwake, b
Fair Isle	Fulmar, b
Foula	Fulmar, b Puffin, b
Noss	Gannet, b
Hermaness, Saxavord and Valla Field	Gannet, b Puffin, b
Saltee Islands	Fulmar, b Gannet, b
Lambay Island	Fulmar, b

7.4 Annex II Species - Migratory Fish

260. The designated sites and the specific migratory fish qualifying features that have been screened in for further assessment in relation to the impacts listed in Section 5.5 to determine the potential for any adverse effects on the integrity of the sites in relation to the conservation objectives as result of the project alone or in-combination with other projects and activities are listed in Table 7.4.

Table 7.4 Designated sites where Annex II migratory fish species are a qualifying feature screened into the HRA for further assessment

Site	Qualifying feature(s) screened in
River Wye/ Afon Gwy SAC	• Atlantic salmon • Sea lamprey • River lamprey • Twaite shad
River Usk/ Afon Wysg SAC	• Atlantic salmon • Sea lamprey • River lamprey • Twaite shad
Severn Estuary/ Môr Hafren SAC	• Sea lamprey • River lamprey • Twaite shad
Severn Estuary Ramsar	• Atlantic salmon • Sea lamprey • River lamprey • Twaite shad • Allis shad • European eel
Carmarthen Bay and Estuaries/ Bae Caerfyrddin ac Aberoedd SAC	• Twaite shad
Afon Tywi/ River Tywi SAC	• Twaite shad
Transboundary	
River Slaney SAC	• Atlantic salmon • Sea lamprey • River lamprey • Twaite shad
River Barrow and River Nore SAC	• Atlantic salmon • Sea lamprey • River lamprey • Twaite shad

Site	Qualifying feature(s) screened in
Lower River Suir SAC	• Atlantic salmon • Sea lamprey • River lamprey • Twaite shad
Blackwater River (Cork/Waterford) SAC	• Atlantic salmon • Sea lamprey • River lamprey • Twaite shad

8. References

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Appendix 1 Screening of National Site Network Sites for Marine Mammal features

Site Code	Designated Site	Country	Qualifying Species	Distance to closest point of project (km)	Screened In / Out	Rationale
UK0012712	Cardigan Bay SAC	United Kingdom	Bottlenose Dolphin	120km	In	Potential connectivity. It is assumed that Bottlenose dolphin in the Project area, or areas of potential effect, could be from this designated site.
UK0013114	Lundy SAC	United Kingdom	Grey seal	1km	In	Potential connectivity. It is assumed that grey seal in the Project area, or areas of potential effect, could be from this designated site.
UK0013116	Pembrokeshire Marine SAC	United Kingdom	Grey seal	60km	In	Potential connectivity. It is assumed that grey seal in the Project area, or areas of potential effect, could be from this designated site.
UK0030396	Bristol Channel Approaches	United Kingdom	Harbour porpoise	Within site	In	Potential connectivity. It is assumed that harbour porpoise in the Project area, or areas of potential effect, could be from this designated site.
IE0000101	Roaring water Bay and Islands SAC	Ireland	Grey seal	279km	Out	The distance between the potential effect range of the Project and this designated site is beyond that of potential for direct or indirect effects, alone or in-combination.
IE0000101	Roaring water Bay and Islands SAC	Ireland	Harbour porpoise	279km	In	Potential for connectivity. It is assumed that harbour porpoise in the Project area, or areas of

Site Code	Designated Site	Country	Qualifying Species	Distance to closest point of project (km)	Screened In / Out	Rationale
						potential effect, could be also have connectivity to the Project.
IE0002172	Blasket Islands SAC	Ireland	Grey seal	361km	Out	The distance between the potential effect range of the Project and this designated site is beyond that of potential for direct or indirect effects, alone or in-combination.
IE0002172	Blasket Islands SAC	Ireland	Harbour porpoise	361km	In	Potential for connectivity. It is assumed that harbour porpoise in the Project area, or areas of potential effect, could be also have connectivity to the Project.
IE0003000	Rockabill to Dalkey Island SAC	Ireland	Harbour porpoise	231km	In	Potential for connectivity. It is assumed that harbour porpoise in the Project area, or areas of potential effect, could be also have connectivity to the Project.
IE0000204	Lambay Island SAC	Ireland	Grey seal	257km	Out	The distance between the potential effect range of the Project and this designated site is beyond that of potential for direct or indirect effects, alone or in-combination.
E0000707	Saltee Islands SAC	Ireland	Grey seal	123km	Out	The distance between the potential effect range of the Project and this designated site is beyond that of potential for direct or indirect effects, alone or in-combination.

Site Code	Designated Site	Country	Qualifying Species	Distance to closest point of project (km)	Screened In / Out	Rationale
FR5300018	Ouessant-Molène	France	Harbour porpoise	280km	In	Potential for connectivity. It is assumed that harbour porpoise in the Project area, or areas of potential effect, could be also have connectivity to the Project.
FR5300018	Ouessant-Molène	France	Grey seal	280km	Out	The distance between the potential effect range of the Project and this designated site is beyond that of potential for direct or indirect effects, alone or in-combination.
FR5300018	Ouessant-Molène	France	Bottlenose Dolphin	280km	In	Potential for connectivity. It is assumed that bottlenose dolphin in the Project area, or areas of potential effect, could be also have connectivity to the Project.
FR2502022	Nord Bretagne DH	France	Harbour porpoise	164km	In	Potential for connectivity. It is assumed that harbour porpoise in the Project area, or areas of potential effect, could be also have connectivity to the Project.
FR2502022	Nord Bretagne DH	France	Bottlenose Dolphin	164km	In	Potential for connectivity. It is assumed that bottlenose dolphin in the Project area, or areas of potential effect, could be also have connectivity to the Project.

Site Code	Designated Site	Country	Qualifying Species	Distance to closest point of project (km)	Screened In / Out	Rationale
FR5302015	Mers Celtiques - Talus du golfe de Gascogne	France	Harbour porpoise	219 km	In	Potential for connectivity. It is assumed that harbour porpoise in the Project area, or areas of potential effect, could be also have connectivity to the Project.
FR5302015	Mers Celtiques - Talus du golfe de Gascogne	France	Bottlenose Dolphin	219 km	In	Potential for connectivity. It is assumed that bottlenose dolphin in the Project area, or areas of potential effect, could be also have connectivity to the Project.
FR5300017	Abers - Côte des légendes	France	Harbour porpoise	260km	In	Potential for connectivity. It is assumed that harbour porpoise in the Project area, or areas of potential effect, could be also have connectivity to the Project.
FR5300017	Abers - Côte des légendes	France	Bottlenose Dolphin	260km	In	Potential for connectivity. It is assumed that bottlenose dolphin in the Project area, or areas of potential effect, could be also have connectivity to the Project.
FR5300017	Abers - Côte des légendes	France	Grey seal	260km	Out	The distance between the potential effect range of the Project and this designated site is beyond that of potential for direct or indirect effects, alone or in-combination.

Site Code	Designated Site	Country	Qualifying Species	Distance to closest point of project (km)	Screened In / Out	Rationale
FR5300015	Baie de Morlaix	France	Harbour porpoise	243km	In	Potential for connectivity. It is assumed that harbour porpoise in the Project area, or areas of potential effect, could be also have connectivity to the Project.
FR5300015	Baie de Morlaix	France	Grey seal	243km	Out	The distance between the potential effect range of the Project and this designated site is beyond that of potential for direct or indirect effects, alone or in-combination.
FR5300009	Côte de Granit rose-Sept-Iles	France	Grey seal	220km	Out	The distance between the potential effect range of the Project and this designated site is beyond that of potential for direct or indirect effects, alone or in-combination.
FR5300009	Côte de Granit rose-Sept-Iles	France	Harbour porpoise	220km	In	Potential for connectivity. It is assumed that harbour porpoise in the Project area, or areas of potential effect, could be also have connectivity to the Project.
FR5300009	Côte de Granit rose-Sept-Iles	France	Bottlenose Dolphin	220km	In	Potential for connectivity. It is assumed that bottlenose dolphin in the Project area, or areas of potential effect, could be also have connectivity to the Project.

Site Code	Designated Site	Country	Qualifying Species	Distance to closest point of project (km)	Screened In / Out	Rationale
FR5300010	Tregor Goëlo	France	Grey seal	228km	Out	The distance between the potential effect range of the Project and this designated site is beyond that of potential for direct or indirect effects, alone or in-combination.
FR5300010	Tregor Goëlo	France	Harbour porpoise	228km	In	Potential for connectivity. It is assumed that harbour porpoise in the Project area, or areas of potential effect, could be also have connectivity to the Project.
FR5300010	Tregor Goëlo	France	Bottlenose Dolphin	228km	In	Potential connectivity. It is assumed that bottlenose dolphin in the Project area, or areas of potential effect, could be from this designated site.
FR5300052	Côte de Cancale à Paramé	France	Bottlenose Dolphin	307km	In	Potential for connectivity. It is assumed that bottlenose dolphin in the Project area, or areas of potential effect, could be also have connectivity to the Project.
FR2500079	Chausey	France	Grey seal	282km	Out	The distance between the potential effect range of the Project and this designated site is beyond that of potential for direct or indirect effects, alone or in-combination.

Site Code	Designated Site	Country	Qualifying Species	Distance to closest point of project (km)	Screened In / Out	Rationale
FR2500079	Chausey	France	Bottlenose Dolphin	282km	In	Potential for connectivity. It is assumed that bottlenose dolphin in the Project area, or areas of potential effect, could be also have connectivity to the Project.
FR2500077	Baie du Mont Saint-Michel	France	Grey seal	310km	Out	The distance between the potential effect range of the Project and this designated site is beyond that of potential for direct or indirect effects, alone or in-combination.
FR2500077	Baie du Mont Saint-Michel	France	Bottlenose Dolphin	310km	In	Potential for connectivity. It is assumed that bottlenose dolphin in the Project area, or areas of potential effect, could be also have connectivity to the Project.
FR2502018	Banc et récifs de Surtainville	France	Bottlenose Dolphin	237km	In	Potential for connectivity. It is assumed that bottlenose dolphin in the Project area, or areas of potential effect, could be also have connectivity to the Project.
FR2502019	Anse de Vauville	France	Bottlenose Dolphin	222km	In	Potential for connectivity. It is assumed that bottlenose dolphin in the Project area, or areas of potential effect, could be also have connectivity to the Project.

Site Code	Designated Site	Country	Qualifying Species	Distance to closest point of project (km)	Screened In / Out	Rationale
FR2500084	Récifs et landes de la Hague	France	Bottlenose Dolphin	217km	In	Potential for connectivity. It is assumed that bottlenose dolphin in the Project area, or areas of potential effect, could be also have connectivity to the Project.
FR2500085	Récifs et marais arrière-littoraux du Cap Lévi à la Pointe de Saire	France	Bottlenose Dolphin	244km	In	Potential for connectivity. It is assumed that bottlenose dolphin in the Project area, or areas of potential effect, could be also have connectivity to the Project.
FR2500085	Récifs et marais arrière-littoraux du Cap Lévi à la Pointe de Saire	France	Grey seal	244km	Out	The distance between the potential effect range of the Project and this designated site is beyond that of potential for direct or indirect effects, alone or in-combination.
FR2502020	Baie de Seine occidentale	France	Bottlenose Dolphin	270km	In	Potential for connectivity. It is assumed that bottlenose dolphin in the Project area, or areas of potential effect, could be also have connectivity to the Project.
FR2500088	Marais du Cotentin et du Bessin - Baie des Veys	France	Grey seal	270km	Out	The distance between the potential effect range of the Project and this designated site is beyond that of potential for direct or indirect effects, alone or in-combination.

Site Code	Designated Site	Country	Qualifying Species	Distance to closest point of project (km)	Screened In / Out	Rationale
FR5302007	Chaussée de Sein	France	Harbour porpoise	336km	In	Potential for connectivity. It is assumed that bottlenose dolphin in the Project area, or areas of potential effect, could be also have connectivity to the Project.
FR5302007	Chaussée de Sein	France	Grey seal	336km	Out	The distance between the potential effect range of the Project and this designated site is beyond that of potential for direct or indirect effects, alone or in-combination.

Appendix 2 Screening outcome for UK SPA and Ramsar Sites with offshore ornithology qualifying features

Site code	Site name	Distance from Project (km)	Distance from cable AoS (km)	Qualifying feature[1]	Screening decision	Rationale
UK9014051	Sgomer, Sgogwm a Moroedd Penfro / Skomer, Skokholm and the Seas off Pembrokeshire	33	32	Lesser black-backed gull, b	IN	Project is within the published mean maximum foraging range, and feature was recorded during baseline surveys during the breeding season. Therefore, screened in for potential impacts during the breeding season. Non-breeding season impacts will also be considered.
UK9014051	Sgomer, Sgogwm a Moroedd Penfro / Skomer, Skokholm and the Seas off Pembrokeshire	33	32	Manx shearwater, b	IN	Project is within the published mean maximum foraging range, and feature was recorded during baseline surveys during the breeding season. Therefore, screened in for potential impacts during the breeding season. Non-breeding season impacts will also be considered.
UK9014051	Sgomer, Sgogwm a Moroedd Penfro / Skomer, Skokholm and the Seas off Pembrokeshire	33	32	Puffin, b	IN	Project is within the published mean maximum foraging range, and feature was recorded during baseline surveys during the breeding season. Therefore, screened in for potential

Site code	Site name	Distance from Project (km)	Distance from cable AoS (km)	Qualifying feature[1]	Screening decision	Rationale
						impacts during the breeding season. Non-breeding season impacts will also be considered.
UK9014051	Sgomer, Sgogwm a Moroedd Penfro / Skomer, Skokholm and the Seas off Pembrokeshire	33	32	Seabird assemblage, b	IN	Project is within the published mean maximum foraging range of several qualifying features of the assemblage, and several features were recorded during baseline surveys during the breeding season. Therefore, screened in for potential impacts during the breeding season. Non-breeding season impacts will also be considered.
UK9014051	Sgomer, Sgogwm a Moroedd Penfro / Skomer, Skokholm and the Seas off Pembrokeshire	33	32	Short-eared owl, b	IN	Potential risk of collision with the Project during migratory flights to and from the site.
UK9014051	Sgomer, Sgogwm a Moroedd Penfro / Skomer, Skokholm and the Seas off Pembrokeshire	33	32	Storm petrel, b	OUT	Project is within the published mean maximum foraging range. However, species not recorded during baseline surveys to date during any season. There is no evidence for

Site code	Site name	Distance from Project (km)	Distance from cable AoS (km)	Qualifying feature[1]	Screening decision	Rationale
						connectivity between this feature and the Project at any time of year.
UK9014041	Grassholm	63	57	Gannet, b	IN	Project is within the published mean maximum foraging range, and feature was recorded during baseline surveys during the breeding season. Therefore, screened in for potential impacts during the breeding season. Non-breeding season impacts will also be considered.
UK9014091	Bae Caerfyrddin / Carmarthen Bay	70	41	Common scoter, *Melanitta nigra*, nb	OUT	Site boundary encompasses core areas used during the non-breeding season. Extensive distance between the site boundary and the Project. No evidence for connectivity between this feature and the Project.
UK9020323	Falmouth Bay to St Austell Bay	88	76	Black-throated diver, nb	OUT	Site boundary encompasses core areas used during the non-breeding season. Extensive distance between the site boundary and the Project. No

Site code	Site name	Distance from Project (km)	Distance from cable AoS (km)	Qualifying feature[1]	Screening decision	Rationale
						evidence for connectivity between this feature and the Project.
UK9020323	Falmouth Bay to St Austell Bay	88	76	Great northern diver, *Gavia immer*, nb	OUT	Site boundary encompasses core areas used during the non-breeding season. Extensive distance between the site boundary and the Project. No evidence for connectivity between this feature and the Project.
UK9020323	Falmouth Bay to St Austell Bay	88	76	Slavonian grebe, *Podiceps auritus*, nb	OUT	Site boundary encompasses core areas used during the non-breeding season. Extensive distance between the site boundary and the Project. No evidence for connectivity between this feature and the Project at any time of year.
UK9015011	Burry Inlet	88	48	Arctic tern, passage	IN	Potential risk of collision with the Project during migratory flights to and from the site in numbers sufficient for LSE to be a possibility.

Site code	Site name	Distance from Project (km)	Distance from cable AoS (km)	Qualifying feature[1]	Screening decision	Rationale
UK9015011	Burry Inlet	88	48	Black tern, *Childonias niger*, passage	IN	Potential risk of collision with the Project during migratory flights to and from the site in numbers sufficient for LSE to be a possibility.
UK9015011	Burry Inlet	88	48	Common tern, passage	IN	Potential risk of collision with the Project during migratory flights to and from the site in numbers sufficient for LSE to be a possibility.
UK9015011	Burry Inlet	88	48	Curlew, Numenius arquata, nb	IN	Potential risk of collision with the Project during migratory flights to and from the site in numbers sufficient for LSE to be a possibility.
UK9015011	Burry Inlet	88	48	Dunlin, Calidris alpina, nb	IN	Potential risk of collision with the Project during migratory flights to and from the site in numbers sufficient for LSE to be a possibility.
UK9015011	Burry Inlet	88	48	Greenshank, *Tringa nebularia*, passage	IN	Potential risk of collision with the Project during migratory flights to and from the site in numbers sufficient for LSE to be a possibility.

Site code	Site name	Distance from Project (km)	Distance from cable AoS (km)	Qualifying feature[1]	Screening decision	Rationale
UK9015011	Burry Inlet	88	48	Grey plover, Pluvialis squatarola , nb	IN	Potential risk of collision with the Project during migratory flights to and from the site in numbers sufficient for LSE to be a possibility.
UK9015011	Burry Inlet	88	48	Knot, Calidris canutus, nb	IN	Potential risk of collision with the Project during migratory flights to and from the site in numbers sufficient for LSE to be a possibility.
UK9015011	Burry Inlet	88	48	Little tern, passage	IN	Potential risk of collision with the Project during migratory flights to and from the site in numbers sufficient for LSE to be a possibility.
UK9015011	Burry Inlet	88	48	Oystercatcher, Haematopus ostralegus, nb	IN	Potential risk of collision with the Project during migratory flights to and from the site in numbers sufficient for LSE to be a possibility.
UK9015011	Burry Inlet	88	48	Pintail, *Anas acuta*, nb	IN	Potential risk of collision with the Project during migratory flights to and from the site in numbers sufficient for LSE to be a possibility.

Site code	Site name	Distance from Project (km)	Distance from cable AoS (km)	Qualifying feature[1]	Screening decision	Rationale
UK9015011	Burry Inlet	88	48	Redshank, *Tringa totanus*, nb	IN	Potential risk of collision with the Project during migratory flights to and from the site in numbers sufficient for LSE to be a possibility.
UK9015011	Burry Inlet	88	48	Sandwich tern, passage	IN	Potential risk of collision with the Project during migratory flights to and from the site in numbers sufficient for LSE to be a possibility.
UK9015011	Burry Inlet	88	48	Shelduck, Tadorna tadorna, nb	IN	Potential risk of collision with the Project during migratory flights to and from the site in numbers sufficient for LSE to be a possibility.
UK9015011	Burry Inlet	88	48	Shoveler, *Anas clypeata*, nb	IN	Potential risk of collision with the Project during migratory flights to and from the site in numbers sufficient for LSE to be a possibility.
UK9015011	Burry Inlet	88	48	Teal, Anas crecca, nb	IN	Potential risk of collision with the Project during migratory flights to and from the site in numbers sufficient for LSE to be a possibility.

Site code	Site name	Distance from Project (km)	Distance from cable AoS (km)	Qualifying feature[1]	Screening decision	Rationale
UK9015011	Burry Inlet	88	48	Turnstone, Arenaria interpres, nb	IN	Potential risk of collision with the Project during migratory flights to and from the site in numbers sufficient for LSE to be a possibility.
UK9015011	Burry Inlet	88	48	Whimbrel, *Numenius phaeopus*, passage	IN	Potential risk of collision with the Project during migratory flights to and from the site in numbers sufficient for LSE to be a possibility.
UK9015011	Burry Inlet	88	48	Wigeon, Anas penelope, nb	IN	Potential risk of collision with the Project during migratory flights to and from the site in numbers sufficient for LSE to be a possibility.
UK9010141	Tamar Estuaries Complex	97	57	Avocet, Recurvirostra avosetta, nb	IN	Potential risk of collision with the Project during migratory flights to and from the site in numbers sufficient for LSE to be a possibility.
UK9010141	Tamar Estuaries Complex	97	57	Little egret, *Egretta garzetta*, nb	IN	Potential risk of collision with the Project during migratory flights to and from the site in numbers sufficient for LSE to be a possibility.

Site code	Site name	Distance from Project (km)	Distance from cable AoS (km)	Qualifying feature[1]	Screening decision	Rationale
UK9020288	Isles of Scilly	135	137	Great black-backed gull, b	IN	Project is beyond the published mean maximum foraging range, therefore no connectivity during the breeding season. Screened in for non-breeding season impacts as species was recorded during this season, and >1% of birds at the Project during this period will originate from this population.
UK9020288	Isles of Scilly	135	137	Lesser black-backed gull, b	IN	Project is beyond the published mean maximum foraging range, therefore no connectivity during the breeding season. Screened in for non-breeding season impacts as species was recorded during this season, and >1% of birds at the Project during this period will originate from this population.
UK9020288	Isles of Scilly	135	137	Seabird assemblage, b	OUT	Project is beyond the published mean maximum foraging range of the majority of qualifying features of this site, therefore no connectivity

Site code	Site name	Distance from Project (km)	Distance from cable AoS (km)	Qualifying feature[1]	Screening decision	Rationale
						during the breeding season. Not screened in for non-breeding season impacts as it is considered very unlikely that sufficient numbers of the assemblage would be present at the Project for LSE to occur.
UK9020288	Isles of Scilly	135	137	Shag, b	OUT	Project is beyond the published mean maximum foraging range, therefore no connectivity during the breeding season. Species not recorded during baseline surveys to date during any season. Therefore there is no evidence for connectivity between this feature and the Project at any time of year.
UK9020288	Isles of Scilly	135	137	Storm petrel, b	OUT	Project is within the published mean maximum foraging range. However, species not recorded during baseline surveys to date during any season. There is no evidence for connectivity between this feature and the Project at any time of year.

Site code	Site name	Distance from Project (km)	Distance from cable AoS (km)	Qualifying feature[1]	Screening decision	Rationale
UK9020327	Gogledd Bae Ceredigion / Northern Cardigan Bay	154	133	Red-throated diver, nb	OUT	Site boundary encompasses core areas used during the non-breeding season. Extensive distance between the site boundary and the Project. No evidence for connectivity between this feature and the Project.
UK9013121	Glannau Aberdaron ac Ynys Enlli / Aberdaron Coast and Bardsey Island	170	165	Manx shearwater, b	IN	Project is within the published mean maximum foraging range, and feature was recorded during baseline surveys during the breeding season. Therefore, screened in for potential impacts during the breeding season. Non-breeding season impacts will also be considered.
UK9013061	Morwenoliaid Ynys Môn / Anglesey Terns	223	214	Arctic tern, b	OUT	Project is beyond the published mean maximum foraging range, therefore no connectivity during the breeding season. Species not recorded during baseline surveys to date during any season. Therefore there is no evidence for connectivity

Site code	Site name	Distance from Project (km)	Distance from cable AoS (km)	Qualifying feature[1]	Screening decision	Rationale
						between this feature and the Project at any time of year.
UK9013061	Morwenoliaid Ynys Môn / Anglesey Terns	223	214	Common tern, b	OUT	Project is beyond the published mean maximum foraging range, therefore no connectivity during the breeding season. Not screened in for non-breeding season impacts as species not recorded.
UK9013061	Morwenoliaid Ynys Môn / Anglesey Terns	223	214	Roseate tern, b	OUT	Project is beyond the published mean maximum foraging range, therefore no connectivity during the breeding season. Species not recorded during baseline surveys to date during any season. Therefore there is no evidence for connectivity between this feature and the Project at any time of year.
UK9013061	Morwenoliaid Ynys Môn / Anglesey Terns	223	214	Sandwich tern, b	OUT	Project is beyond the published mean maximum foraging range, therefore no connectivity during the breeding season. Not screened in for non-breeding season impacts as whilst species was

Site code	Site name	Distance from Project (km)	Distance from cable AoS (km)	Qualifying feature[1]	Screening decision	Rationale
						recorded during this season, <1% of birds at the Project during this period will originate from this population.
UK9020294	Liverpool Bay / Bae Lerpwl	251	232	Common scoter, nb	OUT	Site boundary encompasses core areas used during the non-breeding season. Extensive distance between the site boundary and the Project. No evidence for connectivity between this feature and the Project.
UK9020294	Liverpool Bay / Bae Lerpwl	251	232	Common tern, b	OUT	Project is beyond the published mean maximum foraging range, therefore no connectivity during the breeding season. Not screened in for non-breeding season impacts as species not recorded.
UK9020294	Liverpool Bay / Bae Lerpwl	251	232	Little gull, Hydrocoloeus minutus, nb	OUT	Site boundary encompasses core areas used during the non-breeding season. Extensive distance between the site boundary and the Project. No evidence for connectivity

Site code	Site name	Distance from Project (km)	Distance from cable AoS (km)	Qualifying feature[1]	Screening decision	Rationale
						between this feature and the Project.
UK9020294	Liverpool Bay / Bae Lerpwl	251	232	Little tern, b	OUT	Project is beyond the published mean maximum foraging range, therefore no connectivity during the breeding season. Species not recorded during baseline surveys to date during any season. Therefore there is no evidence for connectivity between this feature and the Project at any time of year.
UK9020294	Liverpool Bay / Bae Lerpwl	251	232	Red-throated diver, nb	OUT	Site boundary encompasses core areas used during the non-breeding season. Extensive distance between the site boundary and the Project. No evidence for connectivity between this feature and the Project.
UK9020285	Ynys Seiriol / Puffin Island	255	237	Cormorant, b	OUT	Project is beyond the published mean maximum foraging range, therefore no connectivity during the breeding season. Species not recorded during baseline surveys to date

Site code	Site name	Distance from Project (km)	Distance from cable AoS (km)	Qualifying feature[1]	Screening decision	Rationale
						during any season. Therefore there is no evidence for connectivity between this feature and the Project at any time of year.
UK9013011	The Dee Estuary	276	240	Common tern, b	OUT	Project is beyond the published mean maximum foraging range, therefore no connectivity during the breeding season. Not screened in for non-breeding season impacts as species not recorded.
UK9013011	The Dee Estuary	276	240	Little tern, b	OUT	Project is beyond the published mean maximum foraging range, therefore no connectivity during the breeding season. Species not recorded during baseline surveys to date during any season. Therefore there is no evidence for connectivity between this feature and the Project at any time of year.
UK9013011	The Dee Estuary	276	240	Sandwich tern, passage	OUT	Qualifying feature of this site unlikely to be present at Project in sufficient numbers for LSE to occur.

Site code	Site name	Distance from Project (km)	Distance from cable AoS (km)	Qualifying feature[1]	Screening decision	Rationale
UK9020328	Irish Sea Front	284	279	Manx shearwater, b	OUT	Site boundary encompasses core areas used during the breeding season. Extensive distance between the site boundary and the Project. No evidence for connectivity between this feature and the Project.
UK9020287	Mersey Narrows and North Wirral Foreshore	287	255	Common tern, b	OUT	Project is beyond the published mean maximum foraging range, therefore no connectivity during the breeding season. Not screened in for non-breeding season impacts as species not recorded.
UK9005103	Ribble and Alt Estuaries	300	267	Lesser black-backed gull, b	IN	Project is beyond the published mean maximum foraging range, therefore no connectivity during the breeding season. Screened in for non-breeding season impacts as species was recorded during this season, and >1% of birds at the Project during this period will originate from this population.
UK9020161	Carlingford Lough	322	317	Common tern, b	OUT	Project is beyond the published mean maximum

Site code	Site name	Distance from Project (km)	Distance from cable AoS (km)	Qualifying feature[1]	Screening decision	Rationale
						foraging range, therefore no connectivity during the breeding season. Not screened in for non-breeding season impacts as species not recorded.
UK9020161	Carlingford Lough	322	317	Sandwich tern, b	OUT	Project is beyond the published mean maximum foraging range, therefore no connectivity during the breeding season. Not screened in for non-breeding season impacts as whilst species was recorded during this season, <1% of birds at the Project during this period will originate from this population.
UK9020326	Morecambe Bay and Duddon Estuary	340	309	Common tern, b	OUT	Project is beyond the published mean maximum foraging range, therefore no connectivity during the breeding season. Not screened in for non-breeding season impacts as species not recorded.
UK9020326	Morecambe Bay and Duddon Estuary	340	309	Herring gull, b	OUT	Project is beyond the published mean maximum foraging range, therefore no connectivity during the breeding season. Not

Site code	Site name	Distance from Project (km)	Distance from cable AoS (km)	Qualifying feature[1]	Screening decision	Rationale
						screened in for non-breeding season impacts as whilst species was recorded during this season, <1% of birds at the Project during this period will originate from this population.
UK9020326	Morecambe Bay and Duddon Estuary	340	309	Lesser black-backed gull, b, nb	OUT	Project is beyond the published mean maximum foraging range, therefore no connectivity during the breeding season. Not screened in for non-breeding season impacts as whilst species was recorded during this season, <1% of birds at the Project during this period will originate from this population.
UK9020326	Morecambe Bay and Duddon Estuary	340	309	Little tern, b	OUT	Project is beyond the published mean maximum foraging range, therefore no connectivity during the breeding season. Not screened in for non-breeding season impacts as whilst species was recorded during this season, <1% of birds at the Project during this

Site code	Site name	Distance from Project (km)	Distance from cable AoS (km)	Qualifying feature[1]	Screening decision	Rationale
						period will originate from this population.
UK9020326	Morecambe Bay and Duddon Estuary	340	309	Sandwich tern, b	OUT	Project is beyond the published mean maximum foraging range, therefore no connectivity during the breeding season. Not screened in for non-breeding season impacts as whilst species was recorded during this season, <1% of birds at the Project during this period will originate from this population.
UK9020326	Morecambe Bay and Duddon Estuary	340	309	Seabird assemblage, b	OUT	Project is beyond the published mean maximum foraging range of all qualifying features of this site, therefore no connectivity during the breeding season. Not screened in for non-breeding season impacts as it is considered very unlikely that sufficient numbers of the assemblage would be present at the Project for LSE to occur.
UK9020111	Strangford Loch	350	345	Arctic tern, b	OUT	Project is beyond the published mean maximum

Site code	Site name	Distance from Project (km)	Distance from cable AoS (km)	Qualifying feature[1]	Screening decision	Rationale
						foraging range, therefore no connectivity during the breeding season. Species not recorded during baseline surveys to date during any season. Therefore there is no evidence for connectivity between this feature and the Project at any time of year.
UK9020111	Strangford Loch	350	345	Common tern, b	OUT	Project is beyond the published mean maximum foraging range, therefore no connectivity during the breeding season. Not screened in for non-breeding season impacts as species not recorded.
UK9020111	Strangford Loch	350	345	Sandwich tern, b	IN	Project is beyond the published mean maximum foraging range, therefore no connectivity during the breeding season. Screened in for non-breeding season impacts as species was recorded during this season, and >1% of birds at the Project during this period will originate from this population.

Site code	Site name	Distance from Project (km)	Distance from cable AoS (km)	Qualifying feature[1]	Screening decision	Rationale
UK9020271	Outer Ards	354	349	Arctic tern, b	OUT	Project is beyond the published mean maximum foraging range, therefore no connectivity during the breeding season. Species not recorded during baseline surveys to date during any season. Therefore there is no evidence for connectivity between this feature and the Project at any time of year.
UK9005151	Bowland Fells	355	321	Lesser black-backed gull, b	IN	Project is beyond the published mean maximum foraging range, therefore no connectivity during the breeding season. Screened in for non-breeding season impacts as species was recorded during this season, and >1% of birds at the Project during this period will originate from this population.
UK9020091	Lough Neagh and Lough Beg	377	372	Common tern, b	OUT	Project is beyond the published mean maximum foraging range, therefore no connectivity during the breeding season. Not screened in for non-

Site code	Site name	Distance from Project (km)	Distance from cable AoS (km)	Qualifying feature[1]	Screening decision	Rationale
						breeding season impacts as species not recorded.
UK9020101	Belfast Lough	388	383	Arctic tern, b	OUT	Project is beyond the published mean maximum foraging range, therefore no connectivity during the breeding season. Species not recorded during baseline surveys to date during any season. Therefore there is no evidence for connectivity between this feature and the Project at any time of year.
UK9020101	Belfast Lough	388	383	Common tern, b	OUT	Project is beyond the published mean maximum foraging range, therefore no connectivity during the breeding season. Not screened in for non-breeding season impacts as species not recorded.
UK9020290	Belfast Lough Open Water	389	383	Great crested grebe, nb	OUT	Site boundary encompasses core areas used during the non-breeding season. Extensive distance between the site boundary and the Project. No evidence for connectivity

Site code	Site name	Distance from Project (km)	Distance from cable AoS (km)	Qualifying feature[1]	Screening decision	Rationale
						between this feature and the Project.
UK9020291	Copeland Islands	391	386	Arctic tern, b	OUT	Project is beyond the published mean maximum foraging range, therefore no connectivity during the breeding season. Species not recorded during baseline surveys to date during any season. Therefore there is no evidence for connectivity between this feature and the Project at any time of year.
UK9020291	Copeland Islands	391	386	Manx shearwater, b	IN	Project is within the published mean maximum foraging range, and feature was recorded during baseline surveys during the breeding season. Therefore, screened in for potential impacts during the breeding season. Non-breeding season impacts will also be considered.
UK9020042	Larne Lough	403	398	Common tern, b	OUT	Project is beyond the published mean maximum foraging range, therefore no connectivity during the breeding season. Not

Site code	Site name	Distance from Project (km)	Distance from cable AoS (km)	Qualifying feature[1]	Screening decision	Rationale
						screened in for non-breeding season impacts as species not recorded.
UK9020042	Larne Lough	403	398	Roseate tern, b	OUT	Project is beyond the published mean maximum foraging range, therefore no connectivity during the breeding season. Species not recorded during baseline surveys to date during any season. Therefore there is no evidence for connectivity between this feature and the Project at any time of year.
UK9020042	Larne Lough	403	398	Sandwich tern, b	IN	Project is beyond the published mean maximum foraging range, therefore no connectivity during the breeding season. Screened in for non-breeding season impacts as species was recorded during this season, and >1% of birds at the Project during this period will originate from this population.
UK9003091	Ailsa Craig	454	448	Gannet, b	IN	Project is beyond the published mean maximum foraging range, therefore

Site code	Site name	Distance from Project (km)	Distance from cable AoS (km)	Qualifying feature[1]	Screening decision	Rationale
						no connectivity during the breeding season. Screened in for non-breeding season impacts as species was recorded during this season, and >1% of birds at the Project during this period will originate from this population.
UK9003091	Ailsa Craig	454	448	Guillemot, b	IN	Project is beyond the published mean maximum foraging range, therefore no connectivity during the breeding season. Screened in for non-breeding season impacts as species was recorded during this season, and >1% of birds at the Project during this period will originate from this population.
UK9003091	Ailsa Craig	454	448	Herring gull, b	OUT	Project is beyond the published mean maximum foraging range, therefore no connectivity during the breeding season. Not screened in for non-breeding season impacts as whilst species was recorded during this

Site code	Site name	Distance from Project (km)	Distance from cable AoS (km)	Qualifying feature[1]	Screening decision	Rationale
						season, <1% of birds at the Project during this period will originate from this population.
UK9003091	Ailsa Craig	454	448	Kittiwake, b	OUT	Project is beyond the published mean maximum foraging range, therefore no connectivity during the breeding season. Not screened in for non-breeding season impacts as whilst species was recorded during this season, <1% of birds at the Project during this period will originate from this population.
UK9003091	Ailsa Craig	454	448	Lesser black-backed gull, b	OUT	Project is beyond the published mean maximum foraging range, therefore no connectivity during the breeding season. Not screened in for non-breeding season impacts as whilst species was recorded during this season, <1% of birds at the Project during this period will originate from this population.

Site code	Site name	Distance from Project (km)	Distance from cable AoS (km)	Qualifying feature[1]	Screening decision	Rationale
UK9003091	Ailsa Craig	454	448	Seabird assemblage, b	OUT	Project is beyond the published mean maximum foraging range of all qualifying features of this site, therefore no connectivity during the breeding season. Not screened in for non-breeding season impacts as it is considered very unlikely that sufficient numbers of the assemblage would be present at the Project for LSE to occur.
UK9005103	Ribble and Alt Estuaries	460	454	Common tern, b	OUT	Project is beyond the published mean maximum foraging range, therefore no connectivity during the breeding season. Not screened in for non-breeding season impacts as species not recorded.
UK9020011	Rathlin Island	460	454	Guillemot, b	IN	Project is beyond the published mean maximum foraging range, therefore no connectivity during the breeding season. Screened in for non-breeding season impacts as species was recorded during this season, and

Site code	Site name	Distance from Project (km)	Distance from cable AoS (km)	Qualifying feature[1]	Screening decision	Rationale
						>1% of birds at the Project during this period will originate from this population.
UK9020011	Rathlin Island	460	454	Kittiwake, b	IN	Project is beyond the published mean maximum foraging range, therefore no connectivity during the breeding season. Screened in for non-breeding season impacts as species was recorded during this season, and >1% of birds at the Project during this period will originate from this population.
UK9020011	Rathlin Island	460	454	Razorbill, b	IN	Project is beyond the published mean maximum foraging range, therefore no connectivity during the breeding season. Screened in for non-breeding season impacts as species was recorded during this season, and >1% of birds at the Project during this period will originate from this population.
UK9020021	Sheep Island	461	455	Cormorant, b	OUT	Project is beyond the published mean maximum

Site code	Site name	Distance from Project (km)	Distance from cable AoS (km)	Qualifying feature[1]	Screening decision	Rationale
						foraging range, therefore no connectivity during the breeding season. Species not recorded during baseline surveys to date during any season. Therefore there is no evidence for connectivity between this feature and the Project at any time of year.
UK9006101	Flamborough and Filey Coast	478	424	Gannet, b	IN	Project is beyond the published mean maximum foraging range, therefore no connectivity during the breeding season. Screened in for non-breeding season impacts as species was recorded during this season, and >1% of birds at the Project during this period will originate from this population.
UK9006102	Flamborough and Filey Coast	478	424	Guillemot, b	OUT	Project is beyond the published mean maximum foraging range, therefore no connectivity during the breeding season. Not screened in for non-breeding season impacts as whilst species was

Site code	Site name	Distance from Project (km)	Distance from cable AoS (km)	Qualifying feature[1]	Screening decision	Rationale
						recorded during this season, <1% of birds at the Project during this period will originate from this population.
UK9006101	Flamborough and Filey Coast	478	424	Kittiwake, b	IN	Project is beyond the published mean maximum foraging range, therefore no connectivity during the breeding season. Screened in for non-breeding season impacts as species was recorded during this season, and >1% of birds at the Project during this period will originate from this population.
UK9006101	Flamborough and Filey Coast	478	424	Razorbill, b	OUT	Project is beyond the published mean maximum foraging range, therefore no connectivity during the breeding season. Not screened in for non-breeding season impacts as whilst species was recorded during this season, <1% of birds at the Project during this period will originate from this population.

Site code	Site name	Distance from Project (km)	Distance from cable AoS (km)	Qualifying feature[1]	Screening decision	Rationale
UK9006101	Flamborough and Filey Coast	478	424	Seabird assemblage, b	OUT	Project is beyond the published mean maximum foraging range of all qualifying features of this site, therefore no connectivity during the breeding season. Not screened in for non-breeding season impacts as it is considered very unlikely that sufficient numbers of the assemblage would be present at the Project for LSE to occur.
UK9003301	Knapdale Lochs	523	530	Black-throated diver, b	OUT	Project is beyond the published mean maximum foraging range, therefore no connectivity during the breeding season. Species not recorded during baseline surveys to date during any season. Therefore there is no evidence for connectivity between this feature and the Project at any time of year.
UK9006031	Coquet Island	528	495	Arctic tern, b	OUT	Project is beyond the published mean maximum foraging range, therefore no connectivity during the

Site code	Site name	Distance from Project (km)	Distance from cable AoS (km)	Qualifying feature[1]	Screening decision	Rationale
						breeding season. Species not recorded during baseline surveys to date during any season. Therefore there is no evidence for connectivity between this feature and the Project at any time of year.
UK9006031	Coquet Island	528	495	Common tern, b	OUT	Project is beyond the published mean maximum foraging range, therefore no connectivity during the breeding season. Not screened in for non-breeding season impacts as species not recorded.
UK9006031	Coquet Island	528	495	Roseate tern, b	OUT	Project is beyond the published mean maximum foraging range, therefore no connectivity during the breeding season. Species not recorded during baseline surveys to date during any season. Therefore there is no evidence for connectivity between this feature and the Project at any time of year.
UK9006031	Coquet Island	528	495	Sandwich tern, b	OUT	Project is beyond the published mean maximum

Site code	Site name	Distance from Project (km)	Distance from cable AoS (km)	Qualifying feature[1]	Screening decision	Rationale
						foraging range, therefore no connectivity during the breeding season. Not screened in for non-breeding season impacts as whilst species was recorded during this season, <1% of birds at the Project during this period will originate from this population.
UK9006031	Coquet Island	528	495	Seabird assemblage, b	OUT	Project is beyond the published mean maximum foraging range of all qualifying features of this site, therefore no connectivity during the breeding season. Not screened in for non-breeding season impacts as it is considered very unlikely that sufficient numbers of the assemblage would be present at the Project for LSE to occur.
UK9003171	North Colonsay and Western Cliffs	551	545	Guillemot, b	IN	Project is beyond the published mean maximum foraging range, therefore no connectivity during the breeding season. Screened in for non-

Site code	Site name	Distance from Project (km)	Distance from cable AoS (km)	Qualifying feature[1]	Screening decision	Rationale
						breeding season impacts as species was recorded during this season, and >1% of birds at the Project during this period will originate from this population.
UK9003171	North Colonsay and Western Cliffs	551	545	Kittiwake, b	IN	Project is beyond the published mean maximum foraging range, therefore no connectivity during the breeding season. Screened in for non-breeding season impacts as species was recorded during this season, and >1% of birds at the Project during this period will originate from this population.
UK9003171	North Colonsay and Western Cliffs	551	545	Seabird assemblage, b	OUT	Project is beyond the published mean maximum foraging range of all qualifying features of this site, therefore no connectivity during the breeding season. Not screened in for non-breeding season impacts as it is considered very unlikely that sufficient numbers of the

Site code	Site name	Distance from Project (km)	Distance from cable AoS (km)	Qualifying feature[1]	Screening decision	Rationale
						assemblage would be present at the Project for LSE to occur.
UK9006021	Farne Islands	553	522	Arctic tern, b	OUT	Project is beyond the published mean maximum foraging range, therefore no connectivity during the breeding season. Species not recorded during baseline surveys to date during any season. Therefore there is no evidence for connectivity between this feature and the Project at any time of year.
UK9006021	Farne Islands	553	522	Common tern, b	OUT	Project is beyond the published mean maximum foraging range, therefore no connectivity during the breeding season. Not screened in for non-breeding season impacts as species not recorded.
UK9006021	Farne Islands	553	522	Guillemot, b	OUT	Project is beyond the published mean maximum foraging range, therefore no connectivity during the breeding season. Not screened in for non-breeding season impacts as whilst species was

Site code	Site name	Distance from Project (km)	Distance from cable AoS (km)	Qualifying feature[1]	Screening decision	Rationale
						recorded during this season, <1% of birds at the Project during this period will originate from this population.
UK9006021	Farne Islands	553	522	Puffin, b	IN	Project is beyond the published mean maximum foraging range, therefore no connectivity during the breeding season. Screened in for non-breeding season impacts as species was recorded during this season, and >1% of birds at the Project during this period will originate from this population.
UK9006021	Farne Islands	553	522	Sandwich tern, b	OUT	Project is beyond the published mean maximum foraging range, therefore no connectivity during the breeding season. Not screened in for non-breeding season impacts as whilst species was recorded during this season, <1% of birds at the Project during this period will originate from this population.

Site code	Site name	Distance from Project (km)	Distance from cable AoS (km)	Qualifying feature[1]	Screening decision	Rationale
UK9006021	Farne Islands	553	522	Seabird assemblage, b	OUT	Project is beyond the published mean maximum foraging range of all qualifying features of this site, therefore no connectivity during the breeding season. Not screened in for non-breeding season impacts as it is considered very unlikely that sufficient numbers of the assemblage would be present at the Project for LSE to occur.
UK9004171	Forth Islands	554	542	Arctic tern, b	OUT	Project is beyond the published mean maximum foraging range, therefore no connectivity during the breeding season. Species not recorded during baseline surveys to date during any season. Therefore there is no evidence for connectivity between this feature and the Project at any time of year.
UK9004171	Forth Islands	554	542	Common tern, b	OUT	Project is beyond the published mean maximum foraging range, therefore no connectivity during the

Site code	Site name	Distance from Project (km)	Distance from cable AoS (km)	Qualifying feature[1]	Screening decision	Rationale
						breeding season. Not screened in for non-breeding season impacts as species not recorded.
UK9004171	Forth Islands	554	542	Cormorant, b	OUT	Project is beyond the published mean maximum foraging range, therefore no connectivity during the breeding season. Species not recorded during baseline surveys to date during any season. Therefore there is no evidence for connectivity between this feature and the Project at any time of year.
UK9004171	Forth Islands	554	542	Gannet, b	IN	Project is beyond the published mean maximum foraging range, therefore no connectivity during the breeding season. Screened in for non-breeding season impacts as species was recorded during this season, and >1% of birds at the Project during this period will originate from this population.
UK9004171	Forth Islands	554	542	Guillemot, b	OUT	Project is beyond the published mean maximum

Site code	Site name	Distance from Project (km)	Distance from cable AoS (km)	Qualifying feature[1]	Screening decision	Rationale
						foraging range, therefore no connectivity during the breeding season. Not screened in for non-breeding season impacts as whilst species was recorded during this season, <1% of birds at the Project during this period will originate from this population.
UK9004171	Forth Islands	554	542	Herring gull, b	OUT	Project is beyond the published mean maximum foraging range, therefore no connectivity during the breeding season. Not screened in for non-breeding season impacts as whilst species was recorded during this season, <1% of birds at the Project during this period will originate from this population.
UK9004171	Forth Islands	554	542	Kittiwake, b	OUT	Project is beyond the published mean maximum foraging range, therefore no connectivity during the breeding season. Not screened in for non-breeding season impacts as whilst species was

Site code	Site name	Distance from Project (km)	Distance from cable AoS (km)	Qualifying feature[1]	Screening decision	Rationale
						recorded during this season, <1% of birds at the Project during this period will originate from this population.
UK9004171	Forth Islands	554	542	Lesser black-backed gull, b	OUT	Project is beyond the published mean maximum foraging range, therefore no connectivity during the breeding season. Not screened in for non-breeding season impacts as whilst species was recorded during this season, <1% of birds at the Project during this period will originate from this population.
UK9004171	Forth Islands	554	542	Puffin, b	IN	Project is beyond the published mean maximum foraging range, therefore no connectivity during the breeding season. Screened in for non-breeding season impacts as species was recorded during this season, and >1% of birds at the Project during this period will originate from this population.

Site code	Site name	Distance from Project (km)	Distance from cable AoS (km)	Qualifying feature[1]	Screening decision	Rationale
UK9004171	Forth Islands	554	542	Razorbill, b	OUT	Project is beyond the published mean maximum foraging range, therefore no connectivity during the breeding season. Not screened in for non-breeding season impacts as whilst species was recorded during this season, <1% of birds at the Project during this period will originate from this population.
UK9004171	Forth Islands	554	542	Roseate tern, b	OUT	Project is beyond the published mean maximum foraging range, therefore no connectivity during the breeding season. Species not recorded during baseline surveys to date during any season. Therefore there is no evidence for connectivity between this feature and the Project at any time of year.
UK9004171	Forth Islands	554	542	Sandwich tern, b	OUT	Project is beyond the published mean maximum foraging range, therefore no connectivity during the breeding season. Not screened in for non-

Site code	Site name	Distance from Project (km)	Distance from cable AoS (km)	Qualifying feature[1]	Screening decision	Rationale
						breeding season impacts as whilst species was recorded during this season, <1% of birds at the Project during this period will originate from this population.
UK9004171	Forth Islands	554	542	Seabird assemblage, b	OUT	Project is beyond the published mean maximum foraging range of all qualifying features of this site, therefore no connectivity during the breeding season. Not screened in for non-breeding season impacts as it is considered very unlikely that sufficient numbers of the assemblage would be present at the Project for LSE to occur.
UK9004171	Forth Islands	554	542	Shag, b	OUT	Project is beyond the published mean maximum foraging range, therefore no connectivity during the breeding season. Species not recorded during baseline surveys to date during any season. Therefore there is no evidence for connectivity

Site code	Site name	Distance from Project (km)	Distance from cable AoS (km)	Qualifying feature[1]	Screening decision	Rationale
						between this feature and the Project at any time of year.
UK9004451	Imperial Dock Lock Leith	556	539	Common tern, b	OUT	Project is beyond the published mean maximum foraging range, therefore no connectivity during the breeding season. Not screened in for non-breeding season impacts as species not recorded.
UK9003211	Glas Eileanan	595	590	Common tern, b	OUT	Project is beyond the published mean maximum foraging range, therefore no connectivity during the breeding season. Not screened in for non-breeding season impacts as species not recorded.
UK9003041	Treshnish Isles	595	595	Storm petrel, b	OUT	Project is beyond the published mean maximum foraging range, therefore no connectivity during the breeding season. Species not recorded during baseline surveys to date during any season. Therefore there is no evidence for connectivity between this feature and the Project at any time of year.

Site code	Site name	Distance from Project (km)	Distance from cable AoS (km)	Qualifying feature[1]	Screening decision	Rationale
UK9001121	Mingulay and Berneray	641	636	Fulmar, b	OUT	Project is beyond the published mean maximum foraging range, therefore no connectivity during the breeding season. Not screened in for non-breeding season impacts as whilst species was recorded during this season, <1% of birds at the Project during this period will originate from this population.
UK9001121	Mingulay and Berneray	641	636	Guillemot, b	IN	Project is beyond the published mean maximum foraging range, therefore no connectivity during the breeding season. Screened in for non-breeding season impacts as species was recorded during this season, and >1% of birds at the Project during this period will originate from this population.
UK9001121	Mingulay and Berneray	641	636	Kittiwake, b	IN	Project is beyond the published mean maximum foraging range, therefore no connectivity during the breeding season. Screened in for non-

Site code	Site name	Distance from Project (km)	Distance from cable AoS (km)	Qualifying feature[1]	Screening decision	Rationale
						breeding season impacts as species was recorded during this season, and >1% of birds at the Project during this period will originate from this population.
UK9001121	Mingulay and Berneray	641	636	Puffin, b	OUT	Project is beyond the published mean maximum foraging range, therefore no connectivity during the breeding season. Not screened in for non-breeding season impacts as whilst species was recorded during this season, <1% of birds at the Project during this period will originate from this population.
UK9001121	Mingulay and Berneray	641	636	Razorbill, b	IN	Project is beyond the published mean maximum foraging range, therefore no connectivity during the breeding season. Screened in for non-breeding season impacts as species was recorded during this season, and >1% of birds at the Project during this period

Site code	Site name	Distance from Project (km)	Distance from cable AoS (km)	Qualifying feature[1]	Screening decision	Rationale
						will originate from this population.
UK9001121	Mingulay and Berneray	641	636	Seabird assemblage, b	OUT	Project is beyond the published mean maximum foraging range of all qualifying features of this site, therefore no connectivity during the breeding season. Not screened in for non-breeding season impacts as it is considered very unlikely that sufficient numbers of the assemblage would be present at the Project for LSE to occur.
UK9001121	Mingulay and Berneray	641	636	Shag, b	OUT	Project is beyond the published mean maximum foraging range, therefore no connectivity during the breeding season. Species not recorded during baseline surveys to date during any season. Therefore there is no evidence for connectivity between this feature and the Project at any time of year.
UK9001341	Rum	642	637	Guillemot, b	OUT	Project is beyond the published mean maximum

Site code	Site name	Distance from Project (km)	Distance from cable AoS (km)	Qualifying feature[1]	Screening decision	Rationale
						foraging range, therefore no connectivity during the breeding season. Not screened in for non-breeding season impacts as whilst species was recorded during this season, <1% of birds at the Project during this period will originate from this population.
UK9001341	Rum	642	637	Kittiwake, b	OUT	Project is beyond the published mean maximum foraging range, therefore no connectivity during the breeding season. Not screened in for non-breeding season impacts as whilst species was recorded during this season, <1% of birds at the Project during this period will originate from this population.
UK9001341	Rum	642	637	Manx shearwater, b	IN	Project is within the published mean maximum foraging range, and feature was recorded during baseline surveys during the breeding season. Therefore, screened in for potential

Site code	Site name	Distance from Project (km)	Distance from cable AoS (km)	Qualifying feature[1]	Screening decision	Rationale
						impacts during the breeding season. Non-breeding season impacts will also be considered.
UK9001341	Rum	642	637	Red-throated diver, b	OUT	Project is beyond the published mean maximum foraging range, therefore no connectivity during the breeding season. Species not recorded during baseline surveys to date during any season. Therefore there is no evidence for connectivity between this feature and the Project at any time of year.
UK9001341	Rum	642	637	Seabird assemblage, b	OUT	With the exception of Manx shearwater, the Project is beyond the published mean maximum foraging range of all qualifying features of this site, therefore no connectivity during the breeding season. Not screened in for non-breeding season impacts as it is considered very unlikely that sufficient numbers of the assemblage would be

Site code	Site name	Distance from Project (km)	Distance from cable AoS (km)	Qualifying feature[1]	Screening decision	Rationale
						present at the Project for LSE to occur.
UK9020319	West Coast of the Outer Hebrides	653	648	Red-throated diver, b	OUT	Project is beyond the published mean maximum foraging range, therefore no connectivity during the breeding season. Species not recorded during baseline surveys to date during any season. Therefore there is no evidence for connectivity between this feature and the Project at any time of year.
UK9001431	Canna and Sanday	658	652	Guillemot, b	IN	Project is beyond the published mean maximum foraging range, therefore no connectivity during the breeding season. Screened in for non-breeding season impacts as species was recorded during this season, and >1% of birds at the Project during this period will originate from this population.
UK9001431	Canna and Sanday	658	652	Herring gull, b	OUT	Project is beyond the published mean maximum foraging range, therefore no connectivity during the

Site code	Site name	Distance from Project (km)	Distance from cable AoS (km)	Qualifying feature[1]	Screening decision	Rationale
						breeding season. Not screened in for non-breeding season impacts as whilst species was recorded during this season, <1% of birds at the Project during this period will originate from this population.
UK9001431	Canna and Sanday	658	652	Kittiwake, b	OUT	Project is beyond the published mean maximum foraging range, therefore no connectivity during the breeding season. Not screened in for non-breeding season impacts as whilst species was recorded during this season, <1% of birds at the Project during this period will originate from this population.
UK9001431	Canna and Sanday	658	652	Puffin, b	OUT	Project is beyond the published mean maximum foraging range, therefore no connectivity during the breeding season. Not screened in for non-breeding season impacts as whilst species was recorded during this season, <1% of birds at

Site code	Site name	Distance from Project (km)	Distance from cable AoS (km)	Qualifying feature[1]	Screening decision	Rationale
						the Project during this period will originate from this population.
UK9001431	Canna and Sanday	658	652	Seabird assemblage, b	OUT	Project is beyond the published mean maximum foraging range of all qualifying features of this site, therefore no connectivity during the breeding season. Not screened in for non-breeding season impacts as it is considered very unlikely that sufficient numbers of the assemblage would be present at the Project for LSE to occur.
UK9001431	Canna and Sanday	658	652	Shag, b	OUT	Project is beyond the published mean maximum foraging range, therefore no connectivity during the breeding season. Species not recorded during baseline surveys to date during any season. Therefore there is no evidence for connectivity between this feature and the Project at any time of year.

Site code	Site name	Distance from Project (km)	Distance from cable AoS (km)	Qualifying feature[1]	Screening decision	Rationale
UK9002271	Fowlsheugh	670	649	Kittiwake, b	IN	Project is beyond the published mean maximum foraging range, therefore no connectivity during the breeding season. Screened in for non-breeding season impacts as species was recorded during this season, and >1% of birds at the Project during this period will originate from this population.
UK9001082	South Uist Machair and Lochs	675	684	Little tern, b	OUT	Project is beyond the published mean maximum foraging range, therefore no connectivity during the breeding season. Species not recorded during baseline surveys to date during any season. Therefore there is no evidence for connectivity between this feature and the Project at any time of year.
UK9002491	Buchan Ness to Collieston Coast	721	699	Fulmar, b	OUT	Project is beyond the published mean maximum foraging range, therefore no connectivity during the breeding season. Not screened in for non-

Site code	Site name	Distance from Project (km)	Distance from cable AoS (km)	Qualifying feature[1]	Screening decision	Rationale
						breeding season impacts as whilst species was recorded during this season, <1% of birds at the Project during this period will originate from this population.
UK9002492	Buchan Ness to Collieston Coast	721	699	Guillemot, b	OUT	Project is beyond the published mean maximum foraging range, therefore no connectivity during the breeding season. Not screened in for non-breeding season impacts as whilst species was recorded during this season, <1% of birds at the Project during this period will originate from this population.
UK9002493	Buchan Ness to Collieston Coast	721	699	Herring gull, b	OUT	Project is beyond the published mean maximum foraging range, therefore no connectivity during the breeding season. Not screened in for non-breeding season impacts as whilst species was recorded during this season, <1% of birds at the Project during this

Site code	Site name	Distance from Project (km)	Distance from cable AoS (km)	Qualifying feature[1]	Screening decision	Rationale
						period will originate from this population.
UK9002494	Buchan Ness to Collieston Coast	721	699	Kittiwake, b	IN	Project is beyond the published mean maximum foraging range, therefore no connectivity during the breeding season. Screened in for non-breeding season impacts as species was recorded during this season, and >1% of birds at the Project during this period will originate from this population.
UK9002496	Buchan Ness to Collieston Coast	721	699	Seabird assemblage, b	OUT	Project is beyond the published mean maximum foraging range of all qualifying features of this site, therefore no connectivity during the breeding season. Not screened in for non-breeding season impacts as it is considered very unlikely that sufficient numbers of the assemblage would be present at the Project for LSE to occur.
UK9002495	Buchan Ness to Collieston Coast	721	699	Shag, b	OUT	Project is beyond the published mean maximum

Site code	Site name	Distance from Project (km)	Distance from cable AoS (km)	Qualifying feature[1]	Screening decision	Rationale
						foraging range, therefore no connectivity during the breeding season. Species not recorded during baseline surveys to date during any season. Therefore there is no evidence for connectivity between this feature and the Project at any time of year.
UK9001501	Mointeach Scadabhaigh	724	719	Black-throated diver, b	OUT	Project is beyond the published mean maximum foraging range, therefore no connectivity during the breeding season. Species not recorded during baseline surveys to date during any season. Therefore there is no evidence for connectivity between this feature and the Project at any time of year.
UK9001501	Mointeach Scadabhaigh	724	719	Red-throated diver, b	OUT	Project is beyond the published mean maximum foraging range, therefore no connectivity during the breeding season. Species not recorded during baseline surveys to date during any season.

Site code	Site name	Distance from Project (km)	Distance from cable AoS (km)	Qualifying feature[1]	Screening decision	Rationale
						Therefore there is no evidence for connectivity between this feature and the Project at any time of year.
UK9020332	Seas off St Kilda	744	740	Fulmar, b	OUT	Site boundary encompasses core areas used during the breeding season. Extensive distance between the site boundary and the Project. No evidence for connectivity between this feature and the Project at any time of year.
UK9020332	Seas off St Kilda	744	740	Gannet, b	OUT	Site boundary encompasses core areas used during the breeding season. Extensive distance between the site boundary and the Project. No evidence for connectivity between this feature and the Project.
UK9020332	Seas off St Kilda	744	740	Guillemot, b	OUT	Site boundary encompasses core areas used during the breeding season. Extensive distance between the site boundary and the Project. No evidence for connectivity between this feature and

Site code	Site name	Distance from Project (km)	Distance from cable AoS (km)	Qualifying feature[1]	Screening decision	Rationale
						the Project at any time of year.
UK9020332	Seas off St Kilda	744	740	Puffin, b	OUT	Site boundary encompasses core areas used during the breeding season. Extensive distance between the site boundary and the Project. No evidence for connectivity between this feature and the Project at any time of year.
UK9020332	Seas off St Kilda	744	740	Seabird assemblage, b	OUT	Site boundary encompasses core areas used during the breeding season. Extensive distance between the site boundary and the Project. No evidence for connectivity between this feature and the Project at any time of year.
UK9020332	Seas off St Kilda	744	740	Storm petrel, b	OUT	Site boundary encompasses core areas used during the breeding season. Extensive distance between the site boundary and the Project. No evidence for connectivity between this feature and the Project at any time of year.

Site code	Site name	Distance from Project (km)	Distance from cable AoS (km)	Qualifying feature[1]	Screening decision	Rationale
UK9001041	Shiant Isles	749	744	Fulmar, b	IN	Project is beyond the published mean maximum foraging range, therefore no connectivity during the breeding season. Screened in for non-breeding season impacts as species was recorded during this season, and >1% of birds at the Project during this period will originate from this population.
UK9001041	Shiant Isles	749	744	Guillemot, b	IN	Project is beyond the published mean maximum foraging range, therefore no connectivity during the breeding season. Screened in for non-breeding season impacts as species was recorded during this season, and >1% of birds at the Project during this period will originate from this population.
UK9001041	Shiant Isles	749	744	Kittiwake, b	OUT	Project is beyond the published mean maximum foraging range, therefore no connectivity during the breeding season. Not screened in for non-

Site code	Site name	Distance from Project (km)	Distance from cable AoS (km)	Qualifying feature[1]	Screening decision	Rationale
						breeding season impacts as whilst species was recorded during this season, <1% of birds at the Project during this period will originate from this population.
UK9001041	Shiant Isles	749	744	Puffin, b	IN	Project is beyond the published mean maximum foraging range, therefore no connectivity during the breeding season. Screened in for non-breeding season impacts as species was recorded during this season, and >1% of birds at the Project during this period will originate from this population.
UK9001041	Shiant Isles	749	744	Razorbill, b	IN	Project is beyond the published mean maximum foraging range, therefore no connectivity during the breeding season. Screened in for non-breeding season impacts as species was recorded during this season, and >1% of birds at the Project during this period

Site code	Site name	Distance from Project (km)	Distance from cable AoS (km)	Qualifying feature[1]	Screening decision	Rationale
						will originate from this population.
UK9001041	Shiant Isles	749	744	Seabird assemblage, b	OUT	Site boundary encompasses core areas used during the breeding season. Extensive distance between the site boundary and the Project. No evidence for connectivity between this feature and the Project at any time of year.
UK9001041	Shiant Isles	749	744	Shag, b	OUT	Project is beyond the published mean maximum foraging range, therefore no connectivity during the breeding season. Species not recorded during baseline surveys to date during any season. Therefore there is no evidence for connectivity between this feature and the Project at any time of year.
UK9002471	Troup, Pennan and Lion's Heads	750	732	Fulmar, b	OUT	Project is beyond the published mean maximum foraging range, therefore no connectivity during the breeding season. Not screened in for non-breeding season impacts

Site code	Site name	Distance from Project (km)	Distance from cable AoS (km)	Qualifying feature[1]	Screening decision	Rationale
						as whilst species was recorded during this season, <1% of birds at the Project during this period will originate from this population.
UK9002471	Troup, Pennan and Lion's Heads	750	732	Guillemot, b	OUT	Project is beyond the published mean maximum foraging range, therefore no connectivity during the breeding season. Not screened in for non-breeding season impacts as whilst species was recorded during this season, <1% of birds at the Project during this period will originate from this population.
UK9002471	Troup, Pennan and Lion's Heads	750	732	Herring gull, b	OUT	Project is beyond the published mean maximum foraging range, therefore no connectivity during the breeding season. Not screened in for non-breeding season impacts as whilst species was recorded during this season, <1% of birds at the Project during this period will originate from this population.

Site code	Site name	Distance from Project (km)	Distance from cable AoS (km)	Qualifying feature[1]	Screening decision	Rationale
UK9002471	Troup, Pennan and Lion's Heads	750	732	Kittiwake, b	IN	Project is beyond the published mean maximum foraging range, therefore no connectivity during the breeding season. Screened in for non-breeding season impacts as species was recorded during this season, and >1% of birds at the Project during this period will originate from this population.
UK9002471	Troup, Pennan and Lion's Heads	750	732	Razorbill, b	OUT	Project is beyond the published mean maximum foraging range, therefore no connectivity during the breeding season. Not screened in for non-breeding season impacts as whilst species was recorded during this season, <1% of birds at the Project during this period will originate from this population.
UK9002471	Troup, Pennan and Lion's Heads	750	732	Seabird assemblage, b	OUT	Project is beyond the published mean maximum foraging range of all qualifying features of this site, therefore no connectivity during the

Site code	Site name	Distance from Project (km)	Distance from cable AoS (km)	Qualifying feature[1]	Screening decision	Rationale
						breeding season. Not screened in for non-breeding season impacts as it is considered very unlikely that sufficient numbers of the assemblage would be present at the Project for LSE to occur.
UK9001261	Priest Island (Summer Isles)	758	752	Storm petrel, b	OUT	Project is beyond the published mean maximum foraging range, therefore no connectivity during the breeding season. Species not recorded during baseline surveys to date during any season. Therefore there is no evidence for connectivity between this feature and the Project at any time of year.
UK9001031	St Kilda	762	757	Fulmar, b	IN	Project is beyond the published mean maximum foraging range, therefore no connectivity during the breeding season. Screened in for non-breeding season impacts as species was recorded during this season, and >1% of birds at the

Site code	Site name	Distance from Project (km)	Distance from cable AoS (km)	Qualifying feature[1]	Screening decision	Rationale
						Project during this period will originate from this population.
UK9001031	St Kilda	762	757	Gannet, b	IN	Project is beyond the published mean maximum foraging range, therefore no connectivity during the breeding season. Screened in for non-breeding season impacts as species was recorded during this season, and >1% of birds at the Project during this period will originate from this population.
UK9001031	St Kilda	762	757	Great skua, b	OUT	Project is beyond the published mean maximum foraging range, therefore no connectivity during the breeding season. Species not recorded during baseline surveys to date during any season. Therefore there is no evidence for connectivity between this feature and the Project at any time of year.
UK9001031	St Kilda	762	757	Guillemot, b	IN	Project is beyond the published mean maximum foraging range, therefore

Site code	Site name	Distance from Project (km)	Distance from cable AoS (km)	Qualifying feature[1]	Screening decision	Rationale
						no connectivity during the breeding season. Screened in for non-breeding season impacts as species was recorded during this season, and >1% of birds at the Project during this period will originate from this population.
UK9001031	St Kilda	762	757	Kittiwake, b	OUT	Project is beyond the published mean maximum foraging range, therefore no connectivity during the breeding season. Not screened in for non-breeding season impacts as whilst species was recorded during this season, <1% of birds at the Project during this period will originate from this population.
UK9001031	St Kilda	762	757	Leach's petrel, b	OUT	Project is beyond the published mean maximum foraging range, therefore no connectivity during the breeding season. Species not recorded during baseline surveys to date during any season. Therefore there is no

Site code	Site name	Distance from Project (km)	Distance from cable AoS (km)	Qualifying feature[1]	Screening decision	Rationale
						evidence for connectivity between this feature and the Project at any time of year.
UK9001031	St Kilda	762	757	Manx shearwater, b	IN	Project is within the published mean maximum foraging range, and feature was recorded during baseline surveys during the breeding season. Therefore, screened in for potential impacts during the breeding season. Non-breeding season impacts will also be considered.
UK9001031	St Kilda	762	757	Puffin, b	IN	Project is beyond the published mean maximum foraging range, therefore no connectivity during the breeding season. Screened in for non-breeding season impacts as species was recorded during this season, and >1% of birds at the Project during this period will originate from this population.
UK9001031	St Kilda	762	757	Razorbill, b	OUT	Project is beyond the published mean maximum foraging range, therefore

Site code	Site name	Distance from Project (km)	Distance from cable AoS (km)	Qualifying feature[1]	Screening decision	Rationale
						no connectivity during the breeding season. Not screened in for non-breeding season impacts as whilst species was recorded during this season, <1% of birds at the Project during this period will originate from this population.
UK9001031	St Kilda	762	757	Seabird assemblage, b	OUT	Project is beyond the published mean maximum foraging range of all qualifying features of this site, therefore no connectivity during the breeding season. Not screened in for non-breeding season impacts as it is considered very unlikely that sufficient numbers of the assemblage would be present at the Project for LSE to occur.
UK9001031	St Kilda	762	757	Storm petrel, b	OUT	Project is beyond the published mean maximum foraging range, therefore no connectivity during the breeding season. Species not recorded during baseline surveys to date

Site code	Site name	Distance from Project (km)	Distance from cable AoS (km)	Qualifying feature[1]	Screening decision	Rationale
						during any season. Therefore there is no evidence for connectivity between this feature and the Project at any time of year.
UK9001151	Caithness and Sutherland Peatlands	765	790	Black-throated diver, b	OUT	Project is beyond the published mean maximum foraging range, therefore no connectivity during the breeding season. Species not recorded during baseline surveys to date during any season. Therefore there is no evidence for connectivity between this feature and the Project at any time of year.
UK9001151	Caithness and Sutherland Peatlands	765	790	Common scoter, Melanitta nigra, b	OUT	Project is beyond the published mean maximum foraging range, therefore no connectivity during the breeding season. Species not recorded during baseline surveys to date during any season. Therefore there is no evidence for connectivity between this feature and the Project at any time of year.

Site code	Site name	Distance from Project (km)	Distance from cable AoS (km)	Qualifying feature[1]	Screening decision	Rationale
UK9001151	Caithness and Sutherland Peatlands	765	790	Red-throated diver, b	OUT	Project is beyond the published mean maximum foraging range, therefore no connectivity during the breeding season. Species not recorded during baseline surveys to date during any season. Therefore there is no evidence for connectivity between this feature and the Project at any time of year.
UK9001571	Lewis Peatlands	770	764	Black-throated diver, b	OUT	Project is beyond the published mean maximum foraging range, therefore no connectivity during the breeding season. Species not recorded during baseline surveys to date during any season. Therefore there is no evidence for connectivity between this feature and the Project at any time of year.
UK9001572	Lewis Peatlands	770	764	Red-throated diver, b	OUT	Project is beyond the published mean maximum foraging range, therefore no connectivity during the breeding season. Species not recorded during

Site code	Site name	Distance from Project (km)	Distance from cable AoS (km)	Qualifying feature[1]	Screening decision	Rationale
						baseline surveys to date during any season. Therefore there is no evidence for connectivity between this feature and the Project at any time of year.
UK9001182	East Caithness Cliffs	782	772	Cormorant, b	OUT	Project is beyond the published mean maximum foraging range, therefore no connectivity during the breeding season. Species not recorded during baseline surveys to date during any season. Therefore there is no evidence for connectivity between this feature and the Project at any time of year.
UK9001182	East Caithness Cliffs	782	772	Fulmar, b	IN	Project is beyond the published mean maximum foraging range, therefore no connectivity during the breeding season. Screened in for non-breeding season impacts as species was recorded during this season, and >1% of birds at the Project during this period

Site code	Site name	Distance from Project (km)	Distance from cable AoS (km)	Qualifying feature[1]	Screening decision	Rationale
						will originate from this population.
UK9001182	East Caithness Cliffs	782	772	Great black-backed gull, b	OUT	Project is beyond the published mean maximum foraging range, therefore no connectivity during the breeding season. Not screened in for non-breeding season impacts as whilst species was recorded during this season, <1% of birds at the Project during this period will originate from this population.
UK9001182	East Caithness Cliffs	782	772	Guillemot, b	OUT	Project is beyond the published mean maximum foraging range, therefore no connectivity during the breeding season. Not screened in for non-breeding season impacts as whilst species was recorded during this season, <1% of birds at the Project during this period will originate from this population.
UK9001182	East Caithness Cliffs	782	772	Herring gull, b	OUT	Project is beyond the published mean maximum foraging range, therefore no connectivity during the

Site code	Site name	Distance from Project (km)	Distance from cable AoS (km)	Qualifying feature[1]	Screening decision	Rationale
						breeding season. Not screened in for non-breeding season impacts as whilst species was recorded during this season, <1% of birds at the Project during this period will originate from this population.
UK9001182	East Caithness Cliffs	782	772	Kittiwake, b	IN	Project is beyond the published mean maximum foraging range, therefore no connectivity during the breeding season. Screened in for non-breeding season impacts as species was recorded during this season, and >1% of birds at the Project during this period will originate from this population.
UK9001182	East Caithness Cliffs	782	772	Razorbill, b	OUT	Project is beyond the published mean maximum foraging range, therefore no connectivity during the breeding season. Not screened in for non-breeding season impacts as whilst species was recorded during this season, <1% of birds at

Site code	Site name	Distance from Project (km)	Distance from cable AoS (km)	Qualifying feature[1]	Screening decision	Rationale
						the Project during this period will originate from this population.
UK9001182	East Caithness Cliffs	782	772	Seabird assemblage, b	OUT	Project is beyond the published mean maximum foraging range of all qualifying features of this site, therefore no connectivity during the breeding season. Not screened in for non-breeding season impacts as it is considered very unlikely that sufficient numbers of the assemblage would be present at the Project for LSE to occur.
UK9001182	East Caithness Cliffs	782	772	Shag, b	OUT	Project is beyond the published mean maximum foraging range, therefore no connectivity during the breeding season. Species not recorded during baseline surveys to date during any season. Therefore there is no evidence for connectivity between this feature and the Project at any time of year.

Site code	Site name	Distance from Project (km)	Distance from cable AoS (km)	Qualifying feature[1]	Screening decision	Rationale
UK9001241	Handa	801	796	Fulmar, b	OUT	Project is beyond the published mean maximum foraging range, therefore no connectivity during the breeding season. Not screened in for non-breeding season impacts as whilst species was recorded during this season, <1% of birds at the Project during this period will originate from this population.
UK9001241	Handa	801	796	Great skua, b	OUT	Project is beyond the published mean maximum foraging range, therefore no connectivity during the breeding season. Species not recorded during baseline surveys to date during any season. Therefore there is no evidence for connectivity between this feature and the Project at any time of year.
UK9001241	Handa	801	796	Guillemot, b	IN	Project is beyond the published mean maximum foraging range, therefore no connectivity during the breeding season. Screened in for non-

Site code	Site name	Distance from Project (km)	Distance from cable AoS (km)	Qualifying feature[1]	Screening decision	Rationale
						breeding season impacts as species was recorded during this season, and >1% of birds at the Project during this period will originate from this population.
UK9001241	Handa	801	796	Kittiwake, b	OUT	Project is beyond the published mean maximum foraging range, therefore no connectivity during the breeding season. Not screened in for non-breeding season impacts as whilst species was recorded during this season, <1% of birds at the Project during this period will originate from this population.
UK9001241	Handa	801	796	Razorbill, b	IN	Project is beyond the published mean maximum foraging range, therefore no connectivity during the breeding season. Screened in for non-breeding season impacts as species was recorded during this season, and >1% of birds at the Project during this period

Site code	Site name	Distance from Project (km)	Distance from cable AoS (km)	Qualifying feature[1]	Screening decision	Rationale
						will originate from this population.
UK9001241	Handa	801	796	Seabird assemblage, b	OUT	Project is beyond the published mean maximum foraging range of all qualifying features of this site, therefore no connectivity during the breeding season. Not screened in for non-breeding season impacts as it is considered very unlikely that sufficient numbers of the assemblage would be present at the Project for LSE to occur.
UK9001021	Flannan Isles	803	798	Fulmar, b	IN	Project is beyond the published mean maximum foraging range, therefore no connectivity during the breeding season. Screened in for non-breeding season impacts as species was recorded during this season, and >1% of birds at the Project during this period will originate from this population.
UK9001021	Flannan Isles	803	798	Guillemot, b	IN	Project is beyond the published mean maximum

Site code	Site name	Distance from Project (km)	Distance from cable AoS (km)	Qualifying feature[1]	Screening decision	Rationale
						foraging range, therefore no connectivity during the breeding season. Screened in for non-breeding season impacts as species was recorded during this season, and >1% of birds at the Project during this period will originate from this population.
UK9001021	Flannan Isles	803	798	Kittiwake, b	OUT	Project is beyond the published mean maximum foraging range, therefore no connectivity during the breeding season. Not screened in for non-breeding season impacts as whilst species was recorded during this season, <1% of birds at the Project during this period will originate from this population.
UK9001021	Flannan Isles	803	798	Leach's petrel, b	OUT	Project is beyond the published mean maximum foraging range, therefore no connectivity during the breeding season. Species not recorded during baseline surveys to date during any season.

Site code	Site name	Distance from Project (km)	Distance from cable AoS (km)	Qualifying feature[1]	Screening decision	Rationale
						Therefore there is no evidence for connectivity between this feature and the Project at any time of year.
UK9001021	Flannan Isles	803	798	Puffin, b	IN	Project is beyond the published mean maximum foraging range, therefore no connectivity during the breeding season. Screened in for non-breeding season impacts as species was recorded during this season, and >1% of birds at the Project during this period will originate from this population.
UK9001021	Flannan Isles	803	798	Razorbill, b	OUT	Project is beyond the published mean maximum foraging range, therefore no connectivity during the breeding season. Not screened in for non-breeding season impacts as whilst species was recorded during this season, <1% of birds at the Project during this period will originate from this population.

Site code	Site name	Distance from Project (km)	Distance from cable AoS (km)	Qualifying feature[1]	Screening decision	Rationale
UK9001021	Flannan Isles	803	798	Seabird assemblage, b	OUT	Project is beyond the published mean maximum foraging range of all qualifying features of this site, therefore no connectivity during the breeding season. Not screened in for non-breeding season impacts as it is considered very unlikely that sufficient numbers of the assemblage would be present at the Project for LSE to occur.
UK9001231	Cape Wrath	825	819	Fulmar, b	OUT	Project is beyond the published mean maximum foraging range, therefore no connectivity during the breeding season. Not screened in for non-breeding season impacts as whilst species was recorded during this season, <1% of birds at the Project during this period will originate from this population.
UK9001231	Cape Wrath	825	819	Guillemot, b	IN	Project is beyond the published mean maximum foraging range, therefore no connectivity during the

Site code	Site name	Distance from Project (km)	Distance from cable AoS (km)	Qualifying feature[1]	Screening decision	Rationale
						breeding season. Screened in for non-breeding season impacts as species was recorded during this season, and >1% of birds at the Project during this period will originate from this population.
UK9001231	Cape Wrath	825	819	Kittiwake, b	IN	Project is beyond the published mean maximum foraging range, therefore no connectivity during the breeding season. Screened in for non-breeding season impacts as species was recorded during this season, and >1% of birds at the Project during this period will originate from this population.
UK9001231	Cape Wrath	825	819	Puffin, b	OUT	Project is beyond the published mean maximum foraging range, therefore no connectivity during the breeding season. Not screened in for non-breeding season impacts as whilst species was recorded during this season, <1% of birds at

Site code	Site name	Distance from Project (km)	Distance from cable AoS (km)	Qualifying feature[1]	Screening decision	Rationale
						the Project during this period will originate from this population.
UK9001231	Cape Wrath	825	819	Razorbill, b	IN	Project is beyond the published mean maximum foraging range, therefore no connectivity during the breeding season. Screened in for non-breeding season impacts as species was recorded during this season, and >1% of birds at the Project during this period will originate from this population.
UK9001231	Cape Wrath	825	819	Seabird assemblage, b	OUT	Project is beyond the published mean maximum foraging range of all qualifying features of this site, therefore no connectivity during the breeding season. Not screened in for non-breeding season impacts as it is considered very unlikely that sufficient numbers of the assemblage would be present at the Project for LSE to occur.

Site code	Site name	Distance from Project (km)	Distance from cable AoS (km)	Qualifying feature[1]	Screening decision	Rationale
UK9001181	North Caithness Cliffs	829	821	Fulmar, b	IN	Project is beyond the published mean maximum foraging range, therefore no connectivity during the breeding season. Screened in for non-breeding season impacts as species was recorded during this season, and >1% of birds at the Project during this period will originate from this population.
UK9001181	North Caithness Cliffs	829	821	Guillemot, b	OUT	Project is beyond the published mean maximum foraging range, therefore no connectivity during the breeding season. Not screened in for non-breeding season impacts as whilst species was recorded during this season, <1% of birds at the Project during this period will originate from this population.
UK9001181	North Caithness Cliffs	829	821	Kittiwake, b	IN	Project is beyond the published mean maximum foraging range, therefore no connectivity during the breeding season. Screened in for non-

Site code	Site name	Distance from Project (km)	Distance from cable AoS (km)	Qualifying feature[1]	Screening decision	Rationale
						breeding season impacts as species was recorded during this season, and >1% of birds at the Project during this period will originate from this population.
UK9001181	North Caithness Cliffs	829	821	Puffin, b	OUT	Project is beyond the published mean maximum foraging range, therefore no connectivity during the breeding season. Not screened in for non-breeding season impacts as whilst species was recorded during this season, <1% of birds at the Project during this period will originate from this population.
UK9001181	North Caithness Cliffs	829	821	Razorbill, b	OUT	Project is beyond the published mean maximum foraging range, therefore no connectivity during the breeding season. Not screened in for non-breeding season impacts as whilst species was recorded during this season, <1% of birds at the Project during this

Site code	Site name	Distance from Project (km)	Distance from cable AoS (km)	Qualifying feature[1]	Screening decision	Rationale
						period will originate from this population.
UK9001181	North Caithness Cliffs	829	821	Seabird assemblage, b	OUT	Project is beyond the published mean maximum foraging range of all qualifying features of this site, therefore no connectivity during the breeding season. Not screened in for non-breeding season impacts as it is considered very unlikely that sufficient numbers of the assemblage would be present at the Project for LSE to occur.
UK9002141	Hoy	856	845	Arctic skua, b	OUT	Project is beyond the published mean maximum foraging range, therefore no connectivity during the breeding season. Species not recorded during baseline surveys to date during any season. Therefore there is no evidence for connectivity between this feature and the Project at any time of year.
UK9002141	Hoy	856	845	Fulmar, b	IN	Project is beyond the published mean maximum

Site code	Site name	Distance from Project (km)	Distance from cable AoS (km)	Qualifying feature[1]	Screening decision	Rationale
						foraging range, therefore no connectivity during the breeding season. Screened in for non-breeding season impacts as species was recorded during this season, and >1% of birds at the Project during this period will originate from this population.
UK9002141	Hoy	856	845	Great black-backed gull, b	OUT	Project is beyond the published mean maximum foraging range, therefore no connectivity during the breeding season. Not screened in for non-breeding season impacts as whilst species was recorded during this season, <1% of birds at the Project during this period will originate from this population.
UK9002141	Hoy	856	845	Great skua, b	OUT	Project is beyond the published mean maximum foraging range, therefore no connectivity during the breeding season. Species not recorded during baseline surveys to date during any season.

Site code	Site name	Distance from Project (km)	Distance from cable AoS (km)	Qualifying feature[1]	Screening decision	Rationale
						Therefore there is no evidence for connectivity between this feature and the Project at any time of year.
UK9002141	Hoy	856	845	Guillemot, b	OUT	Project is beyond the published mean maximum foraging range, therefore no connectivity during the breeding season. Not screened in for non-breeding season impacts as whilst species was recorded during this season, <1% of birds at the Project during this period will originate from this population.
UK9002141	Hoy	856	845	Kittiwake, b	OUT	Project is beyond the published mean maximum foraging range, therefore no connectivity during the breeding season. Not screened in for non-breeding season impacts as whilst species was recorded during this season, <1% of birds at the Project during this period will originate from this population.

Site code	Site name	Distance from Project (km)	Distance from cable AoS (km)	Qualifying feature[1]	Screening decision	Rationale
UK9002141	Hoy	856	845	Puffin, b	OUT	Project is beyond the published mean maximum foraging range, therefore no connectivity during the breeding season. Not screened in for non-breeding season impacts as whilst species was recorded during this season, <1% of birds at the Project during this period will originate from this population.
UK9002141	Hoy	856	845	Red-throated diver, b	OUT	Project is beyond the published mean maximum foraging range, therefore no connectivity during the breeding season. Species not recorded during baseline surveys to date during any season. Therefore there is no evidence for connectivity between this feature and the Project at any time of year.
UK9002141	Hoy	856	845	Seabird assemblage, b	OUT	Project is beyond the published mean maximum foraging range of all qualifying features of this site, therefore no connectivity during the

Site code	Site name	Distance from Project (km)	Distance from cable AoS (km)	Qualifying feature[1]	Screening decision	Rationale
						breeding season. Not screened in for non-breeding season impacts as it is considered very unlikely that sufficient numbers of the assemblage would be present at the Project for LSE to occur.
UK9002181	Sule Skerry and Sule Stack	875	870	Gannet, b	IN	Project is beyond the published mean maximum foraging range, therefore no connectivity during the breeding season. Screened in for non-breeding season impacts as species was recorded during this season, and >1% of birds at the Project during this period will originate from this population.
UK9002181	Sule Skerry and Sule Stack	875	870	Guillemot, b	IN	Project is beyond the published mean maximum foraging range, therefore no connectivity during the breeding season. Screened in for non-breeding season impacts as species was recorded during this season, and >1% of birds at the

Site code	Site name	Distance from Project (km)	Distance from cable AoS (km)	Qualifying feature[1]	Screening decision	Rationale
						Project during this period will originate from this population.
UK9002181	Sule Skerry and Sule Stack	875	870	Leach's petrel, b	OUT	Project is beyond the published mean maximum foraging range, therefore no connectivity during the breeding season. Species not recorded during baseline surveys to date during any season. Therefore there is no evidence for connectivity between this feature and the Project at any time of year.
UK9002181	Sule Skerry and Sule Stack	875	870	Puffin, b	IN	Project is beyond the published mean maximum foraging range, therefore no connectivity during the breeding season. Screened in for non-breeding season impacts as species was recorded during this season, and >1% of birds at the Project during this period will originate from this population.
UK9002181	Sule Skerry and Sule Stack	875	870	Seabird assemblage, b	OUT	Project is beyond the published mean maximum foraging range of all

Site code	Site name	Distance from Project (km)	Distance from cable AoS (km)	Qualifying feature[1]	Screening decision	Rationale
						qualifying features of this site, therefore no connectivity during the breeding season. Not screened in for non-breeding season impacts as it is considered very unlikely that sufficient numbers of the assemblage would be present at the Project for LSE to occur.
UK9002181	Sule Skerry and Sule Stack	875	870	Shag, b	OUT	Project is beyond the published mean maximum foraging range, therefore no connectivity during the breeding season. Species not recorded during baseline surveys to date during any season. Therefore there is no evidence for connectivity between this feature and the Project at any time of year.
UK9002181	Sule Skerry and Sule Stack	875	870	Storm petrel, b	OUT	Project is beyond the published mean maximum foraging range, therefore no connectivity during the breeding season. Species not recorded during baseline surveys to date

Site code	Site name	Distance from Project (km)	Distance from cable AoS (km)	Qualifying feature[1]	Screening decision	Rationale
						during any season. Therefore there is no evidence for connectivity between this feature and the Project at any time of year.
UK9002311	Orkney Mainland Moors	877	866	Red-throated diver, b	OUT	Project is beyond the published mean maximum foraging range, therefore no connectivity during the breeding season. Species not recorded during baseline surveys to date during any season. Therefore there is no evidence for connectivity between this feature and the Project at any time of year.
UK9001011	North Rona and Sula Sgeir	883	877	Fulmar, b	IN	Project is beyond the published mean maximum foraging range, therefore no connectivity during the breeding season. Screened in for non-breeding season impacts as species was recorded during this season, and >1% of birds at the Project during this period will originate from this population.

Site code	Site name	Distance from Project (km)	Distance from cable AoS (km)	Qualifying feature[1]	Screening decision	Rationale
UK9001011	North Rona and Sula Sgeir	883	877	Gannet, b	IN	Project is beyond the published mean maximum foraging range, therefore no connectivity during the breeding season. Screened in for non-breeding season impacts as species was recorded during this season, and >1% of birds at the Project during this period will originate from this population.
UK9001011	North Rona and Sula Sgeir	883	877	Great black-backed gull, b	OUT	Project is beyond the published mean maximum foraging range, therefore no connectivity during the breeding season. Not screened in for non-breeding season impacts as whilst species was recorded during this season, <1% of birds at the Project during this period will originate from this population.
UK9001011	North Rona and Sula Sgeir	883	877	Guillemot, b	IN	Project is beyond the published mean maximum foraging range, therefore no connectivity during the breeding season. Screened in for non-

Site code	Site name	Distance from Project (km)	Distance from cable AoS (km)	Qualifying feature[1]	Screening decision	Rationale
						breeding season impacts as species was recorded during this season, and >1% of birds at the Project during this period will originate from this population.
UK9001011	North Rona and Sula Sgeir	883	877	Kittiwake, b	OUT	Project is beyond the published mean maximum foraging range, therefore no connectivity during the breeding season. Not screened in for non-breeding season impacts as whilst species was recorded during this season, <1% of birds at the Project during this period will originate from this population.
UK9001011	North Rona and Sula Sgeir	883	877	Leach's petrel, b	OUT	Project is beyond the published mean maximum foraging range, therefore no connectivity during the breeding season. Species not recorded during baseline surveys to date during any season. Therefore there is no evidence for connectivity between this feature and

Site code	Site name	Distance from Project (km)	Distance from cable AoS (km)	Qualifying feature[1]	Screening decision	Rationale
						the Project at any time of year.
UK9001011	North Rona and Sula Sgeir	883	877	Puffin, b	OUT	Project is beyond the published mean maximum foraging range, therefore no connectivity during the breeding season. Not screened in for non-breeding season impacts as whilst species was recorded during this season, <1% of birds at the Project during this period will originate from this population.
UK9002121	Marwick Head	892	882	Guillemot, b	OUT	Project is beyond the published mean maximum foraging range, therefore no connectivity during the breeding season. Not screened in for non-breeding season impacts as whilst species was recorded during this season, <1% of birds at the Project during this period will originate from this population.
UK9002121	Marwick Head	892	882	Kittiwake, b	OUT	Project is beyond the published mean maximum foraging range, therefore no connectivity during the

Site code	Site name	Distance from Project (km)	Distance from cable AoS (km)	Qualifying feature[1]	Screening decision	Rationale
						breeding season. Not screened in for non-breeding season impacts as whilst species was recorded during this season, <1% of birds at the Project during this period will originate from this population.
UK9002121	Marwick Head	892	882	Seabird assemblage, b	OUT	Project is beyond the published mean maximum foraging range, therefore no connectivity during the breeding season. Not screened in for non-breeding season impacts as whilst species was recorded during this season, <1% of birds at the Project during this period will originate from this population.
UK9002101	West Westray	914	902	Arctic skua, b	OUT	Project is beyond the published mean maximum foraging range, therefore no connectivity during the breeding season. Species not recorded during baseline surveys to date during any season. Therefore there is no evidence for connectivity

Site code	Site name	Distance from Project (km)	Distance from cable AoS (km)	Qualifying feature[1]	Screening decision	Rationale
						between this feature and the Project at any time of year.
UK9002101	West Westray	914	902	Arctic tern, b	OUT	Project is beyond the published mean maximum foraging range, therefore no connectivity during the breeding season. Species not recorded during baseline surveys to date during any season. Therefore there is no evidence for connectivity between this feature and the Project at any time of year.
UK9002101	West Westray	914	902	Fulmar, b	OUT	Project is beyond the published mean maximum foraging range, therefore no connectivity during the breeding season. Not screened in for non-breeding season impacts as whilst species was recorded during this season, <1% of birds at the Project during this period will originate from this population.
UK9002101	West Westray	914	902	Guillemot, b	OUT	Project is beyond the published mean maximum foraging range, therefore

Site code	Site name	Distance from Project (km)	Distance from cable AoS (km)	Qualifying feature[1]	Screening decision	Rationale
						no connectivity during the breeding season. Not screened in for non-breeding season impacts as whilst species was recorded during this season, <1% of birds at the Project during this period will originate from this population.
UK9002101	West Westray	914	902	Kittiwake, b	IN	Project is beyond the published mean maximum foraging range, therefore no connectivity during the breeding season. Screened in for non-breeding season impacts as species was recorded during this season, and >1% of birds at the Project during this period will originate from this population.
UK9002101	West Westray	914	902	Razorbill, b	OUT	Project is beyond the published mean maximum foraging range, therefore no connectivity during the breeding season. Not screened in for non-breeding season impacts as whilst species was recorded during this

Site code	Site name	Distance from Project (km)	Distance from cable AoS (km)	Qualifying feature[1]	Screening decision	Rationale
						season, <1% of birds at the Project during this period will originate from this population.
UK9002101	West Westray	914	902	Seabird assemblage, b	OUT	Project is beyond the published mean maximum foraging range of all qualifying features of this site, therefore no connectivity during the breeding season. Not screened in for non-breeding season impacts as it is considered very unlikely that sufficient numbers of the assemblage would be present at the Project for LSE to occur.
UK9002091	Fair Isle	955	938	Arctic skua, b	OUT	Project is beyond the published mean maximum foraging range, therefore no connectivity during the breeding season. Species not recorded during baseline surveys to date during any season. Therefore there is no evidence for connectivity between this feature and the Project at any time of year.

Site code	Site name	Distance from Project (km)	Distance from cable AoS (km)	Qualifying feature[1]	Screening decision	Rationale
UK9002092	Fair Isle	955	938	Arctic tern, b	OUT	Project is beyond the published mean maximum foraging range, therefore no connectivity during the breeding season. Species not recorded during baseline surveys to date during any season. Therefore there is no evidence for connectivity between this feature and the Project at any time of year.
UK9002093	Fair Isle	955	938	Fulmar, b	IN	Project is beyond the published mean maximum foraging range, therefore no connectivity during the breeding season. Screened in for non-breeding season impacts as species was recorded during this season, and >1% of birds at the Project during this period will originate from this population.
UK9002084	Fair Isle	955	938	Gannet, b	OUT	Project is beyond the published mean maximum foraging range, therefore no connectivity during the breeding season. Not screened in for non-

Site code	Site name	Distance from Project (km)	Distance from cable AoS (km)	Qualifying feature[1]	Screening decision	Rationale
						breeding season impacts as whilst species was recorded during this season, <1% of birds at the Project during this period will originate from this population.
UK9002085	Fair Isle	955	938	Great skua, b	OUT	Project is beyond the published mean maximum foraging range, therefore no connectivity during the breeding season. Species not recorded during baseline surveys to date during any season. Therefore there is no evidence for connectivity between this feature and the Project at any time of year.
UK9002086	Fair Isle	955	938	Guillemot, b	OUT	Project is beyond the published mean maximum foraging range, therefore no connectivity during the breeding season. Not screened in for non-breeding season impacts as whilst species was recorded during this season, <1% of birds at the Project during this

Site code	Site name	Distance from Project (km)	Distance from cable AoS (km)	Qualifying feature[1]	Screening decision	Rationale
						period will originate from this population.
UK9002087	Fair Isle	955	938	Kittiwake, b	OUT	Project is beyond the published mean maximum foraging range, therefore no connectivity during the breeding season. Not screened in for non-breeding season impacts as whilst species was recorded during this season, <1% of birds at the Project during this period will originate from this population.
UK9002088	Fair Isle	955	938	Puffin, b	OUT	Project is beyond the published mean maximum foraging range, therefore no connectivity during the breeding season. Not screened in for non-breeding season impacts as whilst species was recorded during this season, <1% of birds at the Project during this period will originate from this population.
UK9002089	Fair Isle	955	938	Razorbill, b	OUT	Project is beyond the published mean maximum foraging range, therefore no connectivity during the

Site code	Site name	Distance from Project (km)	Distance from cable AoS (km)	Qualifying feature[1]	Screening decision	Rationale
						breeding season. Not screened in for non-breeding season impacts as whilst species was recorded during this season, <1% of birds at the Project during this period will originate from this population.
UK9002091	Fair Isle	955	938	Seabird assemblage, b	OUT	Project is beyond the published mean maximum foraging range of all qualifying features of this site, therefore no connectivity during the breeding season. Not screened in for non-breeding season impacts as it is considered very unlikely that sufficient numbers of the assemblage would be present at the Project for LSE to occur.
UK9002090	Fair Isle	955	938	Shag, b	OUT	Project is beyond the published mean maximum foraging range, therefore no connectivity during the breeding season. Species not recorded during baseline surveys to date during any season.

Site code	Site name	Distance from Project (km)	Distance from cable AoS (km)	Qualifying feature[1]	Screening decision	Rationale
						Therefore there is no evidence for connectivity between this feature and the Project at any time of year.
UK9002061	Foula	1,014	1,000	Arctic skua, b	OUT	Project is beyond the published mean maximum foraging range, therefore no connectivity during the breeding season. Species not recorded during baseline surveys to date during any season. Therefore there is no evidence for connectivity between this feature and the Project at any time of year.
UK9002061	Foula	1,014	1,000	Arctic tern, b	OUT	Project is beyond the published mean maximum foraging range, therefore no connectivity during the breeding season. Species not recorded during baseline surveys to date during any season. Therefore there is no evidence for connectivity between this feature and the Project at any time of year.

Site code	Site name	Distance from Project (km)	Distance from cable AoS (km)	Qualifying feature[1]	Screening decision	Rationale
UK9002061	Foula	1,014	1,000	Fulmar, b	IN	Project is beyond the published mean maximum foraging range, therefore no connectivity during the breeding season. Screened in for non-breeding season impacts as species was recorded during this season, and >1% of birds at the Project during this period will originate from this population.
UK9002061	Foula	1,014	1,000	Great skua, b	OUT	Project is beyond the published mean maximum foraging range, therefore no connectivity during the breeding season. Species not recorded during baseline surveys to date during any season. Therefore there is no evidence for connectivity between this feature and the Project at any time of year.
UK9002061	Foula	1,014	1,000	Guillemot, b	OUT	Project is beyond the published mean maximum foraging range, therefore no connectivity during the breeding season. Not screened in for non-

Site code	Site name	Distance from Project (km)	Distance from cable AoS (km)	Qualifying feature[1]	Screening decision	Rationale
						breeding season impacts as whilst species was recorded during this season, <1% of birds at the Project during this period will originate from this population.
UK9002061	Foula	1,014	1,000	Kittiwake, b	OUT	Project is beyond the published mean maximum foraging range, therefore no connectivity during the breeding season. Not screened in for non-breeding season impacts as whilst species was recorded during this season, <1% of birds at the Project during this period will originate from this population.
UK9002061	Foula	1,014	1,000	Leach's petrel, b	OUT	Project is beyond the published mean maximum foraging range, therefore no connectivity during the breeding season. Species not recorded during baseline surveys to date during any season. Therefore there is no evidence for connectivity between this feature and

Site code	Site name	Distance from Project (km)	Distance from cable AoS (km)	Qualifying feature[1]	Screening decision	Rationale
						the Project at any time of year.
UK9002061	Foula	1,014	1,000	Puffin, b	IN	Project is beyond the published mean maximum foraging range, therefore no connectivity during the breeding season. Screened in for non-breeding season impacts as species was recorded during this season, and >1% of birds at the Project during this period will originate from this population.
UK9002061	Foula	1,014	1,000	Razorbill, b	OUT	Project is beyond the published mean maximum foraging range, therefore no connectivity during the breeding season. Not screened in for non-breeding season impacts as whilst species was recorded during this season, <1% of birds at the Project during this period will originate from this population.
UK9002061	Foula	1,014	1,000	Red-throated diver, b	OUT	Project is beyond the published mean maximum foraging range, therefore no connectivity during the

Site code	Site name	Distance from Project (km)	Distance from cable AoS (km)	Qualifying feature[1]	Screening decision	Rationale
						breeding season. Species not recorded during baseline surveys to date during any season. Therefore there is no evidence for connectivity between this feature and the Project at any time of year.
UK9002061	Foula	1,014	1,000	Seabird assemblage, b	OUT	Project is beyond the published mean maximum foraging range of all qualifying features of this site, therefore no connectivity during the breeding season. Not screened in for non-breeding season impacts as it is considered very unlikely that sufficient numbers of the assemblage would be present at the Project for LSE to occur.
UK9002061	Foula	1,014	1,000	Shag, b	OUT	Project is beyond the published mean maximum foraging range, therefore no connectivity during the breeding season. Species not recorded during baseline surveys to date during any season.

Site code	Site name	Distance from Project (km)	Distance from cable AoS (km)	Qualifying feature[1]	Screening decision	Rationale
						Therefore there is no evidence for connectivity between this feature and the Project at any time of year.
UK9002081	Noss	1,032	1,014	Fulmar, b	OUT	Project is beyond the published mean maximum foraging range, therefore no connectivity during the breeding season. Not screened in for non-breeding season impacts as whilst species was recorded during this season, <1% of birds at the Project during this period will originate from this population.
UK9002081	Noss	1,032	1,014	Gannet, b	IN	Project is beyond the published mean maximum foraging range, therefore no connectivity during the breeding season. Screened in for non-breeding season impacts as species was recorded during this season, and >1% of birds at the Project during this period will originate from this population.

Site code	Site name	Distance from Project (km)	Distance from cable AoS (km)	Qualifying feature[1]	Screening decision	Rationale
UK9002081	Noss	1,032	1,014	Great skua, b	OUT	Project is beyond the published mean maximum foraging range, therefore no connectivity during the breeding season. Species not recorded during baseline surveys to date during any season. Therefore there is no evidence for connectivity between this feature and the Project at any time of year.
UK9002081	Noss	1,032	1,014	Guillemot, b	OUT	Project is beyond the published mean maximum foraging range, therefore no connectivity during the breeding season. Not screened in for non-breeding season impacts as whilst species was recorded during this season, <1% of birds at the Project during this period will originate from this population.
UK9002081	Noss	1,032	1,014	Kittiwake, b	OUT	Project is beyond the published mean maximum foraging range, therefore no connectivity during the breeding season. Not screened in for non-

Site code	Site name	Distance from Project (km)	Distance from cable AoS (km)	Qualifying feature[1]	Screening decision	Rationale
						breeding season impacts as whilst species was recorded during this season, <1% of birds at the Project during this period will originate from this population.
UK9002081	Noss	1,032	1,014	Puffin, b	OUT	Project is beyond the published mean maximum foraging range, therefore no connectivity during the breeding season. Not screened in for non-breeding season impacts as whilst species was recorded during this season, <1% of birds at the Project during this period will originate from this population.
UK9002081	Noss	1,032	1,014	Seabird assemblage, b	OUT	Project is beyond the published mean maximum foraging range of all qualifying features of this site, therefore no connectivity during the breeding season. Not screened in for non-breeding season impacts as it is considered very unlikely that sufficient numbers of the

Site code	Site name	Distance from Project (km)	Distance from cable AoS (km)	Qualifying feature[1]	Screening decision	Rationale
						assemblage would be present at the Project for LSE to occur.
UK9002041	Ronas Hill - North Roe and Tingon SPA	1,072	1,056	Great skua, b	OUT	Project is beyond the published mean maximum foraging range, therefore no connectivity during the breeding season. Species not recorded during baseline surveys to date during any season. Therefore there is no evidence for connectivity between this feature and the Project at any time of year.
UK9002041	Ronas Hill - North Roe and Tingon SPA	1,072	1,056	Red-throated diver, b	OUT	Project is beyond the published mean maximum foraging range, therefore no connectivity during the breeding season. Species not recorded during baseline surveys to date during any season. Therefore there is no evidence for connectivity between this feature and the Project at any time of year.
UK9002011	Hermaness, Saxavord and Valla Field	1,099	1,081	Fulmar, b	OUT	Project is beyond the published mean maximum foraging range, therefore

Site code	Site name	Distance from Project (km)	Distance from cable AoS (km)	Qualifying feature[1]	Screening decision	Rationale
						no connectivity during the breeding season. Not screened in for non-breeding season impacts as whilst species was recorded during this season, <1% of birds at the Project during this period will originate from this population.
UK9002011	Hermaness, Saxavord and Valla Field	1,099	1,081	Gannet, b	IN	Project is beyond the published mean maximum foraging range, therefore no connectivity during the breeding season. Screened in for non-breeding season impacts as species was recorded during this season, and >1% of birds at the Project during this period will originate from this population.
UK9002011	Hermaness, Saxavord and Valla Field	1,099	1,081	Great skua, b	OUT	Project is beyond the published mean maximum foraging range, therefore no connectivity during the breeding season. Species not recorded during baseline surveys to date during any season. Therefore there is no

Site code	Site name	Distance from Project (km)	Distance from cable AoS (km)	Qualifying feature[1]	Screening decision	Rationale
						evidence for connectivity between this feature and the Project at any time of year.
UK9002011	Hermaness, Saxavord and Valla Field	1,099	1,081	Guillemot, b	OUT	Project is beyond the published mean maximum foraging range, therefore no connectivity during the breeding season. Not screened in for non-breeding season impacts as whilst species was recorded during this season, <1% of birds at the Project during this period will originate from this population.
UK9002011	Hermaness, Saxavord and Valla Field	1,099	1,081	Kittiwake, b	OUT	Project is beyond the published mean maximum foraging range, therefore no connectivity during the breeding season. Not screened in for non-breeding season impacts as whilst species was recorded during this season, <1% of birds at the Project during this period will originate from this population.

Site code	Site name	Distance from Project (km)	Distance from cable AoS (km)	Qualifying feature[1]	Screening decision	Rationale
UK9002011	Hermaness, Saxavord and Valla Field	1,099	1,081	Puffin, b	IN	Project is beyond the published mean maximum foraging range, therefore no connectivity during the breeding season. Screened in for non-breeding season impacts as species was recorded during this season, and >1% of birds at the Project during this period will originate from this population.
UK9002011	Hermaness, Saxavord and Valla Field	1,099	1,081	Red-throated diver, b	OUT	Project is beyond the published mean maximum foraging range, therefore no connectivity during the breeding season. Species not recorded during baseline surveys to date during any season. Therefore there is no evidence for connectivity between this feature and the Project at any time of year.
UK9002011	Hermaness, Saxavord and Valla Field	1,099	1,081	Seabird assemblage, b	OUT	Project is beyond the published mean maximum foraging range of all qualifying features of this site, therefore no connectivity during the

Site code	Site name	Distance from Project (km)	Distance from cable AoS (km)	Qualifying feature[1]	Screening decision	Rationale
						breeding season. Not screened in for non-breeding season impacts as it is considered very unlikely that sufficient numbers of the assemblage would be present at the Project for LSE to occur.
UK9002011	Hermaness, Saxavord and Valla Field	1,099	1,081	Shag, b	OUT	Project is beyond the published mean maximum foraging range, therefore no connectivity during the breeding season. Species not recorded during baseline surveys to date during any season. Therefore there is no evidence for connectivity between this feature and the Project at any time of year.
1 "b" indicates breeding season, "nb" indicates non-breeding season						

Appendix 3 Screening outcome for transboundary SPA and Ramsar Sites with offshore ornithology qualifying features

Site code	Site name	Distance from Project (km)	Distance from cable AoS (km)	Qualifying feature[1]	Screening decision	Rationale
004009	Lady's Island Lake	134	130	Arctic tern, b	OUT	Project is beyond the published mean maximum foraging range, therefore no connectivity during the breeding season. Species not recorded during baseline surveys to date during any season. Therefore there is no evidence for connectivity between this feature and the Project at any time of year.
004009	Lady's Island Lake	134	130	Common tern, b	OUT	Project is beyond the published mean maximum foraging range, therefore no connectivity during the breeding season. Not screened in for non-breeding season impacts as species not recorded during this season.
004009	Lady's Island Lake	134	130	Roseate tern, b	OUT	Project is beyond the published mean maximum foraging range, therefore no connectivity during the breeding season. Species not recorded during baseline surveys to date during any season. Therefore there is no evidence for connectivity between this feature and

Site code	Site name	Distance from Project (km)	Distance from cable AoS (km)	Qualifying feature[1]	Screening decision	Rationale
						the Project at any time of year.
004009	Lady's Island Lake	134	130	Sandwich tern, b	OUT	Project is beyond the published mean maximum foraging range, therefore no connectivity during the breeding season. Not screened in for non-breeding season impacts as whilst species was recorded during this season, it is expected that <1% of birds at the Project during this period will originate from this population.
004002	Saltee Islands	137	135	Cormorant, b	OUT	Project is beyond the published mean maximum foraging range, therefore no connectivity during the breeding season. Species not recorded during baseline surveys to date during any season. Therefore there is no evidence for connectivity between this feature and the Project at any time of year.
004002	Saltee Islands	137	135	Fulmar, b	IN	Project is within the published mean maximum foraging range, and feature was recorded during baseline surveys during the

Site code	Site name	Distance from Project (km)	Distance from cable AoS (km)	Qualifying feature[1]	Screening decision	Rationale
						breeding season. Therefore screened in for potential impacts during the breeding season. Non-breeding season impacts will also be considered.
004002	Saltee Islands	137	135	Gannet, b	IN	Project is within the published mean maximum foraging range, and feature was recorded during baseline surveys during the breeding season. Therefore screened in for potential impacts during the breeding season. Non-breeding season impacts will also be considered.
004002	Saltee Islands	137	135	Guillemot, b	OUT	Project is beyond the published mean maximum foraging range, therefore no connectivity during the breeding season. Not screened in for non-breeding season impacts as whilst species was recorded during this season, it is expected that <1% of birds at the Project during this period will originate from this population.
004002	Saltee Islands	137	135	Herring gull, b	OUT	Project is beyond the published mean maximum

Site code	Site name	Distance from Project (km)	Distance from cable AoS (km)	Qualifying feature[1]	Screening decision	Rationale
						foraging range, therefore no connectivity during the breeding season. Not screened in for non-breeding season impacts as whilst species was recorded during this season, it is expected that <1% of birds at the Project during this period will originate from this population.
004002	Saltee Islands	137	135	Kittiwake, b	OUT	Project is beyond the published mean maximum foraging range, therefore no connectivity during the breeding season. Not screened in for non-breeding season impacts as whilst species was recorded during this season, it is expected that <1% of birds at the Project during this period will originate from this population.
004002	Saltee Islands	137	135	Lesser black-backed gull, b	OUT	Project is beyond the published mean maximum foraging range, therefore no connectivity during the breeding season. Not screened in for non-breeding season impacts as whilst species was recorded

Site code	Site name	Distance from Project (km)	Distance from cable AoS (km)	Qualifying feature[1]	Screening decision	Rationale
						during this season, it is expected that <1% of birds at the Project during this period will originate from this population.
004002	Saltee Islands	137	135	Puffin, b	OUT	Project is beyond the published mean maximum foraging range, therefore no connectivity during the breeding season. Not screened in for non-breeding season impacts as whilst species was recorded during this season, it is expected that <1% of birds at the Project during this period will originate from this population.
004002	Saltee Islands	137	135	Razorbill, b	OUT	Project is beyond the published mean maximum foraging range, therefore no connectivity during the breeding season. Not screened in for non-breeding season impacts as whilst species was recorded during this season, it is expected that <1% of birds at the Project during this period will originate from this population.

Site code	Site name	Distance from Project (km)	Distance from cable AoS (km)	Qualifying feature[1]	Screening decision	Rationale
004002	Saltee Islands	137	135	Shag, b	OUT	Project is beyond the published mean maximum foraging range, therefore no connectivity during the breeding season. Species not recorded during baseline surveys to date during any season. Therefore there is no evidence for connectivity between this feature and the Project at any time of year.
004193	Mid-Waterford Coast	166	165	Cormorant, b	OUT	Project is beyond the published mean maximum foraging range, therefore no connectivity during the breeding season. Species not recorded during baseline surveys to date during any season. Therefore there is no evidence for connectivity between this feature and the Project at any time of year.
004193	Mid-Waterford Coast	166	165	Herring gull, b	OUT	Project is beyond the published mean maximum foraging range, therefore no connectivity during the breeding season. Not screened in for non-breeding season impacts as whilst species was recorded

Site code	Site name	Distance from Project (km)	Distance from cable AoS (km)	Qualifying feature[1]	Screening decision	Rationale
						during this season, it is expected that <1% of birds at the Project during this period will originate from this population.
004192	Helvick Head to Ballyquin	180	180	Cormorant, b	OUT	Project is beyond the published mean maximum foraging range, therefore no connectivity during the breeding season. Species not recorded during baseline surveys to date during any season. Therefore there is no evidence for connectivity between this feature and the Project at any time of year.
004192	Helvick Head to Ballyquin	180	180	Herring gull, b	OUT	Project is beyond the published mean maximum foraging range, therefore no connectivity during the breeding season. Not screened in for non-breeding season impacts as whilst species was recorded during this season, it is expected that <1% of birds at the Project during this period will originate from this population.
004192	Helvick Head to Ballyquin	180	180	Kittiwake, b	OUT	Project is beyond the published mean maximum

Site code	Site name	Distance from Project (km)	Distance from cable AoS (km)	Qualifying feature[1]	Screening decision	Rationale
						foraging range, therefore no connectivity during the breeding season. Not screened in for non-breeding season impacts as whilst species was recorded during this season, it is expected that <1% of birds at the Project during this period will originate from this population.
004127	Wicklow Head	206	200	Kittiwake, b	OUT	Project is beyond the published mean maximum foraging range, therefore no connectivity during the breeding season. Not screened in for non-breeding season impacts as whilst species was recorded during this season, it is expected that <1% of birds at the Project during this period will originate from this population.
004186	The Murrough	209	204	Black-headed gull, Chroicocephalus ridibundus, nb	OUT	Site boundary encompasses core areas used during the non-breeding season. Extensive distance between the site boundary and the Project. No evidence for connectivity between this

Site code	Site name	Distance from Project (km)	Distance from cable AoS (km)	Qualifying feature[1]	Screening decision	Rationale
						feature and the Project at any time of year.
004186	The Murrough	209	204	Herring gull, nb	OUT	Site boundary encompasses core areas used during the non-breeding season. Extensive distance between the site boundary and the Project. No evidence for connectivity between this feature and the Project.
004186	The Murrough	209	204	Little tern, b	OUT	Project is beyond the published mean maximum foraging range, therefore no connectivity during the breeding season. Species not recorded during baseline surveys to date during any season. Therefore there is no evidence for connectivity between this feature and the Project at any time of year.
004186	The Murrough	209	204	Red-throated diver, nb	OUT	Site boundary encompasses core areas used during the non-breeding season. Extensive distance between the site boundary and the Project. No evidence for connectivity between this feature and the Project.
004124	Sovereign Islands	222	224	Cormorant, b	OUT	Project is beyond the published mean maximum

Site code	Site name	Distance from Project (km)	Distance from cable AoS (km)	Qualifying feature[1]	Screening decision	Rationale
						foraging range, therefore no connectivity during the breeding season. Species not recorded during baseline surveys to date during any season. Therefore there is no evidence for connectivity between this feature and the Project at any time of year.
004021	Old Head of Kinsale	227	229	Guillemot, b	OUT	Project is beyond the published mean maximum foraging range, therefore no connectivity during the breeding season. Not screened in for non-breeding season impacts as whilst species was recorded during this season, it is expected that <1% of birds at the Project during this period will originate from this population.
004021	Old Head of Kinsale	227	229	Kittiwake, b	OUT	Project is beyond the published mean maximum foraging range, therefore no connectivity during the breeding season. Not screened in for non-breeding season impacts as whilst species was recorded during this season, it is

Site code	Site name	Distance from Project (km)	Distance from cable AoS (km)	Qualifying feature[1]	Screening decision	Rationale
						expected that <1% of birds at the Project during this period will originate from this population.
004172	Dalkey Islands	241	235	Arctic tern, b	OUT	Project is beyond the published mean maximum foraging range, therefore no connectivity during the breeding season. Species not recorded during baseline surveys to date during any season. Therefore there is no evidence for connectivity between this feature and the Project at any time of year.
004172	Dalkey Islands	241	235	Common tern, b	OUT	Project is beyond the published mean maximum foraging range, therefore no connectivity during the breeding season. Not screened in for non-breeding season impacts as species not recorded during this season.
004172	Dalkey Islands	241	235	Roseate tern, b	OUT	Project is beyond the published mean maximum foraging range, therefore no connectivity during the breeding season. Species not recorded during baseline surveys to date during any

Site code	Site name	Distance from Project (km)	Distance from cable AoS (km)	Qualifying feature[1]	Screening decision	Rationale
						season. Therefore there is no evidence for connectivity between this feature and the Project at any time of year.
004113	Howth Head Coast	250	245	Kittiwake, b	OUT	Project is beyond the published mean maximum foraging range, therefore no connectivity during the breeding season. Not screened in for non-breeding season impacts as whilst species was recorded during this season, it is expected that <1% of birds at the Project during this period will originate from this population.
004117	Ireland's Eye	254	249	Cormorant, b	OUT	Project is beyond the published mean maximum foraging range, therefore no connectivity during the breeding season. Species not recorded during baseline surveys to date during any season. Therefore there is no evidence for connectivity between this feature and the Project at any time of year.
004117	Ireland's Eye	254	249	Guillemot, b	OUT	Project is beyond the published mean maximum

Site code	Site name	Distance from Project (km)	Distance from cable AoS (km)	Qualifying feature[1]	Screening decision	Rationale
						foraging range, therefore no connectivity during the breeding season. Not screened in for non-breeding season impacts as whilst species was recorded during this season, it is expected that <1% of birds at the Project during this period will originate from this population.
004117	Ireland's Eye	254	249	Herring gull, b	OUT	Project is beyond the published mean maximum foraging range, therefore no connectivity during the breeding season. Not screened in for non-breeding season impacts as whilst species was recorded during this season, it is expected that <1% of birds at the Project during this period will originate from this population.
004117	Ireland's Eye	254	249	Kittiwake, b	OUT	Project is beyond the published mean maximum foraging range, therefore no connectivity during the breeding season. Not screened in for non-breeding season impacts as whilst species was recorded

Site code	Site name	Distance from Project (km)	Distance from cable AoS (km)	Qualifying feature[1]	Screening decision	Rationale
						during this season, it is expected that <1% of birds at the Project during this period will originate from this population.
004117	Ireland's Eye	254	249	Razorbill, b	OUT	Project is beyond the published mean maximum foraging range, therefore no connectivity during the breeding season. Not screened in for non-breeding season impacts as whilst species was recorded during this season, it is expected that <1% of birds at the Project during this period will originate from this population.
004069	Lambay Island	263	257	Cormorant, b	OUT	Project is beyond the published mean maximum foraging range, therefore no connectivity during the breeding season. Species not recorded during baseline surveys to date during any season. Therefore there is no evidence for connectivity between this feature and the Project at any time of year.
004069	Lambay Island	263	257	Fulmar, b	IN	Project is within the published mean maximum

Site code	Site name	Distance from Project (km)	Distance from cable AoS (km)	Qualifying feature[1]	Screening decision	Rationale
						foraging range, and feature was recorded during baseline surveys during the breeding season. Therefore screened in for potential impacts during the breeding season. Non-breeding season impacts will also be considered.
004069	Lambay Island	263	257	Guillemot, b	OUT	Project is beyond the published mean maximum foraging range, therefore no connectivity during the breeding season. Not screened in for non-breeding season impacts as whilst species was recorded during this season, it is expected that <1% of birds at the Project during this period will originate from this population.
004069	Lambay Island	263	257	Herring gull, b	OUT	Project is beyond the published mean maximum foraging range, therefore no connectivity during the breeding season. Not screened in for non-breeding season impacts as whilst species was recorded during this season, it is expected that <1% of birds

Site code	Site name	Distance from Project (km)	Distance from cable AoS (km)	Qualifying feature[1]	Screening decision	Rationale
						at the Project during this period will originate from this population.
004069	Lambay Island	263	257	Kittiwake, b	OUT	Project is beyond the published mean maximum foraging range, therefore no connectivity during the breeding season. Not screened in for non-breeding season impacts as whilst species was recorded during this season, it is expected that <1% of birds at the Project during this period will originate from this population.
004069	Lambay Island	263	257	Lesser black-backed gull, b	OUT	Project is beyond the published mean maximum foraging range, therefore no connectivity during the breeding season. Not screened in for non-breeding season impacts as whilst species was recorded during this season, it is expected that <1% of birds at the Project during this period will originate from this population.
004069	Lambay Island	263	257	Puffin, b	OUT	Project is beyond the published mean maximum foraging range, therefore no

Site code	Site name	Distance from Project (km)	Distance from cable AoS (km)	Qualifying feature[1]	Screening decision	Rationale
						connectivity during the breeding season. Not screened in for non-breeding season impacts as whilst species was recorded during this season, it is expected that <1% of birds at the Project during this period will originate from this population.
004069	Lambay Island	263	257	Razorbill, b	OUT	Project is beyond the published mean maximum foraging range, therefore no connectivity during the breeding season. Not screened in for non-breeding season impacts as whilst species was recorded during this season, it is expected that <1% of birds at the Project during this period will originate from this population.
004069	Lambay Island	263	257	Shag, b	OUT	Project is beyond the published mean maximum foraging range, therefore no connectivity during the breeding season. Species not recorded during baseline surveys to date during any season. Therefore there is no evidence for connectivity

Site code	Site name	Distance from Project (km)	Distance from cable AoS (km)	Qualifying feature[1]	Screening decision	Rationale
						between this feature and the Project at any time of year.
004014	Rockabill	272	266	Arctic tern, b	OUT	Project is beyond the published mean maximum foraging range, therefore no connectivity during the breeding season. Species not recorded during baseline surveys to date during any season. Therefore there is no evidence for connectivity between this feature and the Project at any time of year.
004014	Rockabill	272	266	Common tern, b	OUT	Project is beyond the published mean maximum foraging range, therefore no connectivity during the breeding season. Not screened in for non-breeding season impacts as species not recorded during this season.
004014	Rockabill	272	266	Roseate tern, b	OUT	Project is beyond the published mean maximum foraging range, therefore no connectivity during the breeding season. Species not recorded during baseline surveys to date during any season. Therefore there is

Site code	Site name	Distance from Project (km)	Distance from cable AoS (km)	Qualifying feature[1]	Screening decision	Rationale
						no evidence for connectivity between this feature and the Project at any time of year.
004122	Skerries Islands	273	268	Cormorant, b	OUT	Project is beyond the published mean maximum foraging range, therefore no connectivity during the breeding season. Species not recorded during baseline surveys to date during any season. Therefore there is no evidence for connectivity between this feature and the Project at any time of year.
004122	Skerries Islands	273	268	Shag, b	OUT	Project is beyond the published mean maximum foraging range, therefore no connectivity during the breeding season. Species not recorded during baseline surveys to date during any season. Therefore there is no evidence for connectivity between this feature and the Project at any time of year.
1 "b" indicates breeding season, "nb" indicates non-breeding season						

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Appendix D Marine Conservation Zone Screening Assessment

White Cross Offshore Wind Farm Marine Conservation Zone Assessment Screening Report

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V 1.0	Draft
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1. Introduction

1.1 Purpose of this document

1. This document provides the screening stage of the Marine Conservation Zone Assessment (MCZA) process for the White Cross Floating Offshore Wind Project (hereafter 'the Project').

2. The MCZA comprises up to three stages (see **Section 2: MCZ Assessment Methodology**). The aim of this stage is to determine whether or not an activity is capable of affecting (other than insignificantly) the protected features or physical processes of a marine conservation zone (MCZ), either directly or indirectly. This enables the competent authority to ensure compliance with the Marine and Coastal Access Act (MCAA) (2009).

3. Where it is considered that there is no potential for a significant effect as a result of the Project, it is proposed that the MCZ (or relevant feature of the MCZ) is 'screened out' from further consideration. Where the potential for a significant effect on the conservation objectives cannot be discounted, it remains 'screened in' and further assessment will be undertaken.

4. This document is to be used to inform stakeholder consultation. Agreement on whether sites and features should or should not be screened out will be sought through consultation.

1.2 Project Background

5. The Project is a proposed offshore windfarm located in the Celtic Sea (see **Figure 1.1.1 in the EIA Scoping Report**) with a capacity of up to 100MW. The Project is being developed by Offshore Wind Ltd (OWL) a joint venture between Cobra Instalaciones Servicios, S.A., and Flotation Energy plc. The Project was selected in 2021 as part of The Crown Estate's Test and Demonstration leasing opportunity.

6. The Windfarm Site is located over 52km off the North Cornwall and North Devon coast (west-north-west of Hartland Point). The Offshore Export Cable will connect the Offshore Substation Platform to shore. Onshore, the grid connection is confirmed as East Yelland (see **Figure 1.1.2 in the EIA Scoping Report**). The Export Cable will come ashore at a Landfall and then routed underground to the onshore substation where it connects into the Western Power Distribution Network.

1.3 Offshore Project Description

7. At this early stage in the development of the Project, the Project description is indicative.

8. The Agreement for Lease (AfL) area is illustrated in the map in (see **Figure 1.1.1 in the EIA Scoping Report**). The AfL area, known as the Windfarm Site, is located 52km north of the Cornwall and Devon coastline in a water depth of 60m – 80m. The Windfarm Site covers 50km^2.

9. The key characteristics of the AfL area are summarised in **Table 1.1**.

Table 1.1 Key characteristics

Area	Parameters	Values
AfL/windfarm site	Area	50km^2
	Closest distance to shore	52km
	Water depth	60m - 80m

1.3.1 Wind Turbine Generators

10. The size and capacity of the wind turbines will be decided at a later stage, prior to final investment decision. Technology develops rapidly and the available sizes of turbines are expected to increase over the coming years. The current wind turbine design envelope for the Project is outlined in **Table 1.2**.

Table 1.2 Wind Turbine Design Envelope

Wind Turbine Generator Parameter	Range to be considered
WTG capacity (MW)	12 – 24
Turbine type	3-bladed, with horizontal axis
Rotor Diameter (m)	220-300
Number of wind turbines	6-8
Individual Rotor swept area (m^2)	38,000 – 70,700
Total Rotor swept area (km^2)	~0.304km^2 (based on 8 x 220m diameter turbines)
Max Tip Height (m) above Mean Sea Level (MSL)	~345
Air Gap above MSL (m)	22
Indicative separation distance between turbines (inter-row)	Min. 1000m (subject to yield assessment)

Wind Turbine Floating Substructure

11. The floating substructure provides a base for the installation of the wind turbine. The substructure as defined here has three key components: (1) the mooring system, which anchors the structure to the seabed; (2) the substructure, a floating structure that supports the wind turbine; and (3) the transition, which provides the

connection from the substructure to the wind turbine tower. Substructures are typically made of tubular steel columns.

12. Conventional fixed substructures are less suitable for deeper waters (>50m), and floating substructures, where water depth presents less of an issue, could be a viable option. In addition to allowing turbines to be installed in deeper waters further from shore, floating structures offer benefits in that their construction is largely yard based, with significantly less offshore construction activity, therefore reducing the impacts of offshore construction, the cost and scheduling uncertainties traditionally associated with more conventional windfarm construction.

13. The substructure is constructed and the turbine installed in a dry dock or inshore (tensionleg/submersible only), thus reducing the high costs of assembly and installation at sea. Once complete it is towed to site where it is attached to the pre-installed moorings and interarray cables. The substructure is then fully ballasted (water), moorings are picked up and tensioned, the electrical cable head pulled-in and the Wind Turbine commissioned.

Tension leg platform (TLP)

14. A semi-submerged buoyant structure, anchored to the seabed with tensioned mooring lines, which provide stability (see illustration in **Plate 1**). The shallow draft and tension stability allows for a smaller and lighter structure, but this design increases stresses on the tendon and anchor system. There are also challenges with the installation process and increased operational risks if a tendon fails. Examples include: PelaStar (by Glosten); Blue H TLP (by Blue H Group); Eco TLP (by DBD Systems); GICON-SOF (by GICON).

Semi-submersible platform

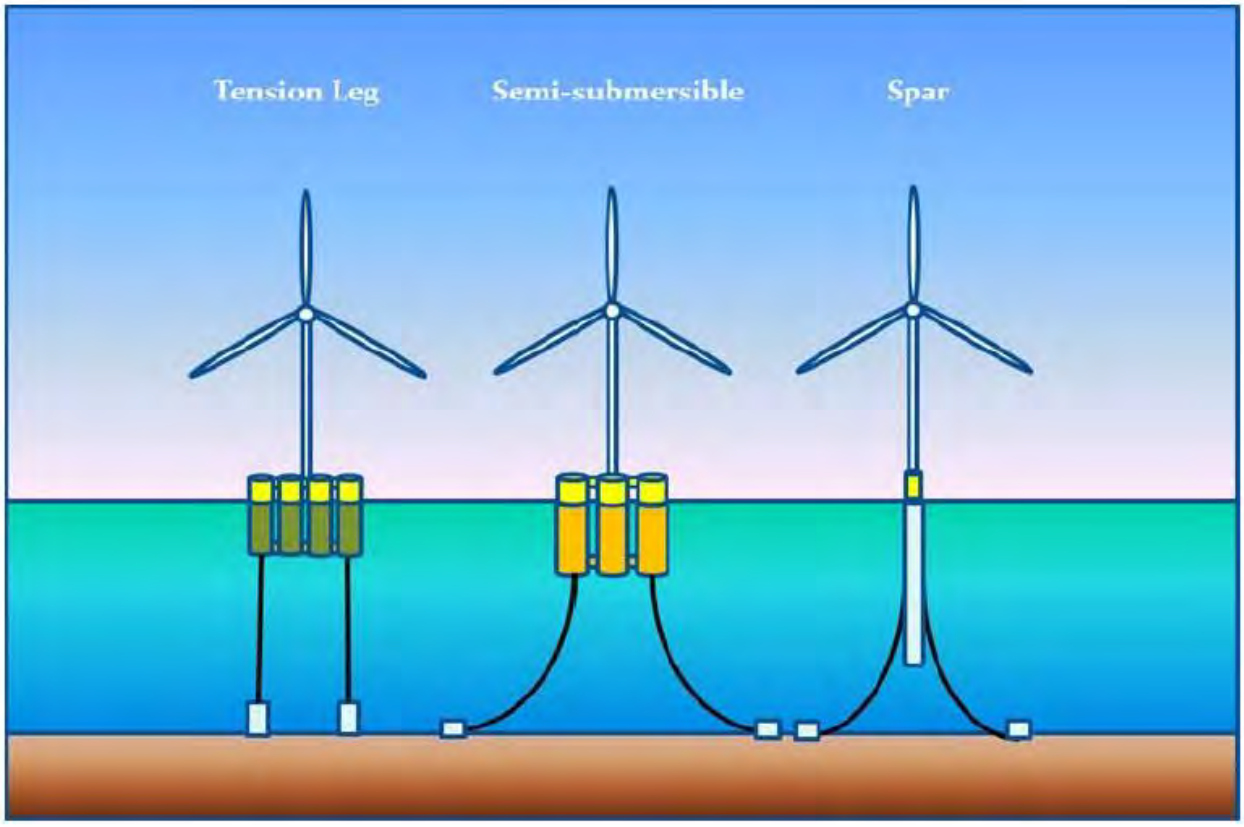
15. Buoyancy stabilised platform which floats semi-submerged on the surface of the ocean whilst anchored to the seabed with catenary mooring lines (see illustration in **Plate 1**). Often requires a large and heavy structure to maintain stability, but a low draft allows for more flexible application and simpler installation. Examples include: WindFloat (by Principle Power); Damping Pool (by IDEOL); SeaReed (by DCNS).

Spar-buoy

16. A cylindrical ballast-stabilised structure which gains its stability from having the centre of gravity lower in the water than the centre of buoyancy (see illustration in **Plate 1**). Thus, while the lower parts of the structure are heavy, the upper parts are usually lighter, thereby raising the centre of buoyancy. The simple structure of the spar-buoy is typically easy to fabricate and provides good stability, but the large draft requirement can create logistical challenges during assembly, transportation,

and installation (and decommissioning), and can constrain deployment to waters >100m depth. Therefore, this option is not anticipated to be used for the Project. Examples include: Hywind (by Statoil); Sway (by Sway); Advanced Spar (by Japan Marine United).

Plate 1 Types of floating offshore windfarm systems - Tension leg, Semi-sub and Spare Buoy



17. Currently the selection of the floating substructure is defined by the water depths that each substructure requires for safe operation and the suitable construction ports/locations where the proposed development is located. The Carbon Trust (2015) document highlights the key strengths of each system (**Table 1.3**).

18. Given the depth of the Windfarm Site, OWL is likely to use the semi-submersible technology type.

Table 1.3 Key strengths and weaknesses of each substructure type

Technology	Strengths	Weaknesses
Tension Leg (water depth +100m)	• Low Structural mass. • Onshore turbine assembly. • Few moving parts (no active ballast required). • Stability.	• High loads on the mooring and anchoring system. • Challenging installation process. • Bespoke installation barge often required.
Semi-submersible (water depth +40m)	• Flexible application due to the ability to operate in shallow water depths. • Low vessel requirement- only basic tug boats required. • Onshore turbine assembly. • Amendable to port-side major repairs.	• High structural mass to provide sufficient buoyancy and stability. • Complex steel structures with many welded joints - can be difficult to fabricate. • Potentially costly active ballast systems.
Spar-buoy (water depth +120m)	• Simple design is amenable to serial fabrication processes. • Few moving parts (No active ballast required). • Excellent stability.	• High loads on the mooring and anchoring system. • Challenging installation process. • Bespoke installation barge often required.

Table 1.4: Wind Turbine Floating Substructure Envelope

Turbine Floating Substructure Parameters*	Parameter
Overall length of each face (m)	~100
Water depth in operation (m)	12 – 18 (indicative range)
Freeboard (in operation) (m)	10 – 16 (indicative range)
Total substructure unit height (m)	22 – 34 (indicative range)

*The baseline assumption is that the type of floating substructure used will be **semi-submersible**. However, until sufficient engineering has been completed, other floating substructure types cannot be ruled out.

Wind Turbine Anchors and Mooring

19. The floating substructures described require moorings to anchor the turbine to the seabed in order to maintain position. The type and number of anchors and moorings used for the Project will depend on the type of floating substructure, loads imposed

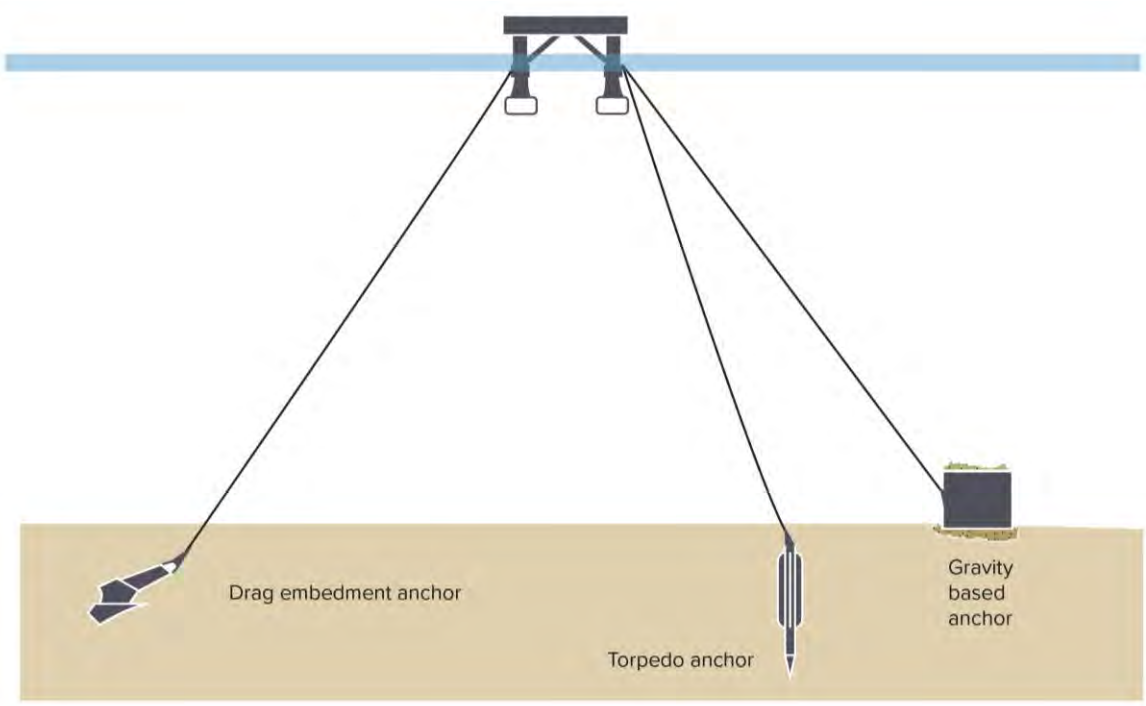
on the mooring system by the substructure/WTG assembly in the metocean conditions prevailing on site, in addition to geotechnical and environmental considerations.

20. The anchoring system options being considered are detailed in **Table 1.5**, with an illustration of the types shown in **Plate 2**.

Table 1.5 Wind Turbine Anchoring Options

Wind Turbine Substructure Anchoring Options	Maximum (unless specified)
Sub-structure types	Tension Leg, Semi-sub and Spar-buoy
Number of mooring lines	Depends on sub structure type
Mooring types	Depends on sub structure type
Anchor types	Drag embedment anchors, Torpedo Anchors, Gravity Based Anchors
Anchor mass	TBC
Mooring lines	Anchor chain, Mooring cables, polyester mooring lines
Pennant wires/buoys	Temporary surface buoys during construction, Permanent submersible buoys at seabed for ROV recovery
Mooring line radius	TBC

Plate 2 Types of floating offshore windfarm anchoring systems



21. **Table 1.6** presents the key dimensions of the anchoring systems.

Table 1.6 Wind Turbine Anchoring Systems Envelope

Turbine Anchoring Options Parameters	Parameter
Weight (tonnes)	15 – 20 tonnes per anchor
Estimated length of mooring line	Up to 800m
No. of anchors and mooring lines per turbine	3 – 6 per turbine

1.3.2 Electrical system

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

23. The key components of the electrical infrastructure are described below.

Array cables

24. Array cables connect the turbines to each other and to the offshore substation. The array cables are expected to be 66KV to 132kV alternating current (AC). The length of each array cable will depend on the final layout. A realistic maximum distance of array cables will be defined for the purposes of the EIA and used as the basis for the assessments.

25. The inter-array cables will be buried in the seabed, typically to a depth of 1m, but may range from 0.5m - 3m, and can be buried via several techniques depending on the seabed conditions along the route. These techniques can be ploughing, jetting, trenching or post-lay burial. Where cable burial is not possible alternative cable protection measures could be used. This includes rock placement, grout / sandbags, concrete mattresses and polyethylene ducting, but no protection will also be considered.

Offshore substation

26. The cables from turbines will be brought to an offshore substation platform, located appropriately to optimise the array cable and export cable lengths. One substation is required. At the substation, the generated power will be transformed to a higher AC voltage. This higher voltage will be determined by detailed studies, although it expected that the substation will step up the 66kV or 132kV array cable voltage to up to 220kV for the export cabling.

27. The offshore substation platform will typically include components including but not limited to transformers, batteries, generators, switchgear, fire systems, and modular facilities for operational and maintenance activities.

28. The offshore substation will comprise a topside platform installed on a foundation. The location of the offshore substation/s will be confirmed during the detailed design process. **Table 1.7** describes the substation foundation options.

29. The typical footprint plan of the offshore substation will be in the region of 80m x 60m with the topsides comprised of several layers / decks stacked on top of another as required. The offshore substation foundation type will likely be a jacket or a Gravity Based Structure (GBS) foundation. The jacket foundation will have 4 or 6 legs with up to three piles at each leg or one suction bucket at each leg. Leg spacing at the seabed will be up to 40m. In case of a GBS foundation the diameter of the foundation at seabed will be up to 50m.

Table 1.7 Offshore Substation Foundation Options Parameters

Offshore Substation Foundation Options Parameters	Parameter	Maximum (unless specified)
Jacket with piling	Leg spacing	<30m
	Hammer size	<3000kJ
	Pile Diameter	3m - 5m per pile
Tripod	Leg spacing	<30m
	Hammer size	<3000kJ
	Pile Diameter	3m - 5m per pile
Suction bucket	Leg spacing	<35m
	Bucket diameter	<20m
Gravity based structure	Diameter	<50m
	Diameter of seabed levelling	100m

Offshore export cable

30. Electricity from the offshore substation will be transmitted via one subsea export cable to shore. The export cable (up to 220kV AC) is likely to run from the offshore substation to a transition joint bay at the Landfall. The transition joint bay connects the offshore cable and onshore export cable. The export cable will be installed in an individual trench and protected in line with good industry practice. **Table 1.8** describes the main cable parameters.

31. The cable will be buried where possible to ensure that the cable is protected from damage by external factors. Typical burial depth is 1m but may range from 0.5m -

3m. The depth will be determined by a Burial Assessment Study (BAS) and a Cable Burial Risk Assessment (CBRA). Where cable burial is not possible alternative cable protection measures could be used. This includes rock placement, grout / sand bags, concrete mattresses and polyethylene ducting, but no protection option will also be considered. The appropriate level of protection will be determined based on an assessment of the risks posed to the Project in specific areas.

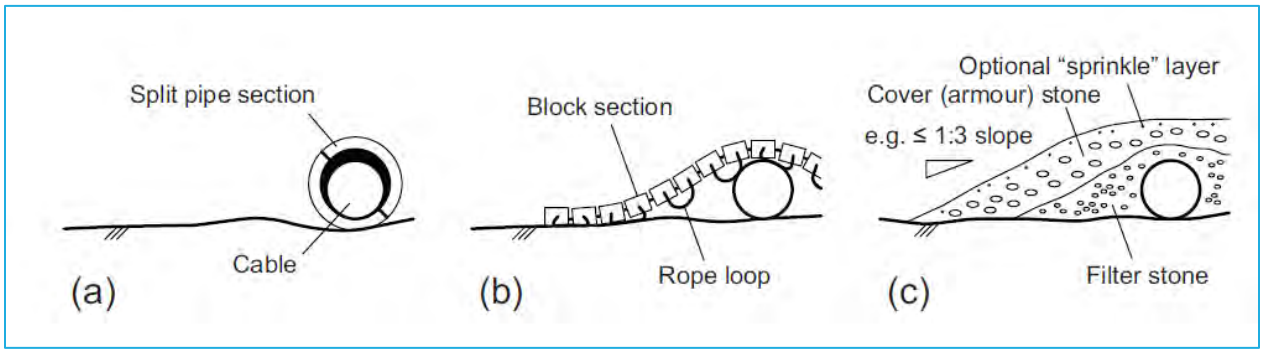
32. It is likely that the export cable will have to cross other cables and/or pipelines. Formal agreements with regards to existing cable crossings will be entered into by OWL and the existing owners / operators, with the installation techniques discussed and agreed to ensure integrity of the existing infrastructure and any new cables associated with the Project. Several techniques can be utilised, include tubular products, concrete mattresses, and rock placement as shown in **Plate 3**.

Table 1.8 Offshore cable parameters (based on an HVAC export cable system)

Item	Indicative parameters
Substation	1
Array cables	One per wind turbine plus potential cables for redundancy between strings
Export cable/trench	1
Fibre optic cables	Bundled in export cable
Export cable route standard working width (cable corridor)	Minimum 22m, maximum 50m
Length of cables	
Array cables	Dependent upon distance between turbines
Export cable	70km

* The baseline assumption is that **one offshore substation** will be required. However, once sufficient engineering has been completed, OWL will consider options to remove the need for an offshore substation from the Project.

Plate 3 Cable protection: (a) tubular product; (b) concrete mattress; (c) rock placement



33. Pre-lay intervention activities may be required prior to the installation of cables including boulder removal, sandwave clearance, installation of equipment at crossings and the cutting and removal of any out-of-service cables.

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

1.4 Legislation, Policy and Guidance

1.4.1 Marine and Coastal Access Act (2009)

35. The UK Marine & Coastal Access Act (MCAA) (2009) establishes a range of measures to manage the marine environment, including establishing MCZs. The MCZ Project was established in 2008 by the Joint Nature Conservation Committee (JNCC) and Natural England to work with regional stakeholder led projects to identify and recommend MCZs to Government. MCZs were designated in three tranches (2013, 2016 and 2019) and the process is now complete.

36. Section 126 of the MCAA describes the duties of public authorities in relation to certain decisions and applies where:

    - a public authority has the function of determining an application (whenever made) for authorisation of the doing of an act
    - the act is capable of affecting (other than insignificantly):
        - the protected features of an MCZ
        - any ecological or geomorphological process on which the conservation of any protected feature of an MCZ is (wholly or in part) dependent

37. The statutory nature conservation body (SNCB) (in this case Natural England) has responsibility under the MCAA to give advice on how to further the conservation objectives for the MCZ and identify the activities that are capable of affecting the designated features and the processes which they are dependent upon.

1.4.2 Guidance

38. The MCZ Screening gives consideration to the Marine Management Organisation (MMO) (2013) Marine Conservation Zones and Marine Licensing guidance.

39. The Stage 1 MCZA will also be informed by Supplementary Advice on Conservation Objectives (SACO) for each relevant site, where available.

2. MCZ Assessment Methodology

40. To undertake its marine licensing function, the MMO has introduced a three-stage sequential assessment process for considering impacts on MCZs, in order for it to deliver its duties under Section 126 of the MCAA. Section 126 places specific duties on all public bodies in undertaking their licensing activities where they are capable of hindering the conservation objectives of an MCZ. The MCZ assessment process is similar to, but separate from, the Habitats Regulations Assessment (HRA) process. The stages of MCZ assessment are presented below.

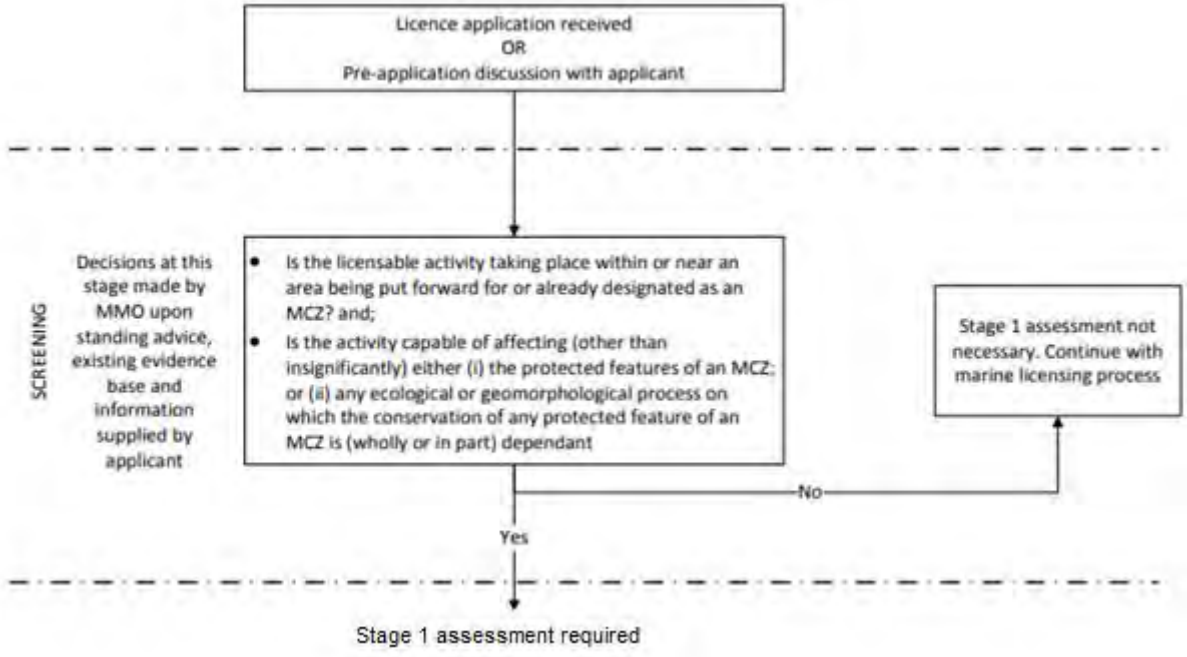
2.1 Screening (this report)

41. The need for the Project and its key objectives will be set out fully in consultation documents and/or application. In summary, there are four drivers for the development of offshore wind energy:

- The plan, project or activity within or near to an MCZ
- The plan, project or activity is capable of significantly affecting (without mitigation) (i) the protected features of an MCZ, or (ii) any ecological or geomorphological processes on which the conservation of the features depends

42. The MCZA screening stage is summarised in **Plate 4**.

Plate 4 MCZA Process



2.2 Stage 2 Assessment

43. The Stage 2 assessment considers the socio-economic impact of the Project together with the risk of environmental damage. There are two parts to the Stage 2 assessment process:

    - Does the public benefit in proceeding with the Project clearly outweigh the risk of damage to the environment that will be created by proceeding with it? If so,
    - Can the applicant secure, or undertake arrangements to secure, measures of equivalent environmental benefit (MEEB) for the damage the Project will have on the MCZ features?

2.3 Cumulative Effects

44. The MCAA does not provide any legislative requirement for explicit consideration of cumulative effects on the protected features of MCZs. However, the MMO guidelines (MMO, 2013) state that the MMO considers that in order for the MMO to fully discharge its duties under section 69 (1) of the MCAA, cumulative effects must be considered.

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

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

    - Other windfarms
    - Aggregate extraction and dredging
    - Licensed disposal sites
    - Navigation and shipping
    - Commercial fisheries
    - Sub-sea cables and pipelines
    - Potential port and harbour development
    - Oil and gas activities
    - Unexploded ordnance (UXO) clearance

47. Plans and projects that existed at the time of the relevant MCZ designation or the latest status reports, undertaken every 6 years, are considered to be part of the baseline environment.

48. The assessment will present relevant cumulative effects of projects based on their stage of development using the tiered approach as devised by Natural England (JNCC and Natural England, 2013) and presented in **Table 2.1**.

Table 2.1 Natural England Tiered Approach

Tier	Consenting or Construction Phase	Data Availability
Tier 1	Built and operational projects should be included within the cumulative assessment where they have not been included within the environmental characterisation survey, i.e. they were not operational when baseline surveys were undertaken, and/or any residual impact may not have yet fed through to and been captured in estimates of "baseline" conditions e.g. background" distribution or mortality rate for birds.	Pre-construction (and possibly post-construction) survey data from the built project(s) and environmental characterisation survey data from proposed project (including data analysis and interpretation within the ES for the Project).
Tier 2	Tier 1 + projects under construction	As Tier 1 but not including post construction survey data
Tier 3	Tier 2 + projects that have been consented (but construction has not yet commenced)	Environmental characterisation survey data from proposed project (including data analysis and interpretation within the ES for the Project) and possibly pre-construction
Tier 4	Tier 3 + projects that have an application submitted to the appropriate regulatory body that have not yet been determined	Environmental characterisation survey data from proposed project (including data analysis and interpretation within the ES for the Project)
Tier 5	Tier 4 + projects that the regulatory body are expecting an application to be submitted for determination (e.g. projects listed under the PINS programme of projects), including projects where a Preliminary Environmental Information Report (PEIR) has been undertaken and submitted	Possibly environmental characterisation survey data (but strong likelihood that this data will not be publicly available at this stage.
Tier 6	Tier 5 + projects that have been identified in relevant strategic plans or programmes (e.g. projects identified in Round 3 windfarm ZAP documents)	Historic survey data collected for other purposes/by other projects or industries or at a strategic level.

49. Projects classified under Tiers 1-4 are included in the MCZA screening. Tier 5 and 6 projects will be considered where sufficient information is available.

50. For this screening assessment, the Project activities and associated pressures are reviewed to determine whether they are capable of significantly affecting MCZs when combined with equivalent activities and associated pressures from other plans and projects. The potential for projects to act cumulatively on MCZs is considered in the context of the likely spatial and temporal extent of pressures.

2.4 Consultation

51. Consultation of relevance to the MCZA process will be undertaken with Statutory Nature Conservation Bodies (SNCBs) and other stakeholders through scoping and stakeholder engagement.

3. Is the activity within or near to a MCZ?

52. The first stage of the screening assessment is to determine whether the Project and associated activities take place within or near an MCZ.

53. A potential zone of influence (ZoI) from the Project has been analysed based on an understanding of the tidal regime. The potential ZoI is based on the knowledge that effects arising from WTG and substation platform foundations on the tidal regime are relatively small in magnitude, and localised. It is expected that changes to the tidal regime would have returned to background levels immediately outside the excursion of one spring tidal ellipse (approximately 10km from the Offshore Development Area) shown in see **Figure 1.8.1 in the EIA Scoping Report**.

54. **Figure 2.4.1 in the EIA Scoping Report** shows the MCZs within this ZoI, along with the distances measured to the nearest point of the Windfarm Site and Export Cable Corridor.

55. The MCZs listed in **Table 3.1** are considered further in **Section 4**.

Table 3.1 Marine Coastal Zones within the Zone of Influence

MCZ	Distance to the project (KM)
Bideford to Foreland Point	0km. Overlaps the Area of Search for the offshore Export Cable Corridor
Hartland Point to Tintagel	1km from Area of Search for the offshore Export Cable Corridor
Morte Platform	1km from Area of Search for the offshore Export Cable Corridor
South West Approaches to Bristol Channel	4km from Area of Search for the offshore Export Cable Corridor
North West of Lundy	6km from Area of Search for the offshore Export Cable Corridor

56. The next closest MCZ (Padstow Bay and Surround MCZ) is approximately 50km away from the Project Windfarm Site and therefore there is no potential pathway for impact from the Project, alone or cumulatively with other projects.

4. Screening of impacts on protected features

57. Of the MCZs identified in **Section 3**, this section considers the potential for any impacts as a result of the Project, alone or cumulatively with other plans and projects, on the protected features of the MCZ or any physical processes on which the features are dependent.

4.1 Bideford to Foreland Point MCZ

4.1.1 Protected Features

58. **Table 4.1** shows the features designated by the Bideford to Foreland Point MCZ.

Table 4.1 Designated features for Bideford to Foreland MCZ (source: Defra, 2018a)

Protected feature	Management approach
Low energy intertidal rock	Maintain in favourable condition
Moderate energy intertidal rock	Maintain in favourable condition
High energy intertidal rock	Maintain in favourable condition
Intertidal coarse sediment	Maintain in favourable condition
Intertidal mixed sediments	Maintain in favourable condition
Intertidal sand and muddy sand	Maintain in favourable condition
Intertidal underboulder communities	Maintain in favourable condition
Littoral chalk communities	Maintain in favourable condition
Low energy infralittoral rock	Maintain in favourable condition
Moderate energy infralittoral rock	Maintain in favourable condition
High energy infralittoral rock	Maintain in favourable condition
Moderate energy circalittoral rock	Maintain in favourable condition
High energy circalittoral rock	Maintain in favourable condition
Subtidal coarse sediment	Maintain in favourable condition
Subtidal mixed sediments	Maintain in favourable condition
Subtidal sand	Recover to favourable condition
Fragile sponge & anthozoan communities on subtidal rocky habitats	Maintain in favourable condition
Honeycomb worm (*Sabellaria alveolata*) reefs	Maintain in favourable condition
Pink sea-fan (*Eunicella verrucosa*)	Maintain in favourable condition
Spiny lobster (*Palinurus elephas*)	Recover to favourable condition

59. This site protects a wide range of habitats, from beaches of intertidal sand, which are exposed to the air at low tide and below water at high tide, to subtidal sediment and rock habitats, which are permanently submerged. This site is important for creating connectivity between sites along the north coast of Devon and Cornwall.

4.1.2 Conservation Objectives

60. The overarching conservation objectives for the site is for its designated features either to be maintained in, or brought into, favourable condition.

61. For each protected feature, favourable condition means that, within a zone:

    - its extent is stable or increasing; and
    - its structure and functions, its quality, and the composition of its characteristic biological communities (including diversity and abundance of species forming part or inhabiting the habitat) are sufficient to ensure that its condition remains healthy and does not deteriorate.

62. With respect to a species of marine fauna within the zone, the quality and quantity of its habitat and the composition of its population in terms of number, age, and sex ratio are such to ensure that the population is maintained in numbers which enable it to thrive.

63. The reference to the composition of the characteristic biological communities of a habitat includes a reference to the diversity and abundance of species forming part of, or inhabiting, that habitat.

64. For the purposes of this MCZ, any temporary deterioration in condition is to be disregarded if the habitat is sufficiently healthy and resilient to enable its recovery, any temporary reduction of numbers is to be disregarded if the population is sufficiently thriving and resilient to enable its recovery, and for the purpose of determining whether a protected feature is in favourable condition within the meaning of this designation, any alteration to that feature brought about entirely by natural processes is to be disregarded.

4.1.3 Potential Impacts

65. This section summaries the sources of pressures with the potential to have significant effects on the protected features of the Bideford to Foreland Point MCZ.

66. The MCZ overlaps the Area of Search for the Export Cable Corridor and therefore potential impacts are associated with direct and indirect effects from the Export Cable Corridor.

67. The impacts screened in and discussed below will be assessed for the Project alone and cumulatively with other plans and projects.

Construction

68. During construction of the Project, the seabed preparation and Export Cable installation will have a direct effect on the seabed habitats, associated communities and priority species. This impact may also will occur at, and offshore of, the

Hydraulic Directional Drill (HDD) exit pits if required at the Landfall. If Landfall occurs on a beach, open trenching would be used instead of HDD. Any impact to intertidal sand or subtidal sand is considered short term and habitat will likely recover in one tidal cycle.

69. Indirect effects of seabed disturbance are the increased likelihood of sediment deposition and the resulting release of sediments into the water column. This seabed disturbance also has the potential to disturb contaminated sediments.

70. Increased vessel traffic and the introduction of vessels from a global destination increased the chances of introducing invasive non-native species from the discharge of ballast water or colonisation of vessel hulls.

71. The increase in vessel traffic and construction machinery could also potentially result in an increase of artificial underwater noise or vibration effects.

Operation and Maintenance (O&M)

72. Potential impacts during operation will mostly result from the physical presence of infrastructure situated within the proximity of the MCZ.

73. Maintenance activities also have the potential to result in temporary impacts, similar to those seen during construction, but significantly lower in magnitude.

74. The magnitude of underwater noise and vibration from windfarm operation is much lower than for activities such UXO clearance during construction.

75. Electromagnetic fields (EMFs) resulting from the presence of cables may be detected by some benthic species.

Decommissioning

76. The potential impacts arising during the decommissioning phase are envisaged to be similar to those described for the construction phase. The extent of removal of infrastructure during decommissioning will determine how much habitat loss will be lasting or long term and how much may be permanent.

Summary of pressures screened into MCZA

Table 4.2 Summary of screening of pressures for Bideford to Foreland MCZ

Potential Effect	Construction	O&M	Decommissioning
Temporary physical disturbance	✓	x	✓
Permanent/long term habitat loss	✓	x	✓
Increased suspended sediment concentrations	✓	x	✓

Potential Effect	Construction	O&M	Decommissioning
Re-mobilisation of contaminated sediments	✓	x	✓
Effects on bedload sediment transport	✓	x	✓
Underwater noise and vibration	✓	x	✓
Colonisation of foundations and cable protection	x	✓	x
Invasive species	✓	x	✓
Electromagnetic fields	x	✓	x

4.2 Hartland Point to Tintagel MCZ

4.2.1 Protected Features

77. **Table 4.3** shows the features designated by the Hartland Point to Tintagel MCZ.

Table 4.3 Designated features for Hartland Point to Tintagel MCZ (source: Defra, 2018b)

Protected feature	Management approach
Coastal saltmarshes and saline reedbeds	Maintain in favourable condition
Low energy intertidal rock	Maintain in favourable condition
Moderate energy intertidal rock	Maintain in favourable condition
High energy intertidal rock	Maintain in favourable condition
Intertidal coarse sediment	Maintain in favourable condition
Intertidal sand and muddy sand	Maintain in favourable condition
Moderate energy infralittoral rock	Maintain in favourable condition
High energy infralittoral rock	Maintain in favourable condition
Moderate energy circalittoral rock	Recover to favourable condition
High energy circalittoral rock	Recover to favourable condition
Subtidal coarse sediment	Recover to favourable condition
Subtidal sand	Recover to favourable condition
Fragile sponge & anthozoan communities on subtidal rocky habitats	Recover to favourable condition
Honeycomb worm (*Sabellaria alveolata*) reefs	Maintain in favourable condition
Pink sea-fan (*Eunicella verrucosa*)	Recover to favourable condition

78. This MCZ contains rocky habitats in deeper waters (circalittoral rock) which are dominated by a mosaic of different marine creatures such as sponges, anemones and sea-fan corals living on the rocky surfaces. Intertidal sand and rocky areas, covered by water at high tide and exposed to the air at low tide, provide habitats

for many species, including the honeycomb worm. Honeycomb worm reefs are formed from the closely-packed sand tubes constructed by these colonial worms. The reef structures resemble honeycomb and can extend for tens of metres across and up to a metre tall. They, in turn, are able to support a wide range of shore-dwelling species including anemones, snails, shore crabs and seaweeds.

4.2.2 Conservation Objectives

79. The overarching conservation objectives for the site is for its designated features either to be maintained in, or brought into, favourable condition.

80. For each protected feature, favourable condition means that, within a zone:

- its extent is stable or increasing; and
- its structure and functions, its quality, and the composition of its characteristic biological communities (including diversity and abundance of species forming part or inhabiting the habitat) are sufficient to ensure that its condition remains healthy and does not deteriorate.

81. The reference to the composition of the characteristic biological communities of a habitat includes a reference to the diversity and abundance of species forming part of, or inhabiting, that habitat.

82. For the purposes of this MCZ, any temporary deterioration in condition is to be disregarded if the habitat is sufficiently healthy and resilient to enable its recovery, any temporary reduction of numbers is to be disregarded if the population is sufficiently thriving and resilient to enable its recovery, and for the purpose of determining whether a protected feature is in favourable condition within the meaning of this designation, any alteration to that feature brought about entirely by natural processes is to be disregarded.

4.2.3 Potential Impacts

83. This section summarises the sources of pressures with the potential to have significant effects on the protected features of the Hartland Point to Tintagel MCZ.

84. The MCZ is located 1km away from the Area of Search for the Export Cable Corridor and therefore potential impacts are limited to those associated with indirect effects from the Export Cable Corridor.

85. The impacts screened in and discussed below will be assessed for the Project alone and cumulatively with other plans and projects.

Construction

86. Indirect effects of seabed disturbance are the increased likelihood of sediment deposition and the resulting release of sediments into the water column. This seabed disturbance also has the potential to disturb contaminated sediments.

87. Increased vessel traffic and the introduction of vessels from a global destination increased the chances of introducing invasive non-native species from the discharge of ballast water or colonisation of vessel hulls.

88. The increase in vessel traffic and construction machinery could also potentially result in an increase of artificial underwater noise or vibration effects.

Operation and Maintenance (O&M)

89. At a distance of 1km from the Area of Search for the offshore export cable, there is no potential for operational impacts such as EMFs to affect the species supported by the Hartland Point to Tintagel MCZ.

Decommissioning

90. The potential impacts arising during the decommissioning phase are envisaged to be similar to those described for the construction phase. The extent of removal of infrastructure during decommissioning will determine how much habitat loss will be lasting / long term and how much may be permanent.

Summary of pressures screened into MCZA

91. Screening of pressures associated with construction, operation and decommissioning is shown in **Table 4.4** for each feature of the MCZ.

Table 4.4 Summary of screening of pressures for Hartland Point to Tintagel MCZ

Potential Effect	Construction	O&M	Decommissioning
Temporary physical disturbance	x	x	x
Permanent/long term habitat loss	x	x	x
Increased suspended sediment concentrations	✓	x	✓
Re-mobilisation of contaminated sediments	✓	x	✓
Effects on bedload sediment transport	✓	x	✓
Underwater noise and vibration	✓	x	✓
Colonisation of foundations and cable protection	x	x	x
Invasive species	✓	x	✓
Electromagnetic fields	x	x	x

4.3 Morte Platform

4.3.1 Protected Features

92. **Table 4.5** shows the features designated by the Morte Platform MCZ.

Table 4.5 Designated features for Morte Platform MCZ (source: Defra, 2019a)

Protected feature	Management approach
High energy circalittoral rock	Recover to favourable condition
Moderate energy circalittoral rock	Recover to favourable condition
Subtidal coarse sediment	Recover to favourable condition

93. Morte Platform contains a mix of habitats that is rarely represented elsewhere in the UK, primarily due to the high tidal flows, high sediment content within the water column, and the mosaic of sediment and rock ridges within the site.

94. Subtidal sediment provides important nursery grounds for many ecologically and commercially important fish such as flatfish (e.g. sole and plaice), seabass and sand eel (an important prey species for seabirds such as puffin and guillemots) as well as supporting nationally rare Ross worm reefs. Circalittoral rock habitats support a range of marine life, including worms, sponges, soft and hard corals, bryozoans, small, filter feeding animals and mobile species in more sheltered areas.

4.3.2 Conservation Objectives

95. The overarching conservation objectives of the MCZ is that the protected features so far as already in favourable condition, remain in such condition, and so far as not already in favourable condition, be brought into such condition, and remain in such condition.

96. For each protected feature, favourable condition means that, within a zone:

- its extent is stable or increasing; and
- its structure and functions, its quality, and the composition of its characteristic biological communities (including diversity and abundance of species forming part or inhabiting the habitat) are sufficient to ensure that its condition remains healthy and does not deteriorate.

97. The reference to the composition of the characteristic biological communities of a habitat includes a reference to the diversity and abundance of species forming part of, or inhabiting, that habitat.

98. Any temporary deterioration in condition is to be disregarded if the habitat is sufficiently healthy and resilient to enable its recovery.

99. Any alteration to a feature brought about entirely by natural processes is to be disregarded when determining whether a protected feature is in favourable condition.

4.3.3 Potential Impacts

100. This section summaries the sources of pressures with the potential to have significant effects on the protected features of the Morte Platform MCZ.

101. The MCZ is located 1km away from the Area of Search for the Export Cable Corridor and therefore potential impacts are limited to those associated with indirect effects from the Export Cable Corridor.

102. The impacts screened in and discussed below will be assessed for the Project alone and cumulatively with other plans and projects.

Construction

103. Indirect effects of seabed disturbance are the increased likelihood of sediment deposition and the resulting release of sediments into the water column. This seabed disturbance also has the potential to disturb contaminated sediments.

104. Increased vessel traffic and the introduction of vessels from a global destination increased the chances of introducing invasive non-native species from the discharge of ballast water or colonisation of vessel hulls.

105. The increase in vessel traffic and construction machinery could also potentially result in an increase of artificial underwater noise or vibration effects.

Operation and Maintenance (O&M)

106. At a distance of 1km from the Area of Search for the offshore export cable, there is no potential for operational impacts such as EMFs to affect the species supported by the Morte Platform MCZ.

Decommissioning

107. The potential impacts arising during the decommissioning phase are envisaged to be similar to those described for the construction phase. The extent of removal of infrastructure during decommissioning will determine how much habitat loss will be lasting / long term and how much may be permanent.

Summary of pressures screened into MCZA

108. Screening of pressures associated with construction, operation and decommissioning is shown in **Table 4.6** for each feature of the MCZ.

Table 4.6 Summary of screening of pressures for Morte Platform MCZ

Potential Effect	Construction	O&M	Decommissioning
Temporary physical disturbance	x	x	x
Permanent/long term habitat loss	x	x	x
Increased suspended sediment concentrations	✓	x	✓
Re-mobilisation of contaminated sediments	✓	x	✓
Effects on bedload sediment transport	✓	x	✓
Underwater noise and vibration	✓	x	✓
Colonisation of foundations and cable protection	x	x	x
Invasive species	✓	x	✓
Electromagnetic fields	x	x	x

4.4 South West Approaches to Bristol Channel

4.4.1 Protected Features

109. **Table 4.7** shows the features designated by the South West Approaches to Bristol Channel MCZ.

Table 4.7 Designated features for South West Approaches to Bristol Channel MCZ (source: Defra, 2019b)

Protected feature	Management approach
Subtidal coarse sediment	Recover to favourable condition
Subtidal sand	Recover to favourable condition

110. The South West Approaches to the Bristol Channel MCZ is mainly comprised of two subtidal sediment types. These are made up of a range of fine sediments, coarser sediments, shell fragments, gravels, shingles and cobbles. These habitats provide a home for a wide variety of species that bury into the seabed, including worms, razor clams, anemones, sea cucumbers and sea urchins.

4.4.2 Conservation Objectives

111. The overarching conservation objectives of the MCZ is that the protected features so far as already in favourable condition, remain in such condition, and so far as not already in favourable condition, be brought into such condition, and remain in such condition.

112. For each protected feature, favourable condition means that, within a zone:

- its extent is stable or increasing; and
- its structure and functions, its quality, and the composition of its characteristic biological communities (including diversity and abundance of species forming part or inhabiting the habitat) are sufficient to ensure that its condition remains healthy and does not deteriorate.

113. The reference to the composition of the characteristic biological communities of a habitat includes a reference to the diversity and abundance of species forming part of, or inhabiting, that habitat.

114. Any temporary deterioration in condition is to be disregarded if the habitat is sufficiently healthy and resilient to enable its recovery.

115. Any alteration to a feature brought about entirely by natural processes is to be disregarded when determining whether a protected feature is in favourable condition.

4.4.3 Potential Impacts

116. This section summaries the sources of pressures with the potential to have significant effects on the protected features of the South West Approaches to Bristol Channel MCZ.

117. The MCZ is located 4km away from the Area of Search for the Export Cable Corridor and therefore potential impacts are limited to those associated with indirect effects from the Export Cable Corridor.

118. The impacts screened in and discussed below will be assessed for the Project alone and cumulatively with other plans and projects.

Construction

119. Indirect effects of seabed disturbance are the increased likelihood of sediment deposition and the resulting release of sediments into the water column. This seabed disturbance also has the potential to disturb contaminated sediments.

120. Increased vessel traffic and the introduction of vessels from a global destination increased the chances of introducing invasive non-native species from the discharge of ballast water or colonisation of vessel hulls.

121. The increase in vessel traffic and construction machinery is unlikely to result in an increase of artificial underwater noise or vibration effects given the distance from the Offshore Development Area.

Operation and Maintenance (O&M)

122. At a distance of 4km from the Area of Search for the offshore export cable, there is no potential for operational impacts such as EMFs to affect the species supported by the South West Approaches to Bristol Channel MCZ.

Decommissioning

123. The potential impacts arising during the decommissioning phase are envisaged to be similar to those described for the construction phase. The extent of removal of infrastructure during decommissioning will determine how much habitat loss will be lasting / long term and how much may be permanent.

Summary of pressures screened into MCZA

124. Screening of pressures associated with construction, operation and decommissioning is shown in **Table 4.8** for each feature of the MCZ.

Table 4.8 Summary of screening of pressures for South West Approaches to Bristol Channel MCZ

Potential Effect	Construction	O&M	Decommissioning
Temporary physical disturbance	x	x	x
Permanent/long term habitat loss	x	x	x
Increased suspended sediment concentrations	✓	x	✓
Re-mobilisation of contaminated sediments	✓	x	✓
Effects on bedload sediment transport	✓	x	✓
Underwater noise and vibration	x	x	x
Colonisation of foundations and cable protection	x	x	x
Invasive species	✓	x	✓
Electromagnetic fields	x	x	x

4.5 North West of Lundy

4.5.1 Protected Features

125. **Table 4.9** shows the features designated by the North West of Lundy MCZ.

Table 4.9 Designated features for North West of Lundy MCZ

PROTECTED FEATURE	MANAGEMENT APPROACH
Subtidal coarse sediment	Recover to a favourable condition

126. The North West of Lundy site contains a large area of subtidal coarse sediment which provides habitat that supports a variety of species, for example segmented bristle worms, venus clams and small crustaceans (such as crabs and barnacles) living within and on top of the sediment. Coarse sediments include coarse sand, gravel, pebbles and shingle. The habitat is often unstable due to tidal currents and/or wave action.

4.5.2 Conservation Objectives

127. The overarching conservation objectives of the MCZ is that the protected features so far as already in favourable condition, remain in such condition, and so far as not already in favourable condition, be brought into such condition, and remain in such condition.

128. For each protected feature, favourable condition means that, within a zone:

- its extent is stable or increasing; and
- its structure and functions, its quality, and the composition of its characteristic biological communities (including diversity and abundance of species forming part or inhabiting the habitat) are sufficient to ensure that its condition remains healthy and does not deteriorate.

129. Any temporary deterioration in condition is to be disregarded if the habitat is sufficiently healthy and resilient to enable its recovery.

130. Any alteration to a feature brought about entirely by natural processes is to be disregarded when determining whether a protected feature is in favourable condition.

4.5.3 Potential Impacts

131. This section summaries the sources of pressures with the potential to have significant effects on the protected features of the North West of Lundy MCZ.

132. The MCZ is located 6km away from the Area of Search for the Export Cable Corridor and therefore potential impacts are limited to those associated with indirect effects from the Export Cable Corridor.

133. The impacts screened in and discussed below will be assessed for the Project alone and cumulatively with other plans and projects.

Construction

134. Indirect effects of seabed disturbance are the increased likelihood of sediment deposition and the resulting release of sediments into the water column. This seabed disturbance also has the potential to disturb contaminated sediments.

135. Increased vessel traffic and the introduction of vessels from a global destination increased the chances of introducing invasive non-native species from the discharge of ballast water or colonisation of vessel hulls.

136. The increase in vessel traffic and construction machinery is unlikely to result in an increase of artificial underwater noise or vibration effects given the distance from the Offshore Development Area.

Operation and Maintenance (O&M)

137. At a distance of 6km from the Area of Search for the offshore export cable, there is no potential for operational impacts such as EMFs to affect the species supported by the North West of Lundy MCZ.

Decommissioning

138. The potential impacts arising during the decommissioning phase are envisaged to be similar to those described for the construction phase. The extent of removal of infrastructure during decommissioning will determine how much habitat loss will be lasting / long term and how much may be permanent.

Summary of pressures screened into MCZA

139. Screening of pressures associated with construction, operation and decommissioning is shown in for each feature of the MCZ.

Table 4.10 Summary of screening of pressures for North West of Lundy MCZ

Potential Effect	Construction	O&M	Decommissioning
Temporary physical disturbance	x	x	x
Permanent/long term habitat loss	x	x	x
Increased suspended sediment concentrations	✓	x	✓
Re-mobilisation of contaminated sediments	✓	x	✓

Potential Effect	Construction	O&M	Decommissioning
Effects on bedload sediment transport	✓	x	✓
Underwater noise and vibration	x	x	x
Colonisation of foundations and cable protection	x	x	x
Invasive species	✓	x	✓
Electromagnetic fields	x	x	x

5. Cumulative Effects

140. The ZoI for the Offshore Development Area shown in **Figure 2.4.1** shows the MCZs within this ZoI has a range of 10km. In order to provide a conservative search area for screening of plans and projects which have potential to interact with the impacts of the Project, a range of 20km from the Offshore Development Area has been used.

141. Plans and projects that existed at the time of MCZ designation or the latest status reports, undertaken every 6 years (whichever is most recent) are considered to be part of the baseline environment. Bideford to Fortland Point MCZ and Hartland Point to Tintagel MCZ was included in the Defra (2018c) Marine Protected Areas Network Report. Morte Platform MCZ, South West Approaches to Bristol Channel MCZ and North West of Lundy MCZ were designated in 2019. Plans and projects prior to 2018 are therefore considered part of the baseline and are screened out of the cumulative assessment. No plans or projects have been identified within 20km. Therefore, no plans or projects are considered in the Stage 1 MCZA cumulative assessment.

6. Screening Summary

142. **Table 6.1** provides a summary of the MCZs screened in for further consideration of the potential for the Project to hinder the conservation objectives of the features of each site, alone or cumulatively with other plans and projects.

Table 6.1 Summary of screening

Site	Features screened in	Relevant Components	Impacts screened in (Alone and cumulatively)
Bideford to Foreland Point MCZ	All	Direct and in-direct effects of the Offshore Export Cable Corridor (export cables and associated works)	Temporary physical disturbance
			Permanent/long term habitat loss
			Increased suspended sediment concentrations
			Re-mobilisation of contaminated sediments
			Effects on bedload sediment transport
			Underwater noise and vibration
			Colonisation of foundations and cable protection
			Invasive species
			Electromagnetic fields
Hartland Point to Tintagel MCZ	Coastal saltmarshes and saline reedbeds Intertidal coarse sediment Intertidal sand and muddy sand	In-direct effects of the Offshore Export Cable Corridor (export cables and associated works)	Increased suspended sediment concentrations
			Re-mobilisation of contaminated sediments
			Effects on bedload sediment transport
			Underwater noise and vibration
			Invasive species
Morte Platform MCZ	Subtidal coarse sediment	In-direct effects of the Offshore Export Cable Corridor (export cables and associated works)	Increased suspended sediment concentrations
			Re-mobilisation of contaminated sediments
			Effects on bedload sediment transport
			Underwater noise and vibration
			Invasive species

Site	Features screened in	Relevant Components	Impacts screened in (Alone and cumulatively)
South West Approaches to Bristol Channel MCZ	Subtidal coarse sediment Subtidal sand	In-direct effects of the Offshore Export Cable Corridor (export cables and associated works)	Increased suspended sediment concentrations
			Re-mobilisation of contaminated sediments
			Effects on bedload sediment transport
			Invasive species
North West of Lundy MCZ	Subtidal coarse sediment	In-direct effects of the Offshore Export Cable Corridor (export cables and associated works)	Increased suspended sediment concentrations
			Re-mobilisation of contaminated sediments
			Effects on bedload sediment transport
			Invasive species
			Increased suspended sediment concentrations

7. References

Defra (2018a) Bideford to Foreland Point MCZ Factsheet. Available at: https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/492340/mcz-bideford-foreland-point-factsheet.pdf

Defra (2018b) Hartland Point to Tintagel MCZ Factsheet. Available at: https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/492391/mcz-hartland-point-tintagel-factsheet.pdf

Defra (2019a) Morte Platform MCZ Factsheet. Available at: https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/915649/mcz-morte-platform-2019.pdf

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