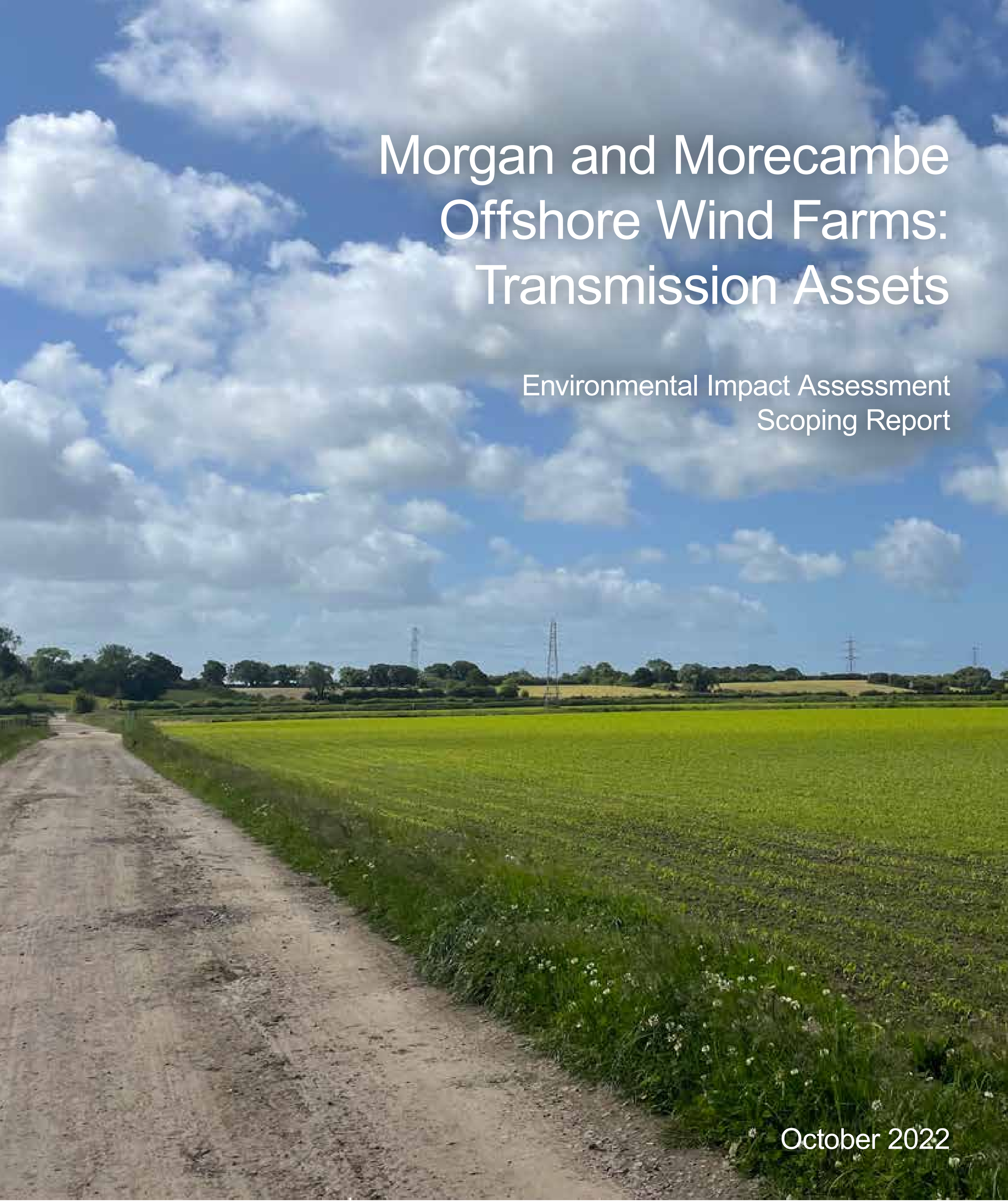
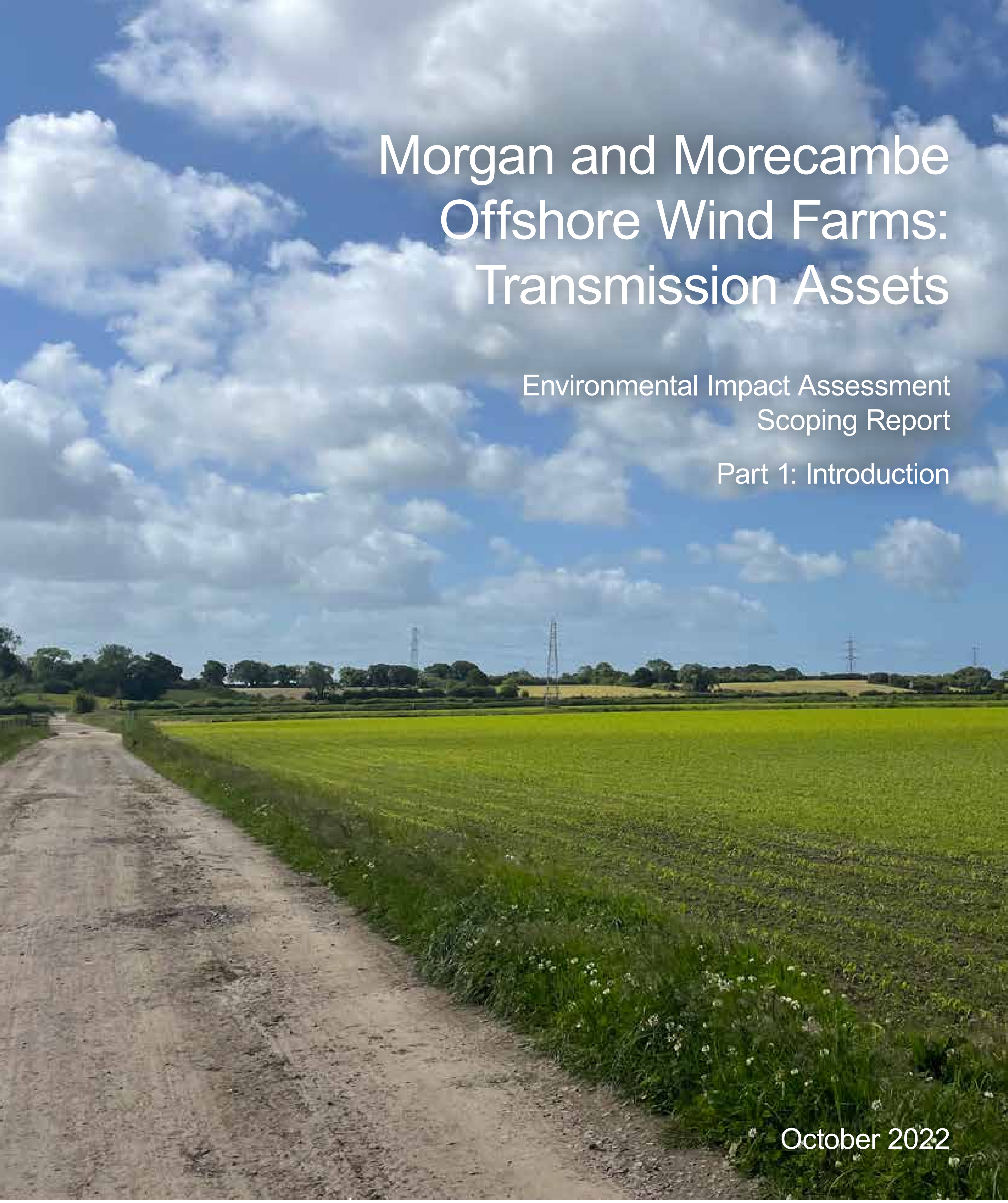


Morgan and Morecambe Offshore Wind Farms: Transmission Assets

Environmental Impact Assessment Scoping Report

October 2022

Partners in UK offshore wind



Morgan and Morecambe Offshore Wind Farms: Transmission Assets

Environmental Impact Assessment
Scoping Report

Part 1: Introduction

October 2022

Partners in UK offshore wind

Morgan and Morecambe Offshore Wind Farms: Transmission Assets

EIA Scoping Report

Part 1: Introduction

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Executive summary

Morgan Offshore Wind Limited (Morgan OWL), a joint venture between bp and Energie Baden-Württemberg AG (EnBW), is developing the Morgan Offshore Wind Project, located in the east Irish sea. The Morgan Offshore Wind Project is located 22.3km (12 nautical miles (nm)) from the Isle of Man and 36.3km (19.6nm) from the northwest coast of England (when measured from Mean High Water Springs (MHWS)). The anticipated nominal capacity of the Morgan Offshore Wind Project is 1500 Megawatts (MW).

Morecambe Offshore Windfarm Limited (Morecambe OWL), a joint venture between Cobra Instalaciones y Servicios, S.A. (Cobra) and Flotation Energy Ltd., is developing the Morecambe Offshore Windfarm. The Morecambe Offshore Windfarm is also located in the east Irish Sea approximately 28.75km (15.5nm) from the northwest coast of England (when measured from MHWS). The anticipated nominal capacity of the Morecambe Offshore Windfarm is 480MW.

Both the Morgan Offshore Wind Project and the Morecambe Offshore Windfarm have been scoped into the Pathways to 2030 workstream under the Offshore Transmission Network Review (OTNR). Under the OTNR, the National Grid Electricity System Operator is responsible for conducting a Holistic Network Design Review to assess options to improve the coordination of offshore wind generation connections and transmission networks. In July 2022, the UK Government published the Pathway to 2030 Holistic Network Design documents, which set out the approach to connecting 50GW of offshore wind to the UK electricity network (National Grid ESO, 2022). The output of this process concluded that the Morgan Offshore Wind Project and the Morecambe Offshore Windfarm should work collaboratively in connecting the wind farms to the National Grid at Penwortham in Lancashire. The developers were involved in this process and agree with this output.

Morgan OWL and Morecambe OWL (the Applicants) are therefore seeking consent for transmission assets comprising shared offshore export cable corridors to landfall and shared onshore export cable corridors to onshore substation(s), and onward connection to the National Grid electricity transmission network at Penwortham, Lancashire.

Given the anticipated grid connection arrangements, the proposed consenting strategy for the Morgan Offshore Wind Project and the Morecambe Offshore Windfarm is as follows:

- A stand-alone application to consent the construction, operation and maintenance, and decommissioning of the generation assets of Morgan Offshore Wind Project.
- A stand-alone application to consent the construction, operation and maintenance, and decommissioning of the generation assets of Morecambe Offshore Windfarm.
- A separate application to consent the construction, operation and maintenance and decommissioning of the transmission assets required to enable the export of electricity from both the Morgan Offshore Wind Project and the Morecambe Offshore Windfarm with shared offshore and onshore export cable corridors to the National Grid connection point at Penwortham (these works are the subject of this Environmental Impact Assessment (EIA) Scoping Report).

Both the Morgan Offshore Wind Project and the Morecambe Offshore Windfarm fall within the definition of a Nationally Significant Infrastructure Project (NSIP), as they exceed the threshold for an offshore generating station of 100MW, set under the Planning Act 2008, as amended. They therefore require an application for development consent to be made to the Planning Inspectorate.

In relation to the transmission assets for the Morgan Offshore Wind Project and the Morecambe Offshore Windfarm the Applicants sought a direction from the Secretary of State under section 35 of the Planning Act to confirm that they should be treated as development for which development consent is required under the Planning Act 2008, as amended. A direction was duly made on 4 October 2022 and the Applicants are now pursuing a single development consent for the transmission assets for both wind farms. It is anticipated that the application will apply for a DCO which authorises two coordinated but electrically separate sets of transmission works (for example, where each offshore wind farm would have its own transmission cables and substation infrastructure).

This EIA Scoping Report supports the Applicants' request for a Scoping Opinion from the Secretary of State for the Morgan and Morecambe Offshore Wind Farms: Transmission Assets (hereafter referred to as the Transmission Assets).

Separate EIA Scoping Reports have been submitted to the Planning Inspectorate for the Morgan Offshore Wind Project generation assets and the Morecambe Offshore Windfarm generation assets respectively. Scoping Opinions have been provided by the Planning Inspectorate (on behalf of the Secretary of State) for both projects. This EIA Scoping Report for the Transmission Assets takes into account these Scoping Opinions, where relevant.

This EIA Scoping Report is presented in three parts:

- Part 1 of this EIA Scoping Report (Introduction) provides an introduction to the Transmission Assets, sets out the policy and legislative context, sets out the considerations for site selection and alternatives, provides an indicative project description, and sets out the proposed EIA methodology and details of the pre-application consultation process.
- Part 2 of this EIA Scoping Report (Transmission Assets) identifies the main aspects of the offshore and onshore physical, biological and human environment likely to be significantly affected by the construction, operation and maintenance, and decommissioning of the Transmission Assets.
- Part 3 of this EIA Scoping Report (Annexes) contains the transboundary impacts, Water Framework Directive and Marine Conservation Zone (MCZ) screening annexes.

This EIA Scoping Report has identified potential topics and impacts to be scoped into the EIA process based upon an understanding of the environmental conditions likely to be encountered within the technical topic study areas for the Transmission Assets. The EIA Scoping Report also identifies those potential topics and impacts that are proposed to be scoped out of the EIA process, based on an understanding of the nature of the Transmission Assets (including measures adopted as part of the project) and the proposed location.

Consultees are invited to consider the information provided in this EIA Scoping Report and to advise on whether they agree with the conclusions reached. Broad questions have been presented at the end of part 2 of this EIA Scoping Report to encourage reflection on the key elements of the Transmission Assets.

Following receipt of the Scoping Opinion from the Secretary of State, a Preliminary Environmental Information Report (PEIR) is planned to be produced and consulted on during 2023. The PEIR will provide an initial statement of the environmental information available for the Transmission Assets, including descriptions of the likely environmental effects, measures adopted as part of the project, and relevant enhancement, mitigation and monitoring commitments. The PEIR is intended to allow those taking part in the consultation to understand the nature, scale, location and likely significant environmental effects of the Transmission Assets, such that they can make an informed contribution to the process of pre-application consultation under the Planning Act 2008, as amended, and to the EIA process.

The infrastructure for the Transmission Assets will be located within the Transmission Assets Scoping Boundary identified within this EIA Scoping Report. The site selection process for all elements is ongoing, with a view towards refining the design and site selection before the production of the PEIR.

Extensive consultation with relevant statutory and non-statutory consultation bodies is required before an application for development consent is submitted to The Planning Inspectorate, which will help to inform the development and design evolution of the Transmission Assets.

In parallel to the EIA process, the Applicants will undertake a Habitats Regulations Assessment (HRA), including provision of a HRA Screening Report and subsequent Information to Support Appropriate Assessment (ISAA). This will be consulted upon during the pre-application consultation process.

The Applicants expect that they will further refine the design of the Transmission Assets taking into consideration the consultation responses received from the pre-application consultation in addition to environmental constraints identified during the EIA process. The application for development consent will comprise full details of the Transmission Assets and will be accompanied by an Environmental Statement (ES), which will present the results of the EIA process. The EIA will be undertaken in accordance with The Infrastructure Planning (Environmental Impact Assessment) Regulations 2017, as amended, and The Marine Works (Environmental Impact Assessment) Regulations 2007, as amended (the 2007 EIA Regulations). A summary of all consultation responses received will be presented in a Consultation Report, which will accompany the ES and the application for development consent which is planned to be submitted in 2024.

Glossary

Term	Meaning
Applicants	Morgan Offshore Wind Limited (Morgan OWL) and Morecambe Offshore Windfarm Limited (Morecambe OWL)
Generation assets	The generation assets associated with the Morgan Offshore Wind Project and the Morecambe Offshore Windfarm include the offshore wind turbines, together with other electrical infrastructure that contributes to electricity production, including inter-array cables, offshore substation platforms[1] and possible platform link cables to connect offshore substations.
Landfall	The area in which the offshore export cables make landfall (come on shore) and the transitional area between the offshore cabling and the onshore cabling.
Morgan and Morecambe Offshore Wind Farms: Transmission Assets	The transmission assets for the Morgan Offshore Wind Project and the Morecambe Offshore Windfarm. This includes the offshore substation platforms[1], interconnector cables, Morgan offshore booster station, offshore export cables, landfall site, onshore export cables, onshore substations, 400kV cables and associated grid connection infrastructure such as circuit breaker infrastructure. Also referred to in this report as the Transmission Assets, for ease of reading.
Morecambe OWL	Morecambe Offshore Windfarm Limited is a joint venture between Cobra Instalaciones y Servicios, S.A. (Cobra) and Flotation Energy Ltd.
Morgan OWL	Morgan Offshore Wind Limited is a joint venture between bp and Energie Baden-Württemberg AG (EnBW)
Offshore booster station	A fixed structure located along the offshore export cables, containing electrical equipment to ensure bulk wind farm capacity can be fully transmitted to the onshore substations.
Offshore export cables	The cables which would bring electricity from the offshore substation platforms to the landfall.
Offshore substation platform(s) (OSPs)	A fixed structure located within the wind farm sites, containing electrical equipment to aggregate the power from the wind turbine generators and convert it into a more suitable form for export to shore.[1]
Onshore export cables	The cables which would bring electricity from landfall to the onshore substations.
Scour protection	Protective materials to avoid sediment being eroded away from the base of the foundations due to the flow of water.
Study Area	For each environmental topic, the baseline environment will be characterised and the potential environmental impacts will be described within a topic-specific study area. The topic-specific study areas are defined for each topic in part 2 of this EIA Scoping Report and are based on the maximum spatial extent across which potential impacts of the Transmission Assets may be experienced by the relevant receptors (i.e., Zone of Influence).
Substation	Part of an electrical transmission and distribution system. Substations transform voltage from high to low, or the reverse by means of electrical transformers.
Transmission Assets	See Morgan and Morecambe Offshore Wind Farms: Transmission Assets (above)
Transmission Assets Scoping Boundary	The Scoping Boundary within which all elements of the Transmission Assets will be located and used to inform this EIA Scoping Report. This area will be refined through future site selection work, with details presented in the PEIR and ES.

1 It is possible that all or part of the offshore substation platforms will be classed as generation assets as the Transmission Assets are refined in the future, but for the purpose of this EIA Scoping Report a precautionary approach has been taken and all infrastructure that may form part of the Transmission Assets has been included. A similar precautionary approach has been taken in scoping the generation assets.

Acronyms

Acronym	Meaning
AfL	Agreement for Lease
BEIS	Department of Business, Energy and Industrial Strategy
CCC	Committee on Climate Change
CDG	Central Design Group
CEA	Cumulative Effects Assessment
CfD	Contract for Difference
CIEEM	Chartered Institute of Ecology and Environmental Management
COWRIE	Collaborative Offshore Windfarm Research Into the Environment
CPA	Coast Protection Act
Csac	Candidate Special Area of Conservation
DCO	Development Consent Order
DECC	Department of Energy and Climate Change (now BEIS)
Defra	Department for Environment, Food and Rural Affairs
EC	European Commission
EIA	Environmental Impact Assessment
EnBW	Energie Baden-Württemberg AG
EMR	Electricity Market Reform
EPS	European Protected Species
ES	Environmental Statement
ESO	National Grid Electricity System Operator
EU	European Union
EWG	Expert Working Group
FEPA	Food and Environment Protection Agency
GHG	Greenhouse Gas
GIS	Geographic Information Systems
HDD	Horizontal Directional Drilling
HLV	Heavy Lift Vessel
HNDR	Holistic Network Design Review
HRA	Habitats Regulations Assessment
HVAC	High Voltage Alternating Current
IEMA	Institute of Environmental Management and Assessment
IEP	Industry Evidence Programme
ISAA	Information to Support Appropriate Assessment
JNCC	Joint Nature Conservation Committee
LCCC	Low Carbon Contracts Company
MCAA	Marine and Coastal Access Act
MCZ	Marine Conservation Zone
MHWS	Mean High Water Springs
MMO	Marine Management Organisation
MPA	Marine Protected Area
MPS	Marine Policy Statement

Acronym	Meaning
NPPF	National Planning Policy Framework
NPS	National Policy Statement
NSIP	Nationally Significant Infrastructure Project
Ofgem	Office of Gas and Electricity Markets
OSP	Offshore Substation Platform
OTNR	Offshore Transmission Network Review
PDE	Project Design Envelope
PEI	Preliminary Environmental Information
PEIR	Preliminary Environmental Information Report
pSPA	Potential Special Protection Area
ROC	Renewables Obligation Certificate
SAC	Special Area of Conservation
SCI	Site of Community Importance
SNCB	Statutory Nature Conservation Body
SoCC	Statement of Community Consultation
SPA	Special Protection Area
TCA	Trade and Cooperation Agreement
TCE	The Crown Estate
TJB	Transition Joint Bay
UK	United Kingdom
UKCP	UK Climate Projections
UNCCC	United Nations Convention on Climate Change
UXO	Unexploded Ordnance

Units

Unit	Description
GW	Gigawatt
km	Kilometres
kV	Kilovolt
m	Metre
MW	Megawatt
nm	Nautical miles

1. Introduction

1.1. Background

1.1.1.1. Morgan Offshore Wind Limited (Morgan OWL), a joint venture between bp and Energie Baden-Württemberg AG (EnBW), is developing the Morgan Offshore Wind Project, located in the east Irish sea. The anticipated nominal capacity of the Morgan Offshore Wind Project is 1500 Megawatts (MW).

1.1.1.2. Morecambe Offshore Windfarm Limited (Morecambe OWL), a joint venture between Cobra Instalaciones y Servicios, S.A. (Cobra) and Flotation Energy Ltd., is developing the Morecambe Offshore Windfarm. The Morecambe Offshore Windfarm is also located in the east Irish Sea approximately 28.75km (15.5nm) from the northwest coast of England (when measured from MHWS). The anticipated nominal capacity of the Morecambe Offshore Windfarm is 480MW.

1.1.1.3. The rights to the seabed for the Morgan Offshore Wind Project and the Morecambe Offshore Windfarm (for separate leases for each windfarm of up to 60 years) were awarded by The Crown Estate (TCE) in Offshore Wind Leasing Round 4.

1.1.1.4. Both projects have been scoped into the Pathways to 2030 workstream under the Offshore Transmission Network Review (OTNR). Under the OTNR, the National Grid Electricity System Operator is responsible for conducting a Holistic Network Design Review to assess options to improve the coordination of offshore wind generation connections and transmission networks. In July 2022, the UK Government published the Pathway to 2030 Holistic Network Design documents, which set out the approach to connecting 50GW of offshore wind to the UK electricity network (National Grid ESO, 2022). The output of this process concluded that the Morgan Offshore Wind Project and the Morecambe Offshore Windfarm should work collaboratively in connecting the wind farms to the National Grid at Penwortham in Lancashire. The developers were involved in this process and agree with this output.

1.1.1.5. Morgan OWL and Morecambe OWL (the Applicants) are therefore seeking consent for transmission assets comprising shared offshore export cable corridors to landfall and shared onshore export cable corridors to onshore substation(s), and onward connection to the National Grid electricity transmission network at Penwortham, Lancashire. The locations of the wind farms and the proposed point of connection to the National Grid at Penwortham are shown on Figure 1.1.

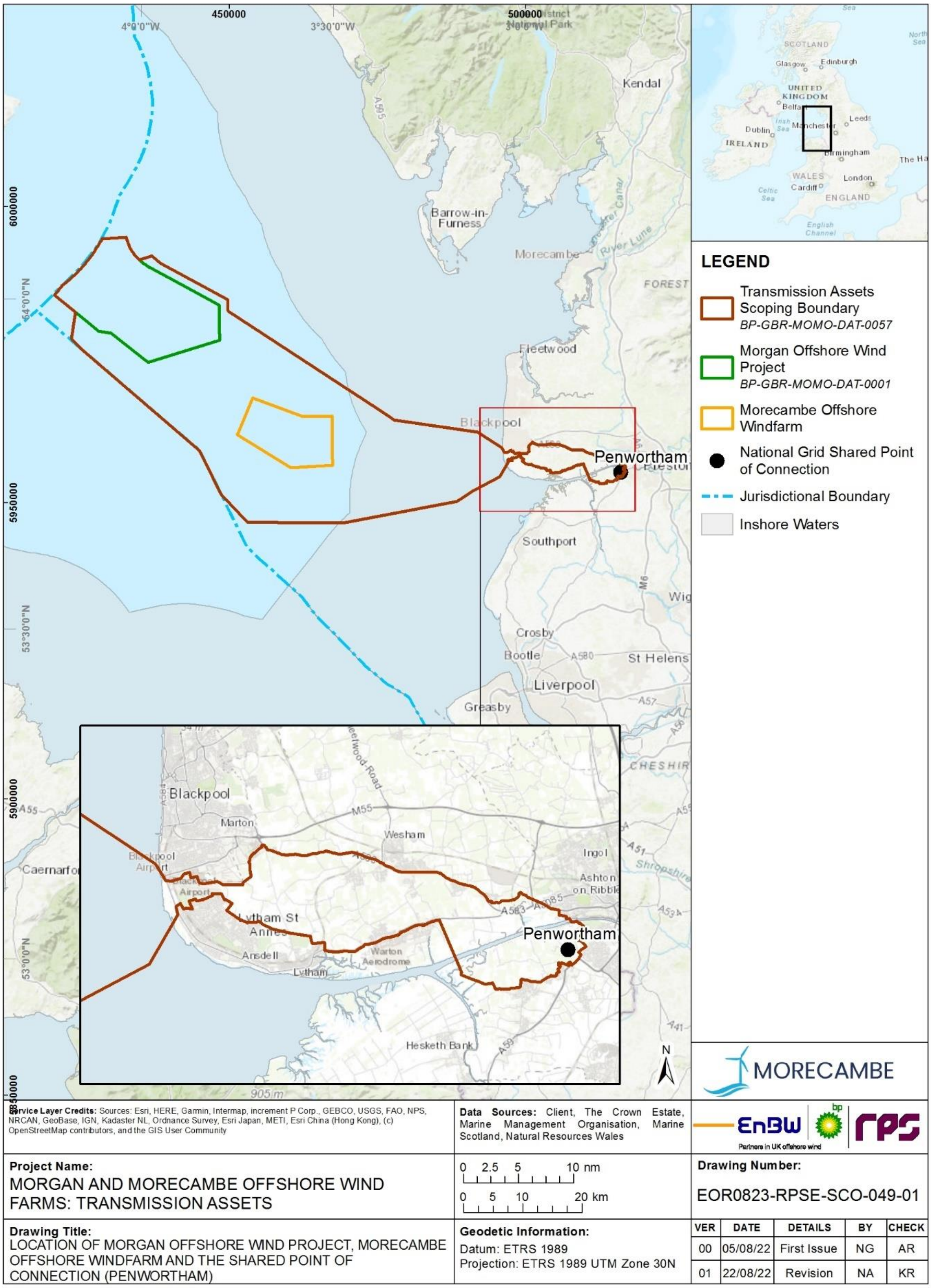


Figure 1.1: Location of Morgan Offshore Wind Project, Morecambe Offshore Windfarm and the Joint Point of Connection (Penwortham)

1.1.1.6. Given the anticipated grid connection arrangements, the proposed consenting strategy for the Morgan Offshore Wind Project and the Morecambe Offshore Windfarm is as follows:

- A stand-alone application to consent the construction, operation and maintenance, and decommissioning of the generation assets of Morgan Offshore Wind Project
- A stand-alone application to consent the construction, operation and maintenance, and decommissioning of the generation assets of Morecambe Offshore Windfarm
- A separate application to consent the construction, operation and maintenance and decommissioning of the transmission assets required to enable the export of electricity from both the Morgan Offshore Wind Project and the Morecambe Offshore Windfarm with a shared export cable corridor to the National Grid connection point at Penwortham (the subject of this Environmental Impact Assessment (EIA) Scoping Report).

1.1.1.7. Both the Morgan Offshore Wind Project and the Morecambe Offshore Windfarm fall within the definition of a Nationally Significant Infrastructure Project (NSIP), as they exceed the threshold for an offshore generating station of 100MW, set under the Planning Act 2008, as amended. They therefore require an application for development consent to be made to the Planning Inspectorate.

1.1.1.8. In relation to the transmission assets for the Morgan Offshore Wind Project and the Morecambe Offshore Windfarm, the Applicants sought a direction from the Secretary of State under section 35 of the Planning Act to confirm that they should be treated as development for which development consent is required under the Planning Act 2008, as amended. A direction was duly made on 4 October 2022 and the Applicants are now pursuing a single development consent for the transmission assets for both wind farms. It is anticipated that the application will apply for a DCO which authorises two coordinated but electrically separate sets of transmission works (for example, where each offshore wind farm would have its own transmission cables and substation infrastructure).

1.1.1.9. This EIA Scoping Report supports the Applicants' request for a Scoping Opinion from the Secretary of State for the Morgan and Morecambe Offshore Wind Farms: Transmission Assets (hereafter referred to as the Transmission Assets).

1.1.1.10. The benefits of pursuing a single development consent for the Transmission Assets are to:

- Allow for better consideration of potential impacts (including cumulative impacts)
- Ensure more efficient use of stakeholder resources
- Provide a formal structure for the projects to collaborate and align on transmission design, assessment and mitigation approach
- Streamline the consenting process with a single development consent and approval timeline

- Align with the National Policy Statements (NPS) for delivering major energy infrastructure (for example 4.9.2 of the current adopted NPS for Overarching Energy (EN-1), and 4.10.3 and 4.10.4 of the draft NPS EN-1).

1.1.1.11. Separate EIA Scoping Reports have been submitted for the Morgan Offshore Wind Project generation assets and the Morecambe Offshore Windfarm generation assets, respectively. Scoping Opinions have been provided by the Planning Inspectorate (on behalf of the Secretary of State) for both projects. This EIA Scoping Report takes into account these Scoping Opinions, where relevant.

1.1.1.12. This EIA Scoping Report has identified potential topics and impacts to be scoped into the EIA process based upon an understanding of the environmental conditions likely to be encountered within the technical topic study areas for the Transmission Assets. The EIA Scoping Report also identifies those potential topics and impacts that are proposed to be scoped out of the EIA process, based on an understanding of the nature of the Transmission Assets, including measures adopted as part of the project design and the proposed location.

1.1.1.13. Consultees are invited to consider the information provided in this EIA Scoping Report and to advise on whether they agree with the conclusions reached. Broad questions have been presented at the end of part 2 of the EIA Scoping Report to encourage reflection on the key elements of the Transmission Assets.

1.1.1.14. Following receipt of the Scoping Opinion from the Secretary of State, a Preliminary Environmental Information Report (PEIR) is planned to be produced and consulted on during 2023. The PEIR will provide an initial statement of the environmental information available for the Transmission Assets, including descriptions of the likely significant environmental effects, mitigation measures adopted as part of the project, and relevant enhancement, mitigation and monitoring commitments. The PEIR is intended to allow those taking part in the consultation to understand the nature, scale, location and likely significant environmental effects of the Transmission Assets, such that they can make an informed contribution to the process of pre-application consultation under the Planning Act 2008, as amended, and to the EIA process.

1.1.1.15. The infrastructure for the Transmission Assets will be located within the Transmission Assets Scoping Boundary identified within this EIA Scoping Report (see Figure 1.1). The site selection process for all elements is ongoing, with a view towards refining the design and site selection before the production of the PEIR for statutory consultation under the Planning Act 2008.

1.1.1.16. Further consultation with relevant statutory and non-statutory consultation bodies is required and will be undertaken before an application for development consent is submitted to the Planning Inspectorate, which will help to inform the development and design evolution of the Transmission Assets. Further details of the approach to consultation are set out in part 1, section 6: Consultation process.

1.1.1.17. The Applicants expect that they will further refine the design of the Transmission Assets taking into consideration the consultation responses received from the pre-application consultation in addition to environmental constraints identified during the EIA process. The application for development consent will comprise full details of the Transmission Assets and will be accompanied by an Environmental Statement (ES), which will present the results of the EIA process. The EIA will be undertaken in accordance with The Infrastructure Planning (Environmental Impact Assessment) Regulations 2017, as amended (the 2017 EIA Regulations) and The Marine Works (Environmental Impact Assessment) Regulations 2007, as amended (the 2007 EIA Regulations). A summary of all consultation responses received will be presented in a Consultation Report, which will accompany the ES and the application for development consent which is currently anticipated to be submitted in 2024.

1.2. Habitats Regulations Assessment

1.2.1.1. A plan level Habitats Regulations Assessment (HRA) is currently being undertaken by The Crown Estate. This process assesses the potential impact of the Round 4 Preferred Bidding Areas as a whole on the UKs National Site Network, as well as European designated sites and protected habitats and species, where relevant. It is understood that this process is nearing its conclusion. Projects that progress through the plan level HRA will proceed to the Agreement for Lease stage with The Crown Estate and will need to undertake their own project level HRA.

1.2.1.2. In parallel to the EIA process, the Applicants will undertake a project level HRA in relation to the Transmission Assets, including provision of a HRA Screening Report and subsequent Information to Support Appropriate Assessment (ISAA[2]). This will be consulted upon during the pre-application consultation process.

1.3. The Applicants and the EIA team

1.3.1.1. The Applicants are Morgan OWL and Morecambe OWL. Both applicants are joint ventures made up of leading energy companies, bp and EnBW and Cobra and Flotation Energy, respectively.

1.3.1.2. EnBW is one of the largest energy supply companies in Germany and supplies electricity, gas, water and energy solutions and energy industry services to around 5.5 million customers with a workforce of more than 23,000 employees. EnBW aims to strengthen its position as a sustainable and innovative infrastructure partner for customers, citizens and local authorities to an even greater extent. The repositioning of EnBW with a focus on renewable energies and smart infrastructure solutions is a key component of its strategy. With a focus on renewable energy and smart infrastructure solutions, EnBW's objective is for half of the electricity it supplies to be from renewable sources by the end of 2025. This is already

2 It is noted that the term Report to Inform Appropriate Assessment (RIAA) is often used interchangeably with the term ISAA

having a noticeable effect on the reduction of CO_2 emissions, which EnBW aims to halve by 2030. EnBW is aiming for climate neutrality by 2035. EnBW has been involved in the operation of hydro power plants in the Black Forest for more than 100 years and has a large and continuously growing number of onshore wind farms and solar PV in Germany, France and Sweden. In addition, EnBW has developed, constructed and operates four offshore wind farms in Germany (EnBW Baltic 1, Baltic 2, Hohe See and Albatros) with a total installed capacity of 945MW, commissioned between 2011 and 2020. A further 900MW offshore wind farm is currently under development with commissioning planned for 2025.

1.3.1.3. bp has set out an ambition to be a net zero company by 2050, or sooner. This strategy will see bp transform from an international oil company producing resources, to an integrated energy company providing solutions to customers. bp already has a significant onshore wind business in the US with a gross generating capacity of 1.7 Gigawatts (GW), operating nine wind assets across the country. Since setting its new strategy in August 2020, bp has already formed a partnership with Equinor to develop offshore wind projects in the US, including the Empire Wind and Beacon Wind projects off the East Coast that have a planned potential 4.4GW generating capacity. To date, these projects have been selected by New York to supply 3.3GW of power to the State, underpinning the commercial attractiveness of the investments.

1.3.1.4. Cobra is a worldwide leader with more than 75 years of experience in the development, construction and management of industrial infrastructure and energy projects. Cobra has an international presence in Europe, Asia, Africa and the Americas. In recent years the company has focused on renewable energy projects, including onshore/offshore wind and solar power, including a specialised floating windfarm business. Cobra has a business culture that is focused on quality and excellence stemming from its greatest asset, its employees.

1.3.1.5. Flotation Energy has a growing project pipeline of offshore wind projects with 10GW in the UK, Ireland, Taiwan, Japan and Australia and plans to expand into many more key markets. The expertise of the Flotation Energy team lies in the project and engineering management of large infrastructure projects. Flotation Energy has developed its own projects but also recognise the benefits of collaboration and working in partnership with other developers to deliver proven, cost-effective solutions.

1.3.1.6. RPS has been contracted by the Applicants to provide this EIA Scoping Report for the Transmission Assets. This EIA Scoping Report has been prepared with input from and has been technically reviewed by Royal Haskoning DHV. Royal Haskoning DHV are acting as advising consultants for the Applicants.

1.3.1.7. The scoping stage has included an initial review of the key environmental issues associated with the construction, operation and maintenance and decommissioning of the Transmission Assets to inform the EIA Scoping Report. The EIA team responsible for drafting this report includes a number of topic specialists, as set out in Table 1.2.

1.3.1.8. In accordance with Regulation 14(4) of the 2017 EIA Regulations, as amended, and Regulation 12(2) of the 2007 EIA Regulations, as amended, the ES will be prepared by competent experts. The ES will outline the relevant expertise of those experts.

1.4. Project overview

1.4.1.1. As described above (see part 1, section 1.1 of this EIA Scoping Report), the Applicants will be seeking consent for two coordinated but electrically separate sets of transmission works. This includes a shared offshore export cable corridor to landfall and a shared onshore export cable corridor to onshore substation(s), and onward connection to the National Grid electricity transmission network at Penwortham, Lancashire. Further detail of the Transmission Assets considered in this EIA Scoping Report is provided in part 1, section 4 of this report.

1.4.1.2. The locations of the offshore wind farm projects and the point of connection at Penwortham are shown on Figure 1.1.

1.5. Purpose, approach and structure of the EIA Scoping Report

1.5.1. Purpose

1.5.1.1. The purpose of this EIA Scoping Report is to provide information on the Transmission Assets and to allow for engagement with stakeholders on the key topics to be addressed in the EIA process. In addition, scoping can be used to present the baseline data sources and assessment methodologies to be used to inform the EIA process. Guidance on EIA scoping from the European Commission sets out the following benefits (Banfi *et al.,* 2017):

- Ensures that key environmental issues to be addressed are identified at an early stage.
- Ensures resources are focused on the key environmental issues and further information is not required to be requested after the application for development consent is submitted.
- Ensures consultation with relevant consultees occurs at an early stage.
- Aids effective management and planning of resources and timescales for the production of the EIA.
- Allows for the identification of initial alternatives and mitigation measures being considered by the developers.

1.5.1.2. This EIA Scoping Report has been prepared in support of a request for a Scoping Opinion from the Secretary of State in accordance with Regulation 10 of the 2017 EIA Regulations and Regulation 13 of the 2007 EIA Regulations. In compliance with these regulations, this EIA Scoping Report provides:

- A plan sufficient to identify the land.
- A description of the proposed development, including its location and technical capacity.
- An explanation of the likely significant effects of the development on the environment.

- Such other information or representations as the person making the request may wish to provide or make.

1.5.1.3. Table 1.1 summarises the information requirements set out in the 2017 EIA Regulations and the 2007 EIA Regulations, and where these can be found in this EIA Scoping Report.

Table 1.1: Scoping requirements of the 2017 EIA Regulations and 2007 EIA Regulations and where the information is included in the EIA Scoping Report.

EIA Regulation requirement	Summary content
2017 EIA Regulations	
A plan sufficient to identify the land.	Part 1, section 4: Project Description, of the EIA Scoping Report includes a plan/map of the location of the Transmission Assets.
A description of the proposed development, including its location and technical capacity.	Part 1, section 4: Project Description, of the EIA Scoping Report includes a description of the Transmission Assets.
An explanation of the likely significant effects of the development on the environment.	Part 2, Transmission Assets of the EIA Scoping Report, include a description of the potential likely significant effects on the environment arising from the Transmission Assets.
Such other information or representations as the person making the request may wish to provide or make.	Further information on the Transmission Assets is provided in part 2 and part 3 of this EIA Scoping Report.
2007 EIA Regulations	
A chart, plan or map sufficient to identify the location of the regulated activity and of other activities to be carried out in the course of the project	Part 1, section 4: Project Description, of the EIA Scoping Report includes a plan/map of the location of the Transmission Assets.
A brief description of the nature and purpose of the project and the regulated activity and their possible effects on the environment	Part 1, section 4: Project Description, of the EIA Scoping Report includes a description of the Transmission Assets; and Part 2, Transmission Assets of the EIA Scoping Report, include a description of the potential likely significant effects on the environment arising from the Transmission Assets.
Such other information or representations as the person making the request may wish to provide or make.	Further information on the Transmission Assets is provided in part 2 and part 3 of this EIA Scoping Report.

1.5.2. Approach

1.5.2.1. The approach taken in the preparation of this EIA Scoping Report has aimed to achieve the following objectives:

- To provide an overview of the baseline environment and the data collection and survey methodologies that will be implemented to inform the EIA baseline characterisation for each technical assessment.
- To propose topics and impacts to scope into the EIA process, drawing upon the existing evidence base and presenting topic-specific assessment methodologies where appropriate.

- To propose topics and impacts to be scoped out of the EIA process, drawing upon the existing evidence base where appropriate, where there is clear justification for doing so.

1.5.2.2. This approach will allow the EIA process to focus on those potential impacts which either have the potential to lead to a likely significant effect, or where uncertainty exists on potential effects, thereby supporting the development of a proportionate ES.

1.5.2.3. The ES, which will present the findings of the EIA process for the Transmission Assets, will be informed by the Scoping Opinion provided by the Secretary of State, including responses from relevant statutory and non-statutory consultation bodies. Details of the proposed approach to stakeholder consultation are outlined in part 1, section 6: Consultation process of this EIA Scoping Report. The application for development consent, which will be accompanied by the ES, is planned to be submitted to The Planning Inspectorate (on behalf of the Secretary of State) in 2024.

1.5.2.4. The Applicants welcome the opportunity for engagement with consultees and feedback on the Transmission Assets and the scope (proposed content) of the ES.

1.5.3. Structure

1.5.3.1. This EIA Scoping Report is presented in three parts:

- Part 1 of this EIA Scoping Report (Introduction) provides an introduction to the Transmission Assets, sets out the policy and legislative context, sets out the considerations for site selection and alternatives, provides an indicative project description, and sets out the proposed EIA methodology and details the pre-application consultation process.
- Part 2 of this EIA Scoping Report (Transmission Assets) identifies the main aspects of the offshore and onshore physical, biological and human environment likely to be significantly affected by the construction, operation and maintenance, and decommissioning of the Transmission Assets.
- Part 3 of this EIA Scoping Report (Annexes) contains the transboundary impacts, Water Framework Directive and Marine Conservation Zone (MCZ) screening annexes.

1.5.3.2. The structure of this EIA Scoping Report is set out in Table 1.2.

Table 1.2: Structure of this EIA Scoping Report.

Topic	Summary of content	Section	Author
Part 1: Introduction			
Introduction	Background to the Transmission Assets and the consenting approach; and outlines the purpose, approach and structure of the EIA Scoping Report.	Part 1, section 1	RPS
Policy and legislation	Description of the policy and legislative context relevant to the Transmission Assets.	Part 1, section 2	RPS
Site selection and alternatives	Description of the site selection process, including the approach undertaken by the Applicants to identify the siting of the Transmission Assets.	Part 1, section 3	RPS, Morgan OWL, Morecambe OWL
Project description	Description of the design for the Transmission Assets, based on preliminary conceptual design information and current understanding of the environment from initial site investigation studies.	Part 1, section 4	RPS, Morgan OWL, Morecambe OWL
EIA methodology	Description of the proposed principles of the EIA process and the approach that will be applied in the ES to identify and evaluate the likely impacts and, subsequently, evaluate the significance of effects, associated with the Transmission Assets.	Part 1, section 5	RPS
Consultation process	Description of the consultation that has been carried out at the time of submission of the EIA Scoping Report and the consultation that will be carried out in the pre-application phase.	Part 1, section 6	RPS
Part 2: Transmission Assets			
Section 1: Introduction			
Introduction	Introduction to the Transmission Assets what is considered within part 2 of the EIA Scoping Report.	Part 2, section 1	RPS
Section 2: Structure of EIA Report			
Structure of this EIA Report	Sets out the structure of this part of the EIA Scoping Report (part 2).	Part 2, section 2	RPS
Section 3: Proposed technical assessments - offshore physical environment			
Proposed scope of the assessment for impacts on the offshore physical environment			
Physical processes	Overview of the offshore physical environment (tidal elevations, currents, waves, bathymetry, geology, seabed sediments, suspended sediments and sediment transport) within the boundaries of the Transmission Assets Scoping Boundary. Supports assessment of potential impacts to the offshore physical environment from construction, operation and maintenance and decommissioning.	Part 2, section 3.1	RPS
Underwater noise	Overview of approach to the assessment of underwater noise arising from the construction, operation and maintenance and decommissioning of the Transmission Assets. Required for understanding of potential impact to underwater noise sensitive receptors such as marine mammals and fish.	Part 2, section 3.2	RPS and Seiche

Topic	Summary of content	Section	Author
Section 4: Proposed technical assessments - offshore biological environment			
Proposed scope of the assessment for impacts on the offshore biological environment			
Benthic subtidal and intertidal ecology	Overview of the ecology of the seabed within the boundaries of the Transmission Assets Scoping Boundary. Required for understanding of potential impacts to seabed ecology from construction, operation and maintenance and decommissioning.	Part 2, section 4.1	RPS
Fish and shellfish ecology	Overview of the fish and shellfish ecology of the seabed within the boundaries of the Transmission Assets Scoping Boundary. Required for understanding of potential impact to fish and shellfish ecology from construction, operation and maintenance and decommissioning.	Part 2, section 4.2	RPS
Marine mammals	Overview of the marine mammals within the vicinity of the Transmission Assets Scoping Boundary. Required for understanding of potential impacts to marine mammals from construction, operation and maintenance and decommissioning.	Part 2, section 4.3	RPS
Offshore ornithology	Overview of the ornithology features within the vicinity of the Transmission Assets Scoping Boundary. Required for understanding of potential impacts to ornithology from construction, operation and maintenance and decommissioning.	Part 2, section 4.4	RPS
Section 5: Proposed technical assessments - offshore human environment			
Proposed scope of the assessment for impacts on the offshore human environment			
Commercial fisheries	Overview of commercial fisheries within the vicinity of the Transmission Assets Scoping Boundary. Required for understanding of potential impacts to commercial fisheries from construction, operation and maintenance and decommissioning.	Part 2, section 5.1	RPS and Marine Space
Shipping and navigation	Overview of the baseline shipping and navigation within the vicinity of the Transmission Assets Scoping Boundary. Required for understanding of potential impacts to shipping and navigation from construction, operation and maintenance and decommissioning.	Part 2, section 5.2	RPS and NASH Maritime
Marine archaeology	Overview of marine archaeology within the vicinity of the Transmission Assets Scoping Boundary. Supports understanding of impact to marine archaeology from construction, operation and maintenance and decommissioning.	Part 2, section 5.3	RPS
Other sea users	Overview of other sea users within the vicinity of the Transmission Assets Scoping Boundary. Required for understanding of potential impacts to other sea users from construction, operation and maintenance and decommissioning.	Part 2, section 5.4	RPS
Section 6: Proposed technical assessments – onshore physical environment			
Proposed scope of the assessment for impacts on the onshore physical environment			
Geology and ground conditions	Overview of geology and ground conditions within the Transmission Assets Scoping Boundary. Required for understanding of potential impacts to	Part 2, section 6.1	RPS

Topic	Summary of content	Section	Author
	geology and ground conditions from construction, operation and maintenance and decommissioning.		
Hydrology and flood risk	Overview of hydrology and flood risk within the Transmission Assets Scoping Boundary. Required for understanding of potential impacts to hydrology and flood risk from construction, operation and maintenance and decommissioning.	Part 2, section 6.2	RPS
Section 7: Proposed technical assessments - onshore biological environment			
Proposed scope of the assessment for impacts on the onshore biological environment			
Terrestrial ecology and intertidal birds	Overview of terrestrial ecology and intertidal birds within the vicinity of the Transmission Assets Scoping Boundary. Required for understanding of potential impacts to terrestrial ecology and intertidal birds from construction, operation and maintenance and decommissioning.	Part 2, section 7.1	RPS
Section 8: Proposed technical assessments – onshore human environment			
Proposed scope of the assessment for impacts on the onshore human environment			
Historic environment	Overview of historic environment within the Transmission Assets Scoping Boundary. Required for understanding of potential impacts to historic environment from construction, operation and maintenance and decommissioning.	Part 2, section 8.1	RPS
Land use and recreation	Overview of land use and recreation (including rights fo way) within the vicinity of the Transmission Assets Scoping Boundary. Required for understanding of potential impacts to land use and recreation from construction, operation and maintenance and decommissioning.	Part 2, section 8.2	RPS
Traffic and transport	Overview of traffic and transport within the Transmission Assets Scoping Boundary. Required for understanding of potential impacts to traffic and transport from construction, operation and maintenance and decommissioning.	Part 2, section 8.3	RPS
Noise and vibration	Overview of potential impacts of noise and vibration arising from the Transmission Assets from construction, operation and maintenance and decommissioning.	Part 2, section 8.4	RPS
Air quality	Overview of air quality within the Transmission Assets Scoping Boundary. Required for understanding of potential impacts to air quality from construction, operation and maintenance and decommissioning.	Part 2, section 8.5	RPS
Section 9: Proposed technical assessments – impacts on the onshore and offshore environment			
Proposed scope of the assessment for topics where effects may occur on the onshore and offshore environment			
Seascape, landscape and visual resources	Overview of seascape, landscape and visual resources within the vicinity of the Transmission Assets Scoping Boundary. Required for understanding of potential impacts to seascape, landscape and visual resources from construction, operation and maintenance and decommissioning.	Part 2, section 9.1	RPS

Topic	Summary of content	Section	Author
Socio-economics and community	Overview of socio-economics and community within the vicinity of the Transmission Assets Scoping Boundary, including tourism. Required for understanding of potential impacts to socio-economics and community from construction, operation and maintenance and decommissioning.	Part 2, section 9.2	RPS and Hardisty Jones
Aviation and radar	Overview of aviation and radar receptors within the vicinity of the Transmission Assets Scoping Boundary. Required for understanding of potential impacts to aviation and radar from construction, operation and maintenance and decommissioning.	Part 2, section 9.3	RPS and Osprey
Climate change	Overview of climate change receptors for the Transmission Assets. Required for understanding of potential impacts of the Transmission Assets on the climate during construction, operation and maintenance and decommissioning and the vulnerability of the Transmission Assets to future climate change.	Part 2, section 9.4	RPS
Section 10: Proposed scope of assessment – supporting technical information			
Topics with supporting information	Overview of topics of relevance to the Transmission Assets where a technical appendix only will be provided to support the relevant technical chapters of the ES.	Part 2, section 10.2	RPS
Topics covered elsewhere in the ES	Overview of topics of relevance to the Transmission Assets that will be covered in other technical chapters of the ES and are not proposed to be subject to standalone chapters or appendices within the ES.	Part 2, section 10.3	RPS
Section 11: Topics to be scoped out			
Topics proposed to be scoped out	Justification for scoping out relevant topics for the Transmission Assets.	Part 2, section 11	RPS
Section 12: Summary			
Summary	Presents a summary of the potential impacts which are proposed to be scoped into and out of the EIA process, relevant to the Transmission Assets.	Part 2, section 12	RPS
Part 3: Annexes			
Transboundary impacts screening	Includes a screening assessment of potential transboundary impacts arising from the Transmission Assets.	Annex A	RPS
Water Framework Directive screening	Includes a screening assessment of potential impacts on the status of receptors designated under the Water Framework Directive arising from the Transmission Assets.	Annex B	RPS
MCZ screening	Includes a screening assessment of potential impacts on Marine Conservation Zones arising from the Transmission Assets.	Annex C	RPS

2. Policy and legislation

2.1. Climate change policy and need for the project

2.1.1. International climate change commitments

2.1.1.1. The UK is a signatory to the Kyoto protocol, which committed industrialised countries and economies to limit and reduce greenhouse gas emissions in accordance with agreed individual targets. The protocol came into effect in 2005 and its commitments were transposed into UK law by the Climate Change Act 2008.

2.1.1.2. In December 2015, 195 countries (including the UK) adopted the first ever universal, legally binding global climate deal at the Paris climate conference (COP21). The Paris Agreement (2015) sets out a global action plan towards climate neutrality with the aims of limiting the increase in global average temperature to below 2°C above pre-industrial levels, and to pursue efforts to limit global warming to 1.5°C.

2.1.1.3. In November 2021, the UN Climate Change Conference (COP26) was held in Glasgow. The Glasgow Climate Pact, agreed by all parties, ensures the 1.5°C warming limit remains achievable but only with accelerated action on climate. Guidelines for how the Paris Agreement will be delivered were also completed at COP26.

2.1.2. UK climate change and renewable energy commitments

The Climate Change Act 2008 (as amended)

2.1.2.1. Under the Climate Change Act 2008, the UK committed to a net reduction in greenhouse gas emissions of 80% by 2050 against the 1990 baseline, in line with the commitments of the Kyoto Protocol.

2.1.2.2. In June 2019, the Climate Change Act 2008 (2050 Target Amendment) Order 2019 was passed, which extended that target to at least 100% net reduction in greenhouse gas emissions by 2050 against the 1990 baseline.

2.1.2.3. The Climate Change Act 2008 also established the Climate Change Committee, which advises the UK and devolved governments on emissions targets and reports to Parliament on progress made in reducing greenhouse gas emissions and preparing for and adapting to the impacts of climate change.

The Energy Act 2013

2.1.2.4. The Energy Act received Royal Assent on 18 December 2013. The Energy Act introduced a legislative framework for delivering secure, affordable and low carbon energy. It included provisions to incentivise investment in low carbon electricity generation, ensure security of supply, and help the UK meet its emission reduction and renewables targets. In particular, the Energy Act contained provisions for Electricity Market Reform.

The Clean Growth Strategy 2017

2.1.2.5. The Clean Growth Strategy, published in 2017, emphasised growing national income while cutting greenhouse gas emissions (HM Government, 2017). Its states aim was to achieve clean growth, while ensuring that an affordable energy supply for businesses and consumers is at the heart of the UK's Industrial Strategy.

National Infrastructure Assessment (2018 onwards)

2.1.2.6. The National Infrastructure Commission (NIC) provides advice on the UK's national infrastructure and an assessment of infrastructure needs to 2050 and beyond.

2.1.2.7. The first National Infrastructure Assessment was published in 2018 (NIC, 2018), which highlighted the need for the UK to have low cost and low carbon electricity. It proposed a highly renewable generation mix as a low-cost option for the energy system, with at least 50% renewable generation by 2030. It set out that offshore wind should be recognised as cost competitive.

The UK Offshore Wind Sector Deal 2019

2.1.2.8. The UK Government published the Offshore Wind Sector Deal in 2019, which sets the key commitments and actions from the UK Government to support offshore wind energy development (HM Government, 2020a).

National Infrastructure Strategy 2020

2.1.2.9. The National Infrastructure Strategy was published in November 2020 and sets out the plan for the UK's infrastructure revolution, alongside the plans for levelling up. It responds to the recommendations made in the National Infrastructure Assessment. Commitments include:

- Significant investment in offshore wind and into modern ports and manufacturing infrastructure to expand the share of energy generation from renewables.
- Infrastructure investment in offshore wind capacity (40GW by 2030) and port infrastructure will create jobs in coastal communities.

The Ten Point Plan for a Green Industrial Revolution 2020 and the HM Government Energy White Paper - Powering our Net Zero Future 2020

2.1.2.10. The UK's Ten Point Plan (HM Government, 2020c) intends to set the foundations for a Green Industrial Revolution, creating jobs through harnessing British science and technology to create and use clean energy.

2.1.2.11. Following the ten-point plan, the White Paper - Powering our Net Zero Future (HM Government, 2020d) set a net zero target for 2050. It refers to the generation, supply and use of energy with the drive towards net zero by 2050, along with energy efficient buildings and lower household bills.

2.1.2.12. The White Paper sets out an aim to quadruple offshore wind capacity by 2030, '*backing new innovations to make the most of this proven technology and investing to bring new jobs and growth to our ports and coastal regions*'. It included a target for 40GW of offshore wind by 2030.

UK Net Zero Strategy 2021

2.1.2.13. The Government published its Net Zero Strategy in 2021 (HM Government, 2021a). This sets out the long-term plan to end the UK's contribution to man-made climate change by 2050. The key policies in the net zero strategy include:

- By 2035 the UK will be powered entirely by clean electricity, subject to security of supply.
- 40GW of offshore wind by 2030.

British Energy Security Strategy

2.1.2.14. The Energy Security Strategy (HM Government, 2022) places a heavy reliance on a renewable and low carbon domestic energy supply to '*bring clean, affordable, secure power to the people for generations to come*…'.

2.1.2.15. The strategy plans to accelerate delivery of offshore wind by strengthening the renewable National Policy Statements (NPSs) to reflect the importance of energy security and net zero emissions. Specifically, the strategy states an ambition to deliver up to 50GW of offshore wind by 2030, an increase on previous targets of 40GW.

Holistic Network Design

2.1.2.16. In July 2022, the UK Government published the Pathway to 2030 Holistic Network Design documents, which set out the approach to connecting 50GW of offshore wind to the UK electricity network (National Grid ESO, 2022a).

2.2. The consenting process

2.2.1. Introduction

2.2.1.1. The Transmission Assets will be located in English offshore waters (beyond 12nm from the English coast) and inshore waters, with the onshore infrastructure located wholly within England. As set out in part 1, section 1: Introduction, of this EIA Scoping Report, the Secretary of State has directed that the Transmission Assets are nationally significant infrastructure and are to be treated as development for which development consent is required under the Planning Act 2008, as amended. This section provides a summary of the consenting process and describes the legal requirements for EIA. Where legislation applies to NSIPs differently to other development applications, this has been highlighted where relevant to reflect the consenting regime within which the Transmission Assets will be determined.

2.2.2. The Planning Act 2008

2.2.2.1. The Planning Act 2008 (as amended) is the primary legislation that established the legal framework for the application, examination and determination of applications for development requiring development consent.

2.2.2.2. Under section 35 of the Planning Act 2008, the Secretary of State may give a direction for a project to be treated as development for which development consent is required. The application for development consent for the Transmission Assets will cover all offshore aspects of the project located within English offshore and inshore waters, as well as all onshore aspects of the project. Applications for development consent are examined by the Planning Inspectorate and determined by the Secretary of State.

2.2.2.3. Section 105 of the Planning Act 2008 will apply to the determination of an application for development consent for the Transmission Assets. In deciding the application, the Secretary of State must have regard to the following:

- Any local impact report submitted to the Secretary of State within the required timescales
- Any matters prescribed in relation to development of the description to which the application relates
- Any other matters which the Secretary of State thinks are both important and relevant to the Secretary of State's decision.

2.2.2.4. The Applicants consider that the National Policy Statements are the key policy for determining the Transmission Assets.

2.2.3. Marine and Coastal Access Act 2009

2.2.3.1. The Marine and Coastal Access Act (MCAA) introduced a new planning system for marine environmental management and a requirement to obtain marine licences for licensable marine activities.

2.2.3.2. Section 149A of the Planning Act 2008 allows an applicant for a DCO to apply for 'deemed marine licences' to be issued under Part 4 of the MCAA 2009 as part of the DCO process. The Marine Management Organisation (MMO) is the responsible authority for deemed marine licences in English waters and works with The Planning Inspectorate to ensure that these licences are transposed into the DCO. The MMO remains the monitoring and enforcement body in respect of the conditions and restrictions contained within the deemed marine licences.

2.2.3.3. This EIA Scoping Report has been prepared in support of both the DCO and deemed marine licence application for the Transmission Assets.

2.2.4. The Environmental Impact Assessment Regulations

2.2.4.1. The Infrastructure Planning (Environmental Impact Assessment) Regulations 2017 (as amended) and the Marine Works (Environmental Impact Assessment) Regulations 2007 (as amended) set out the requirements for EIA under the Planning Act and the Marine and Coastal Access Act 2009 respectively.

2.2.4.2. EIA is the process of identifying and assessing the significant effects likely to arise from a project. This ensures that the determining authority has sufficient information relating to the likely significant effects on the environment arising from a project. The approach to EIA for the

Transmission Assets is set out in part 1, section 5: EIA methodology of this EIA Scoping Report.

2.2.5. Habitats Regulations

2.2.5.1. The Conservation of Habitats and Species Regulations 2017 (as amended) and the Conservation of Offshore Marine Habitats and Species Regulations 2017 (as amended) require the assessment of significant effects on internationally important nature conservation sites.

2.2.5.2. These have been traditionally referred to as European Sites or Natura 2000 sites. Following the UK's departure from the European Union (EU), such sites in the UK are now referred to as the National Site Network. The assessment is to be undertaken by the 'competent authority', which in the case of the Transmission Assets is the Secretary of State for Business, Energy and Industrial Strategy (BEIS).

2.2.5.3. In order to carry out the Habitat Regulations Assessment, the competent authority requires a report to be submitted alongside the application for development consent. ISAA will be provided alongside the ES with the application for development consent, which will consider effects on the National Site Network and on European Sites (outside of the UK), where relevant.

2.2.5.4. The Habitats Regulations also provide protection for certain species of plants and animals, referred to as European Protected Species (EPS). These regulations set out those species that are protected and the activities that are prohibited, such as deliberate disturbance or creating damage to a breeding place.

2.2.5.5. With respect to the Transmission Assets, the species present will be identified, and the likely significant effects assessed. Where possible, effects on protected species will be avoided or minimised. Where such effects cannot be avoided, then an application for an EPS licence will be made.

2.2.6. Environment Act 2021

2.2.6.1. The Environment Act sets out targets, plans and policies for environmental protection. Schedule 15 of the Environment Act sets out provisions for biodiversity net gain for NSIPs and amends the Planning Act. This includes the requirement for the production of biodiversity net gain statements for NSIPs.

2.2.7. The Water Environment (Water Framework Directive) (England and Wales) Regulations 2017

2.2.7.1. These regulations set out objectives for surface and groundwater bodies, including water quality with the aim of improving the water environment. Objectives are set for waterbodies in terms of their status (see part 3, section 2: Annex B: WFD Screening, of this EIA Scoping Report).

2.2.8. Flood and Water Management Act 2010

2.2.8.1. This Act came into effect in April 2010, with an aim to create a simplified and more effective means of managing flood risk and coastal erosion, as well as improving the sustainability of water resources.

2.2.8.2. Schedule 3 of the Act was introduced to establish an approving body for sustainable drainage at the county and unitary level, ensuring its delivery is mandatory. This Schedule was not enacted with the rest of the Act. However, in July 2022, it was announced that Schedule 3 would be enacted.

2.2.9. Environmental Permitting (England and Wales) Regulations 2016

2.2.9.1. The Environmental Permitting Regulations aim to ensure that authorised activities and their discharges do not endanger the environment or human health.

2.3. International conventions

2.3.1.1. The following international conventions are relevant to the Transmission Assets and will be taken into account in the EIA process:

- **The Ramsar Convention (1976)** - an international treaty for the conservation and sustainable use of designated wetland areas, known as Ramsar sites.
- **The OSPAR Convention (1992)** - aims to protect the marine environment of the North-East Atlantic.
- **The Espoo Convention (1997)** - sets out the obligations of Parties to notify and consult each other on all major projects under consideration that are likely to have a significant adverse impact across international boundaries (transboundary effects).
- **The Convention on Biological Diversity (1993)** - encourages actions that will lead to a sustainable future.

2.4. National policy statements

2.4.1.1. NPSs are designated under the Planning Act 2008. They describe the national case and establish the need for certain types of infrastructure development, including offshore wind farms.

2.4.1.2. There are six energy NPSs, three of which contain policy relevant to offshore wind development and the Transmission Assets, specifically:

- Overarching NPS for Energy (NPS EN-1) which sets out the UK Government's policy for the delivery of major energy infrastructure (DECC 2011a).
- NPS for Renewable Energy Infrastructure (NPS EN-3) (DECC 2011b).
- NPS for Electricity Networks Infrastructure (NPS EN-5) (DECC 2011c).

2.4.1.3. These are currently being updated and draft versions were published for consultation in September 2021 (BEIS, 2021a; BEIS, 2021b; BEIS, 2021c).

2.4.1.4. The policy provisions within the NPS relevant to each physical, biological and human environment topic of the EIA will be presented and addressed in the individual technical topic chapters of the ES.

2.5. Other relevant national planning policy

2.5.1. The National Planning Policy Framework

2.5.1.1. The National Planning Policy Framework (NPPF) was published in 2012 and updated in 2018, 2019 and 2021 (Ministry of Housing, Communities and Local Government, 2021). The NPPF sets out the Government's planning policies for England.

2.5.1.2. Paragraph 5 states that the NPPF does not contain specific policies for NSIPs. These are to be determined in accordance with the decision-making framework set out in the Planning Act, as well as any other matters that are considered both important and relevant (which may include the NPPF).

2.6. Marine policy

2.6.1. UK Marine Policy Statement

2.6.1.1. The UK-wide Marine Policy Statement (MPS) was published in March 2011, under the MCAA 2009, in order to provide a framework for marine spatial planning (Defra, 2011).

2.6.1.2. The MCAA requires all public authorities taking authorisation or enforcement decisions that affect or might affect the UK marine area to do so in accordance with the MPS and the relevant Marine Plans.

2.6.1.3. The MPS provides that the following issues should be taken into account by decision makers when examining and determining applications for energy infrastructure:

- The national level of need for energy infrastructure, as set out in NPS EN-1.
- The positive wider environmental, societal and economic benefits of low carbon electricity generation and carbon capture and storage as key technologies for reducing carbon dioxide emissions.
- The potential impact of inward investment in offshore renewable energy related manufacturing and deployment activity; as well as the impact of associated employment opportunities on the regeneration of local and national economies. These activities support the objective of developing the UK's low carbon manufacturing capability (MPS, paragraph 3.3.4).

North West Marine Plan

2.6.1.4. The Transmission Assets are located in English waters, covered by the North West Marine Plan. The North West Marine Plan (HM Government, 2021b) was published in June 2021 and introduces a strategic approach to marine planning within the marine plan area. It is intended to inform decision-making by marine users and regulators on where, when or how activities may take place within the marine plan area.

2.6.1.5. The North West Marine Plan sets out the following four objectives in relation to achieving a sustainable marine economy:

- Infrastructure is in place to support and promote safe, profitable and efficient marine businesses.
- The marine environment and its resources are used to maximise sustainable activity, prosperity and opportunities for all, now and in the future.
- Marine businesses are taking long-term strategic decisions and managing risks effectively. They are competitive and operating efficiently.
- Marine businesses are acting in a way which respects environmental limits and is socially responsible. This is rewarded in the market place.

2.6.1.6. The policy provisions within the North West Marine Plan relevant to each physical, biological and human environment topic of the EIA will be presented and addressed in the individual technical topic chapters of the ES.

2.7. Local planning policy

2.7.1.1. The Planning Act 2008, as amended, does not incorporate Section 38(6) of the Planning and Compulsory Purchase Act 2004, which provides the principal basis in legislation for the determination of planning applications under the Town and Country Planning Act 1990, namely that they must be determined in accordance with the statutory development plan unless material considerations indicate otherwise. Applications for development consent made under the Planning Act are determined as set out above.

2.7.1.2. It is the view of the Applicants that the National Policy Statements are the key policy for determining the Transmission Assets. The local development plan is not therefore likely to be the starting point for the consideration of an application for development consent. Nevertheless, local policy will be considered through the EIA process where relevant.

2.7.1.3. In addition, relevant supplementary planning documents will also be considered where they are relevant and important. Where study areas for individual topics extend beyond the above administrative areas, planning documents relevant to additional administrative areas within the study areas will be taken into account.

3. Site selection

3.1. Site selection and alternatives

3.1.1. Introduction

3.1.1.1. Both the 2017 EIA Regulations and the 2007 EIA Regulations require a description of the reasonable alternatives considered by the Applicant(s) and an indication of the main reasons for selection of the chosen option, taking into account effects on the environment. This information will be provided in the ES.

3.1.1.2. The consideration of siting options and alternatives, including design refinement, is iterative during the EIA process and, therefore, this process is not yet complete. This section of this EIA Scoping Report therefore provides an overview of the process to date for the Transmission Assets.

3.1.1.3. The site selection process is linked to, and has been informed by, work undertaken by National Grid ESO, who is responsible for determining the most appropriate point of connection to the national electricity transmission network via the HNDR.

3.2. Work undertaken by National Grid ESO

3.2.1.1. Offshore wind farms in the UK currently connect to the onshore national electricity transmission system via individual radial connections (i.e., with each offshore wind farm having its own point of interconnection with the national electricity transmission system on land).

3.2.1.2. As set out in part 1, section 1 of this EIA Scoping Report, the UK Government has initiated the OTNR, which is being undertaken by the Department for Business, Energy and Industrial Strategy, in partnership with a number of other agencies, including National Grid ESO. The OTNR, and its associated projects (including the HNDR), is examining a range of technical and engineering solutions to improve the coordination of new offshore wind generation connections and transmission. This work is required to enable the connection of 50GW of offshore wind by 2030, in line with Government commitments (see part 1, section 2 of this EIA Scoping Report).

3.2.1.3. The HNDR process has sought to balance the needs of consumers, developers, communities and the environment. This has been undertaken through the use of network design objectives, as set out in Table 3.1.

Table 3.1: Network design objectives (source: National Grid ESO, 2022a)

Objective	Description
Economic and efficient costs	The network design should be economic and efficient
Deliverability and operability	The network design should be deliverable by 2020 and the resulting system should be safe, reliable and operable
Environmental impact	Environmental impacts should be avoided, minimised or mitigated by the network design, and best practice environmental management incorporated in the network design
Local community impact	Local community impacts should be avoided, minimised, or mitigated by the network design

3.2.1.4. The HNDR report (National Grid ESO, 2022a) sets out the methodology used, noting that all four objectives have been considered on an equal footing. The review considered the following information for each objective.

- Economic and efficient costs – an economic optimiser was used that considered network costs, market conditions and system benefits were identified.
- Deliverability and operability – a deliverability assessment framework was developed that considered factors such as supply chain of technologies, construction timeframes, and consenting challenges.
- Environmental impact – assessments of environmental constraints were undertaken using Geographical Information System (GIS) datasets to determine the location and severity of environmental constraints. Any proposed designs that would result in severe environmental impacts were not provided as inputs to the economic optimiser.
- Local community impact – assessments of community constraints were undertaken using GIS data sources to determine the location and severity of community constraints. Any proposed designs that would result in severe community impacts were not provided as inputs to the economic optimiser.

3.2.1.5. Partners and stakeholders were engaged with at different points during this process. These included a Central Design Group (CDG), consisting of representation from key stakeholders, including the onshore transmission owners (National Grid Electricity Transmission, Scottish Power Transmission, Scottish and Southern Electricity Networks-Transmission). This group was supplemented by four subgroups, through which expert input and formal advice on specific elements of the design was received. These included:

- A stakeholder and communications subgroup.
- A commercial subgroup.
- An environmental subgroup.

- A developer forum (including input from the Applicants, based on their own work to identify constraints and critical analysis of the design).

3.2.1.6. The recommended design output from the HNDR for the North West Region includes a connection through offshore waters between Scotland and Wales and connections from the Irish Sea to the North West of England and North Wales. For the Morgan Offshore Wind Project and the Morecambe Offshore Windfarm specifically, the recommended design proposes collaboration between the projects and consists of radial connections with a shared cable corridor connecting to the grid at the existing National Grid substation at Penwortham. The shared onshore and offshore cable corridor (which will include both projects' cables) and landfall location aim to minimise the impact of the cables on the environment and local community. This is consistent with a collaborative proposal submitted by the Applicants to BEIS, Ofgem and National Grid ESO, which proposed coordination between the projects to Penwortham to minimise environmental and community impacts.

3.2.1.7. Although this design provides two electrically separate sets of transmission assets, the HNDR concludes that the approach delivers many of the benefits of coordination, such as reduced environmental impact through a shared export cable corridor and landfall location.

3.2.1.8. The HNDR identified the existing National Grid substation at Penwortham in Lancashire as the preferred point of interconnection, based on the system capability and required reinforcement deliverability to accept the transmission export capacity for both wind farms.

3.2.1.9. The review considered each of the four objectives in reaching this conclusion and noted that, while it is not possible to avoid all environmental constraints, the proposed connection to Penwortham performed better than the alternative designs and avoided the Morecambe Bay Special Area of Conservation (SAC).

3.2.1.10. Site selection work undertaken by the Applicants in parallel to the HNDR process aligns with the HNDR outputs, therefore the Applicants support the recommended HNDR design output, and therefore intend to enter into a connection agreement on this basis.

3.3. Work being undertaken by the Applicants

3.3.1. Introduction

3.3.1.1. The Applicants are undertaking a site selection process in parallel to, and building on the output of, the HNDR process. This process will develop export cable routes and substation options to enable the connection to the existing National Grid substation at Penwortham.

3.3.1.2. The objective of any such siting process is to identify technically, economically and environmentally feasible locations, whilst minimising potential impacts on the existing environment and communities. This process includes identifying and evaluating alternative technology and routing options, where these would affect constructability and the environment. The design and siting process is iterative, based on engineering, the findings of the EIA process (such as findings of the baseline surveys) and on feedback from and consultation with stakeholders.

3.3.1.3. The site selection and routing process will take into account the principles in key guidance documents, such as the Horlock and Holford Rules as adhered to by National Grid, and input from land owners. In addition, this ongoing process will take into account the policies set out in NPS EN-1 (DECC, 2011a), including the approach to consideration of alternatives set out in Section 4.4 and the principles of good design for energy infrastructure set out in Section 4.5 of the NPS. In addition, topic-specific considerations set out in NPS EN-3 (DECC, 2011b) and EN-5 (DECC, 2011c) relevant to the site selection process will also be considered.

3.3.2. Methodology overview

3.3.2.1. The Applicants' site selection process is iterative, remaining under review and being continually updated as more information becomes available. Where necessary, options will be refined and the appraisal updated, or new options will be identified and appraised following the gathering of site data and consultation.

3.3.2.2. The identification and appraisal of options for locating the different elements of the Transmission Assets is following five broad stages as set out below.

Stage 1 – Identification of the study area

3.3.2.3. By considering the locations of the generation assets and the existing National Grid substation at Penwortham, it has been possible to establish a likely maximum stretch of suitable coastline available for identifying landfall options (see section 3.3.3).

3.3.2.4. The ideal location for an onshore substation is adjacent, or as near as possible, to the grid connection location. However, this is not always possible, often due to planning and environmental considerations, infrastructure congestion, cost or technical reasons. Accounting for this, both inner and outer study areas are being considered around the existing National Grid Penwortham substation.

3.3.2.5. The identification of the export cable corridors is generally dictated by their start and end points (i.e., the location of the generation assets of both wind farm projects, the landfall location and the onshore substation site options).

Stage 2 – Identification and analysis of constraints

3.3.2.6. To guide the identification of options, key environmental, consenting and technical constraints have been, and will continue to be identified. These constraints vary in nature and the degree to which they might influence or constrain the siting of infrastructure. When identifying options, the avoidance of constraints is preferred, but in some instances, this may not be practicable, and it may be determined that interaction with the Transmission Assets is considered by the Applicants and stakeholders to be the preferred option where there are proven solutions and/or mitigation measures available.

3.3.2.7. Where constraints data for the study area is available in electronic format, datasets are being processed, grouped into topics and presented as constraints layers within a GIS environment for mapping.

3.3.2.8. Table 3.2 presents the constraints currently being considered within the options appraisal. These constraints (and, where appropriate, buffer zones around them) will continue to evolve, as appropriate, with the site selection process.

Table 3.2: Key Constraints Considered

Topic	Description
Biodiversity	Ramsar sites. Special Protection Areas (SPAs). Special Areas of Conservation (SACs). Sites of Special Scientific Interest (SSSIs). Marine Conservation Zones (MCZs). Annex 1 habitats outside of an SAC (inc. sandbanks and reefs). Fish spawning and nursey grounds. National Nature Reserves. Local Nature Reserves. Marine Nature Reserves. Ancient / mature woodland (plus 10m buffer). Local Wildlife Sites. Royal Society for the Protection of Birds reserves. Sites identified within local planning policy. Natural England Priority Habitats.
Marine geology and physical processes	Seabed geology (including major geological features (e.g megaripples, sandwaves)). Sedimentology.
Shipping and navigation	Shipping lanes. Vessel traffic separation schemes. Navigation channels. High density shipping areas. International Maritime Organisation Deep Water Routes. Ferry routes.
Civil and military aviation and radar	Commercial aviation (including recreational aviation). Oil and Gas Radar Early Warning Systems. Military aviation. PEXA (military practice and exercise areas_ (danger areas). PEXA areas (other – restrictions in place to restrict civilian activities).
Commercial fisheries	Offshore lease areas for shellfish and aquaculture. High intensity spawning and nursery grounds for commercially important fish.
Landscape / seascape	Areas of Outstanding Natural Beauty. National Parks. Country Parks. Local landscape designations. Sites identified within local planning policy. Coastal heritage sites and historic seascape areas. Slope data.
Cultural heritage	World Heritage Sites. Scheduled Monuments. Registered Parks and Gardens.

Topic	Description
	Registered Battlefields. Conservation Areas. Listed Buildings. Protected / unprotected wrecks. Naval maritime graves. Lancashire County Council Historic Environment Record (HER) data.
Water resources and flood risk	Flood Zone 3. Flood Zone 2. Surface water flooding. Groundwater Source Protection Zones. Main Rivers
Ground conditions and contamination	Potentially contaminated sites. Historic landfill sites. Regional / local designations.
Land use / community	Sites allocated within local planning policy. Tourism / recreation facilities. Agricultural Land Classifications. Public Right of Way (PRoW) network. National Cycle Routes. National Trails. Residential properties.
Infrastructure	Oil and gas installations. Carbon capture / gas storage areas. Offshore mines (potash). Aggregate licence areas. Tunnels. Cables (live and out of service). Pipelines (live and out of service). Interconnectors. Munition dumps. Hydrocarbon fields. Renewables cable corridors. Anchorage areas. Active disposal sites. Overhead lines. Coastal defences.

Stage 3 – Identification of options

3.3.2.9. Following the mapping and analysis of constraints, the identification of siting options will be led by a series of design and construction engineering assumptions (for example, the parameters of the Transmission Assets as set out in part 1, section 4 of this EIA Scoping Report), alongside a number of design principles. These assumptions and design principles will be considered ‘optimal’ and used as a starting point only. It is not always practicable for options to meet the desirable criteria, and this is ultimately reflected in how the options are being appraised. The design principles currently in use are set out in Table 3.3.

Table 3.3: Site Selection Design Principles

Transmission Assets Element	Design Principles
Landfall.	Avoid/minimise impacts upon international, European and national designations. Avoid direct impacts on woodland/woodland removal. Minimise the number of third-party asset crossings (e.g. cables and pipelines). Maintain required separation distances with other offshore export cables and pipelines, including consideration for sufficient space (with safety buffer) for offshore cable installation and maintenance vessels. Allow for open cut works if practicable and without unacceptable environmental impacts. Minimise the extent of intertidal working.
Offshore export cable route.	Route(s) should be as straight and as direct as practicable. Avoid/minimise impacts upon international, European and national designations. Avoid/minimise impacts on ecologically important sandbanks and reefs. Avoid historic wrecks. Minimise the number of crossings of existing offshore export cables and pipelines, where crossing is required, cables and pipelines to be crossed at 90° Maintain required separation distances with other offshore export cables and pipelines including consideration for sufficient space (with safety buffer) for offshore cable installation and maintenance vessels. Minimise seabed take in aggregate dredging areas. Avoid areas of hard substrate where practicable.
Substation location.	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 (Horlock Rules). Area 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 (Horlock Rules). Area should aim to keep the visual, noise and other environmental effects to a reasonably practicable minimum (Horlock Rules). The area should be limited to that required for development consistent with appropriate mitigation measures and to minimise the adverse effects on existing land use and rights of way (Horlock Rules). Avoid/minimise impacts upon international, European and national designations. Avoid direct impacts on woodland / woodland removal. Avoid/minimise heritage setting impacts. Avoid/ minimise interactions with Flood Zones 3 and 2 and notable areas of surface water flooding. Minimise working within proximity of overhead lines and maintain stand-off distances where unavoidable. Minimise construction with challenging ground conditions (e.g. rocky outcrops / areas of loose boulders and potentially contaminated land).
Onshore cable route(s).	Route(s) should be as straight and as direct as practicable. Avoid impacts to international, European and national designations. Avoid direct impacts on woodland / woodland removal. Avoid residential areas/properties Minimise routing through challenging ground conditions (e.g. rocky outcrops / areas of loose boulders, potentially contaminated land and wetlands). Minimise the number and length of complex crossings, where practicable (e.g. railways).

Stage 4 – Appraisal of options

3.3.2.10. A black/red/amber/green (BRAG) approach is proposed to evaluate the consenting risk and buildability of the different elements of the Transmission Assets against each of the appraisal topics under consideration. This will provide a systematic and transparent means by which the options can be compared, with 'black' representing areas or factors of greater constraint, and green representing areas/ factors of lesser constraint.

Stage 5 – Options refinement

3.3.2.11. As noted, site selection is an iterative process. Options will be refined and their appraisal updated, or new options will be identified and appraised following the gathering of further site data and stakeholder consultation feedback.

3.3.3. Current status and ongoing work

3.3.3.1. At this stage, the only preferred option identified by the Applicants relates to the landfall location. Initially, six landfall zones were identified across a search area that included sections of the coastline within the Fylde, South Ribble, West Lancashire and Merseyside local authority areas between Blackpool in the north and Crosby in the south. These sections of the coastline were the only undeveloped areas in between existing urban development adjacent to the coastline.

3.3.3.2. Of the six potential landfall zones initially identified, those zones south of the Ribble Estuary were primarily discounted due to the anticipated length of potential Horizontal Directional Drills (HDDs) and potential need for crossing statutory nature conservation designations (i.e., international, European and national) and sensitive habitats (e.g., saltmarsh, mudflats and/or coastal sand dunes). Onshore constraints include the need for complex interactions between the extent of urban development, Special Category Land (e.g., Royal Air Force/Ministry of Defence land), infrastructure crossings, Main Rivers and non-statutory nature designations. As such, landfall zones south of the Ribble Estuary were considered to be less feasible compared to the landfall zone north of the Ribble Estuary.

3.3.3.3. The identified landfall zone (south of Blackpool) is considered preferable due to the lower number, and potential scale, of interactions with designated sites. The preferred zone is also considered to be more technically feasible in light of less complex urban and other infrastructure constraints (e.g., location of railway, and proximity to adjacent residential areas) when compared to the zones south of the Ribble Estuary. From the preferred landfall zone any onshore cable routes would avoid the built-up areas of Blackpool and Lytham St Annes.

3.3.3.4. The Transmission Assets Scoping Boundary used within this EIA Scoping Report reflects the current progress with regard to the site selection process. It has been developed to accommodate all future optionality in identifying preferred options for the remaining elements of the Transmission Assets.

3.4. Next steps

3.4.1.1. Non-statutory consultation on the project will be undertaken during November 2022. Following this, the outcome of the site selection process for the Transmission Assets will be used to inform the PEIR, which will be the subject of statutory consultation. Feedback received will be incorporated into future iterations of the Transmission Assets design and subsequent Order Limits. The latter will form the basis of the environmental assessments to be presented in the ES at the time of the application for development consent.

4. Project description

4.1. Introduction

4.1.1.1. This section of the EIA Scoping Report provides a description of the design of the Transmission Assets. The design has been informed by conceptual design information and current understanding of the environment from initial survey work. This section also sets out the activities associated with the construction, operation and maintenance, and decommissioning of the Transmission Assets.

4.1.1.2. At this stage in the EIA process, the project description is indicative, and the project design envelope has been set to include sufficient flexibility to accommodate future project refinement. This section therefore sets out a series of options and parameters for which maximum (and where relevant, minimum) values are shown. These values constitute the worst-case scenario in relation to the Transmission Assets.

4.1.1.3. The final design will be refined later in the project development process. The Applicants will also, throughout the EIA process, seek to refine the proposed values and to provide more detailed realistic worst-case scenarios where possible. The PEIR and ES will present a detailed project description, including a further refinement of the parameters where possible, on which the assessment will be based.

4.2. Project location

4.2.1.1. The Transmission Assets will be located within the Transmission Assets Scoping Boundary shown on Figure 1.1. It is noted that the Transmission Assets Scoping Boundary includes the array areas for each of the Morgan Offshore Wind Project and the Morecambe Offshore Windfarm, in order to include the locations within which the Offshore Substation Platforms (OSPs) will be located.

4.2.1.2. The Transmission Assets Scoping Boundary is 1,667.9km^2 in area and is located in the east Irish Sea. Parts of this boundary overlap with the scoping boundaries for the generation assets of the Morgan Offshore Wind Project (322.2km^2) and the Morecambe Offshore Windfarm (125km^2). The onshore parts of the boundary cover parts of the local authority areas of Fylde Council, Blackpool Council, South Ribble Borough Council, Preston City Council and Lancashire County Council.

4.3. Project design envelope approach

4.3.1.1. The Project Design Envelope (PDE) approach (also known as the Rochdale Envelope approach) will be adopted for the assessment of the Transmission Assets, in accordance with current industry good practice. This approach allows for a project to be assessed on the basis of maximum project design parameters (i.e., the worst case scenario). This approach provides flexibility, while ensuring all potentially significant effects are assessed within the EIA process and reported in the ES. Those parameters include a range of potential values. The PDE concept allows for some flexibility in project design options, where the full details of a project are not known at the time of application submission.

4.3.1.2. This approach will be taken for the EIA process because it is not possible to provide precise final design details of the Transmission Assets a number of years ahead of the time they will be constructed. Additionally, the Applicants have yet to undertake consultation and receive feedback from statutory and non-statutory stakeholders. This will allow the Applicants to fully understand any likely significant effects that need to be mitigated/managed, which will aid the refinement of the final application.

4.3.1.3. Transmission infrastructure, including cabling and substation technologies, is constantly evolving with a constant focus on cost reduction. Therefore, improvements in technology and construction methodologies occur frequently and an unnecessarily prescriptive approach could preclude the adoption of new technology and methods.

4.3.1.4. The use of the PDE approach has been recognised in the Overarching National Policy Statement (NPS) for Energy (NPS EN-1) (DECC, 2011a), the NPS for Renewable Energy Infrastructure (NPS EN-3) (DECC, 2011b) and the NPS for Electricity Networks Infrastructure (NPS EN-5) (DECC 2011c). It is also reflected in the updated draft NPS EN-1, EN-3 and EN-5 (BEIS, 2021a; BEIS, 2021b; BEIS, 2021c). Co-ordination of offshore wind transmission works is encouraged and supported by both draft NPS EN-1 and NPS EN-5.

4.3.1.5. The PDE approach is also consistent with The Planning Inspectorate's Advice Note Nine: Rochdale Envelope (The Planning Inspectorate, 2018).

4.3.1.6. For each of the impacts to be assessed in the topic-specific EIA chapters, the maximum design scenario will be identified from the range of potential options for each parameter in the PDE. The maximum design scenario assessed is therefore the scenario which would give rise to the greatest potential impact. For example, where several substation design options are included, the assessment will be based on the option predicted to have the greatest impact. This may be the option with the largest footprint, the greatest height or the largest area of disturbance during construction, depending on the topic under consideration. By identifying the maximum design scenario for any given impact, it can be concluded that the impact (and therefore the effect) would be no greater for any other design scenario. By employing the maximum design scenario approach, the Applicants retain some flexibility in the final design of the Transmission Assets, but within certain maximum parameters, which will be assessed in the ES.

4.3.1.7. All assumptions regarding the PDE will be clearly set out within the project description chapter of the PEIR and ES and within the topic chapters. The draft DCO will be prepared in conjunction with the ES, in order to ensure that the key parameters applied for are consistent with those assessed through the EIA process.

4.3.1.8. Throughout this EIA Scoping Report (and subsequent PEIR and ES), the PDE approach is applied to allow meaningful assessments of the Transmission Assets to proceed, whilst still allowing reasonable flexibility for future project design decisions.

4.4. Transmission Assets

4.4.1. Introduction

4.4.1.1. The design philosophy for the Transmission Assets is for the Morgan Offshore Wind Project and Morecambe Offshore Windfarm to be electrically independent. Therefore, each wind farm project will have its own set of transmission assets (i.e., cable and substation infrastructure). However, the location of the infrastructure will be co-ordinated within shared offshore and onshore cable corridors and at a shared onshore substation location, as far as practicable, to minimise impacts to environment and the community. The location of the cable corridors and substations will subject to the outcome of ongoing site selection work and consultation.

4.4.1.2. The key components of the Transmission Assets are likely to include:

- Offshore elements:
  - Offshore substation platforms (OSPs): Platforms to transform electricity generated by the wind farms to a higher voltage allowing the power to be efficiently transmitted to shore.
  - Interconnector cables: Cables to connect the OSPs to each other.
  - Morgan offshore booster station: Also known as a mid-point reactive power compensation substation. This may be required for the Morgan Offshore Wind Project.
  - Offshore export cable corridor: The area within which the offshore export cables will be located. These cables will link the Morgan Offshore Wind Project and the Morecambe Offshore Windfarm to the landfall site.
- Onshore elements:
  - Landfall site: This is where the offshore export cables are jointed to the onshore export cables.
  - Onshore export cable corridor: The area within which the onshore export cables will be located between the landfall site and the onshore substations.
  - Onshore infrastructure: Any temporary ancillary onshore infrastructure required for the construction phase of the onshore export cable corridor and onshore substations (such as construction compounds and accesses).
  - Onshore substations: The proposed substations containing the components for transforming the power supplied from the Morgan Offshore Wind Project and Morecambe Offshore Windfarm up to 400kV. It is anticipated that these substations will be at a shared location, if practicable.
  - 400kV cable corridor: The cable corridor connecting the proposed onshore substations to the existing National Grid substation at Penwortham in which the onshore 400kV grid connection cables will be located. This may include up to two circuit breaker infrastructure.

4.4.1.3. These elements are shown in Figure 4.1.

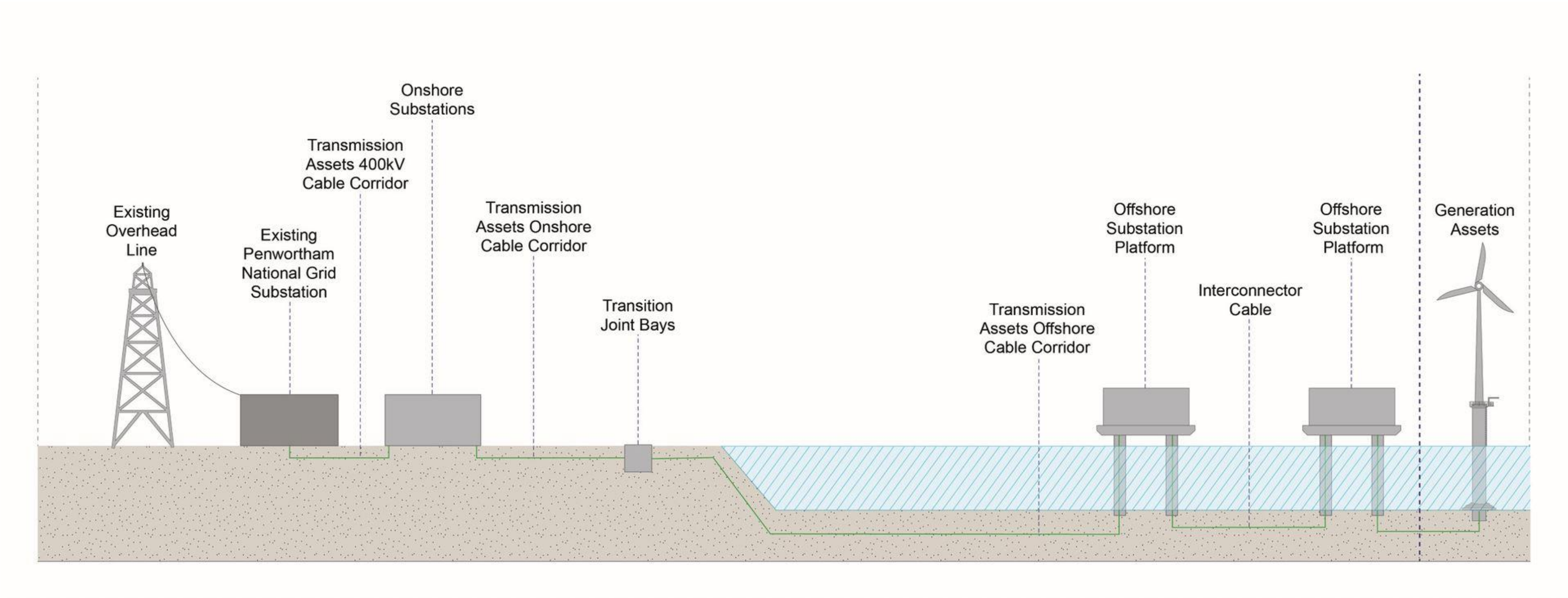


Figure 4.1: Key components of the Transmission Assets[3]

3 It is possible that all or part of the offshore substation platforms will be classed as generation assets and considered within the EIA process for the Morgan Offshore Wind Project and the Morecambe Offshore Windfarm, as the design of the Transmission Assets is refined in the future. For the purpose of this EIA Scoping Report a precautionary approach has been taken and all infrastructure that may form part of the Transmission Assets has been included. A similar precautionary approach has been taken in scoping the generation assets.

4.4.1.4. These key components are briefly described in the following sections. Realistic worst-case parameters (dimensions and numbers where appropriate) are provided to indicate the potential scale of the Transmission Assets. A further refined and detailed project description will be provided in the PEIR and ES.

4.4.2. Offshore substation platforms

4.4.2.1. The Transmission Assets may require up to six OSPs within the Transmission Assets Scoping Boundary (including up to four for the Morgan Offshore Wind Project and two for the Morecambe Offshore Windfarm). The OSPs will transform electricity generated by the Morgan Offshore Wind Project and the Morecambe Offshore Windfarm to a higher voltage, allowing the power to be efficiently transmitted to shore. The size of the platforms will depend on the final electrical set up for the wind farms.

4.4.2.2. The exact location of the OSPs will be determined during the design phase (typically post-consent), informed by pre-construction site investigation data and cable routing among other considerations. All OSPs will be marked for aviation and navigation purposes.

4.4.2.3. The design envelope for OSPs is presented in Table 4.1.

Table 4.1: Design envelope: indicative key parameters for offshore substation platforms.

Parameter	Maximum Design Envelope
Number of OSPs	6
Height of main structure (above LAT) (m)	75
Height of lightning protection (above LAT) (m)	115
Height of helideck (if applicable, above LAT) (m)	80
Height of crane (above LAT) (m)	120
Height of top of antenna structure (above LAT) (m)	125
Topside length (m)	80
Topside width (m)	60

4.4.3. Interconnector cables

4.4.3.1. Interconnector cables connect OSPs to each other, in order to provide redundancy in the case of cable failure elsewhere. The design envelope for interconnector cables is provided in Table 4.2.

Table 4.2: Design envelope: indicative key parameters for interconnector cables.

Parameter	Maximum Design Envelope
Number of interconnector cables	5
Maximum external cable diameter (mm)	350
Maximum total length of interconnector cables (km)	80
Burial technique	Trenching, jetting, plough, mechanical cutting, pre-lay plough
Target burial depth (m)	1 m (minimum 0.5 m)
Cable protection material type	Rock armour/ mattresses

4.4.4. Morgan offshore booster station

4.4.4.1. One offshore booster station may be required within the Transmission Assets Scoping Boundary for the Morgan Offshore Wind Project. Offshore booster stations (also known as mid-point reactive power compensation substations) are required in High Voltage Alternating Current (HVAC) transmission systems only where the total length of the export cables exceed 80km.

4.4.4.2. The exact location of the Morgan offshore booster station will be determined during the design phase (typically post-consent), taking into account seabed conditions and cable routing among other considerations. At this stage it is anticipated that this infrastructure, if required, will be located around the mid-point of the offshore export cable corridor. The Morgan offshore booster station will be marked for aviation and navigation purposes.

4.4.4.3. The design envelope for the Morgan offshore booster station is presented in Table 4.3.

Table 4.3: Design envelope: indicative key parameters for the Morgan offshore booster station.

Parameter	Maximum Design Envelope
Number of offshore booster stations	1
Height of main structure (above LAT) (m)	70
Height of lightning protection (above LAT) (m)	85
Height of helideck (above LAT) (m)	80
Height of crane (above LAT) (m)	80
Height of top of antenna structure (above LAT) (m)	95
Topside length (m)	80
Topside width (m)	60

4.4.5. Offshore substation platform and booster station foundations

4.4.5.1. The OSPs and Morgan offshore booster station will be fixed to the seabed by foundation structures. There are a number of foundation types that can be used, and the types used will not be confirmed until the final design, post-consent. Consequently, the EIA will consider a range of foundation types, where appropriate. The foundation types currently under consideration include:

- Monopile
- Suction bucket (monopod)
- Jacket foundations with piling
- Jacket foundations on suction buckets
- Gravity based structures
- Tripod.

4.4.5.2. An illustration of the foundation types is provided at Figure 4.2.

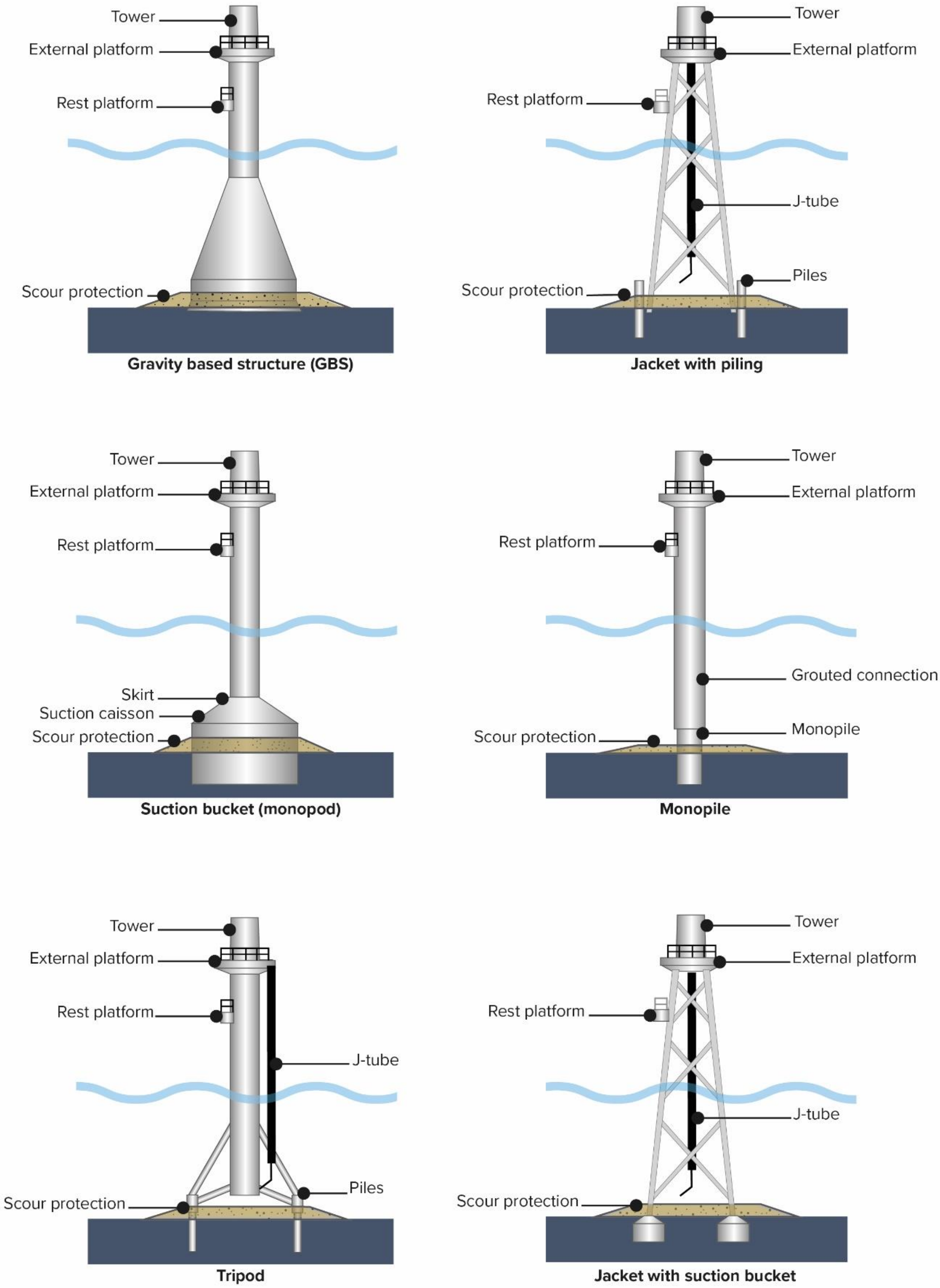


Figure 4.2: Illustrative foundation options (Source: Morecambe Offshore Windfarm, 2022)

4.4.5.3. Monopile foundations are the most common type of foundation structure and comprise a simple single steel tubular section and a transition piece, which may include boat landing features, ladders, a crane, and other ancillary components. Monopiles may be driven or 'piled' into the seabed using hydraulic hammers either above or below the sea surface, operated from a jack-up vessel or floating vessel/barge. The Applicants are also considering use of emerging alternative installation technologies, such as blue hammer, however hydraulic piling is considered to represent the maximum design envelope for monopile foundations.

4.4.5.4. Jacket foundations are formed of a steel lattice construction (comprising steel tubular members and welded joints). Jacket structures can be used to support OSPs and offshore booster stations in deeper waters. They may be secured by piling or by suction buckets. Pin piles are driven, drilled or vibrated into the seabed. Piles are typically narrower than monopiles. Suction buckets are typically hollow steel cylinders, capped at the upper end.

4.4.5.5. A gravity base foundation comprises a heavy ballasted column or cone, constructed of reinforced/pre-stressed concrete or steel, or a combination of concrete and steel. The foundation relies on the dead weight of the structure, which can also be ballasted to support the applied loads.

4.4.5.6. Tripod foundations comprise three tubular legs that are pinned to the seabed and support a single support column. The tripod is piled to the seabed through the legs.

4.4.5.7. The final selection of foundation type will be dependent upon the findings of site investigation and project design work, as well as commercial considerations.

4.4.5.8. The foundations will be fabricated offsite, stored at a suitable port facility and transported to site as needed. Specialist vessels will be needed to transport and install foundations. A filter layer and/or scour protection layer (typically rock) may be needed on the seabed and will be installed either before and/or after foundation installation.

4.4.5.9. Seabed preparation may be required prior to foundation and cable installation. Seabed preparation may include seabed levelling, and removing surface and subsurface debris such as boulders, fishing nets or lost anchors. If debris is present below the seabed surface, then excavation may be required for access and removal.

4.4.5.10. Any unexploded ordnance (UXO) found with a potential to contain live ammunition may be detonated on site, with any remaining debris of sufficient size to present a snagging risk to commercial fishing activities removed.

4.4.5.11. The design envelope for the foundations is presented in Table 4.4.

Table 4.4: Design envelope: indicative key parameters for foundations

Offshore foundation types	Parameter	Maximum Design Envelope
N/A	Number of OSPs and booster stations	6 OSPs 1 offshore booster station (Morgan only)
Monopile	Pile diameter (m)	16m (2 monopiles per OSPs or booster station)
	Hammer size (kJ)	5,500
Suction bucket (monopod)	Bucket diameter (m)	40
Jacket with piling	Leg spacing (at seabed) (m)	70 x 50
	Hammer size (kJ)	3,700
	Pile diameter (m)	5.5 (per pile)
Jacket with suction buckets	Leg spacing (at seabed) (m)	70 x 50
	Bucket diameter (m)	20
Gravity based structure	Diameter (m)	65
Tripod	Leg spacing (m)	35
	Hammer size (kJ)	3,000
	Pile diameter (m)	3 – 5 (per pile)

4.4.6. Offshore export cable corridor

4.4.6.1. Offshore export cables are used for the transfer of power from the OSPs to the landfall site. A shared export cable corridor is anticipated for the export cables for the Morgan Offshore Wind Project and the Morecambe Offshore Windfarm.

4.4.6.2. Up to six offshore cables will be required (up to four for the Morgan Offshore Wind Project and two for the Morecambe Offshore Windfarm).

4.4.6.3. The location of the offshore export cable corridor within the Transmission Assets Scoping Boundary will be presented in the PEIR following a process of route refinement (see also part 1, section 3: Site selection and alternatives, of this EIA Scoping Report). Flexibility is required in the location, depth of burial, and protection measures for the offshore export cables to ensure physical and technical constraints, changes in available technology and project economics can be accommodated within the final design. The design envelope for the offshore export cables is described in Table 4.5.

Table 4.5: Design envelope: indicative key parameters for offshore export cables.

Parameter	Maximum Design Envelope
Number of offshore export cables	6
Maximum external cable diameter (mm)	350
Maximum total length of offshore export cables (km)	580
Burial technique	Trenching, jetting, plough, mechanical cutting, pre-lay plough
Target burial depth (m)	1 (minimum 0.5 m)
Cable protection material type	Rock armour/ mattresses

4.4.6.4. Offshore export cables may be installed using methods such as ploughing, trenching or jetting. The offshore export cable installation methodology and potential cable protection measures will be described in the PEIR and ES and finalised at the final design stage (post-consent), informed by environmental and pre-construction site investigation survey results.

4.4.7. Landfall

4.4.7.1. The landfall area will be located along the northwest coast of England within the Transmission Assets Scoping Boundary (see Figure 1.1). Its location is subject to a process of refinement and will be described further in the PEIR and subsequent ES. The offshore export cables will be installed through the intertidal zone using either trenchless methods (e.g., HDD, where cables are pulled through pre-installed underground ducts) or open cut trenching (where cable circuits are buried using mechanical tools from ground level), or a combination of the above.

4.4.7.2. The offshore export cables will be jointed to the onshore export cables at transition joint bays (TJBs). The TJBs are an underground concrete structure (accessed via an inspection cover at ground level) and will be located on the landward side of the landfall.

4.4.7.3. The works at the landfall may require access to the beach for construction vehicles depending on the installation method and the location of the landfall. The landfall works will be supported by a temporary compound.

4.4.8. Onshore export cables

4.4.8.1. A single export cable corridor is anticipated for the onshore export cables for the Morgan Offshore Wind Project and the Morecambe Offshore Windfarm.

4.4.8.2. Up to 18 onshore export cables are anticipated to be required between the landfall and the onshore substation location. Onshore export cables will be installed in cable circuits (with each circuit typically comprising three cables). The cable circuits will be buried in up to six separate trenches (up to four for the Morgan Offshore Wind Project and two for the Morecambe Offshore Windfarm). The cable circuits may be installed directly into open trenches or pulled through previously installed ducts. The onshore cable corridors are currently anticipated to have a maximum width of 120m during construction, within which the permanent cables will be located. The width of the permanent and/or temporary areas may change and increase in specific locations, for example where obstacles such as railway crossings or major HDDs are encountered.

4.4.8.3. The proposed onshore cable corridors will also require access tracks to allow the movement of construction vehicles and the installation of the onshore export cable circuits, in addition to other related works such as temporary compounds and laydown areas. Operational access may also be required along the onshore cable corridor.

4.4.8.4. The indicative design envelope for the onshore export cables is provided in Table 4.6. All onshore parameters are indicative at this stage and may change as a result of the engineering process and understanding of the local context and stakeholder feedback.

Table 4.6: Design envelope: indicative key parameters for onshore export cables.

Parameter	Maximum Design Envelope
Maximum number of export cables	18
Maximum number of cable trenches	6
Length of cable corridor (km)	35
Width of construction cable corridor (temporary) (m)	120
Indicative target trench depth (m) to the top of the protective tile	1.2
Indicative number of joint bays	330
Number of haul roads	2
Width of haul road (m) excluding passing bays	6 (per haul road)

4.4.8.5. In addition to the above, fibre-optic cables are likely to be required for communications and temperature sensing. This may include up to one communication and one temperature sensing fibre-optic cable per circuit.

4.4.8.6. The majority of the cable circuits will be installed using open trenching methods, however, where an open trench approach is not preferred due to certain crossings (e.g., roads and watercourses), trenchless techniques may be employed, such as HDD.

4.4.8.7. During construction of the cable trenches, the topsoil and subsoil will be removed and stored separately on site within the temporary working corridor of the onshore cable corridor. Potential construction impacts will be managed through a Code of Construction Practice (CoCP), an outline of which will be provided prior to application for development consent.

4.4.8.8. Joint bays and link boxes will be required along the proposed onshore cable route. Joint bays are typically concrete lined pits, that provide a clean and dry environment for jointing sections of cable together. Link boxes are smaller pits that house connections between the cable shielding, joints for fibre optic cables and other auxiliary equipment.

4.4.8.9. Full details of the proposed onshore cable corridor, jointing bays and installation methods (and parameters) will be included within the PEIR.

4.4.9. Onshore substations

4.4.9.1. The proposed purpose-built substations will contain the electrical equipment required to adjust the power quality and power factor to meet the UK Grid Code as required to supply the National Grid. To maintain electrical independence, one substation will be required for the Morgan Offshore Wind Project and one for the Morecambe Offshore Windfarm. It is anticipated that the substations will share a substation location, subject to the outcome of site selection work and consultation.

4.4.9.2. Two broad substation design options are included in the design envelope; Air Insulated Substation (AIS) and Gas Insulated Substation (GIS) designs. For an AIS option, the equipment will be housed in an 'open yard' style. For a GIS option, some of the equipment will be housed within single or multiple buildings. It is also possible to have a combination of the above. The substation location will also include areas for landscaping and drainage mitigation.

4.4.9.3. The exact siting of the onshore substation location within the Transmission Assets Scoping Boundary will be identified through the EIA process and will take into account environmental and engineering constraints as well as stakeholder and commercial considerations. However, the proposed location will be within an area surrounding the existing Penwortham substation. An overview of the site selection process is provided in part 1, section 3: Site selection and alternatives, of this EIA Scoping Report. Temporary construction compound(s) and working area(s) will be required to facilitate the construction of the onshore substations.

4.4.9.4. The design envelope for the onshore substations is provided in Table 4.7. It should be noted that AIS and GIS substations are different in form and size, however the indicative maximum parameters are presented here. All onshore parameters are indicative at this stage, and may change as a result of the engineering process and as understanding of the local context and stakeholder feedback evolves.

Table 4.7: Design envelope: indicative key parameters for onshore substations

Parameter	Maximum Design Envelope
Transmission type	HVAC
Permanent footprint of substations (combined) (m^2)	205,000
Temporary compound (combined) (m^2), includes working and laydown areas (excludes permanent substation footprint)	110,000
Height of main structure/buildings (m)	20
Height of lightning protection (m)	30

4.4.10. Grid connection export cable

4.4.10.1. Up to 18 onshore cables are anticipated to be required between the proposed onshore substations and the existing National Grid substation at Penwortham. The cables are anticipated to be buried in up to six separate trenches (one circuit per trench, with up to four cable circuits/trenches for the Morgan Offshore Wind Project and two for the Morecambe Offshore Windfarm). If practicable, and depending on the final siting of each of the onshore substations, the grid connection export cable corridors/ areas would be shared for the Morgan Offshore Wind Project and the Morecambe Offshore Windfarm. However, subject to the final siting of each of the onshore substations, and the final point of connection to the grid at the National Grid substation, it is possible that the grid connection corridors/areas may need to diverge on the approach to the National Grid substation depending on their specific connection point within the substation.

4.4.10.2. Circuit breaker infrastructure may also be required (one for the Morgan Offshore Wind Project and one for the Morecambe Offshore Windfarm) within the 400kV grid connection areas. These will comprise permanent above ground infrastructure components in proximity to the National Grid substation.

4.4.10.3. The cables may be installed directly into open trenches or pulled through pre-installed ducts. The grid connection onshore cable corridors are anticipated to have a maximum width of 120m during construction, within which the permanent cable corridors will be located. The width of the permanent and/or temporary areas may change and increase in specific locations, for example where obstacles such as railway crossings or major HDDs are encountered, or subject to a confirmed connection point at the National Grid substation at Penwortham.

4.4.10.4. The proposed grid connection onshore cable corridors will also require access tracks to allow the movement of construction vehicles and the installation of the onshore export cable circuits, in addition to other related works such as temporary compounds and laydown areas. Operational access may also be required along the grid connection onshore cable corridors.

4.4.10.5. The design envelope for the grid connection export cable is provided in Table 4.8. All onshore parameters are indicative at this stage, and may change as a result of the engineering process and as understanding of the local context and stakeholder feedback evolves.

Table 4.8: Design envelope: indicative key parameters for grid connection export cable.

Parameter	Maximum Design Envelope
Maximum number of cables	18
Maximum number of cable trenches	6
Width of cable corridor (temporary) (m)	120
Indicative target trench depth (m) to the top of the protective tile	1.2
Maximum number of joint bays	96
Number of haul roads	2
Width of haul road (m) excluding passing bays	6 (per haul road)
Circuit breaker infrastructure	2

4.4.10.6. The majority of the cable circuits will be installed using open trenching methods, however, where an open trench approach is not preferred due to certain crossings (e.g., roads and watercourses) trenchless techniques may be employed, such as HDD.

4.4.10.7. During construction of the cable trenches, the topsoil and subsoil will be removed and stored separately on site within the temporary working corridor of the onshore cable corridor. Potential construction impacts will be managed through a CoCP, an outline of which will be provided for the application for development consent.

4.4.10.8. Joint bays will be located along the onshore cable routes where sections of the cable will be joined together. These will be accessible via inspection covers at ground level.

4.4.10.9. Full details of the proposed onshore cable corridor, jointing bays and installation methods (and parameters) will be included within the PEIR.

4.5. Construction

4.5.1.1. Some of the Transmission Assets components are likely to be fabricated offsite at manufacturing sites in the UK and/or abroad.

4.5.1.2. The Transmission Assets are likely to be installed over a period of up to four years for the Morgan Offshore Wind Project and up to three years for the Morecambe Offshore Windfarm. The general construction sequence is likely to include the following:

- Pre-construction site investigation surveys.
- Seabed preparation activities.
- Foundation installation.
- Offshore substation and booster station installation and commissioning.
- Offshore export cable installation.
- Installation at the landfall, including TJB.
- Onshore export cable installation.
- Onshore substation construction and installation.
- Grid connection export cable installation.
- Onshore substation commissioning.

4.5.2. Offshore construction

4.5.2.1. The offshore construction phase will be supported by various vessels including jack-up vessels or floating Heavy Lift Vessels (HLV), support vessels, tug/anchor handlers, cable lay vessels, guard vessels, survey vessels, seabed preparation vessels, crew transfer vessels, scour protection installation vessels and cable protection installation vessels. Helicopters may also be used during the construction phase for equipment and personnel transfer.

4.5.2.2. Foundation structures, offshore substation topsides and cabling will be transported to the installation site by vessel from the pre-assembly harbour. Foundations will be installed first. The offshore substation topside will then be placed on top of each offshore substation platform foundation structure and undergo commissioning. Offshore export cables will then be installed.

4.5.3. Onshore construction

4.5.3.1. At the landfall, the offshore export cables will be installed through the intertidal zone using either trenchless methods or open cut trenching, or a combination of both methods. The offshore export cables will be jointed to the onshore export cables at a TJB, located on the landward side of the landfall.

4.5.3.2. Installation of the onshore export cables is broadly anticipated to be undertaken in the following broad sequence. However, some sequencing may differ once the Principal Contractor(s) is appointed:

- Completion of any pre-construction surveys
- Installation of fencing within the construction areas
- Site clearance and temporary compound set up, including vegetation clearance, where required
- Establish and prepare temporary haul road(s) along onshore cable routes
- Excavation of trenches for direct burial and/or ducted cable, with topsoil and subsoil removed from the trench and stored on site and installation of HDD ducts.
- Excavation of joint bays (this may also be undertaken after the ducting is laid and the cable trench is reinstated)
- Cable laying/cable pulling, and then cable jointing. Placement of stabilised backfill material
- Replacement of subsoil and topsoil
- Reinstatement to previous land use and placement of inspection covers (where required)
- Removal of temporary fencing and haul road
- Planting of any sections of replacement hedgerow.

4.5.3.3. Temporary compound(s) will be required to facilitate the construction of each of the onshore substations. To install the platforms for the onshore substations, some 'cut and fill' may be required (i.e., excavated material may be used to create a level site for substation construction after foundation installation). The extent of cut and fill required will be determined as the design progresses. The onshore substation building substructures are likely to be composed of steel and cladding materials.

4.6. Operation and maintenance

4.6.1.1. The operational lifetime of the Transmission Assets is expected to be up to 35 years, in order to match that of the offshore wind projects[4]. The

4 'Operational lifetime' means the cumulative period of time over which the Transmission Assets are expected to be in operation. For the avoidance of doubt, the term 'operational lifetime' does not refer to the expected useful economic life of individual assets installed as part of the project

Transmission Assets will require operation and maintenance activities to take place over their lifetime.

4.6.1.2. Routine maintenance activities offshore may include inspections, removal of marine growth build up, minor repairs, cleaning activities, and replacement of consumables and corrosion protection systems. Non-routine major maintenance activities may include cable reburial and cable repair activities. Routine operation and maintenance activities may be carried out from Crew Transfer Vessels or Service Operation Vessels, with major maintenance activities requiring jack-up vessels, HLV or specialist vessels such as cable repair and cable laying vessels. Occasionally, helicopters may also be used to transport personnel and equipment. Full details of the proposed operation and maintenance activities will be set out in the PEIR and the ES.

4.6.1.3. The onshore export cables will be continuously monitored remotely. However, the onshore operational and maintenance requirements for the onshore export cables may require infrequent on-site inspections corrective maintenance activities, if and where they may be required. Following completion of construction, operational access to the landfall TJBs and onshore cable routes may be required. Land above both the joint bays and link boxes will be reinstated, and an inspection cover will be provided on the surface for link boxes for access during the operation and maintenance phase.

4.6.1.4. The onshore substations will be monitored and operated remotely. Operational and maintenance staff will visit the onshore substations to undertake preventative and corrective works.

4.6.1.5. Link boxes will be provided with inspection covers to allow for access to the TJBs. Some access may be required for checking and where corrective and/or preventative activities are required.

4.7. Decommissioning and repowering

4.7.1.1. At the end of the operational lifetime (currently assumed to be 35 years as stated above), the Transmission Assets will be decommissioned. As the seabed leases that Morgan OWL and Morecambe OWL will enter are for up to 60 years it is anticipated that one re-powering of the generation assets may be required during the lease duration in line with the regulations, requirements, guidance and best practice relevant at that time. In this case, new consents are likely to be required for the generation assets, and the consenting requirements for the Transmission Assets would also be reviewed as part of that process alongside legislation and guidance in existence at that time. Potential future repowering and operational life extension of the Transmission Assets is not included as part of the scope of the development consent application or EIA which this EIA Scoping Report supports.

4.7.1.2. If decommissioning takes place, it is anticipated that all structures above ground will be completely removed. It is anticipated offshore cables and any offshore cable protection may 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.

4.7.1.3. The decommissioning sequence will generally be the reverse of the construction sequence and involve similar types and numbers of vessels and equipment.

4.7.1.4. It is expected that the onshore export cables will be left *in situ* to minimise the environmental disturbance during decommissioning. The cable ends will be cut, sealed and securely buried as a precautionary measure.

4.7.1.5. The structures of the jointing bays and link boxes will be removed only if it is feasible with minimal environmental disturbance or if their removal is required to return the land to its current agricultural use.

4.7.1.6. The components of the onshore substations have varying life expectancies. Transformers typically have a lifetime of up to 50 years, and some components lives can be extended beyond this period. Decommissioning of the onshore substations will be reviewed in discussion with the transmission system operator and appropriate regulators in the light of any other existing or proposed future use of the onshore substations. If complete decommissioning is required, then all of the electrical infrastructure will be removed, and any waste arising disposed of in accordance with relevant regulations.

4.7.1.7. Foundations will be broken up and the site reinstated to its original condition or for an alternative use.

5. EIA methodology

5.1. Proposed approach to the EIA process

5.1.1.1. This section presents an outline of the Environmental Impact Assessment (EIA) methodology to be employed for the Transmission Assets. It outlines the methodology for the identification and evaluation of potential likely significant environmental effects and also presents the methodology for the identification and evaluation of potential cumulative and inter-related effects, and consideration of potential transboundary effects.

5.1.1.2. A systematic and auditable evidence-based approach is proposed to evaluate and interpret potential effects on physical, biological and human environment receptors.

5.1.1.3. As described in part 1, section 2: Policy and legislation, of this EIA Scoping Report, the EIA process can be broadly summarised as consisting of three main elements that take place prior to the submission of the application, namely scoping, consultation and ES preparation.

5.2. Scoping

5.2.1.1. Scoping is the process of identifying the issues to consider within the EIA process (establishing the scope of the assessment). As set out in part 1, section 1: Introduction, of this EIA Scoping Report, scoping is therefore an important preliminary procedure, which sets the context for the EIA process. Through scoping, the key environmental issues are identified at an early stage, which permits subsequent work to concentrate on those environmental topics for which significant effects may arise as a result of a proposed development.

5.2.1.2. The scoping process is informed by increasing knowledge acquired through the EIA process. Figure 5.1 highlights some of the key inputs to the scoping process. These inputs include the identification of an initial project description, including the key components of the Transmission Assets and their likely maximum parameters. Taking this into account, alongside the characteristics of the environment in the vicinity of a project, the requirements of the relevant EIA regulations can be reviewed to provide an initial indication of the topics likely to be relevant to the project. From this point, the scope of assessment can be refined through consultation and the findings of initial assessment by topic specialists.

Figure 5.1: Overview of the scoping process.

5.2.1.3. This EIA Scoping Report presents the findings of the scoping process undertaken to date and sets out the proposed methodology for carrying out the EIA. Taking into account the work undertaken to date, it identifies the potential impacts that are proposed to be considered within the EIA process for the Transmission Assets. Each topic area is considered, setting out the proposed scope of assessment and identifying any sub-topics that are proposed to be scoped out of the assessment (where no significant effects are considered likely).

5.2.1.4. A Scoping Opinion is requested from the Secretary of State, which will inform the scope of the EIA process, to be reported in the ES. The ES must be based on the most recent Scoping Opinion adopted.

5.2.1.5. As assessment work continues and surveys are completed, new issues may arise, or it may become apparent that some potential impacts are not likely to result in significant effects. Where this is the case, the findings of the assessment process will be discussed with consultees in order that the scope of the assessment may be refined as appropriate throughout the EIA process.

5.3. Legislation and guidance

5.3.1.1. The impact assessment methodology will draw upon a number of EIA principles, regulations and guidance documents, including:

Legislation

- The Infrastructure Planning (Environmental Impact Assessment) Regulations 2017 (as amended) (the 2017 EIA Regulations).
- The Planning Act 2008 (as amended).

Policy

- Overarching NPS for Energy (NPS EN-1) (including draft NPS EN-1) (DECC, 2011a; BEIS, 2021a).
- NPS for Renewable Energy Infrastructure (NPS EN-3) (including draft NPS EN-3) (DECC, 2011b; BEIS, 2021b).
- NPS for Electricity Networks Infrastructure (NPS EN-5) (including draft NPS EN-5) (DECC, 2011c; BEIS, 2021c).

Guidance

- The Planning Inspectorate Advice Note Seven: Environmental Impact Assessment: Preliminary Environmental Information, Screening and Scoping (The Planning Inspectorate, 2020a).
- The Planning Inspectorate Advice Note Nine: Rochdale Envelope (The Planning Inspectorate, 2018).
- The Planning Inspectorate Advice Note Twelve: Transboundary Impacts and Process (The Planning Inspectorate, 2020b).
- The Planning Inspectorate Advice Note Seventeen: Cumulative effects assessment (The Planning Inspectorate, 2019).
- Guidelines for Ecological Impact Assessment (EcIA) in the UK and Ireland (CIEEM, 2019).
- Environmental Impact Assessment Guide to: Delivering Quality Development (IEMA, 2016).
- Delivering Proportionate EIA, A Collaborative Strategy for Enhancing UK Environmental Impact Assessment Practice (IEMA, 2017).
- Cumulative Impact Assessment Guidelines, Guiding Principles for Cumulative Impact Assessment in Offshore Wind Farms (RenewableUK, 2013).
- Guidelines for data acquisition to support marine environmental assessments of offshore renewable energy projects (Cefas, 2012).

5.3.1.2. Other topic-specific specialist methodologies and good practice guidelines will be drawn on as necessary. These are set out and described within the relevant topic sections of the EIA Scoping Report.

5.3.1.3. A full account of applicable legislation and guidance taken into account within the EIA methodology will be documented within the PEIR and ES.

5.4. Key principles of the assessment

5.4.1. Overview

5.4.1.1. The EIA process will assess the potential impacts arising from the construction, operation and maintenance and decommissioning phases of the Transmission Assets. The assessment of each environmental topic (as listed in part 1, section 1: Introduction, of the EIA Scoping Report) will form a separate chapter of the ES. For each environmental topic, the following will be addressed:

- Identification of the study area[5] for the topic-specific assessments.
- Description of the planning policy and guidance context.
- Summary of consultation activity.
- Description of the environmental baseline conditions.
- Presentation of the impact assessment, including:
  - Identification of the maximum design scenario (see section 5.4.4) for each impact assessment.
  - A description of the measures adopted as part of the project, including design measures which seek to prevent, reduce or offset environmental effects.
  - Identification of likely impacts and assessment of the significance of identified effects.
  - Identification of any further mitigation measures required in respect of likely significant effects, together with consideration of any residual effects.
  - Identification of any future monitoring required.
  - Assessment of any cumulative effects with other major developments, including those that are proposed, consented and under construction (including, where applicable, those projects, plans or activities that are currently operational that were not operational when baseline data was collected or that have an ongoing effect).
  - Assessment of any transboundary effects (i.e., effects on other states).

5.4.1.2. Inter-related effects (i.e., inter-relationships between environmental topic areas) will be assessed in a separate standalone section.

5.4.1.3. Within each topic section key principles will be applied, and these are detailed in the following sections.

5 For each environmental topic, the baseline environment will be characterised and the potential environmental impacts will be described within a topic-specific study area. The topic-specific study areas are defined for each topic in part 2 of this EIA Scoping Report and are based on the maximum spatial extent across which potential impacts of the Combined Transmission Assets may be experienced by the relevant receptors (i.e. Zone of Influence).

5.4.2. Proportionate EIA

5.4.2.1. The aim of undertaking a proportionate EIA (as per IEMA, 2017; and the Industry Evidence Programme (IEP) (The Crown Estate *et al.,* 2018)) has been a key consideration in the development of this EIA Scoping Report. A number of tools and processes will be used to aid the proportionality of the Transmission Assets ES. This includes:

- Development of consultation Evidence Plans, where applicable (see part 1, section 6: Consultation process, of the EIA Scoping Report).
- Application of the existing evidence-base.
- Commitment to measures adopted as part of the project.

5.4.3. Evidence-based approach

5.4.3.1. The Transmission Assets are located in the east Irish sea, a region where there is significant data and knowledge regarding the baseline environment. This data/knowledge has been acquired through surveys, assessments and post-construction monitoring programmes undertaken for other proposed and existing offshore wind projects, much of which is available in the public domain. It is therefore the Applicants' intention to maximise, where possible, the use of this data and assessments to supplement the site-specific survey data acquired for the Transmission Assets, to:

- Characterise the baseline environment to inform the EIA where data is sufficient and appropriate to do so.
- Scope out impacts where there is a clear evidence-base.
- Where impacts are scoped in, to draw upon the pre-existing evidence-base where appropriate.

5.4.4. Maximum design scenario approach

5.4.4.1. As described in part 1, section 4: Project description, of this EIA Scoping Report, the Transmission Assets EIA will use the Project Design Envelope (PDE) approach, also known as the Rochdale Envelope approach. All assumptions regarding the PDE will be clearly set out within the project description chapter of the PEIR/ES and within the topic chapters. The draft DCO will be prepared in conjunction with the ES to ensure that the key parameters applied for are consistent with those assessed through the EIA process.

5.5. Identification of impacts and assessment of significance

5.5.1. Definitions of impact and effect

5.5.1.1. The Transmission Assets have the potential to create a range of impacts and effects with regard to the physical, biological and human environment. For the purposes of the EIA, 'impact' is used to define a change that is caused by an action. For example, the excavation of a cable trench (action) will result in levels of habitat loss (impact). Impacts can be defined as direct, indirect, secondary, cumulative and inter-related. They can also be either adverse or beneficial. In addition, for certain impacts, the reversibility of an impact is relevant to its overall effect. An irreversible (permanent) impact may occur when recovery is not possible, or not possible within a reasonable timescale. In contrast, a reversible (temporary) impact is one where natural recovery is possible over a short time period, or where mitigation measures can be effective at reversing the impact.

5.5.1.2. The term 'effect' will be used in the EIA to express the consequence of an impact. Considering the cable trenching example, the excavation of trenches (action) results in levels of habitat loss (impact), with the potential to disturb breeding birds (effect).

5.5.1.3. Each topic chapter will consider the magnitude of the impact alongside the sensitivity of the receptor in determining the significance of the effect, in accordance with defined significance criteria.

5.5.2. Defining magnitude of impact

5.5.2.1. For each of the impacts assessed in the EIA process, a magnitude will be assigned. In assigning magnitude, the spatial extent, duration, frequency and reversibility of the impact will be considered (in line with Schedule 3, paragraph 3, of the 2017 EIA Regulations). For each topic, the magnitude of impact will be categorised according to the below scale:

- No change.
- Negligible.
- Low.
- Medium.
- High.

5.5.2.2. Topic-specific definitions for each of these categories will be based on relevant guidance and specialist knowledge and will be provided in each of the topic chapters of the EIA.

5.5.3. Defining sensitivity of receptor

5.5.3.1. Receptors are defined as the physical or biological resource or human user group that would be affected by the impacts of a proposed development. Identification of receptors will be informed by available data and the baseline studies completed in the preparation of the EIA.

5.5.3.2. In defining the sensitivity of each receptor, the vulnerability, recoverability and value/importance will be taken into account. The determination of these factors will be specific to each environmental topic and defined within the corresponding chapters of the ES.

5.5.3.3. The sensitivity of each receptor to each impact will then be defined for each topic according to the below scale:

- Negligible.
- Low.
- Medium.

- High.
- Very high.

5.5.4. Evaluation of significance of effect

5.5.4.1. Effect is the term used to express the consequence of an impact (expressed as the 'significance of effect'). The significance of an effect will be determined by the consideration of the magnitude of impact alongside the sensitivity of the receptor. In order to ensure a consistent approach throughout the EIA, a matrix approach will be adopted to guide topic-specific assessments. An example of such an EIA matrix is given below in Table 5.1.

Table 5.1: Matrix used for assessment of significance, showing the combinations of receptor sensitivity and the magnitude of impact.

Sensitivity of Receptor	Magnitude of impact				
	No Change	**Negligible**	**Low**	**Medium**	**High**
Negligible	No change	Negligible	Negligible or Minor	Negligible or Minor	Minor
Low	No change	Negligible or Minor	Negligible or Minor	Minor	Minor or Moderate
Medium	No change	Negligible or Minor	Minor	Moderate	Moderate or Major
High	No change	Minor	Minor or Moderate	Moderate or Major	Major
Very High	No change	Minor	Moderate or Major	Major	Major

5.5.4.2. By cross-referencing the magnitude of impact with the sensitivity of the receptor, a significance of effect may be assigned for all potential impacts. The significance of effect may be one, or a range of:

- No change.
- Negligible.
- Minor.
- Moderate.
- Major.

5.5.4.3. These significance levels are defined in Table 5.2.

Table 5.2: Definition of significance levels.

Term	Definition (adapted from Highways England *et al.*, 2019)
No change	No loss or alteration of characteristics, features or elements; no observable impact in either direction.
Negligible	No effects or those that are beneath levels of perception, within normal bounds of variation or within the margin of forecasting error.
Minor	These beneficial or adverse effects are generally, but not exclusively, raised as local factors. They are unlikely to be critical in the decision-making process but are important in enhancing the subsequent design of the project.
Moderate	These beneficial or adverse effects have the potential to be important and may influence the key decision-making process. The cumulative effects of such factors may influence decision-making if they lead to an increase in the overall adverse or beneficial effect on a particular resource or receptor.
Major	These beneficial or adverse effects are considered to be very important considerations and are likely to be material in the decision-making process. These effects are generally, but not exclusively, associated with sites or features of international, national or regional importance that are likely to suffer a most damaging impact and loss of resource integrity. However, a major change in a site or feature of local importance may also enter this category. Effects upon human receptors may also be attributed this level of significance.

5.5.4.4. In general, a significance level of moderate or greater is considered to be a 'significant effect' in the context of the 2017 EIA Regulations and the 2007 EIA Regulations. However, this will be topic-specific and dependent on relevant practitioner guidance, and therefore for each topic chapter of the ES, what is considered 'significant' will be clearly defined. In cases where a range is suggested for the significance of effect, there remains the possibility that this may span the significance threshold (for example, if the range is given as minor to moderate). In such cases the final significance is based upon expert opinion as to which outcome delineates the most likely effect, with an explanation as to why this is the case.

5.6. Mitigation and enhancement measures

5.6.1.1. The 2017 EIA Regulations require that where potential significant effects are identified 'a description of any features of the proposed development, or measures envisaged in order to avoid, prevent or reduce and, if possible, offset likely significant adverse effects on the environment' should be included in the ES.

5.6.1.2. Mitigation measures are measures developed to avoid, prevent, reduce or, if possible, offset significant adverse environmental effects. In some cases, measures are proposed that would create or enhance beneficial environmental or social effects; these are referred to as enhancement measures.

5.6.2. Measures adopted as part of the project

5.6.2.1. Measures adopted as part of the project may include those developed as part of the project design, industry standard measures committed to by the Applicants, or measures which are required by law. For the purposes of the EIA process, the term 'measures adopted as part of the project' is used to include the following measures (adapted from IEMA, 2016):

- Measures included as part of the project design. These include modifications to location or design, integrated into the application for consent. These measures are implemented through the consent itself (through the requirements of the DCO or the conditions within the deemed marine licences) (referred to as primary mitigation in IEMA, 2016).
- Industry standard measures committed to by the Applicants. These include commitment to implementing post-consent management plans to reduce the significance or likelihood of adverse environmental effects, integrated into the application for consent. These measures are also implemented through the consent itself (through the requirements of the DCO or the conditions within the deemed marine licences) (referred to as secondary mitigation in IEMA, 2016).
- Measures required to meet legislative requirements (referred to as tertiary mitigation in IEMA, 2016).
- Enhancement measures designed to provide an improvement or net gain, compared to existing baseline conditions.

5.6.2.2. The development of mitigation and enhancement measures is part of an iterative EIA process, whereby measures are developed throughout the EIA process in response to the findings of initial assessments. The proposed methodology involves a 'feedback loop' as illustrated in Figure 5.2. Impacts are initially assessed for significance of potential environmental effects. If the effect is significant adverse, changes are made where practicable to the project design to reduce or offset the impact magnitude (i.e., primary mitigation). This process is repeated (as per Figure 5.2) until the EIA practitioner is satisfied that either:

- The effect is reduced to a level that is not significant in EIA terms or
- No further primary or secondary mitigation can be applied to reduce the impact magnitude (and hence the significance of the effect). In these cases, an overall effect that is still significant in EIA terms may be presented.

5.6.2.3. Where appropriate, opportunities are explored within the EIA process to develop enhancement measures and to create beneficial effects.

5.6.2.4. The application for development consent for the Transmission Assets will include a range of measures adopted as part of the project. The assessment of effects presented within each topic-specific chapter of the ES will take into account all measures adopted as part of the project to which the Applicants are committed.

5.6.2.5. All measures adopted as part of the project, together with the means of securing them (e.g., through submission of post-consent management plans), will ultimately form part of the requirements included in the DCO or the conditions within the deemed marine licence.

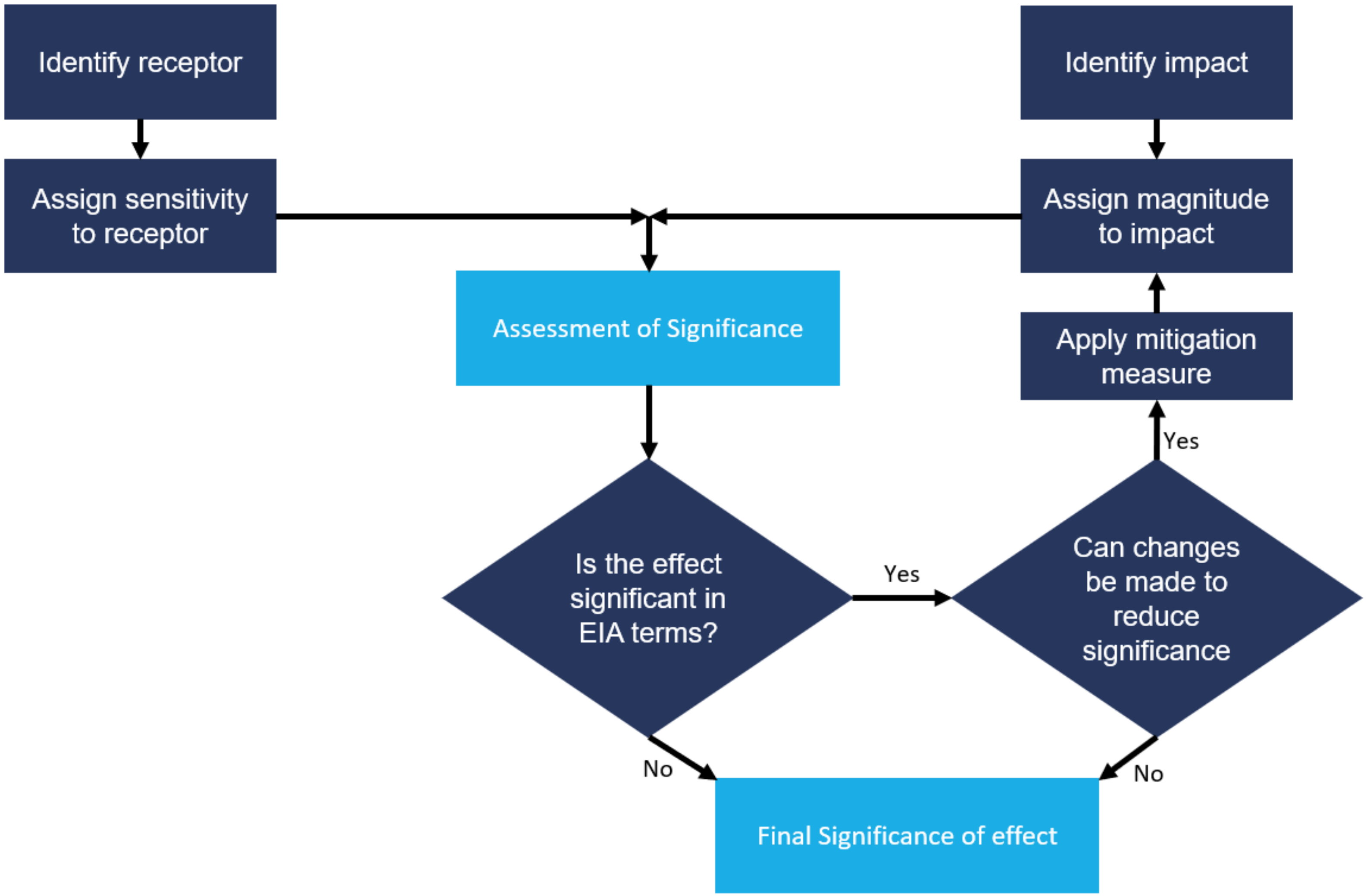


Figure 5.2: Proposed iterative approach to mitigation within the Transmission Assets EIA.

5.6.3. Further mitigation

5.6.3.1. Where required, further mitigation will be identified within the topic-specific chapters of the ES. These are measures that could further prevent, reduce and, where possible, offset any significant residual adverse effects on the environment. This category of further mitigation is used, for example, where measures may not be industry standard, or where there is less certainty regarding the proven effectiveness of an emerging mitigation technique. For such measures, the significance of effect is assessed both with and without these measures in place.

5.6.4. Monitoring

5.6.4.1. In some cases, monitoring measures may be appropriate. Where appropriate, monitoring measures will be set out in the topic-specific chapters of the ES

5.7. Addressing uncertainty

5.7.1.1. There is some degree of inherent uncertainty within the EIA process. There is uncertainty in relation to future improvements to construction and design (see section 5.4.4). In addition, there is uncertainty in relation to future baseline conditions, such as the potential effects of climate change on existing receptors. There is also a degree of uncertainty in terms of the margin of error within forecasting or modelling tools. The following sections set out the proposed approach to addressing uncertainty. In all cases, where uncertainty exists, this will be identified (and quantified where possible) within the relevant chapter of the PEIR/ES, together with details of the measures that have been taken to reduce uncertainty as far as reasonably practicable.

5.7.2. Future baseline and assessment years

5.7.2.1. The baseline for the assessment of environmental effects will primarily be drawn from evidence collated during review of desktop data and any site-specific environmental surveys. Consideration will also be given to any likely changes between the time of data collection/survey and the future baseline for the construction and operation of the Transmission Assets. In some cases, these changes may include the construction or operation of other planned developments in the area. Where such developments are built and operational at the time of writing and data collection, these will be considered to form part of the baseline environment (unless they have an ongoing effect). Where sufficient and robust information is available, such as expected traffic growth figures, other future developments will be considered as part of the future baseline conditions. In all other cases, planned future developments will be considered within the assessment of cumulative effects.

5.7.2.2. The consideration of future baseline conditions will also take into account the likely effects of climate change, as far as these are known at the time of writing. It is recognised that there will be some element of uncertainty regarding future trends in environmental conditions and climate. Where accepted methodologies for identifying the likely effects of climate change are available, these will be considered in the assessment. For example, information available from the UK Climate Projections project (UKCP18), which provides information on plausible changes in climate for the UK (Environment Agency and Met Office, 2018) and in published documents such as the UK Climate Change Risk Assessment 2017 (Climate Change Committee, 2017b) and subsequent updates. Recent published research will also be reviewed to inform judgements on whether specific receptors are susceptible to the effects of climate change.

5.7.3. Forecasting and modelling

5.7.3.1. Where forecasting and modelling tools are used, care will be taken to ensure that the tool selected is appropriate for the assessment, taking into account topic-specific good practice and guidance. Model assumptions will be described, and calibration will be used to ensure a reasonable degree of accuracy in measurements. In addition, uncertainty will be addressed by undertaking modelling for a number of scenarios and at representative points across the Transmission Assets, where applicable. Topic chapters within the PEIR/ES will set out measures taken to address any uncertainty with regard to modelling inputs and outputs.

5.8. Cumulative effects assessment

5.8.1.1. This section describes the proposed approach to the Cumulative Effects Assessment (CEA) for the Transmission Assets. Cumulative effects are defined as those that result from incremental changes caused by other reasonably foreseeable actions or other major developments alongside the assessed project. Cumulative effects are therefore the combined effect of the assessed project cumulatively with the effects from a number of different projects, on the same single receptor/resource. A fundamental requirement of undertaking the CEA is to identify those foreseeable developments or activities with which the assessed project may interact to produce a cumulative effect. Interactions have the potential to arise during the construction, operation and maintenance, and decommissioning phases.

5.8.1.2. The Planning Inspectorate's Advice Note Seventeen: Cumulative Effects Assessment Relevant to Nationally Significant Infrastructure Projects (The Planning Inspectorate, 2019) recommends that, through consultation with local authorities and other relevant consenting bodies, other major developments in the area should be taken into account when conducting CEA, including those which are:

- Under construction.
- Permitted application(s), but not yet implemented.
- Submitted application(s) not yet determined.
- Projects on the National Infrastructure Planning Portal's Programme of Projects.
- Projects identified in relevant development plans.
- Projects identified in other plans and programmes as may be relevant.

5.8.1.3. For the Transmission Assets CEA, other proposed major developments in the area will be taken into account within the CEA, including but not limited to the generation assets of the Morgan Offshore Wind Project and the Morecambe Offshore Windfarm and, where relevant, other Round 4 projects, including the Mona Offshore Wind Project.

5.8.1.4. The CEA for the Transmission Assets will draw on and be informed by the assessments set out in the PEIR and ES for the generation assets of the Morgan Offshore Wind Project and the Morecambe Offshore Windfarm, as set out in Figure 5.3 below. This will ensure that the cumulative effects of the Transmission Assets with the Morgan Offshore Wind Project and the Morecambe Offshore Windfarm (generation assets) are assessed.

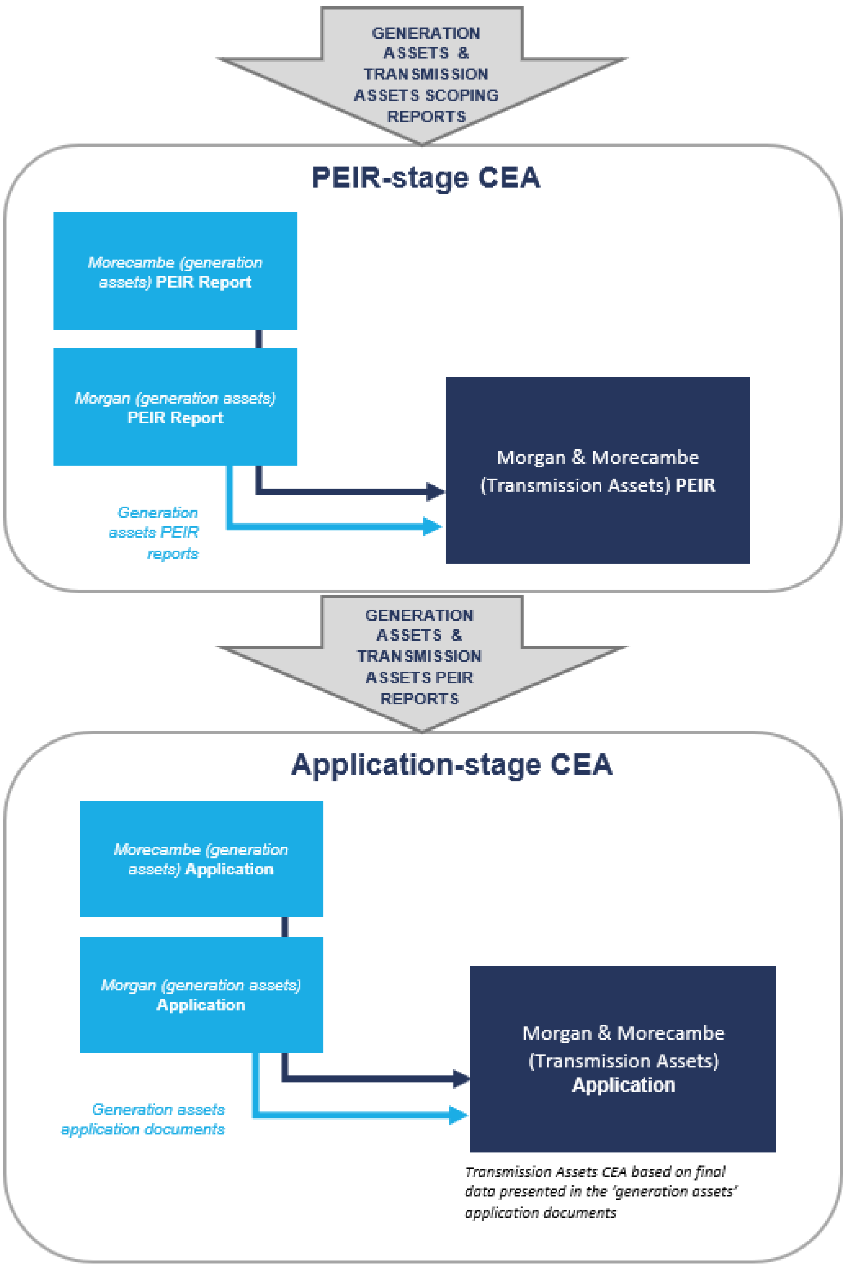


Figure 5.3: Approach to consideration of the generation assets in the CEA process

5.8.2. Screening stage

5.8.2.1. The CEA process is divided into a screening stage and an assessment stage. The proposed process is broadly illustrated in Figure 5.4.

5.8.2.2. An extensive list of plans, projects and activities will be prepared to inform the CEA, known as the CEA long list. A process will be followed to methodically and transparently screen the large number of projects and plans that may be considered cumulatively alongside the Transmission Assets. This involves a stepwise process that considers the level of detail available for projects/plans, as well as the potential for interactions to occur on the following basis:

- Data confidence: data confidence is taken into account when screening projects, plans and activities into or out of the CEA. The premise here is that projects, plans and activities with a low level of detail publicly available cannot meaningfully contribute to a CEA and, as such, are screened out. The application of this screening step is consistent with Guiding Principle 7 of the RenewableUK Cumulative Impact Assessment Guidelines (RenewableUK, 2013).
- Conceptual overlap: for a conceptual overlap to occur it must be established that such an impact has the potential to directly or indirectly affect the receptor(s) in question. In EIA terms this is described as an impact-receptor pathway and is defined here as a conceptual overlap.
- Physical overlap: a physical overlap refers to the ability for impacts arising from the Transmission Assets to overlap with those from other projects/plans on a receptor basis. This means that, in most examples, an overlap of the physical extents of the impacts arising from the two (or more) projects/plans must be established for a cumulative effect to arise. Exceptions to this exist for certain mobile receptors that may move between, and be subject to, two or more separate physical extents of impact from two or more projects.
- Temporal overlap: in order for a cumulative effect to arise from two or more projects, a temporal overlap of impacts arising from each must be established. It should be noted that some impacts are active only during certain phases of development, such as piling noise during construction. In these cases, it is important to establish the extent to which an overlap may occur between the specific phase of the Transmission Assets and other projects/plans. The absence of a strict overlap however may not necessarily preclude a cumulative effect, as receptors may become further affected by additional, non-temporally overlapping projects.

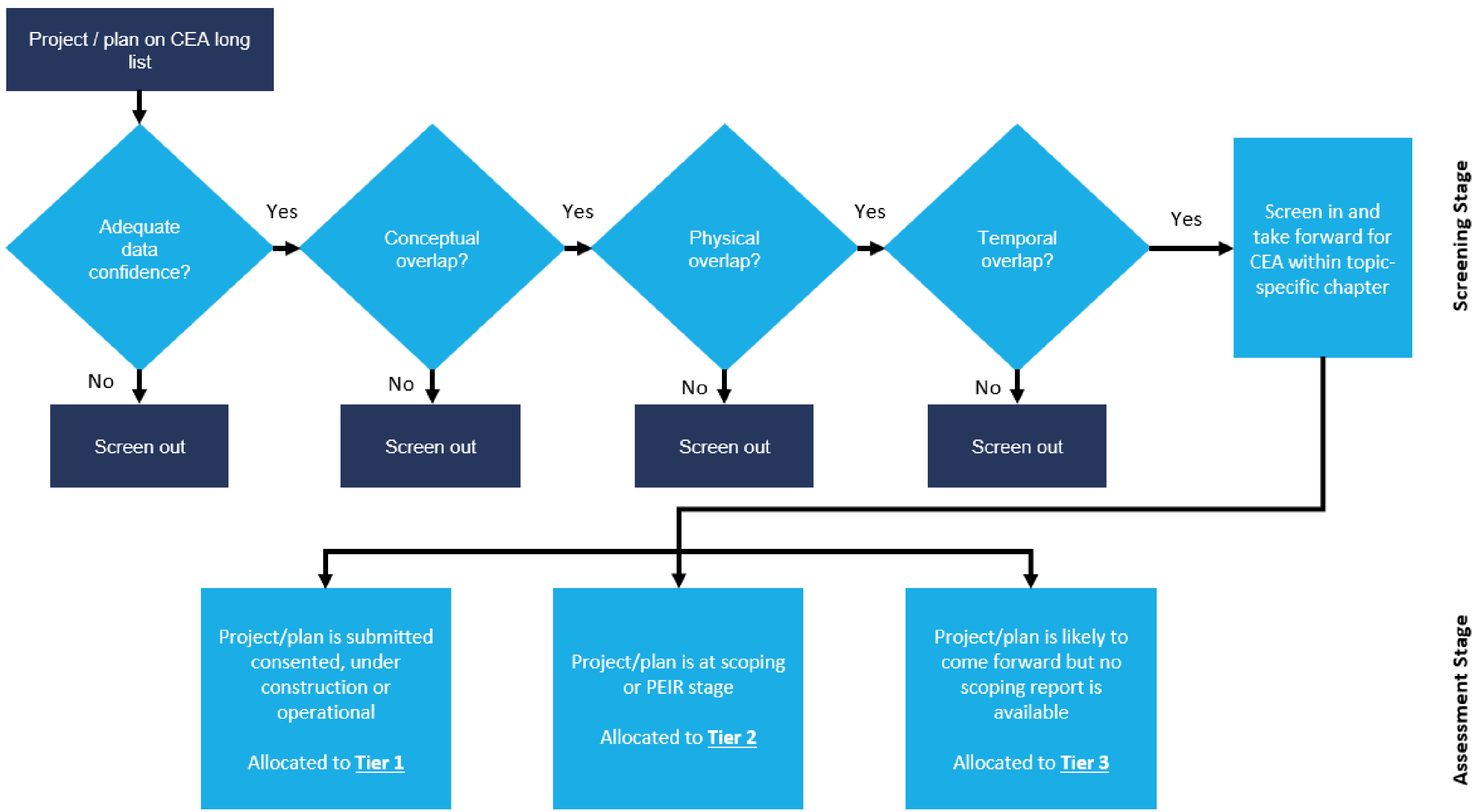


Figure 5.4: Proposed methodology for the Transmission Assets for the screening of potential projects/plans to provide cumulative effects.

5.8.3. Assessment stage

5.8.3.1. Once a project has been taken forward to the assessment stage, a tiered approach is proposed for the CEA. The tiered approach provides a framework to assist the decision maker in placing relative weight upon the potential for each project/plan assessed cumulatively to ultimately be realised, based upon the project/plan's current stage of maturity. The allocation of projects/plans into tiers is not affected by the screening process; it is a categorisation applied to all projects/plans that have been screened in for assessment.

5.8.3.2. The definitions of the tiers to be used will be included in the PEIR and will be broadly consistent with The Planning Inspectorate's Advice Note Seventeen (The Planning Inspectorate, 2019) and the RenewableUK Cumulative Impact Assessment Guidelines, specifically Guiding Principle 4 and Guiding Principle 7 (RenewableUK, 2013).

5.8.3.3. All projects/plans that have been screened into the CEA via the screening process will be allocated into one of the tiers and assessed for cumulative effect. Where practicable, the CEA methodology then follows the outline of the project-alone assessment methodology as described above in section 5.4. This approach allows consistency throughout the EIA and enables comparisons to be made.

5.9. Transboundary impacts

5.9.1. Legislation and guidance

5.9.1.1. Transboundary effects arise when impacts from a project within one state affect the environment of another state(s). The need to consider such transboundary effects has been embodied by the United Nations Economic Commission for Europe Convention on EIA in a Transboundary Context (commonly referred to as the 'Espoo Convention'). The Convention requires that assessments are extended across borders between Parties of the Convention when a planned activity may cause significant adverse transboundary impacts.

5.9.1.2. The Espoo Convention has been implemented in the UK by the 2017 EIA Regulations. Regulation 32 of the 2017 EIA Regulations sets out a prescribed process of consultation and notification. In addition, The Planning Inspectorate's Advice Note Twelve: Transboundary Impacts (The Planning Inspectorate, 2020b) sets out the procedures for consultation in association with an application for a DCO where such a development may have significant transboundary effects.

5.9.1.3. The Planning Inspectorate's Advice Note Twelve (The Planning Inspectorate, 2020b) also sets out the procedure for screening, consulting and assessing transboundary issues. This procedure involves the following broad steps which are divided into two stages:

- Stage 1:
  - Developer carries out pre-application consultation with other state(s).

  - Developer notifies The Planning Inspectorate of EIA potentially requiring transboundary assessment.
  - Developer prepares initial matrix to identify potential significant impacts on other state(s) and provides to The Planning Inspectorate.
  - The Secretary of State undertakes transboundary screening for potential significant impacts.
  - The Secretary of State notifies other relevant state(s), including London Gazette notice.
  - Other state(s) notify The Planning Inspectorate of their wish to participate in the consultation.
- Stage 2:
  - Developer submits DCO application, including translated non-technical summary and a consultation report summarising pre-submission transboundary consultation that took place.
  - Secretary of State undertakes consultation with other relevant state(s).
  - Other state(s) consult with their public and provide comments to the Secretary of State.
  - Consultation responses are taken account of by the Secretary of State in the decision-making process.

5.9.1.4. The Transmission Assets will follow this broad process with regard to transboundary EIA, including any other guidance that may prevail at the time of undertaking the assessment.

5.9.2. Screening

5.9.2.1. Identification and screening of transboundary impacts has been undertaken and is presented in part 3, annex A: Transboundary impacts screening, of this EIA Scoping Report.

5.10. Inter-related effects

5.10.1.1. Regulation 5(2) of the 2017 EIA Regulations requires a consideration of the interactions or inter-relationships between EIA topics that may lead to additional environmental effects. For example, the separate impacts of subsea noise and habitat loss may together have an effect upon a single receptor, such as marine mammals.

5.10.1.2. Guidance on inter-related effects is provided within The Planning Inspectorate's Advice Note Nine: Rochdale Envelope (The Planning Inspectorate, 2018), which state that 'interactions between aspect assessments includes where a number of separate impacts, e.g., noise and air quality, affect a single receptor such as fauna'. The approach to inter-related effects will take into account this Advice Note, along with any other guidance that may prevail at the time.

5.10.1.3. The approach to the assessment of inter-related effects will consider two levels of potential effect:

- Project lifetime effects: effects that occur throughout more than one phase of the Transmission Assets (e.g., construction, operation and maintenance or decommissioning).
- Receptor-led effects: effects that interact spatially and/or temporally resulting in inter-related effects upon a single receptor.

5.10.1.4. The assessment of inter-related effects will be undertaken with specific reference to the potential for such effects to arise in relation to receptor groups (i.e., the assessment will, in the main, not assess every individual receptor assessed at the EIA stage, but rather, potentially sensitive groups of receptors).

5.10.1.5. The broad approach to inter-related effects assessment will follow the below key steps:

- Review of effects for individual EIA topic areas.
- Review of the assessment carried out for each EIA topic area, to identify ’receptor groups’ requiring assessment.
- Identify potential inter-related effects on these receptor groups via review of the assessment carried out across a range of topics.
- Develop tables that list all potential effects on the selected receptor across the construction, operation and maintenance phases (project lifetime effects).
- Develop lists for all potential receptor-led effects.
- Qualitative assessment on how individual effects may combine to create inter-related effects.

5.10.1.6. It is important to note that the inter-relationships assessment will consider only effects produced by the Transmission Assets, and not those from other projects (these will be considered within the CEA).

6. Consultation process

6.1. Pre-application consultation

6.1.1.1. The Planning Inspectorate's Advice Note Three: EIA Notification and Consultation (The Planning Inspectorate, 2017a) states that *'It is the responsibility of the Applicant to ensure that their pre-application consultation fully accords with the requirements of the [Planning Act 2008], including associated regulations, and that they have regard to relevant guidance'*.

6.1.1.2. The Planning Act 2008, as amended, requires the Applicants to consult with the local authorities and such persons as prescribed in Section 42 and Section 44 of the Planning Act 2008 and Schedule 1 of the Infrastructure Planning (Applications: Prescribed Forms and Procedure) Regulations 2009 (as amended).

6.1.1.3. In addition, the Applicants must have regard to guidance issued in accordance with section 50 of the Planning Act 2008, which includes 'Planning Act 2008: Guidance on the pre-application process' (Department for Communities and Local Government, 2015).

6.1.1.4. Section 43 of the Planning Act 2008 details local authorities that must be consulted and section 47 sets out the process that an applicant must comply with in consulting people living in the vicinity of the land of the proposed application. The onshore elements of the Transmission Assets Scoping Boundary are located within the local authority areas of Fylde Council, Blackpool Council, South Ribble Borough Council and Preston City Council (and Lancashire County Council at the County level)

6.1.1.5. The Applicants intend to consult with local communities that may be affected by the Transmission Assets. The Applicants will identify and consult with relevant local authorities on the proposed scope of consultation with their affected communities.

6.1.1.6. The Applicants will consult a range of statutory consultees as identified by The Planning Inspectorate (this EIA Scoping Report will help inform that consultation exercise). The Applicants will have regard to any relevant responses to statutory consultation, as prescribed in Section 49 of the Planning Act 2008.

6.1.1.7. Anyone with an active interest in the Transmission Assets is encouraged to participate in the pre-application consultation and more detail on the consultation that will be undertaken by the Applicants is set out in section 6.4 below.

6.2. Statement of Community Consultation (SoCC)

6.2.1.1. Under Section 47 of the Planning Act 2008, the Applicants have a duty to prepare a SoCC, which sets out how they plan to consult local communities in the vicinity of the project. The Applicants must conduct their consultation in line with the SoCC. The Applicants will consult with relevant local authorities on the approach to consultation with the communities likely to be affected by the Transmission Assets.

6.3. Evidence plan process and expert groups

6.3.1.1. Since September 2012, applicants for development consent in England have been able to agree evidence plans with relevant Statutory Nature Conservation Bodies (SNCBs).

6.3.1.2. Evidence plans are formal mechanisms to agree what information the Applicants need to supply to The Planning Inspectorate as part of an application for development consent. This helps ensure compliance with the Habitats Regulations, and helps applicants provide sufficient information as part of their application.

6.3.1.3. Guidance on the evidence plan approach is provided by the Department for Environment, Food and Rural Affairs (Defra) in 'Habitats Regulations: Evidence Plans for Nationally Significant Infrastructure Projects' (Defra, 2012) and within The Planning Inspectorate's Advice Note Eleven, Annex H – Evidence Plans for Habitats Regulations Assessments of Nationally Significant Infrastructure Projects (The Planning Inspectorate, 2017b). The Planning Inspectorate's Advice Note Eleven, Annex H, describes four stages to the evidence plan process:

- The Applicant requests an evidence plan.
- The Applicant and relevant SNCB(s) agree the initial structure and content of the evidence plan.
- The Applicant gathers and analyses the evidence and the relevant SNCB(s) assess the evidence through an iterative process. The Applicant and SNCB(s) agree where specific issues are resolved.
- The evidence plan process is finalised and agreed by the Applicant and SNCB(s) during the pre-application stage.

6.3.1.4. Evidence plan steering groups have been set up for both the Morgan Offshore Wind Project and the Morecambe Offshore Windfarm (generation assets). An evidence plan steering group will also be established for the Transmission Assets. The steering group will include the Applicants, the Planning Inspectorate, Natural England, the Joint Nature Conservation Committee (JNCC), the Marine Management Organisation (MMO) (and Cefas), the Environment Agency and the relevant Local Planning Authority(ies), once confirmed. The steering group will meet at key milestones throughout the EIA process.

6.3.1.5. In addition, Expert Working Groups (EWGs) will be established to discuss topic-specific issues with relevant stakeholders, building on those already set up for the generation assets. EWG meetings will be held at key stages in the EIA process or when new information becomes available for each topic, to provide the opportunity for stakeholders to provide feedback and advice at an early stage. EWGs will be established for the following topics:

- Physical processes, benthic ecology and fish and shellfish ecology.
- Marine mammals.
- Offshore and coastal ornithology.
- Marine archaeology.

- Shipping and navigation.
- Commercial fisheries.
- Other sea users.
- Onshore ecology.
- Onshore historic environment.
- Water/ground conditions (hydrology, flood risk, hydrogeology, geology, ground conditions).
- Traffic and transport
- Air quality, noise and health.
- Land use, recreation and socio-economics.
- Seascape, landscape and visual.
- Aviation and radar.

6.3.1.6. In addition, engagement will be undertaken for other offshore and onshore topic areas. This will include additional working groups (likely to include local authority groups for onshore topics) where required. The Marine Navigation Engagement Forum set up for the generation assets has been extended to incorporate consideration of the Transmission Assets.

6.4. Timing of consultation

6.4.1.1. Prior to the submission of the application for development consent, further consultation will take place with relevant parties. This will include, but not be limited to, consultation on the preliminary environmental information (including submission of a Preliminary Environmental Information Report (PEIR)). This will ensure that relevant stakeholder feedback is received and can be taken into account.

6.4.1.2. Key dates include:

- 2022: EIA Scoping.
- 2022: Phase 1 community consultation (non-statutory consultation) to introduce the Transmission Assets, including the process underway to site onshore infrastructure and connect to grid. This is likely to be supplemented with targeted consultation in early 2023 to seek feedback in relation to proposals for the potential cable corridor and onshore substation locations.
- 2023: Phase 2 community consultation (statutory consultation, including on the PEIR).

6.4.1.3. Consultation will continue with key topic-specific technical stakeholders throughout the EIA process.

6.4.2. Scoping

6.4.2.1. The Planning Inspectorate, having received this EIA Scoping Report, will consult with the relevant authorities and key statutory consultees to seek their comments on the scope of the Transmission Assets EIA. In addition to the bodies that The Planning Inspectorate will formally consult, the Applicants will make the EIA Scoping Report available to other stakeholders. Following consultation with statutory consultees on the scope of the EIA, the Secretary of State will provide a Scoping Opinion.

6.4.3. Phase 1 consultation

6.4.3.1. In addition to seeking a Scoping Opinion from the Secretary of State, the Applicants will carry out their Phase 1 community consultation. Anyone who could potentially be affected by, or may have an active interest in, the Transmission Assets will be encouraged to participate.

6.4.3.2. An online consultation platform will form a central hub for the consultation, making all information easily accessible and providing a simple way to provide feedback. Over the consultation period, a number of events are proposed. These are likely to include online events, public exhibitions and pop-up events to allow those interested in, or affected by, the Transmission Assets to view the information provided.

6.4.3.3. At these events (whether online or in person), members of the public will be able to view the latest information on the Transmission Assets, including maps and diagrams illustrating the proposed infrastructure. They will be able to speak directly with members of the Transmission Assets team and ask any questions or raise any concerns they may have. Participants will have the opportunity to complete a feedback form. The dates, venues and times will be confirmed nearer to the time and advertised online and in local media.

6.4.3.4. At the end of Phase 1 consultation, a consultation feedback report will be produced. The report will include an overview of the issues raised during the Phase 1 community consultation events and will inform future development of the consultation and EIA process, where appropriate.

6.4.4. Phase 2 consultation

6.4.4.1. Phase 2 consultation comprises statutory consultation (under Sections 42 to 48 of the Planning Act 2008). The statutory consultation materials will include the PEIR. This document will act as a draft ES, will be based on the EIA Scoping Report and Scoping Opinion, and will take into account comments received from the consultation process.

6.4.4.2. As part of this consultation the Applicants will hold a second round of community consultation events, online and/or in local authority areas across the consultation zone (subject to public health advice on COVID-19 at the time). At this stage, the Applicants will specifically consult stakeholders and the local community on the contents of the PEIR and following this, additional community consultation events will be held. The dates, venues and times will be confirmed nearer to the time and advertised online and in local media.

6.4.4.3. During these consultation events, the Applicants may be able to present a more refined design, on which members of the public can comment. Participants will have the opportunity to complete a feedback form and a consultation feedback report will be produced and made available online.

6.4.4.4. A Consultation Report will be prepared and submitted as part of the application for development consent that will provide details of the consultation activities (non-statutory and statutory), the responses received and how they have influenced the project.

Preliminary Environmental Information Report (PEIR)

6.4.4.5. The EIA Regulations require preliminary environmental information (PEI) to be provided for public consultation by those seeking development consent. The level of detail required in the PEI is not defined by The Infrastructure Planning (Environmental Impact Assessment) Regulations 2017; however, it must cover those areas being assessed by the ES, which will accompany the application for development consent.

6.4.4.6. The Applicants plan to consult upon a PEIR for the Transmission Assets as part of Phase 2 consultation during 2023. The PEIR is intended to allow statutory consultees, local communities and interested parties to understand the nature, scale, location and likely significant environmental effects of the Transmission Assets, such that they can make an informed contribution to the process of pre-application consultation under the Planning Act 2008 and to the EIA process.

6.4.4.7. The Applicants expect they will further refine the design of the Transmission Assets, in terms of the detailed consent application to be submitted, based upon the consultation responses received from the PEI process. The final results of the EIA will be presented in an ES and a summary of all consultation responses received will be presented in the Consultation Report, both of which will accompany the application for development consent.

6.4.5. Application for development consent

6.4.5.1. The application for development consent is currently planned to be submitted to The Planning Inspectorate in 2024. The ES that will be submitted to accompany the application will be prepared taking into account the responses to the Phase 1 and Phase 2 consultation, which will be captured in the Consultation Report that will accompany the application.

7. References

7.1. Introduction

Banfi, P., Lantieri, A., McGuinn, J. and McNeill, A. (2017) Environmental Impact Assessment of Projects Guidance on Scoping. Directive 2011/92/EU as amended by 2014/52/EU. Implemented for the European Commission by COWI A/S and Milieu Ltd.

7.2. Policy and legislation

Climate Change Committee (2020) The Sixth Carbon Budget – The UK's Path to Net Zero, December 2020. Available at: The-Sixth-Carbon-Budget-The-UKs-path-to-Net-Zero.pdf (theccc.org.uk). Accessed: June 2022.

Department for Business, Energy and Industrial Strategy (BEIS) (2020) Contracts for Difference Policy Paper. Available at: https://www.gov.uk/government/publications/contracts-for-difference/contract-for-difference#the-fourth-cfd-allocation-round-ar4. Accessed November 2021.

Department for Business, Energy and Industrial Strategy (BEIS) (2021a) Draft Overarching National Policy Statement for Energy (EN-1). Available at: https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/1015233/en-1-draft-for-consultation.pdf. Accessed: June 2022.

Department for Business, Energy and Industrial Strategy (BEIS) (2021b) Draft National Policy Statement for Renewable Energy Infrastructure (EN-3). Available at: https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/1015236/en-3-draft-for-consultation.pdf. Accessed: June 2022.

Department for Business, Energy and Industrial Strategy (BEIS) (2021c) Draft National Policy Statement for Electricity Networks Infrastructure (EN5). Available at: https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/1015238/en-5-draft-for-consultation.pdf. Accessed: June 2022.

Department for Business, Energy and Industrial Strategy (BEIS) (2022) Five Year Review of the Energy Act 2013. Available at: Five Year Review of the Energy Act 2013 (publishing.service.gov.uk). Accessed: June 2022.

Department for Business, Energy and Industrial Strategy (BEIS) and Prime Minister's Office (2022). British Energy Security Strategy Available at: British energy security strategy - GOV.UK (www.gov.uk). Accessed: June 2022.

Department for Environment, Food and Rural Affairs (2022) Consultation on Biodiversity Net Gain Regulations and Implementation, January 2022. Available at: Consultation on Biodiversity Net Gain Regulations and Implementation_January2022.pdf (defra.gov.uk). Accessed July 2022.

Department for Environment, Food and Rural Affairs (Defra) (2011) Marine Policy Statement. Available at: https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/69322/pb3654-marine-policy-statement-110316.pdf. Accessed: June 2022.

Department of Energy and Climate Change (DECC) (2011) Overarching National Policy Statements for Energy (NPS EN-1). Available online at: https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/47854/1938-overarching-nps-for-energy-en1.pdf Accessed November 2021.

Department of Energy and Climate Change (DECC) (2011a) Overarching National Policy Statements for Energy (NPS EN-1). Available: [https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/47854/1938-overarching-nps-for-energy-en1.pdf].

Department of Energy and Climate Change (DECC) (2011b) National Policy Statement for Renewable Energy Infrastructure. Available: [https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/47856/1940-nps-renewable-energy-en3.pdf].

Department of Energy and Climate Change (DECC) (2011c) National Policy Statements for Electricity Networks Infrastructure (NPS EN-5). Available: [https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/47858/1942-national-policy-statement-electricity-networks.pdf].

European Commission (2011) The roadmap for transforming the EU into a competitive, low-carbon economy by 2050. Available at: [https://ec.europa.eu/clima/sites/clima/files/2050_roadmap_en.pdf].

European Commission (2020a) 2030 climate and energy framework. Available at: https://ec.europa.eu/clima/policies/strategies/2030_en. Accessed November 2021.

European Commission (2020b) 2050 long-term strategy. Available at: [https://ec.europa.eu/clima/policies/strategies/2050_en].

European Commission (2021) Commission presents Renewable Energy Directive revision. Available: [https://ec.europa.eu/info/news/commission-presents-renewable-energy-directive-revision-2021-jul-14_en].

HM Government (2011a) The Carbon Plan: Delivering our Low Carbon Future. Available at: https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/47613/3702-the-carbon-plan-delivering-our-low-carbon-future.pdf. Accessed November 2021.

HM Government (2011b) UK Marine Policy Statement. Available at: https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/69322/pb3654-marine-policy-statement-110316.pdf. Accessed November 2021.

HM Government (2017) The Clean Growth Strategy – Leading the way to a low carbon future. Available at: Clean Growth Strategy (publishing.service.gov.uk). Accessed: June 2022.

HM Government (2019) Industry Strategy. Offshore Wind Sector Deal. Available at: https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/790950/BEIS_Offshore_Wind_Single_Pages_web_optimised.pdf. Accessed November 2021.

HM Government (2020a) Offshore Wind Sector Deal. Available at: https://www.gov.uk/government/publications/offshore-wind-sector-deal/offshore-wind-sector-deal. Accessed: June 2022.

HM Government (2020b) Offshore wind Sector Deal – one year on. Available at: https://www.gov.uk/government/publications/offshore-wind-sector-deal/offshore-wind-sector-deal-one-year-on. Accessed November 2021.

HM Government (2020c) The Ten Point Plan for a Green Industrial Revolution. Building back better, supporting green jobs, and accelerating our path to net zero. Available at: The Ten Point Plan for a Green Industrial Revolution (publishing.service.gov.uk). Accessed: June 2022.

HM Government (2020d) Energy White Paper: Powering out net zero future. Available at: Energy White Paper (publishing.service.gov.uk). Accessed: June 2022.

HM Government (2021a) Net Zero Strategy: Build Back Greener. Available at: net-zero-strategy-beis.pdf (publishing.service.gov.uk). Accessed: June 2022.

HM Government (2021b) North West Inshore and North West Offshore Marine Plan. Available at: North West Inshore and North West Offshore Marine Plan (publishing.service.gov.uk). Accessed: June 2022.

HM Treasury (2020). National Infrastructure Strategy [Online]. Available at: https://www.gov.uk/government/publications/national-infrastructure-strategy (Accessed: August 2022).

Institute for Government (2020) UK net zero target. Available at: https://www.instituteforgovernment.org.uk/explainers/net-zero-target#:~:text=The%20UK%20is%20on%20track%20to%20meet%20its,sixth%20carbon%20budget%20%282033%E2%80%9337%29%20in%20September%202020.%20%5B15%5D. Accessed November 2021.

Ministry of Housing, Communities and Local Government (MHCLG) (2021) National Planning Policy Framework. Available at: https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/1005759/NPPF_July_2021.pdf. Accessed: June 2022.

National Grid ESO (2022a) Pathway to 2030 Holistic Network Design. Available at: download (nationalgrideso.com). Accessed July 2022.

National Grid ESO (2022b) Pathway to 2030 Stakeholder Approach, Engagement and Feedback Report. Available at: https://www.nationalgrideso.com/document/262696/download. Accessed July 2022.

United Nations (1992) United Nations Framework Convention on Climate Change. Available at: Convention text with Annexes - English (unfccc.int). Accessed: June 2022.

United Nations (2015) Paris Agreement. Available at: https://unfccc.int/sites/default/files/english_paris_agreement.pdf. Accessed: June 2022.

United Nations Framework Convention on Climate Change (2021) Glasgow Climate Pact. Available at: https://unfccc.int/sites/default/files/resource/cop26_auv_2f_cover_decision.pdf. Accessed: June 2022. The Climate Change Act 2008

United Nations Framework Convention on Climate Change (2022) Report of the Conference of the Parties on its Twenty-Sixth Session, held in Glasgow from 31 October to 14 November 2021. Available at: https://unfccc.int/sites/default/files/resource/cp2021_12_add1E.pdf. Accessed: June 2022.

7.3. Project description

Department for Business, Energy and Industrial Strategy (BEIS) (2021a) Draft Overarching National Policy Statement for Energy (EN-1). Available at: https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/1015233/en-1-draft-for-consultation.pdf.

BEIS (2021b) Draft National Policy Statement for Renewable Energy Infrastructure (EN-3), September 2021. Available at: https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/1015236/en-3-draft-for-consultation.pdf Accessed November 2021.

Department of Energy and Climate Change (DECC) (2011a) Overarching National Policy Statements for Energy (NPS EN-1). Available at: https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/47854/1938-overarching-nps-for-energy-en1.pdf.

DECC (2011b) National Policy Statement for Renewable Energy Infrastructure (NPS EN-3). Available at: https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/47856/1940-nps-renewable-energy-en3.pdf.

Morecambe Offshore Wind Farm (2022) Scoping Report – Morecambe Offshore Windfarm Generation Assets.

7.4. EIA methodology

Centre for Environment, Fisheries and Aquaculture Science (Cefas) (2004) Offshore Wind Farms: Guidance Note for Environmental Impact Assessment in Respect of Food and Environment Protection Act 1985 and Coastal Protection Act 1949 requirements – Version 2. Prepared by CEFAS on behalf of the Marine Consents and Environment Unit (MCEU).

Centre for Environment, Fisheries and Aquaculture Science (Cefas) (2012) Guidelines for data acquisition to support marine environmental assessments of offshore renewable energy projects. Report reference: ME5403 – Module 15.

Chartered Institute of Ecology and Environmental Management (CIEEM) (2019) Guidelines for Ecological Impact Assessment in the UK and Ireland: Terrestrial, Freshwater, Coastal and Marine version 1.1. Chartered Institute of Ecology and Environmental Management, Winchester.

Climate Change Committee (2017) UK Climate Change Risk Assessment 2017 Evidence Report, Available at: https://www.theccc.org.uk/uk-climate-change-risk-assessment-2017/.

Department of Energy and Climate Change (DECC) (2011a) Overarching National Policy Statements forEnergy(NPSEN-1). [Online],available: <1938-overarching-nps-for-energy-en1.pdf (publishing.service.gov.uk)>.

Department of Energy and Climate Change (DECC) (2011b) National Policy Statement for Renewable Energy Infrastructure (EN3).

Department of Energy and Climate Change (DECC) (2011c) 'National Policy Statement for Electricity Networks Infrastructure (EN-5)'. Institute of Ecology and Environmental Management (IEEM) (2010) Guidelines for ecological impact assessment in Britain and Ireland - Marine and Coastal. IEEM, Winchester Hampshire.

Environment Agency and Met Office (2018). UK Climate Projections UKCP18 [Online]. Available at: https://www.metoffice.gov.uk/research/approach/collaboration/ukcp/index (Accessed: August 2022).

Institute of Environmental Management and Assessment (IEMA) (2004) Guidelines for Environmental Impact Assessment. IEMA, St Nicholas House, 70 Newport, Lincoln.

Highways England, Transport Scotland, Welsh Government, Department for Infrastructure (2019) Design Manual for Roads and Bridges (DMRB) LA 104, Environmental assessment and monitoring, Revision 1, Available at: https://www.standardsforhighways.co.uk/dmrb/ [Accessed 10/02/2022].

Institute of Environmental Management and Assessment (IEMA) (2016) Environmental Impact Assessment Guide to: Delivering Quality Development. IEMA, St Nicholas House, 70 Newport, Lincoln.

Institute of Environmental Management and Assessment (IEMA) (2017) Delivering Proportionate EIA - A Collaborative Strategy for Enhancing UK Environmental Impact Assessment Practice. IEMA, Lincoln.

Maclean, I.M.D., Wright, L.J., Showler, D.A., and Rehfisch, M.M. (2009) A review of assessment methodologies for offshore wind farms. British Trust for Ornithology Report, commissioned by COWRIE Ltd.

OSPAR (The Convention for the Protection of the Marine Environment of the North-East Atlantic) (2008) Assessment of the environmental impact of offshore wind-farms.

RenewableUK (2013) Cumulative Impact Assessment Guidelines - Guiding Principles for Cumulative Impact Assessment in Offshore Wind Farms.

The Crown Estate (2018) Industry Evidence Programme.

The Planning Inspectorate (2018) Advice Note Nine: Rochdale Envelope.

The Planning Inspectorate (2020a) Advice Note Seven: Environmental Impact Assessment: Preliminary Environmental Information, Screening and Scoping.

The Planning Inspectorate (2020b) Advice Note Twelve: Transboundary Impacts and Process.

The Planning Inspectorate (2019) Advice Note Seventeen: Cumulative effects assessment.

UK Government (2017) UK Climate Change Risk Assessment 2017, Available at: https://www.gov.uk/government/publications/uk-climate-change-risk-assessment-2017.

7.5. Consultation process

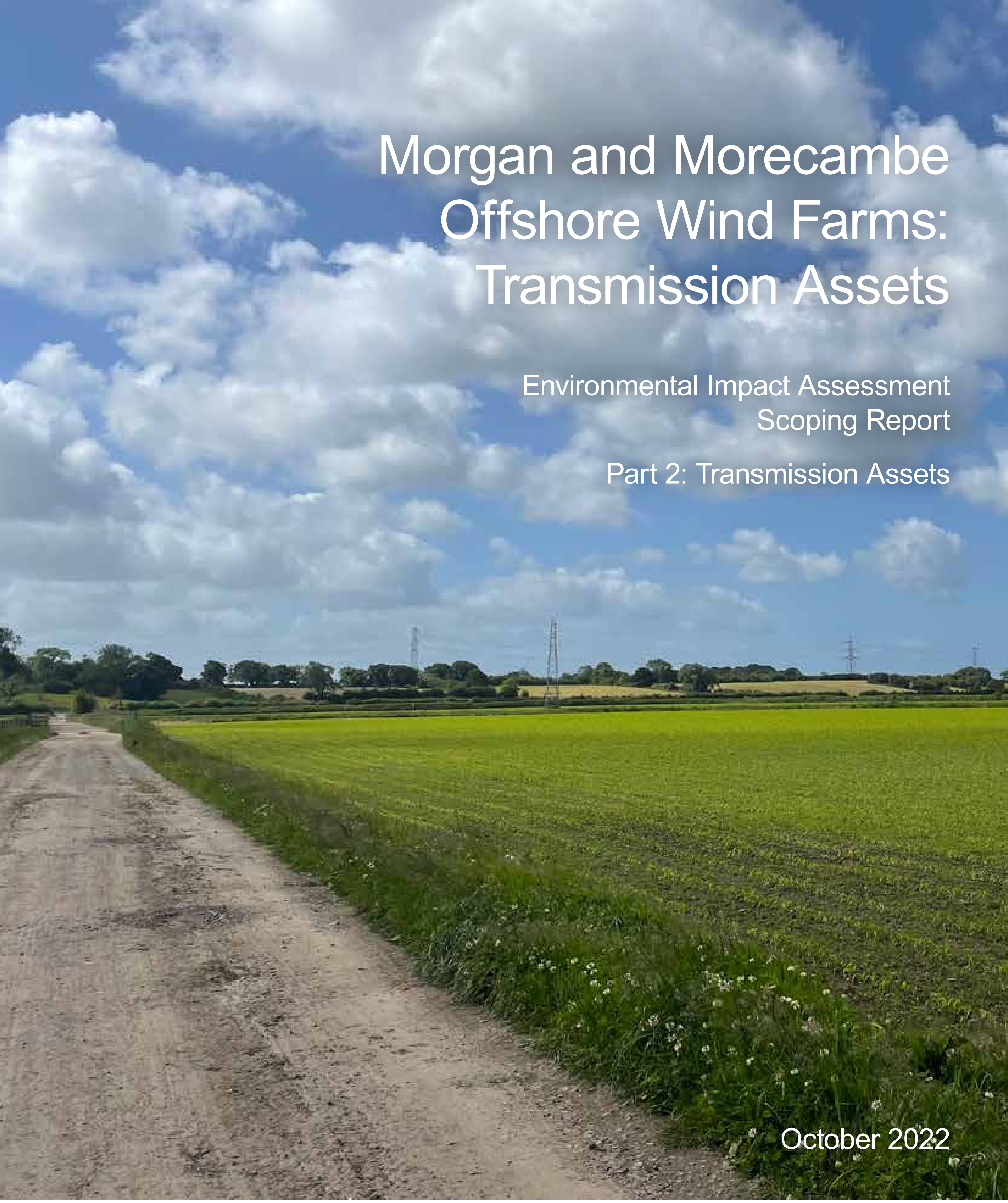
Department for Environment, Food and Rural Affairs (Defra) (2012) ‘Habitats Regulations: Evidence plans for Nationally Significant Infrastructure Projects. Available:

[https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/69601/pb13825-habitats-evidence-plans.pdf].

Department for Communities and Local Government (2015). Planning Act 2008: guidance on changes to Development Consent Orders [Online]. Available at: https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/485064/Making_changes_guidance_to_Development_Consent_Orders.pdf

Planning Inspectorate (2017a) 'Advice Note Three: EIA Notification and Consultation'. Available: [https://infrastructure.planninginspectorate.gov.uk/legislation-and-advice/advice-notes/advice-note-three-eia-notification-and-consultation-2/].

Planning Inspectorate (2017b) ‘Advice Note Eleven, Annex H – Evidence Plans for Habitats Regulations Assessments of Nationally Significant Infrastructure Projects’. Available : [https://infrastructure.planninginspectorate.gov.uk/legislation-and-advice/advice-notes/an-eleven-annex-h/].



Morgan and Morecambe Offshore Wind Farms: Transmission Assets

Environmental Impact Assessment Scoping Report

Part 2: Transmission Assets

October 2022

MAKING COMPLEX EASY

MORECAMBE

Partners in UK offshore wind

Morgan and Morecambe (Offshore Wind) Transmission Assets

EIA Scoping Report

Part 2: Transmission Assets

	For Issue	RPS	25/10/2022	VR	RW	25/10/2022	AS	AP	25/10/2022
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Glossary

Term	Meaning
Access Land	The Countryside and Rights of Way Act 2000 gives a public right of access to land mapped as 'open country' (mountain, moor, heath and down) or registered common land. These areas are known as 'access land'.
Amphipod	Members of the invertebrate order Amphipoda (Crustaceans).
Anthropogenic	An activity resulting from or relating to the influence of humans.
Applicants	Morgan Offshore Wind Limited (Morgan OWL) and Morecambe Offshore Windfarm Limited (Morecambe OWL)
Aquifer	A subsurface layer or layers of rock or other geological strata of sufficient porosity and permeability to allow either a significant flow of groundwater or the abstraction of significant quantities of groundwater.
Automatic Identification System (AIS)	A system by which vessels automatically broadcast their identity, key statistics including location, destination, length, speed and current status.
Bathymetry	A measurement of the depth of water in the ocean.
Best and Most Versatile (BMV)	Agricultural land that is the best and most versatile for growing crops.
Carboniferous	A geological period of time from 359 million years ago to 299 million years ago.
Code of Construction Practice	A document detailing the overarching principles of construction, contractor protocols, construction-related environmental management measures, pollution prevention measures, the selection of appropriate construction techniques and monitoring processes.
Collision	The act or process of colliding (crashing) between two moving objects.
Construction Traffic Management Plan	A document detailing the construction traffic routes for HGV and personnel travel, protocols for delivery of Abnormal Indivisible Loads to site, measures for road cleaning and sustainable site travel measures.
Cumulative Effects	The combined effect of the assessed project in combination with the effects from a number of different projects, on the same single/receptor/resource.
Current	Current is the rate at which electrons flow past a point in a complete electrical circuit.
Development Consent Order	A legal order granting development consent for one or more nationally significant infrastructure projects.
Effect	Term used to express the consequence of an impact. The significance of effect is determined by correlating magnitude of the impact with the importance, or sensitivity, of the receptor or resource in accordance with defined significance criteria.
Electromagnetic Fields (EMF)	EMFs are part of the natural world, and are produced wherever electricity is generated, transmitted, or used.
Epifauna	The animals living on top of the seabed.
Fishery	A group of vessel voyages which target the same species or use the same gear.
Flood Risk Assessment	A flood risk assessment is an assessment of the risk of flooding from all flood mechanisms, including the identification of flood mitigation measures, in order to satisfy the requirements of the National Planning Policy Framework and Planning Practice Guidance.
Formal Safety Assessment (FSA)	A structured and systematic process for assessing the risks and costs (if applicable) associated with shipping activity.
Generation assets	The generation assets associated with the Morgan Offshore Wind Project and the Morecambe Offshore Windfarm include the offshore wind turbines, together with other electrical infrastructure that contributes to electricity production, including inter-array cables, offshore substation platforms [1] and possible platform link cables to connect offshore substations.

1 It is possible that all or part of the offshore substation platforms will be classed as generation assets as the Transmission Assets are refined in the future, but for the purpose of this EIA Scoping Report a precautionary approach has been taken and all infrastructure that may form part of the Transmission Assets has been included. A similar precautionary approach has been taken in scoping the generation assets.

Term	Meaning
Hydrozoa	Small predatory marine animals, some are colonial and can form large colonies of individual animals.
ICES Statistical Rectangles	Defined areas, 1 degree longitude x 0.5 degree latitude equalling approximately 30 x 30 NM used for fisheries statistics.
Impact	Change that is caused by an action, e.g., land clearing (action) during construction which results in habitat loss (impact).
Inter-related Effects	Multiple effects on the same receptor as a result of the Transmission Assets. These occur when a series of the same effect acts on a receptor over time to produce a potential additive effect or where a number of separate effects, such as noise and habitat loss, affect a single receptor.
Landfall	The area in which the offshore export cables make landfall (come on shore) and the transitional area between the offshore cabling and the onshore cabling.
Landings	Quantitative description of amount of fish returned to port for sale, in terms of value or weight.
Local Planning Authority (LPA)	The local government body (e.g. Borough Council, District Council, etc.) that are responsible for determining planning applications within a specific area, empowered by law and legislation.
Local Geodiversity Site (LGS)	Local Geodiversity Sites are the most important places for geology and geomorphology outside statutorily protected land such as Sites of Special Scientific Interest (SSSI).
Magnetometer	A device that measures magnetic fields.
Marine Guidance Note (MGN)	A system of guidance notes issued by the Maritime and Coastguard Agency (MCA) which provide significant advice relating to the improvement of the safety of shipping and of life at sea, and to prevent or minimise pollution from shipping.
Mean Annual Significant Wave Height	A measure of wave height, it is the average height of the highest third of waves over a typical year.
Metocean Buoy	Buoy that is deployed in the ocean that measure wave, current and sea surface wind speeds.
Main Rivers	The term used to describe a watercourse in respect of which the Environment Agency has permissive powers in relation to its management.
Mean High Water Springs (MHWS)	The height of mean high water during spring tides in a year.
Mean Low Water Springs (MLWS)	The height of mean low water during spring tides in a year.
Method Statements	A document that describes how a particular task or action should be undertaken correctly.
Morgan and Morecambe Offshore Wind Farms: Transmission Assets	The transmission assets for the Morgan Offshore Wind Project and the Morecambe Offshore Windfarm. This includes the offshore substation platforms[1], interconnector cables, Morgan offshore booster station, offshore export cables, landfall site, onshore export cables, onshore substations, 400kV cables and associated grid connection infrastructure such as circuit breaker compounds. Also referred to in this report as the Transmission Assets, for ease of reading.
Morecambe OWL	Morecambe Offshore Windfarm Limited is a joint venture between Cobra Instalaciones y Servicios, S.A. (Cobra) and Flotation Energy Ltd
Morgan OWL	Morgan Offshore Wind Limited is a joint venture between bp and Energie Baden-Württemberg AG (EnBW)
Offshore booster station	A fixed structure located along the offshore export cables, containing electrical equipment to ensure bulk wind farm capacity can be fully transmitted to the onshore substations.
Offshore export cables	The cables which would bring electricity from the offshore substation platform to the landfall.
Offshore substation platform(s) (OSPs)	A fixed structure located within the wind farm sites, containing electrical equipment to aggregate the power from the wind turbine generators and convert it into a more suitable form for export to shore [1]
Onshore export cables	The cables which would bring electricity from landfall to the onshore substations.

Term	Meaning
Ordinary Watercourses	A river, stream, ditch, cut, sluice, dyke or non-public sewer that is not designated a main river and for which the Local Planning Authority has flood risk management responsibilities and powers.
Photomontages	A sequence of photographs taken from representative viewpoints which illustrate the location, size, degree of visibility or appearance of a development.
Polychaete	Marine segmented worms
Principal Aquifer	A strategically important aquifer unit, which is designated by the Environment Agency.
Reefiness	A reefiness determination is the result of an assessment of the characteristics of a reef in order to determine if a habitat is considered a reef in the specific context of the Habitats Directive. The features that contribute to the 'reefiness' of a rocky reef include (Irving, 2009): Composition (percentage cover, including patchiness) Elevation (height of the reef above the seabed level) Extent (percentage of species composed of epifaunal species)
Runoff	Runoff occurs when there is more water than land can absorb. The excess liquid flows across the surface of the land.
Scour protection	Protective materials to avoid sediment being eroded away from the base of the foundations due to the flow of water.
Secondary Aquifer	A locally important aquifer unit.
Semi-diurnal Tides	A tide cycle with two nearly equal high tides and low tides every lunar day.
Severance	Severance occurs when the presence of a large or busy road restricts people's ability or desire to move through that area.
Sound Exposure Levels	The representation of a noise event if all the energy were compressed into a one second period. This provides a uniform way to make comparisons between noise events of different durations.
Study area	For each environmental topic, the baseline environment will be characterised and the potential environmental impacts will be described within a topic-specific study area. The topic-specific study areas are defined for each topic in part 2 of this EIA Scoping Report and are based on the maximum spatial extent across which potential impacts of the Transmission Assets may be experienced by the relevant receptors (i.e. Zone of Influence).
Substation	Part of an electrical transmission and distribution system. Substations transform voltage from high to low, or the reverse by means of electrical transformers.
Toolbox Talks	A short presentation to the workforce on a single topic (e.g., health and safety, best practice).
Traffic Flows	Traffic flow describes the number of vehicles passing a reference point per unit of time (e.g., vehicles per hour).
Traffic Separation Scheme (TSS)	A traffic-management route-system ruled by the IMO. The traffic-lanes (or clearways) indicate the general direction of the vessels in that zone; vessels navigating within a TSS all sail in the same direction or they cross the lane in an angle as close to 90 degrees as possible.
Transmission Assets	See Morgan and Morecambe Offshore Wind Farms: Transmission Assets (above).
Transmission Assets Scoping Boundary	The Scoping Boundary within which all elements of the Transmission Assets will be located and used to inform this EIA Scoping Report. This area will be refined through future site selection work, with details presented in the PEIR and ES.
Triassic	A geological period of time from 252 million years ago to 201 million years ago.
Vessel Monitoring System (VMS)	A system used in commercial fishing to allow environmental and fisheries regulatory organizations to monitor, minimally, the position, time at a position, and course and speed of vessels.
Voltage	Voltage is the pressure from an electrical circuit's power source that pushes charged electrons (current) through a conducting loop.
Wirelines	A simple outline of the development included in photographs from representative viewpoints.

Acronyms

Acronym	Meaning
AADT	Annual Average Daily Traffic
AFBI	Agri-Food and Biosciences Institute
AILs	Abnormal Indivisible Loads
AIS	Automatic Identification System
ALARP	As Low as Reasonably Practicable
ALC	Agricultural Land Classification
ANIFPO	Anglo Northern Irish Fish Producers Organisation
AONB	Area of Outstanding Natural Beauty
APIS	Air Pollution Information System
APS	Annual Population Survey
AQMA	Air Quality Management Areas
ASA	Acoustic Society of America
ATC	Air Traffic Control
BAP	Biodiversity Action Plan
BEIS	Department for Business, Energy & Industrial Strategy
BGS	British Geological Survey
BODC	British Oceanographic Data Centre
BRES	Business Register and Employment Survey
BS	British Standard
BTO	British Trust for Ornithology
CAA	Civil Aviation Authority
CAP	Civil Aviation Publication
CCW	Countryside Council for Wales
CI	Confidence Intervals
CIEEM	Chartered Institute of Ecology and Environmental Management
CiFA	Chartered Institute for Archaeology
CIRIA	Construction Industry Research and Information Association
CMACS	Centre for Marine and Coastal Studies
CoCP	Code of Construction Practice
CRTN	Calculation of Road Traffic Noise
CTMP	Construction Traffic Management Plan
CV	Coefficient of Variation
DCO	Development Consent Order
Defra	Department for Environment, Food & Rural Affairs
DfT	Department for Transport
DMP	Dust Management Plan
DMRB	Design Manual for Roads and Bridges
EA	Environment Agency
EcIA	Ecological Impact Assessment
ECMWF	European Centre for Medium-range Weather Forecasting
ECoW	Ecology Clerk of Works

Acronym	Meaning
EEZ	European Economic Zone
EHO	Environmental Health Officer
EIA	Environmental Impact Assessment
EMF	Electric and Magnetic Fields
EMP	Environmental Management Plan
EnBW	Energie Baden-Württemberg AG
EPUK	Environmental Protection UK
ES	Environmental Statement
EU	European Union
FIF	Federation of Irish Fishermen
FIR	Fishing Industry Representative
FLO	Fisheries Liaison Officer
FLOWW	Fishing Liaison with Offshore Wind and Wet Renewables Group
FRA	Flood Risk Assessment
FSA	Formal Safety Assessment
GEBCO	General Bathymetric Chart of the Oceans
GEMS	Geotechnical Engineering and Marine Surveys
GES	Good Environmental Status
GCN	Great Crested Newt
GLVIA3	Guidelines for Landscape and Visual Impact Assessment: Third Edition (Landscape Institute and IEMA, 2013)
GP	General Practitioner
GSI	Geological Survey Ireland
GVA	Gross Value Added
GWD	Groundwater Directives
HDD	Horizonal Directional Drilling
HDV	Heavy Duty Vehicle
HER	Historic Environment Record
HGV	Heavy Goods Vehicle
HLC	Historic Landscape Classification
HMR	Helicopter Main Route
HRA	Habitats Regulation Assessment
HSE	Health and Safety Executive
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
ICPC	International Cable Protection Committee
ICNIRP	International Commission on Non-ionising Radiation Protection
IEF	Important Ecological Features
IEMA	Institute for Environmental Management and Assessment
IHBC	Institute of Historic Building Conservation
IMO	International Maritime Organisation

Acronym	Meaning
INFOMAR	Integrated Mapping for the Sustainable Development of Ireland's Marine Resource
INNS	Invasive Non-native Species
ISAA	Information to Support Appropriate Assessment
ISEFPO	Irish South and East Fish Producers Organisation
ISWFPO	Irish South and West Fish Producers Organisation
ISO	International Standard Organisation
JNCC	Joint Nature Conservation Committee
LAQM	Local Air Quality Management Technical Guidance
LDV	Light Duty Vehicle
LF	Low Frequency
LGM	Last Glacial Maximum
LIA	Local Impact Areas
LLFA	Lead Local Flood Authority
LNR	Local Nature Reserve
LRN	Local Road Network
LSE	Likely Significant Effects
LWS	Local Wildlife Sites
MAFF	Ministry of Agriculture, Fisheries and Food
MAGIC	Multi-Agency Geographic Information for the Countryside
MAIB	Marine Accident Investigation Branch
MarESA	Marine Evidence based Sensitivity Assessment
MarLIN	Marine Life Information Network
MCA	Maritime and Coastguard Agency
MCZ	Marine Conservation Zone
MDS	Maximum Design Scenario
MEDIN	Marine Environmental Data and Information Network
MGN	Marine Guidance Note
MHCLG	Ministry of Housing, Community and Local Government
MHWS	Mean High Water Springs
MLWS	Mean Low Water Springs
MMO	Marine Management Organisation
MNCR	Marine Nature Conservation Review
MNEF	Maritime Navigation Engagement Forum
MNR	Marine Nature Reserves
MOD	Ministry of Defence
MPA	Marine Protected Areas
MPCP	Marine Pollution Contingency Plan
NATS	National Air Traffic Services
NBN	National Biodiversity Network
NERC	Natural Environment and Rural Communities
NFFO	National Federation of Fishermen's Organisations
NHS	National Health Service
NIA	National Impact Area

Acronym	Meaning
NIFPO	Northern Irish Fish Producers Organisation
NIGFS	Northern Irish Ground Fish Trawl Survey
NMFS	National Marine Fisheries Service
NMRW	National Monuments Record Wales
NNR	National Nature Reserve
NOAA	National Oceanic and Atmospheric Administration
NOTAM	Notice to Airmen
NPPF	National Planning Policy Framework
NPS	National Policy Statement
NRA	Navigation Risk Assessment
NRHE	National Record of the Historic Environment
NRW	Natural Resources Wales
NTM	Notice to Mariners
NVC	National Vegetation Classification
NWIFCA	North Western Inshore Fisheries and Conservation Authority
OESEA	Offshore Energy Strategic Environmental Assessment
OGA	Oil and Gas Authority
OMP	Operational Management Plan
ONS	Office for National Statistics
OREIs	Offshore Renewable Energy Installations
OS	Ordnance Survey
OSP	Offshore Substation Platform
PCW	Phocid Carnivores in Water
PDE	Project Design Envelope
PEA	Preliminary Ecological Appraisal
PEIR	Preliminary Environmental Information Report
PELTIC	Pelagic Ecosystem in the Western English Channel and Eastern Celtic Sea
PDE	Project Design Envelope
POI	Point of Interconnection
PRoW	Public Right of Way
pSAC	Possible Special Area of Conservation
RCAHMW	Royal Commission on the Ancient and Historical Monuments of Wales
RIGS	Regionally Important Geological Site
rms	Root Mean Square
RNLI	Royal National Lifeboat Institution
RSPB	Royal Society for the Protection of Birds
RYA	Royal Yachting Association
SAC	Special Area of Conservation
SAR	Search and Rescue
SCANS	Small Cetaceans in the European Atlantic and North Seas
SCOS	Special Committee on Seals
SEL	Sound Exposure Level
SFF	Scottish Fishermen's Federation

Acronym	Meaning
SLVIA	Seascape, Landscape and Visual Impact Assessment
SMP	Soil Management Plan
SMRU	Sea Mammal Research Unit
SNCB	Statutory Nature Conservation Body
SPA	Special Protection Area
SPM	Suspended Particulate Matter
SPZ	Source Protection Zones
SRN	Strategic Road Network
SSC	Suspended Sediment Concentrations
SSSI	Site of Special Scientific Interest
SuDS	Sustainable urban Drainage Systems
SWFPA	Scottish White Fish Producers Association
SWFPO	South West Fish Producers Organisation
SWMP	Site Waste Management Plan
TCE	The Crown Estate
TSS	Traffic Separation Scheme
UK	United Kingdom
UKCP	UK Climate Projections
UKFEN	United Kingdom Fisheries Economics Network
UKHO	UK Hydrographic Office
UKOOA	United Kingdom Offshore Operators Association
UNESCO	The United Nations Educational, Scientific and Cultural Organization
UXO	Unexploded Ordnance
VHF	Very High Frequency
VMS	Vessel Monitoring System
WCSP Ltd	West Coast Sea Products Ltd
WFA	Welsh Fishermen's Association
WFD	Water Framework Directive
WFPO	Western Fish Producers Organisation
WSI	Written Scheme of Investigation
ZOI	Zone of Influence
ZTV	Zone of Theoretical Visibility

Units

Unit	Description
cm	Centimetre
SEL_{cum}	Cumulative Sound Exposure Level
dB	Decibels
°	Degrees
GHz	Gigahertz
GW	Gigawatts
kHz	Kilohertz

Unit	Description
km	Kilometres
km^2	Kilometres Squared
kV	Kilovolt
MW	Megawatt
m	Metre
m/s	Metres Per Second (Speed)
mm	Millimetre
nm	Nautical mile
%	Percentage
m^2	Square Metre

1 Introduction

1.1.1.1 Morgan Offshore Wind Limited (Morgan OWL), a joint venture between bp and Energie Baden-Württemberg AG (EnBW), is developing the Morgan Offshore Wind Project, located in the east Irish sea. The Morgan Offshore Wind Project is located 22.3km (12 nautical miles (nm)) from the Isle of Man and 36.3km (19.6nm) from the northwest coast of England (when measured from Mean High Water Springs (MHWS)). The anticipated nominal capacity of the Morgan Offshore Wind Project is 1500 Megawatts (MW).

1.1.1.2 Morecambe Offshore Windfarm Limited (Morecambe OWL), a joint venture between Cobra Instalaciones y Servicios, S.A. (Cobra) and Flotation Energy Ltd., is developing the Morecambe Offshore Windfarm. The Morecambe Offshore Windfarm is also located in the east Irish Sea approximately 28.75km (15.5nm) from the northwest coast of England (when measured from MHWS). The anticipated nominal capacity of the Morecambe Offshore Windfarm is 480MW.

1.1.1.3 Both the Morgan Offshore Wind Project and the Morecambe Offshore Windfarm have been scoped into the Pathways to 2030 workstream under the Offshore Transmission Network Review (OTNR). Under the OTNR, the National Grid Electricity System Operator is responsible for conducting a Holistic Network Design Review to assess options to improve the coordination of offshore wind generation connections and transmission networks. In July 2022, the UK Government published the Pathway to 2030 Holistic Network Design documents, which set out the approach to connecting 50GW of offshore wind to the UK electricity network (National Grid ESO, 2022). The output of this process concluded that the Morgan Offshore Wind Project and the Morecambe Offshore Windfarm should work collaboratively in connecting the wind farms to the National Grid at Penwortham, Lancashire. As described in part 1, section 3: Site selection, the developers were involved in this process and agree with this output.

1.1.1.4 The design philosophy for the transmission assets associated with the Morgan Offshore Wind Project and Morecambe Offshore Windfarm is for both projects to be electrically independent. Therefore, each wind farm project will have its own set of transmission assets (i.e., cable and substation infrastructure). The location of the infrastructure will be co-ordinated within shared offshore and onshore export cable corridors and at a shared onshore substation location as far as practicable. The location of the cable corridors and substations will subject to the outcome of ongoing site selection work and consultation.

1.1.1.5 This Environmental Impact Assessment (EIA) Scoping Report supports the Applicants' request for a Scoping Opinion from the Secretary of State for this grid connection, known as the Morgan and Morecambe Offshore Wind Farms: Transmission Assets (referred to here as the Transmission Assets for ease of reading).

1.1.1.6 This document comprises part 2 of this EIA Scoping Report and identifies the aspects of the offshore and onshore physical, biological and human environment that may be affected by the Transmission Assets and sets out the proposed scope of the EIA process for each environmental topic.

1.1.1.7 The locations of the Morgan Offshore Wind Project, Morecambe Offshore Windfarm and the National Grid point of connection at Penwortham are shown on Figure 1.1.

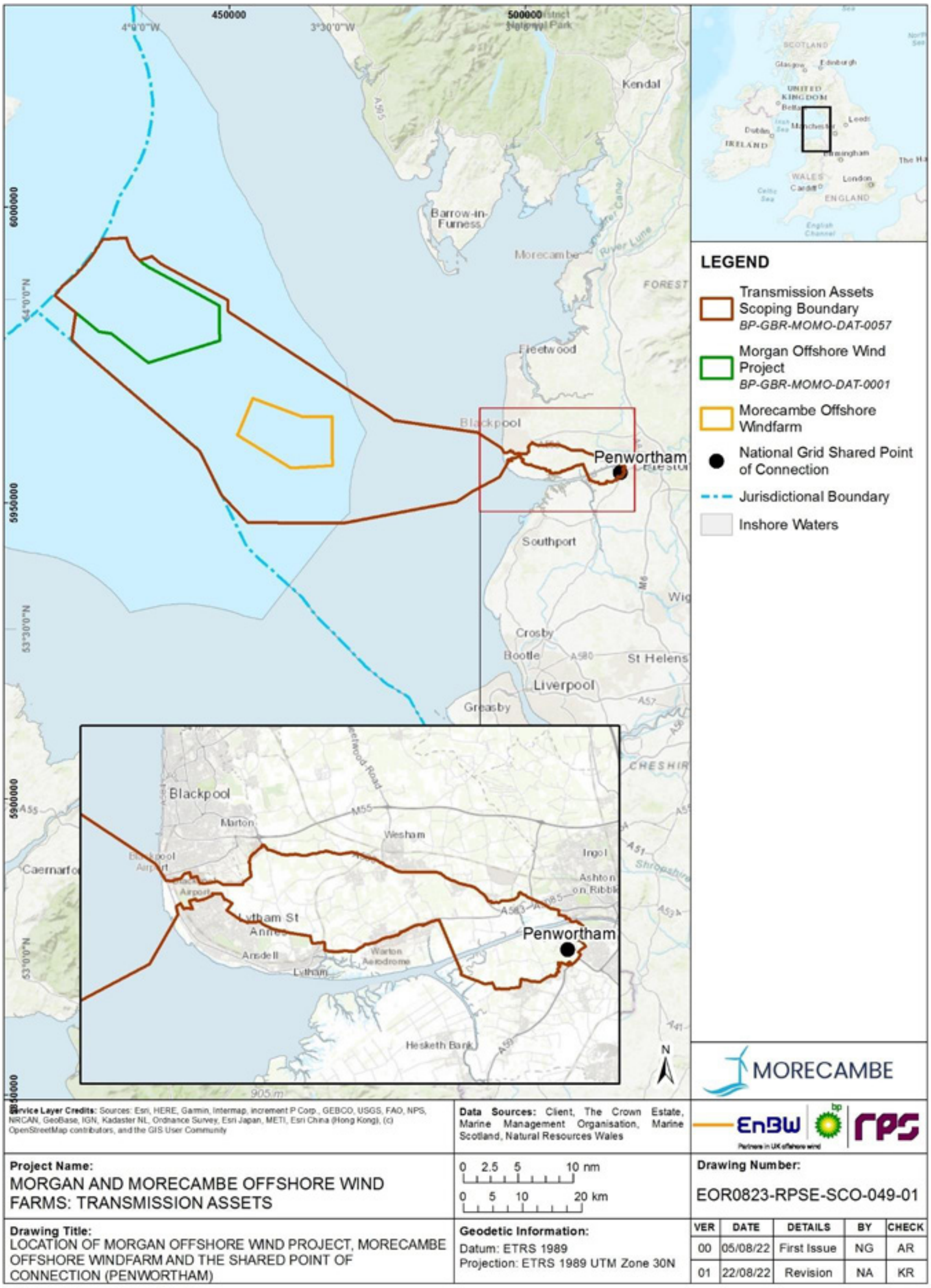


Figure 1.1: Location of Morgan Offshore Wind Project, Morecambe Offshore Windfarm and the Shared Point of Connection (Penwortham)

1.1.1.8 A description of the Transmission Assets is presented in part 1, section 4: Project description, of this EIA Scoping Report. The Transmission Assets will be located within the Transmission Assets Scoping Boundary shown on Figure 1.1. This is the area within which all elements of the Transmission Assets will be located. The boundary also includes the array areas for each of the wind farms, in order to include the locations within which the Offshore Substation Platforms (OSPs) will be located[2].

2 It is possible that all or part of the offshore substation platforms will be classed as generation assets as the Transmission Assets are refined in the future, but for the purpose of this EIA Scoping Report a precautionary approach has been taken and all infrastructure that may form part of the Transmission Assets has been included. A similar precautionary approach has been taken in scoping the generation assets for both projects.

2 Structure of this EIA Scoping Report

2.1.1.1 The structure of part 2, Transmission Assets, of this EIA Scoping Report, is set out in Table 2.1. This structure has been designed for the EIA Scoping Report only. The structure of the Preliminary Environmental Information Report (PEIR) and Environmental Statement (ES) is further described in part 1, section 5: EIA methodology, of this EIA Scoping Report.

Table 2.1: Topics considered within part 2, Transmission Assets, of the EIA Scoping Report.

Topic	Summary of Content	Section	Author
Part 2: Transmission Assets			
Section 1: Introduction			
Introduction	Introduction to the Transmission Assets considered within part 2 of the EIA Scoping Report.	Part 2, section 1	RPS
Section 2: Structure of EIA Scoping Report			
Structure of this EIA Scoping Report	Sets out the structure of this part of the EIA Scoping Report (part 2).	Part 2, section 2	RPS
Section 3: Proposed technical assessments - offshore physical environment			
Proposed scope of the assessment for impacts on the offshore physical environment			
Physical processes	Overview of the offshore physical environment (tidal elevations, currents, waves, bathymetry, geology, seabed sediments, suspended sediments and sediment transport) within the boundaries of the Transmission Assets Scoping Boundary. Supports assessment of potential impacts to the offshore physical environment from construction, operation and maintenance and decommissioning.	Part 2, section 3.1	RPS
Underwater noise	Overview of approach to the assessment of underwater noise arising from the construction, operation and maintenance and decommissioning of the Transmission Assets. Required for understanding of potential impact to underwater noise sensitive receptors such as marine mammals and fish.	Part 2, section 3.2	RPS and Seiche
Section 4: Proposed technical assessments - offshore biological environment			
Proposed scope of the assessment for impacts on the offshore biological environment			
Benthic subtidal and intertidal ecology	Overview of the ecology of the seabed within the boundaries of the Transmission Assets Scoping Boundary. Required for understanding of potential impacts to seabed ecology from construction, operation and maintenance and decommissioning.	Part 2, section 4.1	RPS
Fish and shellfish ecology	Overview of the fish and shellfish ecology of the seabed within the boundaries of the Transmission Assets Scoping Boundary. Required for understanding of potential impact to fish and shellfish ecology from construction, operation and maintenance and decommissioning.	Part 2, section 4.2	RPS
Marine mammals	Overview of the marine mammals within the vicinity of the Transmission Assets Scoping Boundary. Required for understanding of potential impacts to marine mammals from construction, operation and maintenance and decommissioning.	Part 2, section 4.3	RPS

Topic	Summary of Content	Section	Author
Offshore ornithology	Overview of the ornithology features within the vicinity of the Transmission Assets Scoping Boundary. Required for understanding of potential impacts to ornithology from construction, operation and maintenance and decommissioning.	Part 2, section 4.4	RPS
Section 5: Proposed technical assessments - offshore human environment			
Proposed scope of the assessment for impacts on the offshore human environment			
Commercial fisheries	Overview of commercial fisheries within the vicinity of the Transmission Assets Scoping Boundary. Required for understanding of potential impacts to commercial fisheries from construction, operation and maintenance and decommissioning.	Part 2, section 5.1	RPS and Marine Space
Shipping and navigation	Overview of the baseline shipping and navigation within the vicinity of the Transmission Assets Scoping Boundary. Required for understanding of potential impacts to shipping and navigation from construction, operation and maintenance and decommissioning.	Part 2, section 5.2	RPS and NASH Maritime
Marine archaeology	Overview of marine archaeology within the vicinity of the Transmission Assets Scoping Boundary. Supports understanding of impact to marine archaeology from construction, operation and maintenance and decommissioning.	Part 2, section 5.3	RPS
Other sea users	Overview of other sea users within the vicinity of the Transmission Assets Scoping Boundary. Required for understanding of potential impacts to other sea users from construction, operation and maintenance and decommissioning.	Part 2, section 5.4	RPS
Section 6: Proposed technical assessments – onshore physical environment			
Proposed scope of the assessment for impacts on the onshore physical environment			
Geology and ground conditions	Overview of geology and ground conditions within the Transmission Assets Scoping Boundary. Required for understanding of potential impacts to geology and ground conditions from construction, operation and maintenance and decommissioning.	Part 2, section 6.1	RPS
Hydrology and flood risk	Overview of hydrology and flood risk within the Transmission Assets Scoping Boundary. Required for understanding of potential impacts to hydrology and flood risk from construction, operation and maintenance and decommissioning.	Part 2, section 6.2	RPS
Section 7: Proposed technical assessments - onshore biological environment			
Proposed scope of the assessment for impacts on the onshore biological environment			
Terrestrial ecology and ornithology (intertidal and onshore)	Overview of terrestrial ecology and ornithology (intertidal and onshore) within the vicinity of the Transmission Assets Scoping Boundary. Required for understanding of potential impacts to terrestrial ecology and ornithology (intertidal and onshore) from construction, operation and maintenance and decommissioning.	Part 2, section 7.1	RPS
Section 8: Proposed technical assessments – onshore human environment			
Proposed scope of the assessment for impacts on the onshore human environment			

Topic	Summary of Content	Section	Author
Historic environment	Overview of historic environment within the Transmission Assets Scoping Boundary. Required for understanding of potential impacts to historic environment from construction, operation and maintenance and decommissioning.	Part 2, section 8.1	RPS
Land use and recreation	Overview of land use and recreation within the vicinity of the Transmission Assets Scoping Boundary. Required for understanding of potential impacts to land use and recreation from construction, operation and maintenance and decommissioning.	Part 2, section 8.2	RPS
Traffic and transport	Overview of traffic and transport within the Transmission Assets Scoping Boundary. Required for understanding of potential impacts to traffic and transport from construction, operation and maintenance and decommissioning.	Part 2, section 8.3	RPS
Noise and vibration	Overview of potential impacts of noise and vibration arising from the Transmission Assets from construction, operation and maintenance and decommissioning.	Part 2, section 8.4	RPS
Air quality	Overview of air quality within the Transmission Assets Scoping Boundary. Required for understanding of potential impacts to air quality from construction, operation and maintenance and decommissioning.	Part 2, section 8.5	RPS
Section 9: Proposed technical assessments – impacts on the onshore and offshore environment			
Proposed scope of the assessment for topics where effects may occur on the onshore and offshore environment			
Seascape, landscape and visual resources	Overview of seascape, landscape and visual resources within the vicinity of the Transmission Assets Scoping Boundary. Required for understanding of potential impacts to seascape, landscape and visual resources from construction, operation and maintenance and decommissioning.	Part 2, section 9.1	RPS
Socio-economics and community	Overview of socio-economics and community within the vicinity of the Transmission Assets Scoping Boundary. Required for understanding of potential impacts to socio-economics and community from construction, operation and maintenance and decommissioning.	Part 2, section 9.2	RPS and Hardisty Jones
Aviation and radar	Overview of aviation and radar receptors within the vicinity of the Transmission Assets Scoping Boundary. Required for understanding of potential impacts to aviation and radar from construction, operation and maintenance and decommissioning.	Part 2, section 9.3	RPS and Osprey
Climate change	Overview of climate change receptors for the Transmission Assets. Required for understanding of potential impacts of the Transmission Assets on the climate during construction, operation and maintenance and decommissioning and the vulnerability of the Transmission Assets to future climate change.	Part 2, section 9.4	RPS
Section 10: Proposed scope of assessment – supporting technical information			
Topics with supporting information	Overview of topics of relevance to the Transmission Assets where a technical appendix only will be	Part 2, section 10.2	RPS

Topic	Summary of Content	Section	Author
	provided to support the relevant technical chapters of the ES.		
Topics covered elsewhere in the ES	Overview of topics of relevance to the Transmission Assets that will be covered in other technical chapters of the ES and are not proposed to be subject to standalone chapters or appendices within the ES.	Part 2, section 10.3	RPS
Section 11: Topics to be scoped out			
Topics proposed to be scoped out	Justification for scoping out relevant topics for the Transmission Assets.	Part 2, section 11	RPS
Section 12: Summary			
Summary	Presents a summary of the potential impacts which are proposed to be scoped into and out of the EIA process, relevant to the Transmission Assets.	Part 2, section 12	RPS

3 Proposed technical assessments - offshore physical environment

3.1 Physical processes

3.1.1 Introduction

3.1.1.1 This section of the EIA Scoping Report identifies the receptors relevant to the assessment of physical processes for the Transmission Assets. It also considers the potential impacts arising from the construction, operation and maintenance, and decommissioning of the Transmission Assets and identifies the proposed scope of, and methodology for, the EIA process for physical processes.

3.1.1.2 For the purposes of scoping and the EIA process, the following elements are included within the definition of physical processes:

- Bathymetry.
- Waves.
- Tidal elevations and currents.
- Seabed geology.
- Seabed substrate.
- Suspended sediments.
- Sediment transport.

3.1.1.3 The parameters listed above are collectively referred to as ‘physical processes’ though the remainder of this EIA Scoping Report.

3.1.2 Study area

3.1.2.1 The Transmission Assets Scoping Boundary is defined as the area encompassing the offshore elements of the Transmission Assets. The Transmission Assets physical processes study area is taken as the Transmission Assets Scoping Boundary plus a buffer of one spring tidal excursion (see Figure 3.1). This defines a physical processes study area which extends between 9.1km (to the southwest) and 2.9km (to the south) from the Transmission Assets Scoping Boundary. This is the predicted physical processes Zone of Influence (ZOI) for the Transmission Assets, i.e., the maximum distance suspended sediments would travel from the Transmission Assets Scoping Boundary in one tidal cycle prior to deposition on slack water (ABPmer, 2018). The study area, and therefore ZOI, may be refined once the design of the Transmission Assets has been refined (to be based on the footprint of the Transmission Assets plus one spring tidal excursion, for example).

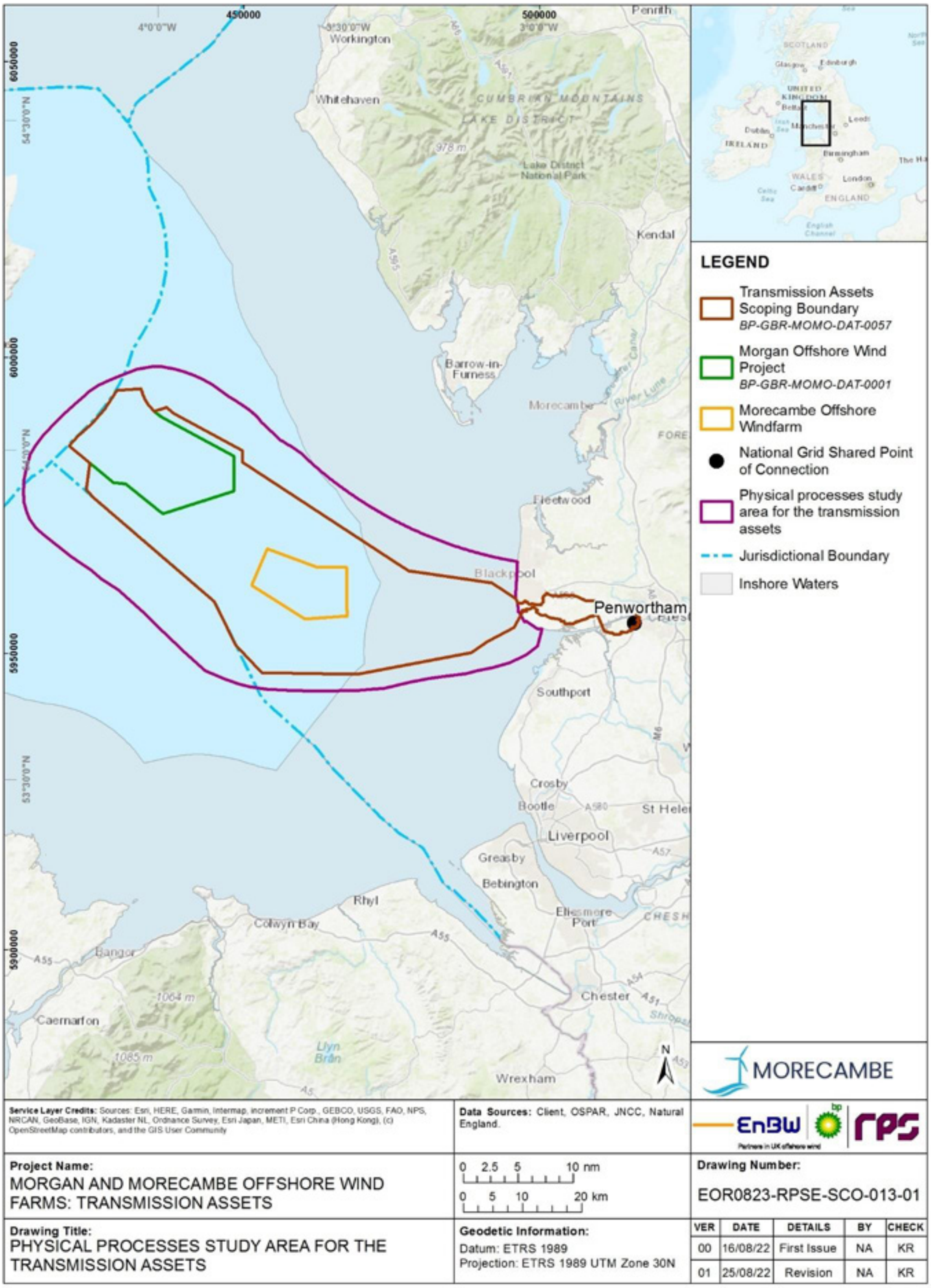


Figure 3.1: The Transmission Assets physical processes study area.

3.1.3 Data sources

Desktop data

3.1.3.1 An initial desk-based review of literature and data sources to support this EIA Scoping Report has identified a number of sources which provide coverage of the physical processes study area. These are summarised in Table 3.1.

Table 3.1: Summary of key desktop datasets and reports – physical processes.

Title	Source	Year	Author
Awel y Môr Offshore Wind Farm. Category 6: Environmental Statement	Awel y Môr Offshore Wind Farm Ltd.	2022	RWE Renewables UK
European Marine Observation and Data Network (EMODnet) – Seabed classification	https://www.emodnet-geology.eu/	2022	EMODnet
European Marine Observation and Data Network (EMODnet) – Bathymetry data	https://www.emodnet-bathymetry.eu/	2022	EMODnet
European Marine Observation and Data Network (EMODnet) – Metocean data	https://map.emodnet-physics.eu/	2022	EMODnet
Department for Environment Food and Rural Affairs – Bathymetry data	https://environment.data.gov.uk/DefraDataDownload	2022	DEFRA
The Environment Agency National LiDAR Programme	National LIDAR Programme - data.gov.uk	2022	Environment Agency
National Oceanic and Atmospheric Administration (NOAA) –Atmospheric data	DHI Metocean Data Portal	2022	NOAA
National Network of Regional Coastal Monitoring Programmes	https://coastalmonitoring.org/cco/	2022	Coastal Channel Observatory
Centre for Environment, Fisheries and Aquaculture Science (CEFAS) – wave data	https://wavenet.cefas.co.uk/map	2022	CEFAS
ABPmer Data explorer	https://www.seastates.net/explore-data/	2022	ABPmer
Hydrography of the Irish Sea, SEA6 Technical Report	UK Government	2005	Howarth M.J.
Atlas of UK Marine Renewable Energy Resources	https://www.renewables-atlas.info/	2022	ABPmer
Geology of the seabed and shallow subsurface: The Irish Sea.	British Geological Survey	2015	Mellett *et al*.
British Geological Survey (BGS)– sediment sample data	https://mapapps2.bgs.ac.uk/geoindex_offshore	2022	BGS
Suspended Sediment Climatologies around the UK.	Department for Business, Energy & Industrial Strategy (BEIS)	2016	Cefas
Metocean Data collection for the Ormonde offshore wind project.	Marine Data Exchange	2011	Geotechnical Engineering and Marine Surveys (GEMS)
Irish Sea Zone Hydrodynamic measurment campaign	Marine Data Exchange	2010 to 2013	EMU Ltd (now Fugro Ltd)
Admiralty Tide Tables	United Kingdom Hydrographic Office (UKHO)	2022	UKHO

Title	Source	Year	Author
Marine Environmental Data Information Network (MEDIN) Seabed Mapping Programme	Admiralty Marine Data Portal	2022	MEDIN
Long term wind and wave datasets	European Centre for Medium-range Weather Forecast (ECMWF)	2022	ECMWF
UK tide gauge network and database of current observation	British Oceanographic Data Centre (BODC)	2021	BODC
UK Climate Projections (UKCP)	Met Office	2018	Met Office
A user-friendly database of coastal flooding in the UK from 1915-2014	Scientific Data (journal)	2015	Haigh *et al.*
British Oceanographic Data Centre	National Oceanography Centre	various	National Oceanography Centre
Review of aggregate dredging off the Welsh coast	HR Wallingford	2016	HR Wallingford
Designated sites - Special Protection Areas (SPAs) and Special Areas of Conservation (SACs)	JNCC mapping data (https://jncc.gov.uk/mpa-mapper/)	2022	JNCC
Designated sites - Sites of Special Scientific Interest ((SSSIs)	Defra Spatial Data Download	2022	DEFRA
Designated Ramsar sites	Map (ramsar.org)	2022	Ramsar

Site specific survey data

3.1.3.2 To support the acquisition of physical processes data, surveys were carried out across 2021 and spring/summer 2022 which include:

- Geophysical surveys across two refined areas within the Transmission Assets Scoping Boundary. The aims of these surveys include:
  - Bathymetric data to determine site topography, gradients and to define a baseline to inform foundation design and cable installation using multibeam echo sounder.
  - High-resolution sidescan sonar data to determine seabed features and the presence of boulders, seabed sediments and debris.
  - High-resolution sub-bottom profiler data to determine the shallow sub-surface soil conditions that may influence foundation design and cable installation such as boulders and shallow geology features.
  - Multichannel 2D ultra-high resolution seismic data to inform infrastructure foundation depth to determine the deeper sub-surface soil conditions.
- Subtidal benthic ecology surveys across two refined areas within the Transmission Assets Scoping Boundary to provide an overview of the seabed sediment composition to support the characterisation of the subtidal environment, including grab sampling and drop-down video/stills footage.
- A metocean buoy deployed within the northwest extent of the Transmission Assets Scoping Boundary, the data collected from which will inform the assessment.

- A phase 1 intertidal walkover survey at the selected landfall location (a refined area within the intertidal section of the Transmission Assets Scoping Boundary). The survey will provide an overview of the nature of the foreshore area, including a review of sediments, evidence of erosion/deposition or littoral sediment transport and any defence assets present, and photographs have been gathered to support the characterisation of the landfall area.

3.1.4 Baseline environment

Bathymetry

3.1.4.1 The bathymetry of the physical processes study area is relatively consistent. Depths vary from 26m to 50m relative to Lowest Astronomical Tide up to 45km from the coast. Depths then gradually decrease towards the landfall site (see Figure 3.2) (EMODnet, 2020).

Waves

3.1.4.2 Waves in the Irish Sea are highest to the southwest of the Isle of Man, with the highest mean annual significant wave height of 1.39m recorded between the Isle of Man and Anglesey. Significant wave height is reduced closer to the coast, with the lowest significant wave height of 0.73m recorded to the west of the Dee Estuary (ABPmer, 2008).

3.1.4.3 Mean annual wave height in the physical processes study area ranges from 0.5m near the coast to 1.3m at the northwest extent. Over 40% of the waves near the physical processes study area arise from the southwest with all significant wave heights (>4m) arriving from the southwest or west. Near the coast, over 40% of the waves arise from the west with significant waves not typically reaching over 2m (ABPmer, 2018).

3.1.4.4 Metocean buoys were deployed for the Ormonde offshore wind project in 2010, to the east of the Transmission Assets physical processes study area. Waves in this survey were recorded with a dominant direction from the southwest, with the majority of the waves originating from the open sea. Significant wave heights ranged from 0.06m to 5.95m, with a maximum wave height of 14.22m recorded in November 2010 (GEMS, 2011).

3.1.4.5 Metocean buoys were deployed in 2010 to monitor the hydrodynamic conditions within the proposed Round 3 Irish Sea Offshore Wind Farm Development Zone. The campaign recorded significant wave heights of over 6m in October, November and December, with the maximum wave height recorded at 9.8m. The most commonly occurring wave direction was from the southwest (EMU, 2013).

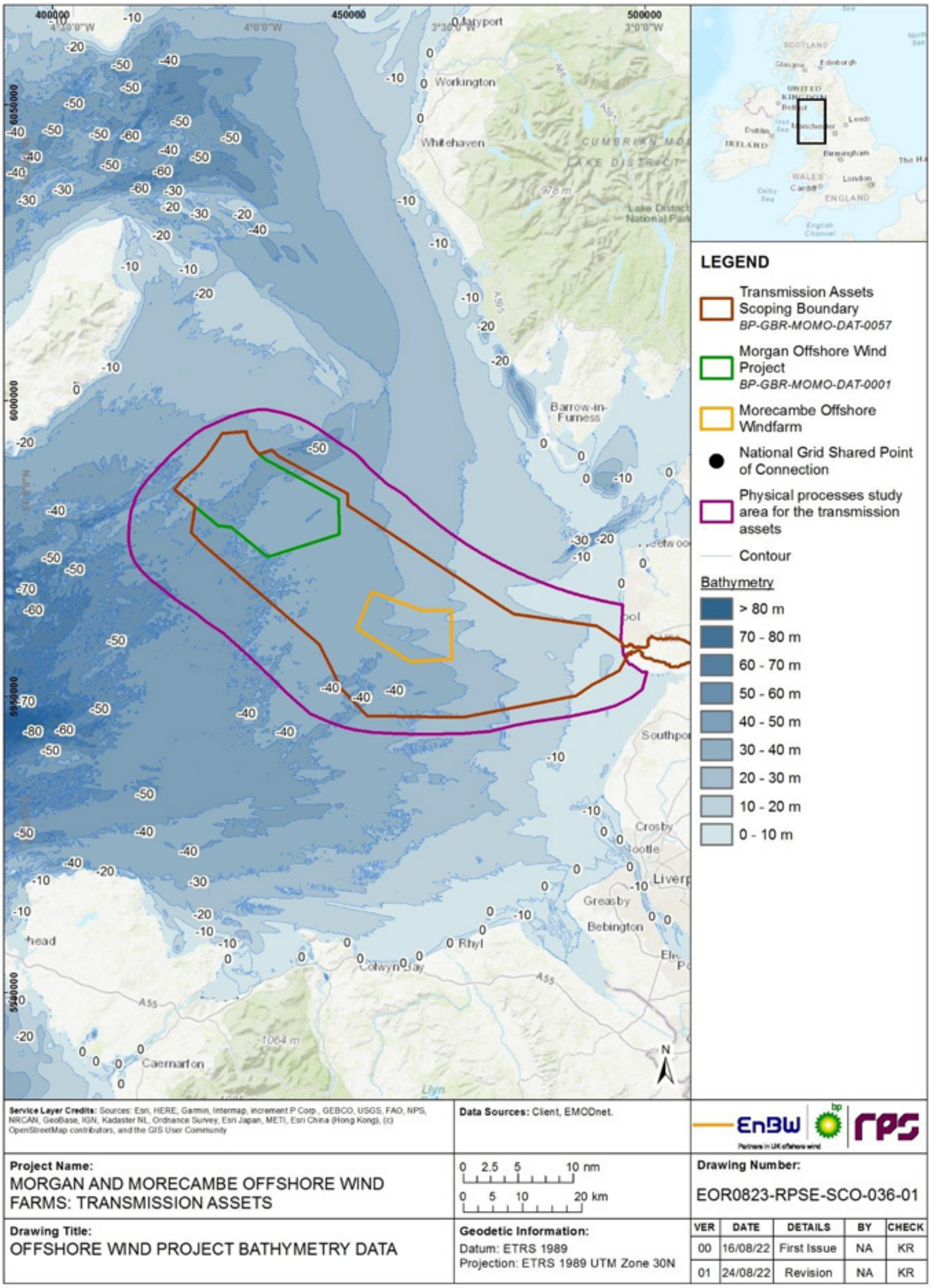


Figure 3.2: The Transmission Assets physical processes study area with bathymetry data (EMODnet, 2020).

3.1.4.6 A detailed baseline will be presented within the physical processes chapter of the PEIR and ES, which will provide an overview of the wave regime within the region and in the physical processes study area for the Transmission Assets, utilising data collected from the deployed metocean buoys.

Tidal currents and elevation

3.1.4.7 An understanding of tidal currents in the physical processes study area provides an insight into the patterns and rates of naturally occurring sediment transport. Currents are primarily driven by tides with a residual component generally dominated by storm driven currents (Ramsay and Brampton, 2000).

3.1.4.8 Semi-diurnal tides are the dominant physical process in the Irish Sea moving into the Irish Sea from the Atlantic Ocean through both the North Channel and St. George's Channel. The tidal range in the Irish Sea is highly variable with the range in Liverpool Bay exceeding 10m on the largest spring tides, the second largest in Britain. Mean tidal elevation over the Irish Sea is highest around the English Coast with average tidal elevations of 3m (m^2 tidal elevation amplitude in metres). Tidal elevation decreases out to the Isle of Man, with average tidal elevations of between 2m and 3m over the physical processes study area (Howarth, 2005).

3.1.4.9 Tidal currents in the Irish Sea are strongest around the north of Anglesey with a mean spring peak flow of 2.8m/s. Tidal currents in the Irish Sea are also strong between the Isle of Man and Scotland with a mean spring peak flow of 2m/s. Tidal currents within the physical processes study area are lower, with a mean spring peak flow of between 0.9m/s and 0.3m/s. Tidal currents range from the fastest currents in the west to the slowest currents in the east within the physical processes study area at the coast (ABPmer, 2008).

3.1.4.10 The Ormonde offshore wind project metocean buoys deployed near the coast, to the east of the physical processes study area, recorded a maximum current speed of 0.85m/s in March 2011 with an average speed of 0.30m/s. The major current axis flowed in an east/northwest direction (GEMS, 2011).

3.1.4.11 Metocean buoys deployed in 2010 to monitor the hydrodynamic conditions within the proposed Round 3 Irish Sea Offshore Wind Farm Development Zone observed a maximum tidal range of 8.71m. The minimum tidal range observed was 6.40m. The tidal current direction varied across the zone, with the greatest differences occurring from the southwest of the zone with an observed depth averaged flood and ebb bearing of 56°/236°, to the southeast corner of the zone with a depth averaged flood bearing of 102°/282°. The maximum current speed recorded was 1.7m/s (EMU, 2013).

Seabed geology

3.1.4.12 Information on the geology of the physical processes study area provides an understanding of the origin and stability of the seabed, and the geology that will be encountered during the installation of Transmission Assets.

3.1.4.13 The predominant bedrock lithologies in the region are Triassic and Carboniferous sandstone and mudstone (Mellett *et al*., 2015). The bedrock is covered by sediments of Quaternary age (<2.6 million years old) over much of the Irish Sea area, with only small areas of exposed bedrock.

Quaternary sediment thickness exceeds 50m in the east and west Irish Sea. Quaternary sediment thickness is generally <20m in the central Irish Sea although relict glacial valleys can cause it to increase to >100m over a short distance (Mellett *et al.,* 2015). The uppermost surface of the bedrock underlying the Quaternary sediment has potentially been weathered during the last glacial period and may be weaker than the underlying rock (Mellett *et al.,* 2015).

Seabed substrate

3.1.4.14 Bedforms show a high degree of variability in the Irish Sea and can range from very small ripples (5cm high) to very large sediment waves (>10m high). The largest are found to the west of the Isle of Man and Anglesey however, there are several bedform banks in the central Irish Sea, forming a boundary between the east Irish mud belt and the central gravel belt (Mellett *et al*., 2015).

3.1.4.15 Seabed sediments are subdivided into regions of soft mud-rich sediment (clay and silt) in the east and west Irish Sea and a central gravel belt comprising coarse sand and gravel. Small areas of bedrock outcrop at the seabed have also been recorded. The Transmission Assets Scoping Boundary sits within the central Irish Sea gravel belt (Mellett *et al*., 2015).

3.1.4.16 Seabed sediments within the physical processes study area are dominated by circalittoral sand, circalittoral sand mud, circalittoral mud and circalittoral coarse sediment with circalittoral muddy sand near the coast (EMODnet, 2019). Further detail on the seabed substrate is presented in part 2, section 4.1 of this EIA Scoping Report.

Sediment transport and suspended sediment

3.1.4.17 The Cefas Climatology Report 2016 (Cefas, 2016) provides the spatial distribution of average non-algal Suspended Particulate Matter (SPM) for the majority of the UK continental shelf. Between 1998 and 2005, the greatest plumes were associated with large rivers such as the Thames Estuary, the Wash and Liverpool Bay, which showed mean values of SPM above 30mg/l. Based on the data provided within this study, the SPM within the physical processes study area has been estimated as approximately 2mg/l to 10mg/l over the 1998 to 2005 period. Higher levels of SPM are experienced more commonly in the winter months; however, due to the tidal influence, even during summer months the levels remain elevated.

3.1.4.18 The principal mechanisms governing suspended sediment concentrations (SSC) in the water column are tidal currents, with fluctuations observed across the spring-neap cycle and across the different tidal stages (high water, peak ebb, low water, peak flood) observed throughout both datasets. It is important to note that SSCs can also be temporarily elevated by wave driven currents during storm events. During high-energy storm events, levels of SSC can rise significantly, both near bed and extending into the water column. Following storm events, SSC levels will gradually decrease to baseline levels, regulated by the ambient regional tidal regimes. The seasonal nature and frequency of storm events supports a broadly seasonal pattern for SSC levels.

3.1.4.19 Sediments in the Irish Sea have been reported, on average, to experience mobilisation 35% of the time during a year (Coughlan *et al*., 2021). Sediments in the east Irish Sea have been reported to experience 5-95% sediment mobility with the highest mobility around Morecambe Bay, Solway Firth and around the north coast of Anglesey (Coughlan *et al*., 2021). The 2012 report commissioned by Celtic Array as part of the Zonal Appraisal and Planning process reported that in the east Irish Sea, sediment suspension and transport are mainly driven by tidal currents. Sediment transport was reported to be of a net northeasterly and easterly transport pathway into Liverpool Bay (Celtic Array Ltd., 2014).

3.1.4.20 Metocean buoys were deployed in 2010 to monitor the hydrodynamic conditions within the proposed Round 3 Irish Sea Offshore Wind Farm Development Zone. Mean SSC near the seabed ranged from 4.3mg/l to 23.6mg/l. Maximum SSC were recorded at 48mg/l (EMU, 2013). Mean SSC in the water column ranged from 1.6mg/l to 55.8mg/l (EMU, 2013).

Designated sites

3.1.4.21 The identification of sites designated for their conservation value for inclusion in the assessment for physical processes has included:

- Sites with relevant qualifying features which overlap with the physical processes study area were screened in for further assessment.
- Sites with relevant qualifying features, which are located within the likely ZOI have been screened in for further assessment. The likely ZOI (and Transmission Assets physical processes study area) has been determined through a review of the potential impacts associated with the Transmission Assets. This ensures that all designated sites and their features potentially affected by changes in increased suspended sediment concentrations and potential changes to the hydrodynamic regime are included in the physical processes assessment.

3.1.4.22 The relevant designated sites which have been screened in for consideration in the EIA process for physical processes include European and National Site Network sites (i.e., SACs, Ramsar sites) and nationally designated sites (i.e., SSSIs, MCZs. See Table 3.2, Figure 3.3). The West of Walney Marine Conservation Zone (MCZ), West of Copeland MCZ, Fylde MCZ, the Lytham St. Annes Dunes Site of Special Scientific Interest (SSSI), Shell Flat and Lune Deep Special Area of Conservation (SAC) and Ribble and Alt Estuaries Ramsar site overlap with the physical processes study area.

3.1.4.23 Information to support a full screening of European and National Site Network sites with qualifying physical processes interest features will be provided in the Habitats Regulations Assessment (HRA) Screening Report. Relevant features screened in will be fully considered and assessed in the physical processes chapter for the PEIR and ES, with the information to support the assessment on international sites and features provided as Information to Support the Appropriate Assessment (ISAA). A preliminary screening of relevant Marine MCZs has been included in part 3, Annex C: MCZ Screening of this EIA Scoping Report.

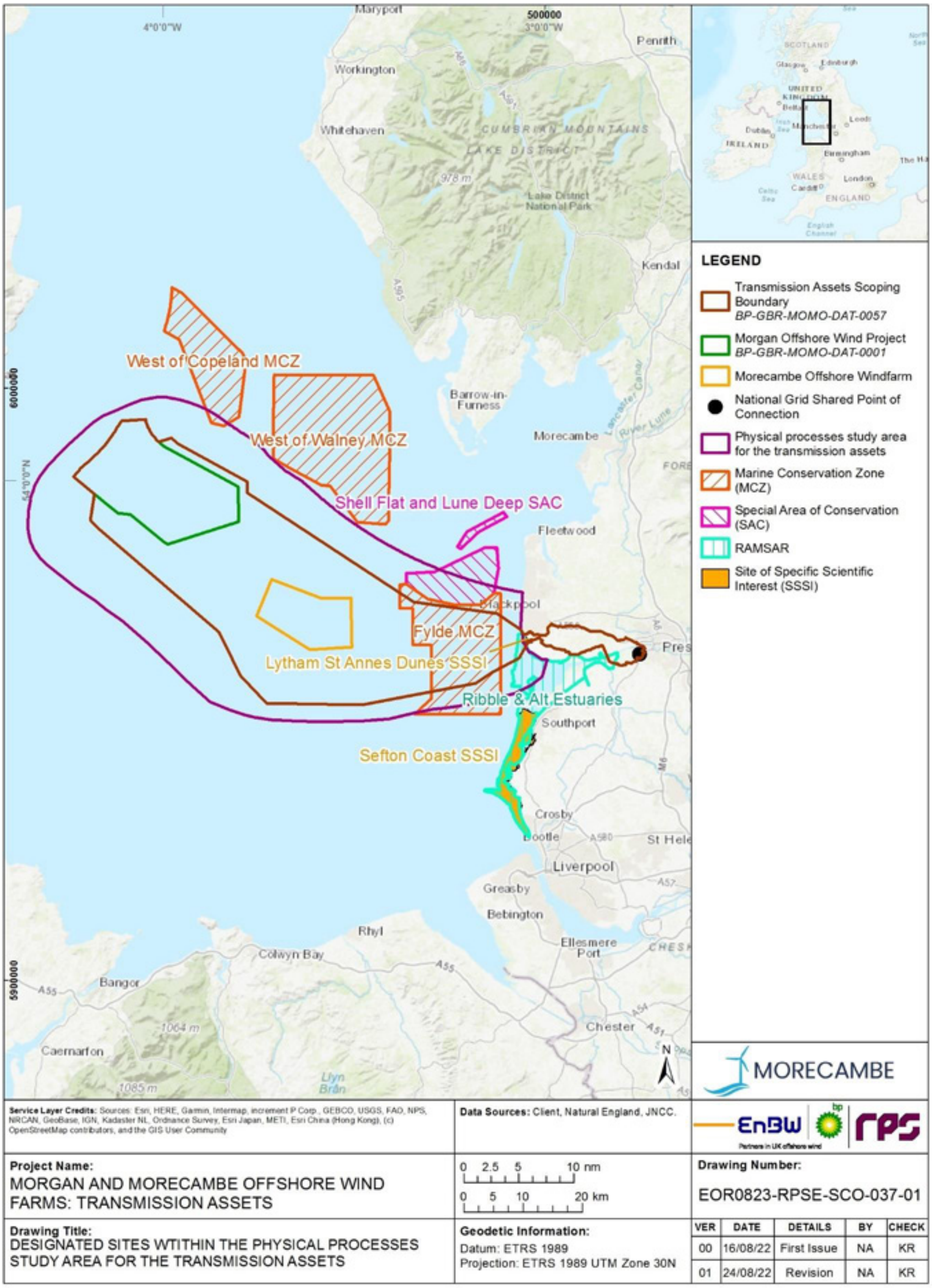


Figure 3.3: Sites designated for their nature conservation value (with features of relevance to physical processes) which overlap with the Transmission Assets physical processes study area.

Table 3.2: Summary of designated sites with relevant physical processes features within the Transmission Assets physical processes study area.

Designated Site	Distance to the Transmission Assets Scoping Boundary (km)	Features
Ribble and Alt Estuaries Ramsar site	0	Tidal flats
Fylde MCZ	0	Subtidal sand Subtidal mud
Lytham St. Annes Dunes SSSI	0	Sand dunes
Shell Flat and Lune Deep SAC	0.4	Sandbanks which are slightly covered by sea water all the time Reef
West of Copeland MCZ	5.8	Subtidal coarse sediment Subtidal sand Subtidal mixed sediment
West of Walney MCZ	5.8	Subtidal sand Subtidal mud Seapen and burrowing megafauna communities
Sefton Coast SSSI	7.9	Intertidal mud Sandflats

Future baseline conditions

3.1.4.24 The EIA process will consider the existing baseline conditions within the study area, and future baseline conditions (as far as reasonably practicable) in accordance with the methodology set out in part 1, section 5 (see section 5.7.2 for the approach to consideration of future baseline conditions).

3.1.5 Potential project impacts

3.1.5.1 A range of potential impacts on physical processes have been identified which may occur during the construction, operation and maintenance, and decommissioning phases of the Transmission Assets.

3.1.5.2 The impacts that have been scoped into the assessment are outlined in Table 3.3 together with a description of any additional data collection (e.g., site-specific surveys) and supporting analyses (e.g., literature review and existing modelling studies from relevant offshore wind farm projects) that will be required to enable a full assessment of the impacts.

3.1.5.3 Potential impacts scoped out of the assessment are presented in Table 3.4, with justification.

Table 3.3: Impacts proposed to be scoped into the project assessment for physical processes (project phase refers to construction (C), operation and maintenance (O) and decommissioning (D)).

Impact	Project phase			Justification	Data collection and analysis required to characterise the baseline environment	Summary of proposed approach to assessment
	C	O	D			
Increase in suspended sediments due to construction, operation and maintenance and/or decommissioning related activities, and the potential impact to physical features.	✓	✓	✓	There is potential for increased suspended sediment consentraitons (SSCs) and deposition associated with seabed preparation activities, foundation installation and cable installation activities, from maintenance activities such as export cable repairs and deposition associated with decommissioning activities.	Data to be collected during the geophysical and benthic ecology site-specific survey campaigns will be used to characterise the seabed and provide information on bedforms and sediment charaterisics to determine impacts on seabed features and potential transport of disturbed material. Data collected from the metocean buoys will also be utilised. A detailed desktop data review will be undertaken to gather other relevant data which will support the assessment. An overview of this is presented in part 2, section 3.1.3 of this EIA Scoping Report.	Existing numerical modelling will be used to provide an overview of the potential impacts to physical processes relating to the various activities of the Transmission Assets. This assessment will consider the potential impacts arising due to changes in SSC and deposition on physical processes and sediment transport. Elevations in SSC and subsequent deposition of disturbed sediments also have the potential to result in adverse and indirect impacts on receptors for other offshore topics, such as benthic subtidal and intertidal ecology, fish and shellfish ecology, marine mammals, marine archaeology and infrastructure and other users. For these receptor groups significance of effect for direct and indirect impacts will not be assigned within the physical processes assessment (but will rather be set out in the relevant topic chapter).
Impacts to the wave regime due to presence of infrastructure and the associated potential impacts along adjacent shorelines.	✓	✓	✓	The interaction of the OSPs and Morgan offshore booster station foundations and associated infrastructure with the wave regime has the potential to impact upon adjacent physical coastal features.		The potential impact of the Transmission Assets on coastal features and sediment transport will be informed by a literature review and existing numerical modelling studies undertaken in relation to relevant offshore wind farm projects. A qualitative assessment of impact on key coastal features will be presented within the physical processes assessment.
Impacts to the tidal regime due to presence of infrastructure and the associated potential impacts along adjacent shorelines.	✓	✓	✓	The interaction of the OSPs, the Morgan offshore booster station foundations and scour and cable protection with the tidal regime has the potential to impact upon adjacent		The potential impact of the Transmission Assets on coastal features and sediment transport will be informed by a literature review and existing numerical modelling studies undertaken in relation to relevant offshore wind farm projects.

Impact	Project phase			Justification	Data collection and analysis required to characterise the baseline environment	Summary of proposed approach to assessment
	C	O	D			
				physical coastal features and sediment transport.		A qualitative assessment of impact on key coastal features will be presented within the physical processes assessment.
Impacts to sediment transport and sediment transport pathways due to presence of infrastructure and associated potential impacts to physical features and bathymetry.	✓	✓	✓	Foundations and associated scour protection within the Transmission Assets Scoping Boundary may interrupt sediment transport pathways. In addition, cable protection may pose an obstacle to sediment transport pathways.		The potential impact of the Transmission Assets on sediment transport and sediment transport pathways will be informed by a literature review and existing numerical modelling studies undertaken in relation to relevant offshore wind farm projects. This assessment will be presented within the physical processes assessment.
Impacts to sediment transport and sediment pathways at the export cable landfall.	✓	✓	✓	The export cables make landfall through the intertidal zone. The construction, operation and maintenance and decommissioning of the cables and/or cable protection measures may disturb or disrupt the intertidal sediment transport.		The potential impact of the Transmission Assets on intertidal sediment transport pathways will be informed by a literature review and existing numerical modelling studies undertaken in relation to relevant offshore wind farm projects. This assessment will be presented within the physical processes assessment.

Table 3.4: Impacts proposed to be scoped out of the project assessment for physical processes.

Impact	Justification
Changes to bathymetry due to depressions left by jack-up vessels.	The potential for jack-up vessel spud-cans to affect the sediment regime has been scoped out of the assessment. Jack-up footprint depressions would be likely to only persist temporarily after jack-up operations have been completed and these would infill over time. Therefore short term changes to bathymetry would have limited impacts on tidal currents and therefore sediment transport regimes. Monitoring at the Barrow offshore wind farm showed depressions were almost entirely infilled 12 months after construction (BOWind, 2008). It is not anticipated that jack-up vessel footprints will have implications for the sediment regime.
Scour of seabed sediments during the operation and maintenance phase.	Interaction between the waves and currents and the Transmission Assets have the potential to cause localised scouring of seabed sediment. Scour protection will be a committed mitigation measure (presented in the measures adopted as part of the project section of the assessment) to prevent scour from occurring. The scour protection measures will be subject to engineering design to ensure they are fit for purpose and prevent scour from occurring. The seabed habitat disturbed/lost due to scour protection will be considered in the benthic subtidal and intertidal ecology chapter of the ES. Therefore, it is proposed that scour of seabed sediments without scour prevention measures is scoped out of the physical processes assessment whilst secondary scour potential is included within the assessment.

3.1.6 Measures adopted as part of the project

3.1.6.1 The following measures adopted as part of the project are relevant to physical processes. These measures may evolve as the engineering design and the EIA process progresses.

- Scour protection will be used around offshore structures as set out in part 1, section 4: Project Description, of this EIA Scoping Report. Note that scour protection and potential impact on benthic communities will be assessed in the benthic subtidal and intertidal ecology assessment.
- Development and adherence to a Cable Specification and Installation Plan which will include cable burial where possible and cable protection as necessary.

3.1.6.2 The requirement for and feasibility of any further mitigation requirements will be dependent on the significance of effects and will be consulted upon with statutory consultees throughout the EIA process.

3.1.7 Proposed assessment methodology

3.1.7.1 The physical processes assessment will follow the methodology set out in part 1 section 5: EIA Methodology, of this EIA Scoping Report. Specific to the physical processes ES chapter, the following guidance documents will also be considered:

- Physical processes guidance to inform EIA baseline survey, monitoring and numerical modelling requirements for major development projects with respect to marine, coastal and estuarine environments, GN041, Natural Resources Wales, Marine Programming Planning and Delivery Group (NRW, 2020)
- Guidance on Marine Baseline Ecological Assessments and Monitoring Activities for Offshore Renewable Energy Projects Parts 1 and 2, Department of the Environment, Climate and Communications, (DECC, 2018)
- Advice to Inform Development of Guidance on Marine, Coastal and Estuarine Physical Processes Numerical Modelling Assessments. NRW Report No 208, 139pp, Natural Resources Wales. (Pye *et al*., 2017)
- Guidance on Best Practice for Marine and Coastal Physical Processes Baseline Survey and Monitoring Requirements to inform EIA of Major Development Projects (Brooks *et al*., 2018).
- Guidance on EIS and NIS Preparation for Offshore Renewable Energy Projects, Department of Communications, Climate Action and Environment, (Barnes, 2017)
- Collaborative Offshore Wind Energy Research into the Environment (COWRIE) - Coastal Process Modelling for Offshore Wind farm Environmental Impact Assessment: Best Practice Guide (Lambkin *et al.,* 2009).
- Guidelines in the use of metocean data through the lifecycle of a marine renewables development (Cooper *et al*., 2008).

3.1.7.2 As the OSPs are included in both the Transmission Assets project description and the project description for the Morgan Offshore Wind Project Generation Assets and Morecambe Offshore Windfarm Generation Assets, the assessment outputs from the Generation Assets impact assessments 'magnitude of impacts' will be replicated in the Transmission Assets impact assessment and applied to the existing and future baseline of the Transmission Assets scoping area.

3.1.7.3 Numerical modelling will not be required for the Transmission Assets. The assessment will follow the approach taken for the Morecambe Offshore Windfarm Generation Assets, as agreed with the Expert Technical Group, and utilise a literature review and existing numerical modelling studies undertaken in relation to relevant offshore wind farm projects.

3.1.8 Potential cumulative effects

3.1.8.1 The predicted effects of construction, operation and maintenance, and decommissioning of the Transmission Assets on physical processes, would predominantly occur within the footprint of the Transmission Assets. However, there is potential for cumulative effects to occur on physical processes when the impacts of the Transmission Assets are considered alongside the impacts of other projects or activities, both within and outside the physical processes study area. The cumulative effects assessment will follow the approach outlined in section part 1 section 5: EIA Methodology, of this EIA Scoping Report.

3.1.8.2 Cumulative effects with the generation assets (i.e., the Morgan Offshore Wind Project and the Morecambe Offshore Windfarm) will be considered, together with cumulative effects with other Round 4 projects (such as the Mona Offshore Wind Project) and other infrastructure projects such as proposed wind farms and interconnectors, where relevant. Note that as the OSPs are included in the Transmission Assets project description and the project description for the Morgan Offshore Wind Project Generation Assets and the Morecambe Offshore Windfarm Generation Assets, some aspects of the CEA will not include the OSPs (e.g. potential impacts associated with the OSP footprint on the seabed) to prevent ‘double counting’ of potential impacts. Where OSPs are included in the CEA and where they are not will be agreed with the Evidence Plan Expert Working Group.

3.1.9 Potential inter-related effects

3.1.9.1 The assessment of potential inter-related effects will be considered within the physical processes assessment. It will include consideration of project lifetime effects and receptor-led effects, in line with the approach outlined in part 1, section 5: EIA Methodology, of this EIA Scoping Report.

3.1.10 Potential transboundary impacts

3.1.10.1 A screening of transboundary impacts has been carried out and is presented in part 3, Annex A of this EIA Scoping Report. This screening exercise identified that there is no potential for transboundary impacts upon physical processes due to construction, operation and maintenance, and decommissioning impacts of the Transmission Assets.

3.2 Underwater noise

3.2.1 Introduction

3.2.1.1 This section of the EIA Scoping Report identifies the receptors relevant to the assessment of underwater noise for the Transmission Assets. It also considers the potential impacts arising from the construction, operation and maintenance, and decommissioning of the Transmission Assets and identifies the proposed scope of, and methodology for, the EIA process for underwater noise.

3.2.1.2 Underwater noise and vibration sources arising during construction of the Transmission Assets may include piling, hammering or drilling for installation of the foundations for the OSPs and the Morgan offshore booster station. This will include the use of barges and vessels, heavy machinery and generators on the vessels.

3.2.1.3 An underwater noise study will be undertaken to provide an assessment of the level of underwater noise generated from the Transmission Assets. This will be presented in the form of a technical appendix, to support the relevant offshore chapters of the ES, including the following receptor groups:

- Fish and shellfish ecology (see part 2, section 4.2 of this EIA Scoping Report)
- Marine mammals (see part 2, section 4.3 of this EIA Scoping Report)
- Commercial fisheries (see part 2, section 5.1 of this EIA Scoping Report).

3.2.2 Study area

3.2.2.1 No separate study area has been outlined for underwater noise as this area is defined by the receptors and is set out for each of the relevant topics listed in section 3.2.1 above.

3.2.3 Data sources

Desktop data

3.2.3.1 An initial desk-based review of literature and data sources has been undertaken to support this EIA Scoping Report. This is summarised in Table 3.5.

3.2.3.2 Seabed bathymetry data will be sourced from the online General Bathymetric chart of the Oceans (GEBCO) database. GEBCO's current gridded bathymetric dataset, the GEBCO_2021 Grid, is a global terrain model for ocean and land, providing elevation data, in metres, on a 15 arc-second interval grid. Seabed sediment and geological condition data will be sourced from the Deep Sea Drilling Project and the British Geological Survey (BGS).

Table 3.5: Summary of key desktop datasets and reports – underwater noise.

Title	Source	Year	Author
Gebco database	https://www.gebco.net/data_and_products/gridded_bathymetry_data/	2021	GEBCO
Deep Sea Drilling Project	http://deepseadrilling.org/	1983-2003	Ocean drilling program
British Geological Survey	Seabed sediment data	2020	BGS
Geology of the seabed and shallow subsurface: The Irish Sea	BGS	2015	Mellett et al.

3.2.4 Baseline environment

3.2.4.1 Baseline noise levels vary significantly depending on multiple factors, such as seasonal variations and different sea states. Lack of long-term sound measurements is a widely recognised gap in knowledge in relation to general soundscape and potential effects of human activities on marine life. Understanding the baseline sound level would therefore be valuable in enabling future studies to assess long-term effects related to continuous sound levels over time in addition to activity-specific effects such as masking impacts.

3.2.4.2 Sound can be either impulsive (pulsed) such as impact piling, or non-impulsive (continuous) such as ship engines, and the magnitude of the impact on marine life will depend heavily on these characteristics. Background or 'ambient' underwater sound is created by several natural sources, such as rain, breaking waves, wind at the surface, seismic sound, biological sound and thermal sound. Biological sources include marine mammals (using sound to communicate, build up an image of their environment and detect prey and predators) as well as certain fish and shrimp. Anthropogenic sources of sound in the marine environment include fishing boats, ships (non-impulsive), marine construction noise (such as piling or dredging), subsurface (seismic) and seabed imaging surveys and leisure activities (all could be either impulsive or non-impulsive), all of which add to ambient background sound. Anthropogenic sound within the vicinity of the Transmission Assets will arise primarily from shipping, the offshore oil and gas industry, subsea geophysical and geotechnical surveys and the offshore renewables industry.

3.2.4.3 Measurements of underwater sound from the operational Ormonde windfarm were undertaken in June 2012 (Nedwell *et al*., 2012). The results reported that there was an increase in noise levels between 0 and 50kHz at a distance of 30m from individual wind turbines. The noise was continuous in nature, and the increase was detectable to a maximum range of approximately 1km. Beyond this range, the underwater sound level was consistent with the ambient underwater sound in the region (Nedwell *et al*., 2012). Shipping routes and shipping traffic are discussed in part 2, section 5.2 of this EIA Scoping Report.

Future baseline conditions

3.2.4.4 The EIA process will consider the existing baseline conditions within the study area, and future baseline conditions (as far as reasonably practicable) in accordance with the methodology set out in part 1, section 5 (see section 5.7.2 for the approach to consideration of future baseline conditions).

3.2.5 Potential project impacts

3.2.5.1 A range of potential impacts resulting from a change in underwater noise have been identified which may occur during the construction, operation and maintenance, and decommissioning of the Transmission Assets. There is the potential for underwater noise to impact sensitive ecological receptors. The potential effects on these receptors will be assessed within the relevant technical sections of the ES (marine mammals, fish and shellfish and commercial fisheries).

3.2.5.2 The impacts that have been scoped into the assessment are outlined in Table 3.6 together with a description of any additional data collection (e.g., site-specific surveys) and supporting analyses (e.g., modelling) that will be required to enable a full assessment of the impacts. Underwater noise generation during the operational and maintenance phase will only be generated by vessels and rigs associated with the Transmission Assets. Therefore, the operational and maintenance phase has been scoped out for most impacts.

3.2.5.3 Potential impacts scoped out of the assessment are presented in Table 3.7, with justification.

Table 3.6: Impacts proposed to be scoped into the project assessment for underwater noise (project phase refers to construction (C), operation and maintenance (O) and decommissioning (D)).

Impact	Project phase			Justification	Data collection and analysis required to characterise the baseline environment	Summary of proposed approach to assessment
	C	O	D			
Effects of underwater noise on marine life due to construction, operation and maintenance and decommissioning vessels and rigs.	✓	✓	✓	Although noise from vessels and rigs will be relatively low in level (e.g., compared to impact piling) and continuous in nature (rather than impulsive) there is still some residual potential for disturbance due to long-term increased traffic and use of rigs etc.	N/A	The approach used for assessing underwater noise is detailed in part 2, section 3.2.7 of this EIA Scoping Report. The results of the noise assessment outputs will be presented in a Technical Report, which will inform the Fish and shellfish ecology, Marine mammal and Commercial fisheries ES chapters.
Effects of underwater noise on marine life due to foundation installation for the OSP and Morgan offshore booster station foundations.	✓	×	×	Due to the potentially high source levels involved and impulsive nature of the sound, modelling and assessment of the proposed piling activities will be undertaken.	N/A	
Effects of underwater noise on marine life due to jacket or monopile cutting and removal.	×	×	✓	There is potential for disturbance or possibly injury from decommissioning activities, depending on the techniques utilised. It is therefore proposed to include these activities in the assessment.	N/A	
Effects of underwater noise on marine life due to clearance of unexploded ordnance (UXO) detonation.	✓	×	×	There is potential for disturbance during the construction phase due to the clearance or detonation of UXO, depending on the occurrence, size, and techniques used. It is therefore proposed to include these activities in the assessment.	N/A	
Effects of the particle motion element of underwater noise on fish and shellfish receptors.	✓	×	✓	There is potential for injury or disturbance due to particle motion. The impact of the construction and decommissioning phases is not well understood and therefore it is proposed to include both in the assessment to at least a qualitative level.	N/A	

Table 3.7: Impacts proposed to be scoped out of the project assessment for underwater noise.

Impact	Justification
Effects of the particle motion element of underwater noise on marine mammals during all phases.	There is no evidence that particle motion has any effect on marine mammals therefore this impact is scoped out of the marine mammals ES chapter.

3.2.6 Measures adopted as part of the project

3.2.6.1 Measures adopted as part of the project are discussed within each of the relevant sections of this EIA Scoping Report for which underwater noise is considered relevant (see part 2, section 4.3: Marine mammals, section 4.2: Fish and shellfish and section 5.1: Commercial fisheries of this EIA Scoping Report). Each of the proposed measures adopted as part of the project relating to reducing potential impacts on receptors from underwater noise will be modelled to assess their efficacy in a quantitative way. These measures may evolve as the engineering design and the EIA progresses.

3.2.6.2 The requirement for and feasibility of any further mitigation will be dependent on the significance of effects of underwater noise on the receptors associated with each topic and will be consulted upon with statutory consultees throughout the EIA process. Any approach to noise mitigation will be informed by best available evidence and latest guidance.

3.2.7 Proposed assessment methodology

3.2.7.1 The underwater noise assessment will follow the methodology set out in part 1, section 5: EIA Methodology of this EIA Scoping report. Specific to the underwater noise assessment, the following guidance documents will also be considered:

- Good practice guide to underwater noise measurement (NPL, 2014).
- Review of underwater acoustic propagation models (NPL) (Wang *et al*., 2014).
- National Oceanic and Atmospheric Administration (NOAA) technical guidance for assessing the effects of anthropogenic sound on marine mammal hearing.
- Underwater acoustic thresholds for onset of permanent and temporary threshold shifts (NMFS, 2018).
- Marine mammal noise exposure criteria: Updated scientific recommendations for residual hearing effects (Southall *et al*., 2019).
- Marine mammal noise exposure criteria: assessing the severity of marine mammal behavioural response to human noise (Southall *et al.*, 2021).
- Sound exposure guidelines for Fishes and Sea Turtles (Popper *et al*., 2014).
- Statutory nature conservation agency protocol for minimising the risk of injury to marine mammals from piling noise (JNCC, 2010).
- JNCC guidelines for minimising the risk of injury to marine mammals from geophysical surveys (JNCC, 2017).
- Guidance on noise management in harbour porpoise SACs (JNCC, 2020).
- The European Union (EU) Marine Strategy Framework Directive (Directive 2008/56/EC). This seeks to achieve good environmental status (GES) in Europe's seas by 2020. The qualitative descriptors for determining GES include "Introduction of energy, including underwater noise, is at levels that do not adversely affect the marine environment." This Directive was transposed into United Kingdom (UK) law by the Marine Strategy Regulations 2010.

- Department for Business, Energy and Industrial Strategy (BEIS) Policy Statement - Marine environment: unexploded ordnance clearance joint interim position statement (BEIS, 2022).

3.2.7.2 The impact criteria will be based on the most recent and up-to-date scientific research and guidance, while utilising a precautionary approach. Potential impacts arising from underwater noise on marine mammals and fish will be assessed with respect to the potential for injury and behavioural disturbance. Where possible, noise source data will be based on measured data from similar devices. Source noise levels will be based on a combination of published data, theoretical and empirical predictions, and detailed source level modelling where appropriate. Source levels of underwater noise will be based on established prediction methodologies.

3.2.7.3 It is anticipated that the underwater noise assessment will likely include:

- A review of the publicly available literature and studies on the impact of impulsive underwater noise on marine mammal and fish species, including an assessment of the sensitivity of fish and marine mammals to underwater noise, and derivation of criteria for estimating the impact to be agreed with the MMO and SNCBs.
- Estimation of the realistic design scenario for source level noise for impact piling operations within the Transmission Assets Scoping Boundary. This will include consideration of the hammer energy, hammer type, ground conditions, water depth, pile size, pile geometry, strike rate, number of strikes and other relevant parameters.
- Estimation of the maximum design scenario for source level noise for impact piling operations during construction within the Transmission Assets Scoping Boundary. This will include consideration of the hammer energy, hammer type, ground conditions, water depth, pile size, pile geometry, strike rate, number of strikes and other relevant parameters. Numerical modelling will not be required for the OSPs as it has already been included in the Morgan Offshore Wind Project Generation Assets and Morecambe Offshore Windfarm Generation Assets PEIRs, therefore the outputs of that modelling and subsequent assessments will be included in the Transmission Assets impact assessment to inform the magnitude of impact. The need for underwater sound modelling for the Morgan Offshore Booster Station will be discussed and agreed with the Transmission Assets Evidence Plan Expert Working Group.

3.2.7.4 Historically, research relating to both physiological effects and behavioural disturbance of noise on marine receptors has typically been based on determining the absolute noise level for the onset of that effect (whether presented as a single onset threshold or a dose response/probabilistic function). Consequently, the available numerical criteria for assessing the effects of noise on marine mammals, fish and shellfish, tend to be based on the absolute noise criteria, rather than the difference between the baseline noise level and the noise being assessed (Southall et al., 2007). The available research rarely takes into account other factors such as measures of impulsivity, frequency content and other characteristics which could be as (or more) important than the absolute level alone. In 2021 Southall et al. released additional guidance for the types of measurements and parameters which should be reported as part of studies into the impact of anthropogenic noise on the behaviour of marine life, however no additional quantitative guidance for the assessment of those levels were included (Southall et al., 2021). Instead, the guidance makes recommendations for additional parameters to be reported for future studies in order to ensure that better information becomes available in future in order to derive better relationships between the sound, its characteristics and the response (e.g., by investigation the exposure novelty, signal-to-noise ratio, sensation level, rise time etc.). In the meantime, assessing potential behavioural disturbance due to anthropogenic sound is a challenging topic and requires a combination of quantitative assessment (e.g., use of dose-response relationships such as those set out in Graham et al. (2017)) and qualitative considerations. The approach proposed for the assessment is described in part 3, section 4.3: Marine mammals, of this EIA Scoping Report.

3.2.7.5 The cumulative effect of multiple events/operations will also be assessed and will consider the likely exposure times of species, allowing for safe distances and reaction ranges to be determined.

3.2.7.6 As the OSPs are included in both the Transmission Assets project description and the project descriptions for the Morgan Offshore Wind Project Generation Assets and Morecambe Offshore Windfarm Generation Assets, the assessment outputs from the Generation Assets impact assessments 'magnitude of effects' will be replicated in the Transmission Assets impact assessment and applied to the existing and future baseline of the Transmission Assets scoping area.

3.2.8 Potential cumulative effects

3.2.8.1 Consideration will be given to cumulative effects from underwater noise in particular during construction related piling activities.

3.2.8.2 Cumulative effects with the generation assets (i.e., the Morgan Offshore Wind Project and the Morecambe Offshore Windfarm) will be considered, together with cumulative effects with other Round 4 projects (such as the Mona Offshore Wind Project) and other infrastructure projects such as proposed wind farms and interconnectors, where relevant. Note that as the OSPs are included in both the Transmission Assets project description and the project description for the Morgan Offshore Wind Project Generation Assets and the Morecambe Offshore Windfarm Generation Assets, some aspects of the CEA will not include the OSPs (e.g. potential impacts associated with the OSP footprint on the seabed) to prevent ‘double counting’ of potential impacts. Where OSPs are included in the CEA and where they are not will be agreed with the Evidence Plan Expert Working Group.

3.2.8.3 The cumulative assessment will include other offshore developments with the potential to create underwater noise. A detailed assessment of offshore developments within the area and their construction windows (where available) will be undertaken, to identify which other offshore developments will be considered in terms of the cumulative underwater noise assessment.

3.2.8.4 The cumulative effects assessment will be set out within the respective ES chapters for marine mammals, fish and shellfish and commercial fisheries.

3.2.9 Potential inter-related effects

3.2.9.1 The potential inter-related effects for underwater noise will be assessed within the relevant technical sections of the ES and described within the relevant sections of this EIA Scoping Report (part 2, section 4.3: Marine mammals, section 4.2: Fish and shellfish and section 5.1: Commercial fisheries of this EIA Scoping Report).

3.2.10 Potential transboundary impacts

3.2.10.1 A screening of transboundary impacts has been carried out and is presented in part 3, Annex A of this EIA Scoping Report. Any transboundary impacts will be discussed within each of the relevant sections of this EIA Scoping Report for which underwater noise is considered relevant (part 2, section 4.3: Marine mammals, section 4.2: Fish and shellfish and section 5.1: Commercial fisheries of this EIA Scoping Report).

4 Proposed technical assessments - offshore biological environment

4.1 Benthic subtidal and intertidal ecology

4.1.1 Introduction

4.1.1.1 This section of the EIA Scoping Report identifies the receptors relevant to the assessment of benthic subtidal and intertidal ecology for the Transmission Assets. It also considers the potential impacts arising from the construction, operation and maintenance, and decommissioning of the Transmission Assets and identifies the proposed scope of, and methodology for, the EIA process for benthic subtidal and intertidal ecology.

4.1.2 Study area

4.1.2.1 To support the development of the benthic subtidal and intertidal ecology assessment, two study areas are defined:

4.1.2.2 The benthic subtidal and intertidal ecology study area is defined as the area encompassing the Transmission Assets Scoping Boundary plus a buffer of one spring tidal excursion (see Figure 4.1) and includes the area up to MHWS. This is the predicted ZOI for benthic subtidal and intertidal ecology for the Transmission Assets. Targeted benthic surveys will be undertaken within the Transmission Assets Scoping Boundary, as appropriate. The refinement of the design for the Transmission Assets and the results of the site-specific benthic surveys will inform the baseline characterisation and identification of benthic receptors against which potential impacts associated with the Transmission Assets will be assessed. This may result in refinement of the study area.

4.1.2.3 The regional benthic subtidal and intertidal ecology study area covers the wider east Irish Sea, extending from MHWS out to the furthest west extent from the Mull of Galloway in Scotland and to the western tip of Anglesey. This study area has been selected to encompass the wider Irish Sea habitats and include the neighbouring consented and developing offshore wind farms and designated sites (see Figure 4.1). This is considered appropriate as it will provide wider context to the site-specific data collected within the benthic subtidal and intertidal ecology study area and is large enough to incorporate all direct and indirect impacts of the Transmission Assets on the identified receptors.

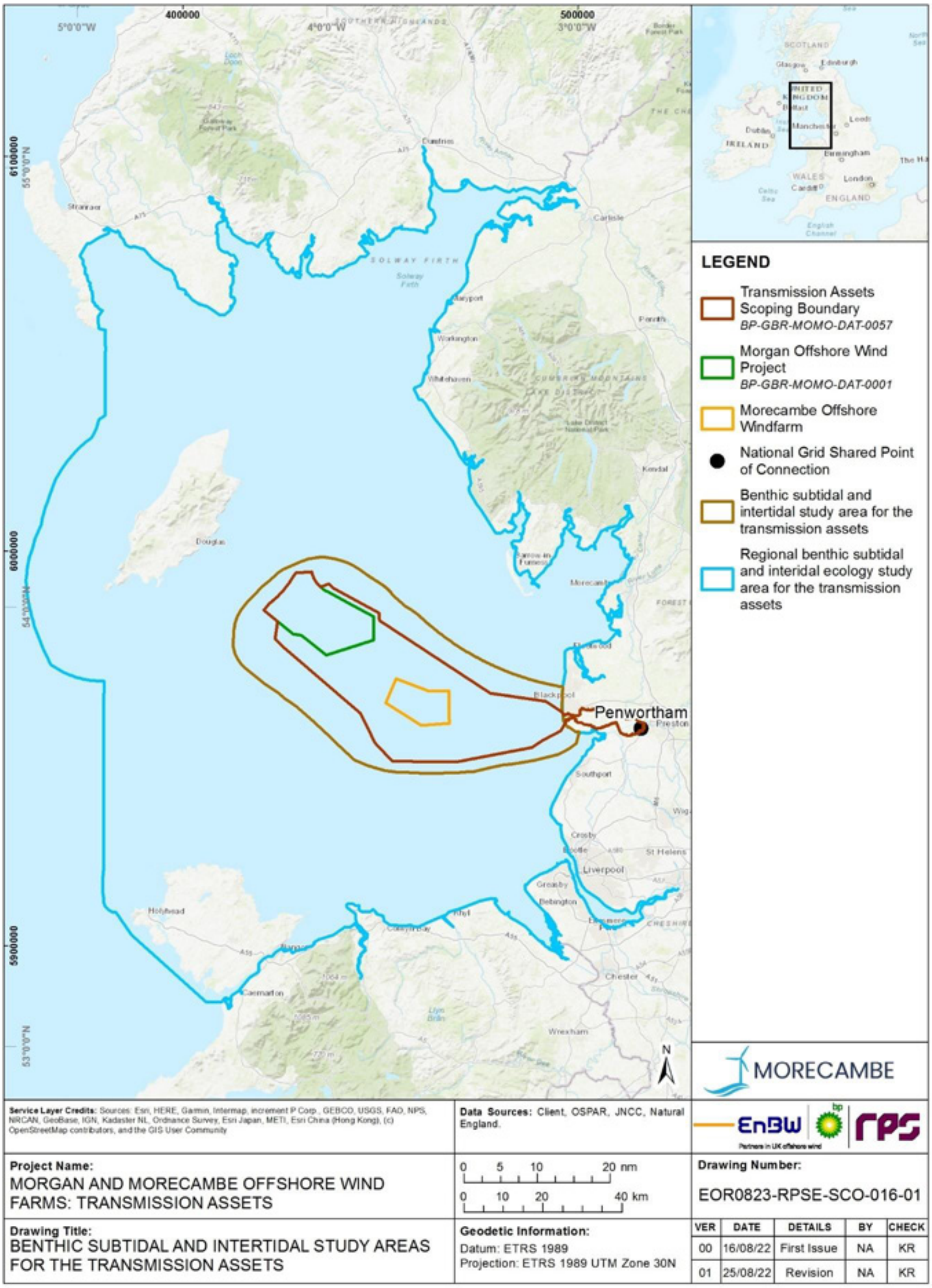


Figure 4.1: The Transmission Assets benthic subtidal and intertidal ecology study areas.

4.1.3 Data sources

Desktop data

4.1.3.1 An initial desk-based review of literature and data sources to support this EIA Scoping Report has identified a number of data sources which provide coverage of the regional benthic subtidal and intertidal ecology study area, and which will provide context to the site-specific benthic ecology survey data collected. These are summarised in Table 4.1.

Table 4.1: Summary of key desk top datasets and reports – benthic subtidal and intertidal ecology.

Title	Source	Year	Author
Awel y Môr Offshore Wind Farm. Category 6: Environmental Statement	Awel y Môr Offshore Wind Farm Ltd.	2022	RWE Renewables UK
Lle Geo-Portal for Wales	Welsh Government	2021	Welsh Government
EMODnet broadscale seabed habitat map for Europe (EUSeaMap)	EMODnet-Seabed Habitats	2019	EMODnet-Seabed Habitats
The National Biodiversity Network (NBN) Gateway	https://nbnatlas.org/	Accessed April 2022	https://nbnatlas.org/
Subtidal Ecology. In: Manx Marine Environmental Assessment (2nd Ed).	The Government of the Isle of Man	2018	Lara Howe
Coastal Ecology. In: Manx Marine Environmental Assessment (2nd Ed).	The Government of the Isle of Man	2018	Lara Howe
Marine Phase 1 Intertidal Habitat Survey	Natural Resources Wales	2005	Natural Resources Wales
A Review of the Contaminant Status of the Irish Sea	JNCC	2005	untitled (publishing.service.gov.uk)
Rhiannon Offshore Wind Farm Preliminary Environmental Information Chapter 9 Benthic Ecology	Celtic Array Ltd	2014	Celtic Array Ltd
Gwynt y Môr offshore wind farm Marine Benthic Characterisation Survey	Gwynt y Môr offshore wind farm Ltd	2005	Centre for Marine and Coastal Studies (CMACS)
Ormonde Offshore Wind Farm Year 1 post-construction benthic monitoring technical survey report (2012 survey)	RPS Energy	2012	CMACS
Walney Offshore Wind Farm Year 1 postconstruction benthic monitoring technical survey report (2012 survey)	Walney Offshore Wind Farms (UK) Ltd/DONG Energy	2012	CMACS
Burbo Bank Offshore Wind Farm Benthic and Annex I Habitat Pre-construction Survey Field Report	Burbo Bank Offshore Wind Farms (UK) Ltd/DONG Energy	2015	CMACS
Phase I- Intertidal Survey- Standard Report	Countryside Council for Wales	2004	Countryside Council for Wales
Burbo Bank Extension Offshore Wind Farm Environmental	Dong Energy Ltd	2013	Dong Energy Ltd

Title	Source	Year	Author
Statement Volume 2 – Chapter 12: Subtidal and Intertidal Benthic Ecology			
Volume 1 Environmental Statement Walney Extension, Chapter 10: Benthic Ecology	Dong Energy Ltd	2013	Dong Energy Ltd
Broadscale seabed survey to the east of the Isle of Man	Holt et al.	1997	Holt et al.
Offshore benthic communities of the Irish Sea	Mackie	1990	Mackie

Site-specific survey data

Benthic subtidal survey

4.1.3.2 A benthic subtidal ecology survey was undertaken in spring/summer 2022 which has collected data on the benthic habitats within a refined area of the Transmission Assets Scoping Boundary. The scope of the survey campaign, including the requirement for site-specific sediment chemistry data, was discussed and agreed with consultees through the Evidence Plan process. The subtidal survey combined drop down video and $0.1m^2$ Hamon grab sampling. The sampling strategy was designed to adequately sample the area to provide up to date data for baseline characterisation. Site-specific geophysical surveys have also been undertaken across refined areas of the Transmission Assets Scoping Boundary in winter 2021 and spring/summer 2022. This included a 2DUHR geophysical survey, side scan sonar, sub-bottom profiler and magnetometer survey. This data will be used to further inform the baseline characterisation alongside the marine ecological datasets.

4.1.3.3 A second benthic survey was undertaken in May 2022 to gather baseline information on the sediment quality, environment, and benthic habitats from within the Morecambe array area (windfarm site). Ocean Ecology Limited conducted the survey which included:

- 50 stations were sampled with a $0.1m^2$ Day grab with prior investigation by Drop Down Camera (DDC). Samples collected were to be suitable for Particle Size Distribution (PSD) and macrobenthic analyses
- Contaminant samples were taken at 20 selected sampling locations
- DDC deployments were undertaken at each grab location
- Four DDC transects across the site to ground truth geophysical data and identify any features of interest.

Intertidal survey

4.1.3.4 A phase 1 intertidal survey has been undertaken at the proposed landfall location (a refined area within the intertidal section of the Transmission Assets Scoping Boundary). The survey was undertaken on a spring tide cycle in spring 2022 and focussed on intertidal biotopes from MHWS to approximately Mean Low Water Springs (MLWS). The survey was undertaken to characterise the area. The survey was undertaken with reference to standard intertidal survey methodologies as outlined in the JNCC Marine Monitoring Handbook (Davies *et al*., 2001), within Procedural Guidance No 3-1 In situ intertidal biotope recording (Wyn and Brazier, 2001 and Wyn *et al*., 2000) and The Handbook for Marine Intertidal Phase 1 Biotope Mapping Survey (Wyn *et al*., 2006). The survey was carried out by two suitably qualified ecologists experienced in habitat mapping in intertidal and coastal environments.

4.1.3.5 The intertidal survey comprised both a general walkover, noting changes in ecological and physical characteristics, and onsite dig over macrofauna sampling and analysis in soft sediments, to help characterise the habitats. The scope of the intertidal survey was discussed and agreed with consultees through the Evidence Plan process.

4.1.3.6 During the walkover survey, notes were made on the shore type, wave exposure, sediments/substrates present and descriptions of species/biotopes present. The spatial relationships between these features were observed and waypoints recorded by a handheld global positioning system device, in conjunction with handwritten descriptions and photographs. All biotopes present were identified, and their extents mapped, with the aid of aerial photography and a Global Positioning System recorder. Other features within the intertidal zone were also noted, including rock pools, man-made structures and any habitats/species of conservation importance. Where present, these features will be target noted in the intertidal biotope maps.

4.1.3.7 Onsite exploratory dig over sampling was also undertaken in different biotopes. This involved the collection of four spade loads (approximately $0.02m^2$) of sediment dug to a depth of 20-25cm, which was then sieved through a series of stacked sieves, the finest of which will be 0.5mm mesh. All macrofauna species present were identified to the highest taxonomic level possible in the field and also enumerated on site, where possible. Field notes were also be taken on the physical characteristics, including sediment type and presence of anoxic layers in the sediment.

4.1.3.8 A detailed analysis of these results will be appended to the ES within a Benthic Technical Report.

4.1.4 Baseline environment

4.1.4.1 The Transmission Assets will be located within the Transmission Assets Scoping Boundary.

4.1.4.2 The following sections describe the baseline environment within the Transmission Assets Scoping Boundary, within which the OSPs, interconnector cables, offshore export cables and the Morgan offshore booster station will be located. The habitat codes referred throughout this section are detailed in Table 4.2.

Subtidal sediments

Transmission Assets regional benthic subtidal and intertidal ecology study area

4.1.4.3 Within the Transmission Assets regional benthic subtidal and intertidal ecology study area, seabed sediments are dominated by ‘circalittoral coarse sediment’ (SS.SCS.CCS; A5.14) and ‘circalittoral mixed sediment’ (SS.SMx.CMx; A5.44) in the west with sediments transitioning to ‘offshore circalittoral sand’ (SS.SSa.OSa; A5.27) and ‘offshore circalittoral mud’

(SS.SMu.OMu; A5.37) to the north east of the area. Within the regional benthic subtidal and intertidal ecology study area, sediment transitions to SS.SSa.OSa with areas of 'circalittoral rock' (CR) around the coast of Anglesey (EUNIS code A4, illustrated in Figure 4.2; EMODnet, 2019). Seabed sediments along the English coast are dominated by 'circalittoral fine sand' (SS.SSa.CFiSa; A5.25) or 'circalittoral muddy sand' (SS.SSa.CMuSa; A5.26) (illustrated in Figure 4.2; EMODnet, 2019).

4.1.4.4 The Isle of Man is located northwest of the Transmission Assets Scoping Boundary (see Figure 4.1) within the regional benthic subtidal and intertidal ecology study area. Circalittoral coarse sediment (SS.SCS.CCS; A5.14) were recorded to the south and east of the isle, while 'infralittoral coarse sediments' (SS.SCS.ICS; A5.13) were observed north of the isle. Circalittoral fine sand (SS.SSa.CFiSa; A5.25) and circalittoral muddy sand (SS.SSa.CMuSa; A5.26) were present to the east of the isle (illustrated in Figure 4.2; EMODnet, 2019). A marine environmental assessment was undertaken by Howe (2018a) to bring together subtidal surveys which have been conducted around the Isle of Man to create an extensive characterisation of the subtidal environment. The subtidal habitats to the west of the island were shown to be predominantly mixed gravel, mixed stone and mixed sand seabed which extended to the north and the south with a small area of sand/muddy sand in the southeast. The seabed located to the southwest of the island comprises an extensive area of mud/fine sand. The EUSeaMap (see Figure 4.2) is aligned with data from Howe (2018a) showing that sediment around the Isle of Man is made of coarse material with sections of fine sand in the southeast as well as the northeast.

4.1.4.5 The benthic surveys conducted for planned or operational offshore wind projects within the Transmission Assets regional study area also provide an overview of the sedimentary habitats present within the immediate vicinity of the study area (illustrated in Figure 4.3).

4.1.4.6 The Ormonde offshore wind project is within the northeast part of the Transmission Assets regional benthic subtidal and intertidal ecology study area (see Figure 4.3). The 2013 year 1 post-construction benthic monitoring survey for the Ormonde offshore wind project reported mud, sand and gravel sediments across the Ormonde offshore wind project array area and export cable corridor. Sample sites further offshore reported a higher percentage of mud compared to the inshore sample sites (CMACS, 2012).

4.1.4.7 Pre-construction monitoring surveys for Walney Extension in 2011 and 2012 and a subsequent monitoring survey for Walney in 2014 were undertaken in the east of the Transmission Assets regional study area. The surveys reported the presence of subtidal mud and subtidal sand within the Transmission Assets regional benthic subtidal and intertidal ecology study area (Dong Energy, 2013; CMACS, 2014).

4.1.4.8 Benthic surveys were undertaken in 2010 and 2012 to support the EIA benthic baseline characterisation for the Rhiannon offshore wind project. These surveys reported that sediments were dominated by SS.SCS.CCS and SS.SMx.CMx with patches of SS.SSa.CFiSa. Sediments graded into mud sediments towards the Welsh coast. Two large sandbanks were recorded off Lynas Point, as illustrated in Figure 4.3. These were composed of very well sorted mobile sand that remains submerged at all times (Celtic Array Ltd, 2014a).

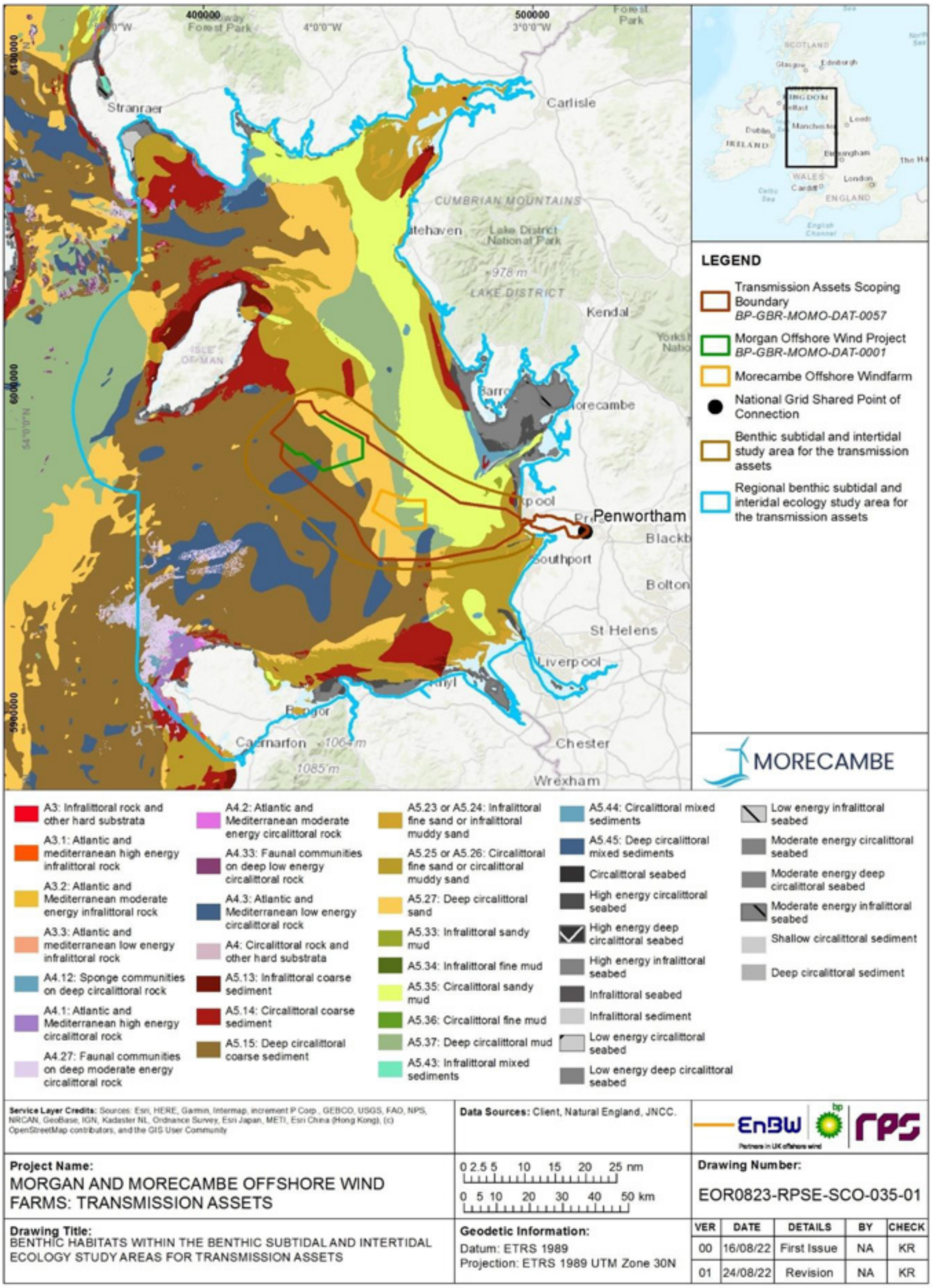


Figure 4.2: Predicted ENUIS habitats from the EUSeaMap for the Transmission Assets benthic subtidal and intertidal ecology study areas (Source, EMODnet, 2019).

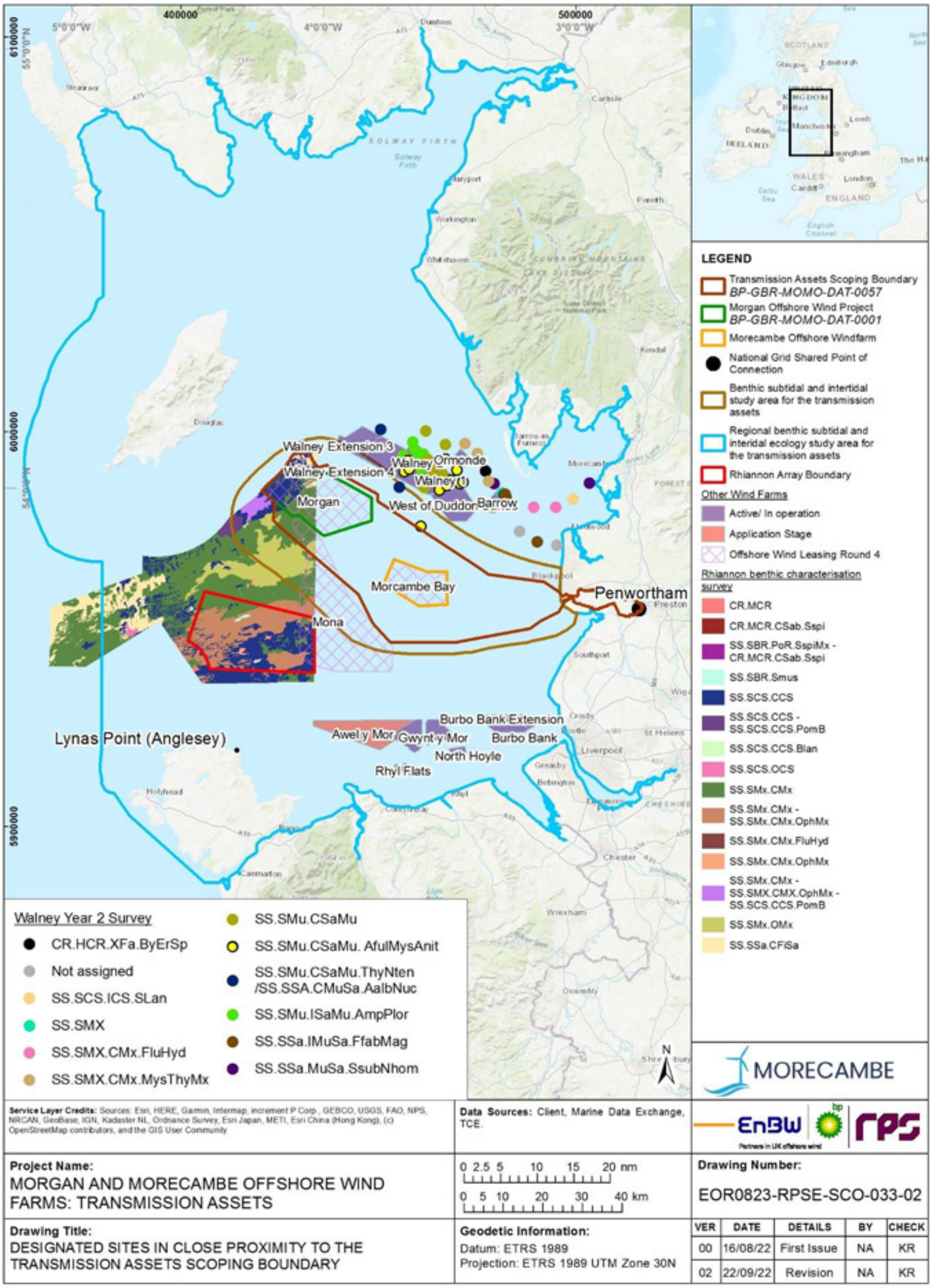


Figure 4.3: Benthic survey results for the other offshore wind projects in relation to the Transmission Assets benthic subtidal and intertidal ecology study area.

4.1.4.9 The results of the comprehensive desktop data review of the seabed sediments within the Transmission Assets regional benthic subtidal and intertidal ecology study area will be presented in the ES.

Transmission assets benthic subtidal and intertidal ecology study area

4.1.4.10 Sediments overlapping with the benthic subtidal and intertidal ecology study area for the transmission asset were reported in the Rhiannon offshore wind project baseline surveys as SS.SMx.CMx and SS.SCS.CCS with patches of SS.SSa.CFiSa north of the Transmission Assets benthic subtidal and intertidal ecology study area (Figure 4.3; Celtic Array Ltd, 2014a).

4.1.4.11 The EUSeaMap data describes the Transmission Assets benthic subtidal and intertidal ecology study area as being dominated by A5.27 deep circalittoral sand and A.15 deep circalittoral coarse sediment furthest offshore. Patches of A5.45 deep circalittoral mixed sediments and A5.37 deep circalittoral mud occur alongside the A5.27 deep circalittoral sand and A.15 deep circalittoral coarse sediment in the mid sections of the Transmission Assets benthic subtidal and intertidal ecology study area (Figure 4.2; EMODnet, 2019). Near the coast there is a large proportion of A5.35 circalittoral sand mud in the north of the Transmission Assets benthic subtidal and intertidal ecology study area. A5.25 circalittoral fine sand or A5.26 circalittoral muddy sand dominates the seabed nearest the coast. The EUSeaMap describes these habitats as moderate energy habitats (Figure 4.2; EMODnet, 2019).

4.1.4.12 Further detail on the seabed sediments within the Transmission Assets benthic subtidal and intertidal ecology study area from the site-specific surveys will be presented in the ES.

Sediment contamination

4.1.4.13 Benthic surveys undertaken for the Rhiannon offshore wind project reported sediment chemical contaminants at generally very low levels across the Transmission Assets benthic subtidal and intertidal ecology study area and wider surveyed area (Celtic Array Ltd, 2014a). Arsenic marginally exceeded Cefas Action Level 1 in several samples taken across the Rhiannon offshore wind project array area, to the south of the Transmission Assets benthic subtidal and intertidal ecology study area (Figure 4.3). Arsenic levels are relatively high in Liverpool Bay and surrounding areas (e.g., Camacho-Ibar *et al.,* 1992). This is generally considered to be due to weathering of glaciated regions such as North Wales and the Lake District rather than to anthropogenic sources (e.g., Leah *et al*., 1992; Thornton *et al*., 1975).

4.1.4.14 Pre-construction monitoring surveys for Walney Extension in 2011 and 2012 reported elevated levels of aluminium, iron and arsenic however they were at levels not considered to pose a risk to the environment (Dong Energy, 2013).

4.1.4.15 Pre-construction monitoring surveys for Burbo Bank offshore wind project in 2005 reported that most contaminants were below interim sediment quality guidelines and Probable Effect Levels (Cole *et al*., 2001; Nagpal *et al*., 2001). Elevated levels of lead and mercury were reported, with only arsenic and zinc detectable below 1.5m from the seabed surface. The report concluded that the construction, operation and decommissioning of the offshore wind farm prosed no increased risk to water quality (CMACS, 2005).

Subtidal benthic communities

4.1.4.16 Benthic surveys undertaken for the Rhiannon offshore wind project reported rich faunal communities on SS.SCS.CCS and SS.SMx.CMx habitats with patches of SS.SSa.CFiSa habitats in the benthic subtidal and intertidal ecology study area. Some areas of the circalittoral mixed sediment habitat with the benthic subtidal and intertidal ecology study area were dominated by brittlestars *Ophiothrix fragilis* (common brittlestar). An area of a mosaic of circalittoral mixed sediment, '*Ophiothrix fragilis* and/or *Ophiocomina nigra* brittlestar beds (black brittlestar) on sublittoral mixed sediment' (SS.SMx.CMx.OphMx) and '*Pomatoceros triqueter* (polychaete) with barnacles and bryozoan crusts on unstable circalittoral cobbles and pebbles' (SS.SCS.CCS.PomB) was recorded in the west of the benthic subtidal and intertidal ecology study area.

4.1.4.17 The '*Mediomastus fragilis* (polychaete), *Lumbrineris* spp. (polychaete) and venerid bivalves in circalittoral coarse sand or gravel' (SS.SCS.CCS.MedLumVen) biotope was reported to be widespread across the southwest of the regional benthic subtidal and intertidal ecology study area. However, when considering the wider area, the match was not considered to be sufficiently strong enough to be a separate biotope on the final biotope map for the Rhiannon offshore wind farm (Figure 4.3; Celtic Array Ltd, 2014a).

4.1.4.18 Annex I rocky reefs (of the Habitats Directive; see part 1, section 2: Policy and legislation, of this EIA Scoping Report) of mostly low to moderate reefiness were recorded to the west of the Rhiannon offshore wind project array area, over 10km to the south of the Transmission Assets Scoping Boundary. It was characterised by relatively sparse epifauna dominated by starfish, with some dense patches of brittlestar *Ophiura fragilis.* Annex I reefs were mapped separately and were not presented on the biotope map available on the Marine Data Exchange (as of December 2021). Annex I stony reefs were also recorded over 10km to the south of the Transmission Assets Scoping Boundary. However, these mostly occurred as a patchwork of boulders over areas more generally described as SS.SCS.CCS or SS.SMx.CM. These were not presented on the biotope map available on the Marine Data Exchange (see Figure 4.3; Celtic Array Ltd, 2014a).

4.1.4.19 No Annex I *Sabellaria spinulosa* (Ross worm) reefs were recorded however a mosaic of '*Sabellaria spinulosa* encrusted circalittoral rock' (CR.MCR.CSab.Sspi) and '*Sabellaria spinulosa* on stable circalittoral mixed sediment' (SS.SBR.PoR.SspiMx) was recorded in a very small patch over 30km to the west of the Transmission Assets regional benthic subtidal and intertidal ecology study area (Figure 4.3; Celtic Array Ltd, 2014a).

4.1.4.20 Areas of potential *Modiolus* (bivalve) reefs were recorded to the south of the benthic subtidal and intertidal ecology study area. This occurs within the biotope 'Sublittoral mussel beds' (SS.SBR.Smus) (Celtic Array Ltd, 2014a; Figure 4.3). Potential *Modiolus* reefs have also been recorded by Natural Resources Wales (NRW) in 2015 north of Anglesey, to the south of the benthic subtidal and intertidal ecology study area (Moore et al., 2017).

4.1.4.21 Benthic surveys undertaken in 2013 for the Walney Year 2 post construction survey recorded sandy mud sediment communities within the Walney offshore wind project array areas. They recorded mixed sediment communities closer to the coast and bivalve dominated communities closest to the benthic subtidal and intertidal ecology study area (CMACS, 2013; Figure 4.3). The marine habitat codes used in Figure 4.3 are shown in Table 4.2. The main four habitats recorded were:

- *Amphiura filiformis* (brittlestar), *Mysella bidentata* (bivalve) and *Abra nitida* (glossy furrow shell) in circalittoral sandy mud (SS.SMu.CSaMu.AfilMysAnit)
- Thyasira spp. (bivalve) and *Nuculoma tenuis* (bivalve) in circalittoral sandy mud/*Abra alba* (white furrow shell) and *Nucula nitidosa* (shiny nut clam) in circalittoral muddy sand or slightly mixed sediment (SS.SMu.CSaMu.ThyNten/SS.SSa.CMuSa.AalbNuc).
- *Ampelisca* spp. (amphipod), *Photis longicaudata* (amphipod) and other tube-building amphipods and polychaetes in infralittoral sandy mud (SS.SMu.ISaMu.AmpPlor)
- '*Fabulina fabula* (bena-like tellin) and *Magelona mirabilis* (polychaete) with venerid bivalves and amphipods in infralittoral compacted fine muddy sand' (SS.SSa.IMuSa.FfabMag).

4.1.4.22 The 2013 year 1 post-construction benthic monitoring survey for the Ormonde offshore wind project reported that faunal taxa composition of samples was dominated by annelids, molluscs and crustaceans. Number of individuals was dominated by annelids and echinoderms which was attributable to the high number of *Amphiura filiformis*. No Annex I reefs were recorded (CMACS, 2012).

4.1.4.23 Pre-construction monitoring surveys for Walney Extension recorded *A. filiformis* and phoronid worms were record in high abundances alongside species of bivalve molluscs and polychaete worms that are adapted to mud sediments. The dominant benthic habitats recorded in the 2011 and 2012 surveys were (Dong Energy, 2013):

- SS.SMx.CMx.
- 'Mysella bidentata and Thyasira spp. in circalittoral, muddy mixed sediments' (SS.SMx.CMx.MysThyMx).
- SS.SMu.CSaMu.AfilMysAnit.

4.1.4.24 The dominant benthic habitats recorded in the 2014 surveys were (CMACS, 2014):

- '*Nephtys cirrosa* (polychaete) and *Bathyporeia* spp. (amphipod) in infralittoral sand' (SS.SSa.IFiSa.NcirBat).
- 'Dense *Lanice conchilega* (sand mason worm) and other polychaetes in tide-swept infralittoral sand and mixed gravelly sand' (SS.SCS.ICS.SLan).
- SS.SSa.IMuSa.FfabMag.
- SS.SMu.CSaMu.AfilMysAnit.
- '*Thyasira* spp. and *Nuculoma tenuis* in circalittoral sandy mud' (SS.SMu.CSaMu.ThyNten).
- 'Circalittoral sandy mud' (SS.SMu.CSaMu).

4.1.4.25 Evidence of the habitat feature of conservation importance 'sea pen and burrowing megafauna communities' has previously been recorded within the Walney Offshore Wind Farm and the Walney Extension Offshore Wind Farm. Within the regional benthic subtidal and intertidal ecology study area (Dong Energy, 2013; CMACS, 2014).

Intertidal benthic communities

4.1.4.26 Characterisation of the intertidal communities will be based on the phase 1 intertidal walkover survey. The preliminary results of the surveys indicate the presence of:

- Polychaete/amphipod-dominated fine sand shores (LS.LSa.FiSa).
- Barren or amphipod-dominated mobile sand shores (LS.LSa.MoSa).
- Polychaete/bivalve-dominated muddy sand shores (LS.LSa.MuSa).
- *Macoma balthica* (Baltic clam) and *Arenicola marina* (lugworm) in littoral muddy sand (LS.LSa.MuSa.MacAre).
- *Lanice conchilega* in littoral sand (LS.LSa.MuSa.Lan).
- *Echinocardium cordatum* (common heart urchin) and *Ensis* spp. (razor clam) in lower shore and shallow sublittoral slightly muddy fine sand (SS.SSa.IMuSa.EcorEns).

4.1.4.27 The full results will be appended to the ES within a Technical Report.

Table 4.2: JNCC marine habitat codes used in Figure 4.3 (JNCC, 2022).

Habitat code	Biotope description
CR.MCR	Moderate energy circalittoral rock
CR.MCR.CSab.Sspi	*Sabellaria spinulosa* encrusted circalittoral rock
CR.HCR.XFa.ByErSp	Bryozoan turf and erect sponges on tide-swept circalittoral rock
SS.SBR.PoR.SspiMx	*Sabellaria spinulosa* on stable circalittoral mixed sediment
SS.SBR.Smus	Sublittoral mussel beds (on sublittoral sediment)
SS.SCS.CCS	Circalittoral coarse sediment
SS.SCS.CCS.PomB	*Pomatoceros triqueter* with barnacles and bryozoan crusts on unstable circalittoral cobbles and pebbles
SS.SCS.CCSBlan	*Branchiostoma lanceolatum* (European lancelet) in circalittoral coarse sand with shell gravel
SS.SCS.OCS	Offshore circalittoral coarse sediment
SS.SMx	Sublittoral mixed sediment
SS.SMx.CMx	Circalittoral mixed sediment
SS.SMx.OphMx	*Ophiothrix fragilis* and/or *Ophiocomina nigra* brittlestar beds on sublittoral mixed sediment
SS.SMx.CMx.FluHyd	*Flustra foliacea* (Hornwrack) and *Hydrallmania falcata* (Hydrozoa) on tide-swept circalittoral mixed sediment
SS.SMx.CMx.MysThyMx	*Mysella bidentata* and *Thyasira* spp. in circalittoral muddy mixed sediment
SS.SMx.OMx	Offshore circalittoral mixed sediment
SS.SSa.CFiSa	Circalittoral fine sand
SS.SMu.CSaMu	Circalittoral sandy mud
SS.SMu.CSaMu.AfilMysAnit	*Amphiura filiformis*, *Mysella bidentata* and *Abra nitida* in circalittoral sandy mud

Habitat code	Biotope description
SS.SMu.CSaMu.ThyNten	*Thyasira* spp. and *Nuculoma tenuis* in circalittoral sandy mud
SS.SSa.CMuSa.AalbNuc	*Abra alba* and *Nucula nitidosa* in circalittoral muddy sand or slightly mixed sediment
SS.SMu.ISaMu.AmpPlor	*Ampelisca* spp., *Photis longicaudata* and other tube-building amphipods and polychaetes in infralittoral sandy mud
SS.SSa.IMuSa.FfabMag	*Fabulina fabula* and *Magelona mirabilis* with venerid bivalves and amphipods in infralittoral compacted fine muddy sand
SS.SSa.MuSa.SsubNhom	*Spisula subtruncata* (cut through shell) and *Nephtys hombergii* (polychaete) in shallow muddy sand

Designated sites

4.1.4.28 The identification of designated sites for inclusion in the benthic subtidal and intertidal ecology assessment has been carried out as follows:

- Sites with relevant qualifying features which overlap with the Transmission Assets Scoping Boundary were screened in for further assessment.
- Sites with relevant qualifying features, which are located within the likely ZOI were screened in for further assessment. The likely ZOI has been determined through a review of the potential impacts associated with the Transmission Assets. On this basis sites within the Transmission Assets benthic subtidal and intertidal ecology study area have been included (i.e., sited within one spring tidal excursion of the Transmission Assets Scoping Boundary as outlined in section 4.1.2). This ensures that all sites potentially affected by changes in water quality (e.g., increased suspended sediment concentrations) and potential changes to the hydrodynamic regime are included in the assessment.

4.1.4.29 A number of MCZs, SACs, SSSIs and Ramsar sites overlap with the benthic subtidal and intertidal ecology study area. The West of Walney MCZ does not overlap with the benthic subtidal and intertidal ecology study area however it has been included due to close proximity. The nature conservation designations which have been screened in for consideration in the benthic subtidal and intertidal ecology EIA comprise European and National Site Network conservation sites (i.e., SACs, Ramsar), and national designations (i.e., SSSIs, MCZs; see Table 4.3).

4.1.4.30 Information to support a full screening of European sites with qualifying benthic subtidal and/or intertidal interest features will be provided in the Likely Significant Effects (LSE) screening report for the Transmission Assets, as part of the HRA process. Relevant features screened into the benthic subtidal and intertidal ecology assessment will be fully considered and assessed in the benthic subtidal and intertidal ecology assessment, with the information to support the assessment on European sites and effects on the site(s) conservation objectives will be undertaken in the ISAA. Information on and a preliminary screening of relevant MCZs has been included in part 3, Annex C: MCZ Screening of this EIA Scoping Report.

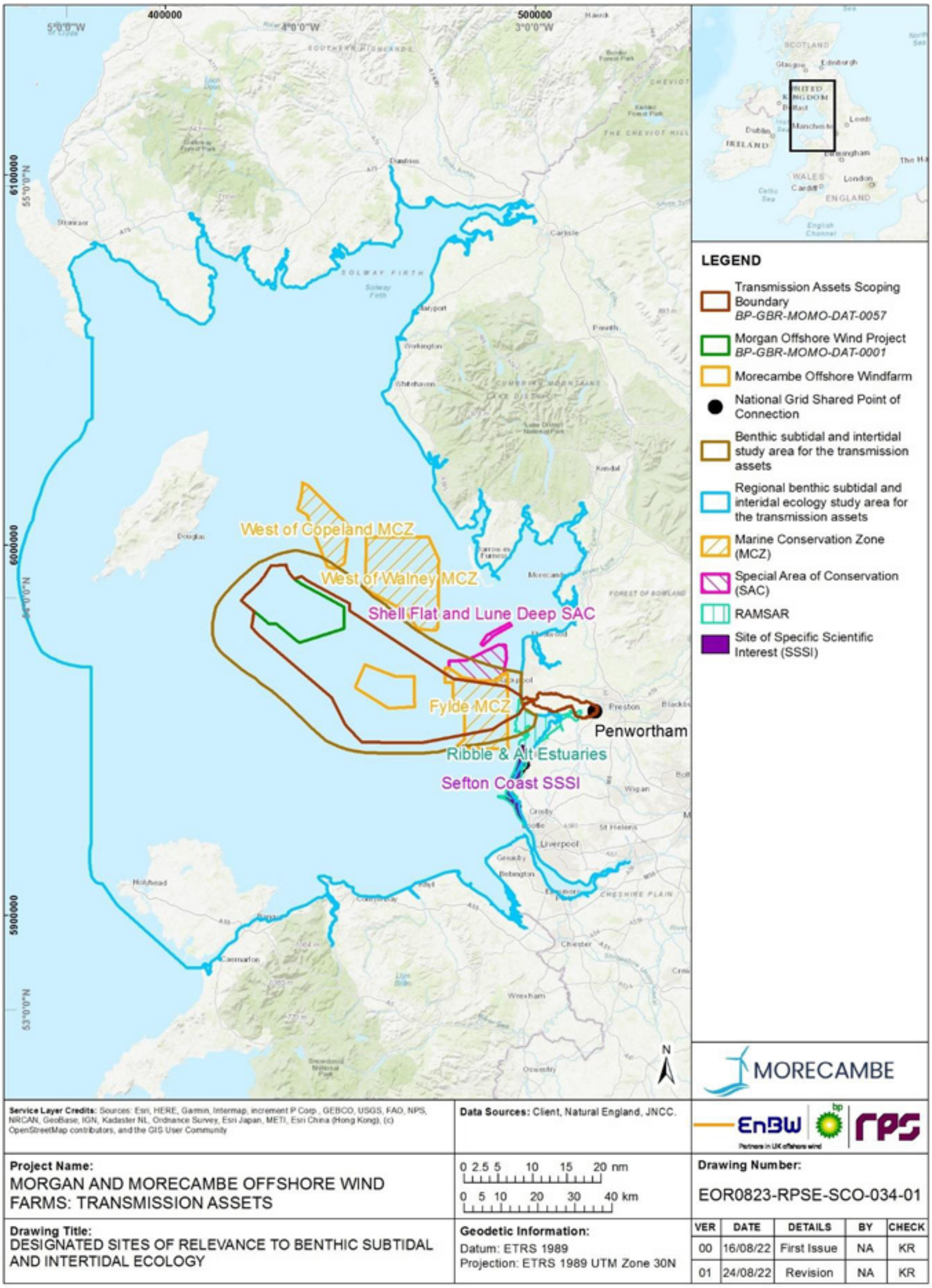


Figure 4.4: Marine nature conservation designations of relevance to benthic subtidal and intertidal ecology and the Transmission Assets.

Table 4.3: Summary of designated sites with relevant benthic ecology features within the Transmission Assets benthic subtidal and intertidal ecology study area.

Designated Site	Distance to the Transmission Assets Scoping Boundary (km)	Features (below MHWS)
Fylde MCZ	0	• Subtidal sand • Subtidal mud
Ribble and Alt Estuaries Ramsar	0	• Tidal flats
Shell Flat and Lune Deep SAC	0.4	• Sandbanks which are slightly covered by sea water all the time • Reefs
West of Copland MCZ	5.8	• Subtidal coarse sediment • Sibtidal sand • Subtidal mixed sediment
West of Walney MCZ	5.8	• Subtidal sand • Subtidal mud • Sea-pen and burrowing megafauna communities
Sefton Coast SSSI	7.9	• Intertidal mud • Sandflats

Protected species and habitats

4.1.4.31 Several species and habitats of conservation importance have been recorded or have the potential to occur within the benthic subtidal and intertidal ecology study area. These are presented below in Table 4.4 and include those species and habitats protected under Annex I of the Habitats Regulations. Where species are afforded protection under other legislation, this has also been noted.

Table 4.4: Relevant protected benthic species and habitats which have the potential to occur within the Transmission Assets benthic subtidal and intertidal ecology study area.

Benthic species and habitats	Protection legislation
Rocky reef	Annex I of the Habitats Regulations
Stony reef	Annex I of the Habitats Regulations
Sabellaria spinulosa reef	Annex I of the Habitats Regulations Habitat of principal importance in England under the Natural Environment and Rural Communities Act 2006 (NERC 2006 Act) UK Biodiversity Action Plan (BAP) prioity habitat that continues to be regarded as conservation priorities in the subsequent UK Post-2010 Biodiversity Framework Annex V of the OSPAR (Oslo-Paris) convention MCZ Feature of Conservation Importance (FOCI)
Modiolus reef	Annex I of the Habitats Regulations Habitat of principal importance in England under the NERC Act 2006. UK BAP priority habitat that continues to be regarded as conservation priorities in the subsequent UK Post-2010 Biodiversity Framework Annex V of the OSPAR convention MCZ Habitat FOCI

Benthic species and habitats	Protection legislation
Sea pen and burrowing megafauna communities	UK BAP prioity habitat that continues to be regarded as conservation priorities in the subsequent UK Post-2010 Biodiversity Framework Annex V of the OSPAR convention Habitat of principal importance in England under the NERC Act 2006. MCZ Habitat FOCI
Subtidal sands and gravels	Habitat of principal importance in England under the NERC Act 2006. UK BAP priority habitat that continues to be regarded as conservation priorities in the subsequent UK Post-2010 Biodiversity Framework MCZ Habitat FOCI

Future baseline conditions

4.1.4.32 The EIA process will consider the existing baseline conditions within the study area, and future baseline conditions (as far as reasonably practicable) in accordance with the methodology set out in part 1, section 5 (see section 5.7.2 for the approach to consideration of future baseline conditions).

4.1.5 Potential project impacts

4.1.5.1 A range of potential impacts on benthic subtidal and intertidal ecology have been identified which may occur during the construction, operation and maintenance, and decommissioning phases of the Transmission Assets.

4.1.5.2 The impacts that have been scoped into the assessment are outlined in Table 4.5 together with a description of any additional data collection (e.g., site-specific surveys) and supporting analyses (e.g., modelling) that will be required to enable a full assessment of the impacts.

4.1.5.3 Potential impacts scoped out of the assessment are presented in Table 4.6, with justification.

4.1.6 Measures adopted as part of the project

4.1.6.1 The following measures adopted as part of the project are relevant to benthic subtidal and intertidal ecology. These measures may evolve as the engineering design and EIA progresses.

- Development and adherence to a Cable Specification and Installation Plan which will require cables to be buried where possible and provision of cable protection as necessary. The potential impact of this measure will be consulted upon with statutory consultees throughout the EIA process.
- Development of, and adherence to, a Construction Method Statement.
- Development of, and adherence to, an Environmental Management Plan, including actions to minimise Invasive Non-native Species (INNS), and a Marine Pollution Contingency Plan (MPCP) which will include planning for accidental spills, address all potential contaminant releases and include key emergency details.

4.1.6.2 Any further mitigation requirements will be dependent on the significance of the effects and will be consulted upon with statutory consultees throughout the EIA process.

Table 4.5: Impacts proposed to be scoped into the project assessment for benthic subtidal and intertidal ecology (project phase refers to construction (C), operation and maintenance (O) and decommissioning (D)).

Impact	Project phase C	Project phase O	Project phase D	Justification	Data collection and analysis required to characterise the baseline environment	Summary of proposed approach to assessment
Increased suspended sediment concentrations (SSC) and associated deposition.	✓	✓	✓	Sediment disturbance arising from construction activities (e.g., OSPs, Morgan offshore booster station, foundation installation, unexploded ordnance (UXO) detonation, cable installation – including any seabed preparation); maintenance operations (e.g., cable repair/ reburial etc.); and decommissioning activities may result in indirect impacts on benthic communities due to temporary increases in SSCs and associated sediment deposition (i.e., smothering effects). Changes in SSCs can impact benthic receptors through changes in water clarity and reduced feeding due to increases in suspended solids and smothering and siltation rate changes.	Targeted benthic subtidal surveys have been undertaken within the benthic subtidal and intertidal ecology study area and intertidal surveys have been undertaken to collect site-specific data to allow for benthic characterisation within the study area.	A literature review and analysis of existing numerical modelling undertaken for the physical processes assessment will inform this impact assessment. For the operation and maintenance phase, the magnitude is assumed to be no greater than for the construction phase therefore modelling carried out for the construction phase will be used to consider the magnitude of impact for the operation and maintenance phase. The significance of effects upon benthic receptors will be determined by correlating the magnitude of the impact and the sensitivity of the receptor. Where possible, the magnitude of the impact will be quantified for the maximum design scenario (MDS). For example, the MDS increases in SSC/associated deposition will be quantified and the assessment will present the areas of habitat potentially affected in the context of the size of the regional benthic subtidal and intertidal ecology study area. The sensitivity of benthic receptors will be determined using the Evidence based Sensitivity Assessment (MarESA) tool.
Temporary habitat loss/ disturbance.	✓	✓	✓	There is potential for temporary, direct habitat loss and disturbance as a result of site preparation activities in advance of cable installation activities (including UXO detonation, pre-cabling seabed clearance and anchor placements), and placement of spud-can legs from jack-up operations. Temporary habitat loss/disturbance may occur	Targeted benthic subtidal surveys have been undertaken within the benthic subtidal and intertidal ecology study area and intertidal surveys have been undertaken to collect site-specific data to allow for benthic characterisation within the benthic subtidal and intertidal ecology study area.	No specific modelling is required to inform this impact assessment, although the assessment will be quantitative in nature (i.e., clearly presenting the maximum spatial scale of impacts). This assessment will be based on information derived from the Project Design Envelope (PDE). The approach to assigning the significance of effect is outlined above for ‘Increased suspended sediment concentrations and associated deposition’ and discussed in part 2, section 3.2 of this EIA Scoping Report.

Impact	Project phase			Justification	Data collection and analysis required to characterise the baseline environment	Summary of proposed approach to assessment
	C	O	D			
				during the operation and maintenance phase as a result of operations (e.g., cable repair/reburial, use of jack-up vessels to facilitate OSP component repairs etc.). The impacts associated with these operations are likely to be similar in nature to those associated with the construction phase although of reduced magnitude. There is potential for temporary, direct habitat loss and disturbance due to decommissioning activities to remove export cables, and jack-up operations to remove foundations, resulting in potential effects on benthic ecology.		
Long term habitat loss.	✓	✓	×	There is the potential for long-term habitat loss to occur directly under all OSP and Morgan offshore booster station foundation structures and associated scour protection, and under any cable protection required along the export cables. As foundations are installed throughout the construction phase this impact is also relevant to the construction phase although this impact will largely occur within the operation and maintenance phase.	Targeted benthic surveys have been undertaken within the benthic subtidal and intertidal ecology study area and intertidal surveys have been undertaken to collect site-specific data to allow for benthic characterisation within the benthic subtidal and intertidal ecology study area.	No specific modelling is required to inform this impact assessment, although the assessment will be quantitative in nature (i.e., clearly presenting the maximum spatial scale of impacts). This assessment will be based on information derived from the PDE. The approach to assigning the significance of effect is outlined above for 'Increased suspended sediment concentrations and associated deposition' and discussed in part 2, section 3.2 of this EIA Scoping Report.

Impact	Project phase			Justification	Data collection and analysis required to characterise the baseline environment	Summary of proposed approach to assessment
	C	O	D			
Increased risk of introduction and spread of invasive non-native species (INNS).	✓	✓	✓	There is potential for an increased risk of introduction and spread of INNS through the vessel movements required during all phases of the Transmission Assets.	Targeted benthic surveys will be undertaken within the benthic subtidal and intertidal ecology study area and intertidal surveys will be undertaken to collect site-specific data to allow for benthic characterisation within the benthic subtidal and intertidal ecology study area.	No specific modelling is required to inform this impact assessment, although the assessment will be quantitative in nature (i.e., clearly presenting the maximum spatial scale of impacts). This assessment will be based on information derived from the PDE The approach to assigning the significance of effect is outlined above for 'Increased suspended sediment concentrations and associated deposition' and discussed in part 2, section 3.2 of this EIA Scoping Report.
Colonisation of hard structures.	×	✓	×	Artificial structures placed on the seabed (i.e., foundations and scour/cable protection) in the offshore environment are expected to be colonised by a range of marine organisms leading to localised increases in biodiversity. These structures may also facilitate the spread of INNS.	Targeted benthic subtidal surveys have been undertaken within the benthic subtidal and intertidal ecology study area and intertidal surveys have been undertaken to collect site-specific data to allow for benthic characterisation within the benthic subtidal and intertidal ecology study area.	No specific modelling is required to inform this impact assessment. A qualitative assessment will be undertaken and presented in the ES. INNS will be considered, particularly in relation to colonisation of hard structures. The approach to assigning the significance of effect is outlined above for 'Increased suspended sediment concentrations and associated deposition' and discussed in part 2, section 3.2 of this EIA Scoping Report.
Changes in physical processes.	×	✓	×	The presence of foundation structures, associated scour protection and cable protection may introduce localised changes to the tidal flow and wave climate, resulting in potential changes to the sediment transport pathways and associated effects on benthic ecology.	Targeted benthic subtidal surveys have been undertaken within the benthic subtidal and intertidal ecology study area and intertidal surveys have been undertaken to collect site-specific data to allow for benthic characterisation within the benthic subtidal and intertidal ecology study area.	A literature review and analysis of existing numerical modelling undertaken for the physical processes assessment will inform this impact assessment. The approach to assigning the significance of effect is outlined above for 'Increased suspended sediment concentrations and associated deposition' and discussed in part 2, section 3.2 of this EIA Scoping Report.
Removal of hard substrates.	×	×	✓	The removal of foundations during decommissioning has the potential to lead to loss of species/habitats colonising these structures.	Targeted benthic subtidal surveys have been undertaken within the benthic subtidal and intertidal ecology study area and intertidal surveys have been undertaken to collect site-specific data to allow for benthic characterisation within	No specific modelling is required to inform this impact assessment, although the assessment will be quantitative in nature (i.e., clearly presenting the maximum spatial scale of impacts). This assessment will be based on information derived from the PDE. The approach to assigning the significance of effect is outlined above for 'Increased suspended sediment

Impact	Project phase			Justification	Data collection and analysis required to characterise the baseline environment	Summary of proposed approach to assessment
	C	O	D			
					the benthic subtidal and intertidal ecology study area.	concentrations and associated deposition' and discussed in part 2, section 3.2 of this EIA Scoping report.
Disturbance/remobilisation of sediment-bound contaminants.	✓	✓	✓	Seabed disturbance associated with construction, maintenance and decommissioning activities (e.g., foundation and cable installation) could lead to the remobilisation of sediment-bound contaminants that may result in harmful and adverse effects on benthic communities.	There is wide ranging and comprehensive desktop information and data sources available to characterise the regional benthic ecology study area. However, the majority of the available sediment chemistry data collated to date is from the Rhiannon offshore wind farm surveys and is therefore not focused over the Transmission Assets Scoping Boundary. This is not currently sufficient information to scope out this impact. Targeted benthic subtidal surveys have been undertaken in spring/summer 2022 over the benthic subtidal and intertidal ecology study area. Any requirement for samples to be collected and analysed for sediment contaminants has been agreed with consultees as part of the Evidence Plan process.	No specific modelling is required to inform this impact assessment. A qualitative assessment will be undertaken and presented in the ES, based on a thorough review of the site-specific information on contaminants in the benthic subtidal and intertidal ecology study area and available scientific evidence on the effects on benthic ecology receptors. This assessment will be based on information derived from the PDE. The significance of effects upon benthic ecology receptors will be determined by correlating the magnitude of the impact and the sensitivity of the receptor.
Impacts to benthic invertebrates due to electromagnetic fields (EMF).	×	✓	×	The presence and operation of interconnector and export cables within the Transmission Assets Scoping Boundary may lead to localised EMF affecting benthic subtidal and intertidal receptors.	N/A	No specific modelling is required to inform this impact assessment. A qualitative assessment will be undertaken and presented in the ES, based on a thorough review of the available scientific information on EMFs in the marine environment and effects on benthic subtidal and intertidal receptors. This assessment will be based on information derived from the PDE. The significance of effects upon benthic subtidal and intertidal receptors will be determined by correlating the magnitude of the impact and the sensitivity of the receptor.

Impact	Project phase			Justification	Data collection and analysis required to characterise the baseline environment	Summary of proposed approach to assessment
	C	O	D			
Heat from subsea electrical cables.	×	✓	×	The presence and operation of interconnector and export cables as part of the Transmission Assets may lead to localised heating of seabed affecting benthic subtidal and intertidal receptors.	N/A	No specific modelling is required to inform this impact assessment. A qualitative assessment will be undertaken and presented in the ES, based on a thorough review of the site-specific information on heat in the marine environment and effects on benthic ecology receptors. This assessment will be based on information derived from the PDE. The significance of effects upon benthic ecology receptors will be determined by correlating the magnitude of the impact and the sensitivity of the receptor.

Table 4.6: Impacts proposed to be scoped out of the project assessment for benthic subtidal and intertidal ecology.

Impact	Justification
Accidental pollution during construction, operation and maintenance and decommissioning.	There is a risk of pollution being accidentally released during the construction, operation and maintenance and decommissioning phases from sources including vessels/vehicles and equipment/machinery. However, the risk of such events is managed by the implementation of measures set out in standard post-consent plans (e.g., Environmental Management Plan, including Marine Pollution Contingency Plan (MPCP)). These plans include planning for accidental spills, address all potential contaminant releases and include key emergency contact details. It will also set out industry good practice and OSPAR (Oslo-Paris), International Maritime Organisation (IMO) and MARPOL (International Convention for the Prevention of Pollution from Ships) guidelines for preventing pollution at sea. Therefore, the likelihood of an accidental spill occurring is very low and in the unlikely event that such events occur, the magnitude of these will be minimised through measures such as the MPCP such that no significant effect would occur. As such, it is intended that this impact is scoped out of further consideration within the benthic subtidal and intertidal ecology ES chapter.

4.1.7 Proposed assessment methodology

4.1.7.1 The benthic subtidal and intertidal ecology EIA will follow the methodology set out in part 1 section 5: EIA Methodology of this EIA Scoping Report. Specific to the benthic subtidal and intertidal ecology EIA, the following guidance documents will also be considered:

- Guidelines for Ecological Impact Assessment (EcIA) in the UK and Ireland. Terrestrial, Freshwater and Coastal (CIEEM, 2019).
- Guidance on Environmental Considerations for Offshore Wind Farm Development (OSPAR, 2008).
- Best Methods for Identifying and Evaluating *Sabellaria spinulosa* and Cobble Reef (Limpenny *et al*., 2010).
- Defining and Managing *Sabellaria spinulosa* Reefs (Gubbay, 2007).
- Identification of the Main Characteristics of Stony Reef Habitats under the Habitats Directive (Irving, 2009).
- Advances in assessing *Sabellaria spinulosa* reefs for ongoing monitoring (Jenkins *et al.,* 2018).
- Marine Evidence-based Sensitivity Assessment – A Guide (Tyler-Walters *et al*., 2018).
- Guidelines for Data Acquisition to Support Marine Environmental Assessments of Offshore Renewable Energy Projects (Judd, 2012).

4.1.7.2 A technical report will present a detailed baseline characterisation for the Transmission Assets using specific survey data and the most recent desktop data. This report will inform the assessment and ES chapter. The approach and focus of these impact assessments will be discussed with stakeholders through the Evidence Plan process.

4.1.7.3 For the purposes of undertaking the EIA, marine habitats and species identified occurring in the benthic subtidal and intertidal ecology study area will be grouped into broad habitat/community types. These broad habitat/community types will serve as the Important Ecological Features (IEFs) against which impacts associated with the construction, operation and maintenance and decommissioning phases of the Transmission Assets will be assessed. Habitats with similar physical and biological characteristics (including species complement and richness/diversity) as well as conservation status/interest will be grouped together for the purposes of the EIA. Consideration will also be given to the sensitivities of different habitats in assigning the groupings, such that habitats and species with similar vulnerability and recoverability, often as a result of similar broad sediment types and species complements, will be grouped together. Impacts on IEFs will be described in terms of the magnitude of that impact and correlated against the sensitivity of each IEF to that that impact, to produce an evaluation of significance (see part 1, section 5: EIA Methodology of this EIA Scoping Report).

4.1.7.4 Information on the sensitivities of benthic ecology receptors will largely be drawn from the Marine Evidence based Sensitivity Assessment (MarESA) (Tyler-Walters *et al*., 2018). The MarESA is a database which has been developed through the Marine Life Information Network (MarLIN) of Britain and Ireland and is maintained by a number of organisations, including the Marine Biological Association and other statutory organisations in the UK.

This database comprises a detailed review of available evidence on the effects of pressures on marine species or habitats, and a subsequent scoring of sensitivity against a standard list of pressures, and their benchmark levels of effect.

4.1.7.5 The evidence base presented in the MarESA is peer reviewed and represents the largest review undertaken to date on the effects of human activities and natural events on marine species and habitats. It is considered to be one of the best available sources of evidence relating to recovery of benthic species and habitats.

4.1.7.6 Further detail of how sensitivity is defined is outlined in Tyler-Walters *et al*. (2018). Sensitivities to the key activities across the Transmission Assets lifetime (i.e., construction and operation and maintenance and decommissioning phases) will be summarised according to the MarESA for each of the IEFs within the benthic subtidal and intertidal ecology study area. Where sensitivity information on specific biotopes is not available through the MarESA, suitable proxies will be used.

4.1.7.7 As the OSPs are included in both the Transmission Assets project description and the project descriptions for the Morgan Offshore Wind Project Generation Assets and Morecambe Offshore Windfarm Generation Assets, the assessment outputs from the Generation Assets impact assessments 'magnitude of effects' will be replicated in the Transmission Assets impact assessment and applied to the existing and future baseline of the Transmission Assets scoping area.

4.1.8 Potential cumulative effects

4.1.8.1 The majority of predicted effects of construction, operation and maintenance, and decommissioning of the Transmission Assets on benthic communities are likely to be localised to within the footprint of the offshore elements of the Transmission Assets. However, there is potential for cumulative effects to occur on benthic subtidal and intertidal ecology from other projects or activities within the Transmission Assets regional benthic subtidal and intertidal ecology study area, where projects or plans could act collectively with the Transmission Assets to affect benthic receptors.

4.1.8.2 Cumulative effects with the generation assets (i.e., the Morgan Offshore Wind Project and the Morecambe Offshore Windfarm) will be considered, together with cumulative effects with other Round 4 projects (such as the Mona Offshore Wind Project) and other infrastructure projects such as proposed wind farms and interconnectors, where relevant. Note that as the OSPs are included in both the Transmission Assets project description and the project description for the Morgan Offshore Wind Project Generation Assets and the Morecambe Offshore Windfarm Generation Assets, some aspects of the CEA will not include the OSPs (e.g. potential impacts associated with the OSP footprint on the seabed) to prevent ‘double counting’ of potential impacts. Where OSPs are included in the CEA and where they are not will be agreed with the Evidence Plan Expert Working Group.

4.1.8.3 The cumulative effects assessment will follow the approach outlined in section part 1 section 5: EIA Methodology of this EIA Scoping Report.

4.1.9 Potential inter-related effects

4.1.9.1 The assessment of potential inter-related effects will be considered within the benthic subtidal and intertidal ecology assessment. It will include consideration of project lifetime effects and receptor-led effects, in line with the approach outlined in part 1, section 5: EIA Methodology, of this EIA Scoping Report.

4.1.10 Potential transboundary impacts

4.1.10.1 A screening of transboundary impacts has been carried out and is presented in part 3, Annex A of this EIA Scoping Report. This screening exercise identified that there is no potential for significant transboundary effects with regard to benthic subtidal and intertidal ecology from the Transmission Assets as the predicted impacts on the benthic communities will largely occur within the footprint of the Transmission Assets Scoping Boundary.

4.2 Fish and shellfish ecology

4.2.1 Introduction

4.2.1.1 This section of the EIA Scoping Report identifies the receptors relevant to the assessment of fish and shellfish ecology for the Transmission Assets. It also considers the potential impacts arising from the construction, operation and maintenance, and decommissioning of the Transmission Assets and identifies the proposed scope of, and methodology for, the EIA process for fish and shellfish ecology.

4.2.2 Study area

4.2.2.1 Fish and shellfish are spatially and temporally variable therefore, for the purpose of the fish and shellfish ecology characterisation, a broad study area has been defined. The fish and shellfish ecology study area is presented in Figure 4.5 and described below.

4.2.2.2 The fish and shellfish ecology study area covers the east Irish Sea, extending from MHWS out to the furthest west extent from the Mull of Galloway in Scotland to the western tip of Anglesey. This study area has been selected to account for the spatial and temporal variability of fish and shellfish populations, including fish migration. This was considered appropriate as it will ensure characterisation of all fish and shellfish receptors in the east Irish Sea and is large enough to consider all direct (e.g., habitat loss/disturbance within project boundaries) and indirect impacts (e.g., underwater noise over a much wider area) of the Transmission Assets on the identified receptors.

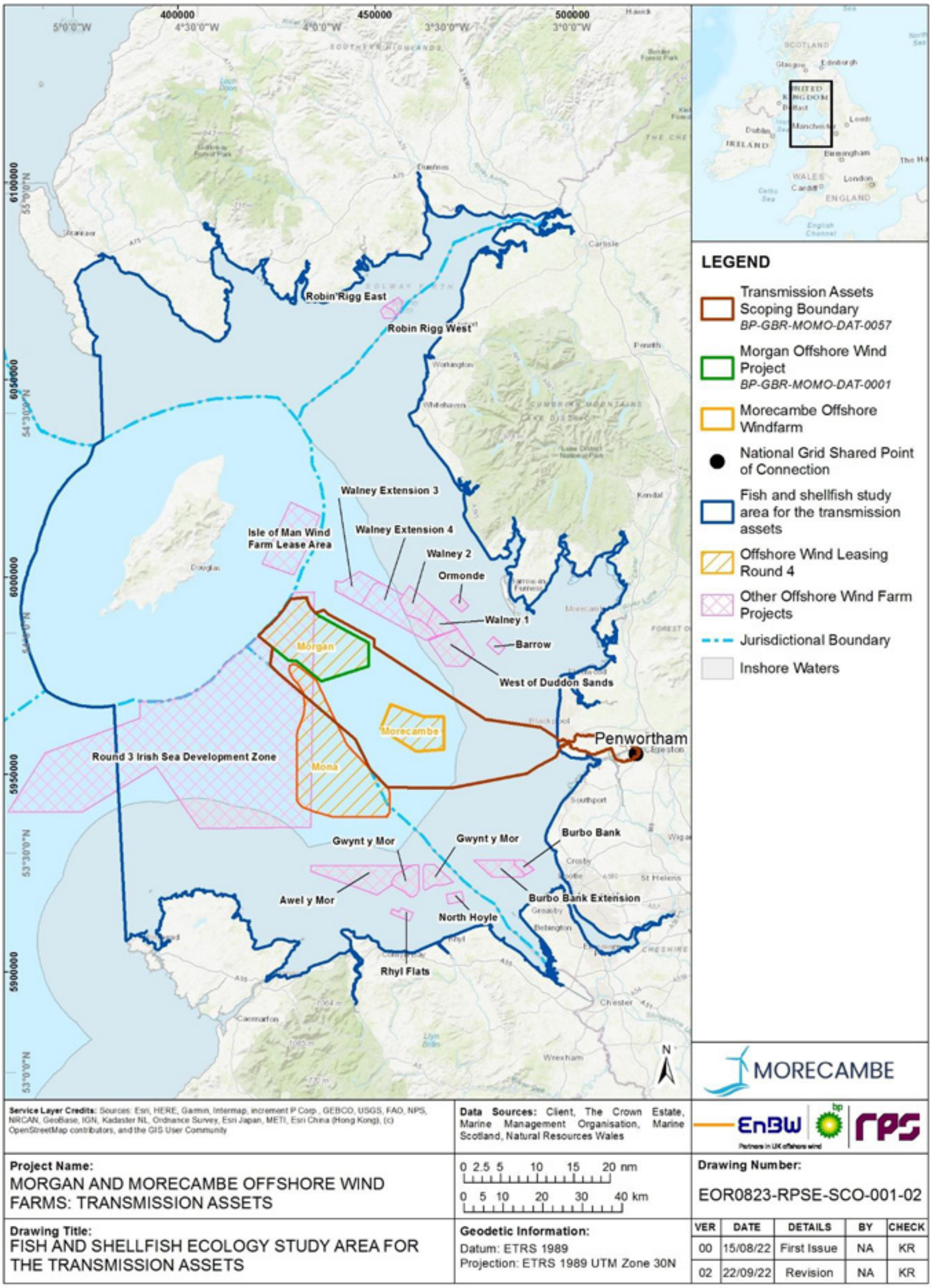


Figure 4.5: The Transmission Assets fish and shellfish ecology study area.

4.2.3 Data sources

Desktop Data

4.2.3.1 An initial desk-based review of literature and data sources to support this EIA Scoping Report has identified a number of data sources which provide coverage of the fish and shellfish ecology study area. These are summarised in Table 4.7.

Table 4.7: Summary of key desktop datasets and reports – fish and shellfish ecology.

Title	Source	Year	Author
Awel y Môr Offshore Wind Farm. Category 6: Environmental Statement	Awel y Môr Offshore Wind Farm Ltd.	2022	RWE Renewables UK
International council for the exploration of the sea (ICES) working group on surveys on ichthyoplankton in the North Sea and adjacent seas	ICES	2021	ICES
Marine Recorder Public UK Snapshot	Joint Nature Conservation Committee (JNCC)	2020	JNCC
Bass and Ray Ecology in Liverpool Bay	Bangor University Sustainable Fisheries and Aquaculture Group.	2020	Moore *et al*.
National Biodiversity Network (NBN) Atlas	NBN Atlas	2019	NBN Atlas
Welsh Waters Scallop Surveys and Stock Assessment	Bangor University	2019	Delargy *et al*.
JNCC MPA Mapper	JNCC	2019	JNCC
Walney Offshore Wind Farm, Year 2 Post construction Monitoring Fish and Epibenthic Survey	Marine Data Exchange	2013	Brown and May Marine Ltd
Welsh waters scallop survey – Cardigan Bay to Liverpool Bay July-August 2013	Bangor University	2013	Lambert *et al*.
Celtic Array Ltd offshore wind farm preliminary environmental information chapter 10: fish and shellfish ecology	Marine Data Exchange	2014	Celtic Array Ltd
Northern Irish Ground Fish Trawl Survey (NIGFS)	ICES	2013	ICES
West of Duddon Sands Offshore Wind Farm, Adult and Juvenile Fish and Epibenthic Pre-Construction Surveys	Marine Data Exchange	2012	Brown and May Marine Ltd
Mapping the Spawning and Nursery Grounds of Selected Fish for Spatial Planning	Cefas	2012	Ellis *et al*.
Gwynt y Mor Offshore Wind Farm, Pre-construction Baseline Beam Trawl Data	Marine Data Exchange	2011	Centre for Marine and Coastal Studies Ltd (CMACS)
Burbo Bank Offshore Wind Farm, Post construction (Year 3) Commercial Fish Survey	Marine Data Exchange	2010	CMACS
Ormonde Offshore Wind Farm, Construction (Year 1) Environmental Monitoring	Marine Data Exchange	2010	RPS Energy
Celtic Array Ltd (Zone 9) Autumn Fish Trawl Survey	Marine Data Exchange	2010	CMACS

Title	Source	Year	Author
Walney Offshore Wind Farm Pre-Construction Fish Survey	Marine Data Exchange	2009	Brown and May Marine Ltd
Rhyl Flats Offshore Wind Farm, Fish and Fisheries Baseline Study	Marine Data Exchange	2002-2006	Coastal Fisheries Conservation and Management
Burbo Bank Offshore Wind Farm, Electromagnetic Fields and Marine Ecology Study	Marine Data Exchange	2007	CMACS
Burbo Bank Offshore Wind Farm, Pre-construction Commercial Fish Survey (2m Beam Trawl)	Marine Data Exchange	2006	CMACS
Walney and West of Duddon Sands Offshore Wind Farms, Baseline Benthic Survey – Epifaunal Beam Trawl Results	Marine Data Exchange	2005	Titan Environmental Surveys Ltd
Fisheries Sensitivity Maps in British Waters	United Kingdom Offshore Operators Association (UKOOA) Ltd.	1998	Coull *et al*.
Herring larvae surveys of the northern Irish Sea	The Agri-Food and Biosciences Institute (AFBI)	1993-2021	AFBI
Fish and shellfish survey results for the east Irish Sea	Environment Agency	Various	Environment Agency
Marine Life Information Network (MarLIN)	MarLIN	2018	Tyler-Wlaters *et al*
SeaLifeBase	https://www.sealifebase.ca/	2021	Palomares and Pauly
Fish and shellfish survey results for the east Irish Sea	Environment Agency	Various	Environment Agency
Updating Fishereis Sensitivity Maps in British Waters	Scottish Marine and Freshwater Science Report	2014	Aires *et al*
Cefas Pelagic ecosystem in the western English Channel and eastern Celtic Sea (PELTIC) surveys	Cefas	Various	Cefas
Fish and shellfish sensitivity reports.	https://www.marlin.ac.uk/activity/pressures_report	n/a	Various
Long-term insights into marine turtle sightings, strandings, and captures around the UK and Ireland (1910-2018)	Journal of the Marine Biological Association of the United Kingdom	2020	Botterell *et al.*
Celtic Seas ecoregion fisheries overview	Summary of commercial fisheries in the Celtic Sea	2018	ICES
Manx Marine Environmental Assessment	Isle of Man Government - Fisheries Division	2018	Howe *et al*.
Fisheries & Conservation Science Group	Bangor University	2022	Bangor University
UK Sea Fisheries Annual Statistics Report	Marine Management Organisation (MMO)	2020	MMO

4.2.3.2 There are a high number of publicly available fish and shellfish characterisation datasets and reports which overlap with the fish and shellfish ecology study area which will be used to inform the fish and shellfish baseline characterisation. Site-specific data collected as part of the benthic surveys will also be used to inform the fish and shellfish baseline characterisation. The benthic surveys include benthic grab samples which will be analysed for particle size analysis to inform habitat suitability for sandeels *Ammodytidae* and herring *Clupea harengus* spawning (discussed in part 2, section 4.2.4 of this EIA Scoping Report). Fish assemblage data collected through incidental observations of fish and shellfish species from the benthic grabs and seabed imagery (e.g., sandeels and crustaceans) will also provide additional validation to the desktop data. Site-specific data collected as part of the aerial marine mammal surveys will record basking shark (if sighted) which will inform the fish and shellfish baseline characterisation.

4.2.3.3 No further site-specific fish and shellfish surveys are therefore proposed across the fish and shellfish ecology study area.

4.2.4 Baseline environment

Fish assemblage

4.2.4.1 Distribution of fish is determined by a range of factors including abiotic parameters such as water temperature, salinity, depth, local-scale habitat features and substrate type. In addition, biotic parameters include predator-prey interactions, competition and anthropogenic factors such as infrastructure and commercial fishing intensity.

4.2.4.2 The fish assemblage within the fish and shellfish ecology study area includes demersal species: European plaice *Pleuronectes platessa*, dab *Limanda limanda*, solenette *Buglossidium luteum*, Dover sole *Solea solea,* whiting *Merlangius merlangus* lesser spotted dogfish *Scyliorhinus canicula* and cod *Gadus morhua*.

4.2.4.3 European seabass *Dicentrarchus labrax* and thornback ray *Raja clavata* have been recorded in Liverpool Bay, the Dee estuary and Morecambe Bay within the fish and shellfish ecology study area. European seabass caught in local fisheries recorded a bias towards females which is consistent with data from north Wales and could possibly indicate localised spawning (Moore *et al*., 2020).

4.2.4.4 Beam trawl surveys were undertaken in 2010 and 2011 across the Irish Sea Round 3 development zone which overlaps with the southwest of the fish and shellfish ecology study area and partially overlaps with the Transmission Assets Scoping Boundary. The surveys reported that the most dominant fish species present were poor cod *Trisopterus minutus* and the lesser spotted dogfish. The next most common species were dragonet *Callionymus lyra*, grey gurnard *Eutrigla gurnardus* and red gurnard *Aspitrigla cuculus*. The most common commercial fish species was plaice. Seven elasmobranch species were recorded, including cuckoo ray *Raja naevus* and spotted ray *Raja montagui* (CMACS, 2010; Celtic Array Ltd, 2014b).

4.2.4.5 A number of fish surveys have been undertaken across the fish and shellfish ecology study area for surrounding offshore wind farm developments (see Figure 4.5). Beam and otter trawl surveys were undertaken during 2011-2013 for Walney offshore wind farm (year 2 post-construction monitoring), for the West of Duddon Sands offshore wind farm (pre-construction survey) and for the Gwynt y Mor offshore wind farm (pre-construction surveys). All surveys recorded plaice, dab, solenette and the lesser spotted dogfish as the most abundance species (CMACS, 2010; CMACS, 2011; Celtic Array Ltd, 2014b; Brown and May Marine Ltd, 2013; 2012). Cod and whiting were also consistently recorded across the area. Dover sole and cod were identified as species of key commercial importance in the area (Brown and May Marine Ltd, 2013). Sand goby *Pomatoschistus minutus* was recorded in high abundance within the Gwynt y Mor offshore wind farm (CMACS, 2011). A small number of elasmobranch species were also recorded within the Gwynt y Mor offshore wind farm: thornback rays and blonde ray *Raja brachyura* (CMACS, 2011).

4.2.4.6 Basking shark *Cetorhinus maximus* are known to migrate through the Irish Sea, with high numbers of sighting recorded around the Isle of Man (NBN Atlas, 2019). Basking shark have been sighted at a density of 11-50 individuals sighted per 0.5 by 0.5° (degrees) (50 by 50km) to the north of the Isle of Man, within the fish and shellfish ecology study area (Southall *et al.,* 2005). Basking shark have a north-south migration and are expected to occur in the vicinity of the fish and shellfish ecology study area during August to October and during the return migration in March to June (Doherty *et al*., 2017). No basking shark were recorded in the site-specific surveys from March 2020 to August 2021, or from March 2021 to February 2022. Basking shark sightings are unlikely but will be recorded (if sighted) in the remaining months of the site-specific aerial surveys undertaken for marine mammals across the Transmission Assets Scoping Boundary. This data will be presented as part of the fish and shellfish baseline characterisation within PEIR and ES chapter.

Diadromous fish species

4.2.4.7 Diadromous fish are species which migrate between freshwater and the sea during key life history stages (i.e., spawning). These may be anadromous (when fish spend most of their lives at sea but return to freshwater to spawn (e.g., Atlantic salmon *Salmo salar*) or catadromous (when fish spend most of their lives in freshwater but return to the sea to breed (e.g., European eel *Anguilla anguilla*).

4.2.4.8 There is the potential for diadromous fish species to migrate to and from rivers in the vicinity of the Transmission Assets and, therefore, they may migrate through the fish and shellfish ecology study area to rivers during certain periods of the year (NBN Atlas, 2019).

4.2.4.9 Fish and epibenthic surveys carried out in 2013 for the Walney offshore wind farm and in 2012 for the West of Duddon Sands offshore wind farm recorded sea trout *Salmo trutta*, a migratory species of relevance within the fish and shellfish ecology study area (Brown and May Marine Ltd, 2013; 2012).

4.2.4.10 Sea trout, European eel, river lamprey *Lampetra fluviatilis* and Atlantic salmon have been recorded in the estuaries of rivers across the fish and shellfish ecology study area. Twaite shad *Alosa fallax* and allis shad *Alosa alosa* have only been recorded at the mouth of the river Esk in the north of the fish and shellfish ecology study area (NBN Atlas, 2019).

4.2.4.11 Sea lamprey *Petromyzon marinus* have been recorded in the estuaries of the river Dee and the river Mersey. However, these records are from the 1960s and 1970s (NBN Atlas, 2019).

4.2.4.12 European smelt *Osmerus eperlanus* have been recorded in Morecambe Bay, the Mersey estuary and the Ribble estuary (NBN Atlas, 2019). European smelt gather near the mouths of rivers in winter and usually swim up the river between February and April, returning to the sea after spawning.

4.2.4.13 For the purposes of the fish and shellfish assessment, it will be assumed that the aforementioned diadromous species have the potential to occur within the fish and shellfish ecology study area, primarily during key migration periods (e.g., adult migration to spawning rivers and smolt/juvenile migration from natal rivers in the vicinity of the Transmission Assets). For migratory fish species, the fish and shellfish assessment will be to determine whether construction, operation and maintenance or decommissioning activities have the potential to lead to disruption to migration, for example construction noise potentially creating an effective barrier to fish migration. The timing of fish migration will therefore be an important element of the baseline characterisation and this will be collected through a review of desktop data sources e.g., recent papers (e.g., Gardiner *et al*., 2018), local rod catches and fish stock reports (Cefas and Environment Agency 2017).

Shellfish assemblage

4.2.4.14 North Wales has a long history of scallop fisheries with both king *Pecten maximus* and queen scallops *Aequipecten opercularis* regularly fished. Bangor University has conducted eight scallop research surveys in Welsh waters since 2012. The king scallop populations in Liverpool Bay have been recorded in consistently low densities and are dominated by larger, older individuals with little or highly sporadic recruitment occurring. However, the 2019 surveys did record evidence of pre-recruit (<110 mm) scallops in Liverpool Bay (Delargy *et al*., 2019).

4.2.4.15 Shellfish recorded in the trawl surveys undertaken in 2010 and 2011 across the Rhiannon offshore wind farm were king scallop, queen scallop, common whelk *Buccinum undatum*, edible crab *Cancer pagurus*, lobster *Homarus Gammarus*, brown shrimp *Crangon crangon* and horse mussel *Modiolus modiolus*. Queen scallop were the most numerous shellfish species recorded (Celtic Array Ltd, 2014b).

4.2.4.16 Beam trawl surveys carried out in 2012 for the West of Duddon Sands offshore wind farm, in 2013 for the Walney offshore wind farm and in 2011 for the Gwynt y Mor offshore wind farm recorded a number of shellfish species within the fish and shellfish ecology study area. Frequently recorded species included: *Nephrops norvegicus*, swimming crab *Liocarcinus* sp., brown shrimp *Crangon allmanni*, transparent razor shell *Phaxas pellucidus*, prickly cockle *Acanthocardia* echinata and the common whelk (Brown and May Marine Ltd, 2013; 2012; CMACS, 2011).

4.2.4.17 *Nephrops* have been consistently recorded across the Walney offshore wind farm with the highest number of individuals (3,296) in a single otter trawl recorded in 2009 (Brown and May Marine Ltd, 2013). The otter trawl surveys for the Walney offshore wind farm post construction monitoring recorded *Nephrops* as the most abundant shellfish species. *Nephrops* were identified as a species of key commercial importance in the area (Brown and May Marine Ltd, 2013). Beam trawl surveys carried out in 2012 for the West of Duddon Sands offshore wind farm also recorded Nephrops West of

Duddon Sands offshore wind farm array area, which is within the within the fish and shellfish ecology study area.

Spawning and nursery grounds

4.2.4.18 Potential nursery and spawning areas in the Irish Sea for a range of species were identified by Coull *et al*. (1998), based on larvae, egg and benthic habitat data. Ellis *et al*. (2012) reviewed this data for several fin fish species in the Irish Sea, including cod, whiting and herring, providing an updated understanding of areas of low and high intensity nursery and spawning grounds.

4.2.4.19 Based on this data, spawning areas and nursery habitats for several species overlap the fish and shellfish ecology study area. Species with known spawning periods and nursery habitats identified within the fish and shellfish ecology study area have been summarised in Table 4.8, and illustrated in Figure 4.6 to Figure 4.15.

Table 4.8: Key species with geographic spawning and nursery overlap with the fish and shellfish ecology study area (Coull *et al*., 1998 and Ellis *et al*., 2012. Mapped in Figure 4.6 to Figure 4.15).

Common name	Species	Spawning	Nursery
Anglerfish	Lophius piscatorius	×	✓
Cod	Gadus morhua	✓	✓
European Hake	Merluccius merluccius	✓	×
Haddock	Melanogrammus aeglefinus	×	✓
Herring	Clupea harengus	✓	✓
Horse mackerel	Trachurus trachurus	✓	×
Lemon sole	Microstomus kitt	✓	✓
Ling	Molva molva	✓	×
Mackerel	Scomber scombrus	✓	✓
Nephrops	Nephrops norvegicus	✓	✓
Plaice	Pleuronectes platessa	✓	✓
Sandeels	Ammodytidae	✓	✓
Sole	Solea solea	✓	✓
Spotted ray	Raja montagui	×	✓
Sprat	Clupeidae sp.	✓	×
Spurdog	Squalus acanthias	×	✓
Thornback ray	Raja clavata	×	✓
Tope shark	Galeorhinus galeus	×	✓
Whiting	Merlangius merlangus	✓	✓

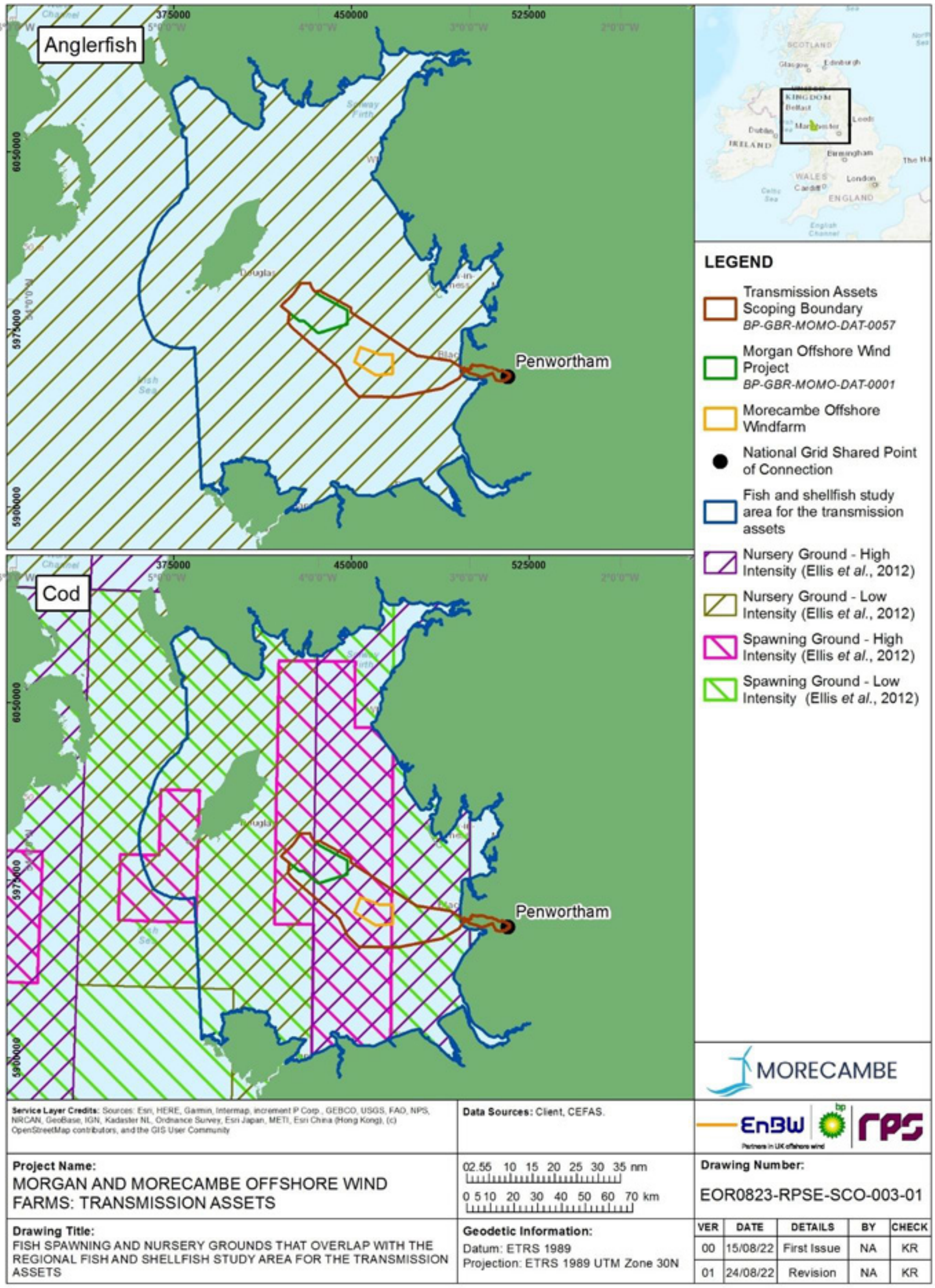


Figure 4.6: Anglerfish and cod spawning and nursery grounds in the vicinity of the Transmission Assets Scoping Boundary (Coull *et al*., 1998 and Ellis *et al*., 2012).

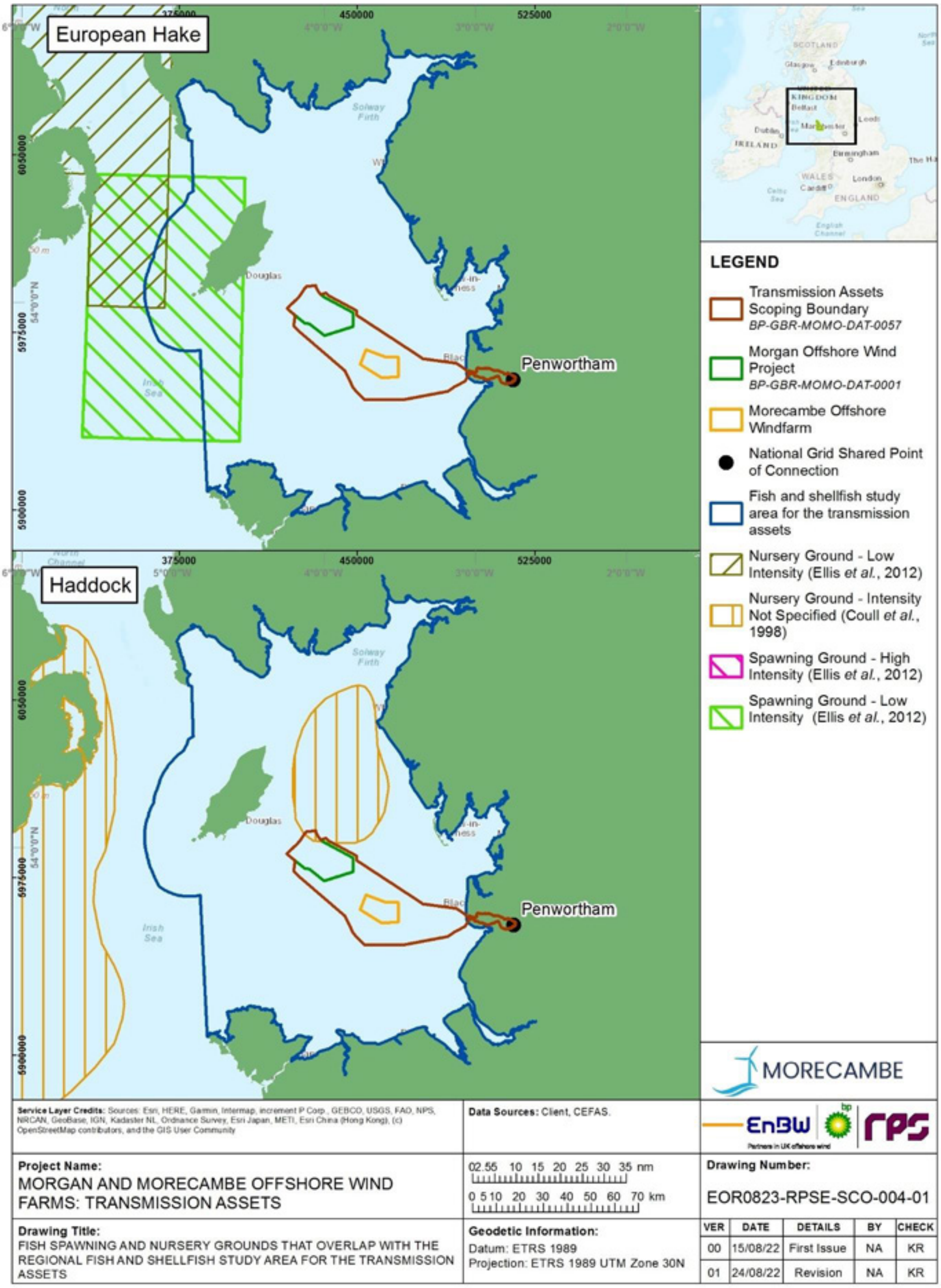


Figure 4.7: European hake and haddock spawning and nursery grounds in the vicinity of the Transmission Assets Scoping Boundary (Coull *et al*., 1998 and Ellis *et al*., 2012).

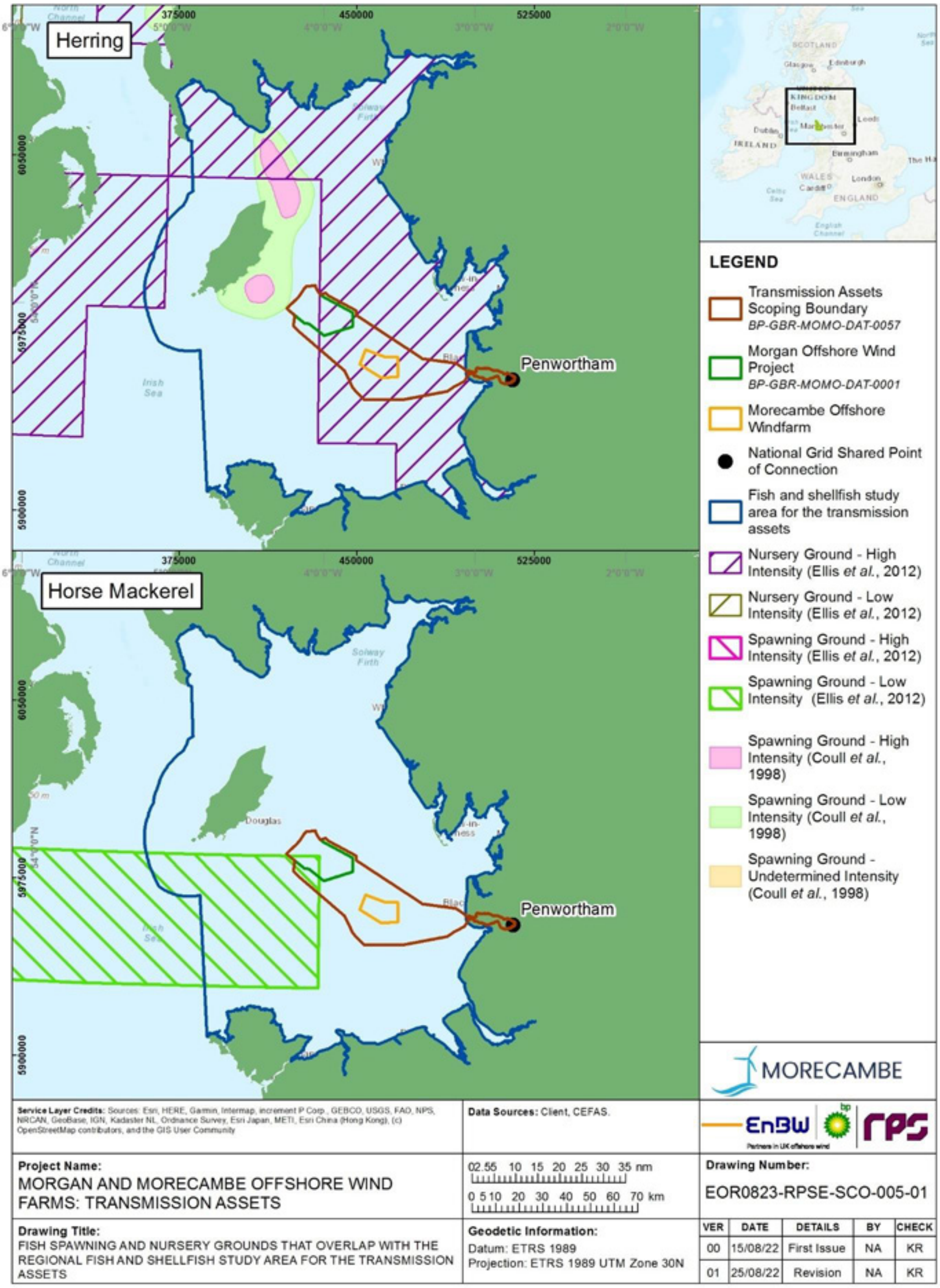


Figure 4.8: Herring and horse mackerel spawning and nursery grounds in the vicinity of the Transmission Assets Scoping Boundary (Coull *et al*., 1998 and Ellis *et al*., 2012).

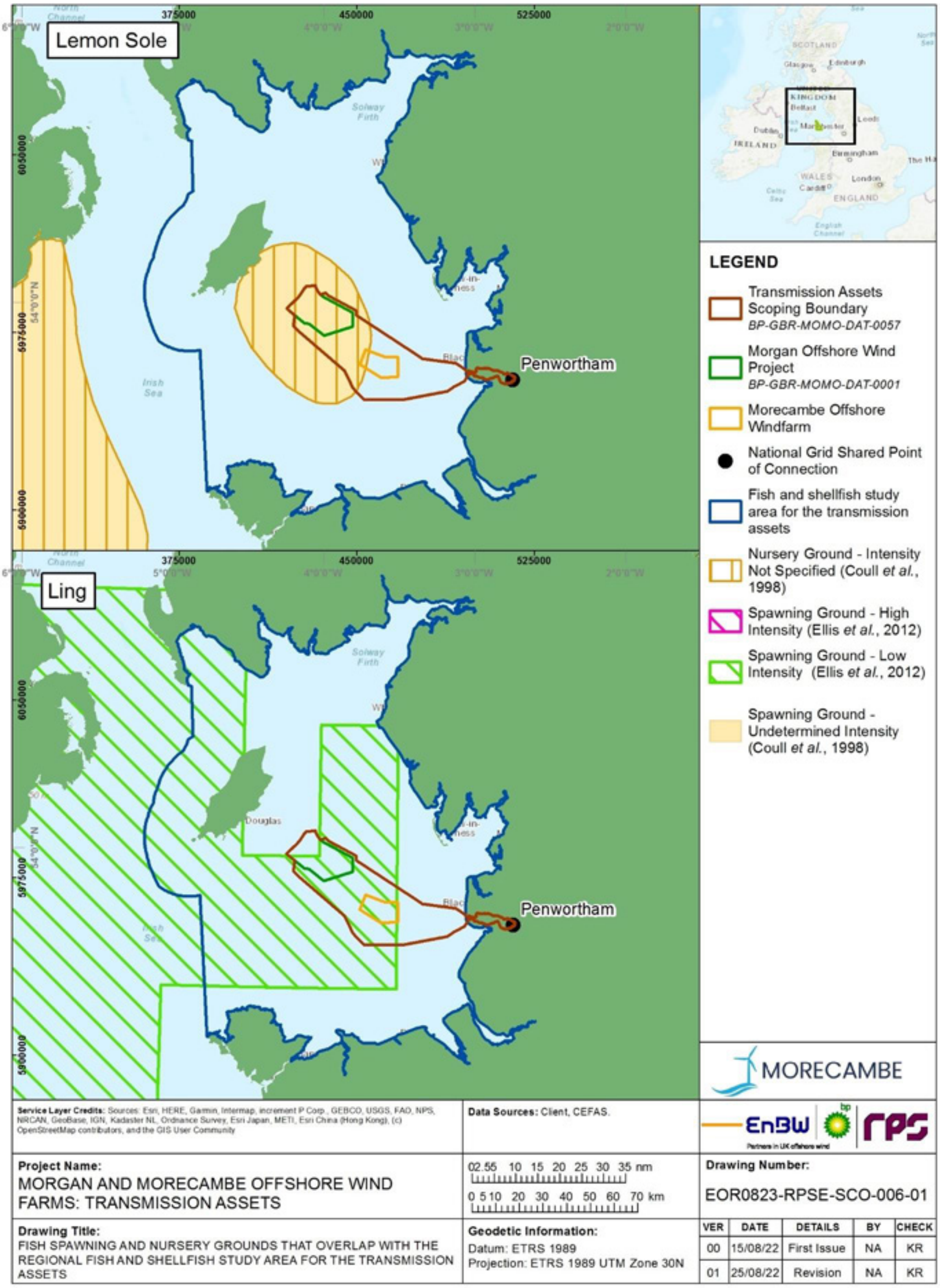


Figure 4.9: Lemon sole and ling spawning and nursery grounds in the vicinity of the Transmission Assets Scoping Boundary (Coull *et al*., 1998 and Ellis *et al*., 2012).

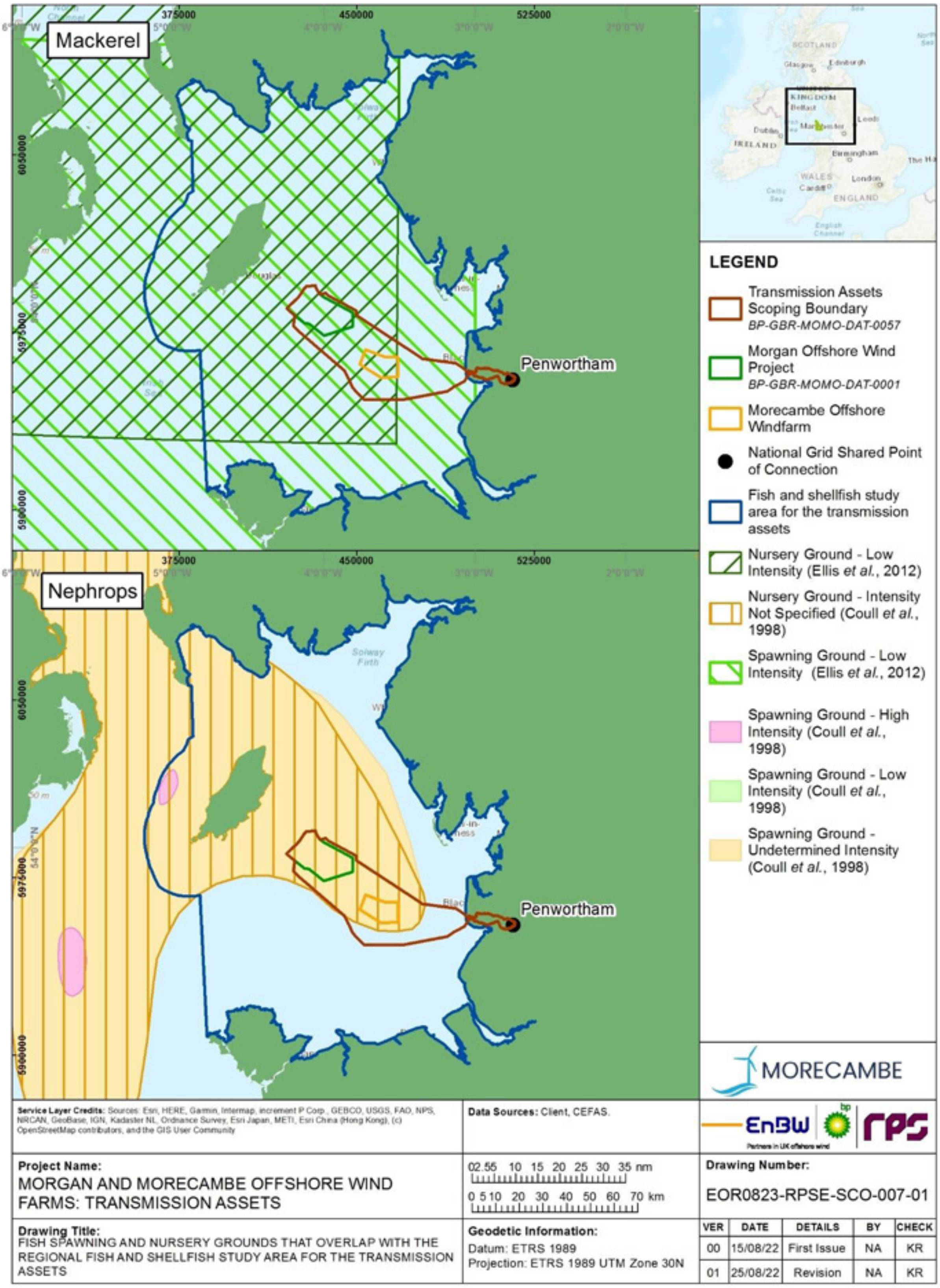


Figure 4.10: Mackerel and Nephrops spawning and nursery grounds in the vicinity of the Transmission Assets Scoping Boundary (Coull *et al*., 1998 and Ellis *et al*., 2012).

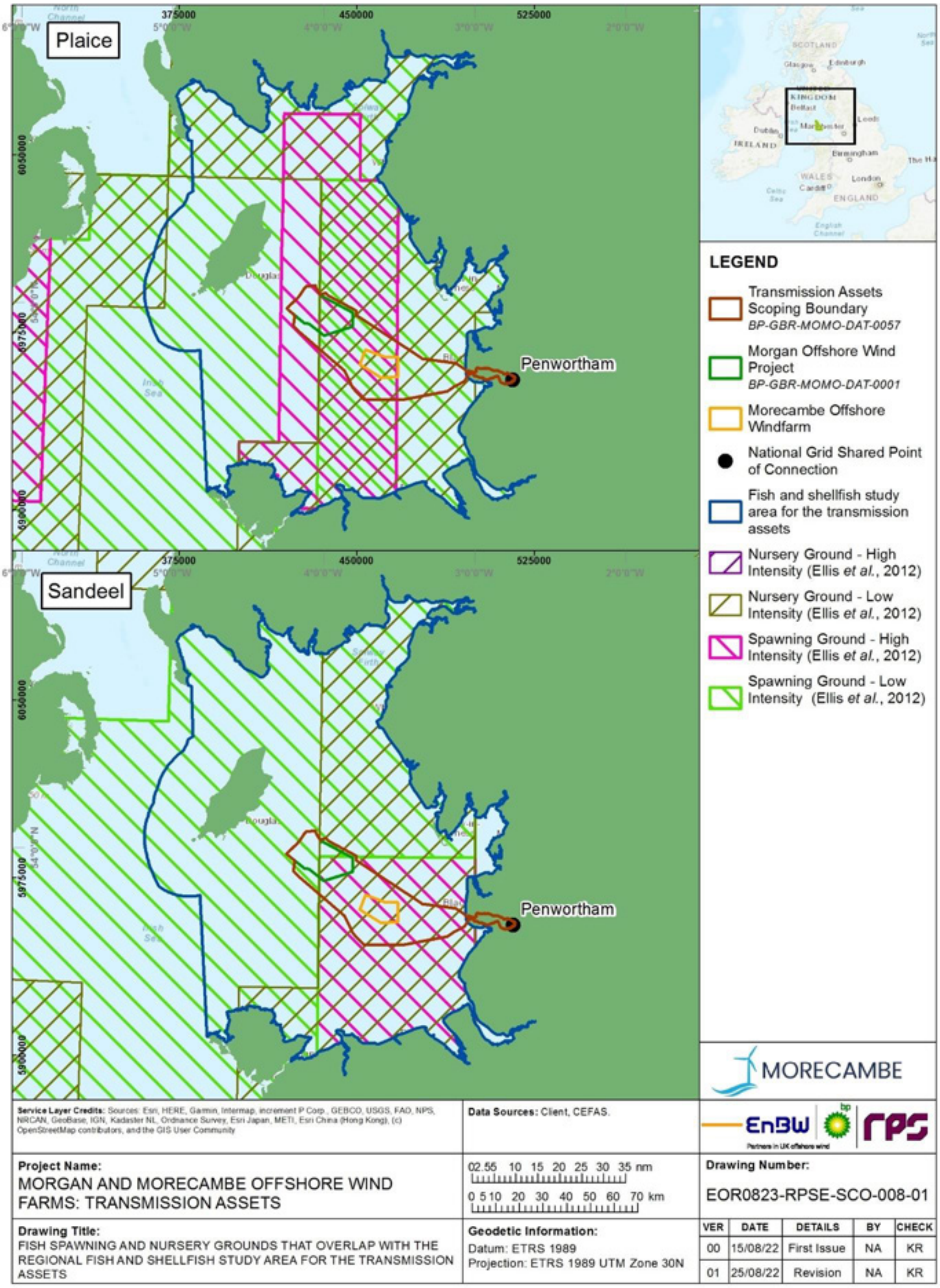


Figure 4.11: Plaice and Sandeel and sole spawning and nursery grounds in the vicinity the Transmission Assets Scoping Boundary (Coull *et al*., 1998 and Ellis *et al*., 2012).

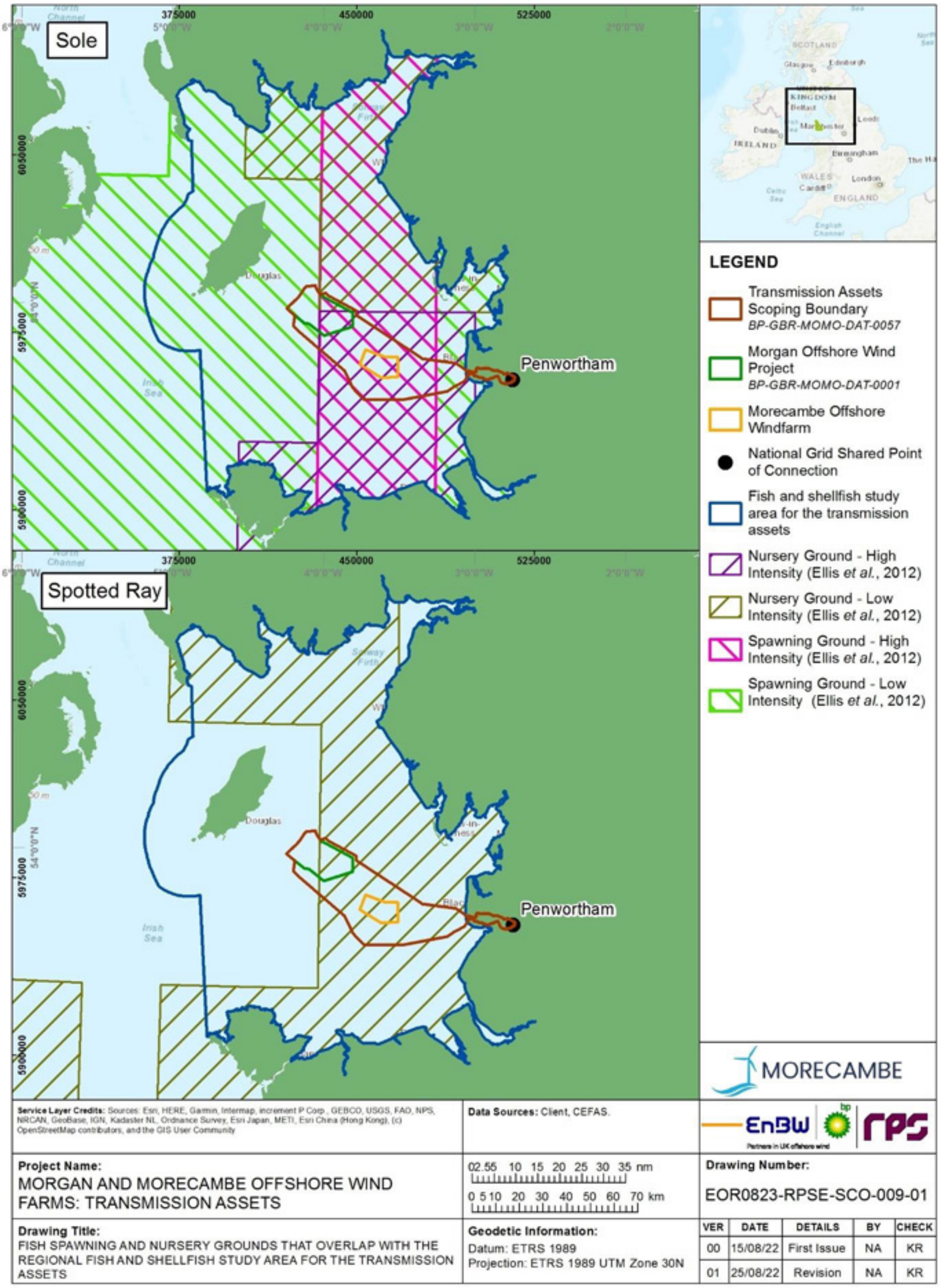


Figure 4.12: Sole and Spotted ray spawning and nursery grounds in the vicinity of the Transmission Assets Scoping Boundary (Coull *et al*., 1998 and Ellis *et al*., 2012).

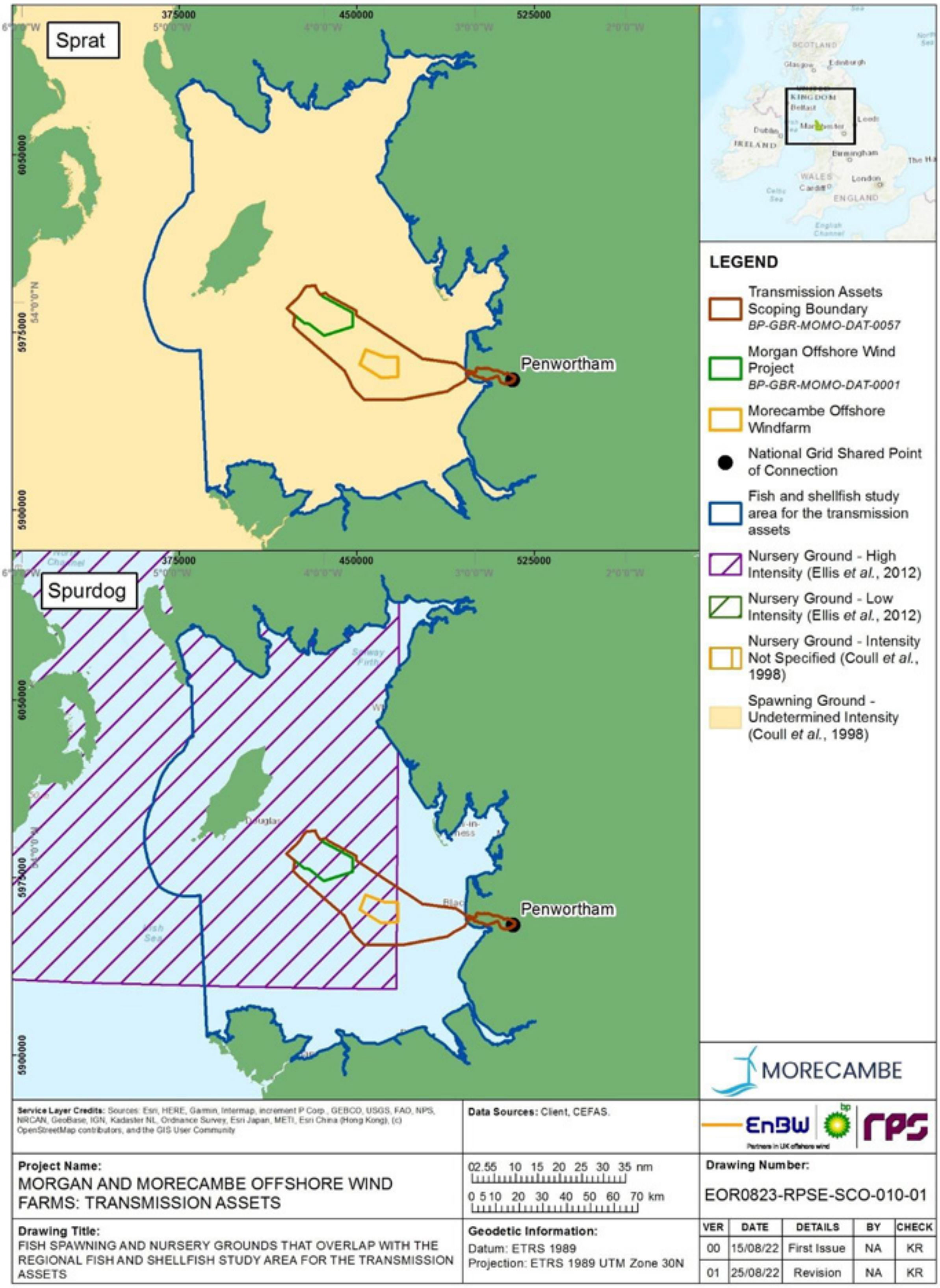


Figure 4.13: Sprat and Spurdog spawning and nursery grounds in the vicinity of the Transmission Assets Scoping Boundary (Coull *et al*., 1998 and Ellis *et al*., 2012).

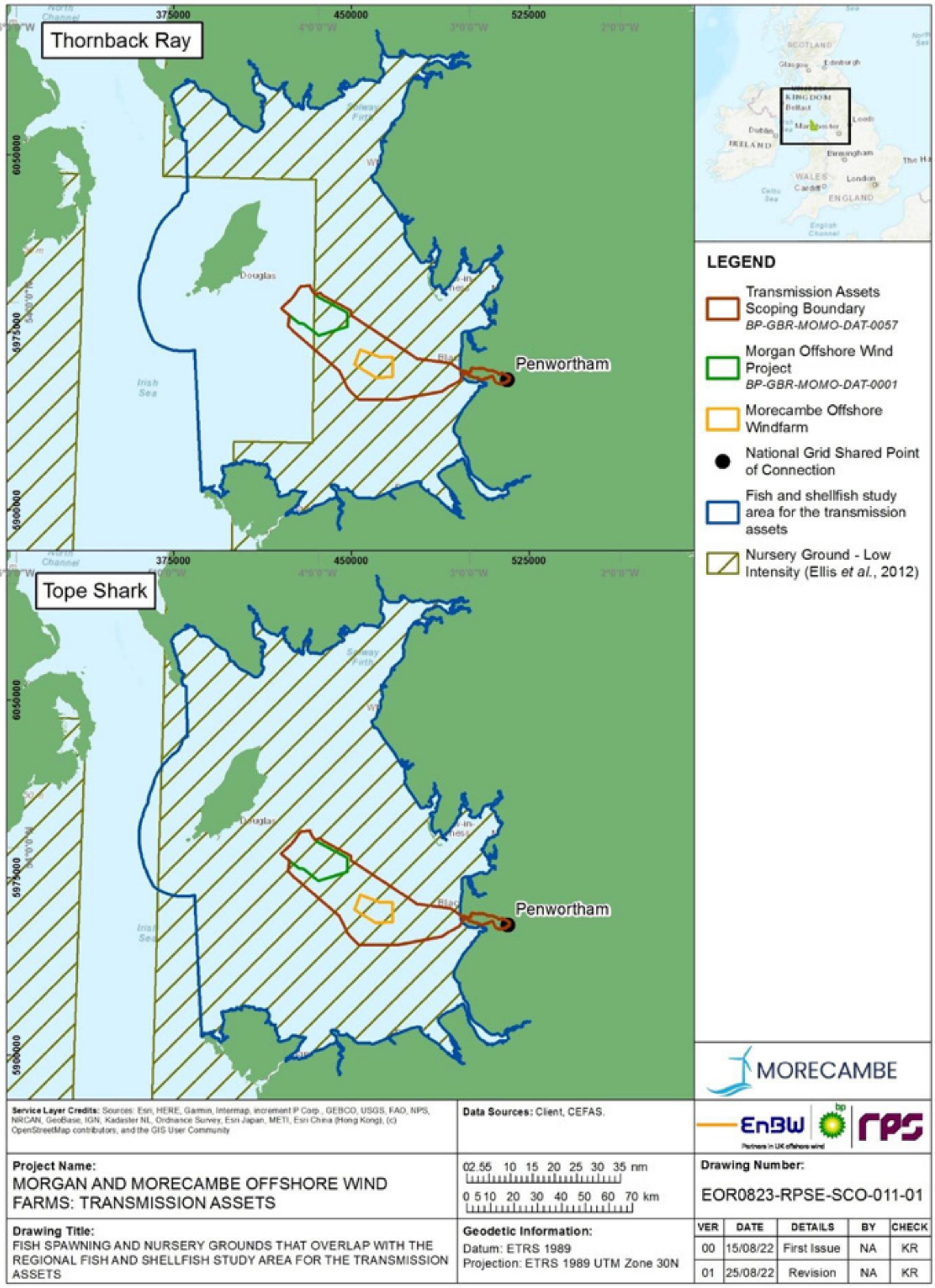


Figure 4.14: Thornback ray and Tope shark spawning and nursery grounds in the vicinity of the Transmission Assets Scoping Boundary (Coull *et al*., 1998 and Ellis *et al*., 2012).

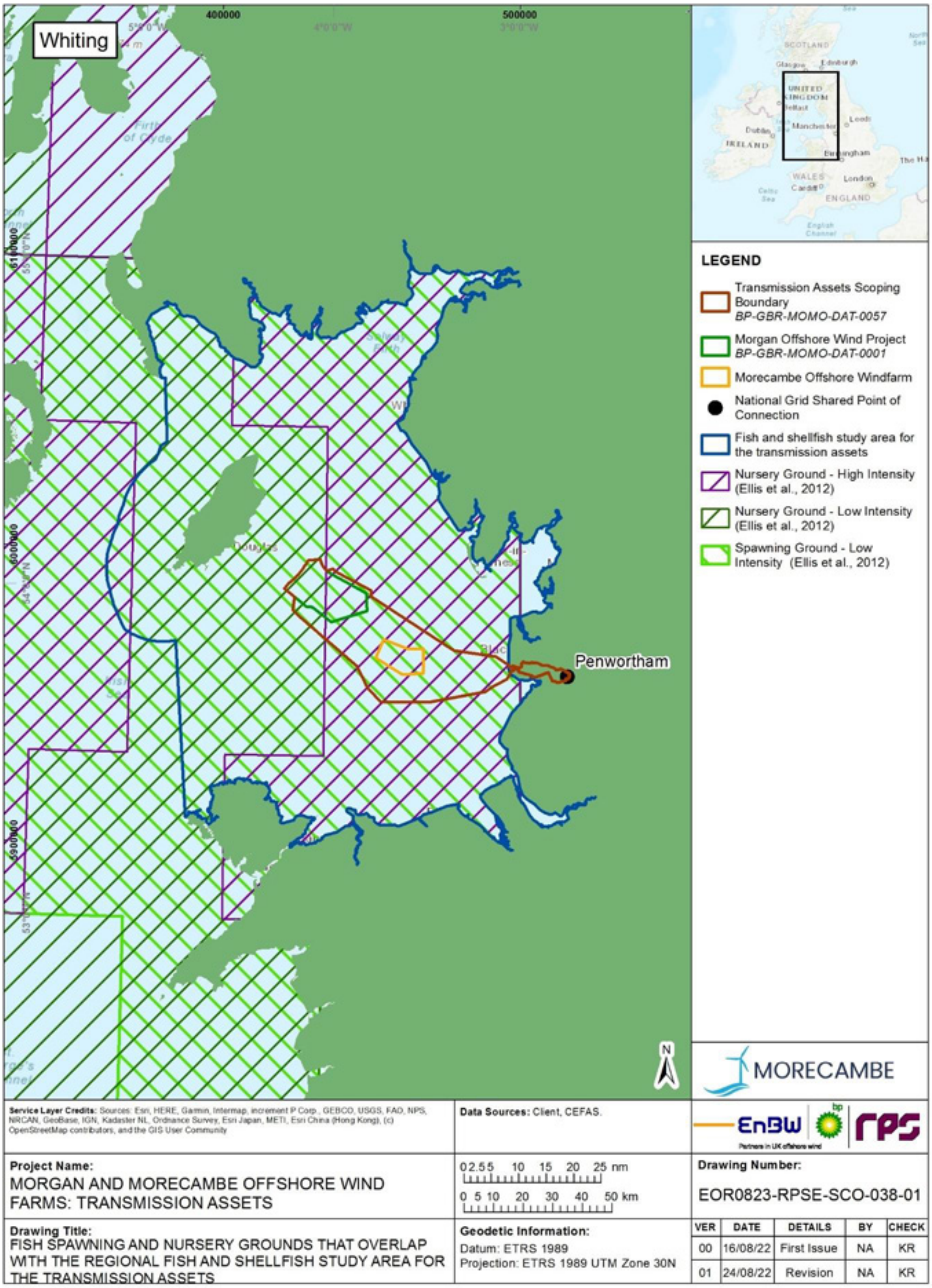


Figure 4.15: Whiting spawning and nursery grounds in the vicinity of the Transmission Assets Scoping Boundary (Ellis *et al*., 2012).

4.2.4.20 A review of spawning and nursery grounds suggests there is an overlap of the fish and shellfish ecology study area with herring spawning and nursery grounds. For nursery grounds this overlap occurs across the east of the Transmission Assets Scoping Boundary and is high intensity (Ellia *et al*., 2012; Figure 4.7). The AFBI in Northern Ireland has undertaken herring larvae surveys of the northern Irish Sea in November every year since 1993. The 2019 survey results recorded that the majority of herring larvae were captured in the east Irish Sea in the vicinity of the Douglas Bank spawning ground and to the north of the Isle of Man (ICES, 2021). Additional data will be requested on the north Irish Sea herring larvae survey from the AFBI to support the baseline characterisation presented within the fish and shellfish ecology assessment.

4.2.4.21 Herring is a commercially and ecologically important pelagic fish species (being an important prey species for numerous fish, marine mammal and bird species) and is common across much of the Irish Sea (Dickey-Collas *et al*., 2001). Herring utilise specific benthic habitats during spawning, which increases their vulnerability to activities impacting the seabed. Further, as a hearing specialist, herring are vulnerable to impacts arising from underwater noise.

4.2.4.22 A further review of the herring spawning and nursery grounds will be undertaken to support the fish and shellfish ecology assessment following guidelines set out by Boyle and New (2018) considering seabed sediment type and herring larval abundances (using data from the AFBI), as outlined above.

Designated sites

4.2.4.23 Designated sites with relevant qualifying features (i.e., fish and shellfish species) which overlap with the fish and shellfish ecology study area are described in this section.

4.2.4.24 Table 4.9 and Figure 4.16 provide an indication of the designated sites (including migratory fish features) that may be considered within the EIA, LSE Screening Report and potentially the ISAA if an LSE is identified as part of the HRA process. This list of designated sties will be refined in the EIA process, to include sites that fall within the potential ZOI for the Transmission Assets, which will be determined as part of the EIA process as a more detailed understanding of the project activities and impacts pathway develops.

4.2.4.25 A full screening of European sites and National Network Sites with qualifying fish features will be undertaken in the LSE Screening Report for the Transmission Assets as part of the HRA process. Relevant Annex II fish species of designated sites screened into the fish and shellfish ecology assessment will be fully considered and assessed in the fish and shellfish ecology assessment. The assessment on the designated sites and effects on the site(s) conservation objectives will be undertaken in the ISAA.

4.2.4.26 The fish and shellfish ecology assessment will also include consideration of nationally designated sites (i.e., Marine Nature Reserves (MNR) and recommended and designated MCZs). Nationally designated sites and the relevant qualifying features will also be fully considered and assessed in the fish and shellfish ecology assessment for the ES, where there is potential for significant effects on these. MCZs and their features will be considered within a separate MCZ Assessment.

Table 4.9: Summary of designated sites with relevant fish and shellfish ecology features within the fish and shellfish ecology study area.

Designated Site	Distance to the Transmission Assets Scoping Boundary (km)	Features
Ribble Estuary MCZ	0	• Smelt (Osmeridae)
Wyre-Lune MCZ	6.9	• Smelt (Osmeridae)
Dee Estuary/Aber Dyfrdwy SAC	28.5	• Sea lamprey (*Petromyzon marinus*) • River lamprey (*Lampetra fluviatilis*)
Langness MNR	16.7	• European eel (*Anguilla anguilla*) • Icelandic clam (*Arctica islandica*) • Cod (spawning/nursery)
Little Ness MNR	20.4	• European eel (*Anguilla anguilla*)
Douglas Bay MNR	22.2	• European eel (*Anguilla anguilla*)
Laxey Bay MNR	22.4	• Icelandic clam (*Arctica islandica*)
Baie Ny Carrickey MNR	30.2	• European eel (*Anguilla anguilla*) • Spiny lobster (*Palinuridae*)
Ramsey Bay MNR	26.4	• European eel (*Anguilla anguilla*) • Icelandic clam (*Arctica islandica*)
River Dee and Bala Lake/Afon Dyfrdwy a Llyn Tegid SAC	52.6	• Sea lamprey (*Petromyzon marinus*) • Atlantic salmon (*Salmo salar*) • River lamprey (Lampetra fluviatilis) • Brook lampreys (*Lampetra planeri*) • Bullhead (*Cottus gobio*)*
Calf and Wart Bank MNR	35.8	• Spiny lobster (*Palinuridae*) • Flame shell (*Limaria hians*) • Sand eel
Niarbyl MNR	36.7	• Icelandic clam (*Arctica islandica*)
Port Erin Bay MNR	36.8	• Flame shell (*Limaria hians*) • Icelandic clam (*Arctica islandica*)
West Coast MNR	38.5	• European eel (Anguilla anguilla) • Common skate (*Dipturus batis*) • Cod (spawning/nursery) • Sand eel • Seabass nursery
River Ehen SAC	55.7	• Atlantic salmon (*Salmo salar*)
River Derwent and Bassenthwaite Lake SAC	64.9	• Sea lamprey (*Petromyzon marinus*) • Atlantic lalmon (*Salmo salar*) • River lamprey (*Lampetra fluviatilis*) • Brook lampreys (*Lampetra planeri*)
Allonby Bay MCZ	78.5	• Blue mussel (*Mytilus edulis*) beds
Solway Firth SAC	84.3	• Sea lamprey (*Petromyzon marinus*) • River lamprey (*Lampetra fluviatilis*)
Solway Firth MCZ	98.4	• Smelt (Osmeridae)

*Bull head is a wholly freshwater species therefore there is no impact-pathway for this species.

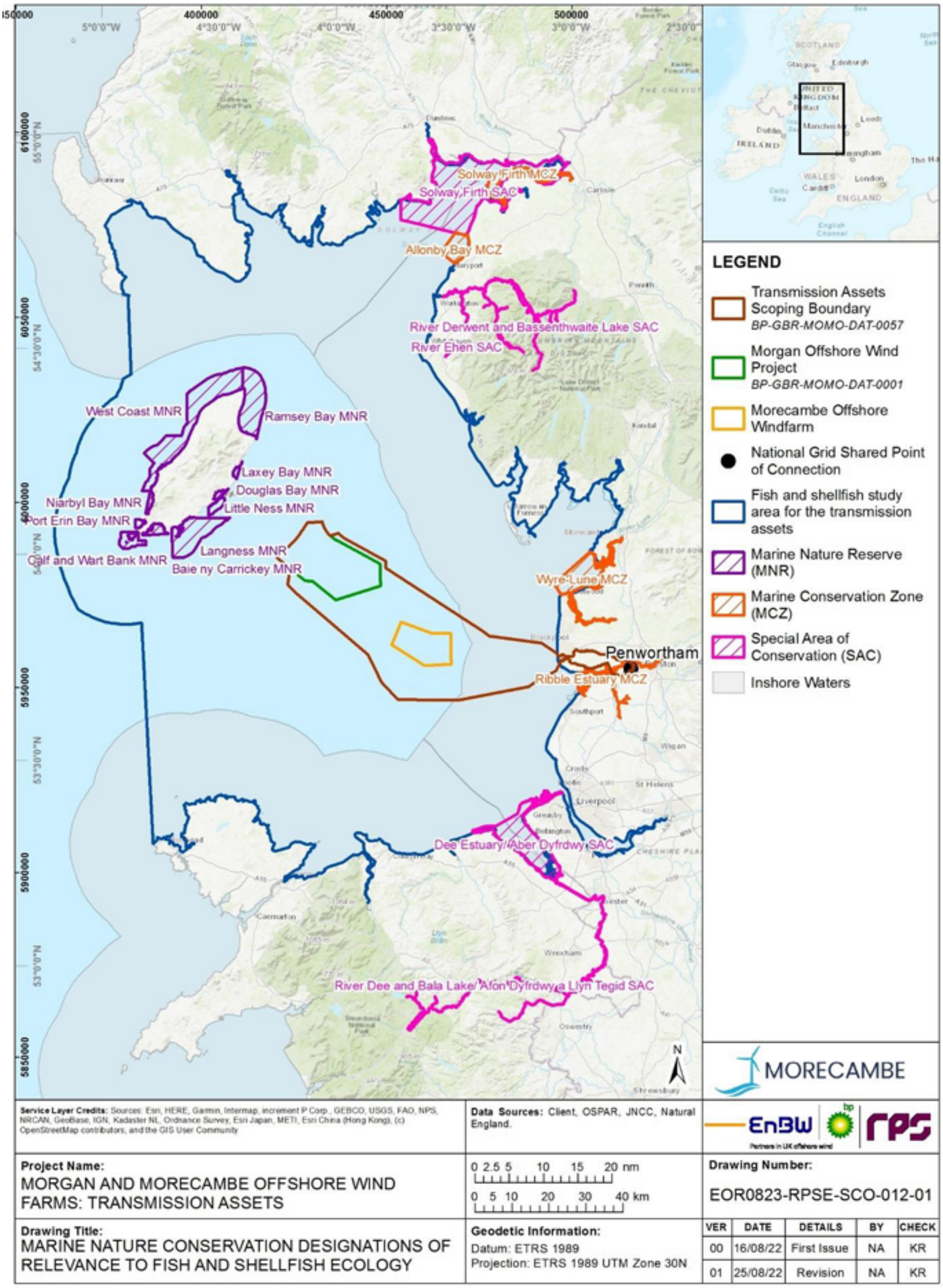


Figure 4.16: Marine nature conservation designations of relevance to fish and shellfish ecology that overlap with the Transmission Assets fish and shellfish ecology study area.

Protected Species

4.2.4.27 Several species of conservation importance have been recorded or have the potential to occur within the fish and shellfish ecology study area. These are presented below in Table 4.10. These species are protected under Annex II of the Habitats Directive or listed as 'species of principal importance' under Section 41 in England of the Natural Environment and Rural Communities (NERC) Act 2006. Where species are afforded protection under other legislation, this has also been noted.

Table 4.10: Relevant protected fish and shellfish species within the fish and shellfish ecology study area.

Fish and Shellfish Species	Protection legislation
Salmon (*Salmo salar*)	Annex II of the Habitats Directive Habitat of principal importance in England under the Natural Environment and Rural Communities Act 2006 (NERC 2006 Act)
European Eel (*Anguilla anguilla*)	Annex II of the Habitats Directive Habitat of principal importance in England under the NERC 2006 Act UK Biodiversity Action Plan (BAP) priority habitat that continues to be regarded as conservation priorities in the subsequent UK Post-2010 Biodiversity Framework Critically endangered on the International Union for Conservation of Nature (IUCN) Red List
Allis shad (*Alosa alosa*)	Annex II of the Habitats Directive Habitat of principal importance in England under the NERC 2006 Act Schedule 5 of the Wildlife and Countryside Act 1981
Twaite shad (*Alosa fallax)*	Annex II of the Habitats Directive Habitat of principal importance in England under the NERC 2006 Act Schedule 5 of the Wildlife and Countryside Act 1981
River lamprey (*Lampetra fluviatilis*)	Annex II of the Habitats Directive Habitat of principal importance in England under the NERC 2006 Act
Sea lamprey (*Petromyzon marinus*)	Annex II of the Habitats Directive Habitat of principal importance in England under the NERC 2006 Act
Sea trout (*Salmo trutta*)	Habitat of principal importance in England under the NERC 2006 Act UK BAP priority habitat that continues to be regarded as conservation priorities in the subsequent UK Post-2010 Biodiversity Framework
Smelt (*Osmerus eperlanus*)	Habitat of principal importance in England under the NERC 2006 Act UK BAP priority habitat that continues to be regarded as conservation priorities in the subsequent UK Post-2010 Biodiversity Framework
Basking shark (*Cetorhinus maximus*)	Habitat of principal importance in England under the NERC 2006 Act Schedule 5 of the Wildlife and Countryside Act 1981 UK BAP priority habitat that continues to be regarded as conservation priorities in the subsequent UK Post-2010 Biodiversity Framework
Angel shark (*Squatina squatina*)	Habitat of principal importance in England under the NERC 2006 Act Schedule 5 of the Wildlife and Countryside Act 1981 UK BAP priority habitat that continues to be regarded as conservation priorities in the subsequent UK Post-2010 Biodiversity Framework
Atlantic cod (*Gadus morhua*)	Habitat of principal importance in England under the NERC 2006 Act UK BAP priority habitat that continues to be regarded as conservation priorities in the subsequent UK Post-2010 Biodiversity Framework OSPAR threatened and/or declining species Vulnerable on the IUCN Red List.

Fish and Shellfish Species	Protection legislation
Whiting (Merlangius merlangus)	Habitat of principal importance in England under the NERC 2006 Act UK BAP priority habitat that continues to be regarded as conservation priorities in the subsequent UK Post-2010 Biodiversity Framework
European hake (Merluccius merluccius)	Habitat of principal importance in England under the NERC 2006 Act UK BAP priority habitat that continues to be regarded as conservation priorities in the subsequent UK Post-2010 Biodiversity Framework
Thornback ray (*Raja clavata*)	Habitat of principal importance in England under the NERC 2006 Act

Future baseline conditions

4.2.4.28 The EIA process will consider the existing baseline conditions within the study area, and future baseline conditions (as far as reasonably practicable) in accordance with the methodology set out in part 1, section 5 (see section 5.7.2 for the approach to consideration of future baseline conditions).

4.2.5 Potential project impacts

4.2.5.1 A range of potential impacts on fish and shellfish ecological receptors have been identified which may occur during the construction, operation and maintenance, and decommissioning phases of the Transmission Assets.

4.2.5.2 The impacts that have been scoped into the assessment are outlined in Table 4.11 together with a description of any additional data collection (e.g., site-specific surveys) and supporting analyses (e.g., modelling) that will be required to enable a full assessment of the impacts.

4.2.5.3 Potential impacts scoped out of the assessment are presented in Table 4.12, with justification.

Table 4.11: Impacts proposed to be scoped in to the project assessment for fish and shellfish ecology (project phase refers to construction (C), operation and maintenance (O) and decommissioning (D)).

Impact	Project phase			Justification	Data collection and analysis required to characterise the baseline environment	Summary of proposed approach to assessment
	C	O	D			
Temporary habitat loss/disturbance.	✓	✓	✓	There is potential for temporary, direct habitat loss and disturbance as a result of site preparation activities in advance of cable installation activities (including, UXO detonation, pre-cabling seabed clearance and anchor placements), and placement of spud-can legs from jack-up operations. Temporary habitat loss/disturbance may occur during the operation and maintenance phase as a result of operations (e.g., cable repair/reburial, use of jack-up vessels to facilitate OSP component repairs etc.). The impacts associated with these operations are likely to be similar in nature to those associated with the construction phase although of reduced magnitude. There is potential for temporary, direct habitat loss and disturbance due to decommissioning activities to remove export and interconnector cables resulting in potential effects on fish and shellfish ecology.	There is wide-ranging and comprehensive desktop information and data sources available to characterise the fish and shellfish ecology study area (as set out in part 2, sections 4.2.3 and 4.2.4 of this EIA Scoping Report) therefore no site-specific surveys are proposed.	No specific modelling is required to inform this impact assessment although the assessment will be quantitative in nature (i.e., clearly presenting the maximum spatial scale of impacts). This assessment will be based on information derived from the PDE. The significance of effects upon fish and shellfish receptors will be determined by correlating the magnitude of the impact and the sensitivity of the receptor. Where possible, the magnitude of the impact will be quantified for the MDS. For example, the MDS for habitat loss/ disturbance will be quantified and the assessment will present the areas of habitat potentially affected in the context of the size of the fish and shellfish ecology study area.
Underwater noise impacting fish and shellfish receptors.	✓	✓	✓	There is potential for mortality, injury and/ or disturbance to sensitive fish and shellfish species as a result of construction activities such as UXO detonation, pile-driving, pre-construction geophysical surveys and similar for decommissioning activities.	There is wide-ranging and comprehensive desktop information and data sources available to characterise the fish and shellfish ecology study area (as set out in part 2, sections 4.2.3 and 4.2.4 of this EIA Scoping Report) therefore no site-specific surveys are proposed.	Underwater noise modelling outputs from the Morgan Offshore Wind Project Generation Assets and the Morecambe Offshore Windfarm Project Generation Assets will be included in the Transmission Assets impact assessment to inform the magnitude of impact, as set out in part 2, section 3.2: Underwater noise of this EIA Scoping Report to inform the assessment of underwater noise impacts to fish and shellfish.

Impact	Project phase			Justification	Data collection and analysis required to characterise the baseline environment	Summary of proposed approach to assessment
	C	O	D			
						This will use the most up to date best practice guidelines (i.e. Popper *et al.,* 2014) and other scientific literature to give consideration to the potential for injury and disturbance to fish and shellfish species, including disruption to spawning activity for marine fish species, disruption to migration of diadromous fish species, with a particular focus on potential barriers to migration. In particular, the hearing ability of fish species will be considered, and both sound pressure and particle motion will be considered. Impacts during the decommissioning phase are anticipated to be less than or equal to the construction phase.
Underwater noise from non-piling activities during all phases.	✓	✓	✓	Underwater noise associated with non-piling activities during construction, maintenance and decommissioning activities (e.g. vessel movement and cable repairs, removal of infrastructure) may lead to injury and/or disturbance to sensitive fish and shellfish species as a result of noise producing activities.	There is wide-ranging and comprehensive desktop information and data sources available to characterise the Transmission Assets fish and shellfish ecology study area (as set out in part 2, sections 4.2.3 and 4.2.4 of this EIA Scoping Report) therefore no site-specific surveys are proposed.	Comparative noise modelling for non-piling 'noisy' activities will be undertaken to inform a qualitative assessment of non-piling noise-generating activities, e.g.vessel movement.
Increased suspended sediment concentrations (SSCs) and associated sediment deposition.	✓	✓	✓	Sediment disturbance arising from construction activities (e.g., foundation and cable installation – including drilling and any deposits arising, UXO detonation and seabed preparation); maintenance operations (e.g., cable repair/ reburial.); and decommissioning activities (e.g., cable and foundation removal) may result in indirect impacts on fish and shellfish communities due to temporary increases in SSCs and associated sediment deposition (i.e. smothering effects).	There is wide-ranging and comprehensive desktop information and data sources available to characterise the fish and shellfish ecology study area (as set out in part 2, sections 4.2.3 and 4.2.4 of this EIA Scoping Report) therefore no site-specific surveys are proposed.	A literature review and analysis of existing numerical modelling undertaken for the physical processes assessment (will inform this impact assessment. This will include consideration of the potential for effects on spawning habitats (i.e., changes to sediment composition, smothering of eggs etc.) and disturbance to migration of diadromous fish species. This will consider differing sensitivities of the identified receptors and life history stages to this impact. Impacts during the decommissioning phase are anticipated to

Impact	Project phase			Justification	Data collection and analysis required to characterise the baseline environment	Summary of proposed approach to assessment
	C	O	D			
						be less than or equal to the construction phase.
Long term habitat loss.	✓	✓	✓	There is the potential for long-term habitat loss to occur directly under all foundation structures and associated scour protection, and under any cable protection required along the export and interconnector cables. As foundations are installed throughout the construction phase this impact is also relevant to the construction phase although the impact will largely occur throughout the operation and maintenance phase. Permanent habitat loss may occur under any infrastructure that is not decommissioned at the end of the Transmission Assets lifetime.	There is wide-ranging and comprehensive desktop information and data sources available to characterise the fish and shellfish ecology study area (as set out in part 2, sections 4.2.3 and 4.2.4 of this EIA Scoping Report) therefore no site-specific surveys are proposed.	No specific modelling is required to inform this impact assessment, although the assessment will be quantitative in nature (i.e. clearly presenting the maximum spatial scale of impacts). This assessment will be based on information derived from the PDE. The significance of effects upon fish and shellfish receptors will be determined by correlating the magnitude of the impact and the sensitivity of the receptor. Where possible, the magnitude of the impact will be quantified for the MDS.
Electromagnetic Fields (EMF) from subsea electrical cabling.	✓	✓	✓	EMF generated through the subsea electrical cabling may affect fish and shellfish prey/predator relationship by inhibiting/interfering with fish and shellfish behaviours due to changes in background EMFs.	There is wide-ranging and comprehensive desktop information and data sources available to characterise the fish and shellfish ecology study area (as set out in part 2, sections 4.2.3 and 4.2.4 of this EIA Scoping Report) therefore no site-specific surveys are proposed.	No specific modelling is required to inform this impact assessment. A qualitative assessment will be undertaken and presented in the ES, based on a thorough review of the available scientific information on EMFs in the marine environment and effects on fish and shellfish ecology receptors. This assessment will be based on information derived from the PDE. The significance of effects upon fish and shellfish receptors will be determined by correlating the magnitude of the impact and the sensitivity of the receptor.
Colonisation of hard structures.	✓	✓	✓	Artificial structures placed on the seabed (i.e., foundations and scour/cable protection) in the offshore environment are expected to be colonised by a range of marine organisms leading to localised increases in biodiversity and/ or	There is wide-ranging and comprehensive desktop information and data sources available to characterise the fish and shellfish ecology study area (as set out in part 2, sections 4.2.3 and 4.2.4 of this EIA	No specific modelling is required to inform this impact assessment therefore a qualitative assessment will be undertaken and presented in the ES, based on a thorough review of the available scientific information on colonisation of hard structures, including from offshore wind

Impact	Project phase			Justification	Data collection and analysis required to characterise the baseline environment	Summary of proposed approach to assessment
	C	O	D			
				aggregation of fish and shellfish in the vicinity of structures.	Scoping Report) therefore no site-specific surveys are proposed.	farms. This assessment will be based on information derived from the PDE. INNS will be considered, particularly in relation to colonisation of hard structures. The significance of effects upon fish and shellfish receptors will be determined by correlating the magnitude of the impact and the sensitivity of the receptor. Where possible, the magnitude of the impact will be quantified for the maximum design scenario.
Disturbance/remobilisation of sediment-bound contaminants.	✓	✓	✓	Seabed disturbance associated with construction, maintenance and decommissioning activities (e.g., foundation and cable installation) could lead to the remobilisation of sediment-bound contaminants that may result in harmful and adverse effects on fish and shellfish communities.	There is wide ranging and comprehensive desktop information and data sources available to characterise the fish and shellfish ecology study area. However, the majority of the available sediment chemistry data is from the Rhiannon offshore wind farm surveys therefore is not focused over the Transmission Assets Scoping Boundary therefore there is not sufficient information to scope out this impact. Targeted benthic subtidal surveys have been undertaken in spring/ summer 2022 within the Transmission Assets Scoping Boundary. The requirement for the samples collected as part of the benthic subtidal survey to be analysed for sediment-bound contaminants would be agreed with consultees as part of the Evidence Plan process.	No specific modelling is required to inform this impact assessment. A qualitative assessment will be undertaken and presented in the ES, based on a thorough review of the site-specific information on contaminants in the Transmission Assets Scoping Boundary and available scientific evidence on the effects on fish and shellfish ecology receptors. This assessment will be based on information derived from the PDE. The significance of effects upon fish and shellfish receptors will be determined by correlating the magnitude of the impact and the sensitivity of the receptor.

Table 4.12: Impacts proposed to be scoped out of the project assessment for fish and shellfish ecology.

Impact	Justification
Accidental pollution during construction, operation and maintenance and decommissioning phases.	There is a risk of pollution being accidentally released during the construction, operation and maintenance and decommissioning phases from sources including vessels/vehicles and equipment/machinery. However, the risk of such events is managed by the implementation of measures set out in standard post-consent plans (e.g., Environmental Management Plan, including MPCP). These plans include planning for accidental spills, address all potential contaminant releases and include key emergency contact details. It will also set out industry good practice and OSPAR (Oslo-Paris), International Maritime Organisation and MARPOL (International Convention for the Prevention of Pollution from Ships) guidelines for preventing pollution at sea. Therefore, the likelihood of an accidental spill occurring is very low and in the unlikely event that such events did occur, the magnitude of these will be minimised through measures such as MPCP. As such, this impact will be scoped out of further consideration within the Fish and shellfish ecology ES chapter.

4.2.6 Measures adopted as part of the project

4.2.6.1 The following measures to be adopted as part of the project are relevant to fish and shellfish ecology. These measures may evolve as the engineering design and EIA progresses.

- Development and adherence to a Cable Specification and Installation Plan which will include cables to be buried to where possible and cable protection as necessary. The potential impact of this measure will be consulted upon with statutory consultees throughout the EIA process.
- Implementation of piling soft-start and ramp-up measures to reduce the risk of injury to fish species.
- Development and adherence to a Construction Method Statement.
- Development of, and adherence to, an Environmental Management Plan, including actions to minimise INNS, and a MPCP which will include planning for accidental spills, address all potential contaminant releases and include key emergency details.

4.2.6.2 The requirement for and feasibility of any further mitigation will be dependent on the significance of effects and will be consulted upon with statutory consultees throughout the EIA process.

4.2.7 Proposed assessment methodology

4.2.7.1 The fish and shellfish ecology EIA will follow the methodology set out in section out in part 1 section 5: EIA Methodology of this EIA Scoping Report. Specific to the fish and shellfish ecology EIA, the following guidance documents will also be considered:

- Guidelines for EcIA in the UK and Ireland. Terrestrial, Freshwater, Coastal and Marine (CIEEM, 2019).
- Offshore Wind Farms. Guidance Note for EIA in Respect of FEPA (Food and Environment Protection Act 1985) and CPA (Coast Protection Act 1949) Requirements (Cefas *et al*., 2004).
- Guidelines for Data Acquisition to Support Marine Environmental Assessments of Offshore Renewable Energy Projects (Judd, 2012).
- Guidance on Environmental Considerations for Offshore Wind Farm Development (OSPAR, 2008).
- Sound exposure guidelines for Fishes and Sea Turtles (Popper *et al*., 2014).

4.2.7.2 For the purposes of undertaking the EIA, fish and shellfish receptors identified as having the potential to occur in the fish and shellfish ecology study area will be grouped into broad ecological receptor groups, called Important Ecological Features (IEFs), in line with guidelines set out in CIEEM (2019). These IEFs will be those features against which impacts associated with the construction, operation and maintenance and decommissioning phases of the Transmission Assets will be assessed. Criteria defining the value of each IEF will be defined to reflect topic-specific interests.

4.2.7.3 The fish and shellfish ecology ES chapter will include diadromous fish in the fish and shellfish ecology impact assessment, and a separate section presented discussing sensitivity of and implications of the impact on diadromous fish in each impact assessment. The approach and focus of these impact assessments will be discussed with stakeholders through the Benthic Ecology, Fish and Shellfish and Physical Processes Evidence Plan process.

4.2.7.4 The importance of fish species (such as herring, sandeels and sprat) as key prey species will be assessed in the relevant sections of other receptor groups (part 2, section 4.4: ornithology and section 4.3: marine mammals of this EIA Scoping Report). These will be informed by the fish and shellfish ecology ES chapter which will provide clear outputs to inform these assessments.

4.2.7.5 Habitat suitability for sandeels and herring will be assessed using data collected as part of the site-specific benthic ecology survey in line with industry good practice guidelines and taking into account discussions with stakeholders via the Evidence Plan process.

4.2.7.6 A fish and shellfish ecology technical report will present a detailed baseline characterisation for the Transmission Assets using site-specific survey data and the most recent desktop data for the fish and shellfish ecology study area. This report will inform the fish and shellfish ecology ES chapter.

4.2.7.7 As the OSPs are included in both the Transmission Assets project description and the project descriptions for the Morgan Offshore Wind Project Generation Assets and Morecambe Offshore Windfarm Generation Assets, the assessment outputs from the Generation Assets impact assessments 'magnitude of effects' will be replicated in the Transmission Assets impact assessment and applied to the existing and future baseline of the Transmission Assets scoping area.

4.2.8 Potential cumulative effects

4.2.8.1 The majority of predicted effects of construction, operation and maintenance, and decommissioning of the Transmission Assets infrastructure on fish and shellfish communities are considered to be localised to within the footprint of the Transmission Assets. However, there is potential for cumulative effects to occur on fish and shellfish ecology from other projects or activities within the fish and shellfish ecology study area, where projects or plans could act collectively with the Transmission Assets to affect fish and shellfish receptors.

4.2.8.2 Cumulative effects with the generation assets (i.e., the Morgan Offshore Wind Project and the Morecambe Offshore Windfarm) will be considered, together with cumulative effects with other Round 4 projects (such as the Mona Offshore Wind Project) and other infrastructure projects such as proposed wind farms and interconnectors, where relevant. Note that as the OSPs are included in both the Transmission Assets project description and the project description for the Morgan Offshore Wind Project Generation Assets and the Morecambe Offshore Windfarm Generation Assets, some aspects of the CEA will not include the OSPs (e.g. potential impacts associated with the OSP footprint on the seabed) to prevent ‘double counting’ of potential impacts. Where OSPs are included in the CEA and where they are not will be agreed with the Evidence Plan Expert Working Group.

4.2.8.3 The cumulative effects assessment will follow the approach outlined in part 1 section 5: EIA Methodology, of this EIA Scoping Report.

4.2.9 Potential inter-related effects

4.2.9.1 The assessment of potential inter-related effects will be considered within the fish and shellfish ecology ES chapter. It will include consideration of project lifetime effects and receptor led effects, in line with the approach outlined in part 1, section 5: EIA Methodology, of this EIA Scoping Report.

4.2.9.2 This will include consideration of any potential inter-relationships with the terrestrial ecology and ornithology (intertidal and onshore) assessment, with respect to migratory fish.

4.2.10 Potential transboundary impacts

4.2.10.1 A screening of transboundary impacts has been carried out and is presented in part 3, Annex A of this EIA Scoping Report. This screening exercise identified that there is potential for transboundary impacts upon fish and shellfish ecology due to construction, operation and maintenance, and decommissioning impacts of the Transmission Assets. These include:

- Underwater noise impacting fish and shellfish receptors.
- Loss of habitat (in particular, spawning and nursery habitat).
- Increased suspended sediment concentrations and associated sediment deposition.

4.2.10.2 These activities have the potential to directly affect Annex II species and species that are of commercial importance for fishing fleets of other states. Therefore, the potential for transboundary effects will be considered within the ES.

4.3 Marine mammals

4.3.1 Introduction

4.3.1.1 This section of the EIA Scoping Report identifies the receptors relevant to the assessment of marine mammals for the Transmission Assets. It also considers the potential impacts arising from the construction, operation and maintenance, and decommissioning of the Transmission Assets and identifies the proposed scope of, and methodology for, the EIA process for marine mammals.

4.3.2 Study area

4.3.2.1 For the purpose of the EIA process two marine mammal study areas have been defined:

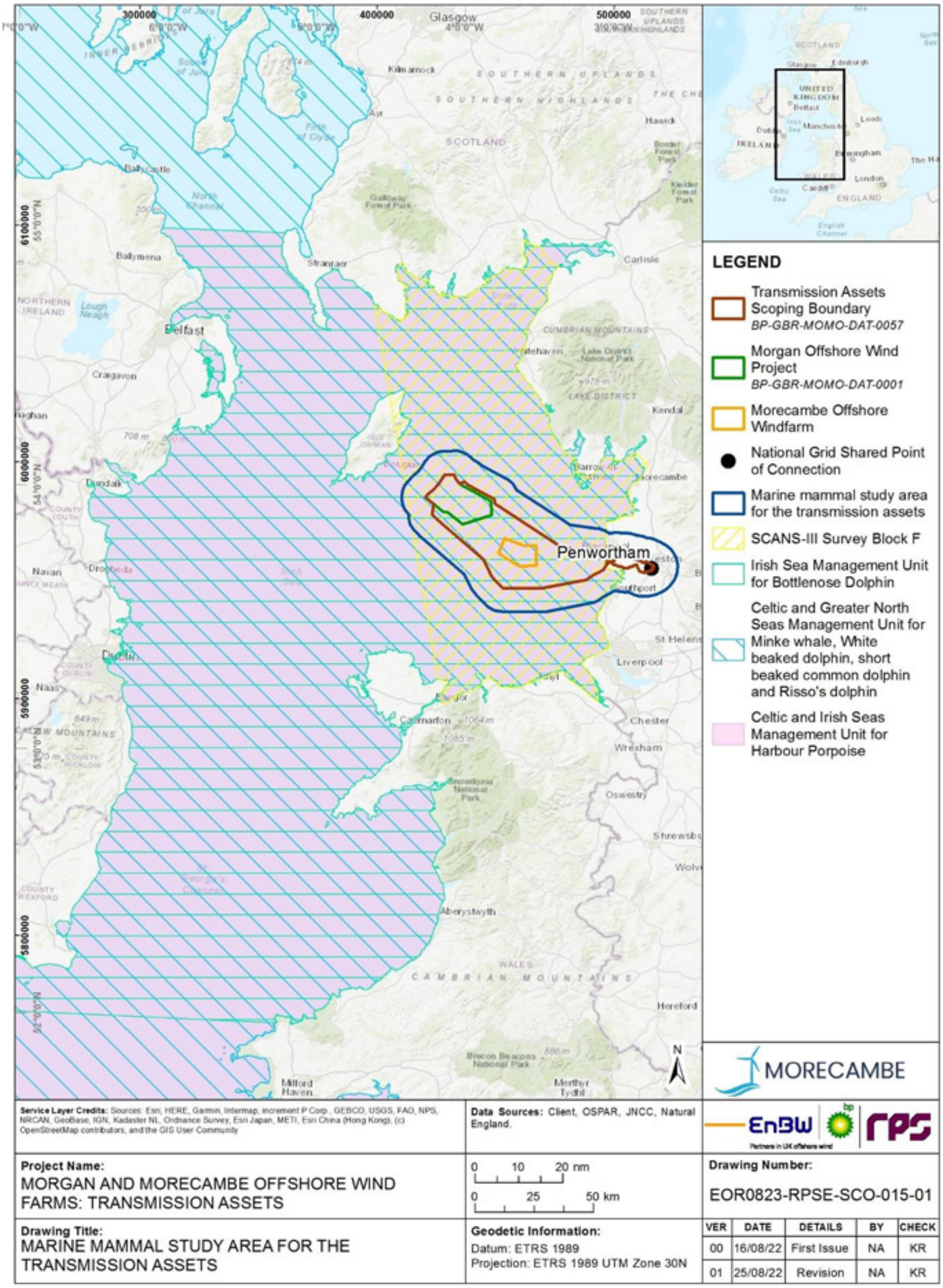


Figure 4.17: The marine mammal study areas for the Transmission Assets.

- The marine mammal study area is defined as the area encompassing the Transmission Assets plus a buffer of 10km (see Figure 4.17). A 10km buffer was recommended by the SNCBs during pre-application consultation. This buffer size was also considered appropriate as it provides better coverage for marine mammals, for the purpose of EIA and HRA baseline characterisation, than the existing best practice approach of a 4km buffer used for marine mammals for EIA for other projects, such as the majority of commissioned windfarms in the UK. For the purposes of this EIA Scoping Report, this study area comprises a 10km buffer around the offshore elements of the Transmission Assets Scoping Boundary. This may be refined as the design of the Transmission Assets progresses (i.e., to a 10km buffer around the offshore elements of the Transmission Assets).
- The regional marine mammal study area extends over the Irish Sea geographic region. Marine mammals are highly mobile and may range over large distances and, therefore, to provide a wider context, the desktop review considered the marine mammal ecology, distribution and density/abundance within the Irish Sea and wider Celtic Sea. Species-specific populations were considered over a regional scale, within the context of their relevant Management Units. The Inter-Agency Marine Mammal Working Group (IAMMWG, 2021) provided advice on cetacean Management Units, and the Special Committee on Seals (SCOS) provided advice on seal Management Units (SCOS, 2020). The spatial scale of the Management Units region will vary by species. Harbour porpoise *Phocoena phocoena* will be considered in context to the Celtic and Irish Sea Management Units whilst bottlenose dolphin *Tursiops truncatus* and grey/harbour seal have smaller Management Units for consideration.

4.3.3 Data sources

Desktop Data

4.3.3.1 An initial desk-based review of literature and data sources to support this EIA Scoping Report has identified a number of data sources which provide coverage of the regional marine mammal study area. These are summarised in Table 4.13.

Table 4.13: Summary of the key desktop datasets and reports – marine mammals.

Title	Source	Year	Author
Awel y Môr Offshore Wind Farm. Category 6: Environmental Statement	Awel y Môr Offshore Wind Farm Ltd.	2022	RWE Renewables UK
Scientific advice on matters related to the management of seal populations: 2020	Sea Mammal Research Unit (SMRU), University of St Andrews	2021	Special Committee on Seals (SCOC)
Marine recorder public UK snapshot	Joint Nature Conservation Comittee (JNCC)	2020	JNCC
National Biodiversity Network (NBN) Atlas	NBN Atlas	2019	NBN Atlas
Aerial surveys of cetaceans and seabirds in Irish waters: Occurrence, distribution and abundance in 2015-2017	Department of Communications, Climate Action & Environment and National Parks and Wildlife Service	2018	Rogan *et al.*
Grey Seal (Halichoerus grypus) Pup Production and Distribution in North Wales	NRW	2017	Clarke *et al*.
SCANS-III	SMRU, University of St Andrews	2016	Hammond *et al*.
Seal habitat preference maps	SMRU, University of St Andrews	2020	Carter *et al*.
JNCC Report 544: Harbour Porpoise Density	JNCC	2010-2011	Heinänen and Skov
Updated abundance estimates for cetacean management units in UK waters	JNCC	2021	Inter-Agency Marine Mammal Working Group (IAMMWG)
Joint cetacean protocol phase III	JNCC	2009-2010	Paxton *et al*.
Background information on marine mammals for Strategic Environmental Assessment 6	SMRU, Gatty Marine Laboratory, University of St Andrews	2005	Hammond *et al*.
Atlas of the Marine Mammals of Wales	Countryside Council for Wales (CCW)	2012	Baines and Evans
Atlas of the distribution and relative abundance of marine mammals in Irish offshore waters	Irish Whale and Dolphin Group	2005-2011	Wall *et al*.
Barrow offshore wind farm (BOW) construction monitoring report	Marine Data Exchange	2006	BOW Wind
Ormonde offshore wind farm construction (Year 1) environmental monitoring	Marine Data Exchange	2010	RPS Energy
Walney and West of Duddon Sands Environmental Impact Assessment - marine mammals in the NW3 Area, Irish Sea	Marine Data Exchange	2006	DHI Water and Environment
Ormonde offshore wind farm marine mammal observers and PAM survey	Marine Data Exchange	2010	RPS Energy
Walney offshore wind farm construction monitoring	Marine Data Exchange	2010-2011	Centre for Marine and Coastal Studies Ltd (CMACS)
Burbo Bank Exensions offshore wind farm environmental statement	Marine Data Exchange	2013	Dong Energy

Title	Source	Year	Author
Skerries tidal stream array marine mammal monitoring	Marine Data Exchange	2014	SMRU Marine
Celtic Array Ltd offshore wind farm preliminary environmental information chapter 11: marine mammals, basking shark and turtles	Marine Data Exchange	2014	Celtic Array Ltd
JNCC MPA mapper	JNCC	2019	JNCC
Zone 9 Celtic Array Ltd, Bird Mammal Survey	Marine Data Exchange	2010-2012	Ecological Consultancy Ltd. (ECON)
Zone 9 Celtic Array Ltd, Hidef Aerial Bird Survey	Marine Data Exchange	2012-2013	HiDef
Morlais Tidal Array Scoping Report	Morlais Energy	2018	Morlais Energy
Manx whale and dolphin watch	Manx whale and dolphin watch	Various	Various
Cefas Pelagic ecosystem in the western English Channel and eastern Celtic Sea (PELTIC) surveys	Cefas	Various	Cefas

Site-specific surveys

4.3.3.2 Two sets of site-specific aerial digital survey results have informed the baseline characterisation, one across the Scoping Boundary for the Morgan Offshore Wind Project (array area, plus buffer) and one across the Morecambe Offshore Windfarm (array area, plus buffer).

4.3.3.3 Aerial digital surveys for marine mammals have been undertaken across the Scoping Boundary for the Morgan Offshore Wind Project (array area) plus a buffer of 10km, which overlaps with the Transmission Assets Scoping Boundary. Surveys commenced in March 2021 and are planned to continue until March 2023. One flight will be undertaken per month over the two years.

4.3.3.4 The survey method was designed to optimise the data collection for marine mammals by using a grid-based collection method with 30% of the sea surface collected and at least 12% analysed. APEM's bespoke camera system was fitted into a twin-engine aircraft. The camera system captured still imagery along 18 survey lines spaced approximately 2km between-track. The images were analysed to enumerate marine mammals to species level, where possible.

4.3.3.5 Baseline digital aerial surveys for marine mammals and ornithology have also been undertaken for the Morecambe Offshore Windfarm commencing in March 2021 and will continue until February 2023. The methodology is based on the industry standard for offshore surveys, involving 24 monthly transect surveys of the Morecambe Offshore Windfarm site boundary and a buffer. For offshore wind farms, the usual offshore ornithology survey area is the wind farm array area plus a 4km buffer; in this case the survey area has been extended to 10km to the north and east due to the close proximity (0km at the nearest point) of the Morecambe array area to the Liverpool Bay SPA. This is based on advice from Statutory Nature Conservation Bodies (SNCBs) for offshore wind farms within 10km of a marine SPA for red-throated diver and agreed with Natural England in a meeting on 3 November 2021. Results of the site-specific surveys will be discussed through the Evidence Plan process with the Expert Working Group as described in part 1, section 6: Consultation of this EIA Scoping Report.

4.3.3.6 Initial observations from the first 12 months of the site-specific surveys have been presented in the following section which also provides an overview of other sources of data available for the study areas relevant to the Transmission Assets. Full details of site-specific data will be presented in the ES.

4.3.4 Baseline environment

Harbour porpoise Phocoena phocoena

4.3.4.1 Harbour porpoise are widespread and common in the Irish Sea throughout the year with potential for breeding (Baines and Evans, 2012). Long term sightings between 1990 to 2009 show an average of 1.1 to 15 harbour porpoise counts per hour around Anglesey (Baines and Evans, 2012). Suitable habitat is available within the east of the regional marine mammal study area and harbour porpoise has been recorded there regularly (RPS Energy, 2012; CMACS, 2011; DHI Water and Environment, 2006). The most recent assessment of harbour porpoise in UK waters concluded that the overall trend in Conservation Status was unknown, highlighting that there was insufficient data to establish a trend for the population size or potential future prospects for the population (JNCC, 2019b).

4.3.4.2 The Transmission Assets would be located within the Celtic and Irish Sea Management Unit or harbour porpoise (IAMMWG, 2021), which is estimated to have an abundance of 62,517 individuals (CV (coefficient of variation):0.13, 955 CI (confidence interval) 48,324 – 80,877) based on estimates from the Small Cetaceans in the European Atlantic and North Seas (SCANS) III survey (Hammond *et al*., 2017; Hammond *et al.,* 2021). The SCANS III density estimate for the relevant survey block (Block F) was estimated to be 0.086 porpoise per km^2 (CV: 0.383).

4.3.4.3 The Joint Cetacean Protocol has undertaken analysis of 18 years of data to inform the identification of discrete and persistent areas of relatively high harbour porpoise density in the United Kingdom (UK) marine area (Heinänen and Skov, 2015). Areas of persistent high density include coastal areas off west Wales (Pembrokeshire and Cardigan Bay), and northwest Wales (Anglesey, Llŷn Peninsula), within the regional marine mammal study area (Heinänen and Skov, 2015). The densities of harbour porpoise are seasonal with large reductions during winter in the areas of high densities predicted for northern Irish Sea and Cardigan Bay (Heinänen and Skov, 2015). Densities within the regional marine mammal study area are up to three individuals per km^2 (Heinänen and Skov, 2015).

4.3.4.4 Monitoring surveys were undertaken in 2010 for the Ormonde offshore wind farm year 1 post-construction surveys. They recorded harbour porpoise at an encounter rate of 0.014 per hour within the Ormonde offshore wind farm which is within the northeast of the regional marine mammal study area (RPS Energy, 2012). Monitoring surveys were undertaken during the construction of the Walney offshore wind in between 2009 and 2010. These recorded harbour porpoise within and to the northeast of the Walney offshore wind farm which is within the regional marine mammal study area (CMACS, 2011).

4.3.4.5 Baseline characterisation surveys undertaken in 2012 to 2013 for the Rhiannon offshore wind farm recorded a total of 227 harbour porpoise across the wider Irish Sea Zone (as defined by The Crown Estate (TCE) Round 3 leasing process). Recording an overall density of 0.09 per km^2 for the Irish Sea Zone over the entire year. Distribution varied across the season however the greatest numbers of sightings occurred in the west of the Rhiannon offshore wind farm, outside the marine mammal study area (Celtic Array Ltd., 2014c). Harbour porpoise are regularly recorded around the Isle of Man by the Manx whale and dolphin watch (Manx whale and dolphin watch, 2022).

4.3.4.6 Baseline characterisation surveys undertaken in 2019 for the Awel Y Mor offshore wind farm recorded harbour porpoise sightings across the survey area, and within the Gwynt y Mor offshore wind farm, but in low densities up to 0.13 per km^2. However, there were a large number of sightings of unidentified dolphins/porpoise (RWE, 2022).

4.3.4.7 The digital aerial surveys for the Morgan Offshore Wind Project recorded harbour porpoise across all of the first 12 months. Peak numbers were recorded in August with 36 individuals. A total of 1,374 individuals was recorded between April 2021 and March 2022.

4.3.4.8 The digital aerial surveys for the Morecambe Offshore Windfarm recorded harbour porpoise in each month of survey in the first 12 months. A total of 372 individuals were recorded between March 2021 and February 2022, with a peak of 85 recorded in March 2021.

4.3.4.9 Based on the review of literature including previous surveys in this region it is considered likely that harbour porpoise occur year round within the regional marine mammal study area. It is therefore proposed that harbour porpoise are scoped into the EIA process.

Minke whale Balaenoptera acutorostrata

4.3.4.10 Minke whale are an occasional visitor to the Irish Sea where they occur annually in small numbers, mainly in July and August (Baines *et al*., 2012). Records of long-term sightings between 1990 to 2007 show that most minke whale encounters are in the east Irish Sea (Baines and Evans, 2012). This species is rarely recorded east of the Isle of Man and is rare in Liverpool Bay (Dong Energy, 2013). The most recent assessment of minke whales in UK waters concluded that the overall trend in Conservation Status was unknown, highlighting that there was insufficient data to establish a trend for the population size or to assess the potential future prospects for the population (JNCC, 2019c).

4.3.4.11 All minke whale in UK waters are considered to be part of the Celtic and Greater North Seas Management Unit (see Figure 4.17; IAMMWG, 2021) which is estimated to have an abundance of 20,118 minke whale (CV: 0.18, 95% CI: 14,061 – 28,786) based on estimates from the SCANS III survey (Hammond *et al*., 2017; Hammond *et al*., 2021) and the ObSERVE survey

(Rogan *et al*., 2018). The SCANS III survey did not record minke whale within the relevant survey block (Block F).

4.3.4.12 Minke whale were not recorded in the Ormonde offshore wind farm year 1 post-construction surveys or the Walney offshore wind farm construction surveys (RPS Energy, 2012; CMACS, 2011). Minke whale are not regularly recorded around the Isle of Man by the Manx whale and dolphin watch however individuals were recorded in November, October and September 2021 (Manx whale and dolphin watch, 2022).

4.3.4.13 Boat-based surveys for the Rhiannon offshore wind farm recorded 19 minke whale over the two-year survey, within and to the west of the Rhiannon offshore wind farm, outside the marine mammals study area for transmission assets (Celtic Array Ltd, 2014c).

4.3.4.14 Baseline characterisation surveys for the Awel Y Mor offshore wind farm did not record any minke whale (RWE, 2022).

4.3.4.15 Neither the Morgan Offshore Wind Project nor the Morecambe Offshore Windfarm digital aerial surveys recorded minke whale within the first 12 months of the surveys.

4.3.4.16 Based on the review of literature including previous surveys in this region, it is considered likely that minke whale occur within the regional marine mammal study area. It is therefore proposed that minke whale are scoped into the EIA process.

White beaked dolphin Lagenorhynchus albirostris

4.3.4.17 White beaked dolphin are common in British and Irish waters, especially to the north around Scotland. This species is also common around the west coast of Ireland, Iceland and west Norway although it is only an occasional visitor to the Irish Sea (Seawatch, 2012). The most recent assessment of white beaked dolphin in UK waters concluded that the overall trend in Conservation Status was unknown, highlighting that there was insufficient data to establish a trend for the population size or to assess the potential future prospects for the population (JNCC, 2019d).

4.3.4.18 All white beaked dolphin in UK waters are considered to be part of the Celtic and Greater North Seas Management Unit (see Figure 4.17; IAMMWG, 2021), which has an estimated population size of 43,951 dolphins (CV: 0.22, 95% CI: 28,439 – 67,924) based on estimates from the SCANS III survey (Hammond *et al*., 2017; Hammond *et al.,* 2021) and the ObSERVE survey (Rogan *et al*., 2018). The SCANS III did not record any white beaked dolphin within the relevant survey block (Block F).

4.3.4.19 White beaked dolphin were not recorded in the Ormonde offshore wind farm year 1 post-construction surveys or the Walney offshore wind farm construction surveys (RPS Energy, 2012; CMACS, 2011).

4.3.4.20 Neither the Morgan Offshore Wind Project nor the Morecambe Offshore Windfarm digital aerial surveys recorded white beaked dolphin within the first 12 months of the surveys.

4.3.4.21 Based on the review of literature including previous surveys in this region, it is considered unlikely that white beaked dolphin is a key species within the regional marine mammal study area. It therefore proposed that white beaked dolphin are scoped out of the EIA process.

Bottlenose dolphin Tursiops truncatus

4.3.4.22 Bottlenose dolphin use both coastal and offshore waters in the UK. One of the main coastal areas is around Cardigan Bay in the southeast of the Irish Sea. The population size in Cardigan Bay has been estimated at between 130-350 individuals (UKBAP, 1999), although the JNCC have estimated that the total UK population is less than 300 (Reid *et al*., 2003). Bottlenose dolphin have also been recorded occurring off the north coast of Wales, particularly north and east of Anglesey (Baines and Evans, 2012). Casual records also show that bottlenose dolphin are present sporadically off the Isle of Man and elsewhere in the northeast Irish Sea (Manx Whale and Dolphin Group unpublished data; Sea Watch Foundation unpublished data). Long term sightings between 1990 to 2009 show an average of 2.5-5 bottlenose dolphin counts per hour around Anglesey (Baines and Evans, 2012).

4.3.4.23 The most recent assessment of bottlenose dolphin in UK waters concluded that the overall trend in Conservation Status was unknown, highlighting that although the population size appears to be stable, there were too few datapoints to confidently draw conclusions on current and future population trends (JNCC, 2019e).

4.3.4.24 The Transmission Assets would be located within the Irish Sea Management Unit for bottlenose dolphin (Figure 4.17; IAMMWG, 2021), which is estimated to have an abundance of 293 individuals (CV: 0.54, 95% CI: 108 - 793) based on surveys undertaken for the Cardigan Bay Special Area of Conservation (SAC) (Lohrengel *et al*., 2018). The SCANS III did not record any bottlenose dolphin within the relevant survey block (Block F) (Hammond *et al*., 2017).

4.3.4.25 Bottlenose dolphin were not recorded in the Ormonde offshore wind farm year 1 post-construction surveys or the Walney offshore wind farm construction surveys (RPS Energy, 2012; CMACS, 2011).

4.3.4.26 Aerial surveys for the Rhiannon offshore wind farm recorded bottlenose dolphin, to the east of the Rhiannon offshore wind farm, outside the marine mammal study area. Insufficient sightings were recorded to produce a local abundance (Celtic Array Ltd, 2014c). Bottlenose dolphin is regularly recorded around the Isle of Man by the Manx whale and dolphin watch (Manx whale and dolphin watch, 2022).

4.3.4.27 Baseline characterisation surveys for the Awel Y Mor offshore wind farm did not record any bottlenose dolphin however a number of unidentified dolphins were recorded (RWE, 2022).

4.3.4.28 The Morgan Offshore Wind Project aerial digital surveys recorded nine bottlenose dolphin in June 2021, which was the only month in the first 12 months of the survey within which bottlenose dolphin was recorded. The Morecambe Offshore Windfarm aerial digital surveys did not record any bottlenose dolphin in the first 12 months of the survey.

4.3.4.29 Given the presence of bottlenose dolphin within coastal waters in the Irish Sea, it is considered likely that bottlenose dolphin occur within the regional marine mammal study area. It is therefore proposed that bottlenose dolphin are scoped into the EIA process.

Short beaked common dolphin Delphinus delphis

4.3.4.30 The short beaked common dolphin are the most numerous offshore cetacean species in the temperate northeast Atlantic. Off the western coasts of Britain and Ireland, the species is found in continental shelf waters, notably in the Celtic Sea and Western Approaches to the Channel, and off southern and western Ireland (Reid, 2003).

4.3.4.31 The most recent assessment of short beaked common dolphins in UK waters concluded that the overall trend in Conservation Status was unknown, highlighting that although the future trend for the range is stable, there were too few datapoints to confidently draw conclusions on the current and future population trends (JNCC, 2019g).

4.3.4.32 There is a relatively low population of short beaked common dolphin in the Irish Sea, however they are regularly seen off the south of the Isle of Man. Long term sightings between 1990 to 2009 show an average of 0.5-1 short-beaked common dolphin counts per hour around the south of the Isle of Man and the Pembroke Peninsula (Baines and Evans, 2012).

4.3.4.33 All short beaked common dolphin in UK waters is considered to be part of the Celtic and Greater North Seas Management Unit (see Figure 4.17; IAMMWG, 2021), which has an estimated population size of 102,656 dolphin (CV: 0.29, 95% CI: 58,932 –178,822). The SCANS III did not record any short beaked common dolphins within the relevant survey block (Block F) (Hammond *et al.,* 2017).

4.3.4.34 The short beaked common dolphin are the most numerous offshore cetacean species in the temperate north-east Atlantic. Off the western coasts of Britain and Ireland, the species is found in continental shelf waters, notably in the Celtic Sea and Western Approaches to the Channel, and off southern and western Ireland (Reid, 2003).

4.3.4.35 Short beaked common dolphin were not recorded in the Ormonde offshore wind farm year 1 post-construction surveys or the Walney offshore wind farm construction surveys (RPS Energy, 2012; CMACS, 2011).

4.3.4.36 Baseline characterisation surveys for the Awel Y Mor offshore wind farm did not record any short beaked common dolphin however a number of unidentified dolphins were recorded (RWE, 2022).

4.3.4.37 Aerial surveys for the Rhiannon offshore wind farm recorded a single sighting of a pod of six short beaked common dolphin, to the west of the Rhiannon offshore wind farm, outside the marine mammal study area for transmission assets (Celtic Array Ltd, 2014c).

4.3.4.38 Neither the Morgan Offshore Wind Project nor the Morecambe Offshore Windfarm digital aerial surveys recorded short beaked common dolphin within the first 12 months of the surveys.

4.3.4.39 Given the presence of short beaked common dolphin within coastal waters in the Irish Sea, it is considered likely that short beaked common dolphin occur within the regional marine mammal study area. It is therefore proposed that short beaked common dolphin are scoped into the EIA process.

Risso's dolphin Grampus griseus

4.3.4.40 Risso's dolphin are most common around northern Scotland however they have been sighted around Ireland and in the Irish Sea. Most sightings from the Irish Sea occurred between July and September. Near shore records off southwest Ireland were obtained primarily between May and August (Reid, 2003). Coastal areas of the Isle of Man and north Anglesey have a low sighting rate for Risso's dolphin (Baines and Evans, 2012). Long-term sighting rates between 1990 to 2009 show an average of 0.26-0.5 Risso's dolphin counts per hour around the south of the Isle of Man and an average of 0.04-0.1 Risso's dolphin counts per hour around the north of Anglesey (Baines and Evans, 2012).

4.3.4.41 The most recent assessment of Risso's dolphin in UK waters concluded that the overall trend in Conservation Status was unknown, highlighting that although the future trend for the range is stable, there were too few datapoints to confidently draw conclusions on the current and future population trends (JNCC, 2019h).

4.3.4.42 All Risso's dolphin in UK waters are considered to be part of the Celtic and Greater North Seas Management Unit (see Figure 4.17; IAMMWG, 2021), which has an estimated population size of 12,262 Risso's dolphin (CV: 0.46, 95% CI: 5,227 – 28,764). The SCANS III did not record any Risso's dolphin within the relevant survey block (Block F) (Hammond *et al*., 2017).

4.3.4.43 Risso's dolphin were not recorded in the Ormonde offshore wind farm year 1 post-construction surveys or the Walney offshore wind farm construction surveys (RPS Energy, 2012; CMACS, 2011).

4.3.4.44 Boat-based surveys for the Rhiannon offshore wind farm recorded three sightings of Risso's dolphin, outside the Rhiannon offshore wind farm, outside the marine mammal study area for transmission assets (Celtic Array Ltd, 2014c). Risso's dolphin are not regularly recorded around the Isle of Man by the Manx whale and dolphin watch however individuals were recorded in September 2021 (Manx whale and dolphin watch, 2022).

4.3.4.45 Baseline characterisation surveys for the Awel Y Mor offshore wind farm did not record any Rissos dolphin (RWE, 2022).

4.3.4.46 Neither the Morgan Offshore Wind Project nor the Morecambe Offshore Windfarm digital aerial surveys recorded Risso's dolphin within the first 12 months of the surveys.

4.3.4.47 Given the presence of Risso's dolphin within coastal waters in the Irish Sea, it is considered likely that Risso's dolphin occur within the regional marine mammal study area. It is therefore proposed that Risso's dolphin are scoped into the EIA process.

Grey seal Halichoerus grypus

4.3.4.48 Grey seal have a wide distribution in Welsh seas and are present in coastal areas throughout the year. Grey seal have been recorded at the River Dee estuary, Walney Island at the southern tip of the Isle of Man and around Cardigan Bay (SCOS, 2021). Long-term sightings between 1990 to 2007 show an average of 0.5-1 grey seal counts per hour around the north coast of Wales. The most recent assessment of grey seals in UK waters concluded that the overall trend in Conservation Status was favourable, with an overall trend in Conservation Status assessed as improving (JNCC, 2019f).

4.3.4.49 Grey seal typically forage within 100km of a haul-out site and foraging trips can last for 30 days; however, individual tracks have shown that some grey seal can make trips several hundred kilometres offshore (SCOS, 2021). The estimated adult class population size in the regularly monitored national colonies at the start of the 2019 breeding season was 133,900 (95% CI 115,300-156,500) (SCOS, 2021). Over 400 grey seal individuals were recorded on the east Irish coast in 2017/2018 (Morris & Duck, 2019). Pup production of grey seals in Ireland (the east coast of which is within the regional marine mammal study area) was estimated at 2,100 pups with an increasing population trend. Pup production of grey seals in the UK was estimated at 68,050 pups with an increasing population trend (SCOS, 2021). However, the regional marine mammal study area does not contain any of the main UK grey seal breeding colonies, the majority of which are in Scotland.

4.3.4.50 There are two main grey seal haul outs in the regional marine mammal study area: the Dee Estuary and Walney Island. In 2019 and 2020, the August count at Walney Island was 248 and 300 adults, respectively. It has been a pupping site since 2015 but numbers are currently still low (2-10 per year). Less extensive monitoring has occurred at the Dee Estuary haul out site (SCOS, 2021).

4.3.4.51 Grey seal at sea distribution maps have been produced by Carter *et al* (2020) based on a Global Positioning System telemetry tagging programme by The Department for Business, Energy and Industrial Strategy (BEIS), through their Offshore Energy Strategic Environmental Assessment (OESEA) programme. These data show that grey seal do not occur in high densities within the regional marine mammal study area. Densities are higher around the coasts and around the River Dee Estuary, the River Mersey Estuary and the southern tip of the Isle of Man (see Figure 4.18; Carter *et al*., 2020; Russell *et al*., 2017).

4.3.4.52 Monitoring surveys were undertaken in 2010 for the Ormonde offshore wind farm year 1 post-construction surveys. Grey seals were recorded at an encounter rate of 0.007 per hour within the Ormonde offshore wind farm which is within the regional marine mammal study area (RPS Energy, 2012).

4.3.4.53 Monitoring surveys were undertaken during the construction of the Walney offshore wind from in 2010-2009. They recorded grey seals sightings at the southern end of Walney Island and around the Walney and Ormonde offshore wind farms which are within the regional marine mammal study area (CMACS, 2011).

4.3.4.54 Aerial and boat-based surveys for the Rhiannon offshore wind farm consistently recorded grey seal particularly between February and August. across the Rhiannon offshore wind farm, within the marine mammal study area for transmission assets (Celtic Array Ltd, 2014c).

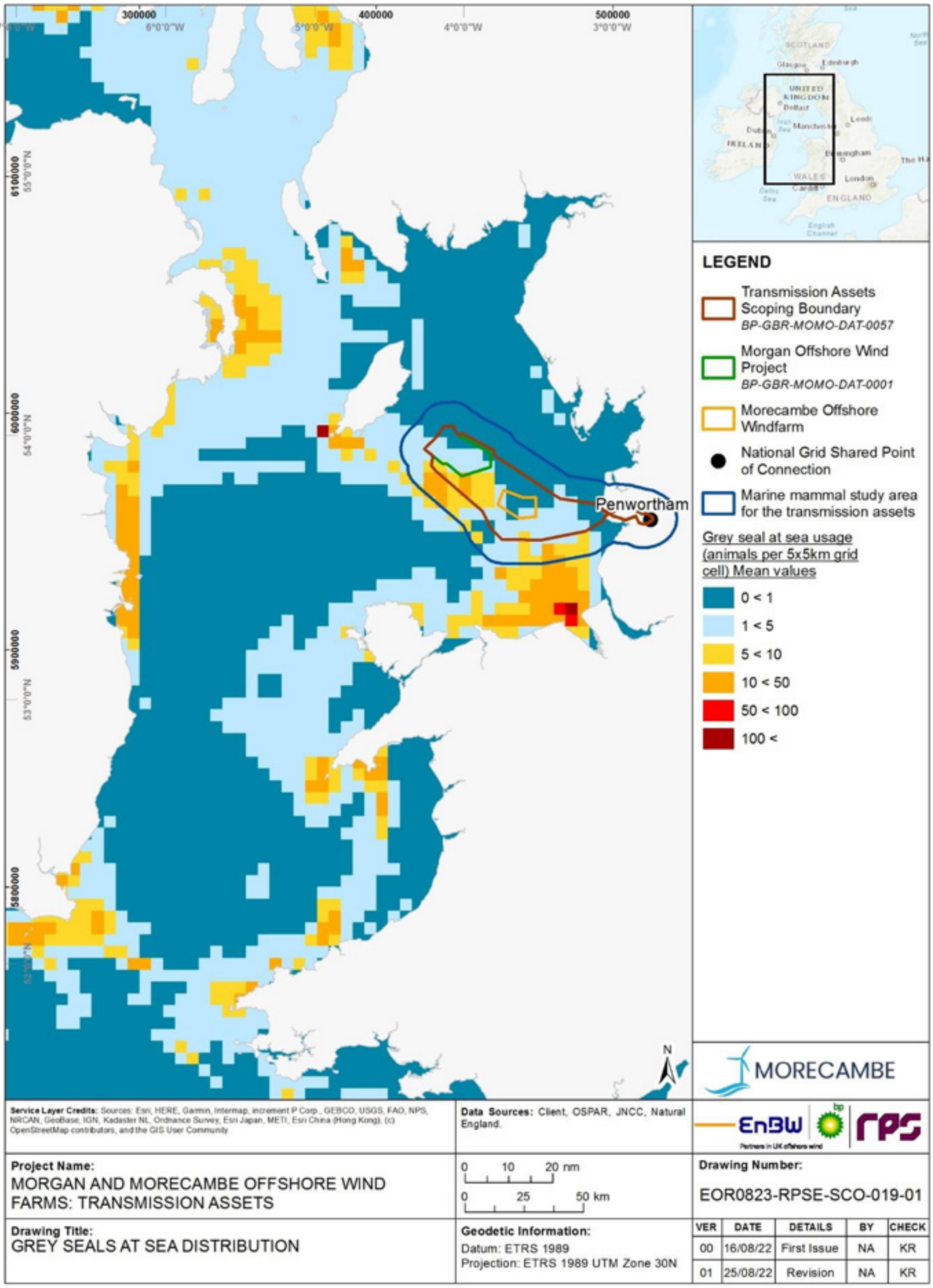


Figure 4.18: Grey seal at-sea distribution (from Russell *et al*. 2017).

4.3.4.55 Baseline characterisation surveys for the Awel Y Mor offshore wind farm recorded 20 grey seal. These were identified as "unknown seal species" however given the lack of harbour seals in Welsh waters, it was considered that these sightings were all grey seals (RWE, 2022).

4.3.4.56 The Morgan Offshore Wind Project digital aerial survey recorded grey seals across April to September 2021, December 2021 and January to March 2022. Peak counts of two individuals were recorded in April 2021, August 2021 and March 2022.

4.3.4.57 The digital aerial surveys for the Morecambe Offshore Windfarm recorded grey seal in 9 months of survey in the first 12 months. A total of 21 individuals were recorded between March 2021 and February 2022 with a peak of 5 recorded in May 2021.

4.3.4.58 Based on the review of literature including previous surveys in this region, it is considered likely that grey seal occur within the regional marine mammal study area. It is therefore proposed that grey seal are scoped into the EIA process.

Harbour seal Phoca vitulina

4.3.4.59 Harbour seal are present around the UK with a higher abundance around Scotland; approximately 80% of the UK population resides around the Scottish coast. Low numbers are also encountered along the south and west coast of England and along the coasts of Wales (JNCC, 2019i). The most recent assessment of harbour seals in UK waters concluded that the overall trend in Conservation Status was unknown, highlighting that although the future trend for the range is stable and the population trend is good, there were too few datapoints to confidently draw conclusions on the current and future population trends (JNCC, 2019i).

4.3.4.60 Harbour seal populations around Northern Ireland and Wales have been estimated at 1,000 and <10 individuals respectively (SCOS, 2021). Over 130 harbour seal individuals were recorded on the east Irish coast in 2017/2018 (Morris & Duck, 2019).

4.3.4.61 Harbour seals at sea distribution maps have been produced by Carter *et al*. (2020) and Russell *et al*. (2017). This data show that harbour seal does not occur in high densities within the regional marine mammal study area. Areas of high density are present around the east coast of Northern Ireland (Figure 4.19; Russell *et al*., 2017; Carter et al. 2020; SCOS, 2021).

4.3.4.62 The population from Carlingford Lough to Copeland Islands has been monitored more frequently from 2002 to 2018. This subset of the Irish Sea population declined slowly over the period 2002 to 2011 at an average rate of 2.7% p.a. (95% CIs: 1.8, 3.5). However, the 2018 survey suggests that since that time period there has been no significant change (SCOS, 2021).

4.3.4.63 Monitoring surveys were undertaken during the construction of the Walney offshore wind from in 2010-2009. They recorded a single harbour seal within the Walney offshore wind farm during the monitoring survey which is within the regional marine mammal study area (CMACS, 2011).

4.3.4.64 Harbour seal were not recorded during the aerial or boat-based surveys for the Rhiannon offshore wind farm (Celtic Array Ltd, 2014c).

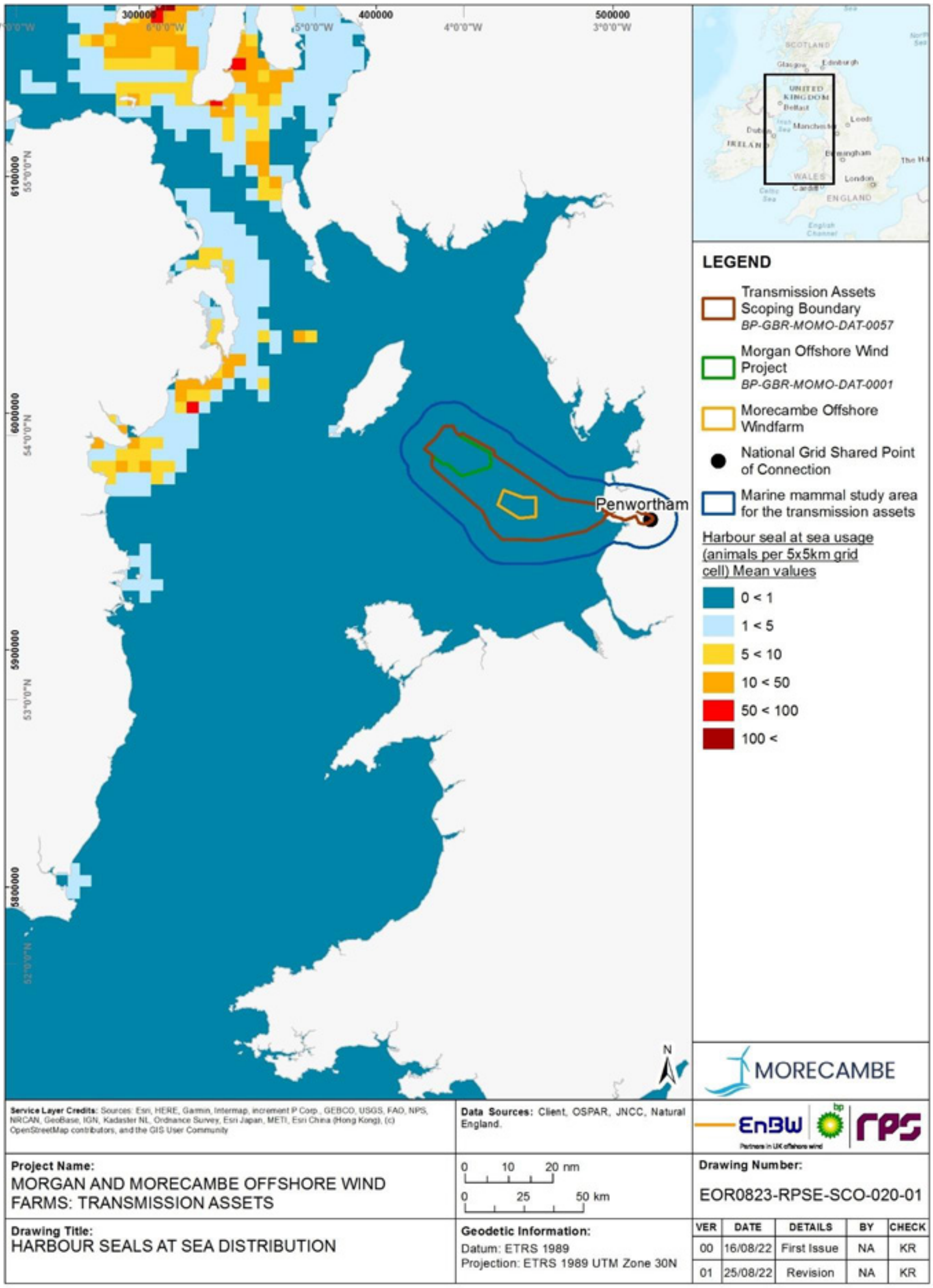


Figure 4.19: Harbour seal at-sea distribution (from Russell *et al.* 2017).

4.3.4.65 The Morecambe Offshore Windfarm digital aerial surveys recorded one harbour seal across the first 12 months of the survey, in July 2021. The

Morgan Offshore Wind Project digital aerial survey did not record any harbour seals across the first 12 months of the survey.

4.3.4.66 Based on the review of literature including previous surveys in this region, it is considered likely that harbour seal are a key species within the regional marine mammal study area. It therefore proposed that harbour seal are scoped into the EIA process.

Designated Sites

4.3.4.67 Designated sites with relevant qualifying features which overlap with the regional marine mammal study area are described in this section.

4.3.4.68 Table 4.14 provides an early indication of the designated sites that may be considered within the EIA, LSE Screening Report and potentially the ISAA if an LSE is identified. The list of designated sites, which includes all marine mammal SACs within the regional marine mammal study area for the generation assets, will be presented in the marine mammal assessment and the ES chapter. As a more detailed understanding of the project activities and impact pathways develops, the EIA will consider potential impacts on relevant Annex II marine mammal species of European and National Site Network designated sites.

4.3.4.69 A full screening of European and National Site Network designated sites with qualifying marine mammal features will be undertaken in the LSE Screening Report for the Transmission Assets, as part of the HRA process. The assessment on the European sites and effects on the sites(s) conservation objectives will be undertaken in the ISAA.

Table 4.14: Summary of designated sites with relevant marine mammal features within the vicinity of the marine mammal study area.

Designated Site	Distance to the Transmission Asset Scoping Boundary (km)	Features
Langness MNR	16.7	• Harbour seal *Phoca vitulina* • Grey seal *Halichoerus grypus* • Basking Shark *Cetorhinus maximus* • Harbour porpoise *Phocena phocoena* • Risso's dolphin *Grampus griseus*
Douglas Bay MNR	22.2	• Bottlenose dolphin *Tursiops truncates* • Risso's dolphin *Grampus griseus*
Laxey Bay MNR	22.4	• Harbour porpoise *Phocena phocoena* • Minke whale *Balaenoptera acutorostrata*
North Anglesey Marine/Gogledd Môn Forol SAC	26.0	• Harbour porpoise *Phocena phocoena*
Ramsey Bay MNR	26.4	• Harbour seal *Phoca vitulina* • Grey seal *Halichoerus grypus*
Baie Ny Carrickey MNR	30.2	• Risso's dolphin *Grampus griseus* • Harbour porpoise *Phocena phocoena* • Bottlenose dolphin *Tursiops truncatus* • Basking Shark *Cetorhinus maximus*

Designated Site	Distance to the Transmission Asset Scoping Boundary (km)	Features
Calf and Wart Bank MNR	35.8	• Risso’s dolphin *Grampus griseus* • Harbour porpoise *Phocena phocoena* • Basking Shark *Cetorhinus maximus*
Niarbyl MNR	36.7	• Harbour porpoise *Phocena phocoena* • Basking Shark *Cetorhinus maximus* • Grey seal *Halichoerus grypus*
Port Erin Bay MNR	36.8	• Harbour porpoise *Phocena phocoena* • Basking Shark *Cetorhinus maximus*
West Coast MNR	38.5	• Harbour porpoise *Phocena phocoena* • Basking Shark *Cetorhinus maximus* • Harbour seal *Phoca vitulina* • Grey seal *Halichoerus grypus*
North Channel SAC	60.6	• Harbour porpoise *Phocena phocoena*
Pen Llyn a`r Sarnau/Llŷn Peninsula and the Sarnau SAC	82.2	• Bottlenose dolphin *Tursiops truncatus* • Grey seal *Halichoerus grypus*
Strangford Lough SAC	91	• Harbour seal *Phoca vitulina*
West Wales Marine/Gorllewin Cymru Forol SAC	97.5	• Harbour porpoise *Phocena phocoena*
Murlough SAC	97.6	• Harbour seal *Phoca vitulina*
Rockabill to Dalkey Island SAC	123.9	• Harbour porpoise *Phocena phocoena*
Lambay Island SAC	130.2	• Harbour seal *Phoca vitulina* • Grey seal *Halichoerus grypus*
Cardigan Bay/Bae Ceredigion SAC	146.5	• Bottlenose dolphin *Tursiops truncatus* • Grey seal *Halichoerus grypus*
Slaney River Valley SAC	187.6	• Harbour seal *Phoca vitulina*
Pembrokeshire Marine/Sir Benfro Forol SAC	216.1	• Grey seal *Halichoerus grypus*

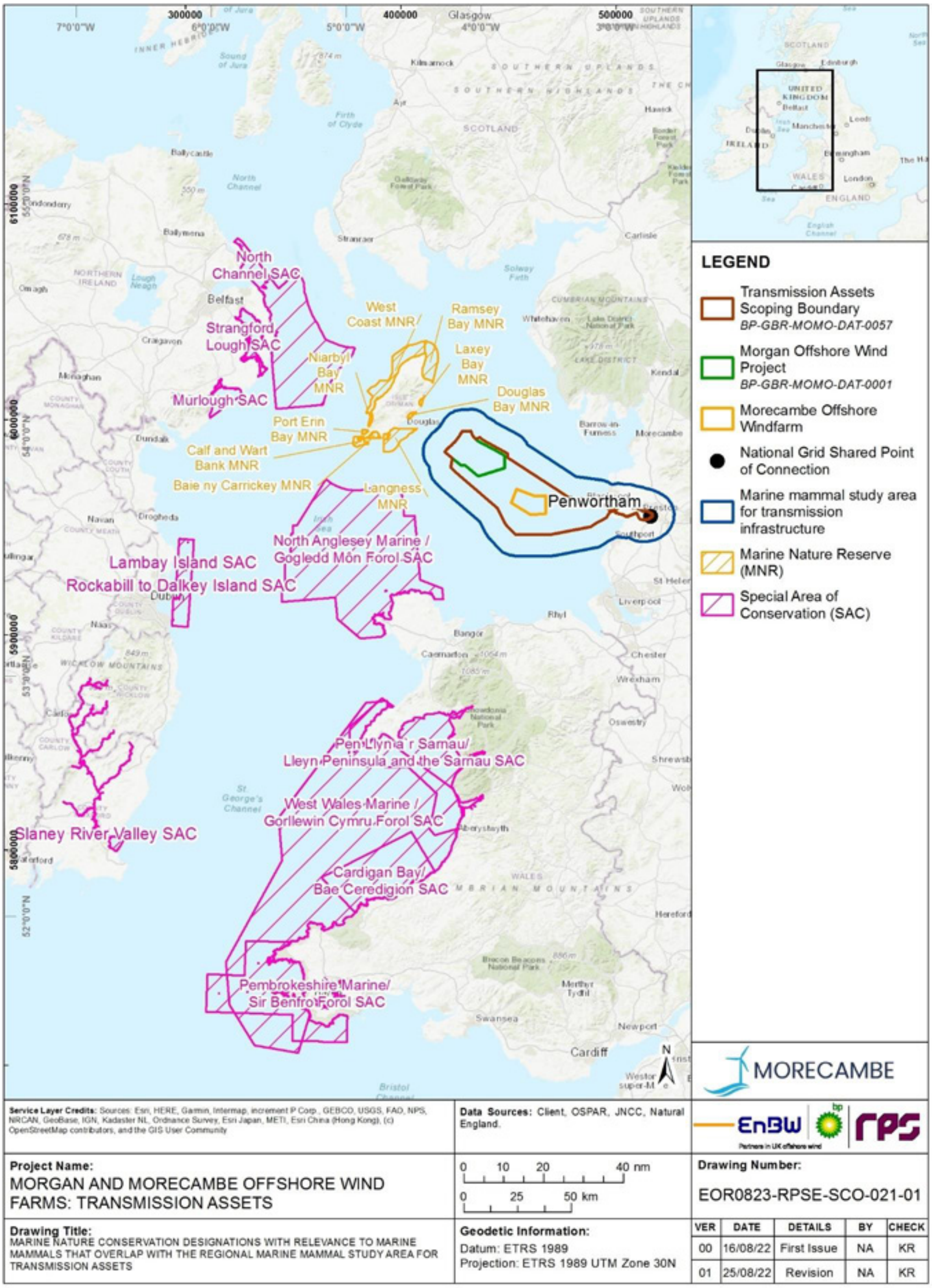


Figure 4.20: Marine nature conservation designations of relevance to marine mammals ecology that overlap with the regional marine mammal study area.

Protected species

4.3.4.70 Several species and habitats of conservation importance have been recorded or have the potential to occur within the marine mammal study area. These are presented below in Table 4.15 and include those species and habitats protected under Annex II of the Habitats Directive. Where species are afforded protection under other legislation, this has also been noted.

Table 4.15 :Relevant protected marine mammal species which have the potential to occur within the marine mammal study area.

Marine Mammal species	Protection legislation
Bottlenose dolphin (*Tursiops truncatus*)	Annex II of the Habitats Directive UK Biodiversity Action Plan (BAP) priority habitat that continues to be regarded as conservation priorities in the subsequent UK Post-2010 Biodiversity Framework Habitat of principal importance in England under the Natural Environment and Rural Communities (NERC) Act 2006 European Protected Species under Annex IV of the European Commission habitats directive Part II Section 28 of the Wildlife and Countryside Act 1981
Harbour porpoise (*Phocoena phocoena*)	Annex II of the Habitats Directive Annex V of the OSPAR (Oslo-Paris) convention UK BAP priority habitat that continues to be regarded as conservation priorities in the European Protected Species under Annex IV of the European Commission habitats directive subsequent UK Post-2010 Biodiversity Framework Schedule 6 of the Wildlife and Countryside Act 1981
Grey seal (*Halichoerus grypus*)	Annex II of the Habitats Directive European Protected Species under Annex IV of the European Commission habitats directive Annex V of the European Commission habitats directive Part II Section 28 of the Wildlife and Countryside Act 1981 Conservation of Seals Act 1970
Harbour seal (*Phoca vitulina*)	Annex II of the Habitats Directive UK BAP priority habitat that continues to be regarded as conservation priorities in the subsequent UK Post-2010 Biodiversity Framework Habitat of principal importance in England under the NERC 2006 Act European Protected Species under Annex IV of the European Commission habitats directive Annex V of the European Commission habitats directive Conservation of Seals Act 1970
Minke whale (*Balaenoptera acutorostrata*)	UK BAP priority habitat that continues to be regarded as conservation priorities in the subsequent UK Post-2010 Biodiversity Framework Habitat of principal importance in England under the NERC 2006 Act European Protected Species under Annex IV of the European Commission habitats directive Schedule 5 of the Wildlife and Countryside Act 1981
Short beaked common dolphin (*Delphinus delphis*)	UK BAP priority habitat that continues to be regarded as conservation priorities in the subsequent UK Post-2010 Biodiversity Framework European Protected Species under Annex IV of the European Commission habitats directive Schedule 6 of the Wildlife and Countryside Act 1981

Marine Mammal species	Protection legislation
Risso's dolphin (*Grampus griseus*)	UK BAP priority habitat that continues to be regarded as conservation priorities in the subsequent UK Post-2010 Biodiversity Framework Habitat of principal importance in England under the NERC 2006 Act European Protected Species under Annex IV of the European Commission habitats directive Schedule 5 of the Wildlife and Countryside Act 1981

Future baseline conditions

4.3.4.71 The EIA process will consider the existing baseline conditions within the study area, and future baseline conditions (as far as reasonably practicable) in accordance with the methodology set out in part 1, section 5 (see section 5.7.2 for the approach to consideration of future baseline conditions).

4.3.5 Potential project impacts

4.3.5.1 A range of potential impacts on marine mammals have been identified which may occur during the construction, operation and maintenance, and decommissioning phases of the Transmission Assets.

4.3.5.2 The impacts that have been scoped into the assessment are outlined in Table 4.16 together with a description of any additional data collection (e.g., site-specific surveys) and supporting analyses (e.g., modelling) that will be required to enable a full assessment of the impacts.

4.3.5.3 Potential impacts scoped out of the assessment are presented in Table 4.17, with justification.

Table 4.16: Impacts proposed to be scoped into the project assessment for marine mammals (project phase refers to construction (C), operation and maintenance (O) and decommissioning (D)).

Impact	Project phase			Justification	Data collection and analysis required to characterise the baseline environment	Summary of proposed approach to assessment
	C	O	D			
Injury and disturbance from underwater noise generated from piling.	✓	×	×	Impact piling during construction may result in hearing damage/auditory injury or behavioural disturbance/displacement (including barrier effects) of marine mammals. No piling will occur during the operational and maintenenace and decomissioning phases.	Aerial surveys to obtain density estimates, where data allow, for each species within the relevant impact footprint. Desktop data sources will also be used where appropriate.	Underwater noise modelling outputs from the Morgan Offshore Wind Project Generation Assets and the Morecambe Offshore Windfarm Project Generation Assets will be included in the Transmission Assets impact assessment to inform the magnitude of impact, (as set out in part 2, section 3.2: Underwater noise of this EIA Scoping Report) to quantitatively assess the risk of auditory injury. Unless any new guidance is published prior to the impact assessment, the Southall *et al*. (2019) thresholds will be used to assess the risk of a permanent auditory injury. The risk of injury will be based on both of the dual criteria: cumulative sound exposure level (SEL_{cum}) and peak sound pressure level (SPL^{peak}). The assessment of disturbance will be based on the good practice methodology available at the time of assessment and making use of the best available scientific evidence. Noise contours at appropriate intervals will likely be generated by noise modelling and overlaid on species density surfaces to predict the number of animals potentially affected.
Injury and disturbance from underwater noise generation from UXO detonation.	✓	×	×	UXO detonation during construction may result in hearing damage/ auditory injury or behavioural disturbance/displacement (including barrier effects) of marine mammals. No UXO clearance will occur during the operational and maintenenace and decomissioning phases.	Aerial surveys to obtain density estimates, where data allow, for each species within the relevant impact footprint. Desktop data sources will also be used where appropriate.	Underwater noise modelling outputs from the Morgan Offshore Wind Project Generation Assets and the Morecambe Offshore Windfarm Project Generation Assets for UXO detonation activities (as set out in part 2, section 3.2: Underwater noise of this EIA Scoping Report) will be used to inform this assessment and determine the extent of noise contours and whether these could lead to injury/disturbance effects.
Disturbance to marine mammals from vessel use	✓	✓	✓	The impact of vessel use during all phases of the project may result in behavioural	Aerial surveys to obtain density estimates, where data allows, for each species within the	Comparative noise modelling for non-piling ‘noisy’ activities will be undertaken to inform a qualitative assessment of

Impact	Project phase			Justification	Data collection and analysis required to characterise the baseline environment	Summary of proposed approach to assessment
	C	O	D			
and other (non-piling) noise-producing activities.				disturbance/ displacement (including barrier effects) of marine mammals. Other (non-piling) related noise-producing activities could also result in disturbance including construction activities (e.g., seabed preparation, trenching, and rock placement), operation and maintenance activities and decommissioning activities (including cutting of jacket or monopiles).	relevant impact footprint. Desktop data sources will also be used where appropriate.	non-piling noise-generating activities, e.g., rock placement, vessel movement.
Injury to marine mammals due to collision with vessels.	✓	✓	✓	Increased vessel traffic during construction activities, operation and maintenance activities and decommissioning activities may result in collisions with marine mammals.	N/A	A qualitative assessment will be undertaken, based on best available literature at the time of writing.
Effects on marine mammals due to changes in prey availability.	✓	✓	✓	Changes in prey abundance and distribution resulting from construction activities, operation and maintenance activities and decommissioning activities may impact on the ability of marine mammals to forage in the area.	N/A	No specific modelling required for this impact although the assessment will be based on the results of the underwater noise modelling assessment (part 2, section 3.2 of this EIA Scoping Report) and physical processes assessment (part 2, section 3.1 of this EIA Scoping Report), and the resulting impact assessment carried out fish and shellfish receptors (see part 2, section 4.2 of this EIA Scoping Report).
Disturbance to marine mammals from pre-construction surveys.	✓	×	×	Geophysical surveys in the construction phase may result in behavioural disturbance/displacement of marine mammals.	Aerial surveys to obtain density estimates, where data allows, for each species within the relevant impact footprint. Desktop data sources will also be used where appropriate.	Comparative noise modelling for non-piling ‘noisy’ activities will be undertaken to inform a qualitative assessment of non-piling noise-generating activities.

Table 4.17: Impacts proposed to be scoped out of the Transmission Assets assessment for marine mammals.

Impact	Justification
Accidental pollution during all phases.	There is a risk of pollution being accidentally released during the construction, operation and maintenance and decommissioning phases from sources including vessels/vehicles and equipment/machinery. This may lead to direct mortality of marine mammals or a reduction in prey availability, either of which may affect species' survival rates. However, the risk of such events is managed by the implementation of measures set out in standard post-consent plans (e.g., EMP including MPCPs). These plans include planning for accidental spills, address all potential contaminant releases and include key emergency contact details. It will also set out industry good practice and OSPAR (Oslo-Paris), International Maritime Organisation (IMO) and MARPOL (International Convention for the Prevention of Pollution from Ships) guidelines for preventing pollution at-sea. Therefore, the likelihood of an accidental spill occurring is very low and in the unlikely event that such events did occur, the magnitude of these will be minimised through measures such as marine pollution contingency planning (MPCP). As such, no significant effect would occur and this is will be scoped out of further consideration within the marine mammal EIA process.
Increased SSCs and associated sediment deposition during all phases.	Disturbance to water quality can have both direct and indirect impacts on marine mammals. Indirect impacts would include effects on prey species (which is scoped in). Direct impacts include the impairment of visibility and therefore foraging ability which might be expected to reduce foraging success. Marine mammals are well known to forage in tidal areas where water conditions are turbid and visibility conditions poor. For example, harbour porpoise and harbour seals in the UK have been documented foraging in areas with high tidal flows (e.g., Pierpoint, 2008; Marubini et al., 2009; Hastie et al., 2016); therefore, low light levels, turbid waters and suspended sediments are unlikely to negatively impact marine mammal foraging success. When the visual sensory systems of marine mammals are compromised, they are able to sense the environment in other ways, for example, seals can detect water movements and hydrodynamic trails with their mystacial vibrissae; while odontocetes primarily use echolocation to navigate and find food in darkness. Whilst elevated levels of SSC arising during construction, operation and decomissioning of the Transmission Assets may decrease light availability in the water column and produce turbid conditions, the maximum impact range is expected to be localised with sediments rapidly dissipating over one tidal excursion. In addition, there is a large natural variability in the SSC within the marine mammal study area, so marine mammals living here will be tolerant of any small scale increases, such as those associated with the construction activities. As such, this impact will be scoped out of further consideration within the marine mammal EIA process.
Impact of EMF (from surface lain or buried cables) during the operation and maintenance phase.	Based on the data available to date, there is no evidence of EMF related to marine renewable devices having any impact (either positive or negative) on marine mammals (Copping, 2018). There is no evidence that seals can detect or respond to EMF, however, some species of cetaceans may be able to detect variations in magnetic fields (Normandeau *et al*., 2011). To date, the only marine mammal known to show any response to EMF is the Guiana dolphin (Sotalia guianensis) which has been shown to possess an electroreceptive system, which uses the vibrissal crypts on their rostrum to detect electrical stimuli similar to those generated by small to medium sized fish (Czech-Damal et al., 2013). However, this has not been shown in any other species of marine mammal and this species does not occur within the marine mammal study area. As such, this impact will be scoped out of further consideration within the marine mammal EIA process.

4.3.6 Measures adopted as part of the project

4.3.6.1 The following measures to be adopted as part of the project are relevant to marine mammals. These measures may evolve as the engineering design and the EIA progresses.

- Development of, and adherence to, an appropriate Construction Method Statement.
- Development of, and adherence to, an EMP, including a MPCP which will include planning for accidental spills, address all potential contaminant releases and include key emergency details.
- Development of, and adherence to, a Marine Mammal Mitigation Protocol which would include implementation of piling soft start and ramp up measures.

4.3.6.2 The requirement for and feasibility of any further mitigation will be dependent on the significance of effect and will be consulted upon with statutory consultees throughout the EIA process.

4.3.7 Proposed assessment methodology

4.3.7.1 The marine mammal offshore EIA process will follow the methodology set out in part 1 section 5: EIA Methodology, of this EIA Scoping Report. Specific to the marine mammal EIA, the following guidance documents will also be considered:

- Guidelines for EcIA in the UK and Ireland. Terrestrial, Freshwater, Coastal and Marine (CIEEM, 2019).
- European Union Guidance on Wind Energy Developments and Natura 2000 legislation (European Commission, 2010).
- Oslo Paris Convention (OSPAR) Guidance on Environmental Considerations for Offshore Wind Farm Development (OSPAR, 2008).
- Marine mammal noise exposure criteria: Updated scientific recommendations for residual hearing effects (Southall *et al.*, 2019).
- National Oceanic and Atmospheric Administration (NOAA) technical guidance for assessing the effects of anthropogenic sound on marine mammal hearing (NMFS, 2016).
- Underwater acoustic thresholds for onset of permanent and temporary threshold shifts (NMFS, 2018).
- Marine mammal noise exposure criteria: assessing the severity of marine mammal behavioural response to human noise (Southall *et al*., 2021)
- Statutory nature conservation agency protocol for minimising the risk of injury to marine mammals from piling noise (JNCC, 2010).
- JNCC guidelines for minimising the risk of injury to marine mammals from geophysical surveys (JNCC, 2017).
- Guidance on noise management in harbour porpoise SACs (JNCC, 2020b).
- The European Union (EU) Marine Strategy Framework Directive (Directive 2008/56/EC). This seeks to achieve good environmental status (GES) in Europe’s seas by 2020. The qualitative descriptors for determining GES include "Introduction of energy, including underwater noise, is at levels that do not adversely affect the marine environment."

This Directive was transposed into United Kingdom (UK) law by the Marine Strategy Regulations 2010.

4.3.7.2 The impact assessment will consist of a detailed quantitative assessment for underwater noise (impulsive and non-impulsive). The assessment will include permanent auditory injury and behavioural disturbance. The risk of injury will be based on both of the dual criteria: cumulative sound exposure level (SEL_{cum}) and peak sound pressure level (peak SPL). To assess the SEL_{cum} criterion, the predictions of received sound level over 24 hours are frequency weighted, to reflect the hearing sensitivity of each functional hearing group. The peak SPL criterion is for unweighted received sound level. The assessment of disturbance will be based on the good practice methodology available at the time of assessment, and, where possible, will include consideration of species-specific dose response curves. Noise contours at appropriate intervals will be generated by noise modelling and overlaid on species density surfaces to predict the number of animals potentially disturbed. This will allow the quantification of the number of animals that will potentially respond.

4.3.7.3 The densities to be used in the assessment process for assessing potential impacts on marine mammals, and agreement of correction factors for availability bias will be discussed with stakeholders as part of the Marine Mammal Evidence Plan process.

4.3.7.4 For the purposes of undertaking the EIA, marine mammal receptors identified as having the potential to occur in the marine mammal study area will be grouped into broad ecological receptor groups, called Important Ecological Features (IEFs), in line with guidelines set out in CIEEM (2019). These IEFs will be those features against which impacts associated with the construction, operation and maintenance and decommissioning phases of the Transmission Assets will be assessed. Criteria defining the value of each IEF will be defined to reflect topic-specific interests.

4.3.7.5 As the OSPs are included in both the Transmission Assets project description and the project descriptions for the Morgan Offshore Wind Project Generation Assets and Morecambe Offshore Windfarm Generation Assets, the assessment outputs from the Generation Assets impact assessments 'magnitude of effects' will be replicated in the Transmission Assets impact assessment and applied to the existing and future baseline of the Transmission Assets Scoping Boundary.

4.3.8 Potential cumulative effects

4.3.8.1 For marine mammal receptors, the approach to cumulative effects assessment will be holistic and combine all potential sources of underwater noise from other plans and projects including:

- Pile driving
- Disturbance from vessels
- UXO clearance
- Seismic surveys
- Other construction development.

4.3.8.2 The key cumulative effect is likely to come from underwater noise from pile driving. A range of realistic scenarios for cumulative underwater noise effects will be developed for the cumulative effects assessment, based on publicly available information, liaison with other developers where possible, as well as consultation with the regulators and stakeholders.

4.3.8.3 Cumulative effects with the generation assets (i.e., the Morgan Offshore Wind Project and the Morecambe Offshore Windfarm) will be considered, together with cumulative effects with other Round 4 projects (such as the Mona Offshore Wind Project) and other infrastructure projects such as proposed wind farms and interconnectors, where relevant. Note that as the OSPs are included in both the Transmission Assets project description and the project description for the Morgan Offshore Wind Project Generation Assets and the Morecambe Offshore Windfarm Generation Assets, some aspects of the CEA will not include the OSPs (e.g. potential impacts associated with the OSP footprint on the seabed) to prevent 'double counting' of potential impacts. Where OSPs are included in the CEA and where they are not will be agreed with the Evidence Plan Expert Working Group.

4.3.8.4 The impacts of fishing and existing shipping activity will not be considered in the cumulative effects assessment since these activities occur throughout the baseline and are therefore already accounted for in the existing marine mammal baseline characterisation abundance and density estimates.

4.3.8.5 The cumulative effects assessment will follow the approach outlined in part 1 section 5: EIA Methodology of this EIA Scoping Report. The cumulative study area (within which the screening for other plans/projects is undertaken) will be defined as the regional marine mammal study area (see part 2, section 4.3.2 of this EIA Scoping Report).

4.3.9 Potential inter-related effects

4.3.9.1 The assessment of potential inter-related effects will be considered within the marine mammals assessment. It will include consideration of project lifetime effects and receptor-led effects, in line with the approach outlined in part 1, section 5: EIA Methodology of this EIA Scoping Report.

4.3.10 Potential transboundary impacts

4.3.10.1 A screening of transboundary impacts has been carried out and is presented in part 3, Annex A of this EIA Scoping Report. This screening exercise identified that there is potential for transboundary impacts upon marine mammals due to construction, operation and maintenance, and decommissioning impacts of the Transmission Assets. These include:

- Injury and disturbance from underwater noise generated from piling.
- Injury and disturbance from underwater noise generation from UXO detonation.
- Disturbance to marine mammals from vessel use and other (non-piling) noise-producing activities.
- Effects on marine mammals due to changes in prey availability.

4.3.10.2 These activities have the potential to directly affect Annex II marine mammal species that are associated with European sites of other states. Therefore, the potential for transboundary impacts will be considered within the ES.

4.4 Offshore ornithology

4.4.1 Introduction

4.4.1.1 This section of the EIA Scoping Report identifies the receptors relevant to the assessment of offshore ornithology for the Transmission Assets. It also considers the potential impacts arising from the construction, operation and maintenance, and decommissioning of the Transmission Assets and identifies the proposed scope of, and methodology for, the EIA process for offshore ornithology.

4.4.1.2 Intertidal and terrestrial ornithology receptors are addressed in part 2, section 7.1: Terrestrial and intertidal ecology, of this EIA Scoping Report.

4.4.2 Study area

4.4.2.1 The offshore ornithology study area is shown in Figure 4.21, and includes the offshore elements of the Transmission Assets Scoping Boundary plus a 4km buffer. This area encompasses the area within which disturbance impacts may occur as a result of activities during the Transmission Assets installation and decommissioning.

4.4.2.2 As shown in Figure 4.21, part of the Morgan aerial survey area and Morecambe aerial survey area overlap with the study area for the Transmission Assets. Surveys undertaken are described in part 2, section 4.1.3 (site-specific surveys) below.

4.4.2.3 The Transmission Assets would include minimal infrastructure with potential to impact on offshore ornithology receptors (the Transmission Assets will include offshore export cables and any associated cable protection, OSPs, a Morgan offshore booster station and any associated scour protection). Therefore, the offshore ornithology study area is considered suitable for characterising the offshore ornithology features and for considering potential impacts arising from the Transmission Assets on offshore ornithology receptors.

4.4.2.4 Seabirds and migratory birds are highly mobile species and there is potential for birds occurring within the offshore ornithology study area to have originated from more distant locations (e.g., a breeding colony). Published foraging ranges (Woodward *et al.*, 2019) and regional population scales (Furness, 2015) will be reviewed to determine the potential connectivity of breeding and non-breeding populations with the Transmission Assets study area.

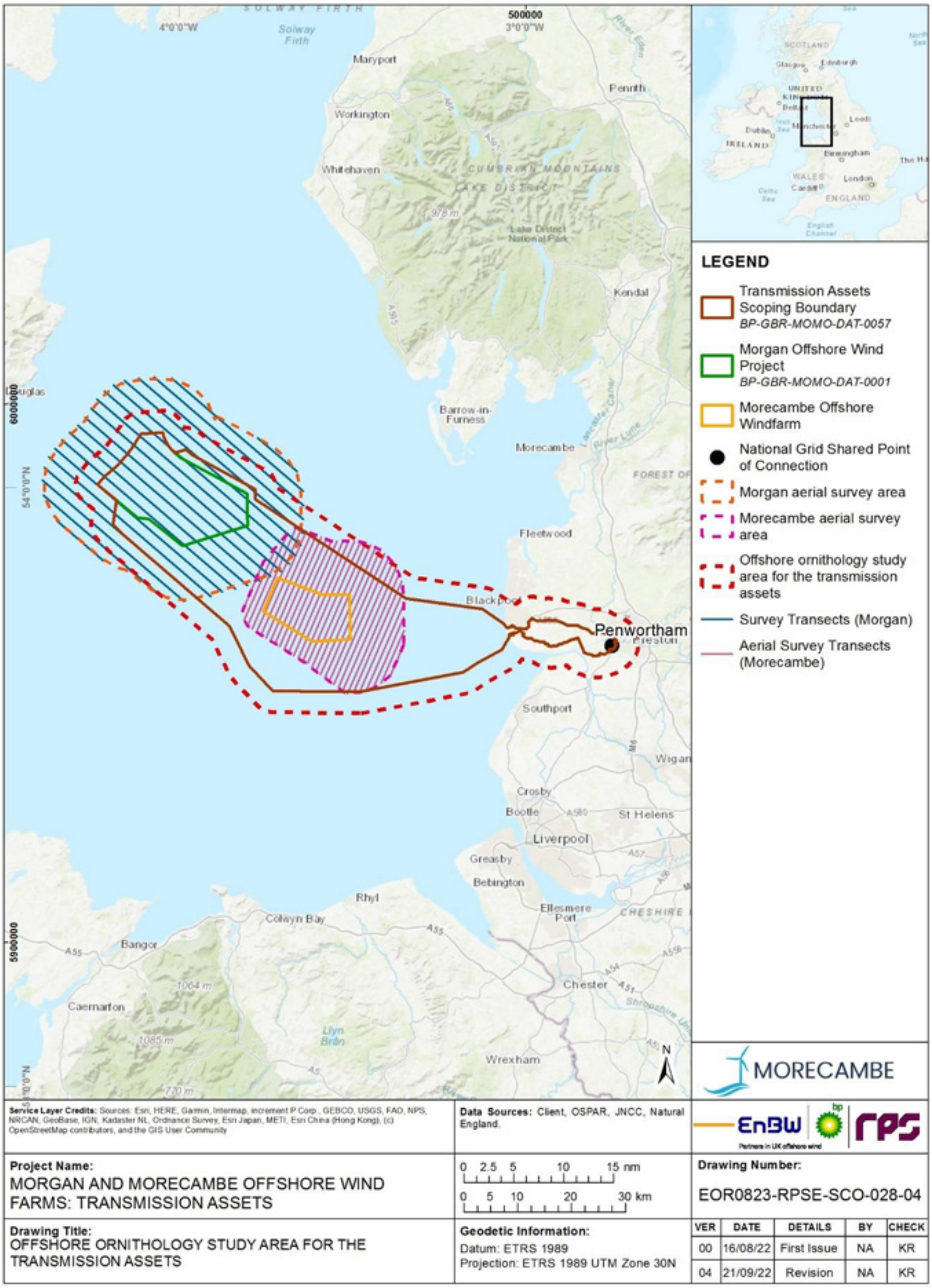


Figure 4.21: The offshore ornithology study area for the transmission assets.

4.4.3 Data sources

Desktop data

4.4.3.1 An initial desk-based review of literature and data sources to support this EIA Scoping Report has identified sources that provide coverage of the offshore ornithology study area. These are summarised in Table 4.18.

Table 4.18: Summary of key desktop datasets and reports – offshore ornithology.

Title	Source	Year	Author
Awel y Môr Offshore Wind Farm. Category 6: Environmental Statement	Awel y Môr Offshore Wind Farm Ltd.	2022	RWE Renewables UK
Seabird Population Trends and Causes of Change	Joint Nature Conservation Comittee (JNCC)	2021	JNCC
Seabirds Count and the Seabird Monitoring Programme	JNCC	2021	JNCC
Protected site networks	JNCC, NatureScot SiteLink (Scotland), Natural England GOV.UK (England), Natural Resources Wales (NRW) GOV.WALES (Wales), Department of Agriculture, Environment and Rural Affairs (DAERA) (Northern Ireland), National Parks and Wildlife Service (NPWS) (Ireland), Isle of Man GOV.IM (DEFA)	2022	SNCBs
National Biodiversity Network (NBN) Atlas	NBN Atlas	2022	NBN Atlas
Identifying important at-sea areas for seabirds using species distribution models and hotspot mapping	Biological Conservation	2020	Cleasby *et al.*
Desk-based revision of seabird foraging ranges used for Habitats Regulation Assessment (HRA) screening	BTO Research Report	2019	Woodward *et al.*
Seabird Mapping and Sensitivity Tool (SeaMAST)	Natural England GOV.UK	2019 2014	Natural England Bradbury *et al.*
Distribution maps of cetacean and seabird populations in the North-East Atlantic	Journal of Applied Ecology	2019	Waggitt *et al.*
Breeding density, fine-scale tracking, and large-scale modelling reveal the regional distribution of four seabird species	Ecological Applications	2017	Wakefield *et al.*
An assessment of the numbers and distributions of wintering waterbirds and seabirds in Liverpool Bay/Bae Lerpwl area of search	JNCC	2016	Lawson *et al.*
Quantifying foraging areas of little tern around its breeding colony SPA during chick-rearing	JNCC	2015	Parsons *et al.*
Quantifying usage of the marine environment by terns *Sterna* sp. around their breeding colony SPAs	JNCC	2014	Wilson *et al.*
Report to Inform Appropriate Assessment: Offshore Wind Leasing Round 4. Plan Level HRA	The Crown Estate	2021/ 2022	Niras

Title	Source	Year	Author
Joint SNCB Interim Advice On The Treatment Of Displacement For Red-Throated Diver	JNCC	2022	JNCC
Awel y Mor aerial digital surveys (2019 to 2021)	Awel y Mor Preliminary Environmental Information Report (PEIR), Volume 2, Chapter 4: Offshore Ornithology https://awelymor.cymru/	2019-2021	RWE
Morlais Project baseline boat-based seabird survey results	Morlais Project Environmental Statement	2019	Natural Power /Royal Haskoning
Walney offshore wind farm year 3 post-construction monitoring	Marine Data Exchange	2014	CMACS
Rhiannon offshore wind farm Preliminary Environmental Information Report (PEIR)	Marine Data Exchange	2012	Celtic Array Ltd
West of Duddon Sands pre-construction offshore wind farm boat-based ornithology samples	Marine Data Exchange	2012	Centre for Marine and Coastal Studies Ltd (CMACS)
Ormonde and Walney offshore wind farm ornithology surveys	Marine Data Exchange	2011-2012	Aarhus University
Round 3 Irish Sea Offshore Wind Farm Development ornithology surveys	Marine Data Exchange	2010-2012	Ecological Consultancy Ltd. (ECON)
SEA678 Data Report for offshore seabird populations	University College Cork	2006	Mackey and Giménez

Site-specific surveys

4.4.3.2 Aerial digital surveys for seabirds and marine mammals are currently being undertaken for the Morgan Offshore Wind Project aerial bird survey area, which comprises a 10km buffer around the Morgan Array Scoping Boundary (Figure 4.21). Surveys commenced in April 2021 and are planned to continue until March 2023. Aerial digital surveys for seabirds and marine mammal have also been undertaken across the Morecambe Offshore Windfarm. Surveys commenced in March 2021 and are planned to continue until February 2023. The aerial bird survey area comprises the Morecambe Array Area plus a buffer of 4km which has been extended out to 10km in the north and east due to the close proximity with the Liverpool Bay SPA (Figure 4.21). These surveys cover part of the offshore ornithology study area for the Transmission Assets (see part 2, section 4.3: Marine mammals of this EIA Scoping Report for further details of these surveys).

4.4.3.3 It is expected that the bird assemblage recorded during these site-specific surveys will also be representative for the majority of the marine areas within the offshore ornithology study area. An initial review of desk study data (Waggitt *et al*., 2020) indicates limited variation in seabird composition and density in the offshore parts of the offshore ornithology study area; however, this will be assessed through further detailed desk study.

4.4.3.4 Intertidal and nearshore waterbird surveys are being undertaken at the landfall during the non-breeding and passage seasons (September to May) in 2021 to 2022 and potentially in 2022 to 2023. The intertidal and nearshore waterbird survey area covers the coastline up to 500m either side of the landfall, extending up to 1.5km (the distance that birds can reliably be surveyed) below the MHWS mark. Bird counts are carried out from vantage points along the upper shore of this intertidal and nearshore survey area. The diurnal surveys comprise monthly 'through-the-tidal-cycle' counts covering between one and 12 snapshot surveys of the count sectors during different tidal states within the intertidal and nearshore survey area each month. Nocturnal surveys are also being undertaken to cover a tidal cycle every two months but cover a smaller range of up to 500m below the MHWS mark due to the limitations of night-vision equipment. Further details on the intertidal and nearshore waterbird surveys can be found in part 3, section 7.1: Terrestrial and intertidal ecology, of this EIA Scoping Report. These surveys provide coverage of the nearshore parts of the offshore ornithology study area within 1.5km of the shoreline.

4.4.3.5 The baseline characterisation for the remaining parts of the offshore ornithology study area that are not covered by site-specific offshore aerial digital surveys and the intertidal and nearshore waterbird surveys will be derived from existing seabird datasets, including, but not necessarily limited to those listed in Table 4.18. Such impacts are therefore likely to be of small spatial and temporal extent, transient in nature and highly unlikely to result in significant effects. The use of the above data sources is therefore considered to be sufficient to characterise the baseline of the offshore ornithology study area for the purposes of the EIA.

4.4.4 Baseline environment

Irish Sea

4.4.4.1 A review of ornithology surveys in the Irish Sea from 1980 to 2003 was undertaken for the Strategic Environmental Assessment area 6, which covers the Irish Sea. Manx shearwater *Puffinus puffinus* have been recorded at densities of up to eight birds per km^2 in the Irish Sea during the breeding season and post-breeding season. Northern gannet *Morus bassanus* have also been recorded at densities in the Irish Sea of up to 2.5 birds per km^2 during the post-breeding season. Herring gull *Larus argentatus* have been recorded at densities of five birds per km^2 during the winter, breeding season and autumn. Kittiwake *Rissa tridactyla* were recorded at densities of up to two birds per km^2 across all seasons. The great cormorant *Phalacrocorax carbo*, northern fulmar *Fulmarus glacialis*, European shag *Phalacrocorax aristotelis*, arctic skua *Stercorarius parasiticus*, great skua *Stercorarius skua*, black headed gull *Chroicocephalus ridibundus*, common gull *Larus canus*, long-tailed skua *Stercorarius longicaudus*, Pomarine Skua *Stercorarius pomarinus*, lesser black-backed gull *Larus fuscus*, great black-backed gull *Larus marinus*, common tern *Sterna hirundo*, arctic tern *Sterna paradisaea*, black guillemot *Cepphus grylle*, common guillemot *Uria aalge*, razorbill *Alca torda* and Atlantic puffin *Fratercula arctica* are also identified as being present within the Irish Sea (Mackey and Giménez, 2006).

4.4.4.2 Boat-based ornithology surveys were carried out within the east Irish Sea (to the southwest of the offshore ornithology study area) from March 2010 to April 2012 to support the EIA for the Rhiannon offshore wind farm. The species assemblage recorded was primarily composed of petrels and shearwaters *Procellariidae*, northern gannet, skuas *Stercorarius*, gulls *Laridae*, terns *Sternidae* and auks *Alcidae*. Manx shearwater dominated the recorded individuals, making up 44% of all birds recorded. Guillemot and razorbill were the second and third most common species recorded. Seasonal variation was also recorded with many of the more numerous species recorded in higher numbers throughout the spring and summer months (Celtic Array Ltd, 2012).

4.4.4.3 Boat-based ornithology surveys were carried out within the east Irish Sea (to the east of the offshore ornithology study area) in 2014 as part of pre-construction and post-construction monitoring for the West of Duddon Sands and Walney offshore wind farms. Manx shearwater and guillemot were the most frequently recorded species and were recorded in all surveys. Kittiwake, lesser black-backed gull and gannet were also recorded frequently. The abundance of birds recorded within the offshore wind farms peaked in June and July. There were low numbers of birds in May and August across both survey campaigns (CMACS, 2012; 2014).

4.4.4.4 Digital aerial surveys were carried out within the east Irish Sea in 2019 as part of the baseline characterisation to support the EIA for the Awel Y Mor offshore wind farm. The species most commonly recorded were: Red-throated diver, Gannet, Fulmar, Manx Shearwater, Kittiwake, Common gull, Herring Gull, Black backed gull, Lesser black backed gull, comic tern, Guillemot, Razorbill and Common scoter.

Offshore ornithology study area

4.4.4.5 Interim analysis of the first 12 months of the aerial digital survey data for the Morgan Offshore Wind Project and the Morecambe Offshore Windfarm indicates that the four most frequently recorded species occurring within the survey areas over this period were guillemot, razorbill, kittiwake, and Manx shearwater. Northern gannet, herring gull, fulmar, 'commic' tern and other gull species were recorded regularly but in lower numbers. It is expected that these species will also be present across the offshore ornithology study area for the Transmission Assets.

4.4.4.6 A summary of the most frequently recorded species in the first 12 months of the digital aerial surveys for the Morgan Offshore Wind Project and the Morecambe Offshore Windfarm is presented below:

- Guillemot: Within the aerial bird survey area for the Morgan Offshore Wind Project guillemot were recorded in every month from April 2021 to March 2022 with the highest records of 1,097 in April 2021. Within the digital aerial survey area for the Morecambe Offshore Windfarm, guillemot were recorded in every month from March 2021 to February 2022, with the highest records of 5,016 in August 2021.
- Razorbill: Within the aerial bird survey area for the Morgan Offshore Wind Project razorbill were recorded in every month from April 2021 to March 2022 except July with the highest records of 69 in December 2021. Within the digital aerial survey area for the Morecambe Offshore Windfarm, razorbill were recorded in every month from March 2021 to February 2022 with the highest records of 294 in October 2021.

- Unidentified guillemot/razorbill: guillemot and razorbill cannot be reliably identified to species level in some images and such incidences are therefore snagged as ‘unidentified guillemot/razorbill’. During the first 12 months of the digital aerial survey for the Morgan Offshore Wind Project unidentified guillemot/ razorbill were recorded in every month with the highest record of 531 in December 2022.
- Kittiwake: Within the aerial bird survey area for the Morgan Offshore Wind Project kittiwake were recorded in every month from April 2021 to March 2022 with the highest records of 421 in December 2021. Within the digital aerial survey area for the Morecambe Offshore Windfarm, kittiwake were recorded in every month from March 2021 to February 2022 with the highest records of 927 in September 2021.
- Manx shearwater: Within the aerial bird survey area for the Morgan Offshore Wind Project Manx shearwater were recorded in April 2021 to September 2021 and February 2022 with the highest records of 262 in August 2021. Within the digital aerial survey area for the Morecambe Offshore Windfarm, Manx shearwater were recorded from March 2021 to September 2021 with the highest records of 3,103 in July 2021.
- Gannet: Within the aerial bird survey area for the Morgan Offshore Wind Project gannet were recorded in every month from April 2021 to March 2022 with the highest records of 84 in August 2021. Within the digital aerial survey area for Morecambe Offshore Windfarm, gannet were recorded from March 2021 to November 2021 with the highest records of 436 in August 2021.

4.4.4.7 Further analysis of density and abundance results using the full 24 months of aerial digital survey data will be undertaken from March 2023 once the surveys are complete.

4.4.4.8 Analysis of the intertidal and nearshore waterbird surveys has not yet been carried out; however, it is expected that there will be increased abundances of non-breeding grebes, divers and seaduck, such as common scoter. Data sources used in the classification of the Liverpool Bay/ Bae Lerpwl SPA will also be used to inform this baseline characterisation (Parsons et al., 2015; Wilson et al., 2014; Lawson et al., 2016).

4.4.4.9 Data from desk-based sources for other parts of the offshore ornithology study area will also be reviewed, analysed and presented in the assessment to provide a comprehensive baseline characterisation of the offshore ornithology study area.

Designated sites

4.4.4.10 Nature conservation designations with relevance to seabirds comprise SPAs within the National Site Network in the UK and the Natura 2000 network of European sites in the Republic of Ireland, Ramsar sites, national (e.g., SSSIs) and regional designations. The offshore ornithology study area overlaps with the Liverpool Bay/Bae Lerpwl SPA and the Ribble and Alt Estuaries SPA and Ramsar site. There are also a number of SPAs along the western British coastline and eastern and northern coastlines of Ireland and Northern Ireland that support qualifying species that have been recorded during the site-specific surveys and are therefore likely to be present within the offshore ornithology study area.

4.4.4.11 Assessment of the impacts will include a search for designated sites within the species-specific foraging range distances of seabirds, defined by the mean maximum (plus one standard deviation (+1 S.D.)) distance. Consideration will also be given to the potential for impacts on marine and wetland SPAs that host important wintering waterbird features that may interact with the offshore ornithology study area. Figure 4.22 provides an initial indication of the designated sites (international and national) with relevant ornithology features that are in the vicinity of the Transmission Assets Scoping Boundary and likely to be given consideration within the EIA and HRA. This is not an exhaustive representation of all designated sites with potential connectivity to the Transmission Assets.

4.4.4.12 The long list of designated sites with potential connectivity to the Transmission Assets generation assets will be refined in the EIA to include sites that fall within the potential ZOI of the Transmission Assets, which will be determined as part of the EIA process, to include consideration of migratory bird species.

4.4.4.13 A full screening of the National Site Network and European sites with qualifying ornithology features will be undertaken in the HRA Screening Report for the Transmission Assets. Relevant qualifying interests of these designated sites screened into the offshore ornithology assessment will be fully considered and assessed in the offshore ornithology chapter of the EIA, with the assessment on the designated sites deferred to the ISAA.

Future baseline conditions

4.4.4.14 The EIA process will consider the existing baseline conditions within the study area, and future baseline conditions (as far as reasonably practicable) in accordance with the methodology set out in part 1, section 5 (see section 5.7.2 for the approach to consideration of future baseline conditions).

4.4.5 Potential project impacts

4.4.5.1 A range of potential impacts on offshore ornithology receptors have been identified which may occur during the construction, operation and maintenance, and decommissioning phases of the Transmission Assets. The impacts that have been scoped into the assessment are outlined in Table 4.19, together with a description of any additional data collection (e.g., site-specific surveys) and supporting analyses (e.g., modelling) that will be required to enable a full assessment of the impacts.

4.4.5.2 On the basis of the baseline information currently available and the project description outlined in part 1, section 4: Project description, of this EIA Scoping Report, potential impacts scoped out of the assessment are presented in Table 4.20, with justification.

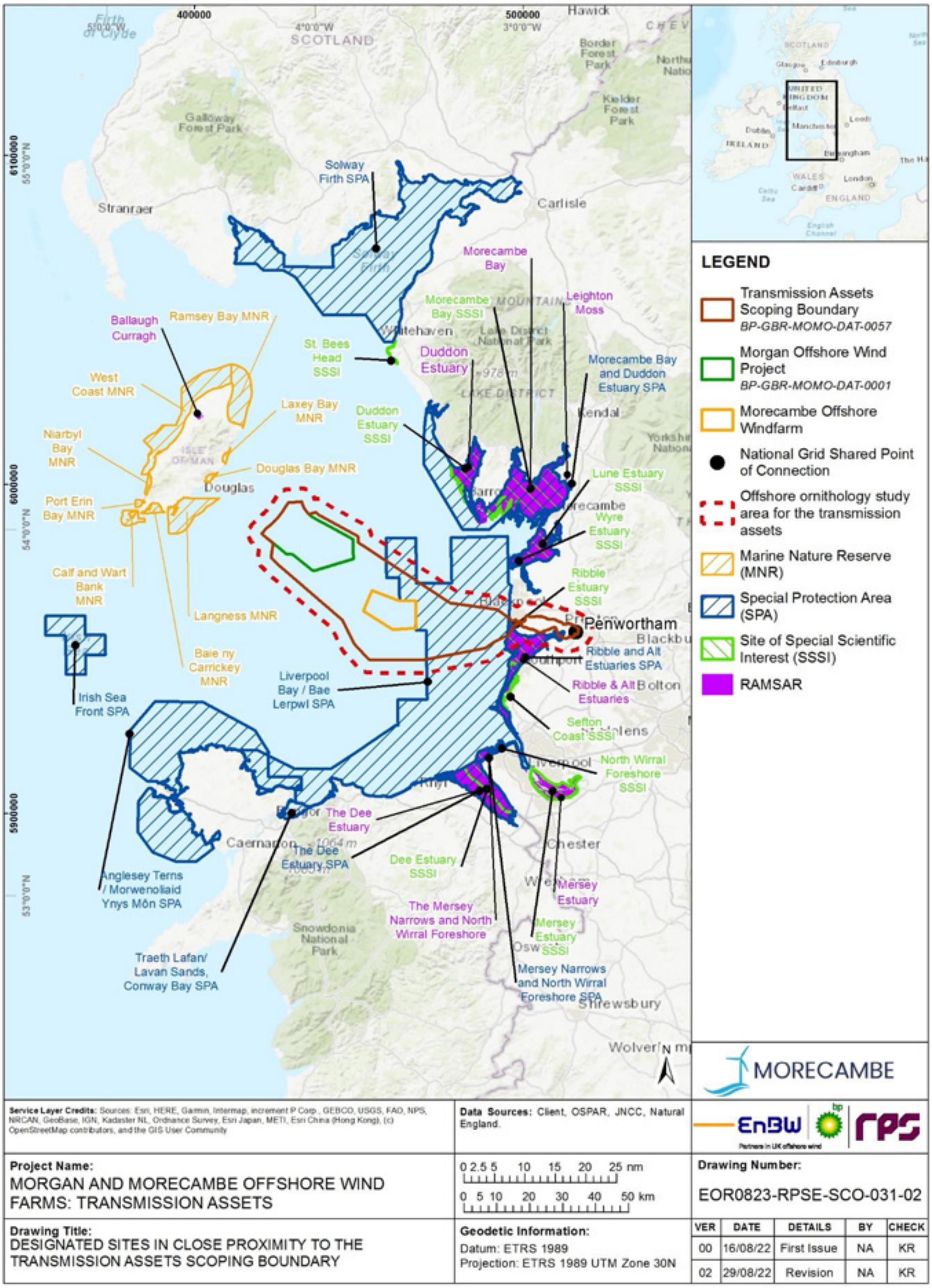


Figure 4.22: Marine nature conservation designations with relevance to offshore ornithology within proximity of the Transmission Assets Scoping Boundary.

Table 4.19: Impacts proposed to be scoped into the project assessment for offshore ornithology (project phase refers to construction (C), operation and maintenance (O) and decommissioning (D)).

Impact	Project phase			Justification	Data collection and analysis required to characterise the baseline environment	Summary of proposed approach to assessment
	C	O	D			
Disturbance and displacement from airborne noise, underwater noise, and presence of vessels and infrastructure.	✓	✓	✓	Airborne noise and underwater noise generated during construction activities (such as pile-driving), and the presence of vessels, may temporarily disturb/ displace birds from foraging areas. Presence of OSPs, the Morgan offshore booster station, associated maintenance activities and operational noise may disturb birds and displace them from their foraging or resting areas. The presence of vessels during the decommissioning phase may temporarily disturb birds from foraging areas. There is potential for disturbance due to underwater noise resulting from jacket or monopile cutting during decommissioning.	Desk study, ornithological baseline surveys and data analysis.	Quantified assessment (e.g., modified displacement matrix) based on area disturbed during the construction, maintenance and decommissioning phases and the impacts from vessels on birds. The extent of disturbance from vessels and the species' sensitivities will be based on published literature, e.g., Furness *et al*. (2013) and Wade *et al*. (2016).
Indirect impacts from underwater noise affecting prey species.	✓	×	✓	There is potential for mortality, injury and/ or disturbance to sensitive fish and shellfish species as a result of construction activities such as pre-construction geophysical surveys, UXO detonation, and pile-driving at the offshore booster station and OSP locations. Similar impacts may arise during the decommissioning phase (although piling will not be required during the decommissioning phase). This may cause reduced energy intake affecting the	Ornithological baseline surveys and data analysis, supported by information presented in the fish and shellfish ecology chapter of the ES.	The assessment of potential effects on birds will draw upon the results from the fish and shellfish ecology chapter of the ES and a qualitative assessment will be undertaken based on predicted extent of impact and known behaviour of fish to noise using the latest published literature.

Impact	Project phase			Justification	Data collection and analysis required to characterise the baseline environment	Summary of proposed approach to assessment
	C	O	D			
				productivity or survival of birds. This does not apply to the operation and maintenance phase when underwater noise emissions would not cause significant disruption to prey species.		
Temporary habitat loss/disturbance and increased SSCs.	✓	✓	✓	There is potential for temporary, direct benthic habitat loss and disturbance to sediments as a result of activities during all phases (e.g., seabed preparation, UXO detonation, drilling, cable installation and repair/ reburial and removal of infrastructure) (see part 2, section 4.1: Benthic subtidal and intertidal ecology, of this EIA Scoping Report). This has potential to affect the foraging efficiency of diving birds as well as indirect effects from impacts on fish and shellfish prey.	Ornithological baseline surveys and data analysis, supported by information presented in the Benthic subtidal and intertidal ecology and Fish and shellfish ecology chapters of the ES.	The assessment of potential effects on birds will draw upon the results from the Benthic subtidal and intertidal ecology and Fish and shellfish ecology chapters of the ES and a qualitative assessment will be undertaken based on predicted extent of impact on habitats.

Table 4.20: Impacts proposed to be scoped out of the project assessment for offshore ornithology.

Impact	Justification
Collision risk during the operation and maintenance phase.	Significant collision risk to birds arising from the stationary OSPs and Morgan offshore booster station structures is considered to be highly unlikely. As such, no significant effects would occur and it is proposed that this is scoped out of the EIA process.
Barrier to movement during the operation and maintenance phase.	Due to the relatively small scale of the stationary OSPs and Morgan offshore booster station structures, they are highly unlikely to present a significant barrier to the movement of birds. As such, no significant effects would occur and it is proposed that this is scoped out of the EIA process.
Accidental pollution during all phases of the Transmission Assets.	Pollution impacts (accidental oil/ fuel spills) during all phases of the Transmission Assets are scoped out on the basis that the implementation of a Marine Pollution Contingency Plan will avoid the risk of significant pollution events. Consequently, seabirds and shorebirds are extremely unlikely to be significantly affected by any such pollution impacts. As such, no significant effects would occur and it is proposed that this is scoped out of the EIA process.

4.4.6 Measures adopted as part of the project

4.4.6.1 The following measures adopted as part of the project are relevant to offshore ornithology and may evolve as the engineering design and EIA progresses.

- The development of and adherence to a Vessel Management Plan which will include measures to minimise disturbance to rafting seabirds.
- Implementation of an EMP including a MPCP.

4.4.6.2 The requirement for and feasibility of any further mitigation will be dependent on the significance of effects and will be consulted upon with statutory consultees throughout the EIA process.

4.4.7 Proposed assessment methodology

4.4.7.1 The offshore ornithology assessment will follow the methodology set out in part 1, section 5: EIA methodology, of this EIA Scoping Report.

4.4.7.2 The EIA will use the source-pathway-receptor method, where likely impacts will be identified on offshore ornithology receptors resulting from the construction, operation and maintenance and decommissioning of the Transmission Assets. This method is defined as follows:

- Source: The origin of a potential impact, for example foundation installation and a resultant impact such as underwater noise.
- Pathway: The method by which the effects of the activity could impact ornithology receptors. For example, underwater noise disturbing prey species.
- Receptor: The baseline environment/ species present that are impacted by the activity (e.g., prey species are unavailable for feeding birds).

4.4.7.3 Sources of guidance and information to inform the ornithological assessment will be identified within the offshore ornithology ES chapter. The displacement matrix approach (SNCBs, 2017) may be modified (in terms of the appropriate displacement and mortality rates) to assess the potential temporary impact of disturbance during installation of the offshore export cables. Emerging guidance will be monitored and applied as appropriate to the assessment and in discussion with consultees, including as part of the ornithology Evidence Plan process.

4.4.8 Potential cumulative effects

4.4.8.1 Seabirds, wintering seaduck, divers and grebes may range over large distances and, as a result, individuals and populations may interact with a number of other developments within the wider area. The majority of the predicted effects arising from the construction, operation and maintenance, and decommissioning of the Transmission Assets on birds are considered to be mainly localised to within the footprint of the Transmission Assets due to the localised nature of construction, maintenance or decommissioning activity in this area and the temporary nature of the potential impacts. However, there is potential for cumulative effects to occur where other projects or plans could act collectively with the Transmission Assets to affect offshore ornithology receptors. The cumulative effect assessment will follow the approach outlined in part 1, section 5: EIA methodology, of this EIA Scoping Report.

4.4.8.2 Cumulative effects with the generation assets (i.e., the Morgan Offshore Wind Project and the Morecambe Offshore Windfarm) will be considered, together with cumulative effects with other Round 4 projects (such as the Mona Offshore Wind Project) and other infrastructure projects such as proposed wind farms and interconnectors, where relevant. Note that as the OSPs are included in both the Transmission Assets project description and the project description for the Morgan Offshore Wind Project Generation Assets and the Morecambe Offshore Windfarm Generation Assets, some aspects of the CEA will not include the OSPs (e.g. potential impacts associated with the OSP footprint on the seabed) to prevent 'double counting' of potential impacts. Where OSPs are included in the CEA and where they are not will be agreed with the Evidence Plan Expert Working Group.

4.4.9 Potential inter-related effects

4.4.9.1 The assessment of potential inter-related effects will be considered within the offshore ornithology ES chapter. It will include consideration of project lifetime effects and receptor-led effects, in line with the approach outlined in part 1, section 5: EIA methodology, of this EIA Scoping Report.

4.4.10 Potential transboundary impacts

4.4.10.1 A screening of transboundary impacts has been carried out and is presented in part 3, Annex A of this EIA Scoping Report. This screening exercise identified that there is potential for transboundary impacts upon offshore ornithology due to construction, operation and maintenance, and decommissioning impacts of the Transmission Assets. These include:

- Disturbance and displacement from airborne noise, underwater noise, and presence of vessels and infrastructure
- Indirect impacts from underwater noise affecting prey species.

4.4.10.2 The potential for transboundary effects will be considered within the ES.

5 Proposed technical assessments - offshore human environment

5.1 Commercial fisheries

5.1.1 Introduction

5.1.1.1 This section of the EIA Scoping Report identifies the receptors relevant to the assessment of commercial fisheries for the Transmission Assets. It also considers the potential impacts arising from the construction, operation and maintenance, and decommissioning of the Transmission Assets and identifies the proposed scope of, and methodology for, the EIA process for commercial fisheries.

5.1.2 Study area

5.1.2.1 For the purpose of identifying commercial fisheries receptors for the Transmission Assets, a broad study area has been defined. The commercial fisheries study area is presented in Figure 5.1 and described below.

5.1.2.2 The Transmission Assets is located within the International Council for the Exploration of the Sea (ICES) Division VIIa (Irish Sea) statistical area. For the purpose of recording fisheries landings, ICES Division VIIa is divided into statistical rectangles which are consistent across all states operating in the Irish Sea. The commercial fisheries study area is defined by the ICES statistical rectangles that contain the Transmission Assets Scoping Boundary. These are ICES statistical rectangles 36E5, 36E6, 37E5 and 37E6.

5.1.3 Data sources

5.1.3.1 An initial desk-based review of literature and data sources to support this EIA Scoping Report has identified several sources to inform the identification of commercial fisheries receptors within the commercial fisheries study area. These are summarised in Table 5.1.

5.1.3.2 It should be noted that individual datasets do not cover all fishing activity in the commercial fisheries study area. For instance, the MMO landing and effort statistics datasets generally only record data for UK and Isle of Man vessels landing in the UK and at European ports and non-UK vessels landing in the UK. As a result, landings taken by non-UK vessels landing into ports in Europe are not captured, therefore data from the European Commission's Scientific, Technical and Economic Committee for Fisheries will also be collated to inform the EIA.

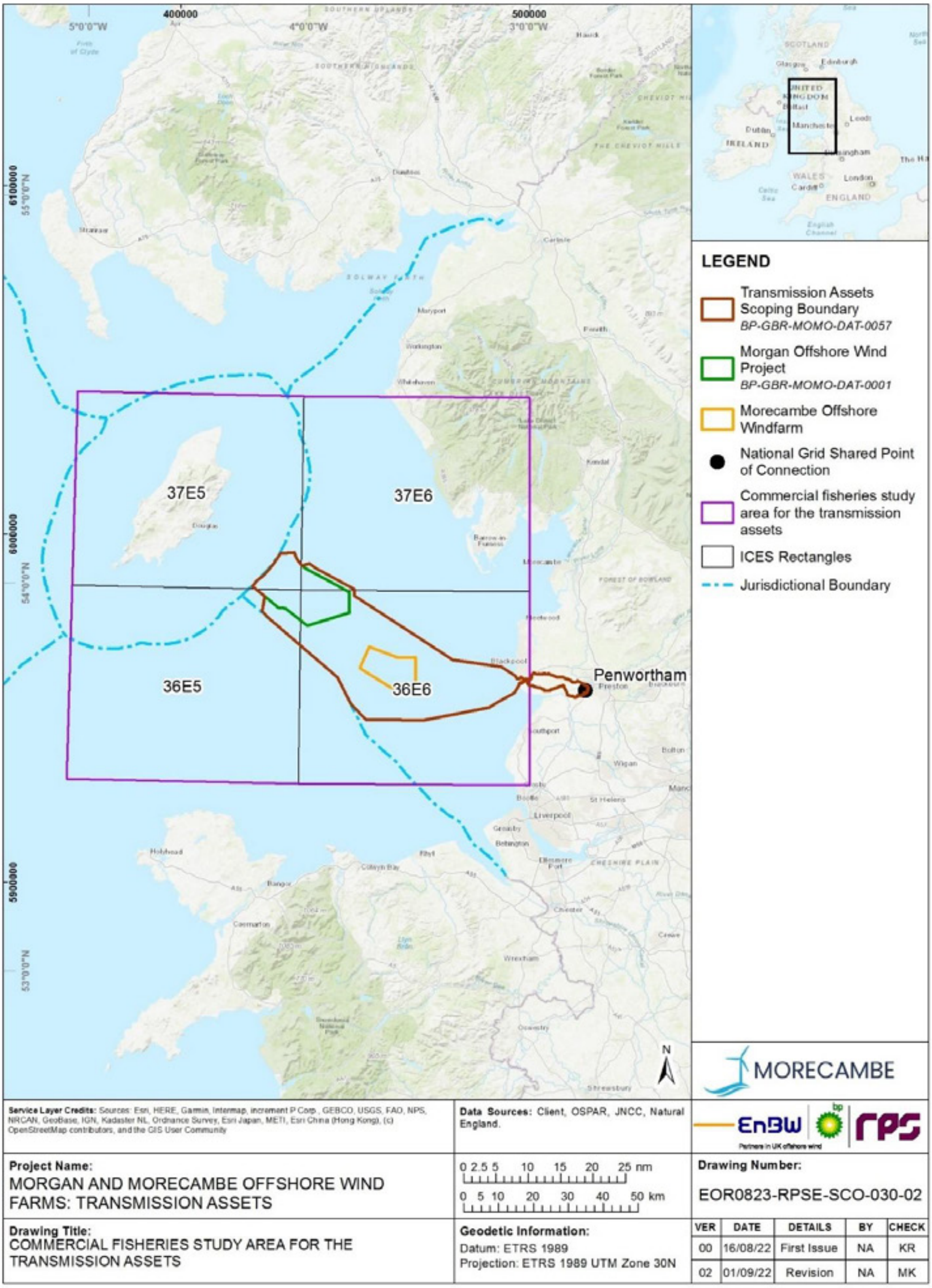


Figure 5.1: The commercial fisheries study area for the Transmission Assets.

5.1.3.3 It is acknowledged that a range of data limitations exist for the various datasets. For example, smaller vessels are excluded from Vessel Monitoring Systems (VMS) data, as only vessels with a length of ≥15m (MMO) or >12m (ICES) are captured. To ensure that smaller vessels are included within the assessment, consultation will be held with fisheries stakeholders, and further datasets will be obtained.

Table 5.1: Summary of key desktop datasets and reports – commercial fisheries.

Title	Source	Year	Author
Landing Statistics from 2010 to 2020	MMO	2021	MMO
Effort Statistics from 2010 to 2020	MMO	2021	MMO
Landings data by port	MMO	2020	MMO
Landing Statistics for EU vessels	EU STECF	2021	EU STECF
VMS Data for UK and Isle of Man vessels (≥15m)	MMO	2020	MMO
VMS Data for EU mobile bottom contacting gear vessels (>12m)	ICES	2018	ICES
UK inshore fishing intensity	Cefas	2012	Cefas
Data from site-specific Traffic Surveys for the Morgan Offshore Wind Project generation assets (see part 2, section 5.2: Shipping and navigation, of this EIA Scoping Report).	NASH Maritime (commissioned by the Applicants)	2021/ 2022	NASH Maritime

Note: Datasets used are the most up to date available.

5.1.3.4 The key regional and national fishing organisations that will be consulted during this assessment are listed below:

- West Coast Sea Products Ltd (WCSP Ltd)
- Scottish White Fish Producers Association (SWFPA)
- Scottish Fishermen's Federation (SFF)
- National Federation of Fishermen's Organisations (NFFO)
- Whitehaven Fishermen's Cooperative Ltd (WFC)
- Irish South and East Fish Producers Organisation (ISEFPO)
- Federation of Irish Fishermen (FIF)
- Irish South and West Fish Producers Organisation (ISWFPO)
- Manx Fish Producers Organisation (MFPO)
- Northern Irish Fish Producers Organisation (NIFPO)
- Anglo North Ireland Fish Producers Organisation (ANIFPO)
- Welsh Fishermen's Association (WFA)
- Western Fish Producers Organisation (WFPO)
- South West Fish Producers Organisation (SWFPO)
- Rederscentrale (Belgium fisheries)
- North Western Inshore Fisheries and Conservation Authority (NWIFCA).

5.1.3.5 Initial engagement has taken place with a number of fisheries stakeholders for the generation assets (the Morgan Offshore Wind Project and the Morecambe Offshore Windfarm), which overlap in places with the study area for the Transmission Assets. Two rounds of meetings (in June/ July 2021 and February 2022) have been held to date with regional fisheries organisations and offshore commercial fisheries operators, to provide comment at this stage of the Transmission Assets and during the surveys of the array areas. Further consultation is planned for Autumn 2022.

5.1.4 Baseline environment

5.1.4.1 The baseline environment for commercial fisheries is constantly evolving, as the fishing industry is dynamic, with frequent and sometimes unpredictable changes in fish abundance and distribution, climatic conditions, management regulations and fuel costs, all of which affect activity (DECC, 2016). Anticipated trends to the baseline environment will be considered within the EIA process, including changes as a result of the new EU-UK Trade and Cooperation Agreement.

5.1.4.2 The commercial fisheries study area is located within the ICES Division VIIa (Irish Sea) statistical area. As stated in section 5.1.2, it is defined by the ICES statistical rectangles that contain the Transmission Assets Scoping Boundary. These are ICES statistical rectangles 36E5, 36E6, 37E5 and 37E6. The annual average value of landings for these ICES rectangles is £4.60 million per rectangle for all UK and Isle of Man vessels for the years 2010 to 2020 (MMO, 2021).

5.1.4.3 The average total tonnage of historical landings across the commercial fisheries study area is presented in Figure 5.2 and the average annual value is presented in Figure 5.3. It is important to note that this data only covers landings by UK and Isle of Man-registered vessels into the UK and abroad, and foreign vessels into the UK. There may also be landings from the commercial fisheries study area by foreign vessels into foreign ports which would not be represented by this data.

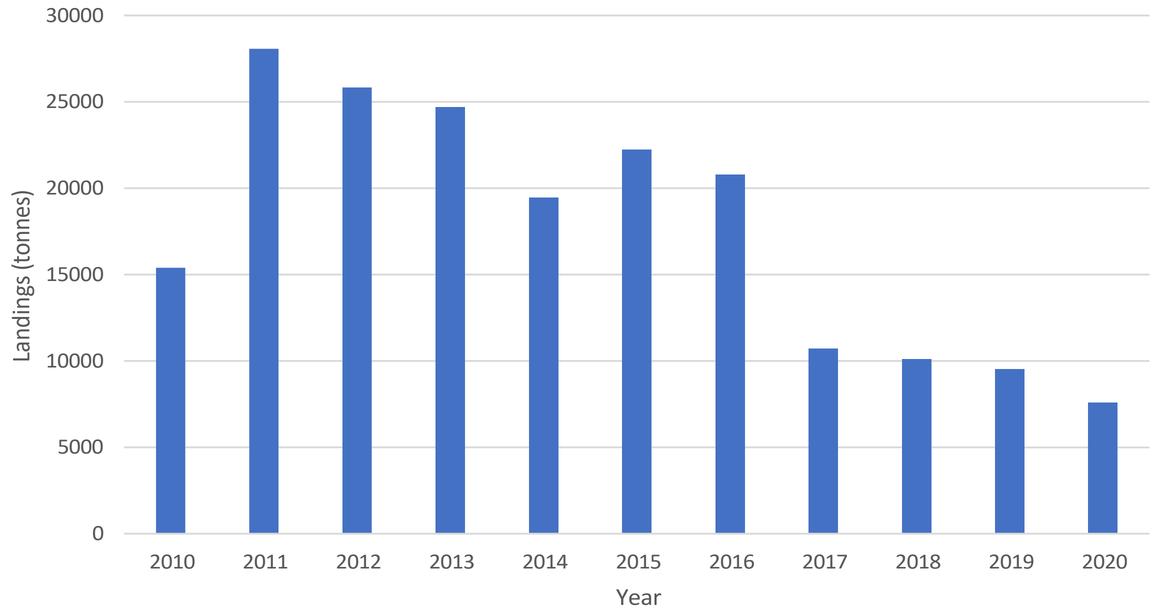


Figure 5.2: Total volume (tonnes) of landings from 2010 to 2020 from the commercial fisheries study area for the Transmission Assets (UK and Isle of Man vessels ≥15m and foreign vessels ≥15m into the UK) (MMO, 2021).

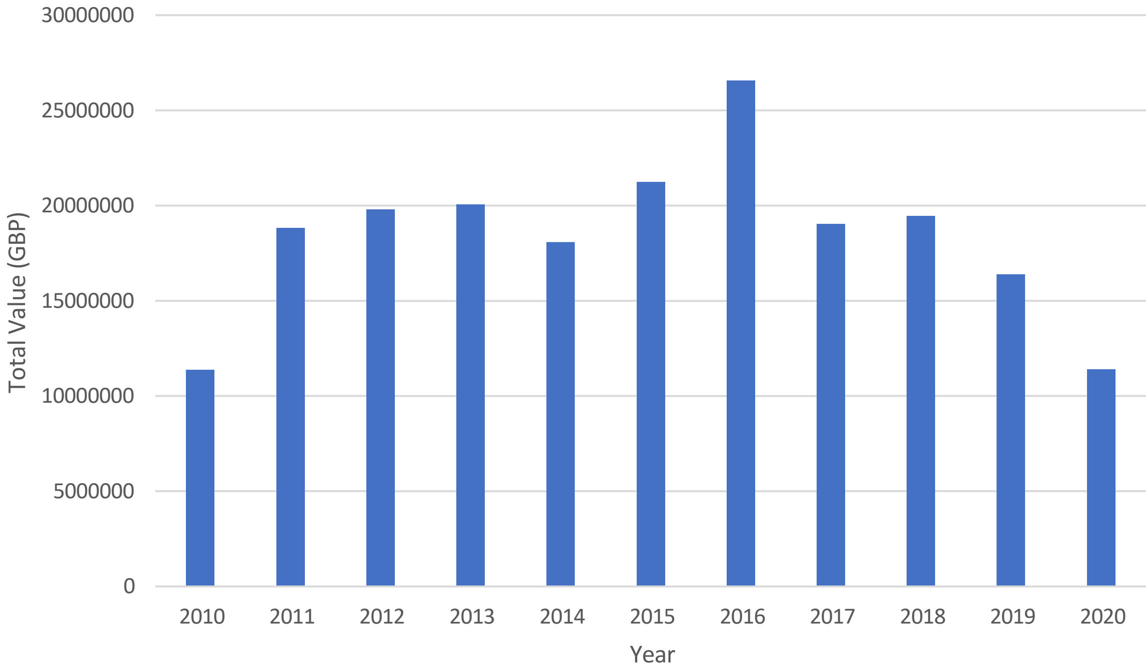


Figure 5.3: Total value (GBP) of landings from 2010 to 2020 from the commercial fisheries study area for the Transmission Assets (UK and Isle of Man vessels ≥15m and foreign vessels ≥15m into the UK) (MMO, 2021).

5.1.4.4 Figure 5.4 shows the top eight species landed from the commercial fisheries study area by weight from 2010 to 2020. Figure 5.5 shows the top eight species by value from the same area over the same period. The key species in terms of both value and weight are queen scallop *Aequipecten opercularis* and king scallop *Pecten maximus*, with a particularly large weight of queen scallop being landed in 2011, 2012 and 2013. Comparatively, a very high value of king scallop was landed in 2016.

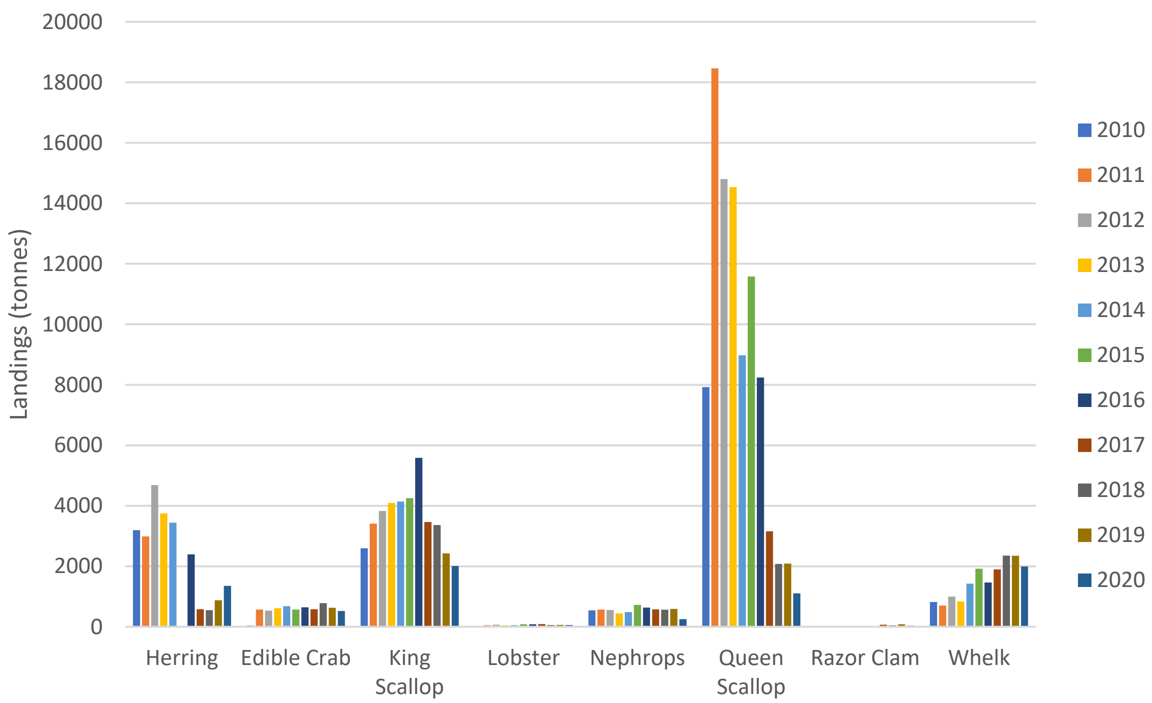


Figure 5.4: Top eight species by weight (tonnes) from 2010 to 2020 landed from the commercial fisheries study area for the Transmission Assets (UK and Isle of Man vessels ≥15m and foreign vessels ≥15m into the UK) (MMO, 2021).

5.1.4.5 Herring *Clupea harengus* catches were comparable with king scallop in terms of weight landed in some years. Whelk *Buccinum undatum* and Nephrops *Nephrops norvegicus* were the most valuable species after king scallop and queen scallop. Other key species include edible crab *Cancer pagurus*, lobster *Homarus Gammarus* and razor clam *Solen spp.*

5.1.4.6 While catches of king scallop are lower by weight than catches of queen scallop in most years, their value is similar or higher owing to a higher market price. Nephrops and lobster also have higher market prices compared to other species.

5.1.4.7 The data suggests that king scallop and queen scallop are important in the commercial fisheries study area for the Transmission Assets and are the most valuable landings in every year other than from 2018 to 2020, when whelk had a similar or higher value landed than queen scallop.

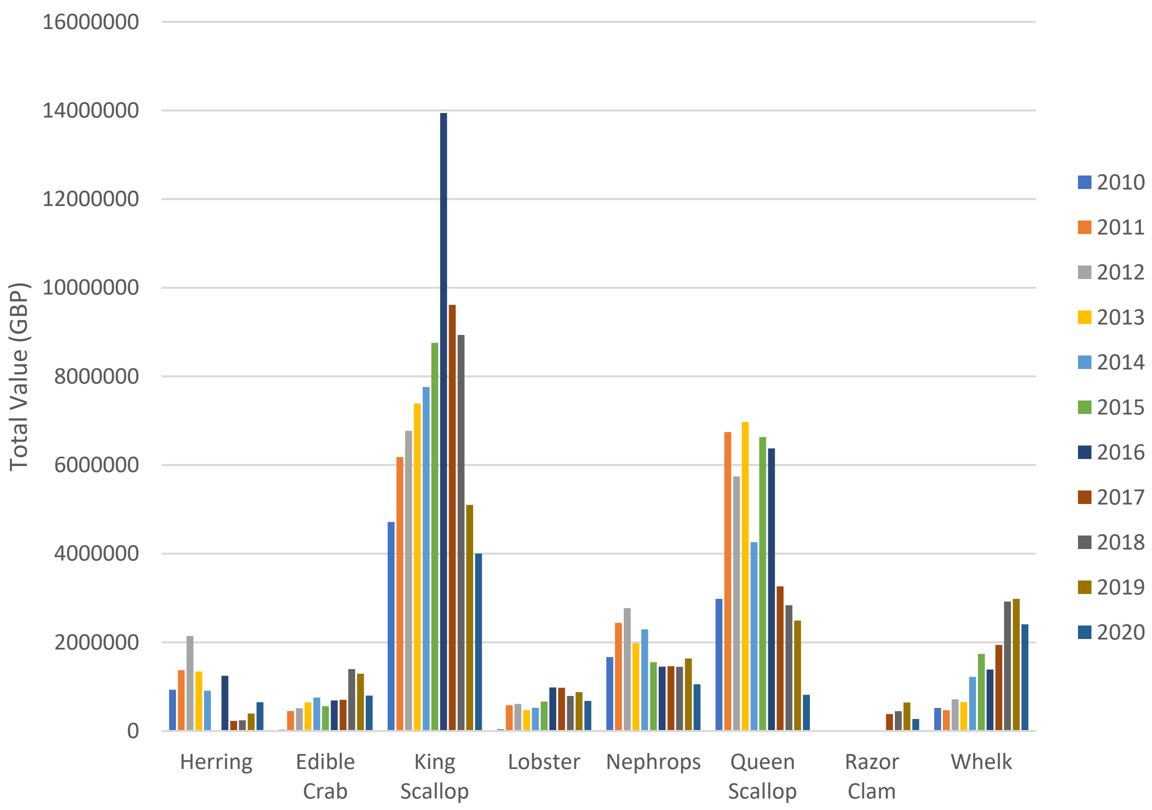


Figure 5.5: Top eight species by value (GBP) from 2010 to 2020 landed from the commercial fisheries study area for the Transmission Assets (UK and Isle of Man vessels ≥15m and foreign vessels ≥15m into the UK) (MMO, 2021).

5.1.4.8 In addition to landings and effort data, data on the type of fishing activity in the commercial fisheries study area has been obtained. This is presented in Figure 5.6 for the years 2017 and 2018, and Figure 5.7 for the years 2019 and 2020. The data suggests that ≥15m mobile gear vessels are active across a larger spatial extent with higher levels of activity than ≥15m static gear vessels within the commercial fisheries study area.

5.1.4.9 Higher levels of static gear activity by ≥15m vessels occur in the southwest of the commercial fisheries study area, with higher levels of mobile gear activity by ≥15m vessels generally recorded in the western half of the Transmission Assets commercial fisheries study area. Within the Transmission Assets Scoping Boundary, the highest levels of ≥15m static gear activity were in the east and central area whereas the highest levels of ≥15m mobile gear activity were in the west and central area. It should be noted that the spatial extent of mobile and static gear activity fluctuates across years.

5.1.4.10 The data in Figure 5.6 and Figure 5.7 is for UK and Isle of Man vessels only. There are vessels from other nations, including the Republic of Ireland and Belgium, conducting fishing activity within the commercial fisheries study area. Data will be analysed further through collation of landings and VMS data from non-UK organisations, consultation, AIS data and site-specific marine vessel traffic survey data to provide a full baseline characterisation for commercial fisheries.

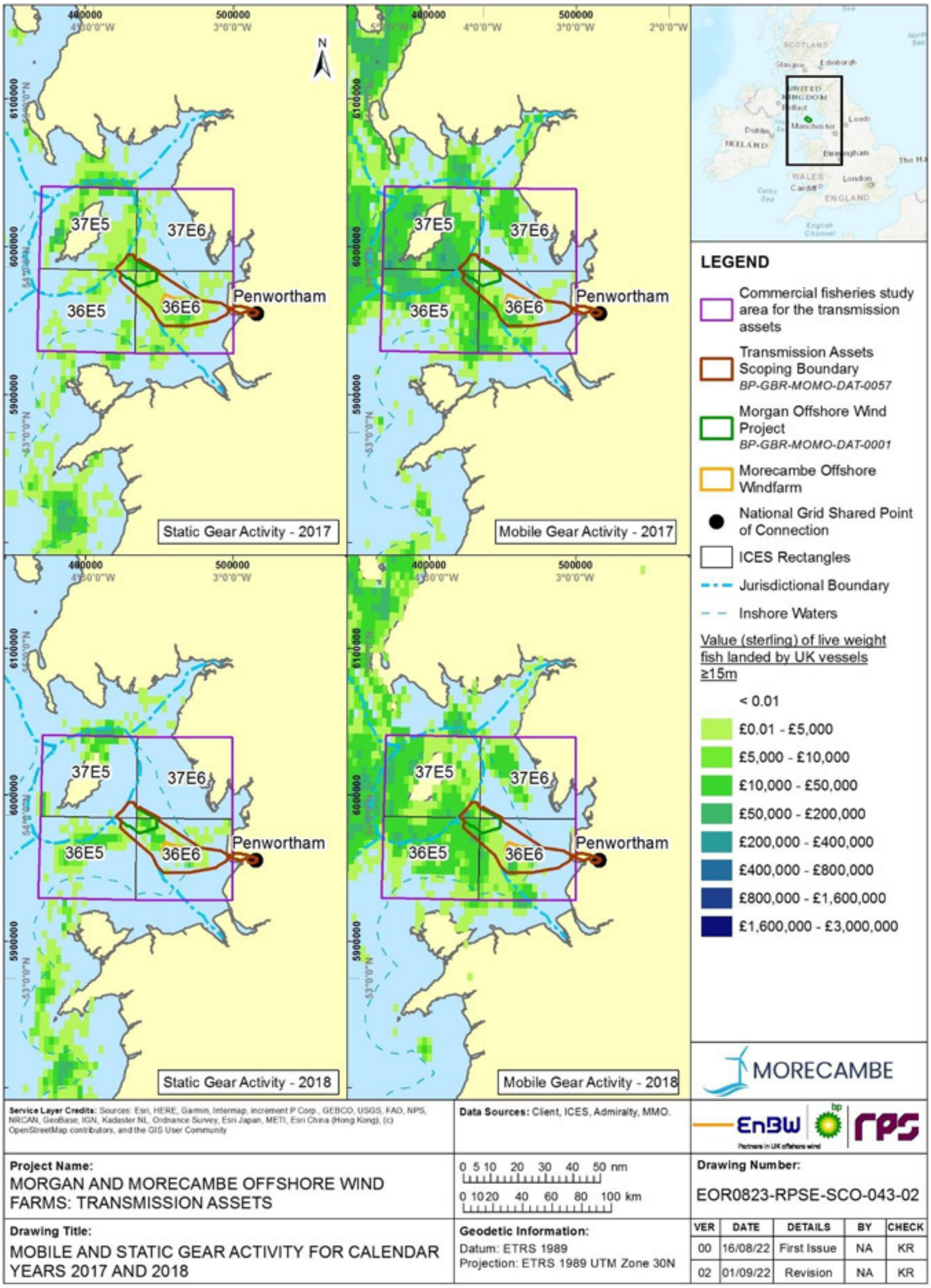


Figure 5.6: Value of landings for static and mobile gear activity in the vicinity of the commercial fisheries study area for the Transmission Assets (UK and Isle of Man vessels ≥15m and foreign vessels ≥15m into the UK) (2017 and 2018) (MMO, 2020).

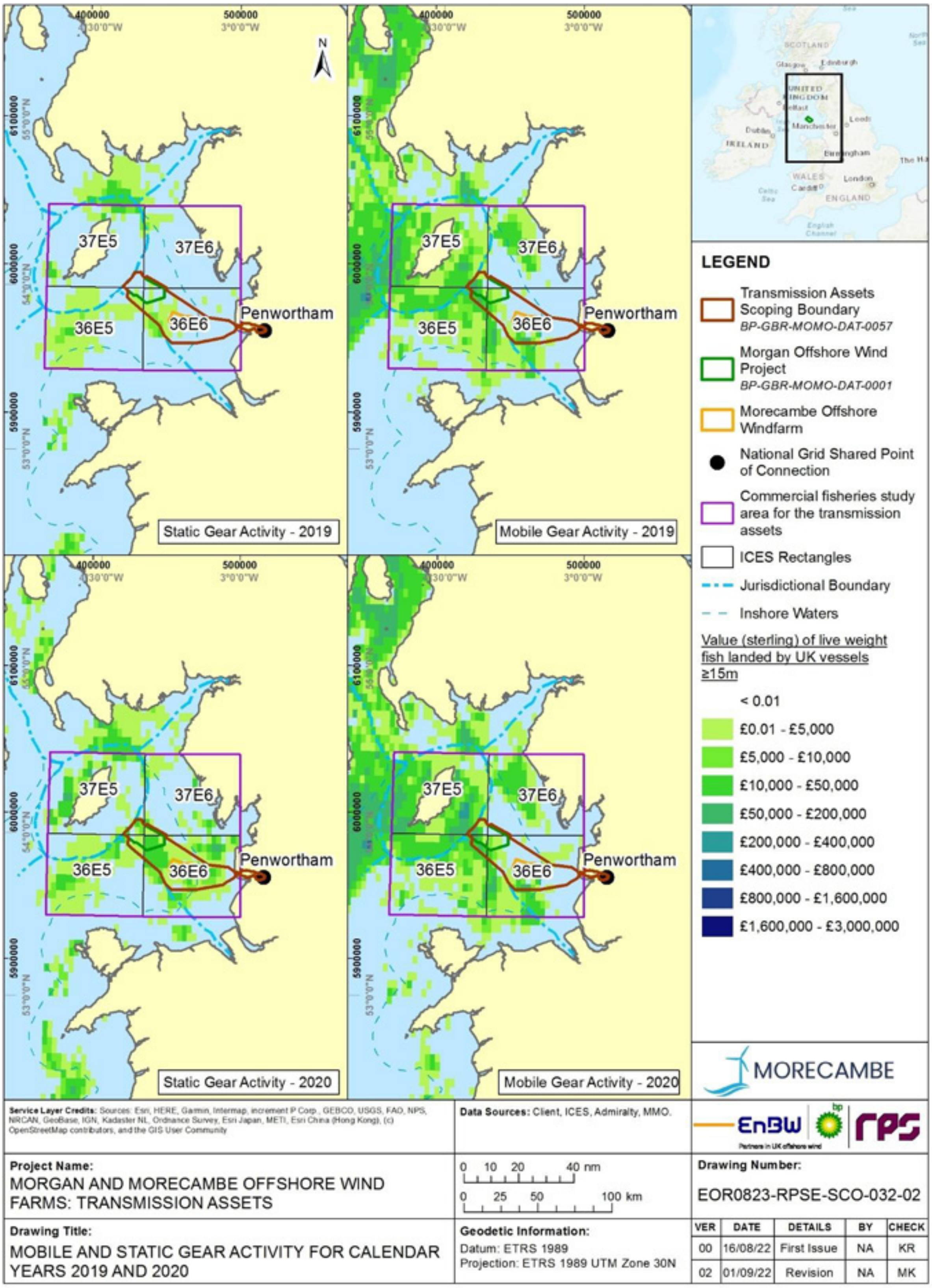


Figure 5.7: Value of landings for static and mobile gear activity in the vicinity of the commercial fisheries study area for the Transmission Assets (UK and Isle of Man vessels ≥15m and foreign vessels ≥15m into the UK) (2019 and 2020) (MMO, 2020).

Future baseline conditions

5.1.4.11 The EIA process will consider the existing baseline conditions within the study area, and future baseline conditions (as far as reasonably practicable) in accordance with the methodology set out in part 1, section 5 (see section 5.7.2 for the approach to consideration of future baseline conditions).

5.1.5 Potential project impacts

5.1.5.1 A range of potential impacts on commercial fisheries receptors have been identified which may occur during the construction, operation and maintenance, and decommissioning phases of the Transmission Assets. The impacts that have been scoped into the assessment are outlined in Table 5.2, together with a description of any additional data collection and supporting analyses that will be required to enable a full assessment of the impacts.

5.1.5.2 On the basis of the baseline information currently available and the project description outlined in part 1, section 4: Project description, of this EIA Scoping Report, potential impacts proposed to be scoped out of the assessment are presented in Table 5.3 with justification.

Table 5.2: Impacts proposed to be scoped into the project assessment for commercial fisheries (project phase refers to construction (C), operation and maintenance (O) and decommissioning (D)).

Impact	Project phase			Justification	Data collection and analysis required to characterise the baseline environment	Summary of proposed approach to assessment
	C	O	D			
Loss or restricted access to fishing grounds.	✓	✓	✓	The implementation of advisory clearance distances around cable installation and maintenance vessels, and safety zones around construction, operation and maintenance and decommissioning works at the OSPs and Morgan offshore booster station, may result in temporary loss or restricted access to fishing grounds within the Transmission Assets Scoping Boundary. The presence of the OSPs and the Morgan offshore booster station may result in loss or restricted access to fishing grounds within the Transmission Assets Scoping Boundary.	Datasets are listed in part 2, section 5.1.3 of this EIA Scoping Report and include VMS data (indicating hours fished and value of catch by area) and landing statistics by ICES rectangle. Additional datasets including maps of key fishing grounds may also be collated where available. These datasets will be requested from the relevant fishing industry representatives and stakeholders in order to inform the commercial fisheries EIA. This information will also be supplemented by results of site-specific marine vessel traffic survey data.	Detailed analysis of existing datasets will be carried out to characterise the status of historic commercial fisheries patterns within the commercial fisheries study area for the Transmission Assets and predict the potential impacts upon future commercial fishing activities (for UK and non-UK vessels). Datasets will be analysed over 5 to 10 year time periods to account for fluctuations in the commercial fisheries activities. Qualitative assessment informed by data analysis and consultation.
Displacement of fishing activity into other areas.	✓	✓	✓	Fishing activity may be temporarily displaced to other areas due to loss or restricted access to fishing grounds.	As above.	As above.
Loss or damage to fishing gear due to snagging.	✓	✓	✓	Potential for snagging fishing gear on offshore export cables and interconnector cables between OSPs. Safety risks for fishing vessels associated with potential gear snagging will be assessed in the shipping and navigation chapter of the EIA (see part 2, section 5.2: Shipping and navigation, of this EIA Scoping Report).	As above.	As above.
Potential impacts on commercially important fish and shellfish resources.	✓	✓	✓	As described in part 2, section 4.2: Fish and shellfish ecology, of this EIA Scoping Report.	As above.	Qualitative assessment informed by data analysis in addition to consideration of results of the fish and

Impact	Project phase			Justification	Data collection and analysis required to characterise the baseline environment	Summary of proposed approach to assessment
	C	O	D			
						shellfish ecology assessment of the EIA.
Supply chain opportunities for local fishing vessels.	✓	✓	✓	Requirement for vessels (such as guard vessels) during all phases of the Transmission Assets may provide supply chain opportunities for local fishing vessels leading to a beneficial impact.	Engagement with local fisheries stakeholders.	Qualitative assessment informed by consultation.

Table 5.3: Impacts proposed to be scoped out of the project assessment for commercial fisheries.

Impact	Justification
Interference with fishing activity.	Increased vessel traffic within fishing grounds as a result of changes to shipping routes and project vessel traffic associated with the Transmission Assets may result in increased interaction with fishing vessels. Offshore export cable and interconnector cable installation, maintenance, and any decommissioning activities will be temporary and the number of vessels required during installation, maintenance and any decommissioning activities associated with the offshore export cables and interconnector cables is unlikely to add significantly to the marine traffic already present within the Transmission Assets Scoping Boundary. Construction, maintenance and decommissioning activities associated with the OSPs and any Morgan offshore booster station will be limited in spatial extent and temporary. Any impacts will be temporary, therefore potential effects are likely to be not significant in EIA terms. Therefore, subject to consultation with commercial fisheries stakeholders and feedback received on this EIA Scoping Report, the Applicants intend to scope this impact out of further consideration within the EIA.
Increase in steaming distances.	Offshore export cable and interconnector cable installation, maintenance, and any decommissioning activities will be temporary and therefore longer steaming distances will occur for a short period of time. Therefore, any potential impacts are unlikely to be significant in EIA terms. Construction, maintenance and decommissioning activities associated with the OSPs and Morgan offshore booster station will be limited in spatial extent and temporary. Therefore, subject to consultation with commercial fisheries stakeholders and feedback received on this EIA Scoping Report, the Applicants intend to scope this impact out of further consideration within the EIA.

5.1.6 Measures adopted as part of the project

5.1.6.1 The following measures adopted as part of the project are relevant to commercial fisheries. These measures may evolve as the engineering design and the EIA progresses.

- Ongoing liaison with the fishing industry via a Fisheries Liaison Officer (FLO) and Fishing Industry Representative (FIR).
- Development of a Fisheries Liaison and Coexistence Plan.
- Adherence to good practice guidance with regards to fisheries liaison (e.g., Fishing Liaison with Offshore Wind and Wet Renewables Group (FLOWW), 2014; 2015).
- Advance warning to fishing fleets of construction, maintenance and decommissioning activities.
- Timely and efficient distribution of Notices to Mariners (NTM) of the location and nature of construction, maintenance and decommissioning works.
- Notification to the United Kingdom Hydrographic Office (UKHO) of the works to facilitate the promulgation of maritime safety information and updating of nautical charts and publications.
- Use of advisory clearance distances and safety zones during construction and periods of major maintenance.
- Use of guard vessels where required by risk assessment.
- Marking and lighting of the Transmission Assets in accordance with International Association of Marine Aids to Navigation and Lighthouse Authorities (IALA) guidance and in consultation with the Maritime and Coastguard Agency (MCA) and Trinity House.
- Cables to be buried to a suitable depth, where possible, to avoid interaction with fishing gear.
- Undertaking of post-lay and cable burial inspection surveys and monitoring.
- Any external cable protection to be designed, where possible, to enable trawling to occur over it. Cables will be buried where possible (target depth of 1m) and in areas where this is not achievable the cable will be protected (e.g., with rock or mattressing). Rock berms can be designed to be over-trawlable (ESCA, 2016).

5.1.6.2 The requirement for and feasibility of any further mitigation will be consulted upon with statutory consultees throughout the EIA process.

5.1.7 Proposed assessment methodology

5.1.7.1 The commercial fisheries EIA will follow the methodology set out in part 1 section 5: EIA methodology, of this EIA Scoping Report. Specific to the commercial fisheries EIA, the following guidance documents will also be considered:

- FLOWW Best Practice Guidance for Offshore Renewables Developments: Recommendations for Fisheries Liaison: FLOWW (Fishing Liaison with Offshore Wind and Wet Renewables Group) (FLOWW, 2014).
- FLOWW Best Practice Guidance for Offshore Renewables Developments: Recommendations for Fisheries Disruption Settlements

and Community Funds. FLOWW (Fishing Liaison with Offshore Wind and Wet Renewables Group) (FLOWW, 2015).
- Best practice guidance for fishing industry financial and economic impact assessments (UKFEN, 2012).
- Options and opportunities for marine fisheries mitigation associated with wind farms (Blyth-Skyrme, 2010).
- Fishing and Submarine Cables – Working Together (ICPC, 2009).

5.1.7.2 In order to characterize the importance of fisheries in this region, consideration will be given to the value of fisheries within the commercial fisheries study area. Any valuation will not be used as the basis of the impact assessment process.

5.1.8 Potential cumulative effects

5.1.8.1 There is potential for cumulative effects to arise from other projects or activities within the east Irish Sea area where projects or activities could act collectively with the Transmission Assets to affect commercial fisheries receptors.

5.1.8.2 The cumulative effect assessment will consider the maximum design scenarios for each of the identified projects or activities. The following projects or activities will be considered within the commercial fisheries study area for the Transmission Assets:

- The generation assets of the Morgan Offshore Wind Project and Morecambe Offshore Windfarm.
- Other wind farms, including the Mona Offshore Wind Project.
- Other energy infrastructure projects, including oil and gas activities (including decommissioning), interconnectors and carbon capture and storage projects.
- Other infrastructure projects (e.g., cables and pipelines).
- Extraction and disposal activities (e.g., aggregate extraction, dredging and disposal).

5.1.8.3 The cumulative effect assessment will follow the approach outlined in part 1 section 5: EIA methodology of this EIA Scoping Report.

5.1.9 Potential inter-related effects

5.1.9.1 The assessment of potential inter-related effects will be considered within the commercial fisheries Environmental Statement (ES) chapter. It will include consideration of project lifetime effects and receptor-led effects, in line with the approach outlined in part 1, section 5: EIA methodology, of this EIA Scoping Report.

5.1.10 Potential transboundary impacts

5.1.10.1 A screening of transboundary impacts has been carried out and is presented in part 3, Annex A of this EIA Scoping Report. This screening exercise identified that there is potential for transboundary impacts upon commercial fisheries due to construction, operation and maintenance, and decommissioning impacts of the project. These include:

- Loss or restricted access to fishing grounds affecting fleets from the Republic of Ireland and Belgium.

- Displacement of fishing activity into other areas affecting fleets from the Republic of Ireland and Belgium.

5.1.10.2 The potential for transboundary impacts will be considered within the ES.

5.2 Shipping and navigation

5.2.1 Introduction

5.2.1.1 This section of the EIA Scoping Report identifies the receptors relevant to the assessment of shipping and navigation for the Transmission Assets. It also considers the potential impacts arising from the construction, operation and maintenance, and decommissioning of the Transmission Assets and identifies the proposed scope of, and methodology for, the EIA process for shipping and navigation.

5.2.2 Study area

5.2.2.1 For the purpose of identifying shipping and navigation receptors for the Transmission Assets, a broad study area has been defined. The shipping and navigation study area is presented in Figure 5.8 and described below.

5.2.2.2 The shipping and navigation study area has been defined as an area extending 10 nautical miles (nm) around the offshore elements of the Transmission Assets Scoping Boundary. This reflects the potential for surface-piercing infrastructure (i.e., the OSPs and the Morgan offshore booster station) to affect shipping and navigation receptors, and will provide a local context of activity within and in proximity to the Transmission Assets Scoping Boundary.

5.2.2.3 Additionally, the waters of the east Irish Sea to the south and east of the Isle of Man (south of 54.5 degrees north and east of 5.0 degrees west) have been considered in terms of shipping routes in these waters and their interaction with the Transmission Assets and existing and planned offshore wind projects within this area.

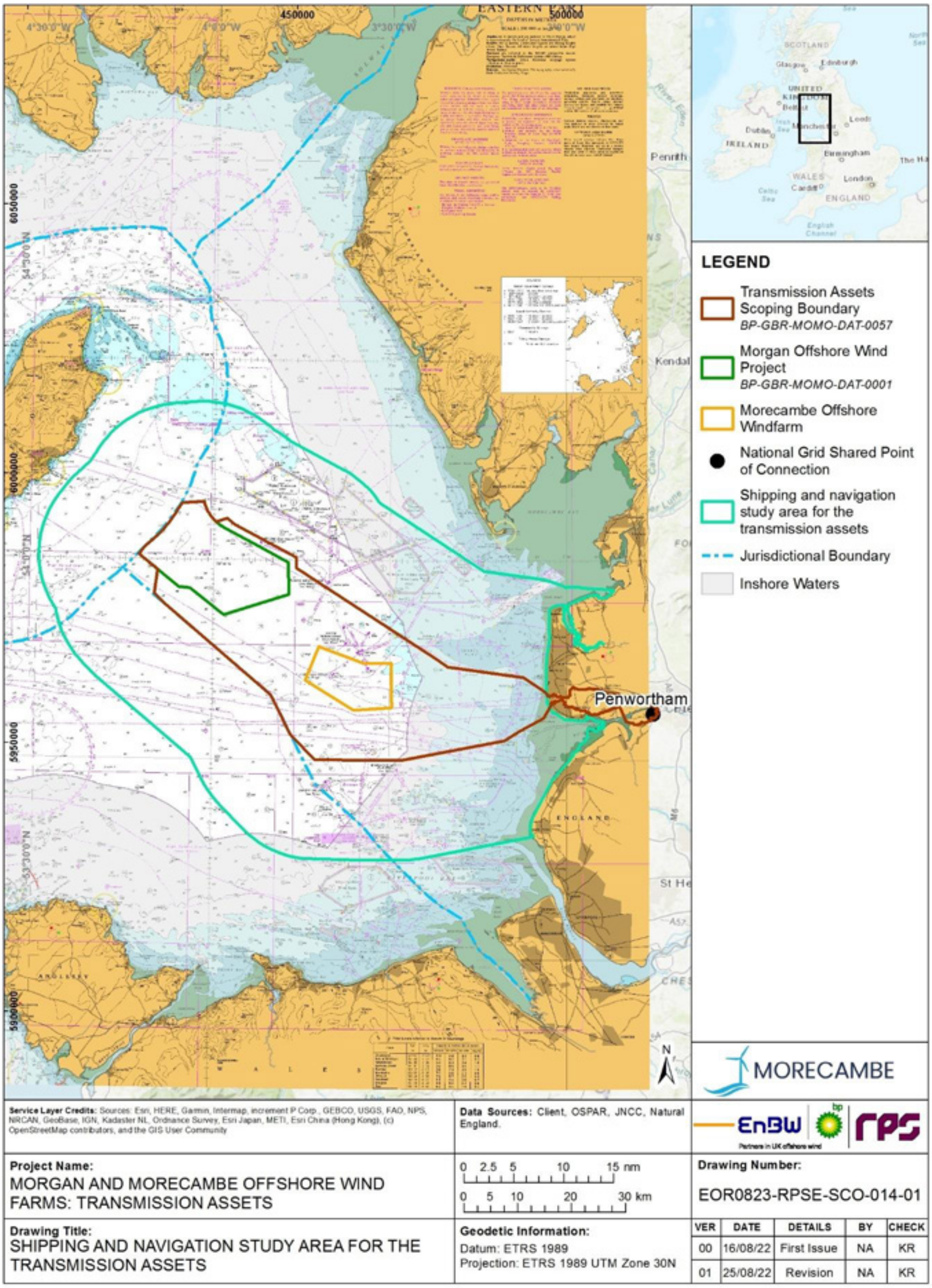


Figure 5.8: The shipping and navigation study area for the Transmission Assets.

5.2.3 Data sources

Desktop data

5.2.3.1 An initial desk-based review of literature and data sources to support this EIA Scoping Report has identified a number of sources to inform the identification of shipping and navigation receptors within the shipping and navigation study area. These are summarised in Table 5.4.

5.2.3.2 Vessel traffic data will be analysed around potential locations of the Morgan offshore booster station to inform the EIA process. This analysis will be used to inform the Navigation Risk Assessment (NRA) and EIA for the Transmission Assets.

Table 5.4: Summary of key desktop datasets and reports – shipping and navigation.

Title	Source	Year	Author
Admiralty charts	British Crown and OceanWise, License No. EK001-FN1001-004664	2021	British Crown
Automatic Identification System (AIS) vessel traffic data	NASH Maritime Ltd.	2019	MarineTraffic
Vessel Monitoring Systems (VMS) data	MMO	2019	MMO
International Maritime Organization (IMO) Traffic Separation Schemes (TSS)	Oceanwise	2021	Oceanwise
UK Coastal Atlas of Recreational Boating	Royal Yachting Association (RYA)	2018	RYA
Marine Incident Data	Marine Accident Investigation Branch (MAIB)	2000-2019	MAIB
Royal National Lifeboat Institution (RNLI) incident data	RNLI	2010-2019	RNLI
Helicopter Search and Rescue (SAR) locations	The Bristow Group	2021	The Bristow Group
Offshore wind farms	The Crown Estate	2021	The Crown Estate
Oil and gas platforms	Oil and Gas Authority	2021	Oil and Gas Authority
Maritime statistics	Department for Transport (DfT)	2021	DfT
Practice and exercise charts	Admiralty	2013	Admiralty
Cables and pipelines	Kis-Orca via Client onemap site	2021	Kis-Orca
Marine aggregate sites and disposal sites	The Crown Estate	2021	The Crown Estate

Site-specific survey data

5.2.3.3 In addition to existing data and data collected for the generation assets (Morgan Offshore Wind Project and Morecambe Offshore Windfarm), site-specific marine vessel traffic surveys will be carried out to inform the EIA for the Transmission Assets. The requirements for such surveys in accordance with MGN654 will be agreed with the MCA. The data from these surveys will be used to inform the NRA and EIA for the Transmission Assets.

Consultation

5.2.3.4 Supporting information and data will also be obtained from stakeholder consultation. The Applicants will liaise with the existing Maritime Navigation Engagement Forum (MNEF) established for the generation assets to determine whether this should also be used for the Transmission Assets or whether a separate MNEF would be preferred. Whichever the approach, this will provide a platform for the exchange of information, knowledge and experience that will enable marine developers and relevant shipping and navigation stakeholders to coexist in the marine environment. Specifically, the MNEF will focus on matters relating to:

- Risk to safety of marine operations and navigation
- Impact on marine operations and navigation.

5.2.3.5 Members of the MNEF will include the MCA and Trinity House as statutory bodies, in addition to key user groups and organisations identified as having a potential shipping and navigation interface with the Transmission Assets including: the UK and Irish Chamber of Shipping, ferry operators, port operators, representatives from other industries (oil and gas, aggregates, other offshore wind developers), with fishing interests represented by a Fisheries Liaison Officer (FLO). Other invited members include the RYA and Ministry of Defence (MOD). The MNEF is scheduled to meet quarterly during the pre-application phase.

5.2.3.6 A marine hazard workshop will also be held as part of the NRA. The MCA, Trinity House and a number of local stakeholders representing all maritime interests (including ports, fishing, commercial shipping, oil and gas, recreation) will be invited to the hazard workshop.

5.2.4 Baseline environment

Navigational features

5.2.4.1 The Transmission Assets Scoping Boundary is located in the east Irish Sea, where several ferry and shipping routes presently operate and safely co-exist alongside a number of notable marine assets and activities. Key marine navigation features within the east Irish Sea include:

- IMO Traffic Separation Scheme (TSS)
- Oil and gas activities
- Commercial fishing activities
- Recreational cruising routes
- Commercial ship anchorages
- Pilot boarding stations
- Ports and marine terminals
- Offshore wind farms
- Marine aggregate and disposal sites.

5.2.4.2 The key marine navigation features and activities within the east Irish Sea are presented in Figure 5.9.

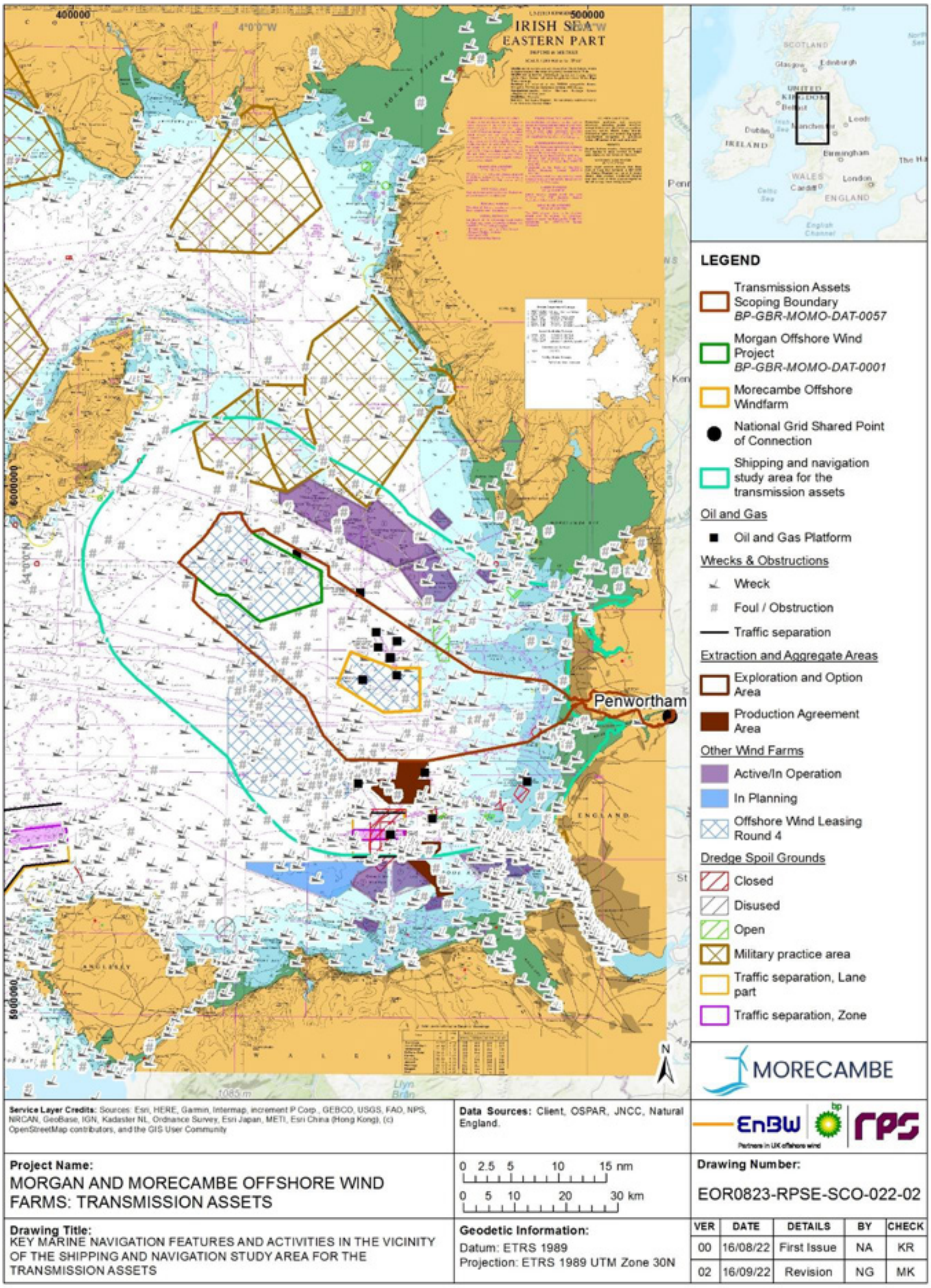


Figure 5.9: Key marine navigation features and activities in the vicinity of the shipping and navigation study area for the Transmission Assets.

Commercial vessel and commercial passenger analysis

5.2.4.3 The main commercial vessel routes identified in the shipping and navigation study area are shown in Figure 5.10. It should be noted that this data is preliminary and will be further informed by site-specific data collected during marine traffic surveys.

5.2.4.4 Large commercial vessels are concentrated in routes to the Port of Liverpool. One route passes Anglesey, to the south of the Transmission Assets Scoping Boundary. Usage of the IMO TSS ensures the separation of opposing streams of traffic to aid navigational safety. Another route transits from Liverpool to the northern Irish Sea, passing to the west of the Isle of Man and intersecting with the Transmission Assets Scoping Boundary. The shipping and navigation study area includes the principal approaches to Liverpool from the west and a busy anchorage located to the east of Anglesey. Less trafficked routes from the east of the Isle of Man, Douglas and Heysham pass through the Transmission Assets Scoping Boundary.

5.2.4.5 As shown in Figure 5.10, a number of commercial ferry routes pass through the shipping and navigation study area. Commercial ferry routes intersect the Transmission Assets Scoping Boundary (namely Liverpool to Belfast, Liverpool to Douglas, Heysham to Dublin, Heysham to Douglas and Heysham to Warrenpoint) whilst other routes are immediately adjacent (namely Liverpool to Dublin). Other passenger vessels, including cruise ship activity, is recorded in the data passing within the shipping and navigation study area.

5.2.4.6 Key commercial ferry operators identified to date include Isle of Man Steam Packet Company, Seatruck Ferries, P&O ferries, and Stena Line. Each of these operators are members of the MNEF and consultation is underway to further understand their activities and operational procedures.

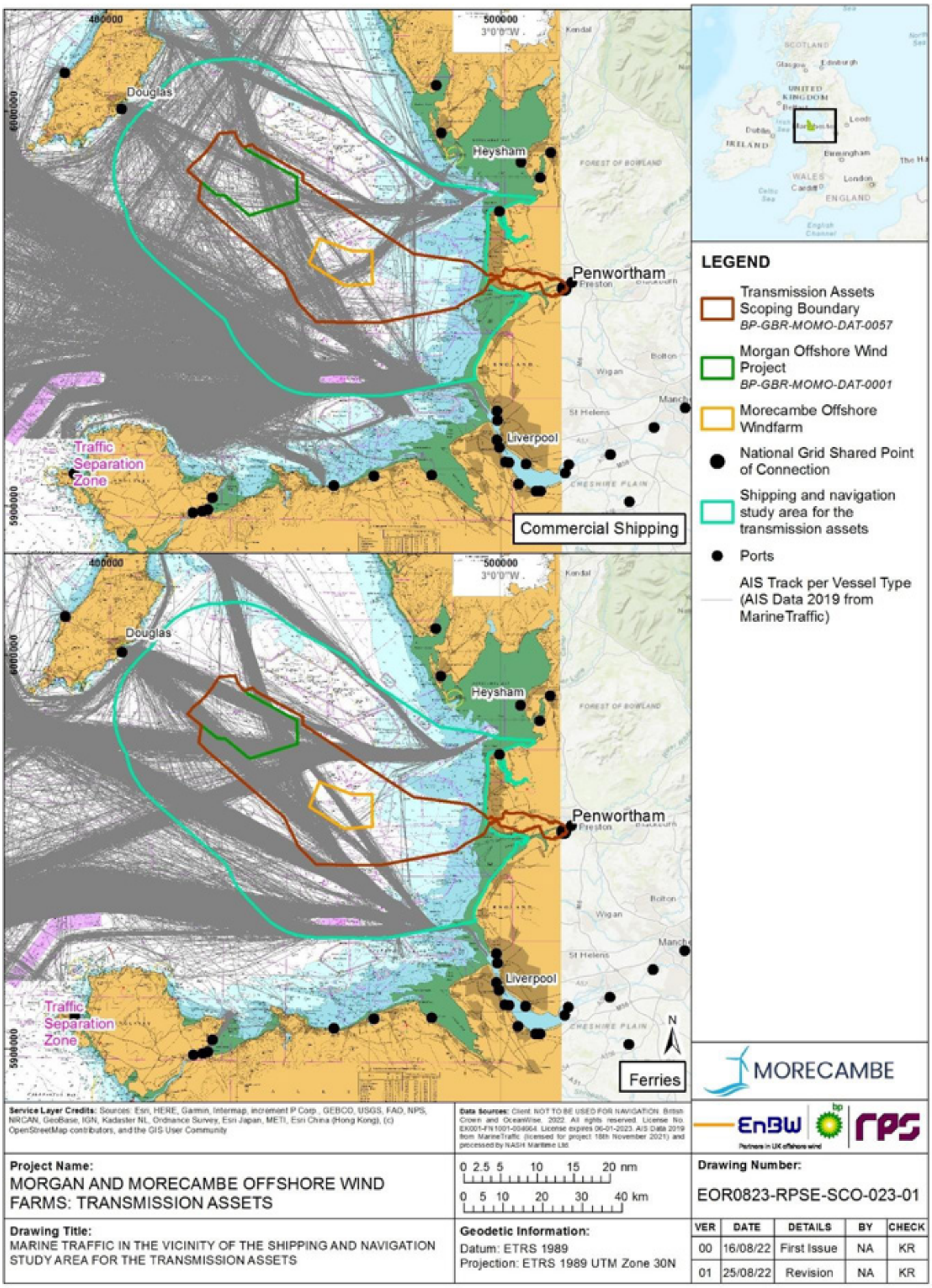


Figure 5.10: Marine traffic (commercial shipping and ferries) in the vicinity of the shipping and navigation study area for the Transmission Assets (all AIS vessel tracks from 2019).

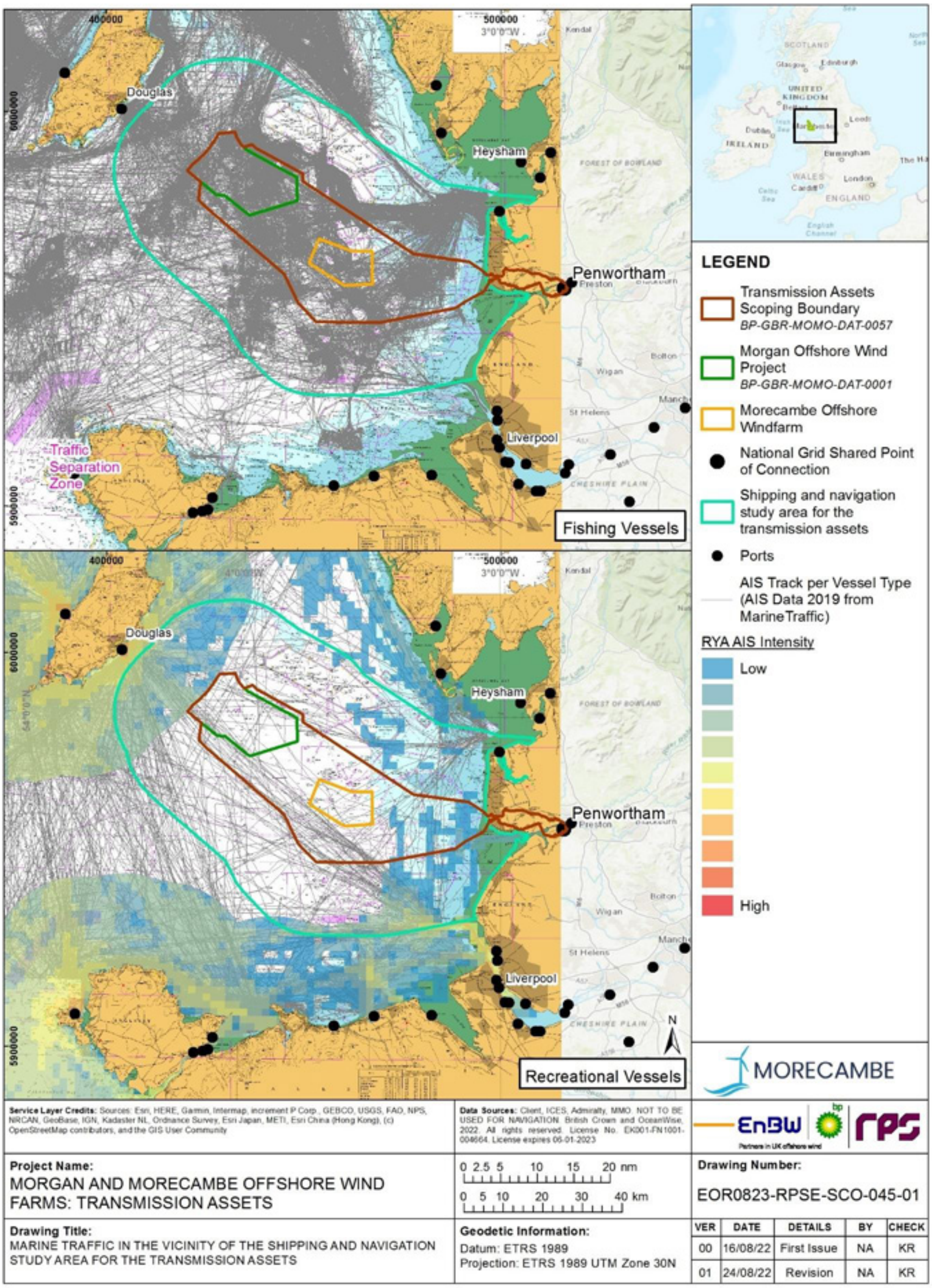


Figure 5.11: Marine traffic (fishing vessels and recreational vessels) in the vicinity of the shipping and navigation study area for the Transmission Assets (all AIS vessel tracks from 2019).

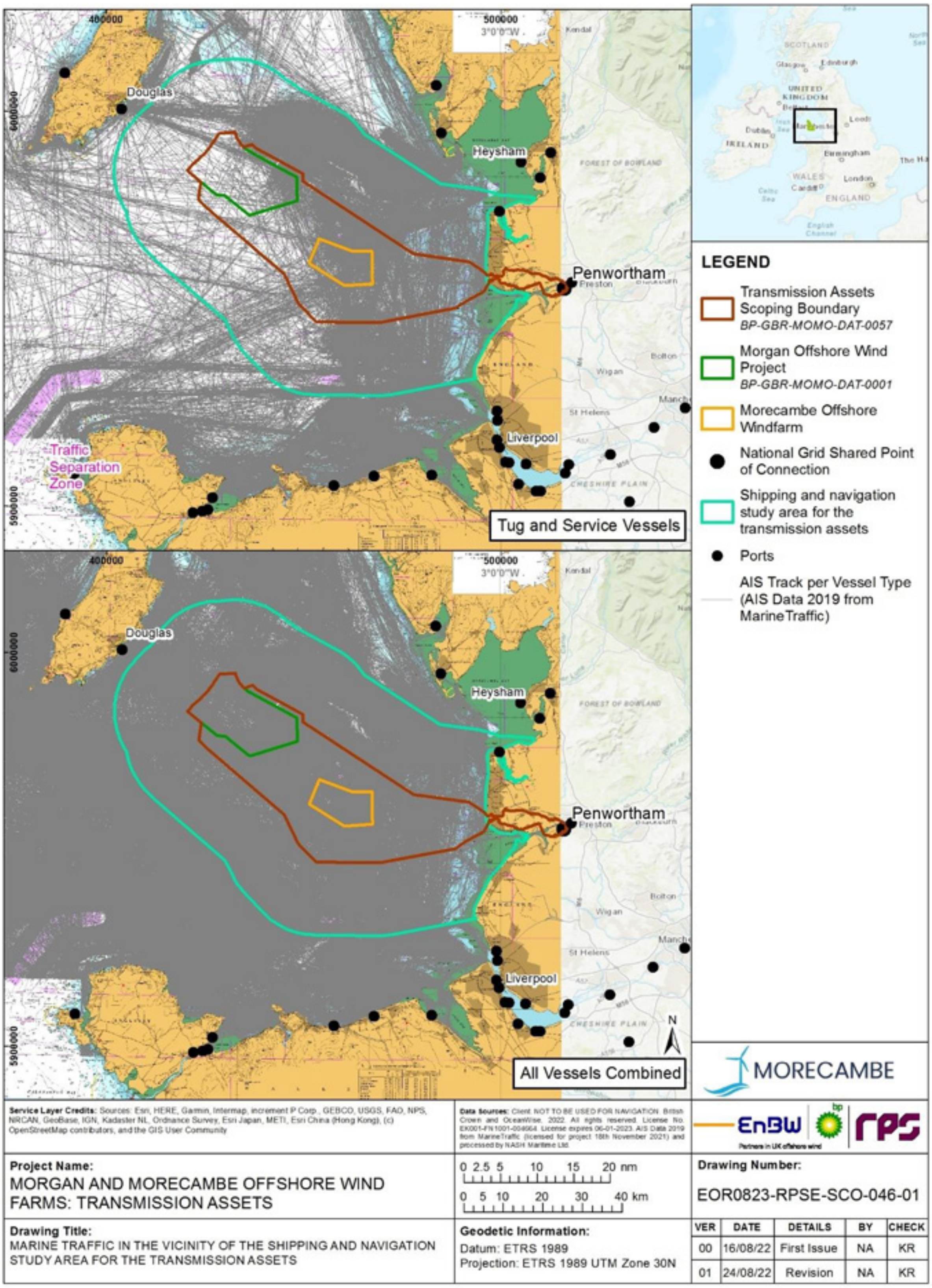


Figure 5.12: Marine traffic (tug and service vessels and all vessels combined) in the vicinity of the shipping and navigation study area for the Transmission Assets (all AIS vessel tracks from 2019).

Fishing vessel density

5.2.4.7 Commercial fishing occurs within the shipping and navigation study area (Figure 5.11). Fishing vessels active within this area are known to operate from harbours across England, Wales, Scotland, the Isle of Man as well as foreign boats. Not all fishing vessels carry AIS and therefore additional data will be collected as part of the vessel traffic surveys and through consultation with commercial fisheries stakeholders.

5.2.4.8 Further detail on commercial fishing activity is provided in part 2, section 5.1: Commercial fisheries, of this EIA Scoping Report.

Recreational vessel activity

5.2.4.9 Recreational activity is defined for the purpose of the shipping and navigation assessment as sailing and motor craft (including those undertaking dive/fish excursions).

5.2.4.10 There is low to medium recreational vessel activity in inshore areas of the shipping and navigation study area based on AIS data, as shown in Figure 5.11. Few recreational craft appear to operate between Liverpool and Morecambe Bay. Much of the recreational activity is concentrated inshore with only sporadic use of offshore cruising routes between the UK mainland and the Isle of Man. Not all recreational vessels carry AIS and therefore additional data will be collected as part of the vessel traffic surveys and through the MNEF engagement activities and hazard workshop.

Service vessels

5.2.4.11 Tugs and service vessels support ongoing operations associated with other infrastructure projects within the east Irish Sea (Figure 5.9). These include crew transfer vessels, standby support vessels, aggregate dredgers, pilot boats and tugs amongst others. The activity of these vessels is shown in Figure 5.12 and is concentrated in harbours and within and between other offshore wind farms and oil and gas platforms.

Search and Rescue

5.2.4.12 SAR within the UK is coordinated by the MCA, with other organisations providing declared assets to undertake SAR operations. These different organisations are outlined below.

5.2.4.13 The MCA provides a coordination service for SAR, counter pollution and salvage. SAR is coordinated through a network of Maritime Rescue Coordination Centres situated throughout the UK, a Maritime Rescue Sub Centre based in London, and the Joint Rescue Coordination Centre in Fareham. The Transmission Assets fall within the area of responsibility of the Holyhead Maritime Rescue Coordination Centres.

5.2.4.14 SAR helicopters, available to the MCA for use during a SAR incident, are provided by the Bristow Group. The Caernarfon SAR helicopter base is the closest to the Transmission Assets, located 74.6km from the shipping and navigation study area.

5.2.4.15 The RNLI provides a 24-hour SAR service maintaining a fleet of lifeboats from stations positioned around the coast of the UK and Ireland. There are a number of lifeboat stations positioned along the coast of north Wales and northwest coast of England that operate a variety of both smaller (open-deck) inshore lifeboats and larger all-weather lifeboats that are capable of high speed and able to safely undertake operations in all weather. Due to the distance offshore, it is most likely that only all-weather lifeboats would respond to an incident in the vicinity of the Transmission Assets. The closest all-weather lifeboat stations to the Transmission Assets are Douglas (Isle of Man) and Barrow Lifeboat Stations, however, given the significant number of stations surrounding the Irish Sea, other assets may respond to an incident. The Rhyl, Hoylake and West Kirby lifeboat stations are all located in the vicinity of the landfall.

5.2.4.16 Other offshore operators (e.g., oil and gas and other renewable energy developments) also have resources which could be used to assist with an incident in the vicinity of the Transmission Assets. As part of the EIA process, the Applicants will undertake further consultation with the MCA in order to inform the assessment of SAR capability in the region.

Maritime accidents and incidents

5.2.4.17 Maritime incidents in the east Irish Sea from 2010 to 2019 have been recorded by MAIB and are shown in Figure 5.13 according to vessel type. The majority of records occur in inshore waters, with three incidents involving tug and service vessels and one incident involving a cargo vessel recorded within the Transmission Assets Scoping Boundary. Data on maritime accidents and incidents will be analysed as part of the NRA for the Transmission Assets.

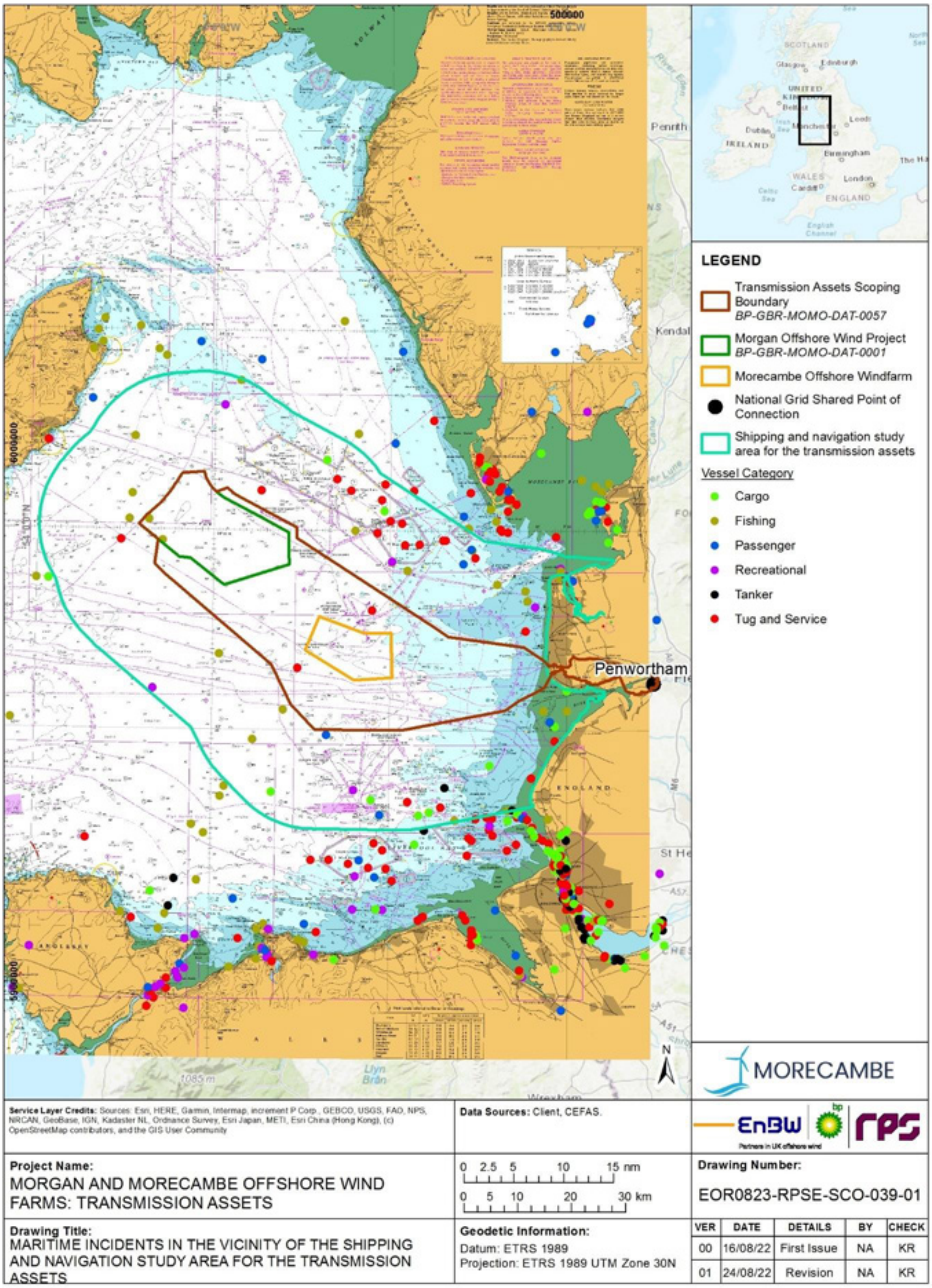


Figure 5.13: Maritime incidents in the vicinity of the shipping and navigation study area for the Transmission Assets (MAIB data from 2010 to 2019).

Future baseline conditions

5.2.4.18 The EIA process will consider the existing baseline conditions within the study area, and future baseline conditions (as far as reasonably practicable) in accordance with the methodology set out in part 1, section 5 (see section 5.7.2 for the approach to consideration of future baseline conditions).

5.2.5 Potential project impacts

5.2.5.1 A range of potential impacts on shipping and navigation receptors have been identified which may occur during the construction, operation and maintenance, and decommissioning phases of the Transmission Assets. The impacts that have been scoped into the assessment are outlined in Table 5.5 together with a description of any additional data collection (e.g., site-specific surveys) and supporting analyses (e.g., modelling) that will be required to enable a full assessment of the impacts.

5.2.5.2 On the basis of the baseline information currently available and the project description outlined in part 1, section 4: Project description, of this EIA Scoping Report, no impacts are proposed to be scoped out of the assessment for shipping and navigation.

Table 5.5: Impacts proposed to be scoped into the project assessment for shipping and navigation (project phase refers to construction (C), operation and maintenance (O) and decommissioning (D)).

Impact	Project phase			Justification	Data collection and analysis required to characterise the baseline environment	Summary of proposed approach to assessment
	C	O	D			
Deviations to commercial routes.	✓	✓	✓	Offshore export cable and interconnector cable installation activities and the presence of the OSPs and Morgan offshore booster station within the Transmission Assets Scoping Boundary, may require deviations to shipping routes and result in increased transit times.	Vessel traffic data and regular runner schedules will be used to inform the NRA. Consultation with commercial operators through the MNEF.	Qualitative assessment of deviations for commercial vessel routes will be undertaken in the NRA.
Increased vessel to vessel collision risk.	✓	✓	✓	Activities associated with the OSPs and Morgan offshore booster station infrastructure of the Transmission Assets will increase the number of vessels operating and may increase the risk of collision between project vessels and other vessels. The deviation of existing commercial and ferry routes around the Transmission Assets Scoping Boundary may increase the number of vessel interactions which may increase collision risk. Displacement of existing activities (such as fishing and recreational users) into adjacent shipping routes may increase the risk of collision.	Vessel traffic data will be used to inform the NRA. Consultation with commercial operators and other user groups through the MNEF.	Qualitative and quantitative assessment using vessel traffic data and consultation feedback.
Increased allision (contact) risk to vessels.	✓	✓	✓	The presence of the OSPs and Morgan offshore booster station in previously open sea areas within the Transmission Assets Scoping Boundary may increase the risk of allision (contact) from passing vessels following engine failure or human error.	Vessel traffic data will be used to inform the NRA. Consultation with commercial operators and other user groups through the MNEF.	Qualitative and quantitative assessment using vessel traffic data and consultation feedback.
Increased risk of anchor and gear snagging for	✓	✓	✓	The presence of cables associated with the Transmission Assets may increase	An assessment of the vessel traffic in proximity to the Transmission Assets will	Qualitative assessment to assess potential impact, informed by the NRA.

Impact	Project phase			Justification	Data collection and analysis required to characterise the baseline environment	Summary of proposed approach to assessment
	C	O	D			
commercial vessels and commercial fishing vessels (in transit).				the likelihood of anchor and gear interaction for third party vessels including a snagging risk.	be carried out including identification of areas where anchoring activity occurs frequently. A Cable Burial Risk Assessment will be undertaken to determine cable protection requirements.	
Reduction of under keel clearance.	✓	✓	✓	The presence of cable protection associated with the Transmission Assets may reduce water depths and therefore reduce under keel clearance for third party vessel traffic.	An assessment of the vessel traffic in proximity to the Transmission Assets will be carried out and assessed against water depths to identify any areas where under keel clearance may be of concern.	Qualitative assessment to assess potential impact, informed by the NRA.
Reduction of emergency response capability due to increased incident rates and reduced access for SAR responders.	✓	✓	✓	The Transmission Assets will increase the number of vessels in the area which may result in an increased number of incidents requiring emergency response and may reduce access for SAR responders.	MAIB and RNLI incident data and Department for Transport (DfT) SAR helicopter taskings data will be assessed to characterise baseline incident rates.	Qualitative assessment to assess potential impact, informed by the NRA. The NRA will include a section that considers the impacts of the Transmission Assets on SAR response in line with Marine Guidance Note (MGN) 654 and its annexes based on desk-based research.
Interference with marine navigation, communications and position fixing equipment.	✓	✓	✓	Communication and position fixing equipment may be affected by the presence of infrastructure associated with the Transmission Assets.	Vessel traffic data will be used to characterise vessel movements in the area and inform the NRA. The NRA will be used to inform the assessment.	Qualitative assessment to assess potential impact, informed by the NRA.

5.2.6 Measures adopted as part of the project

5.2.6.1 The following measures adopted as part of the project are relevant to shipping and navigation. These measures may evolve as the engineering design and the EIA progresses.

- The use of advisory clearance distances and safety zones during construction and periods of major maintenance.
- Compliance with Marine Guidance Note (MGN) 654 Safety of Navigation Offshore Renewable Energy Installations (OREIs) – UK Navigational Practice, Safety and Emergency Response (MGN 654 and associated annexes) (MCA, 2021a).
- The use of guard vessels where required by risk assessment.
- Notifying the United Kingdom Hydrographic Office (UKHO) of the location of the OSPs and the Morgan offshore booster station, for marking on Admiralty Charts.
- Marking and lighting of the Transmission Assets in accordance with International Association of Marine Aids to Navigation and Lighthouse Authorities (IALA) guidance and in consultation with the MCA and Trinity House.
- Marine coordination and promulgation of information using Notices to Mariners and fishermen’s awareness charts.
- Development of, and adherence to, a Navigational Practice, Safety and Emergency Response (Emergency Response and Cooperation Plan (ERCoP)) and provision of self-help capabilities.
- Cable burial or protection where appropriate.

5.2.6.2 The requirement for and feasibility of further mitigation will be consulted upon with statutory consultees throughout the EIA process.

5.2.6.3 The Applicants are also committed to implementing construction vessel traffic monitoring.

5.2.7 Proposed assessment methodology

Approach

5.2.7.1 Shipping and navigation is assessed primarily in accordance with guidance provided by the statutory consultees. The MCA require that their methodology is used as a template for undertaking the EIA (see MCA, 2021b). This template is centred on risk management and requires a submission that shows that sufficient controls are, or will be, in place in order for the assessed risk (base case and future case) to be judged as broadly acceptable or tolerable.

5.2.7.2 The following paragraphs provide an overview of the proposed approach to assessing risk to navigation receptors and how the outputs of the NRA will be carried through into the EIA in order to assess the significance of effect.

Navigation Risk Assessment and Formal Safety Assessment

5.2.7.3 The shipping and navigation EIA will be informed by an NRA undertaken in accordance with MGN 654. The NRA will be supported by stakeholder consultation and a hazard workshop in accordance with MGN 654.

5.2.7.4 The NRA will use a structured and systematic methodology to score the likelihood and consequence of different hazards occurring and is based on the IMO Formal Safety Assessment (FSA) approach (IMO, 2018).

5.2.7.5 The IMO FSA process is a structured and systematic methodology based on risk. As part of the FSA, the impact of the Transmission Assets is considered against the baseline datasets identified.

5.2.7.6 There are five basic steps within this process:

- Step 1 – Identification of hazards (a list of all relevant accident scenarios with potential causes and outcomes).
- Step 2 – Risk analysis (evaluation of risk factors).
- Step 3 – Risk control options (devising measures to control and reduce the identified risks).
- Step 4 – Cost benefit analysis (determining cost effectiveness of risk control measures).
- Step 5 – Recommendations for decision-making (information about the hazards, their associated risks and the cost effectiveness of alternative risk control measures).

5.2.7.7 The FSA would combine both quantitative and qualitative inputs in order to determine the level of risk. Quantitative inputs include vessel traffic analysis, historical incident analysis and risk modelling of shipping accidents. Qualitative inputs include the expertise and judgements of master mariners, regulators and wider stakeholders, elicited through extensive consultation and hazard workshops. By combining these inputs together, a holistic, collaborative approach to maritime risk assessment will be achieved.

Hazard workshop

5.2.7.8 In order to gather expert opinion and local knowledge, a hazard workshop will be undertaken, during which a project and site-specific hazard log will be prepared. The hazard log will be used to identify direct or indirect hazards relating to the development of the Transmission Assets, the level of risk associated with the hazards, the controls to be put in place and the tolerability of the residual risks.

5.2.7.9 The hazard log will also be used to identify standard and additional mitigation measures required to demonstrate that the hazards associated with the Transmission Assets are broadly acceptable or tolerable on the basis of As Low As Reasonably Practicable (ALARP) declarations, in line with regulatory requirements. This information is then fed into the FSA process to identify impacts associated with the development.

EIA methodology

5.2.7.10 The shipping and navigation EIA will broadly follow the methodology set out in part 1, section 5: EIA methodology, of this EIA Scoping Report, but with the assessment criteria tailored to align with MCA requirements described above. Specifically, the assessment criteria will include a combination of consequence and frequency which will inform EIA significance. This will be further described in the Preliminary Environmental Information Report (PEIR) and Environmental Statement (ES).

5.2.7.11 Specific to the shipping and navigation EIA, the following guidance documents will be considered:

- MGN 654 (M+F) Safety of Navigation: OREIs – Guidance on UK Navigational Practice, Safety and Emergency Response (MCA, 2021a), and its annexes.

5.2.7.12 Other guidance that will be referred to during the completion of the shipping and navigation EIA include:

- MGN 372, OREIs: Guidance to Mariners Operating in the Vicinity of UK OREIs (MCA, 2008).
- G1162 ED1.0 The Marking of Offshore Man-Made Structures (IALA, 2021).
- Guidelines for FSA for use in the IMO rule-making process (IMO, 2018)
- The RYA's Position on Offshore Energy Developments: Paper 1 – Wind Energy (RYA, 2019).

5.2.8 Potential cumulative effects

5.2.8.1 There is potential for cumulative effects to arise from other projects or activities within the east Irish Sea where projects or activities could act collectively with the Transmission Assets to affect shipping and navigation receptors.

5.2.8.2 The cumulative assessment for the Transmission Assets will consider the maximum design scenarios for each of the identified projects or activities. The following projects or activities will be considered within the shipping and navigation study area:

- The generation assets of Morgan Offshore Wind Project and Morecambe Offshore Windfarm.
- Other wind farms, including the Mona Offshore Wind Project.
- Other energy infrastructure projects, including oil and gas activities (including decommissioning), interconnectors and carbon capture and storage projects.
- Other infrastructure projects (e.g., cables and pipelines).
- Extraction and disposal activities (e.g., aggregate extraction, dredging and disposal).

5.2.8.3 The cumulative effect assessment will follow the approach outlined in part 1, section 5: EIA methodology, of this EIA Scoping Report.

5.2.9 Potential inter-related effects

5.2.9.1 The assessment of potential inter-related effects will be considered within the shipping and navigation ES chapter. It will include consideration of project lifetime effects and receptor-led effects, in line with the approach outlined in part 1, section 5: EIA methodology, of this EIA Scoping Report.

5.2.10 Potential transboundary impacts

5.2.10.1 A screening of transboundary impacts has been carried out and is presented in part 3, Annex A of this EIA Scoping Report. This screening exercise identified that there is potential for transboundary impacts upon shipping and navigation due to construction, operation and maintenance, and decommissioning impacts of the project. These include:

- Deviations to commercial routes: there is potential for transboundary impacts on ferry and commercial routes operating to/from the Republic of Ireland.

5.2.10.2 The potential for transboundary impacts will be considered within the ES.

5.3 Marine archaeology

5.3.1 Introduction

5.3.1.1 This section of the EIA Scoping Report identifies the receptors relevant to the assessment of marine archaeology for the Transmission Assets. It also considers the potential impacts arising from the construction, operation and maintenance, and decommissioning of the Transmission Assets and identifies the proposed scope of, and methodology for, the EIA process for marine archaeology.

5.3.2 Study area

5.3.2.1 The Transmission Assets marine archaeology study area is shown in Figure 5.14. The marine archaeology study area is defined as the offshore elements of the Transmission Assets Scoping Boundary (grey) with an additional 2km buffer (purple) in line with best practice. This encompasses the offshore footprint of the Transmission Assets and allows the site-specific data to be put into a wider context.

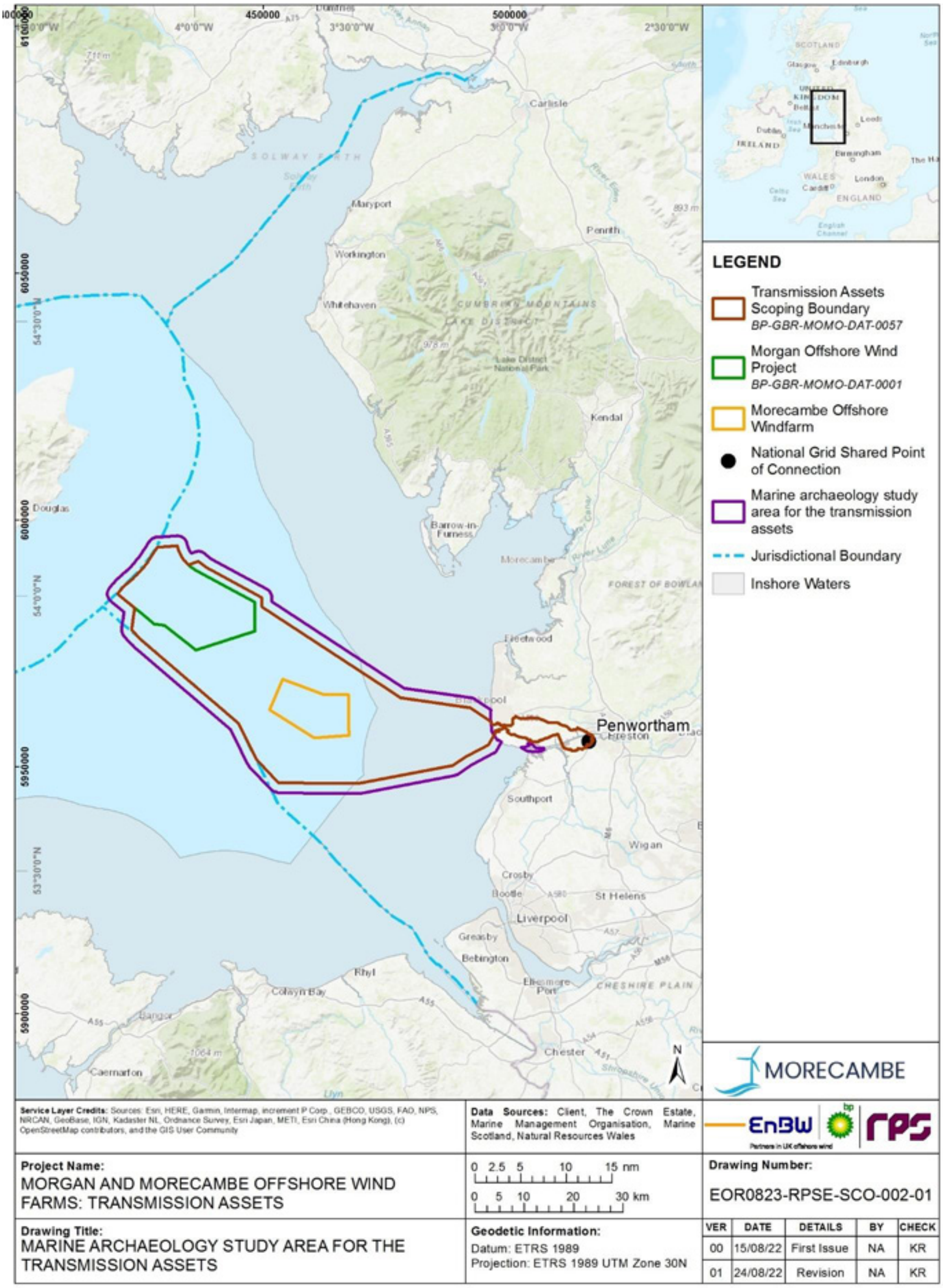


Figure 5.14: The Transmission Assets marine archaeology study area

5.3.3 Data sources

Desktop data

5.3.3.1 Several sources were consulted in order to inform the marine archaeology section of this EIA Scoping Report and will be used to inform the EIA process. These comprise:

- The United Kingdom Hydrographic Office (UKHO) wrecks database, containing recorded wreck and obstruction data
- Records held by the National Record of the Historic Environment (NRHE), which include:
  - monuments records
  - archaeological event records
  - maritime records
  - aircraft crash sites
  - find locations.
- National Monuments Records Wales (NMRW) held by the Royal Commission on the Ancient and Historical Monuments of Wales (RCAHMW).
- West Coast Palaeolandscape Survey.
- Relevant mapping including Admiralty Charts, BGS, Ordnance Survey and historic maps.
- Relevant primary and secondary sources and grey literature, available through the Archaeological Data Service and other websites, including published and unpublished archaeological reports relevant to the vicinity of the marine archaeology study area.

5.3.3.2 In order to compile a marine archaeological baseline for the purposes of this EIA Scoping Report, these sources were compiled into gazetteers (see Appendix 5.4).

5.3.3.3 The historic environment records have been classified between records where material is known to be on the seabed and ‘recorded losses’. Recorded losses are events of vessels that are known to have been lost in the area, but with which no accurately located remains are associated.

5.3.3.4 Where multiple entries across the datasets occur that relate to the same archaeological receptor, the coordinates from the UKHO dataset have been used as they are most frequently updated with the latest survey positions.

Site-specific surveys

5.3.3.5 Site-specific geophysical surveys were undertaken April to September 2022 within the Transmission Assets Scoping Boundary for the Morgan Offshore Wind Project. In addition, geophysical surveys were undertaken in October to December 2021 within the Transmission Assets Scoping Boundary for the Morecambe Offshore Windfarm. Data from these surveys will be reviewed by a marine archaeologist specialising in geophysical data interpretation and will be used to inform the marine archaeology baseline for the EIA.

5.3.4 Baseline environment

5.3.4.1 The baseline environment is structured into the following categories:

- Submerged prehistoric archaeology: This includes palaeochannels and other inundated terrestrial landforms that may preserve sequences of sediment of palaeoenvironmental interest, Palaeolithic and Mesolithic sites and artefacts.
- Maritime archaeology: relates generally to craft or vessels and any of their associated structures and cargo.
- Aviation archaeology: this comprises all military and civilian aircraft crash sites and related wreckage.

5.3.4.2 A gazetteer of the known marine archaeology within the marine archaeology study area can be found in Appendix 5.4.

Submerged prehistoric archaeology

5.3.4.3 There are no entries within the datasets relating to palaeolandscapes within the marine archaeology study area. However, this could be due to a lack of archaeological survey in the area and may not be representative of the submerged prehistoric environment.

<u>Submerged prehistoric archaeological potential</u>

5.3.4.4 The potential for submerged prehistoric archaeology within the marine archaeology study area is considered to be moderate with surviving evidence likely to be found in association with any palaeolandscape features. Landscape modelling undertaken by the West Coast Palaeolandscape Study suggests that the marine archaeology study area may have been intertidal during the Mesolithic period. Archaeological assessment of the geophysical survey data (see section 5.3.3.5) will provide further information on the potential for submerged prehistoric archaeology within the marine archaeology study area.

5.3.4.5 Prior to 5,500BC, fluctuations in sea level presented opportunities for early hominids to occupy and traverse the now submerged Liverpool Bay area (Fitch *et al*., 2011). When sea levels were low, the Liverpool Bay area was a landscape that connected the Isle of Man to mainland Britain (Coles, 1988). Mesolithic footprints dating to c. 6,000BC have been recorded along the coast of Formby, to the east of the marine archaeology study area (Burns 2021). These falls in sea level were associated with the last three glacial maximums and the retreat of the ice sheets.

5.3.4.6 The earliest known occupation of the wider area near the marine archaeology study area is located on the north coast of Wales at the Pontnewydd Cave site, Llandudno. This site dates to circa 225,000BP (Before Present) and confirms that this area was being exploited during the low to mid palaeolithic period.

5.3.4.7 The Last Glacial Maximum (LGM) began circa 18,000BP and ice sheets began to retreat around 13,000BP. It is thought that human and animal reoccupation of mainland Britain was swift, and that this reoccupation came from crossing the now submerged palaeolandscape of Doggerland from mainland Europe (Fitch *et al*., 2011). There is therefore potential that this exploitation of the landscape continued across mainland Britain and over to the Isle of Man potentially via any submerged palaeolandscape.

Maritime archaeology

Maritime archaeological potential

5.3.4.8 The maritime archaeology within the marine archaeology study area is shown in Figure 5.15 and described below.

5.3.4.9 Maritime archaeological sites and materials can be defined as the physical remains of boats and ships that have been wrecked, sunk or have foundered and artefacts which rest upon the seabed as the result of being jettisoned or lost overboard (for example, anchors, cannon or fishing gear).

5.3.4.10 There are an additional three recorded losses attributed to general coordinates within the marine archaeology study area. Archaeological assessment of the geophysical survey data will determine whether any archaeological material is present at these locations.

5.3.4.11 Recorded losses represent maritime and aviation losses that are known to have occurred in the vicinity but to which no specific location can be attributed. Recorded losses are often grouped with reference to a geographic, hydrographic or other point of reference, making the positional data of these records unreliable. However, they do provide information on the historical marine traffic of the general region.

5.3.4.12 Records of wreck sites and losses in UK waters are biased towards the recent, predominantly post-medieval and modern periods. Although the existence and survival of palaeolithic watercraft are highly speculative in the UK, Bronze and Iron Age sea-going vessels are likely to have been lost in the east Irish Sea.

5.3.4.13 The potential for the survival of medieval maritime archaeology is higher than from prehistoric periods but still rare, as ship construction during the medieval period relied heavily on organic building materials that are less likely to survive on and in the seabed.

5.3.4.14 The post-medieval and modern periods present the greatest potential for unrecorded archaeology to be discovered. The increasing incorporation of metal structural elements into vessel designs during this period means that wrecks for the 19th and early 20th centuries are also often more visible on the seabed than their wooden predecessors. They are visible to bathymetric and geophysical survey, and also generate strong magnetic anomalies, and this greater visibility is reflected in the increased number of wrecks (i.e., those that have been located on the seabed), in contrast to earlier periods.

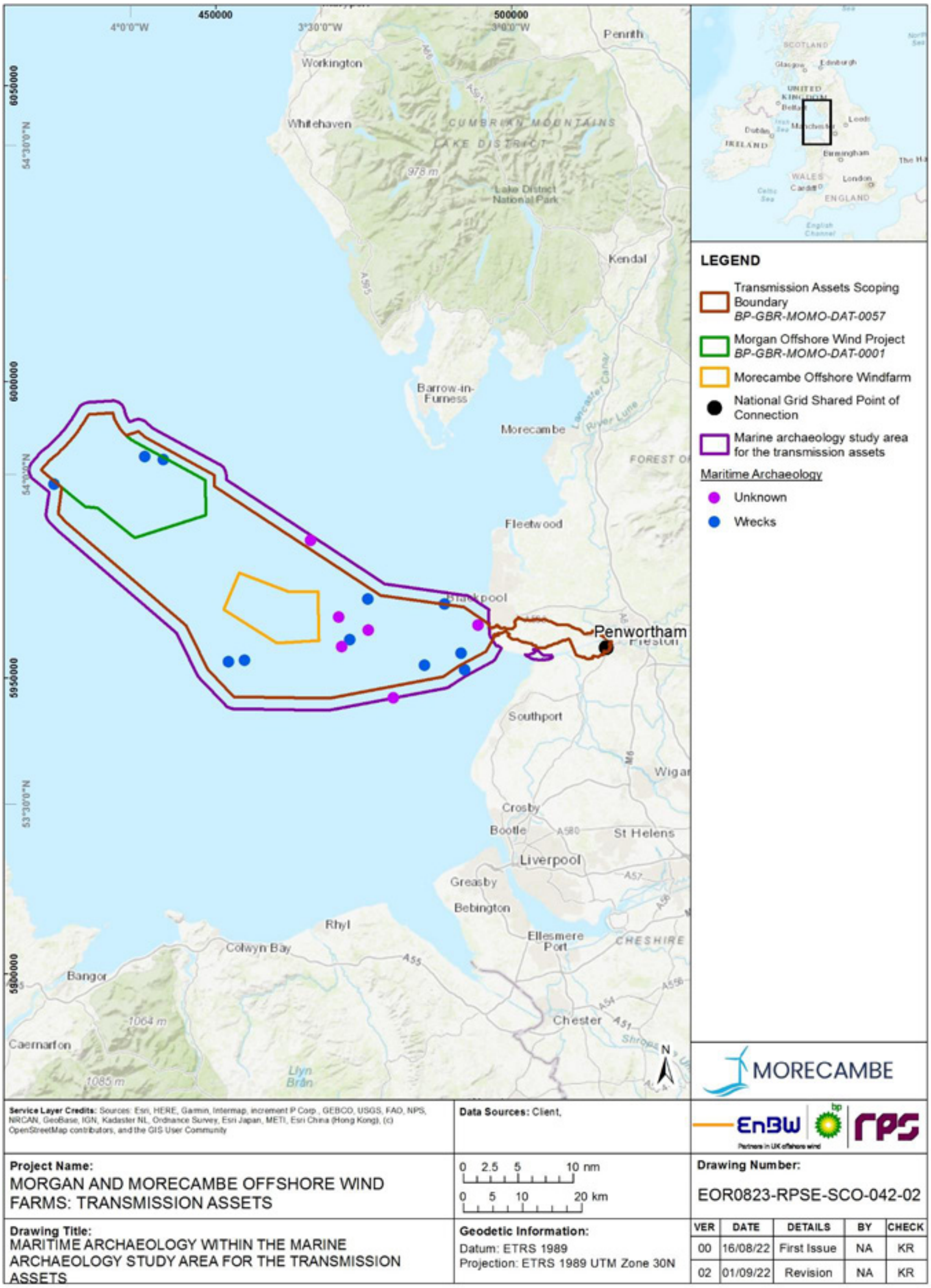


Figure 5.15: Maritime archaeology within the Transmission Assets marine archaeology study area.

Designated maritime archaeology

5.3.4.15 There are no designated maritime archaeology sites within the marine archaeology study area.

Non-designated maritime archaeology

5.3.4.16 There are 11 live wrecks within the marine archaeology study area recorded in the UKHO, NMWR and NRHE data. Of these identified wreck sites, two are from the post-medieval period, three were lost during World War I and one during World War II. Five are modern shipwrecks and therefore considered less significant in archaeological terms. The remaining wrecks are from an unknown period. The locations of the known wreck sites are shown in Figure 5.15 and further details are listed in Appendix 5.4.

5.3.4.17 There are also 25 wreck sites which are listed as 'dead' in the UKHO data indicating that no remains have been located and therefore the wreck is considered not to exist at the location given. However, it is worth noting that 'dead' wrecks may still be present at the locations indicated but are buried and flattened or fragmented and dispersed and are therefore no longer represent a navigational hazard. The site-specific geophysical survey analysis will clarify the presence of any material at these locations. There is one further site listed as lifted or salvaged from within the marine archaeology study area.

5.3.4.18 There are a further six wreck sites recorded as 'unknown' in the NMRW, NRHE and UKHO data about which no further information is known. Archaeological assessment of the geophysical survey data will determine whether they relate to the presence of archaeological material.

5.3.4.19 There are six seabed anomalies recorded as being of man-made origin within the marine archaeology study area. These may indicate the presence of archaeological material.

5.3.4.20 There are also a large number of obstructions within the marine archaeology study area, which may relate to material of anthropogenic origin.

Aviation archaeology

5.3.4.21 There are no known aviation crash sites designated under the Protection of Military Remains Act 1986 within the marine archaeology study area.

Aviation archaeological potential

5.3.4.22 There are no recorded losses of aircraft attributed to coordinates within the marine archaeology study area. The site-specific geophysical survey analysis will clarify whether aviation archaeological material is present within the marine archaeology study area.

5.3.4.23 Thousands of military and civilian aircraft casualties have occurred in UK waters since the advent of powered flight in the early 20th century. The bulk of these are casualties date to World War II and most are concentrated off the south and southeast coasts of England. However, there is evidence for substantial numbers of aircraft casualties in the east Irish Sea (Wessex Archaeology, 2008).

5.3.4.24 Whilst this aviation archaeology record is potentially very large, the ephemeral nature of aircraft crash sites ensures that many sites remain unknown and unrecorded. In addition, although records of aircraft losses at sea are extensive, they are seldom tied to an accurate position, which further complicates any assessment of the likely presence of aircraft wreckage on any area of the seabed.

5.3.4.25 Since World War II, despite the volume of both military and civilian air traffic, there have been few aviation losses off the west coast of England and north Wales, in the vicinity of the marine archaeology study area. The potential for post-war aircraft remains to be discovered within the marine archaeology study area is therefore considered to be low. Any military aviation crash sites are subject to protection under the Protection of Military Remains Act 1986, however civilian aircraft are not subject to protection under the terms of the Protection of Military Remains Act 1986.

Future baseline conditions

5.3.4.26 The EIA process will consider the existing baseline conditions within the study area, and future baseline conditions (as far as reasonably practicable) in accordance with the methodology set out in part 1, section 5 (see section 5.7.2 for the approach to consideration of future baseline conditions).

5.3.5 Potential project impacts

5.3.5.1 A range of potential impacts on marine archaeology receptors have been identified which may occur during the construction, operation and maintenance, and decommissioning phases of the Transmission Assets. The impacts that have been scoped into the assessment are outlined in Table 5.6 together with a description of any additional data collection and supporting analyses that will be required to enable a full assessment of the impacts.

5.3.5.2 On the basis of the baseline information currently available and the project description outlined in part 1, section 4: Project description, of this EIA Scoping Report, no impacts are proposed to be scoped out of the assessment for marine archaeology.

Table 5.6: Impacts proposed to be scoped into the project assessment for marine archaeology (project phase refers to construction (C), operation and maintenance (O) and decommissioning (D)).

Impact	Project phase			Justification	Data collection and analysis required to characterise the baseline environment	Summary of proposed approach to assessment
	C	O	D			
Sediment disturbance and deposition leading to indirect impacts on archaeological receptors.	✓	✓	✓	Construction works, including seabed preparation, installation of foundations, and cable installation, may cause seabed sediment disturbance and associated deposition, which could lead to indirect impacts on archaeological receptors. Effects from decommissioning are likely to be similar to effects from construction. Maintenance operations, including cable repair activities, may cause seabed sediment disturbance and associated deposition, which could lead to indirect impacts on archaeological receptors.	Review of desktop data and archaeological assessment of geophysical survey data with reference to the results of the physical processes chapter of the ES which will consider the extent of sediment disturbance and associated deposition. The geophysical survey data will be scanned to provide an understanding of the geological nature of the area and interpreted for any objects of possible anthropogenic origin. This involves creating a database of anomalies by tagging individual features of possible archaeological potential, recording their positions and dimensions, and acquiring an image of each anomaly for future reference.	Qualitative assessment informed by review of desktop data and archaeological assessment of geophysical survey data. Preparation of a technical report and draft Written Scheme of Investigation (WSI) written in accordance to the Crown Estate Archaeological Written Schemes of Investigation for Offshore Wind Farm Projects (Crown Estate, 2021).
Direct damage to archaeological receptors.	✓	✓	✓	Construction works could directly affect any archaeological receptors present within the Transmission Assets Scoping Boundary. These effects will likely be localised, but should they occur, they could lead to adverse and irreversible damage to archaeological receptors. Operational activities such as anchor deployment have the potential to directly impact archaeological receptors. Where receptor locations are already known, measures for their avoidance and protection include implementing Archaeological Exclusion Zones (AEZ). Effects from decommissioning are likely to be similar to effects from construction.	As above.	Qualitative assessment informed by review of desktop data and archaeological assessment of geophysical survey data. Preparation of a technical report and draft WSI.

Impact	Project phase			Justification	Data collection and analysis required to characterise the baseline environment	Summary of proposed approach to assessment
	C	O	D			
Alteration of sediment transport regimes.	×	✓	×	The physical presence of OSPs and any Morgan offshore booster station foundations and associated scour protection, and cable protection, may interrupt sediment transport pathways, which could be directed towards or away from archaeological receptors causing damage. This is applicable during the operation and maintenance phase only as construction and decommisioning activities will lead to sediment disturbance and deposition, covered above,	As above, with reference to the Physical processes chapter of the ES which will consider the potential impact on sediment transport pathways.	Qualitative assessment informed by review of desktop data and archaeological assessment of geophysical survey data. Preparation of a technical report and draft WSI.

5.3.6 Measures adopted as part of the project

5.3.6.1 The following measures adopted as part of the project are relevant to marine archaeology. These measures may evolve as the engineering design and the EIA progresses.

- The development of, and adherence to, a WSI for the construction phase written in accordance with The Crown Estate Archaeological Written Schemes of Investigation for Offshore Wind Farm Projects (Crown Estate, 2021).
- Provision of a Protocol for Archaeological Discoveries similar to that set out by The Crown Estate (TCE, 2014) for unexpected archaeological discoveries made during the course of the development The identification and implementation of Archaeological Exclusion Zones (AEZ) around receptors identified as having a known archaeological potential. The size of the AEZ will be evidence based and established using the precautionary principle to ensure that it is of sufficient size to protect the site from the nature of the impact (Wessex Archaeology, 2007; Wessex Archaeology for The Crown Estate, 2020).
- Archaeological input into specifications for and analysis of pre-construction geophysical surveys.
- Suitably qualified marine archaeologists to be consulted in the preparation of any pre-construction Remotely Operated Vehicle or diver surveys (usually undertaken as part of Unexploded Ordnance (UXO) clearance) and, if appropriate, in the monitoring and checking of data.
- More detailed geophysical and geotechnical survey acquisition and assessment may be required post-consent to confirm nature and potential heritage importance/value of any anomalies identified from the initial review of the geophysical data.
- Geoarchaeological input into specifications for and analysis of pre-construction geotechnical surveys. This may include the presence of a geoarchaeologist on board the survey vessel and provision for sampling, analysis and reporting of recovered cores. The results of all geoarchaeological investigations will be complied in a final report which will include a sediment deposit model.

5.3.6.2 The requirement for and feasibility of any further mitigation will be dependent on the significance of effects and will be consulted upon with statutory consultees throughout the EIA process.

5.3.7 Proposed assessment methodology

5.3.7.1 The marine archaeology EIA will follow the methodology set out in part 1, section 5: EIA methodology, of this EIA Scoping Report. Specific to the marine archaeology EIA, the following guidance will also be considered:

- Standard and Guidance for Historic Environment Desk-Based Assessment, Chartered Institute for Archaeologists (CIfA) (2014).
- Historic Environment Guidance for Offshore Renewable Energy Sector, Collaborative Offshore Wind Research into the Environment (COWRIE) (2007).
- Guidance for Assessment of Cumulative Impacts on the Historic Environment from Offshore Renewable Energy, COWRIE (2008).

- Joint Nautical Archaeology Policy Committee (JNAPC) Code of Practice for Seabed Development, JNAPC (2006).
- Model Clauses for Archaeological Written Schemes of Investigation, Offshore Renewables Projects, The Crown Estate (2010).
- Protocol for Archaeological Discoveries: Offshore Renewables Projects, The Crown Estate (2014).
- Institute of Environmental Management and Assessment (IEMA) Principles of Cultural Heritage Impact Assessment (IEMA, 2021).
- The Crown Estate Archaeological Written Schemes of Investigation for Offshore Wind Farm Projects 2021.

5.3.8 Potential cumulative effects

5.3.8.1 The majority of the potential effects on marine archaeological receptors arising from the construction, operation and maintenance, and decommissioning of the Transmission Assets are considered to be localised to within the footprint of the Transmission Assets. However, there is potential for cumulative effects to arise from other projects or activities within the east Irish Sea where projects or activities could act collectively on sediment transport regimes with the Transmission Assets to affect marine archaeological receptors. Cumulative impacts can also occur if several projects impact on a collection of marine archaeology assets. Similarly, multiple projects have the potential to affect large scale archaeological features such as palaeolandscapes. The cumulative assessment will consider the maximum design scenarios for each of the projects or activities.

5.3.8.2 Cumulative effects with the generation assets of the Morgan Offshore Wind Project and the Morecambe Offshore Windfarm will be considered, together with cumulative effects with other offshore windfarms (such as the Mona Offshore Wind Project), and other infrastructure projects such as proposed wind farms and interconnectors, where relevant.

5.3.8.3 The cumulative effect assessment will follow the approach outlined in part 1, section 5: EIA methodology, of this EIA Scoping Report.

5.3.9 Potential inter-related effects

5.3.9.1 The assessment of potential inter-related effects will be considered within the marine archaeology Environmental Statement (ES) chapter. It will include consideration of project lifetime effects and receptor-led effects, in line with the approach outlined in part 1, section 5: EIA methodology, of the EIA Scoping Report. It will consider the potential for any interaction with onshore impacts on heritage, as considered in part 2, section 8.1 of this EIA Scoping Report.

5.3.10 Potential transboundary impacts

5.3.10.1 A screening of transboundary impacts has been carried out and is presented in part 3, Annex A of this EIA Scoping Report. This screening exercise identified that there is no potential for transboundary impacts upon marine archaeology during the construction, operation and maintenance, and decommissioning of the Transmission Assets because the project is located well within the European Economic Zone (EEZ).

Appendix 5.4

Gazetteer of known marine archaeology within the marine archaeology study area (data has been compiled from the NMRW, NRHE and UKHO datasets as listed in section 5.3.3, the data is presented in WGS84 UTM30N.)

Some of the data cannot be attributed an ID number at this stage. If these become confirmed locations of archaeological material, they will be assigned ID numbers during the geophysical data analysis. Please note a small section of the Transmission Assets Scoping Boundary has been characterised by UKHO data only.

ID	Easting	Northing	Name	Description	Period
5775	457675	5976154	Anchor	Find	Unknown
7364	475742.2	5963369	Bella	Wooden fishing vessel lost at moorings, 1903.	Modern
7618 / 909398	454914.3	5953000	Ben Cruachan	The *Ben Cruachan* was a an steamship built by Ropner & Sons, Stockton, in 1902. The steamship was carrying a cargo of coal from Cardiff to Scope Flow on 30 January 1915, when it was torpedoed and captured by U21.	WWI
6229	441204.9932	5986911.39	Ben Rein	A British merchantship formerly the SS Starling was captured by the german submarine UB57 whilst on a voyage from Liverpool to Belfast in 1918. The ship was sunk by by gunfire.	WWI
7640 / 1611020	472702	5956467	Blanche (Possibly)	Possible remains of the 1901 wreck of a British cargo vessel located approximately 12nm east of the mouth of the River Ribble. The *Blanche* was a steel-hulled steamer, which foundered while en route from Piel to Liverpool.	Modern
7604 / 907034	487546.5	5943955	Coniston (Probably)	Remains of a steam ship, located 5.8nm west of Southport. This may be the remains of an English steam ship which foundered following an explosion in 1868, while on route from Liverpool to Lancaster with a general cargo.	Post Medieval
7203 / 907033	475753.1	5942517	Counsellor III	Remains of the 1940 wreck of an English cargo vessel which foundered after detonating a mine laid by the German submarine U-30 approximately 17nm northwest of New Brighton. It was a steel-hulled steamer, built in 1926.	WWII
7256 / 907032	474020	5941822	El Oso	Remains of the 1940 wreck of an English tanker which foundered after detonating a magnetic mine laid by the German submarine U-30, approximately 17nm northwest of New Brighton. *El Oso* was a steel-hulled steamer.	WWII
7436 / 7089 / 909278	492138	5951380	Hebe	Possible remains of 1911 wreck of Norwegian cargo vessel, located approximately northwest of the entrance to the South Gut Channel. The *Hebe* was a steel steamer with two masts, which stranded on her arrival at Preston with wood pulp.	20th century
7527	491555.7	5954224	Irene Chalmers	Remains of a fishing vessel lost in 1995.	Modern

ID	Easting	Northing	Name	Description	Period
6224	438004.7	5987413	Limesfield	British steamship captured by the german submarine UB57 whilst on passage from Belfast to Preston in 1918. The ship was sunk by by gunfire and is thought to be located 24 miles south east of Douglas, Isle of Man.	WWI
7128 / 906996	491998.8	5934201	Mary Kate	Remains of a sailing vessel that drove ashore on Mad Wharf in 1881.	Post Medieval
7415 / 909280	488754.6	5962513	Murielle	Possible remains of a steam trawler lost in 1941.	WWII
6700 / 906995	491354.5	5933831	Nautilus	Remains of a barge which beached in a sinking condition off Formby Point and filled with the tide.	Post Medieval
6962 / 907015	490054.7	5937418	Nazarine	Possible remains of the 1872 wreck of an English cargo vessel driven ashore at Burbo Bank. It was en route from Liverpool to Havana with a cargo of coal. Built of wood, it was a sailing vessel.	Post Medieval
7012 / 906999	492331	5934786	Nickolai	Remains of a sailing vessel driven ashore at Mad Wharf in 1897.	Post Medieval
7377 / 1615273	485289.4	5952176	Peru (Probably)	Probable remains of the 1899 wreck of an English cargo vessel which foundered 5 miles north of Nelson buoy in the River Ribble. This iron steam vessel, built in 1881, departed from Fleetwood for Liverpool with gravel.	Post Medieval
6235	422681.3	5982769	Peveril	The *Peveril* was a steamship owned by the Isle of Man Steam Packet Company. On 16 September 1899, it was returning to Douglas from Liverpool when it was in collision with the British steamship *Monarch* and sank.	Post Medieval
7171	452228.5	5952780	Residu	A Honduran motorised cargo vessel built in 1964 and lost in 1992.	Modern
-	432854.4	5970695	Seabed anomaly (man made origin)	Findspot	Post Medieval
-	432214.2	5970431	Seabed anomaly (man made origin)	Findspot	Post Medieval
-	434152.8	5976616	Seabed anomaly (man made origin)	Findspot	Post Medieval
-	433731.5	5976141	Seabed anomaly (man made origin)	Findspot	Post Medieval

ID	Easting	Northing	Name	Description	Period
-	422235.5	5983095	Ship's whistle (From Peveril?)	Find	Post Medieval
7303 / 907029	479211.7	5938535	Speke (Possibly)	Remains of the 1943 wreck of an English cargo vessel which foundered near Jordan's Spit Buoy while en route from Garston to Preston with a cargo of wood pulp.	WWII
7218 / 892903	474330.9	5942030	Unknown	Wreck	Unknown
7204 / 892908	474191.2	5942487	Unknown	Probably partially buried wreck.	Unknown
7308	474650.2	5938288	Unknown	Wreckage	Unknown
5847	466107.6	5973276	Unknown	Wreck	Unknown
7210 / 892907	474250.9	5942329	Unknown	Small area of wreckage.	Unknown
7357 / 892896	473497.2	5939628	Unknown	Wreckage	Unknown
7279	473078.2	5940205	Unknown	Wreck	Unknown
7273	473783.5	5940724	Unknown	Wreck	Unknown
7261	473290	5941005	Unknown	Wreckage	Unknown
7250	473000.2	5941232	Unknown	Wreck	Unknown
7251	473129.1	5941215	Unknown	Wreck	Unknown
1605439	470817.4	5960258	Unknown	Scattered remains of a wreck, located approximately 13.4nm east of Blackpool. This wreck is possibly the remains of the paddle steamer *Leeds*, which foundered in 1852 after springing a leak whilst en route from Dublin to Liverpool.	Post Medieval
7249	473270.5	5941259	Unknown	Wreck	Unknown
7257	473094.5	5941134	Unknown	Wreck	Unknown
7258	473293.9	5941114	Unknown	Wreck	Unknown
7254	473357.1	5941179	Unknown	Wreck	Unknown

ID	Easting	Northing	Name	Description	Period
7243 / 892899	472971.8	5941466	Unknown	Wreck	Unknown
7236 / 892900	473530.4	5941791	Unknown	Wreck	Unknown
7446	480099.8	5946632	Unknown	Sailing vessel	Unknown
7232 / 892902	473220	5941871	Unknown	Small area of wreckage, probably part of *El Oso*.	WWII
7235	472963.8	5941800	Unknown	Wreck	Unknown
7581	475821.5	5958124	Unknown	fishing vessel	Unknown
6950 / 892885	492202.7	5935313	Unknown	Wooden wreckage	Unknown
7575	473059	5944941	Unknown	Wreck	Unknown
7221 / 892904	473070.8	5942007	Unknown	Wreck	Unknown
7429	471381.4	5955255	Unknown	Wreck	Unknown
7229	473288.8	5941958	Unknown	Wreck	Unknown
6231	494434	5958957	Unknown	Fishing vessel	Unknown
7211 / 892906	473167.1	5942274	Unknown	Probably collapsed wreck	Unknown
7270 / 907031	471617.4	5940805	Ystroom (Probably)	Remains of the 1940 wreck of a Dutch cargo vessel which foundered after detonating a German mine. She was a steel-hulled vessel, en route from Teignmouth to Runcorn with a cargo of china clay.	WWII
7449 / 907036	493855.2	5946329	Zealandia	Remains of the 1917 wreck of an American cargo vessel stranded on the Horse Bank, three miles west of Southport Pier. She was an iron-hulled steamer, en route from New York to Liverpool with a general cargo including sheep.	Modern

5.4 Other sea users

5.4.1 Introduction

5.4.1.1 This section of the EIA Scoping Report identifies the receptors relevant to the assessment of other sea users for the Transmission Assets. It also considers the potential impacts arising from the construction, operation and maintenance, and decommissioning of the Transmission Assets and identifies the proposed scope of, and methodology for, the EIA process for other sea users.

5.4.1.2 Potential impacts upon other sea users related to navigational safety are addressed in part 2, section 5.2: Shipping and navigation, of this EIA Scoping Report. The other sea users assessment will only consider impacts that have likely significant effects on the undertaking of a certain marine activity or the operational effectiveness of marine infrastructure.

5.4.2 Study area

5.4.2.1 The other sea users study area varies in scale depending on the receptor. Two study areas have been defined for the assessment of different groupings of other sea users receptors. These are the regional other sea users study area, and the local other sea users study area, as shown in Figure 5.16.

5.4.2.2 The regional other sea users study area is based on one tidal excursion of the Transmission Assets Scoping Boundary and represents the area with potential for increases in suspended sediments arising from Transmission Assets activities. This study area is relevant to the following receptors which are susceptible to increases in suspended sediment concentrations:

- Aggregate extraction and disposal sites
- Recreational receptors (dive sites and bathing waters).

5.4.2.3 The local other sea users study area is defined as the Transmission Assets Scoping Boundary with an additional 1km buffer. The 1km buffer has been included as oil and gas infrastructure, cables and pipelines and offshore wind farm structures undergoing maintenance will require a 500m safety zone or advisory clearance distance. This area includes the extent of potential direct physical overlap between the Transmission Assets activities and the following receptors:

- Recreational receptors (including sailing and motor cruising and recreational fishing).
- Offshore energy projects (including offshore wind farms, oil and gas activities, carbon capture and storage).
- Cable and pipeline operators.
- Offshore microwave fixed communication links.

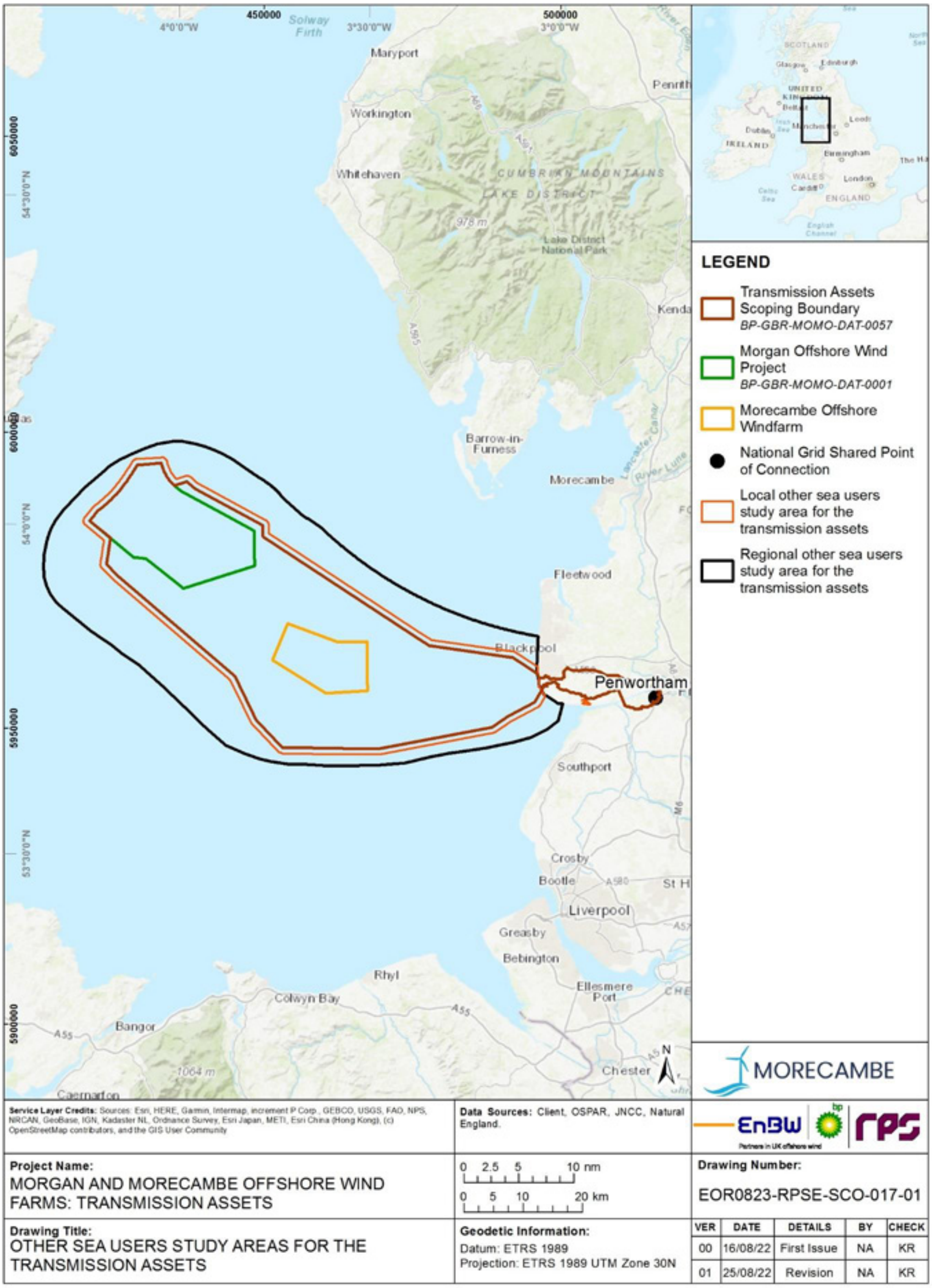


Figure 5.16: The Transmission Assets regional other sea users study area and Transmission Assets local other sea users study area.

5.4.3 Data sources

Desktop data

5.4.3.1 A number of sources were consulted in order to inform the other sea users section of the EIA Scoping Report and will be used to inform the EIA process. These are shown in Table 5.7.

Table 5.7: Data sources – other sea users.

Title	Source	Year	Author
Cable routes	Kis-Orca	2021	Kis-Orca
Disposal sites	EMODnet	2015	EMODnet
Offshore wind farms	The Crown Estate (TCE)	2021	TCE
Aggregate extraction areas	TCE	2021	TCE
Pipelines	Oil and Gas Authority (OGA)	2021	OGA
Wells	OGA	2021	OGA
Oil and gas platforms	OGA	2021	OGA
Subsurface structures	OGA	2021	OGA
Hydrocarbon fields	OGA	2021	OGA
Oil and gas licence block	OGA	2021	OGA
United Kingdom Continental Shelf block	OGA	2021	OGA
Marinas	UK Coastal Atlas of Recreational Boating	2018	Royal Yachting Association (RYA)
Recreational activities	UK Coastal Atlas of Recreational Boating	2018	RYA
RYA clubs	UK Coastal Atlas of Recreational Boating	2018	RYA
RYA training centres	UK Coastal Atlas of Recreational Boating	2018	RYA
General boating areas	UK Coastal Atlas of Recreational Boating	2018	RYA
Data from site-specific 2 x 14-day Marine Vessel Traffic Surveys for the Morgan Offshore Wind Project generation assets (see part 2, section 5.2: Shipping and navigation, of this EIA Scoping Report)	NASH Maritime (commissioned by the Applicants to inform the EIA)	2021/2022	NASH Maritime
Wrecks (diving sites)	UKDiving.co.uk	2010	UK Diving
Communication links	Ofcom, communication	2019	Ofcom
Recreational fishing	Cefas British sea fishing	2021 2020	Cefas British sea fishing

Consultation

5.4.3.2 Supporting data and information will also be obtained through consultation with relevant other sea users receptors with activities and interests in proximity to the Transmission Assets Scoping Boundary.

5.4.4 Baseline environment

Regional other sea users study area

5.4.4.1 Other sea users receptors within the regional other sea users study area include wind farms, aggregate extraction and disposal sites and recreational receptors (dive sites). The baseline environment for these receptors is described below.

Wind farms

5.4.4.2 There is one wind farm (Walney Extension) overlapping the northern boundary of the regional other sea users study area (see Figure 5.17).

Marine aggregate extraction

5.4.4.3 There is one marine aggregate production agreement area overlapping the regional other sea users study area (see Figure 5.17).

Disposal sites

5.4.4.4 There are a number of dredge disposal sites located within the east Irish Sea, including two within the regional other sea users study area (see Figure 5.17).

5.4.4.5 There are no disposal sites for explosive material, chemical munitions disposal sites (post 1945) or radioactive waste sites (1946 to 1993) located within the regional other sea users study area, according to DECC, 2011 (see Figure A3h.21 in DECC, 2011).

Scuba diving

5.4.4.6 There are no recreational dive sites identified within the regional other sea users study area by www.ukdiving.co.uk (Figure 5.18), however the Blackpool Light Craft Club (http://blcclub.co.uk/) is located directly to the north of the landfall section of the Transmission Assets regional other sea users study area. This organisation offers scuba tuition and dive trips so it is feasible that diving take place within the Transmission Assets regional other sea users study area.

Bathing waters

5.4.4.7 There is one designated bathing water sites within the regional other sea users study area (Environment Agency, 2021) (Figure 5.18).

Local other sea users study area

5.4.4.8 Other sea users receptors within the local other sea users study area include recreational receptors (sailing and motor cruising, recreational fishing and inshore water sports), offshore energy projects (offshore wind farms, oil and gas activities, carbon capture and storage), cable and pipeline operators and communication links. The baseline environment for these receptors is described below.

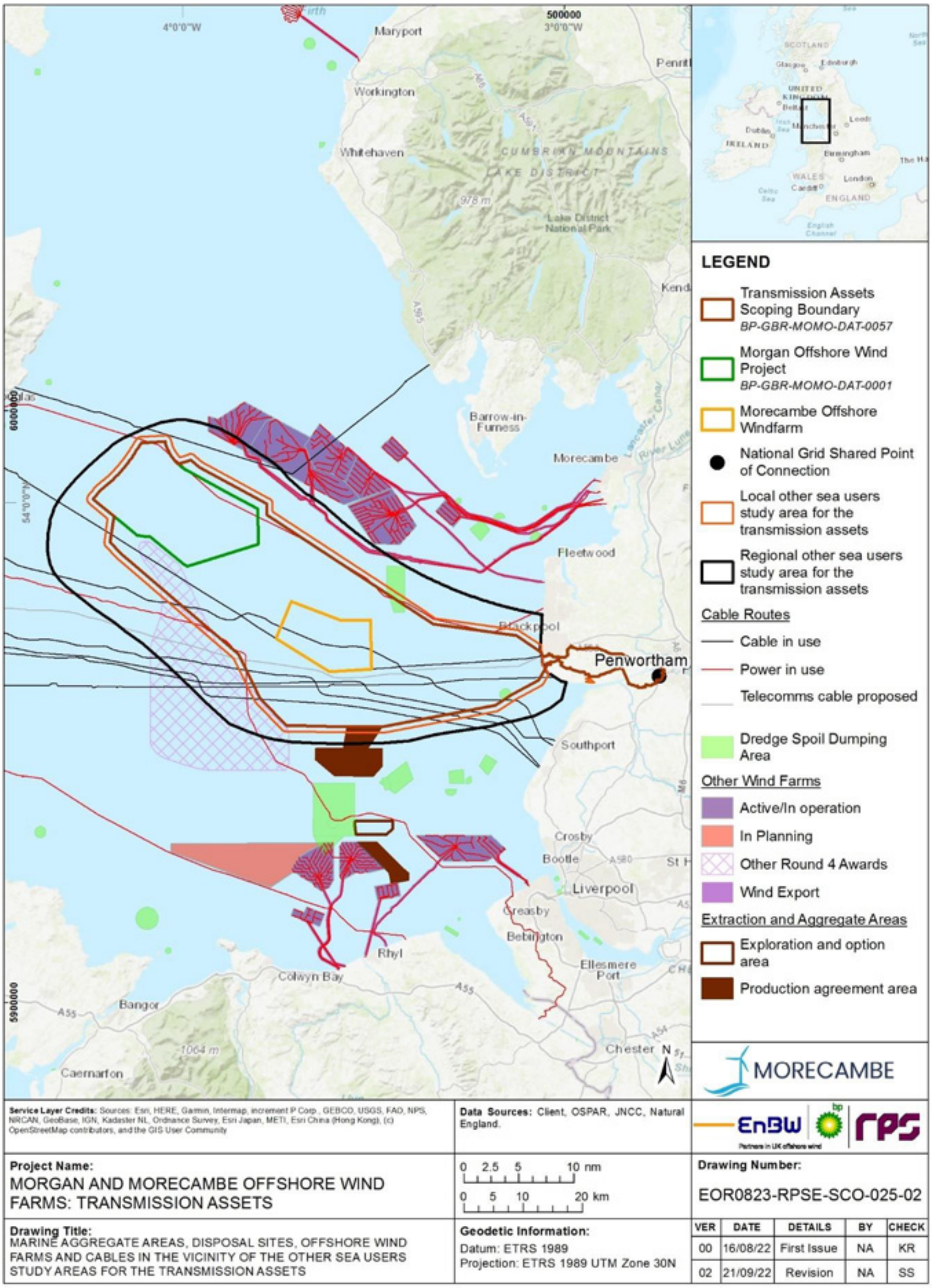


Figure 5.17: Marine aggregates, disposal sites, offshore wind farms and cables within the Transmission Assets regional other sea users study area and the Transmission Assets local other sea users study areas.

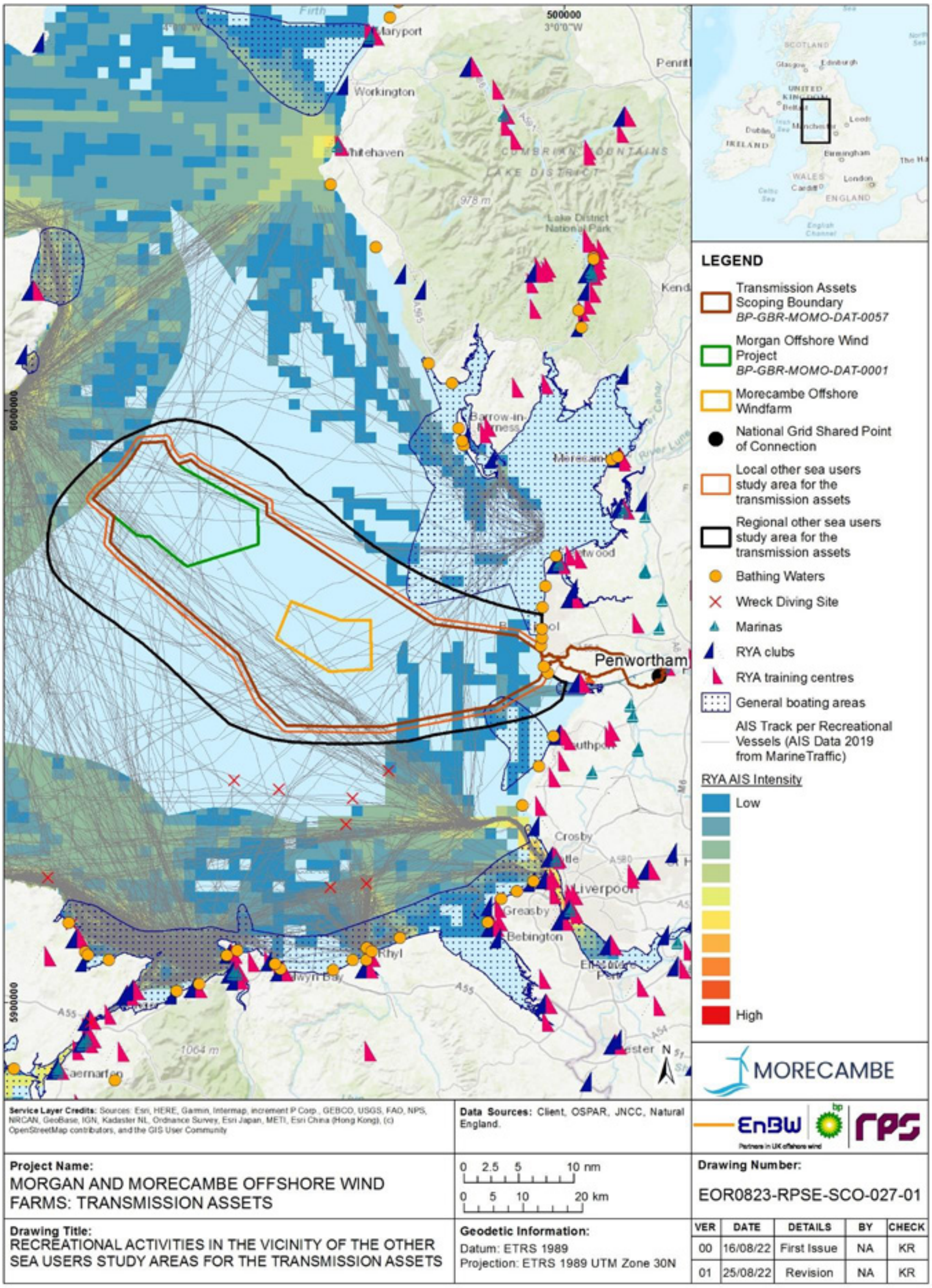


Figure 5.18: Recreational activities in the Transmission Assets regional other sea users study area and the Transmission Assets local other sea users study area.

Recreational sailing and motor cruising

5.4.4.9 Recreational sailing is generally divided into two categories: offshore and inshore. Offshore sailing is usually undertaken by yachts in the form of either cruising or organised offshore racing. Inshore sailing is typically undertaken by smaller vessels including dinghies and recreational vessels that are used for either cruising at leisure or racing. Cruising may include day trips between local ports and often includes a return journey to the home port on the same day. Inshore racing takes place around racing marks and navigational buoyage.

5.4.4.10 As noted in paragraph 5.4.1.2, navigational safety and risk to recreational vessels is considered in part 2, section 5.2: Shipping and navigation, of this EIA Scoping Report. The other sea users ES chapter will only consider receptors undertaking recreational sailing and motor cruising as an activity.

5.4.4.11 Figure 5.18 illustrates that recreational sailing and motor cruising in inshore and coastal areas is of a low to medium intensity. The RYA data is limited to inshore waters, but AIS data tracks show that recreational vessels also transit through offshore waters within the local other sea users study area, particularly between Liverpool and Douglas. There are also several marinas, RYA clubs and training centres situated in proximity to the landfall.

5.4.4.12 Data collection and consultation activities carried out to inform the NRA (see part 2, section 5.2: Shipping and navigation, of this EIA Scoping Report) will be used as an additional data source to inform the assessment on recreational sailing and motor cruising receptors.

Recreational fishing

5.4.4.13 Sea fishing trips run from Conwy, North Wales and specialise in wreck fishing, deep sea fishing and reef fishing from Anglesey to Liverpool Bay (www.sea-fishing-trips.co.uk). Sea fishing trips also operate from the Isle of Man (https://www.manxseafishing.com/) and Fleetwood, Lancashire (http://www.blueminkboatcharters.co.uk/) amongst other ports along the coasts of the east Irish Sea. Consultation will take place with local operators to further understand activities and operational range.

Inshore water sports

5.4.4.14 Water sports such as kite surfing, surfing, wind surfing and kayaking occur almost entirely in coastal waters, usually within one nautical mile (nm) of the shore.

5.4.4.15 The Blackpool Light Craft Club (http://blcclub.co.uk/) is located directly to the north of the local other sea users study area. Therefore, a variety of water sports including Jet Skiing, Jet Boarding, Wet Biking, Kite Surfing, Open Water Swimming, Boat, Kayak, and Jet Ski Angling, Scuba Diving, Power Crafting and sailing may occur within the local other sea users study area.

5.4.4.16 There are several kayaking and canoeing centres located in proximity to the local other sea users study area. An example being Ribble Canoe Club is located immediately to the north. Therefore, it is possible that these activities may occur within inshore and coastal areas of the local other sea users study area.

Offshore wind farms

5.4.4.17 Offshore wind farms in the east Irish Sea are shown in Figure 5.17. There are no operational offshore wind farms within the local other sea users study area. However, a number of proposed wind farms overlap with the local other sea users study area and will be considered as part of the cumulative assessment.

Oil and gas operations

5.4.4.18 The local other sea users study area overlaps with 16 licence blocks currently licenced for the exploration and extraction of oil and gas (see Figure 5.19). These blocks are licenced by Chrysaor North Sea Ltd, Chrysaor Resources (Irish Sea) Ltd., Burgate Exploration and Production Ltd., Spirit Energy Production UK Ltd., Eni UK Ltd. and Eni ULX Ltd. or combinations of these. Note that Chrysaor has now merged with Premier Oil to form Harbour Energy Plc. in 2021. There are 6 hydrocarbon fields located within the local other sea users study area, with 19 associated hydrocarbon producing platforms and one offshore installation barge, as presented in Table 5.8. Initial consultation carried out by the Applicants with Spirit Energy has indicated that some of these platforms are planned to be decommissioned, where relevant this is included in Table 5.8.

Table 5.8: Hydrocarbon platforms within the Transmission Assets local other sea users study area.

Platform name	Owner/operator
Millom West (N) (is planned to be decommissioned)	Spirit Energy (operator), Harbour Energy Plc (owner)
Millom West (S) (is planned to be decommissioned)	Spirit Energy (operator), Harbour Energy Plc (owner)
Calder (is planned to be decommissioned)	Spirit Energy (operator), Harbour Energy Plc (owner)
South Morecambe AP1 (N)	Spirit Energy
South Morecambe AP1 (S)	Spirit Energy
South Morecambe CPP1 (N)	Spirit Energy
South Morecambe CPP1 (S)	Spirit Energy
South Morecambe DP1 (N)	Spirit Energy
South Morecambe DP1 (S)	Spirit Energy
South Morecambe FL1 (N)	Spirit Energy
South Morecambe FL1 (S)	Spirit Energy
South Morecambe DP3 (decommissioning ongoing)	Spirit Energy
South Morecambe DP4 (decommissioning ongoing) (E)	Spirit Energy
South Morecambe DP4 (decommissioning ongoing) (W)	Spirit Energy
South Morecambe DP6 (E)	Spirit Energy
South Morecambe DP6 (W)	Spirit Energy
South Morecambe DP8 (E)	Spirit Energy
South Morecambe DP8 (W)	Spirit Energy
Offshore Storage Installation (OSI)	ENI UK Ltd.

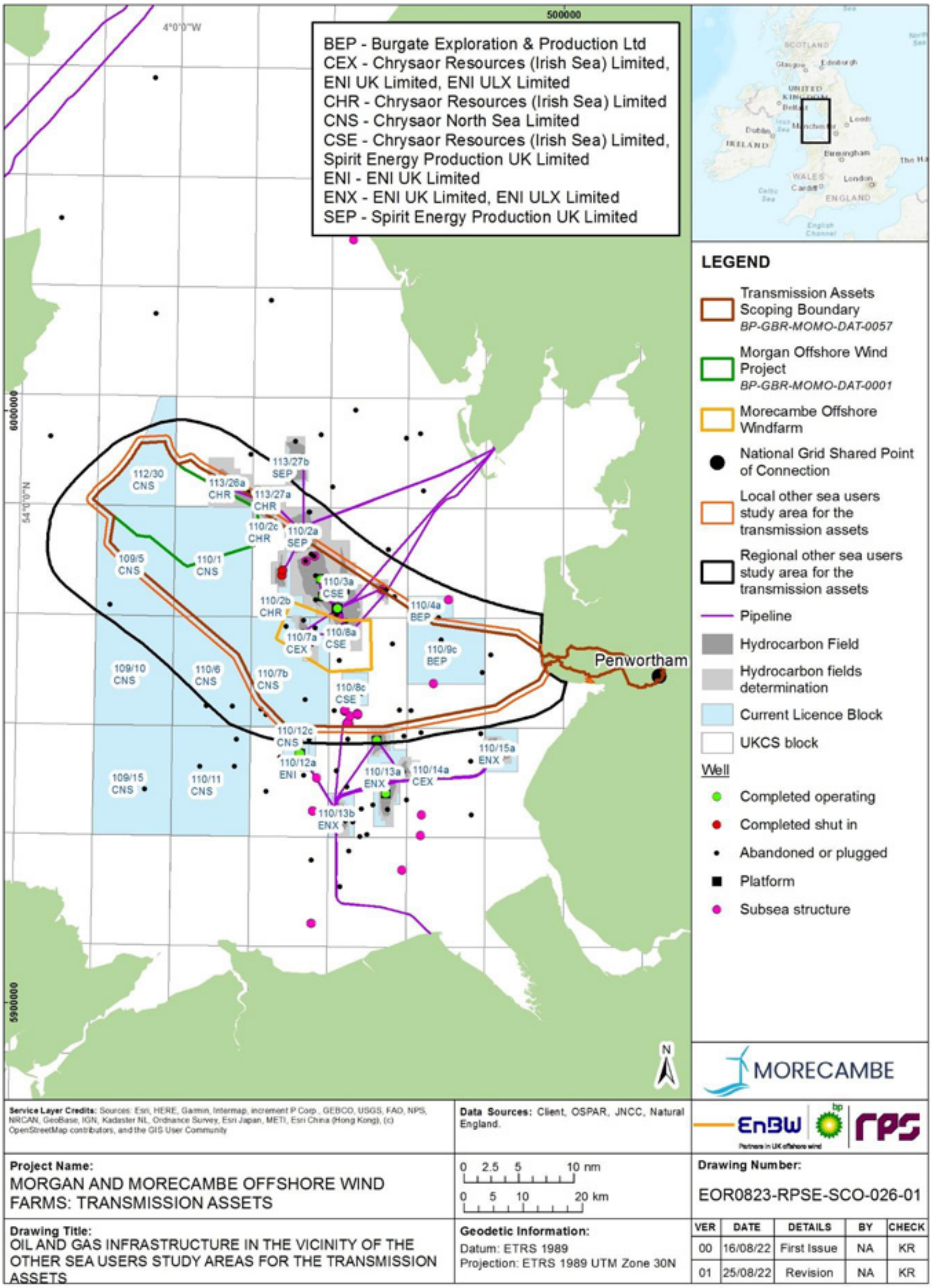


Figure 5.19: Oil and gas infrastructure within the Transmission Assets local other sea users study area.

5.4.4.19 Subsea structures (including protective structures, pipe junctions, manifolds, wellheads, trees and valves) are usually protected by a 500m safety zone. There are 23 subsurface structures located within the local other sea users study area.

5.4.4.20 Wells are classified into the following four categories: completed wells (ready for production), drilling wells (wells in the process of being drilled), plugged and abandoned wells (where work has ceased because it has become non-productive or non-viable) and suspended wells (a well may be temporarily suspended if an operator intends to carry out further operations at a later date). Completed and drilling wells typically have a 500m safety zone. Plugged and abandoned and suspended wells do not have safety zones attached to their location. There are 34 completed wells and 54 plugged and abandoned wells located within the local other sea users study area (Figure 5.19).

5.4.4.21 Consultation will take place with Harbour Energy Plc (owner for Chrysaor North Sea Ltd, Chrysaor Resources (Irish Sea) Ltd.)., Burgate Exploration and Production Ltd., Spirit Energy Production UK Ltd., Eni UK Ltd. and Eni ULX Ltd. to further understand the nature of their operations.

Cables

5.4.4.22 There are eight operational cables and one proposed telecoms cable that cross the local other sea users study area (Figure 5.17). Of these, two are operational power cables.

5.4.4.23 Where the Transmission Assets offshore export cables or interconnector cables will be required to cross an active cable, it is intended that a commercial ‘crossing agreement’ will be entered into with the cable operator. This is a formal arrangement that establishes the responsibilities and obligations of both parties and allows operations to be managed safely. A crossing agreement based upon International Cable Protection Committee (ICPC) Recommendation 3-10C ‘Telecommunications Cable and Oil Pipeline/Power Cables Crossing Criteria’ will be used for any cable crossings. Where a cable is inactive, the Applicants will consult with the cable operator to ascertain if such a crossing agreement is required.

Pipelines

5.4.4.24 There are 40 pipelines that intersect the local other sea users study area for the transmission assets (Figure 5.19). Where the Transmission Assets offshore export cables are required to cross an active pipeline, it is intended that a commercial ‘crossing agreement’ will be entered into with the pipeline operator. This is a formal arrangement that establishes the responsibilities and obligations of both parties and allows operations to be managed safely. A crossing agreement based upon the Oil and Gas UK ‘oil and gas crossing agreement template’ will be used for the pipeline crossings.

Carbon capture and storage

5.4.4.25 In October 2020, the OGA awarded Eni a six-year appraisal licence which targets Eni’s offshore fields in Liverpool Bay to be utilised as a permanent store for CO_2 (www.eni.com). The development is part of ‘HyNet NortWest’, a low carbon cluster project to help UK decarbonisation which also operates a carbon capture and storage facility off the north coast of Wales (www.hynet.co.uk).

5.4.4.26 Consultation will take place with Eni to further understand the location and nature of their plans.

Offshore microwave fixed communication links

5.4.4.27 Communication systems considered within this section include offshore microwave fixed links, which may be used to facilitate communications between offshore oil and gas platforms. Marine navigation, communications and position fixing equipment is addressed in part 3, section 5.2: Shipping and navigation, of this EIA Scoping Report.

5.4.4.28 There is potential for offshore microwave fixed links to be operating between the oil and gas platforms located within the local other sea users study area (Figure 5.19). This will be further explored through desk study and consultation for the EIA.

Future baseline conditions

5.4.4.29 The EIA process will consider the existing baseline conditions within the study area, and future baseline conditions (as far as reasonably practicable) in accordance with the methodology set out in part 1, section 5 (see section 5.7.2 for the approach to consideration of future baseline conditions).

5.4.5 Potential project impacts

5.4.5.1 A range of potential impacts on other sea users receptors have been identified which may occur during the construction, operation and maintenance, and decommissioning phases of the Transmission Assets. The impacts that have been scoped into the assessment are outlined in Table 5.9, together with a description of any additional data collection and supporting analyses that will be required to enable a full assessment of the impacts.

5.4.5.2 On the basis of the baseline information currently available and the project description outlined in part 1, section 4: Project description, of this EIA Scoping Report, no impacts are proposed to be scoped out of the assessment for other sea users.

Table 5.9: Impacts proposed to be scoped into the project assessment for other sea users (project phase refers to construction (C), operation and maintenance (O) and decommissioning (D)).

Impact	Project phase			Justification	Data collection and analysis required to characterise the baseline environment	Summary of proposed approach to assessment
	C	O	D			
Displacement of recreational activities.	✓	✓	✓	Safety zones and advisory clearance distances established during construction, maintenance and decommissioning activities may displace recreational activities.	Review of desktop data, supported by the outcome of consultation.	Qualitative assessment informed from the results of baseline data review and consultation.
Increased suspended sediment concentrations and associated deposition affecting recreational diving sites and designated bathing water sites.	✓	✓	✓	Increased suspended sediment concentrations and associated deposition arising from construction, maintenance and decommissioning activities within the Transmission Assets Scoping Boundary may affect recreational diving sites and designated bathing water sites.	Review of desktop data supported by the outcome of consultation, with reference to the results of the physical processes chapter of the EIA which will consider the extent of sediment disturbance and associated deposition.	Qualitative assessment informed from the results of baseline data review, consultation, and the physical processes chapter of the EIA.
Impacts to existing cables or pipelines or restrictions on access to cables or pipelines.	✓	✓	✓	There are 10 active cables within the Transmission Assets Scoping Boundary and therefore there is potential for impact to existing cables or restrictions on access to cables from installation, maintenance and decommissioning activities.	Review of desktop data supported by the outcome of consultation.	Qualitative assessment informed from the results of baseline data review and consultation.
Increased suspended sediment concentrations and associated deposition affecting aggregate extraction areas.	✓	✓	✓	Installation, maintenance and decommissioning of the transmission assets has the potential to lead to increased suspended sediment concentrations and deposition, which could cause a change in aggregate resource in aggregate extraction areas.	Review of desktop data, with reference to the results of the physical processes chapter of the EIA which will consider the extent of sediment disturbance and associated deposition.	Qualitative assessment informed from the results of baseline data review and the physical processes chapter of the EIA.
Alterations to sediment transport pathways affecting aggregate extraction areas.	×	✓	×	The physical presence of OSPs and any Morgan offshore booster station foundations and associated scour protection, and cable protection, may interrupt sediment transport pathways,	Review of desktop data, with reference to the results of the physical processes chapter of the EIA which will consider the extent of changes to sediment transport pathways.	Qualitative assessment informed from the results of baseline data review and the physical processes chapter of the EIA.

Impact	Project phase			Justification	Data collection and analysis required to characterise the baseline environment	Summary of proposed approach to assessment
	C	O	D			
				which could affect aggregate resource in aggregate extraction areas. This is applicable during the operation and maintenance phase only as construction and decommisioning activities will lead to sediment disturbance and deposition, covered above.		
Reduction or restriction of oil and gas exploration activities (including surveys, drilling and the placement of infrastructure) within the Transmission Assets Scoping Boundary.	✓	✓	✓	The installation, presence and decommissioning of infrastructure associated with the Transmission Assets Scoping Boundary may reduce or restrict oil and gas exploration activities within the Transmission Assets Scoping Boundary.	Review of desktop data. Consultation with each potentially affected licence block operator will be undertaken to inform the assessment.	Qualitative assessment informed from the results of baseline data review and consultation.
Interference with offshore microwave fixed communication links.	×	✓	×	Presence of infrastructure within the Transmission Assets Scoping Boundary may affect offshore microwave fixed links between offshore oil and gas platforms. This is assessed during the operation and maintenance phase only, as this is the phase when the infrastructure is in place and operational.	Review of desktop data. Consultation with Ofcom and oil and gas operators to inform the assessment.	Qualitative assessment informed from the results of baseline data review and consultation.

5.4.6 Measures adopted as part of the project

5.4.6.1 The following measures adopted as part of the project are included as part of the Transmission Assets in relation to other sea users, and will evolve over the development process as the EIA progresses:

- Promulgation of information advising on the nature, timing and location of activities, including through Notices to Mariners.
- Navigational aids and marine charting.
- Consultation with oil and gas operators and other energy infrastructure operators to promote and maximise cooperation between parties and minimise both spatial and temporal interactions between conflicting activities.
- Adherence to agreed safety zones during construction of the Transmission Assets, and certain times during operations (e.g. maintenance).
- Installation of infrastructure over or adjacent to existing or future cables or pipelines will be subject to crossing or proximity agreements between the two parties, prior to the start of the construction phase.

5.4.6.2 The requirement for and feasibility of any further mitigation will be dependent on the significance of effects and will be consulted upon with statutory consultees throughout the EIA process.

5.4.7 Proposed assessment methodology

5.4.7.1 The other sea users EIA will follow the methodology set out in part 1, section 5: EIA methodology, of this EIA Scoping Report. Specific to the other sea users EIA, the following guidance documents will also be considered:

- The RYA's position on offshore renewable energy developments: Paper 1 (of 4) – Wind Energy, June 2019 (RYA, 2019)
- European Subsea Cables UK Association (ESCA) guideline no 6, the proximity of offshore renewable energy installations and submarine cable infrastructure in UK waters (ESCA, 2016)
- ICPC recommendations:
  - recommendation No.2-11B: Cable routing and reporting criteria (ICPC, 2015)
  - recommendation No.3-10C: Telecommunications cable and oil pipeline/power cables crossing criteria (ICPC, 2014)
  - recommendation No.13-2C: The proximity of offshore renewable wind energy installations and submarine cable infrastructure in national waters (ICPC, 2013)
- Pipeline crossing agreement and proximity agreement pack (Oil and Gas UK, 2021)
- Submarine cables and offshore renewable energy installations proximity study (TCE, 2012).

5.4.8 Potential cumulative effects

5.4.8.1 There is potential for cumulative effects to arise from other projects or activities within the east Irish Sea area where projects or activities could act collectively with the Transmission Assets to affect other sea users receptors.

The cumulative assessment will consider the maximum design scenarios for each of the projects or activities.

5.4.8.2 Cumulative effects with the generation assets of the Morgan Offshore Wind Project and the Morecambe Offshore Windfarm will be considered, together with cumulative effects with other Round 4 projects (such as the Mona Offshore Wind Project) and other proposed windfarms (such as Awel y Môr) where relevant.

5.4.8.3 The cumulative effect assessment will follow the approach outlined in part 1, section 5: EIA methodology, of this EIA Scoping Report.

5.4.9 Potential inter-related effects

5.4.9.1 The assessment of potential inter-related effects will be considered within the other sea users ES chapter. It will include consideration of project lifetime effects and receptor-led effects, in line with the approach outlined in part 1, section 5: EIA methodology, of this EIA Scoping Report.

5.4.10 Potential transboundary impacts

5.4.10.1 A screening of transboundary impacts has been carried out and is presented in part 3, Annex A of this EIA Scoping Report. This screening exercise identified that there is no potential for transboundary impacts upon other sea users due to construction, operation and maintenance, and decommissioning of the Transmission Assets.

6 Proposed technical assessments - onshore physical environment

6.1 Geology, hydrogeology and ground conditions

6.1.1 Introduction

6.1.1.1 This section of the EIA Scoping Report identifies the geological, hydrogeological and ground conditions receptors relevant to the onshore elements of the Transmission Assets. This section also considers the potential impacts arising from the construction, operation and maintenance, and decommissioning of the Transmission Assets and identifies the proposed scope of, and methodology for, the EIA process for geology, hydrogeology and ground conditions.

6.1.2 Study area

6.1.2.1 The study area to be used for the assessment of geology, hydrogeology and ground conditions (the geology, hydrogeology and ground conditions study area) will focus on areas located above Mean High Water Springs (MHWS).

6.1.2.2 Based on the refined locations for the onshore elements of the Transmission Assets, the study area will include the selected cable route corridor and substation sites. A 1km buffer zone will be applied to the study area, to ensure the appropriate baseline data is obtained. In some circumstances it may be necessary to increase the study area outside this 1km buffer zone, for example where laterally extensive aquifer units are present.

6.1.2.3 As such, the geology, hydrogeology and ground conditions study area will be defined as:

- The area of land to be temporarily or permanently occupied during the construction, operation and maintenance and decommissioning of the onshore elements of the Transmission Assets.
- Geology, hydrogeology and ground conditions receptors within 1km of land to be temporarily or permanently occupied during the construction, operation and maintenance and decommissioning of the onshore elements of the Transmission Assets. The 1km buffer is based on the area within which impacts on geological, hydrogeological and ground conditions receptors are most likely to occur.

6.1.2.4 The geology, hydrogeology and ground conditions study area will be reviewed and modified, if necessary, in response to refinements made to the design of the Transmission Assets and/or any additional environmental and/or design constraints identified during the EIA process.

6.1.3 Data sources

6.1.3.1 The data sources to be used to inform the baseline assessment for the EIA will primarily comprise published material that is publicly available online and data that is available to purchase from the Environment Agency (EA) and environmental data providers.

6.1.3.2 An initial desk-based review has identified several data sources that provide baseline data coverage of the Transmission Assets Scoping Boundary. These data sources are summarised in Table 6.1 below.

Table 6.1: Baseline data sources - Geology, hydrogeology and ground conditions.

Source	Summary
Baseline chemistry of groundwater in UK aquifers	Results of studies by BGS to define baseline chemistry of groundwater from certain aquifers in England, Wales and Scotland
BGS Aquifer Designation Map	Identifies the type of aquifer designation using the classification system from the Water Framework Directive (WFD).
BGS borehole records obtained from BGS website	Site specific characterisation of the geological strata.
BGS GeoIndex Onshore viewer	Online geological datasets including borehole records
BGS Geology of Britain Viewer	Online geological information for the British Isles
BGS Online Hydrogeological maps	Where available provides hydrogeological information
BGS Map 75: Preston (1:50,000) Bedrock and Superficial	Identifies the bedrock and superficial geology
County Geodiversity Sites (formerly Regionally Important Geological and Geomorphological Sites, RIGS)	Identifies the location of regionally/locally designated geological sites
Department for Environment, Food and Rural Affairs (Defra) MAGIC Interactive Mapping System	Provides information regarding statutory and non-statutory designated sites (e.g., geological Sites of Special Scientific Interest (SSSIs), water dependent sites designated for nature conservation); bedrock and superficial aquifer classification by the BGS; and source protection zones defined for important groundwater abstractions
EA (EA) Catchment Data Explorer	Obtain WFD catchment data for all waterbodies in England
EA Water Quality Archive	The Water Quality Archive provides data on water quality measurements. Samples are taken at sampling points around England and can be from coastal or estuarine waters, rivers, lakes, ponds, canals or groundwaters
EA Water Framework Directive (WFD) Groundwater Bodies Cycle 2	Identifies the WFD status of designated ground water bodies.
UK Soil Observatory (UKSO) Online Viewer	UK Soils Observatory providing information about the diverse soil types of the UK

6.1.3.3 In addition to the baseline data sources identified above, site-specific data will be obtained from a third-party provider (e.g., Envirocheck, Groundsure) for the geology, hydrogeology and ground conditions study area. This will include historical mapping and aerial photography where available.

6.1.3.4 The relevant Local Planning Authority planning portals for the geology, hydrogeology and ground conditions study area will be reviewed to identify any reports that may have been submitted in support of recent planning applications that could be used to characterise baseline ground conditions.

6.1.3.5 The following organisations will be consulted in relation to relevant baseline datasets that they maintain:

- EA – licensed water abstractions, including details of the national water monitoring network and associated datasets.
- Relevant local authorities – private (non-licensed) abstractions and contaminated land register.
- Coal Authority – where the onshore elements of the Transmission Assets coincide with a coal mining reporting area.

6.1.3.6 The list of organisations identified above will be reviewed and modified in response to the evolving design of the Transmission Assets and/or any additional environmental and/or design constraints identified during the EIA process.

6.1.4 Baseline environment

6.1.4.1 An initial review of the published geology mapping identified in Table 6.1 of the EIA Scoping Report shows that the Transmission Assets Scoping Boundary is variously underlain by the following superficial deposits:

- Tidal Flat Deposits.
- Blown Sand Deposits, including the Shirdley Hill Sand Formation.
- Glacial Till (Devensian).
- Peat.
- Storm beach deposits.
- Glaciofluvial deposits.
- Head.
- Alluvium.

6.1.4.2 The largely granular blown sands, including Shirdley Hill Sand Formation and glaciofluvial sheet deposits are classified as Secondary A Aquifer units, reflecting their potential local importance with respect to groundwater resources. Some areas, typically underlain by glacial till, are designated Secondary Undifferentiated aquifer units, reflecting the mixed nature of those deposits. The remaining saltmarsh deposits, tidal flat deposits and peat are considered unproductive strata.

6.1.4.3 Superficial deposits are underlain by the bedrock geology. BGS data sources indicate that the bedrock in the Transmission Assets Scoping Boundary comprises:

- Triassic rocks of the Mercia Mudstone Group in western parts of the Transmission Assets Scoping Boundary - typically red mudstones and subordinate siltstones.
- Triassic rocks of the Sherwood Sandstone Group in eastern parts of the Transmission Assets Scoping Boundary - Typically a red or yellow, pebbly, sandstone with conglomerate at the base.

6.1.4.4 The sandstones of the Sherwood Sandstone Group constitute a nationally important groundwater body and are a designated Principal Aquifer. Mudstones of the Merica Mudstone Group are typically of low productivity, only yielding groundwater from certain horizons and are therefore, designated a Secondary B Aquifer unit.

6.1.4.5 Groundwater resources may be susceptible to pollution from certain land-based activities. To protect groundwater quality, the EA regulates certain potentially polluting activities in groundwater Source Protection Zones

(SPZs). SPZs are designated around important potable water abstractions. No SPZs have been designated within the Transmission Assets Scoping Boundary. However, an area designated as Zone III – Total Catchment coincides with the eastern section of the Transmission Assets Scoping Boundary.

6.1.4.6 The location and extent of SPZs relevant to the Transmission Assets Scoping Boundary is presented in Figure 6.1.

6.1.4.7 Land use within the Transmission Assets Scoping Boundary is predominantly agricultural, although there may be existing and historical uses with the potential to cause contamination (e.g., landfill sites or petrol filling stations). The potential for contamination to exist will be confirmed by a review of historic Ordnance Survey (OS) maps and other environmental information, such as the location of waste management facilities and industrial land uses and recorded pollution incidents.

Designated sites

6.1.4.8 The Transmission Assets Scoping Boundary does not coincide with any sites designated for geomorphology, including SSSIs.

6.1.4.9 The Lytham St Anne's Dunes SSSI is designated principally on the basis of its ecological habitats, flora and fauna for its value as an example of a calcareous dune system remaining in Lancashire. Lytham St. Annes Dunes, specifically Starr Hills Dunes, is also designated as a Local Geodiversity Site (LGS).

6.1.4.10 Potential effects on the ecological SSSI will therefore be assessed in the Terrestrial ecology and ornithology (intertidal and onshore) chapter.

6.1.4.11 Effects on the LGS (if any) will be considered within the scope of the Geology, hydrogeology and ground conditions assessment. However, an assessment would be undertaken as part of the Geology, Hydrogeology and Ground Conditions chapter should any designated features be shown to have a groundwater dependence and if any features are designated on the basis of their geomorphology.

6.1.4.12 The Transmission Scoping Boundary is within 20km of Mineral Safeguarded Areas, as designated by Lancashire County Council. The implication of mineral safeguarding and mineral infrastructure safeguarding policy with respect to the onshore elements of the Transmission Assets shall be considered in the ES.

6.1.4.13 Sites designated for ecology and nature conservation are presented in part 2, section 7: Onshore biological environment, of this EIA Scoping Report. Following the submission of the EIA Scoping Report, a screening exercise will be undertaken to identify whether the any of the qualifying features of the ecologically designated sites are related to groundwater.

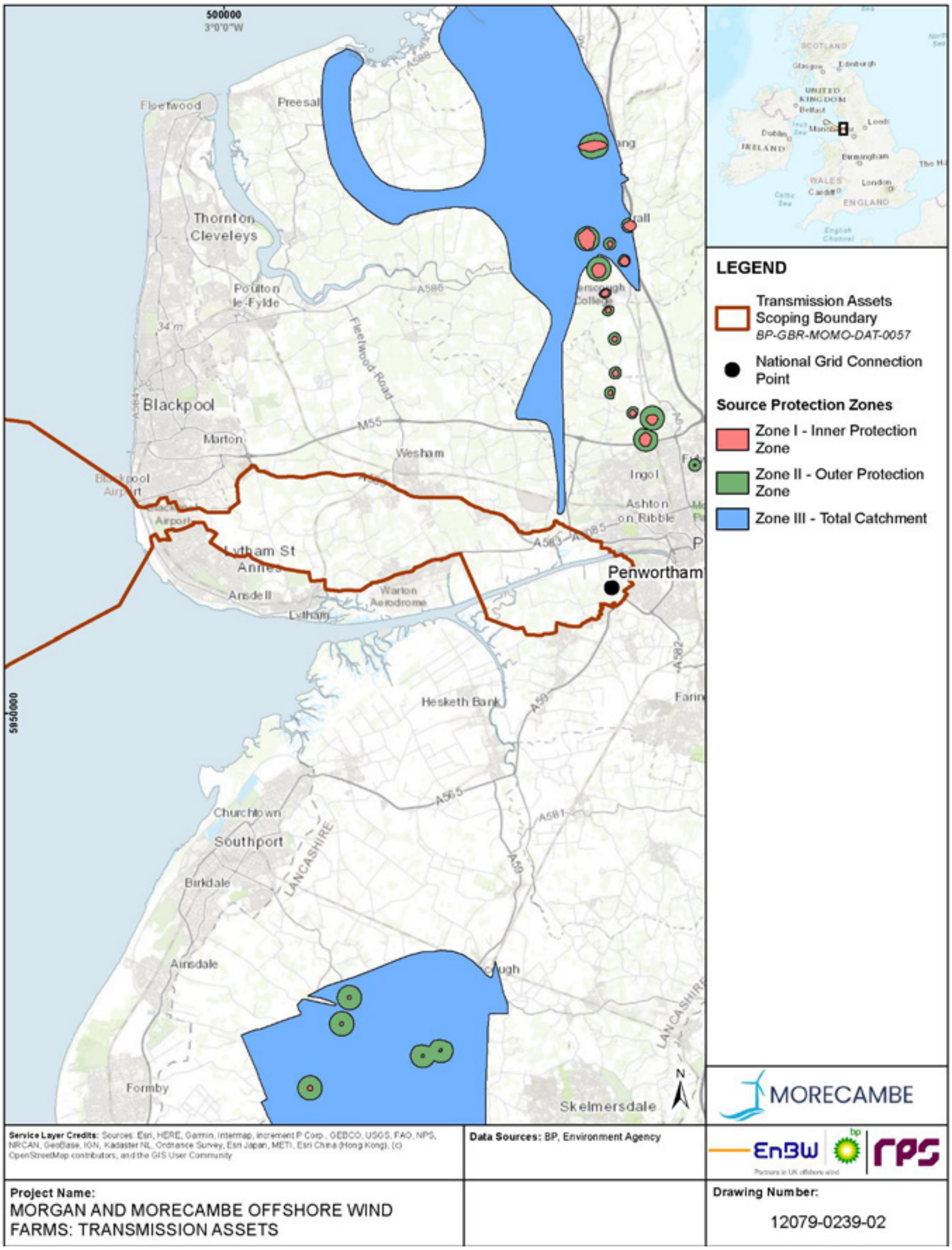


Figure 6.1: Source Protection Zones within the Transmission Assets Scoping Boundary.

Future baseline conditions

6.1.4.14 The EIA process will consider the existing baseline conditions within the study area, and future baseline conditions (as far as reasonably practicable) in accordance with the methodology set out in part 1, section 5 (see section 5.7.2 for the approach to consideration of future baseline conditions).

6.1.5 Potential project impacts

6.1.5.1 A range of potential impacts on geology, hydrogeology and ground conditions have been identified which may occur within the geology, hydrogeology and ground conditions study area during the construction, operation and maintenance, and decommissioning phases of the Transmission Assets.

6.1.5.2 The impacts that have been scoped into the assessment are outlined in Table 6.2 together with a description of any additional data collection (e.g., site-specific surveys) and supporting analyses (e.g., modelling) that will be required to enable a full assessment of the impacts.

6.1.5.3 Potential impacts proposed to be scoped out of the assessment are presented in Table 6.3, with justification for why the impact should be scoped out.

Table 6.2: Impacts proposed to be scoped into the assessment for geology, hydrogeology and ground conditions (project phase refers to construction (C), operation and maintenance (O) and decommissioning (D)).

Impact	Project phase			Justification	Data collection and analysis required to characterise the baseline environment	Summary of proposed approach to assessment
	C	O	D			
The impact of partial or total loss of or damage to designated geological and geomorphological sites during the construction phase.	✓	×	×	There are no SSSIs designated for geology/geomorphology within the Transmission Assets Scoping Boundary. Construction of the onshore elements of the Transmission Assets may affect locally designated geological and geomorphological sites, if present.	There are no SSSIs designated for geology/geomorphology within the Transmission Assets Scoping Boundary. Any locally designated geological and geomorphological sites located within the geology, hydrogeology and ground conditions study area will be identified using desk-based analysis, once the location of the onshore elements of the Transmission Assets (e.g., landfall, onshore export cable corridor and substation location) has been refined.	The impact of partial or total loss of designated geological and geomorphological sites, if relevant, would be assessed qualitatively, using a desk-based assessment. The desk-based assessment would consider the design and construction specifications of the onshore elements of the Transmission Assets, in relation to the location, size and importance of any geological and geomorphological sites.
The impact on groundwater levels or flow in sensitive groundwater dependent sites during the construction and decommissioning phase.	✓	×	✓	Activities required to facilitate construction and decommissioning of the onshore elements of the Transmission Assets (e.g., subsurface excavations, dewatering) may affect groundwater levels and groundwater flow (direction and quantity) in sensitive groundwater dependent sites (e.g., coastal dune systems).	The location and hydrogeological setting of all groundwater dependent sites within the geology, hydrogeology and ground conditions study area will be identified using desk-based analysis.	The impact on groundwater levels or flow in sensitive groundwater dependent sites would be assessed qualitatively, using a desk-based risk assessment. The desk-based risk assessment would be supported by further site-specific data, where groundwater dependent sites are at high risk during construction and decommissioning of the onshore elements of the Transmission Assets.
The impact of mobilisation of existing areas of contamination causing a deterioration of groundwater quality in underlying superficial Secondary Aquifer units during the construction, operation and	✓	✓	✓	Direct impacts may occur during the construction and decommissioning of the onshore elements of the Transmission Assets due to the nature of below ground trenching and other construction activities. This may result in the introduction of hazardous or non-hazardous substances to shallow groundwater, causing pollution or the	The location and extent of current and historical contamination sources within the geology, hydrogeology and ground conditions study area will be identified using desk-based analysis. The position of licensed or non-licensed abstractions will be mapped. In addition, the anticipated hydrogeological conditions and	The impact of mobilisation of existing source areas of contamination would primarily be assessed qualitatively, using a desk-based risk assessment. A tiered approach would be adopted for the assessment of risk associated with sources of existing contamination.

Impact	Project phase			Justification	Data collection and analysis required to characterise the baseline environment	Summary of proposed approach to assessment
	C	O	D			
maintenance, and decommissioning phase				deterioration/change in groundwater WFD status.	baseline water quality of the underlying aquifers located within the geology, hydrogeology and ground conditions study area will be evaluated.	
The impact of mobilisation of existing areas of contamination and the possible creation of new transport pathways causing a deterioration in groundwater quality and quantity within the underlying bedrock and Principal and Secondary Aquifer units during the construction, operation and maintenance, and decommissioning phase	✓	✓	✓	Direct impacts may occur from vertical hydraulic connections between shallow perched groundwater in superficial deposits and underlying bedrock aquifer units during open trench construction. Direct impacts to the Principal Aquifer may also occur from deep ground workings associated to horizontal drilling operations beneath surface infrastructure. This may result from the construction works or from the mobilisation of existing contaminants. The mobilisation of contaminants may result in the introduction of hazardous or non-hazardous substances to shallow groundwater, causing pollution or the deterioration/change in groundwater WFD status.		The impact of mobilisation of existing source areas of contamination would primarily be assessed qualitatively, using a desk-based risk assessment. A tiered approach would be adopted for the assessment of risk associated with sources of existing contamination. No intrusive site investigations or quantitative risk assessments are proposed
The impact of reduced groundwater quantity or quality in aquifer units, on protected groundwater abstractions (licensed or non-licensed) and/or change in groundwater resources status, during the construction, operation and maintenance and decommissioning phase	✓	✓	✓	Certain construction activities and design, most notably short-term dewatering requirements or long-term groundwater level control, have the potential to result in impacts on groundwater quality (see above) and/or groundwater levels and flow. For example, these effects could have the potential to: put abstractions (i.e., protected rights) at risk; affect the groundwater resource value/availability; change the WFD status of groundwater bodies.	The location and hydrogeological setting of all licenced and non-licensed abstractions within the geology, hydrogeology and ground conditions study area will be identified using desk-based analysis, supported by third party consultation.	The impact of reduced groundwater quantity or quality in aquifer units and groundwater-fed surface waters would primarily be assessed qualitatively, using a desk-based risk assessment of construction, operation and maintenance activities. Impacts on surface water are considered within Section 6.2: Hydrology and Flood Risk.
The impact of a reduction in the quantity and quality	✓	×	✓	Indirect impacts may occur from hydraulic connections between shallow	The location of areas with potential hydraulic connectivity between	

Impact	Project phase			Justification	Data collection and analysis required to characterise the baseline environment	Summary of proposed approach to assessment
	C	O	D			
of surface waters fed by groundwater and other groundwater dependent sites, during the construction and decommissioning phase.				perched groundwater affected by trenching, piling and/or the management of dewatered groundwater.	aquifers and surface waters within the geology, hydrogeology and ground conditions study area will be identified using desk-based analysis. In addition, the desk-based analysis will include the baseline characterisation of water quality, including WFD status.	
The impact of a deterioration in groundwater quality through the accidental spillage/release of potentially polluting substances, during the construction and decommissioning phase	✓	×	✓	The accidental emission of potentially polluting substances used/stored/handled during construction or decommissioning phase has the potential to impact groundwater quality and abstraction sources.	The location of the most sensitive groundwater receptors within the geology, hydrogeology and ground conditions study area will be identified using desk-based analysis, including a review of the proposed location/approach for the use of potentially polluting materials.	The impact of a deterioration in groundwater quality through the accidental spillage/release of potentially polluting substances will be assessed qualitatively, using a desk-based risk assessment of construction and decommissioning activities. The desk-based assessment will identify areas/receptors of particular sensitivity to this impact.
The impact of heat generated by the onshore export cables on groundwater quality, during the operation and maintenance phase	×	✓	×	The transmission cables must be kept within safe operating temperatures. Heat from the cables dissipates into the surrounding soil and can affect the local surrounding environment.	A desk-based study would be undertaken of the Secondary and Principal Aquifer properties potentially affected including baseline quality and location of other sensitive receptors (e.g., groundwater abstractions and/or groundwater dependents sites and water courses)	The impact of heat generated by the onshore export cables on groundwater quality and groundwater dependent receptors would primarily be assessed qualitatively, using a desk-based risk assessment of operation and maintenance activities.
The impact of ground gas generation on human health and other environmental receptors, during the construction, operation and maintenance and decommissioning phase.	✓	✓	✓	Contamination source areas and certain natural soils have the potential to generate hazardous ground gases. Construction activities have the potential to expose sensitive receptors to these gases and generate new pathways for ground gas migration.	A desk-based review of the ground gas generating potential of current or historical contamination source areas and certain natural soils located within the geology, hydrogeology and ground conditions study area.	There would be a desk-based review to identify potential risk associated with ground gas generation assets within the geology, hydrogeology and ground conditions study area for transmission assets.

Table 6.3: Impacts proposed to be scoped out of the project assessment for geology, hydrogeology and ground conditions.

Impact	Justification
The impact of accidental spillages/contaminant release on the quality of groundwater ground receptors during operation and maintenance of the onshore elements of the Transmission Assets.	Activities associated with the operation and maintenance of the onshore elements of the Transmission Assets are unlikely to require the transport or storage of harmful substances. Therefore, the potential impact of spills/contaminant releases on the quality of groundwater receptors during operation and maintenance of the onshore elements of the Transmission Assets is unlikely to result in significant effects and is proposed to be scoped out of the assessment for geology, hydrogeology and ground conditions.

6.1.6 Measures adopted as part of the project

6.1.6.1 The following measures adopted as part of the project are relevant to ecology and nature conservation. These measures may evolve as the engineering design and the EIA progresses.

- Code of Construction Practice (CoCP) – Construction of the onshore elements of the Transmission Assets would be undertaken in accordance with the relevant best practice measures, as recommended in Construction Industry Research and Information Association (CIRIA) C648 – Control of water pollution from linear construction projects, including measures for handling oils, fuels or other harmful substances as to avoid pollution of surface and ground water receptors due to accidental spillages/contaminant release (CIRIA, 2006).
- Development of a Discovery Strategy - to manage unexpected areas of land contamination should they be identified during excavation works.

6.1.6.2 The requirement for and feasibility of any mitigation measures will be dependent on the significance of effects and will be consulted upon with statutory and non-statutory consultees throughout the EIA process.

6.1.6.3 Requirements for additional mitigation measures will be determined through discussions with the EA and contaminated land officers from each Local Planning Authority likely to be affected as part of the geology, hydrogeology and ground conditions assessment.

6.1.7 Proposed assessment methodology

6.1.7.1 The geology, hydrogeology and ground conditions assessment will follow relevant legislative requirements, including Part IIA of the Environmental Protection Act 1990, the Water Framework Directive (WFD) (2000/60/EC), Groundwater Directives (GWD) (2006/118/EC) and the Environmental Permitting (England and Wales) Regulations 2016). The assessment methodology will also consider the requirements of the existing and emerging NPSs.

6.1.7.2 In addition, the geology, hydrogeology and ground conditions assessment will be undertaken with due regard to the framework outlined in relevant regulatory and industry guidance, most notably:

- Assessing Risks Posed by Hazardous Ground Gases to Buildings, CIRIA C665 (CIRIA, 2007).
- Contaminated Land Risk Assessment: A Guide to Good Practice, CIRIA 552 (CIRIA, 2001a).
- Control of water pollution from linear construction projects: Site guide, CIRIA C649 (CIRIA, 2006).
- Control of water pollution from linear construction projects: Technical guidance CIRIA C648 (CIRIA, 2006).
- Design Manual for Roads and Bridges (DMRB) LA 104 - Environmental assessment and monitoring (Highways England, Transport Scotland, Welsh Government, Department for Infrastructure, 2020).
- DMRB LA 109 – Geology and soils (Highways England, Transport Scotland, Welsh Government, Department for Infrastructure, 2019).

- DMRB LA 113 - Road drainage and the water environment (Highways England, Transport Scotland, Welsh Government, Department for Infrastructure, 2020).
- Groundwater protection technical guidance (EA, 2017).
- The EA's approach to groundwater protection, Version 1.2 (EA, February 2018).

6.1.7.3 With regards to consideration of land and groundwater contamination the geology, hydrogeology and ground conditions assessment will adopt the standard pollutant (source–pathway-receptor) linkage approach. This approach identifies potential sources of contamination within the geology, hydrogeology and ground conditions study area, the location and sensitivity of environmental receptors and the pathways by which the receptors may be affected.

6.1.8 Potential cumulative effects

6.1.8.1 There is potential for cumulative effects on sensitive receptors to occur when the Transmission Assets are considered together with other developments. The potential cumulative effects between the Transmission Assets and other developments with respect to geology, hydrogeology and ground conditions will be considered within Preliminary Environmental Information Report (PEIR) and the Environmental Statement (ES).

6.1.8.2 The cumulative effect assessment will be undertaken in accordance with the methodology set out in part 1, section 5: EIA Methodology, of this EIA Scoping Report.

6.1.9 Potential inter-related effects

6.1.9.1 The assessment of potential inter-related effects will be considered within the geology, hydrogeology and ground conditions chapter of the ES. It will include consideration of lifetime effects and receptor-led effects in line with the approach outlined in part 1, section 5: EIA Methodology, of this EIA Scoping Report. For example:

- Terrestrial ecology and ornithology (intertidal and onshore):
  - The contamination of groundwater receptors during the construction of the onshore elements of the Transmission Assets may impact groundwater dependent habitats or sites designated for conservation, within the geology, hydrogeology and ground conditions study area.
- Hydrology and flood risk:
  - Surface watercourses are often hydraulically linked to groundwater; contamination of groundwater or reduction in groundwater levels as a result of dewatering may impact on the quality and flow of surface watercourses.

6.1.10 Potential transboundary impacts

6.1.10.1 A screening of transboundary impacts has been carried out and is presented in part 3, Annex A of this EIA Scoping Report. This screening exercise identified that there is no potential for transboundary impacts upon geology, hydrogeology and ground conditions due to construction, operational and maintenance, and decommissioning impacts of the Transmission Assets.

6.2 Hydrology and flood risk

6.2.1 Introduction

6.2.1.1 This section of the EIA Scoping Report identifies the hydrology and flood risk receptors relevant to the onshore elements of the Transmission Assets. This section also considers the potential impacts arising from the construction, operation and maintenance, and decommissioning of the Transmission Assets and identifies the proposed scope of, and methodology for, the EIA process for hydrology and flood risk.

6.2.2 Study area

6.2.2.1 The study area to be used for the assessment of hydrology and flood risk (the hydrology and flood risk study area) will focus on areas landward of MHWS, where potential impacts are most likely to occur on surface water and flood risk receptors.

6.2.2.2 As such, the hydrology and flood risk study area to be used in the assessment will be defined as:

- The area of land to be temporarily or permanently occupied during construction, operation and maintenance, and decommissioning of the onshore elements of the Transmission Assets.
- Surface water receptors located within 250m of land temporarily or permanently occupied during the construction, operation and maintenance, and decommissioning of the onshore elements of the Transmission Assets. The 250m buffer is considered appropriate for data collection taking into account the likely zone of influence on hydrological receptors but may be extended where hydrologically connected catchments are identified.
- Flood risk receptors located within 1km of the onshore elements of the Transmission Assets. The 1km buffer was chosen primarily to identify any existing receptors, assets or infrastructure that have the potential to be affected by flood risk as a result of the Transmission Assets.

6.2.2.3 The hydrology and flood risk study area for surface water receptors will include temporary accesses, access routes (including haul roads), storage areas and construction compounds required to facilitate construction, operation and maintenance and decommissioning of the onshore elements of the Transmission Assets.

6.2.2.4 The hydrology and flood risk study area will be reviewed and modified, if necessary, in response to refinements made to the design of the Transmission Assets and/or any additional environmental and/or design constraints identified during the EIA process.

6.2.3 Data sources

6.2.3.1 The data sources used to inform the baseline assessment will primarily comprise published material which is publicly available online and data that is available to purchase from the EA. An initial desk-based review has identified data sources that provide baseline data coverage of the Transmission Assets Scoping Boundary. These data sources are summarised in Table 6.4 below.

Table 6.4: Baseline data sources – hydrology and flood risk.

Source	Summary
Central Lancashire Strategic Flood Risk Assessment Level 1, Preston City Council, South Ribble Borough Council and Chorley Borough Council, December 2007	Provides area specific information regarding key sources of flooding (fluvial, tidal, groundwater, surface, sewer) as well as information on historic flooding.
Defra and EA Catchment Data Explorer	Provides information regarding the water environment, including relevant River Basin Management Plans and associated waterbodies.
Defra Magic Interactive Mapping System	Provides information regarding statutory and non-statutory designated sites (e.g., water dependent sites designated for nature conservation).
EA Flood Map for Planning	Provides information regarding flood risk from rivers, sea and surface water and areas benefitting from flood defences.
Fylde Borough Council Flood Risk Management Plan	Provides area specific information regarding key sources of flooding (fluvial, tidal, groundwater, surface, sewer) as well as information on historic flooding.
Local Flood Risk Management Strategy for Lancashire 2021 - 2027	Provides area specific information regarding key sources of flooding (fluvial, tidal, groundwater, surface, sewer) as well as information on historic flooding as the legislative context and local strategy for managing flood risk.
North West River Basin District River Basin Management Plan. Updated: December 2015	Provides information regarding the policies and measures enacted to protect and improve the water environment (includes rivers, lakes, canals, groundwater, wetlands, estuaries and coastal waters) for the wider benefits to people and wildlife.
OS Digital Terrain Model (DTM) 50	Provides information regarding the topography of the study area allow the overall land slope and specific levels to be assessed.
OS Open Rivers Mapping Data	Provides information regarding the water environment, including freshwater rivers, tidal estuaries, and canals.
Ribble Catchment Flood Management Plan Summary Report December 2009	Provides catchment wide information regarding key sources of flooding (fluvial, tidal, groundwater, surface, sewer) as well as information on historic flooding as the legislative context and local strategy for managing flood risk.
Shoreline Management Plan 22 Great Ormes Head to Scotland 2019	Provides information regarding risks associated with coastal processes and strategic mitigation measures.
Strategic Flood Risk Assessment Fylde Borough Council. Updated November 2011.	Provides area specific information regarding key sources of flooding (fluvial, tidal, groundwater, surface, sewer) as well as information on historic flooding.
West Lancashire Borough Council Level 2 Strategic Flood Risk Assessment 2020	Provides area specific information regarding key sources of flooding (fluvial, tidal, groundwater, surface, sewer) as well as information on historic flooding.
West Lancashire Borough Council Local Plan - Strategic Flood Risk Assessment Level 1 December 2019	Provides area specific information regarding key sources of flooding (fluvial, tidal, groundwater, surface, sewer) as well as information on historic flooding.

6.2.3.2 The baseline data sources identified in the EIA Scoping Report will remain under review and may be updated in response to feedback from relevant statutory and non-statutory consultees during the EIA process, or in response to new sources of information becoming available.

6.2.4 Baseline environment

6.2.4.1 The Transmission Assets Scoping Boundary is located on the northwest coast of England, east of the city of Preston. The Transmission Assets Scoping Boundary coincides with the Local Planning Authority areas of Blackpool Council, Fylde Council, Preston City Council and South Ribble Borough Council.

6.2.4.2 There are several built-up areas and settlements within and adjacent to the Transmission Assets Scoping Boundary, including Blackpool and Preston, towns, and villages.

6.2.4.3 The Transmission Assets Scoping Boundary is bisected by the A584 which routes broadly east to west. Other infrastructure within the Transmission Assets Scoping Boundary includes several major roads and the Blackpool South to Preston line.

Topography

6.2.4.4 The OS Terrain 50 Digital Terrain Map indicates that land towards the eastern extent of the Transmission Assets Scoping Boundary ranges between of elevations of approximately 0.5m – 20m Above Ordnance Datum (AOD). The elevation of land increases further inland towards the town of Kirkham to the west and ranges between approximately 10m – 40m AOD.

6.2.4.5 Land towards the western extent of the Transmission Assets Scoping Boundary ranges between elevations of approximately 10m – 50m AOD, increasing in elevation towards the city of Preston.

6.2.4.6 Land within the Transmission Assets Scoping Boundary is variable and generally slopes inland. There is a flatter region at lower elevations of between approximately 2m – 8m AOD in the southern extent of the Transmission Assets Scoping Boundary, associated with the River Ribble.

Surface water features

6.2.4.7 There are multiple named watercourses located within the Transmission Assets Scoping Boundary. The EA is responsible for the management of main rivers in England, while the Lead Local Flood Authority (LLFA) and Internal Drainage Board (IDB) manage ordinary watercourses. However, there are no IDBs located in the Transmission Assets Scoping Boundary. The named watercourses are identified in Table 6.5 below.

Table 6.5: Named watercourses within the Transmission Assets Scoping Boundary.

Watercourse
Bambers Lane Watercourse
Birks Watercourse
Branch Drain
Dow Brook
James Lane Watercourse
Liggard Brook
Longton Brook
Middle Pool
Mill Brook
Moorbrook Culvert
Moss Edge Lane
Moss Side Drain
Moss Sluice
Mythop Main Drain
Pegs Lane Watercourse
River Ribble
Savick Brook
Un-Named Tributary of Dow Brook
W/C 6 Birch Avenue to Stanley
Warton Brook
Whitehill Watercourse
Wilding Lane
Wrea Brook

6.2.4.8 In addition to the named watercourses, there are a large number of unnamed watercourses within the Transmission Assets Scoping Boundary, including a system of interconnected rhynes, sluices and smaller watercourses. There are also a number of ponds at various locations within the Transmission Assets Scoping Boundary.

6.2.4.9 The location of key surface water features within the Transmission Assets Scoping Boundary is presented in Figure 6.2.

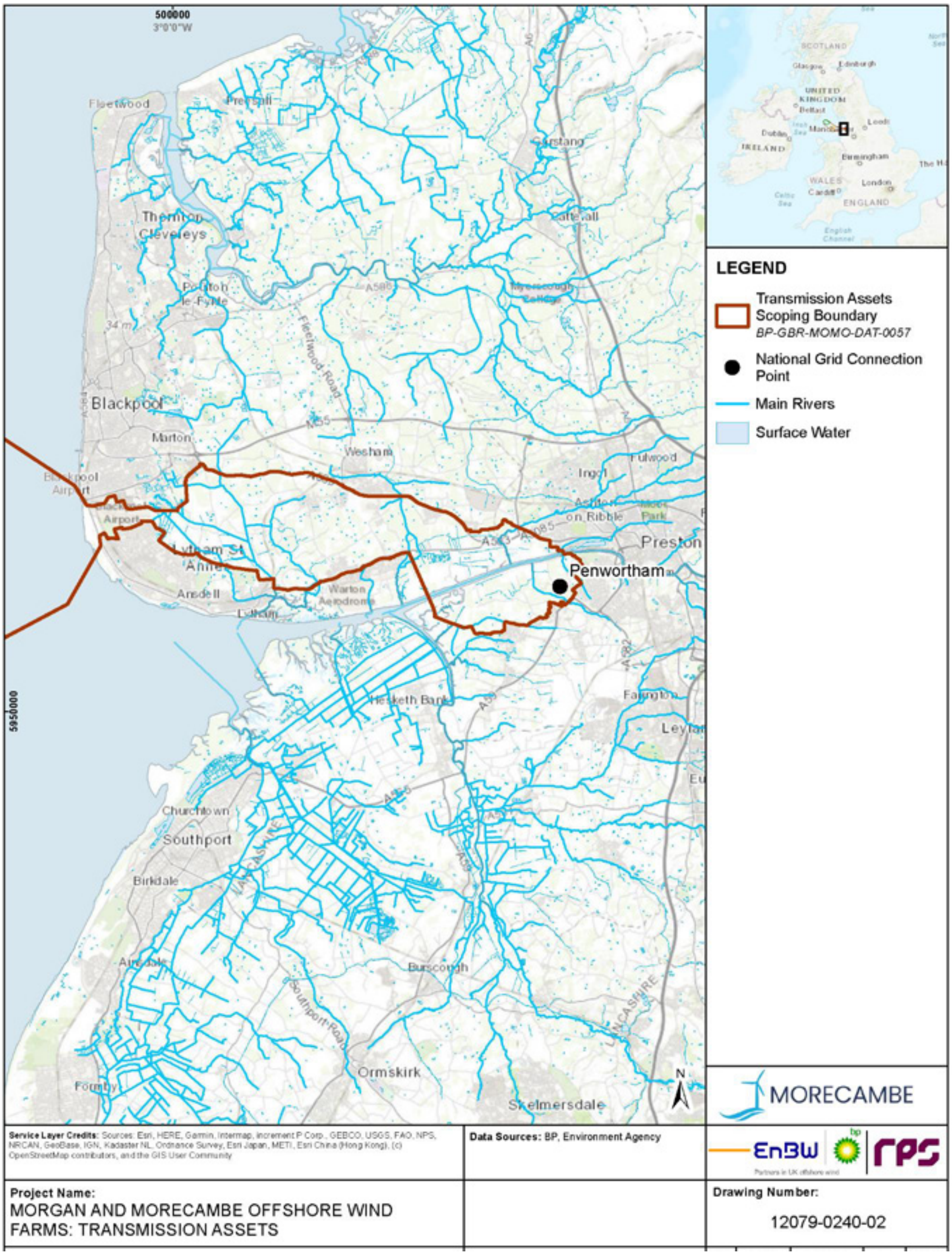


Figure 6.2: Surface water plan for the Transmission Assets Scoping Boundary.

Flood risk

Fluvial flooding

6.2.4.10 The EA Flood Map for Planning indicates that several large areas within the Transmission Assets Scoping Boundary are at risk of fluvial flooding.

6.2.4.11 There are areas of medium flood risk (between 1 in 100 and 1 in 1,000 annual probability of fluvial flooding) and high flood risk (between 1 in 100 or greater annual probability of fluvial flooding) located within the western and eastern portion of the Transmission Assets Scoping Boundary. These fluvial flood risk areas are primarily associated with the Ribble Estuary. Smaller areas of high, medium and low flood risk (1 in 1,000 annual probability of fluvial flooding) are present along some of the smaller watercourses.

6.2.4.12 As the other named and unnamed watercourses and tributaries do not appear to have been included on the flood map; it is assumed that these watercourses are likely to have catchment areas of less than $3km^2$ and therefore have not been modelled by the EA.

6.2.4.13 The locations of fluvial flood risk areas within the Transmission Assets Scoping Boundary are presented in Figure 6.3.

Tidal flooding

6.2.4.14 The EA Flood Map for Planning indicates that several areas within the Transmission Assets Scoping Boundary are at risk of tidal flooding.

6.2.4.15 There are areas at high risk and low risk of tidal flooding located along the western and eastern portion of the Transmission Assets Scoping Boundary, which coincide with areas susceptible to fluvial flooding.

6.2.4.16 The location of tidal flood risk areas within the Transmission Assets Scoping Boundary is presented in Figure 6.3.

Surface water flooding

6.2.4.17 The EA Flood Map for Planning indicates that multiple areas within the Transmission Assets Scoping Boundary are at risk of surface water flooding.

6.2.4.18 There are multiple isolated areas at high, medium and low risk of surface water flooding located throughout the Transmission Assets Scoping Boundary. Areas at risk of surface water flooding are generally located in areas of low elevation and the routes of smaller unmodelled watercourses.

6.2.4.19 The location of areas susceptible to surface water flooding within the Transmission Assets Scoping Boundary is presented in Figure 6.4.

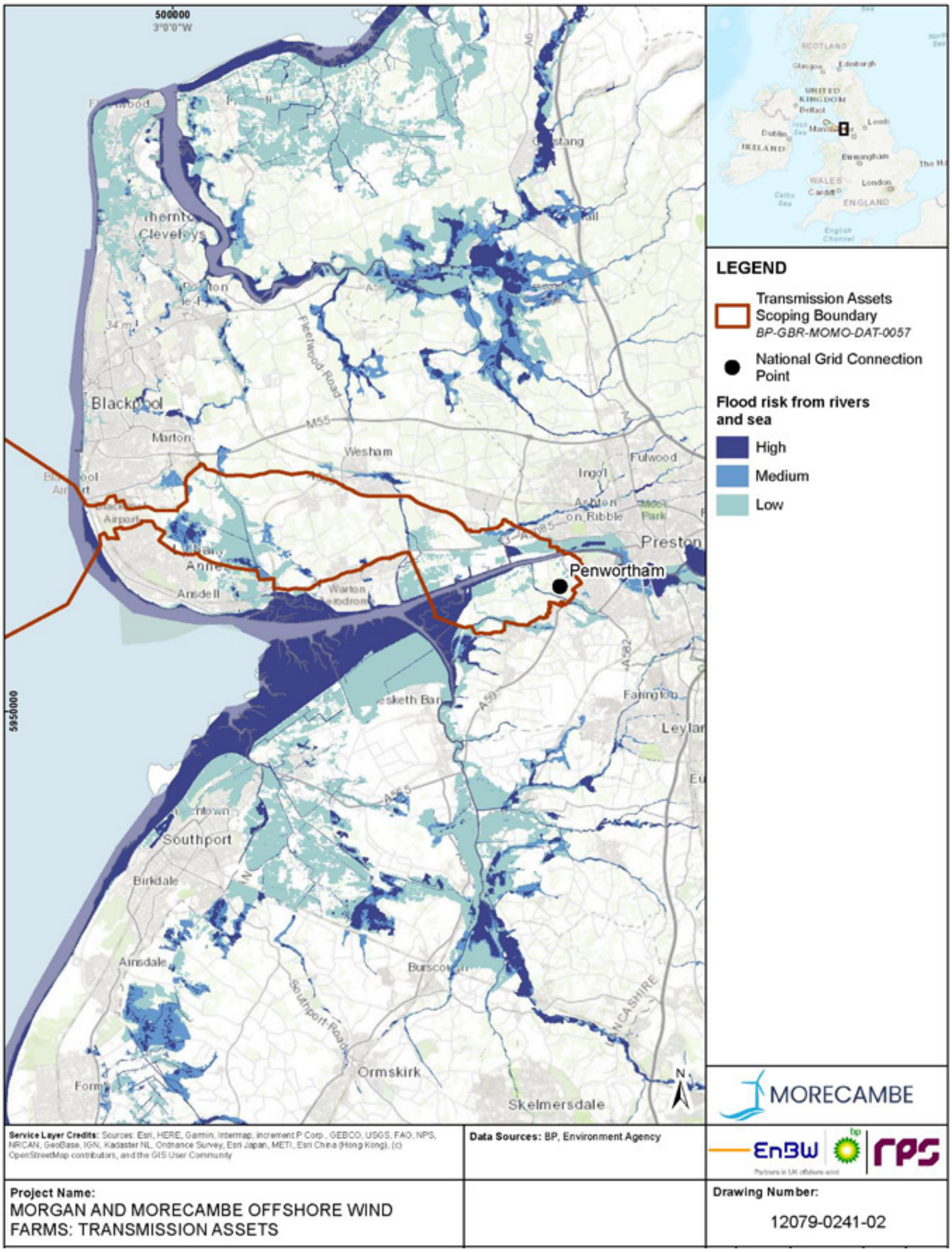


Figure 6.3: Fluvial and tidal flood risk areas within the Transmission Assets Scoping Boundary.

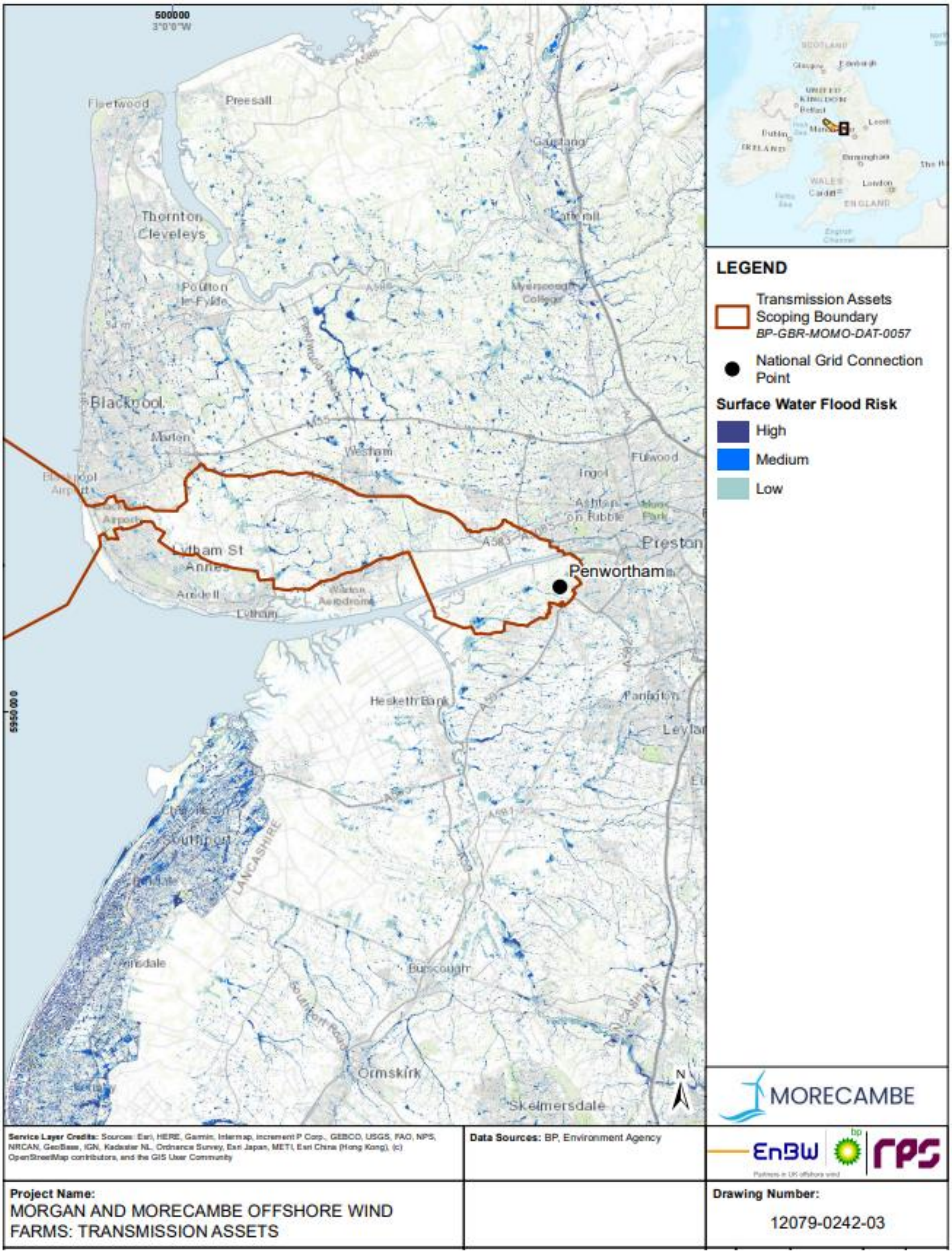


Figure 6.4: Surface water flood areas within the Transmission Assets Scoping Boundary.

Reservoir flooding

6.2.4.20 The EA Flood Map for Planning indicates that, under a wet scenario where there is also risk of fluvial flooding, a large area within the eastern portion of the Transmission Assets Scoping Boundary is at risk of reservoir flooding. This area is associated with the River Ribble.

6.2.4.21 The EA Flood Map for Planning also shows that, under a dry scenario in the absence of fluvial flood risk, there are additional areas within the western portion of the Transmission Assets Scoping Boundary at risk of reservoir flooding. These areas are associated with the Moss Drain system located to the west of the village of Wrea Green.

Flood defences

6.2.4.22 The EA Flood Map for Planning indicates that there are multiple flood defences within the Transmission Assets Scoping Boundary, which are located along Moss Drain, Dow Brook, Sovick Brook and the River Ribble. These flood defences comprise flood embankments and natural high ground defences.

Historic flooding

6.2.4.23 The EA Flood Map for Planning indicates that there are two large areas of land within the eastern portion of the Transmission Assets Scoping Boundary which have records of historic flooding (occurred in 1990). These extend from the River Ribble and are associated with overtopping and the failure/breach of flood defences. Further smaller areas of land located to the north of the village of Wrea Green have records of historic flooding (occurred in 2015) associated with local drainage/surface water and 'unknown' sources.

Designated sites

6.2.4.24 The Transmission Assets Scoping Boundary coincides with multiple sites designated for nature conservation (see part 2, section 7.1.4). Following submission of this EIA Scoping Report, a further screening exercise will be undertaken to identify which designated sites for nature conservation located within the Transmission Assets hydrology and flood risk study area are water dependent and those which can be excluded from the hydrology and flood risk assessment.

6.2.4.25 The location of designated sites for nature conservation within the Transmission Assets Scoping Boundary is presented in part 2, section 7: Onshore biological environment, of this EIA Scoping Report.

Future baseline conditions

6.2.4.26 The EIA process will consider the existing baseline conditions within the study area, and future baseline conditions (as far as reasonably practicable) in accordance with the methodology set out in part 1, section 5 (see section 5.7.2 for the approach to consideration of future baseline conditions).

6.2.5 Potential project impacts

6.2.5.1 A range of potential impacts on hydrology and flood risk have been identified which may occur within the hydrology and flood risk study area during the construction, operation and maintenance, and decommissioning phases of the Transmission Assets.

6.2.5.2 The impacts that have been scoped into the assessment are outlined in Table 6.6 together with a description of any additional data collection (e.g., site-specific surveys) and supporting analyses (e.g., modelling) that will be required to enable a full assessment of the impacts.

6.2.5.3 Potential impacts scoped out of the assessment are presented in Table 6.7, with justification as to why the impact can be scoped out.

6.2.5.4 Information on preliminary Water Framework Directive (WFD) Screening is presented in Section 12.4 and part 3, Annex B: WFD Screening, of this EIA Scoping Report, which has identified rivers and water bodies that could potentially be affected by the Transmission Assets.

Table 6.6: Impacts proposed to be scoped into the assessment for hydrology and flood risk (project phase refers to construction (C), operation and maintenance (O) and decommissioning (D)).

Impact	Project phase			Justification	Data collection and analysis required to characterise the baseline environment	Summary of proposed approach to assessment
	C	O	D			
The impact of contaminated runoff on the quality of 'main rivers' arising from the construction and decommissioning of the onshore elements of the Transmission Assets.	✓	×	✓	Activities required to facilitate the construction and decommissioning of the onshore elements of the Transmission Assets (e.g., removal of surface vegetation, excavations, dewatering, stockpiling) may generate contaminated runoff which could impact the chemical and biological status of main rivers.	Main rivers located within the hydrology and flood risk study area will be identified using desk-based analysis. The chemical/biological status and the use of the surface watercourses (e.g., abstractions) will also be identified from desk-based information where available.	The impact of contaminated runoff and spills/contaminant releases on the water quality of main rivers and ordinary watercourses will be assessed using desk-based analysis in accordance with the methodology set out in part 1, section 5: EIA Methodology, of this EIA Scoping Report, in addition to the application of professional judgement where required. No water sampling or analysis is proposed at this time, as no significant effects on the watercourse are anticipated during construction. This is subject to agreement with the EA and LLFA.
The impact of contaminated runoff on the quality of ordinary watercourses arising from the construction and decommissioning of the onshore elements of the Transmission Assets.	✓	×	✓	Activities required to facilitate the construction and decommissioning of the onshore elements of the Transmission Assets (e.g., removal of surface vegetation, excavations, dewatering, stockpiling) may contaminated runoff which could impact the chemical and biological status of ordinary watercourses.	Ordinary and private watercourses located within the hydrology and flood risk study area for transmission assets will be identified using a desk-based analysis. The use of the surface watercourses	

Impact	Project phase			Justification	Data collection and analysis required to characterise the baseline environment	Summary of proposed approach to assessment
	C	O	D			
					(e.g., abstractions) will also be identified from desk-based information where available	
The impact of accidental spillages/contaminant release on the quality of surface water and ground receptors during construction and decommissioning of the onshore elements of the Transmission Assets.	✓	×	✓	Activities required to facilitate the construction and decommissioning of the onshore elements of the Transmission Assets may result in accidental spills/contaminant release which could impact the chemical and biological status of main rivers and ordinary watercourses	Main rivers and ordinary watercourses located within the hydrology and flood risk study area for transmission assets will be identified using desk-based analysis.	
The impact of increased flood risk arising from additional surface water runoff during construction of the onshore elements of the Transmission Assets.	✓	×	×	Activities required to facilitate the construction of the onshore elements of the Transmission Assets (e.g., temporary construction compounds, removal of surface vegetation, compaction of soils, excavations, dewatering) may alter drainage patterns and surface water runoff rates onsite, increasing the risk of flooding posed to the surrounding area.	Baseline flood risk within the hydrology flood risk study area for transmission assets will be determined using desk-based analysis of flood risk mapping data published by the EA and site-specific data obtained to inform the Flood Risk Assessment (FRA)	The potential impact of flood risk arising from additional surface water runoff will be assessed and mitigated appropriately based on the results of the FRA, which is to be submitted alongside the ES. This FRA will comprise a desk-based assessment of flood risk from all sources of flooding, including

Impact	Project phase			Justification	Data collection and analysis required to characterise the baseline environment	Summary of proposed approach to assessment
	C	O	D			
					(see approach section 6.2.7.2).	appropriate allowances for climate change.
The impact of increased flood risk arising from additional surface water runoff during operation of the onshore substations.	×	✓	×	The installation of the onshore substations would result in additional impermeable land, which may alter drainage patterns and surface water runoff rates onsite, increasing the risk of flooding within the site and the surrounding area.	Baseline flood risk within the hydrology flood risk study area for transmission assets will be determined using desk-based analysis and site-specific data obtained to inform the FRA.	Where appropriate, site specific surface water attenuation modelling will be undertaken, using MicroDrainage Software (or similar), to analyse surface water runoff and inform suitable mitigation measures, including the design of Sustainable Drainage Systems (SuDS). It is anticipated that modelling would primarily be limited to above ground permanent infrastructure (i.e the onshore substations).
The impact of increased flood risk arising from damage to existing flood defences during the construction and decommissioning of the onshore elements of the Transmission Assets.	✓	×	✓	If the onshore elements of the Transmission Assets are located within or near existing flood defences, activities required to facilitate construction and decommissioning of the onshore elements of the Transmission Assets may impact the integrity (or efficacy) of flood defence infrastructure and increase the risk of flooding within the site and the surrounding area.	Existing flood defences within the hydrology and flood risk study area for transmission assets will be determined using desk-based analysis of flood risk mapping data published by the EA and site-specific data	The potential impact of flood risk arising from damage to existing flood defences will be assessed using desk-based analysis in accordance with the methodology set out in part 1, section 5: EIA Methodology, of this EIA Scoping Report, in addition to the application of

Impact	Project phase			Justification	Data collection and analysis required to characterise the baseline environment	Summary of proposed approach to assessment
	C	O	D			
					obtained to inform the FRA.	professional judgement where required. In addition, detailed consultation with the LLFA and EA will be undertaken to discuss works on or near existing flood defences. This would help to identify potential impacts and develop appropriate measures to mitigate any potential impacts.
The impact of damage to existing field drainage during the construction and decommissioning of the onshore elements of the Transmission Assets.	✓	×	✓	If the onshore elements of the Transmission Assets are located on or near existing drainage infrastructure, activities required to facilitate construction and decommissioning of the onshore elements of the Transmission Assets may damage field drainage.	Existing field drainage infrastructure located within the hydrology and flood risk study area for transmission assets will be identified using desk-based analysis and site-specific data obtained to inform the FRA.	The potential impact of flood risk arising from damage to existing field drainage will be assessed using desk-based analysis in accordance with the methodology set out in part 1, section 5: EIA Methodology, of this EIA Scoping Report, in addition to the application of professional judgement where required. In addition, detailed consultation with the relevant stakeholders will be undertaken. This would help to identify potential impacts and

Impact	Project phase			Justification	Data collection and analysis required to characterise the baseline environment	Summary of proposed approach to assessment
	C	O	D			
						develop appropriate measures to mitigate any potential impacts.
The impact of damage to existing water pipelines during the construction and decommissioning of the onshore elements of the Transmission Assets.	✓	×	✓	If the onshore elements of the Transmission Assets are located on or near existing water pipelines, activities required to facilitate construction and decommissioning of the onshore elements of the Transmission Assets may damage existing pipelines, interrupting the local water supply.	Existing water pipelines located within the hydrology and flood risk study area for transmission assets will be identified using desk-based analysis and site-specific data obtained to inform the FRA.	The potential impact of flood risk arising from damage to existing water pipelines will be assessed using desk-based analysis in accordance with the methodology set out in part 1, section 5: EIA Methodology, of this EIA Scoping Report, in addition to the application of professional judgement where required. In addition, detailed consultation with the relevant stakeholders would be undertaken to discuss works on or near existing water pipelines. This would help to identify impacts and develop appropriate measures to mitigate any potential impacts.
Direct disturbance of surface water bodies and increased direct soil erosion and supply of fine sediment to surface watercourses during	✓	×	✓	Activities required to facilitate the construction and decommissioning of the onshore elements of the Transmission Assets (e.g., removal of surface vegetation, excavations, dewatering, stockpiling) may lead to mobilisation of fine sediment and soils to local watercourses, impacting the water quality and flow regimes.	Identification of local watercourses via desktop analysis of publicly available data and	Based on data findings, an assessment of the significance of the potential impact will be undertaken taking into

Impact	Project phase			Justification	Data collection and analysis required to characterise the baseline environment	Summary of proposed approach to assessment
	C	O	D			
construction and decommissioning activities					consultation with EA and LLFA to identify sensitive locations.	account design-in mitigation measures, based on current best practice.

Table 6.7: Impacts proposed to be scoped out of the project assessment for hydrology and flood risk.

Impact	Justification
The impact of contaminated runoff on the chemical and biological status of surface water receptors arising from the operation and maintenance of the onshore elements of the Transmission Assets.	Activities associated with the operation and maintenance of the onshore elements of the Transmission Assets are unlikely to generate contaminated runoff. Therefore, the potential impact of contaminated runoff on the quality of surface water receptors during the operation and maintenance of the onshore elements of the Transmission Assets is unlikely to result in significant effects and is proposed to be scoped out of the assessment for hydrology and flood risk.
The impact of accidental spillages/contaminant release on the quality of surface water and ground receptors during operation and maintenance of the onshore elements of the Transmission Assets.	Activities associated with the operation and maintenance of the onshore elements of the Transmission Assets are unlikely to require the transport or storage of harmful substances. Therefore, the potential impact of spills/contaminant releases on the quality of surface water receptors during operation and maintenance of the onshore elements of the Transmission Assets is unlikely to result in significant effects and is proposed to be scoped out of the assessment for hydrology and flood risk.
The impact of increased flood risk arising from damage to existing flood defences during the operation and maintenance of the onshore elements of the Transmission Assets.	Activities required to facilitate the operation and maintenance of the onshore elements of the Transmission Assets are unlikely to impact the integrity (or efficacy) of existing flood defences. Therefore, the potential impact of increased flood risk arising from damage to existing flood defence infrastructure during the operation and maintenance of the onshore elements of the Transmission Assets is unlikely to result in significant effects and is proposed to be scoped out of the assessment for hydrology and flood risk.
The impact of increased flood risk arising from additional surface water runoff during the operation and maintenance of the onshore export cable.	The operation and maintenance of the onshore export cable and associated infrastructure may result in a minor increase in the total area of impermeable land. However, the increase in impermeable land arising from the installation of the onshore export cable is unlikely to result in a notable change in drainage patterns and surface water runoff rates. Therefore, the potential impact of flood risk arising from additional surface water runoff during the operation and maintenance of the onshore export cable is unlikely to result in significant effects and is proposed to be scoped out of the assessment.

6.2.6 Measures adopted as part of the project

6.2.6.1 The following measures adopted as part of the project are relevant to hydrology and flood risk. These measures may evolve as the engineering design and the EIA progresses.

- Surface Water Management Plan – This would set out a long-term action plan to manage surface water, including measures to prevent or mitigate surface water flooding and the implementation of SuDS where appropriate.
- CoCP – Construction of the onshore elements of the Transmission Assets would be undertaken in accordance with the relevant best practice measures as recommended in CIRIA (2006) C648 – Control of water pollution from linear construction projects, including measures for handling oils, fuels or other harmful substances as to avoid pollution of surface and ground water receptors due to accidental spillages/contaminant release.

6.2.6.2 The requirement for and feasibility of any mitigation measures will be dependent on the significance of effects and will be consulted upon with statutory and non-statutory consultees throughout the EIA process.

6.2.6.3 Requirements for additional mitigation measures will be determined through discussions with the Environment Agency and Lead Local Flood Authority likely to be affected as part of the hydrology and flood risk assessment.

6.2.7 Proposed assessment methodology

6.2.7.1 The hydrology and flood risk assessment for the onshore elements of the Transmission Assets will be undertaken in accordance with the methodology set out in part 1, section 5: EIA Methodology, of this EIA Scoping Report, in addition to the following policy and guidance:

- National Planning Policy Framework (MHCLG, 2021).
- Planning Practice Guidance (MHCLG, 2021).
- Fylde Strategic Flood Risk Assessment (Fylde Borough Council, 2011).
- Central Lancashire Flood Risk Assessment (Preston City Council, South Ribble Borough Council, Chorley Borough Council, 2007).
- West Lancashire Strategic Flood Risk Assessment (West Lancashire Borough Council, 2019).
- Control of water pollution from linear construction projects. Site guide (C649D) (CIRIA, 2006).
- Design Manual for Roads and Bridges (DMRB) LA 104 - Environmental assessment and monitoring (Highways England, Transport Scotland, Welsh Government, Department for Infrastructure, 2020).
- DMRB LA 113 - Road drainage and the water environment (Highways England, Transport Scotland, Welsh Government, Department for Infrastructure, 2020).

6.2.7.2 In accordance with the National Planning Policy Framework (MHCLG, 2021), a Flood Risk Assessment (FRA) will be undertaken for the onshore elements of the Transmission Assets to determine baseline and future flood risk from all sources of flooding. The FRA will include calculations of surface water run-off rates and evidence of how surface water will be attenuated.

The methodology and scope of the FRA, including mitigation proposals, will be agreed through consultation with the EA and LLFA.

6.2.7.3 The FRA will be used to inform the design of the onshore elements of the Transmission Assets and mitigation measures, including the Surface Water Management Plan. The conclusions of the FRA will be referred to in the assessment of hydrology and flood risk in the ES where relevant. The FRA will form a technical appendix to the ES.

6.2.8 Potential cumulative effects

6.2.8.1 There is potential for cumulative effects on sensitive receptors to occur when the Transmission Assets are considered together with other developments. The potential cumulative effects between the onshore elements of the Transmission Assets and other developments with respect to hydrology and flood risk will be considered within the Preliminary Environmental Information Report (PEIR) and ES.

6.2.8.2 The cumulative effect assessment would be undertaken in accordance with the methodology set out in part 1, section 5: EIA Methodology, of this EIA Scoping Report.

6.2.9 Potential inter-related effects

6.2.9.1 The assessment of potential inter-related effects will be considered within the hydrology and flood risk chapter of the ES. It will include consideration of project lifetime effects and receptor-led effects, in line with the approach outlined in part 1, section 5: EIA Methodology of this EIA Scoping Report. For example:

- Terrestrial ecology and ornithology (intertidal and onshore):
  - The contamination of surface water receptors within the hydrology and flood risk study area during the construction of the onshore elements of the Transmission Assets may impact water dependent sites designated for conservation, which could support protected or notable species.
- Air quality:
  - Dust and air emissions generated during the construction of the onshore elements of the Transmission Assets may impact the quality of surface water receptors located within hydrology and flood risk study area.
- Geology, hydrogeology and ground conditions:
  - The mobilisation of existing contaminants or the release of contaminants into soil and groundwater during construction of the onshore elements of the Transmission Assets may impact hydraulically linked surface water receptors within the hydrology and flood risk study area.

6.2.10 Potential transboundary impacts

6.2.10.1 A screening of transboundary impacts has been carried out and is presented in part 3, Annex A of this EIA Scoping Report. This screening exercise identified that there is no potential for transboundary impacts upon hydrology and flood risk due to construction, operational and maintenance, and decommissioning impacts of the Transmission Assets.

7 Proposed technical assessments - onshore biological environment

7.1 Terrestrial ecology and ornithology (intertidal and onshore)

7.1.1 Introduction

7.1.1.1 This section of the EIA Scoping Report identifies the terrestrial ecology and ornithology (intertidal and onshore) receptors relevant to the onshore elements of the Transmission Assets. This section also considers the potential impacts arising from the construction, operation and maintenance, and decommissioning of the Transmission Assets and identifies the proposed scope of, and methodology for, the EIA process for terrestrial ecology and inter-tidal birds.

7.1.1.2 The potential impacts on the offshore biological environment during the construction, operation and maintenance and decommissioning of the offshore elements of the Transmission Assets are described in part 2, section 4: Offshore biological environment, of this EIA Scoping Report.

7.1.2 Study area

7.1.2.1 The study area to be used for the assessment of terrestrial ecology and intertidal and onshore ornithology will focus on the following areas:

- Throughout the tidal range and nearshore (up to 1.5 km from high tide) for intertidal birds
- Landward of MHWS for onshore ornithology;
- Landward of MLWS for any potential intertidal botany; and
- Landward of MHWS for terrestrial ecology.

7.1.2.2 The study areas will follow the guidance set out from the Chartered Institute of Ecology and Environmental Management (CIEEM) (see section 7.1.7 of this EIA Scoping Report below).

7.1.2.3 As such, the terrestrial ecology and intertidal and onshore ornithology study area for the Transmission Assets will be defined as:

- The area of land that will be temporarily or permanently occupied during construction, operation and maintenance, and decommissioning of the onshore elements of the Transmission Assets.
- A surrounding impact zone or ‘zone of influence’ (ZOI) (CIEEM, 2018) that will vary according to the ecological receptors being considered (see paragraph 7.1.3.9 below). The ZOI relating to the terrestrial ecology and ornithology (intertidal and onshore) study area will consider the following:
  - Internationally designated sites, including Special Areas of Conservation (SACs), possible SACs (pSACs), Special Protection Areas (SPAs), possible SPAs (pSPAs) and Ramsar sites, located within 10km of the onshore elements of the Transmission Assets boundary. This distance will be increased to 20km and 30km for those sites designated for birds and bats respectively, taking into account average potential home ranges for some species (e.g.

birds - Scottish Natural Heritage, 2016; bats – Mitchell-Jones, 2004).

- Nationally designated sites, including Sites of Special Scientific Interest (SSSIs) and National Nature Reserves (NNRs), located within 5km of the onshore elements of the Transmission Assets.
- Locally designated sites, including Local Nature Reserves (LNRs) and Local Wildlife Sites (LWSs), located within 2km of the onshore elements of the Transmission Assets.

7.1.2.4 The terrestrial ecology and ornithology (intertidal and onshore) study areas will be reviewed and modified, if necessary, in response to feedback from consultation with stakeholders and/or regulators, refinements made to the design of the Transmission Assets and/or any additional environmental and/or design constraints identified during the EIA process.

7.1.3 Data sources

7.1.3.1 The data sources used to inform the baseline assessment will primarily comprise published material, which is publicly available online, supported by additional data from local wildlife record centres and groups, and the results of site-specific surveys (See paragraph 7.1.3.5).

7.1.3.2 The baseline data sources identified in this EIA Scoping Report will remain under review and may be updated in response to feedback from relevant statutory and non-statutory consultees during the EIA process, or in response to new sources of information becoming available.

Desk-based Data Sources

7.1.3.3 An initial desk-based review has identified a number of data sources which provide baseline data coverage of the Transmission Assets Scoping Boundary. These data sources are summarised in Table 7.1 below.

Table 7.1: Baseline data sources – terrestrial ecology and ornithology.

Source	Summary
British Trust for Ornithology (BTO)	Provides information regarding RSPB reserves and the Wetland Bird Survey (WeBS) data.
Defra Multi-Agency Geographic Information for the Countryside (MAGIC) interactive mapping system	Provides information regarding international, national and regionally designated sites, and historic protected species licences.
Joint nature conservation committee (JNCC)	Provides information regarding the qualifying features of internationally designated sites, including SAC, SPA and Ramsar sites.
Local Wildlife Trust Groups	Provide information relating to local nature reserves, conservation projects/programmes and objectives, protected species presence.
LERN – the Lancashire Environmental Records Network	Provides information regarding locally designated sites and protected species records.
National Biodiversity Network Atlas	Provides information relating to historic records of protected species.
Other local specialist groups that do not report records of species to the local records centres (to be confirmed by the local record centres).	Provide information relating to protected or otherwise notable species records, including areas of interest for target species groups.

Source	Summary
Other organisations responsible for managing sites of nature conservation interest/managing conservation projects in the potential zone of influence	Potential to provide information relating to the ecological interest and value of the site, any sensitivities and/or potential opportunities for enhancement/contribution to the objectives of the project.
Relevant local authorities – Biodiversity/Environment Division	Information relating to locally designated sites, sites of interest, and local/regional conservation objectives and plans/projects.
Royal Society for the Protection of Birds (RSPB)	Provides further ornithological data in addition to BTO WeBS data and relating to RSPB nature reserves.

Field Survey Data Sources and Broad Survey Methods

7.1.3.4 In addition to the data sources identified above, the following site-specific surveys are proposed to inform the baseline assessment for terrestrial ecology and ornithology (intertidal and onshore) in the Environmental Statement (ES):

- Extended Phase 1 Habitat Survey / UK Habitat Classification survey:
  - This extended Phase 1 habitat survey will identify and map habitats, and assess their ecological condition and value, and potential importance to protected / otherwise notable species (in accordance with JNCC 2010). The UK Habitat Classification survey will be informed by the results of the extended Phase 1 habitat survey and will be undertaken as required to provide additional ecology description and information relating to the habitats mapped.
- Habitat condition survey:
  - These surveys will collate more information on habitat condition and the value of ecological sites/areas that may be impacted by the construction, operation and maintenance and decommissioning of the onshore elements of the Transmission Assets. These surveys will be used to inform mitigation proposals.
- Botanical surveys, including lower plants and National Vegetation Classification (NVC) surveys:
  - These surveys will target areas of high potential interest (i.e., high species diversity, or where there is a plant community or species of high conservation interest), that may be impacted by the construction, operation and maintenance and decommissioning of the onshore elements of the Transmission Assets.
  - The presence of Invasive Non-Native Species (INNS) listed on schedule 9 of the Wildlife and Countryside Act 1981 (e.g., Japanese knotweed, Himalayan balsam, rhododendron) will also be recorded during the botanical survey, and if recorded during the Phase 1 habitat survey and subsequent site-surveys.
- Hedgerow surveys:
  - This survey is required under The Hedgerow Regulations 1997. Hedgerows that may be directly impacted by the construction, operation and maintenance, and decommissioning of the onshore

elements of the Transmission Assets will be assessed and hedgerows defined as Important in The Hedgerow Regulations 1997, will be mapped.

- Wintering and migratory bird surveys (intertidal and nearshore):
  - Wintering and migratory bird surveys will primarily be undertaken at the proposed landfall site and surrounding ZOI, which will include potential functionally linked land used by qualifying bird species of nearby designated sites. These surveys commenced in 2021 and are being carried out in accordance with the methodology described in the bp/EnBW Morgan and Mona Offshore Wind Farm, Intertidal and Nearshore Waterbird Survey Methodology (RPS, 2021) and methods agreed during subsequent consultations with Natural England.
- Winter bird surveys (onshore):
  - These surveys will be used to identify wintering bird species and map activity, with the aim of assessing the importance of areas of high potential value, which may be impacted by the construction, operation and maintenance and decommissioning of the onshore elements of the Transmission Assets.
- Breeding bird surveys (onshore):
  - These surveys will be used to identify breeding bird species (e.g., nearshore, intertidal terns, seabirds and barn owls) and map activity, with the aim of assessing the importance of areas of high potential value, which may be impacted by the construction, operation and maintenance and decommissioning of the onshore elements of the Transmission Assets.
- Bat surveys - bat surveys will include both bat activity and roost/hibernation surveys.
  - Bat activity surveys will be undertaken along the onshore cable corridor and at the substation location around dusk and/or dawn, and between dusk and dawn, to confirm areas of high potential value to foraging and commuting bats that would be severed or otherwise impacted (e.g. through light spill), by the onshore elements of the Transmission Assets.
  - Bat roost surveys will include a preliminary daytime roost assessment of trees and built structures to identify potential bat roost features that could be lost or disturbed by the onshore elements of the Transmission Assets, and detailed surveys, including emergence and/or re-entry surveys, to confirm the presence/absence of a roost and identify the species of roosting bat, and type and vale of any confirmed roost.
  - All bat surveys will be undertaken in accordance with Bat Surveys for Professional Ecologists Good Practice Guidelines 3rd Edition (Bat Conservation Trust, 2016), or subsequent updates.
- Otter surveys:
  - These surveys will be undertaken with regard to best practice survey guidelines (e.g., Chanin, 2003; and Crawford, 2003) to confirm presence/likely absence of otters, map areas of significant

activity and identify holts/resting sites in areas that may be impacted (directly or indirectly) during construction, operation and maintenance and decommissioning of the onshore elements of the Transmission Assets.

- Badger surveys:
  - These surveys will confirm the presence and map signs of activity in areas that may be impacted (directly or indirectly) during construction, operation and maintenance and decommissioning of the onshore elements of the Transmission Assets.
  - These surveys will be undertaken by a suitably experienced ecologist and will include a badger sett assessment to identify the location, usage and likely value of badger setts which may be impacted by the construction, operation and maintenance and decommissioning of the onshore elements of the Transmission Assets.
- Water vole surveys:
  - These surveys will be undertaken in accordance with The Water Vole Mitigation Handbook (Dean *et al.* 2016) and will identify habitat areas used by water vole and potential dispersal areas that may be impacted by the construction, operation and maintenance and decommissioning of the onshore elements of the Transmission Assets.
- Great Crested Newt (GCN) surveys (scope of surveys subject to consultation with Natural England):
  - These surveys will include GCN Habitat Suitability Index (HSI) assessment of waterbodies located within the onshore elements of the Transmission Assets boundary and a 250m wide buffer.
  - Unless agreed otherwise, the survey methodologies will include the following:
    - HSI surveys will be undertaken in accordance with the Amphibian and Reptile Group UK Advice Note 5 (ARG UK, 2010).
    - eDNA analysis of water samples collected from waterbodies within the survey area will be undertaken in accordance with Biggs *et al*. 2014, to confirm presence/absence of GCN.
    - Where eDNA analysis is not undertaken (for whatever reason), standard presence / absence surveys will be undertaken, in accordance with English Nature 2001).
    - If presence is confirmed, i.e., through eDNA analysis or standard presence / absence survey methodology, a population class size survey will be undertaken in accordance with English Nature 2001.
- Natterjack toad surveys:
  - These surveys will be undertaken in areas that may be impacted by the construction, operation and maintenance and decommissioning of the onshore elements of the Transmission Assets, where natterjack toads had previously been recorded, to confirm their presence/absence.

- Reptile surveys, including sand lizard:
  - These surveys will be used to confirm the presence or absence of reptiles and will primarily focus on high value habitat that would be directly impacted by the construction, operation and maintenance and decommissioning of the onshore elements of the Transmission Assets. Where presence of reptile species is confirmed, population class size surveys will be undertaken.
  - Reptile surveys will be undertaken in accordance the Herpetofauna Workers' Manual (Gent and Gibson, 2003), Froglife Advice Sheet 10 – Reptile Survey (Froglife, 1999) and Common Standards Monitoring Guidance for Reptiles and Amphibians (JNCC, 2004).
- Terrestrial invertebrates:
  - These surveys are likely to vary according to the habitats present and target species identified. Notwithstanding this, this survey will identify terrestrial invertebrate species present and the value of the habitat area. Surveys of high value habitat located outside of terrestrial ecology study area may also be undertaken to inform a potential enhancement strategy.

7.1.3.5 With regard to dormice, based on information available to date, this species is considered to be absent from the Transmission Assets Scoping Boundary. Therefore, it is considered that the potential effects during construction, operation and maintenance and decommissioning of the Transmission Assets on dormice are unlikely to be significant and are proposed to be scoped out of the assessment of terrestrial ecology.

7.1.3.6 Notwithstanding this, if it is subsequently determined that dormice surveys may be required, for example through consultation with Natural England, these will be undertaken in accordance with the Dormouse Conservation Handbook, Second Edition (English Nature, 2006) (or subsequent updates) and will confirm presence /absence in areas of woodland, hedgerows, and scrub of potential value to dormice that could be directly impacted by the construction, operation and maintenance and decommissioning of the onshore elements of the Transmission Assets.

7.1.3.7 It is proposed that the detailed scope, methodologies, and extents of the site-specific surveys listed above will be agreed with Natural England in advance of survey commencement. The results of the surveys will be used to inform the assessment of terrestrial ecology and intertidal and onshore ornithology, mitigation requirements and enhancement strategy.

7.1.3.8 Where large areas of woodland and main watercourses cannot be avoided, trenchless methodologies would be used where possible during the construction of the onshore export cable, as to prevent direct impacts on these sensitive receptors.

7.1.3.9 However, if this construction technique is not feasible, and where large areas of woodland and main watercourses cannot be avoided, additional surveys may be required to assess the impact of the onshore elements of the Transmission Assets on terrestrial ecology and ornithology.

7.1.4 Baseline environment

Designated sites

7.1.4.1 The Transmission Assets Scoping Boundary coincides with multiple sites designated for nature conservation. These designated sites for nature conservation are presented in Table 7.2 below.

Table 7.2: Designated sites within the Transmission Assets Scoping Boundary.

Site Name	Designation
International Designations	
Ribble & Alt Estuaries	Ramsar site
Ribble & Alt Estuaries	SPA
National Designations	
Ribble Estuary	SSSI
Newton Marsh	
Lytham Coastal Changes	
Lytham St Anne's Dunes	
Local Designations	
Lytham St Annes	LNR
Fishwick Bottoms	

7.1.4.2 Additional ecologically designated sites may be identified within the terrestrial ecology and ornithology (intertidal and onshore) study areas when the location of the onshore elements of the Transmission Assets has been refined. The ecologically designated sites to be considered in the assessment of terrestrial ecology and ornithology (intertidal and onshore) will be agreed with the relevant stakeholders.

7.1.4.3 The location of sites designated for nature conservation within the Transmission Assets Scoping Boundary is presented in Figure 7.1.

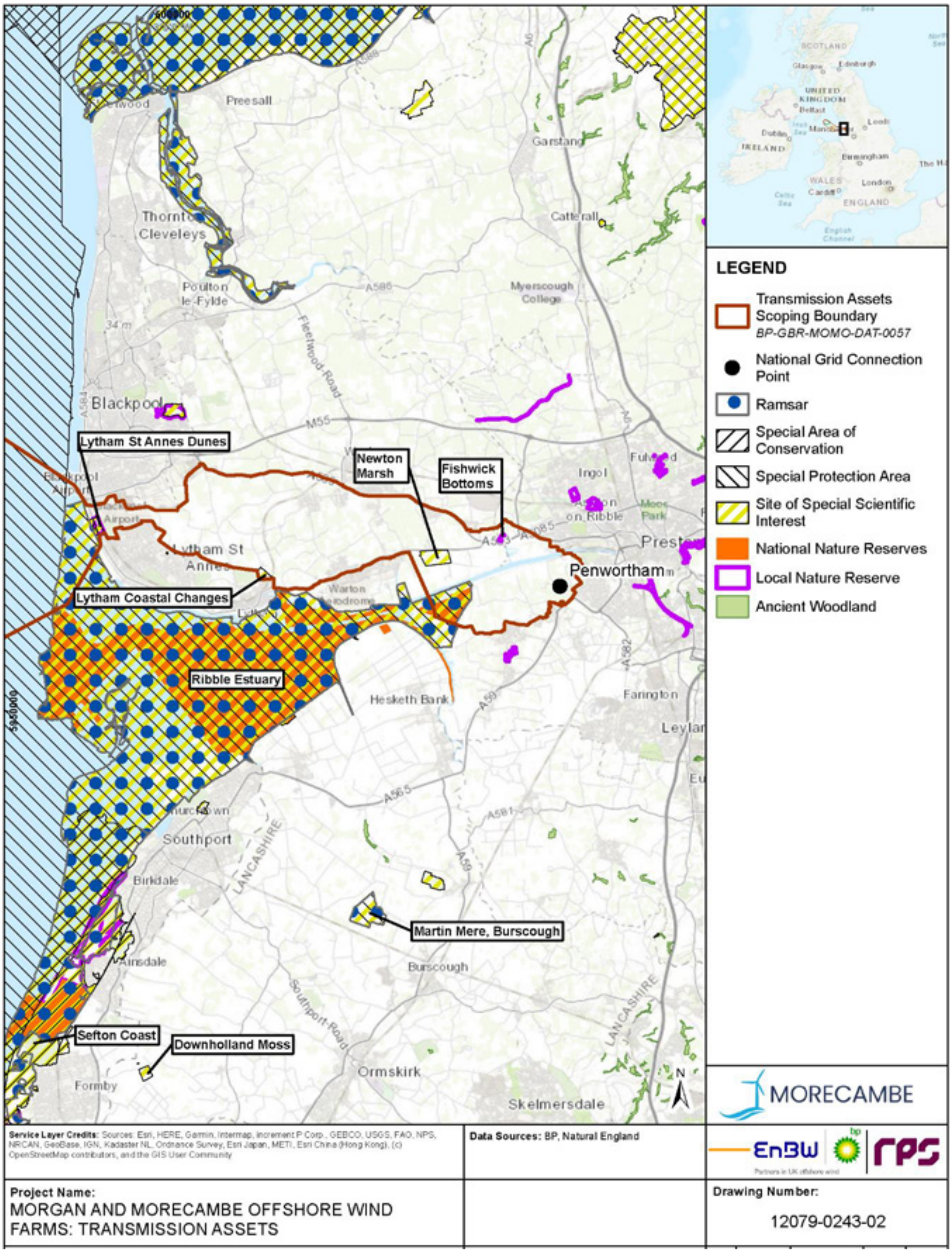


Figure 7.1: Ecological designations within the Transmission Assets Scoping Boundary.

Priority habitats

7.1.4.4 There are a range of habitat types located within the Transmission Assets Scoping Boundary, which are listed on Priority Habitat Inventory (England) as section 41 habitats of principal importance under the Natural Environment and Rural Communities Act 2006. These include the following habitat types that are located within the Transmission Assets Scoping Boundary:

- Coastal and flood plain grazing marsh.
- Coastal sand dunes.
- Deciduous woodland.
- Good quality semi-improved grassland.

7.1.4.5 The location of the priority habitats from the Priority Inventory, including those listed above are presented in Figure 7.2.

Future baseline conditions

7.1.4.6 The EIA process will consider the existing baseline conditions within the study area, and future baseline conditions (as far as reasonably practicable) in accordance with the methodology set out in part 1, section 5 (see section 5.7.2 for the approach to consideration of future baseline conditions).

7.1.5 Potential project impacts

7.1.5.1 A range of potential impacts on terrestrial ecology and ornithology (intertidal and onshore) have been identified which may occur during the construction, operation and maintenance, and decommissioning phases of the Transmission Assets.

7.1.5.2 The impacts that have been scoped into the assessment are outlined in Table 7.3 together with a description of any additional data collection (e.g., site-specific surveys) and supporting analyses (e.g., modelling) that will be required to enable a full assessment of the impacts.

7.1.5.3 Potential impacts scoped out of the assessment are presented in Table 7.4 with justification for why the impact should be scoped out.

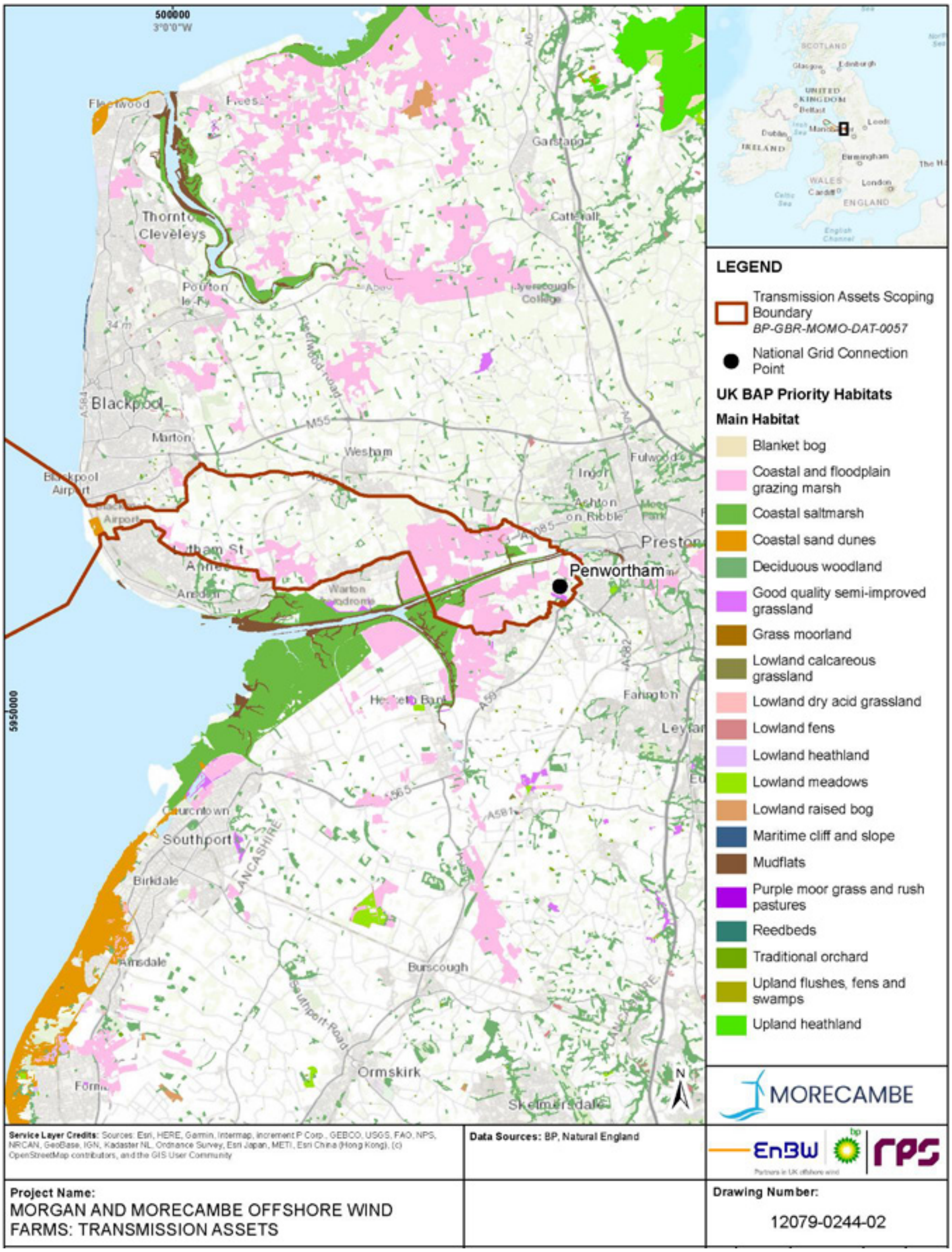


Figure 7.2: Priority habitats within the Transmission Assets Scoping Boundary.

Table 7.3: Impacts proposed to be scoped into the assessment for terrestrial ecology and ornithology (intertidal and onshore) (project phase refers to construction (C), operation and maintenance (O) and decommissioning (D)).

Impact	Project phase			Justification	Data collection and analysis required to characterise the baseline environment	Summary of proposed approach to assessment
	C	O	D			
The impact of temporary and permanent habitat loss during construction and decommissioning of the onshore elements of the Transmission Assets.	✓	×	✓	Construction and decommissioning of the onshore elements of the Transmission Assets may result in the temporary (e.g., onshore export cable) or permanent (e.g., onshore substations) loss of habitat, which may support protected or notable species.	Ecological receptors located within the terrestrial ecology and ornithology study area will be identified through a desk-based assessment and series of site-specific surveys for protected and otherwise notable habitats and species. The requirement for further site-specific surveys will be determined through the desk study and extended Phase 1 habitat survey (see section 7.1.3 of this EIA Scoping Report).	The findings of the desk-based study and site-specific surveys will be used to inform the ecological (terrestrial ecology and ornithology) mitigation strategy and subsequent Ecological Impact Assessment (EcIA). The EcIA will assess the impact of temporary and permanent habitat loss on protected or notable habitats and species identified within the terrestrial ecology and ornithology study area. The EcIA will be undertaken in accordance with CIEEM Guidelines for Ecological Impact Assessment (EcIA) (2018).
The impact of habitat disturbance during construction, operation and maintenance and decommissioning of the onshore elements of the Transmission Assets.	✓	✓	✓	Construction, operation and maintenance and decommissioning of the onshore elements of the Transmission Assets may result in the disturbance of habitat (e.g., movement, noise, light spill, vibration), which may support protected or notable species.		
The impact of habitat fragmentation and species isolation during construction, operation and maintenance and decommissioning of the onshore elements of the Transmission Assets.	✓	✓	✓	Construction, operation and maintenance and decommissioning of the onshore elements of the Transmission Assets may result in the fragmentation of habitat, which may limit population movements and isolate protected or notable species.		
The impact of pollution caused by accidental spills/ contaminant release during construction and decommissioning of the onshore elements of the Transmission Assets.	✓	×	✓	Activities required for the construction and decommissioning of the onshore elements of the Transmission Assets may result in accidental spills/contaminant release which could adversely affect protected or notable habitats and species.		
The impact of spreading INNS during construction and decommissioning of the onshore elements of the Transmission Assets.	✓	×	✓	Construction and decommissioning of the onshore elements of the Transmission Assets may cause the spread of INNS, which could adversely affect the status of native protected or notable habitats and species.	INNS located within the terrestrial ecology study area will be identified and mapped during the desk study and site-specific surveys.	The findings of the ecology desk study and site-specific surveys will be used to inform the ecological mitigation strategy and subsequent Ecological Impact Assessment (EcIA). The EcIA

Impact	Project phase			Justification	Data collection and analysis required to characterise the baseline environment	Summary of proposed approach to assessment
	C	O	D			
						will assess the impact of INNS on native protected or notable habitats and species identified within the terrestrial ecology and intertidal and onshore ornithology study. The EcIA will be undertaken in accordance with CIEEM Guidelines for Ecological Impact Assessment (EcIA) (2018).

Table 7.4: Impacts proposed to be scoped out of the project assessment for terrestrial ecology and ornithology (intertidal and onshore).

Impact	Justification
The impact of temporary and permanent habitat loss on protected habitats and species during operation and maintenance of the onshore elements of the Transmission Assets.	Activities associated with the operation and maintenance of the onshore elements of the Transmission Assets would require no additional land take and are unlikely to result in any temporary or permanent loss of habitat. Therefore, the potential impact on protected habitats and species arising from the temporary and permanent habitat loss during operation and maintenance of the onshore elements of the Transmission Assets is unlikely to result in significant effects and is proposed to be scoped out of the assessment for terrestrial ecology and ornithology (intertidal and onshore).
The impact of pollution caused by accidental spills/contaminant release on protected habitats and species during operation and maintenance of the onshore elements of the Transmission Assets.	Activities associated with the operation and maintenance of the onshore elements of the Transmission Assets are unlikely to result in accidental spills/ contaminant release. Notwithstanding this, best practice measures to be incorporated into an Hydrological, Ecological and Landscape Management Plan would include measures to avoid or minimise the likelihood and the degree of impact of any accidental pollution event. Therefore, the potential impact of pollution on protected habitats and species arising from accidental spills/ contaminant release during operation and maintenance of the onshore elements of the Transmission Assets is unlikely to result in significant effects and is proposed to be scoped out of the assessment for terrestrial ecology and ornithology (intertidal and onshore).
The impact of construction, operation and maintenance and decommissioning of the onshore elements of the Transmission Assets on species not listed in paragraph 7.1.3.4 of this EIA Scoping Report, including red squirrel, brown hare, dormice, fish, and aquatic invertebrates.	As part of the site selection and route refinement process, the onshore elements of the Transmission Assets would be located and designed to avoid large parcels of woodland and main watercourses. Where the onshore export cable is required to cross watercourses, environmentally sensitive construction techniques would be used (e.g., horizontal directional drilling) as to avoid or reduce potential impacts on habitats and species. In addition, due to the limited extent and temporary nature of habitat disturbance associated with construction and decommissioning of the onshore export cable, and the requirement for land to be reinstated post- construction, significant effects on species not listed in paragraph 7.1.3.4 of this EIA Scoping Report are unlikely to occur and are proposed to be scoped out of the assessment for terrestrial ecology and ornithology (intertidal and onshore). However, should it not be feasible to utilise environmentally sensitive construction techniques (e.g., horizontal directional drilling), the list of survey requirements and species to be considered in the assessment for terrestrial ecology and ornithology (intertidal and onshore) will be reassessed.

7.1.6 Measures adopted as part of the project

7.1.6.1 The following measures to be adopted as part of the project are relevant to ecology and nature conservation. These measures may evolve as the engineering design and the EIA progresses.

- Site selection and micro-siting of the onshore elements of the Transmission Assets to avoid sites designated for nature conservation and habitats/areas of high ecological value, where practicable.
- Reduction in the width of the onshore export cable corridor where practicable, to reduce the impact of habitat loss and minimise impacts on habitats/areas and species of high ecological interest.
- Utilisation of environmentally sensitive construction techniques (e.g., horizontal directional drilling) where practicable to avoid impacts on sites designated for nature conservation and habitats/areas of high ecological value, particularly areas of ancient woodland, large parcels of other woodland types, and main watercourses.
- CoCP – Construction of the onshore elements of the Transmission Assets would be undertaken in accordance with the relevant best practice measures. The CoCP may include measures to control temporary lighting. Ecology best practice measures, including a Biosecurity Method Statement and Invasive Species Management Plan, will be incorporated into the CoCP. Any standalone documents supporting the assessment of terrestrial ecology and ornithology (intertidal and onshore) (e.g., protected species licences) will be referenced and/or appended to the CoCP where relevant.
- Ecological Clerk of Works (ECoW) – An ECoW will be a requirement of the CoCP. The ECoW will instruct, oversee, and manage ecology measures to be included in the CoCP during the construction of the onshore elements of the Transmission Assets. The ecology measures to be included in the CoCP will be explained to construction workers/staff during Ecology Toolbox Talks by the ECoW.
- Site Inductions for all site personnel, to ensure that all those working on site are aware of the ecological requirements, mitigation measures and the name, contact details and role of the ECoW.
- Soil Management Plan (SMP) – The SMP would include measures to ensure the protection, retention and potential enhancement (as part of any potential mitigation strategy) of soils during construction of the onshore elements of the Transmission Assets, including any potential mitigation areas required.
- Protected species licence applications (if required) which will be agreed with Natural England and include detailed method statements, mitigation strategies and post-construction monitoring and management requirements.
- Ecological Management Plan – The Ecological Management Plan will be developed in consultation with stakeholders, and other relevant technical specialists, including landscape consultants to provide a coordinated approach to management of the onshore substation site. The integrated approach will ensure that landscape mitigation proposals maximise biodiversity benefits. The plan will include best practice and enhancement measures during the operation and maintenance phase,

including the period of aftercare/establishment following construction. The plan will include details of responsibilities, confirmation of any funding commitments, monitoring, and reporting requirements. The Ecological Management Plan will be designed to be flexible to enable amendments/updates to be made in response to the results of ecological monitoring and to ensure that objectives are met. Such measures include the design and maintenance of lighting to ensure minimal disturbance to ecological receptors. The Ecological Management Plan would be developed in consultation with Natural England and relevant local authorities. If Natural England or the local authorities request an assessment of the benefit of the Transmission Assets to biodiversity, this will be undertaken using either an internal biodiversity net gain calculation tool (as recommended by NRW or the Local Authority) or The Biodiversity Metric 3.0 calculation tool (Natural England, 2021). One of these net gain calculation tools would then be used to provide evidence of the overall benefit of the Transmission Assets to biodiversity.

7.1.6.2 The requirement for mitigation measures will be dependent on the significance of effects. The requirement for, and feasibility of mitigation measures and will be consulted upon with statutory and non-statutory consultees throughout the EIA process.

7.1.6.3 Detailed requirements of the measures identified above, and additional mitigation requirements, will be developed through consultation with relevant stakeholders, including Natural England, Local Planning Authority Ecologists, the Environment Agency, the RSPB and Wildlife Trusts.

7.1.7 Proposed assessment methodology

7.1.7.1 The terrestrial ecology and ornithology (intertidal and onshore) assessment for the onshore elements of the Transmission Assets will be undertaken in accordance with the methodology set out in part 1, section 5: EIA Methodology, of this EIA Scoping Report, in addition to the following established guidance:

- Guidelines for Ecological Impact Assessment in the UK and Ireland (CIEEM, 2018)
- Guidelines for Preliminary Ecological Appraisal Second Edition (CIEEM December, 2017)
- Guidelines for Baseline Ecological Assessment (Institute of Environmental Assessment, 1995)
- Advice on Ecological Assessment of Air Quality Impacts (CIEEM, 2021)
- The Biodiversity Metric 3.0 (JP039) (Natural England, 2021).

7.1.8 Potential cumulative effects

7.1.8.1 There is potential for cumulative effects on sensitive receptors to occur when the Transmission Assets are considered together with other developments. The potential cumulative effects between the onshore elements of the Transmission Assets and other developments with respect to terrestrial ecology and ornithology (intertidal and onshore) will be considered within PEIR and the ES.

7.1.8.2 The cumulative effect assessment would be undertaken in accordance with the methodology set out in part 1, section 5: EIA Methodology, of this EIA

Scoping Report and CIEEM Guidelines for Ecological Impact Assessment in the UK and Ireland (2018).

7.1.9 Potential inter-related effects

7.1.9.1 The assessment of potential inter-related effects will be considered within the terrestrial ecology and ornithology (intertidal and onshore) ES chapter. It will include consideration of project lifetime effects and receptor-led effects in line with the approach outlined in part 1, section 5: EIA Methodology, of this EIA Scoping Report. For example:

- Geology, hydrogeology and ground conditions:
  - Impacts from the disturbance of contaminated land, spillages of contaminants or changes in groundwater levels during construction and decommissioning of the onshore elements of the Transmission Assets may impact sites designated for nature conservation and protected or notable habitats and species within the terrestrial ecology and ornithology (intertidal and onshore) study areas.
- Hydrology and flood risk:
  - Impacts on surface water quality, levels, and drainage, during the construction and decommissioning of the onshore elements of the Transmission Assets may adversely affect sites designated for nature conservation, habitats of ecological value, and protected or otherwise notable species within the terrestrial ecology and ornithology (intertidal and onshore) study areas.
- Land use and recreation:
  - Impacts on soil quality during construction and decommissioning of the onshore elements of the Transmission Assets may cause damage to habitats and reduce the success of habitat reinstatement within the terrestrial ecology and ornithology (intertidal and onshore) study areas.
- Noise and vibration:
  - Noise and vibration emissions generated during construction, operation and maintenance, and decommissioning of the onshore elements of the Transmission Assets may cause habitat disturbance and displacement of protected or notable species within the terrestrial ecology and ornithology (intertidal and onshore) study areas.
- Air quality:
  - Dust and air emissions generated during construction of the onshore elements of the Transmission Assets may impact sites designated for nature conservation and protected habitats and species within the terrestrial ecology and ornithology (intertidal and onshore) study areas.
- Waste Management:
  - Waste materials and management measures during construction, operation and maintenance, and decommissioning of the onshore elements of the Transmission Assets may cause habitat

disturbance and displacement of protected or notable species within the terrestrial ecology and ornithology study areas.

- Seascape, landscape and visual resources:
  - Light spill onto adjacent retained habitats during the construction, operation and maintenance and decommissioning of the onshore elements of the Transmission Assets may result in habitat disturbance and displacement of protected or notable species within the terrestrial ecology and ornithology (intertidal and onshore) study areas.

7.1.10 Potential transboundary impacts

7.1.10.1 A screening of transboundary impacts has been carried out and is presented in part 3, Annex A of this EIA Scoping Report. This screening exercise identified that there is no potential for transboundary impacts upon terrestrial ecology and ornithology (intertidal and onshore) due to construction, operational and maintenance, and decommissioning of the Transmission Assets.

8 Proposed technical assessments - onshore human environment

8.1 Historic environment

8.1.1 Introduction

8.1.1.1 This section of the EIA Scoping Report identifies the historic environment receptors relevant to the onshore elements of the Transmission Assets. This section also considers the potential impacts arising from the construction, operation and maintenance, and decommissioning of the Transmission Assets and identifies the proposed scope of, and methodology for, the EIA process for the historic environment.

8.1.1.2 The potential impacts on marine archaeology during the construction, operation and maintenance, and decommissioning of the offshore elements of the Transmission Assets are described in in part 2, section 5.3: Marine Archaeology, of this EIA Scoping Report.

8.1.2 Study area

8.1.2.1 Based on the refined locations for the onshore elements of the Transmission Assets, the study area for the assessment of historic environment impacts (the historic environment study area) will focus on areas landward of MLWS where potential impacts are most likely to occur on historic environment receptors.

8.1.2.2 As such, the historic environment study area to be used in the assessment will be defined as:

- The area of land to be temporarily or permanently occupied during the construction, operation and maintenance and decommissioning of the onshore elements of the Transmission Assets.
- Designated heritage assets within 1km of the landfall and onshore cable route corridor.
- Designated heritage assets within 5km of the onshore substations. This buffer allows for temporary and permanent impacts on the significance of designated heritage assets and on the character of the historic landscape. A buffer of more than 5km may be considered where there are designed views in which the substations may be visible.
- Buried archaeology and undesignated assets within the landfall site, the onshore substation location and the onshore cable route corridor with a focus on a smaller core area of 250m either side of the cable route corridor.

8.1.2.3 These distances have been based upon standard distances utilised in the assessment of similar development projects.

8.1.2.4 The historic environment study area will be reviewed and modified, if necessary, in response to refinements made to the design of the Transmission Assets and/or any additional environmental and/or design constraints identified during the EIA process.

8.1.3 Data sources

8.1.3.1 The data sources used to inform the baseline assessment will be a combination of published material which is publicly available and site visits undertaken by appropriately qualified archaeologists. An initial desk-based review has identified several data sources, which provide baseline data coverage of the Transmission Assets Scoping Boundary. These data sources are summarised in Table 8.1 below.

Table 8.1: Baseline data sources – historic environment.

Source	Summary
Historic England - The National Heritage List for England	Provided details of listed buildings, Scheduled Monuments, Battlefields, Registered Parks and Gardens, and World Heritage sites.
Historic England - Historic Environment Records (HERs)	Provided details of local archaeological sites, finds, historic buildings and historic landscapes, including Conservation Areas.
Published and unpublished historic mapping, including manuscript maps, historic Ordnance Survey (OS) maps and historic charts held by the United Kingdom Hydrographic Office.	Provided details of historic land use within the Transmission Assets Scoping Boundary.
Conservation Area Character Appraisals produced by the relevant local authorities.	Provided details of Conservation Areas, including reasons for the designation and features of architectural and historical interest.
Documentary resources from the Archaeology Data Service Website.	Provided details of local archaeological sites, finds, historic buildings and historic landscapes, including Conservation Areas.

8.1.3.2 A review of relevant documentary and archival material held in libraries and archives will be undertaken. An iterative approach will be adopted during this process to determine the scope of the above consultations/searches.

8.1.3.3 The baseline data sources identified in this EIA Scoping Report will remain under review and may be updated in response to feedback from relevant statutory and non-statutory consultees during the EIA process, or in response to new sources of information becoming available.

8.1.4 Baseline environment

8.1.4.1 Historic environment receptors which will be considered in the EIA assessment include:

- World Heritage Sites
- Listed buildings (both nationally and locally listed)
- Conservation Areas
- Registered Parks and Gardens
- Scheduled Monuments
- Designated wrecks
- Buried and above ground heritage assets.

8.1.4.2 An initial review of baseline data shows that the Transmission Assets Scoping Boundary coincides with multiple designated heritage assets. These designated heritage assets are presented in Table 8.2.

Table 8.2: Heritage assets within the Transmission Assets Scoping Boundary.

Site Name	Designation
Lytham Hall	Grade II Registered Park and Garden
Old Lea Hall Farmhouse	Grade I Listed Building
White House	Grade II Listed Building
Garage Circa 20 Metres West of Westby House	
Willow Cottage	
Fox Lane Ends Cross	
Church of St Nicholas	
Church Grove House	
Hawthorn House	
204, Lytham Road	
Ribby Hall	
Hall Cross Farmhouse	
Newton Hall Farmhouse	
8, Grange Lane	
Dagger Cottage	
Dixon's Farmhouse	
Stable Block Circa 50 Metres South of Old Lea Hall Farmhouse	
Barn Circa 120 Metres South East of Old Hall Farmhouse	
Barn Circa 75 Metres North of New Hall Farmhouse	
Hesketh Farmhouse	
138 and 140, Ratten Lane	
150, Ratten Lane	

8.1.4.3 In addition to the designated heritage assets identified in Table 8.2 above, there is one Conservation Area which coincides with the Transmission Assets Scoping Boundary. This Conservation Area is Wrea Green.

8.1.4.4 The location of designated heritage assets within the Transmission Assets Scoping Boundary is presented in Figure 8.1.

8.1.4.5 The Transmission Assets Scoping Boundary is located within an area which has the potential to contain archaeological sites, deposits and features of all periods. Palaeolithic material has been recovered from around Poulton-le-Fylde, most famously the skeleton of an elk from which several barbed flint points were recovered. A band of charcoal in the sand dunes of Starr Hills was dated to the Mesolithic period and could indicate activity of that period in this area.

8.1.4.6 Towards the western end of the Scoping Boundary is the wetland area of Lytham Moss. Worked flints of late Mesolithic or early Neolithic date have been found at various locations within this wetland, also several perforated axe-hammers of late Neolithic and early Bronze Age date. Around 30 human skulls were found at Preston Dock in 1855, along with two dug-out canoes, 60 pairs of deer antlers, 43 ox skulls, two pilot whale skulls and a bronze spear head. This material could indicate the presence of marsh dwellings in wetland areas.

8.1.4.7 Freckleton has been suggested as the location of a Roman port mentioned in historical documents, but this has never been proven, whilst a Roman road has been postulated as reaching Kirkham from the north. There was a Roman fort here so the existence of at least one connecting road appears plausible. A major Roman settlement was located at Walton-le-Dale, close to the confluence of the River Ribble and the River Darwen.

8.1.4.8 Evidence of early Medieval activity in the area includes the hoard found at Cuerdale in 1840. This contained more than 8,600 items including silver coins from the Viking kingdoms of eastern England, from the Kingdom of Wessex and from further afield (mints represented were Byzantine, Scandanavian, Islamic, Papal, North Italian and Carolingian), also English and Carolingian jewellery The hoard appears to have been buried around AD 903-910.

8.1.4.9 A monastic cell was founded at Lytham in the late 12th century, and several of the settlements in this area has their origins in the Medieval period if not earlier. Transport networks also developed throughout this period. A motte and bailey castle was established at Penwortham which is still present with the churchyard, close to the river.

8.1.4.10 Drainage of the wetlands may have started in the Medieval period but was much more extensive in the Post-medieval period with some extensive inland lakes being completely drained. The resultant land was highly fertile and is still used for arable farming.

8.1.4.11 It is also noted that there is the potential for important archaeological and paleoenvironmental remains to be present within the intertidal areas in the vicinity of the landfall.

Future baseline conditions

8.1.4.12 The EIA process will consider the existing baseline conditions within the study area, and future baseline conditions (as far as reasonably practicable) in accordance with the methodology set out in part 1, section 5 (see section 5.7.2 for the approach to consideration of future baseline conditions).

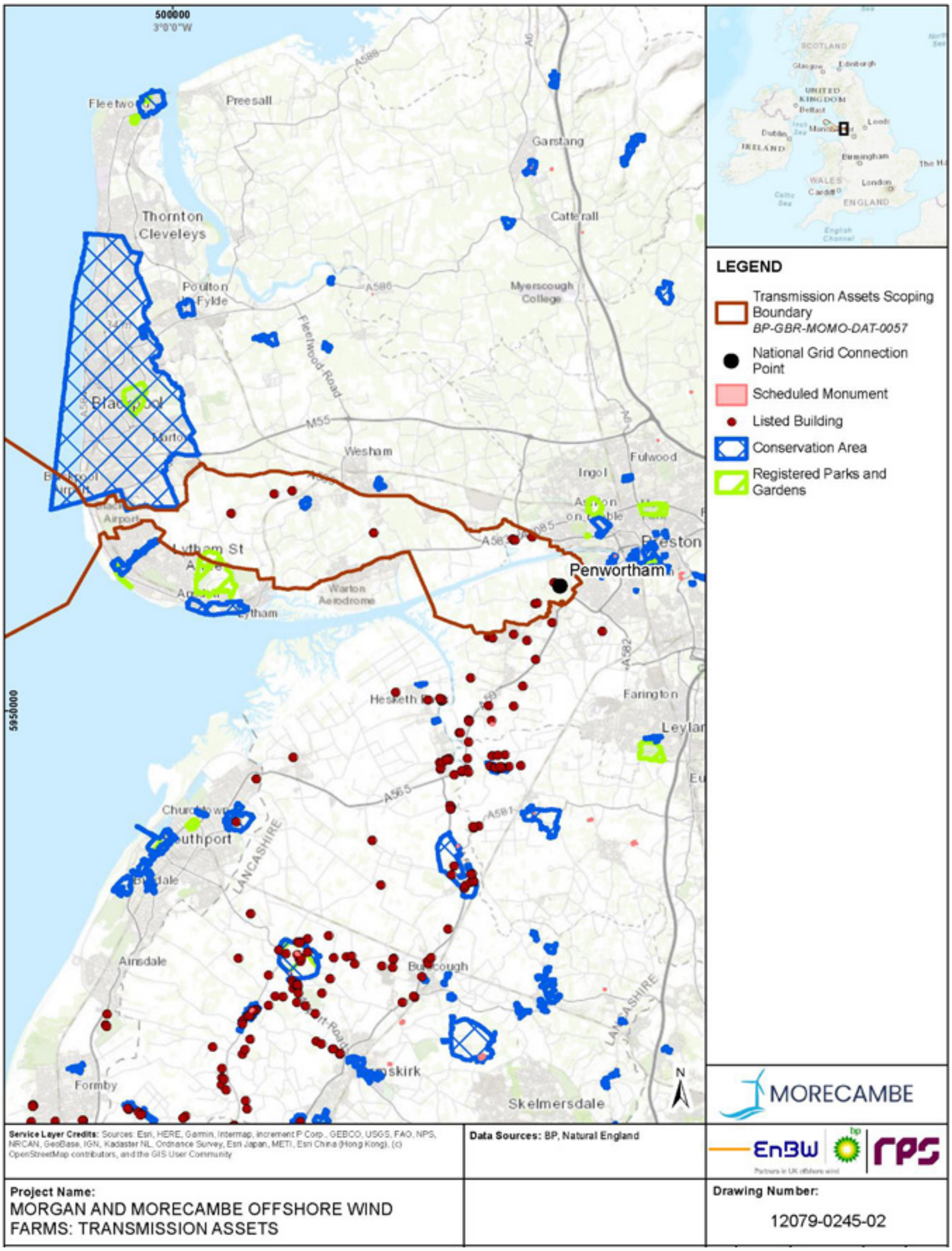


Figure 8.1: Designated historic assets within the Transmission Assets Scoping Boundary.

8.1.5 Potential project impacts

8.1.5.1 A range of potential impacts on the historic environment have been identified which may occur during the construction, operation and maintenance, and decommissioning phases of the onshore elements of the Transmission Assets.

8.1.5.2 The impacts that have been scoped into the assessment are outlined in Table 8.3 together with a description of any additional data collection (e.g., site-specific surveys) and supporting analyses that will be required to enable a full assessment of the impacts.

8.1.5.3 Potential impacts scoped out of the assessment are presented in Table 8.4, with justification for why the impact should be scoped out.

Table 8.3: Impacts proposed to be scoped into the assessment for historic environment (project phase refers to construction (C), operation and maintenance (O) and decommissioning (D)).

Impact	Project phase			Justification	Data collection and analysis required to characterise the baseline environment	Summary of proposed approach to assessment
	C	O	D			
The impact of construction of the onshore elements of the Transmission Assets on buried archaeology resource.	✓	×	×	Activities required for the construction of the onshore elements of the Transmission Assets (e.g., excavation) could result in damage or the permanent loss of buried archaeological resource.	Above ground and below ground heritage assets within the historic environment study area will be identified using a desk-based assessment. The desk-based assessment will be undertaken in accordance with the Chartered Institute for Archaeologists' Standard and guidance for historic environment desk-based assessments (CIfA, 2014). Based on the results of the desk-based assessment and subject to consultation with Local Planning Authority archaeological advisors, the following surveys may be undertaken if appropriate: a walkover by experienced and qualified archaeologist of all designated historic assets; agreement of subsequent fieldwork potentially including targeted geophysical survey, borehole survey and targeted trial trenching. The scope of field surveys will be agreed with the Local Planning Authority archaeological advisors and Historic England prior to any works being undertaken.	The impact of construction on buried archaeology resources will be assessed qualitatively, in accordance with the guidance for historic environment desk-based assessments (CIfA, 2014), Principles of cultural heritage impact assessment guidance (IEMA, IHBC, CiFA, 2021) and DMRB LA 106 - Cultural heritage assessment (Highways England et al 2019).
The impact of construction and decommissioning of the onshore elements of the Transmission Assets on the setting of above ground heritage assets.	✓	×	✓	Activities required for the construction and decommissioning of the onshore elements of the Transmission Assets could result in temporary impacts on the setting of above ground heritage assets.		The impact of construction and decommissioning on the setting of above ground heritage assets will be assessed qualitatively, in accordance with the guidance for historic environment desk-based assessments (CIfA, 2014), Principles of cultural heritage impact assessment guidance (IEMA, IHBC, CiFA, 2021) and DMRB LA 106 - Cultural heritage assessment (Highways England et al 2019).
The impact of operation and maintenance of the onshore substations on the setting of above ground heritage assets.	×	✓	×	Operation of the onshore substations could result in long-term but reversible impacts on the setting of above ground heritage assets.		The impact of operation and maintenance of the onshore substations on the setting of above ground heritage assets will be assessed qualitatively, in accordance with the guidance for historic environment desk-based assessments (CIfA, 2014), Principles of cultural heritage impact assessment guidance (IEMA, IHBC, CiFA, 2021) and DMRB LA 106 - Cultural heritage assessment (Highways England et al 2019).
The impact of construction and decommissioning of the onshore elements of the Transmission Assets on the	✓	×	✓	Construction and decommissioning of the onshore elements of the Transmission Assets could result in		The impact of construction and decommissioning on the character of the historic landscape will be assessed qualitatively, in accordance with the

Impact	Project phase			Justification	Data collection and analysis required to characterise the baseline environment	Summary of proposed approach to assessment
	C	O	D			
character of the historic landscape				temporary impacts on the character of the historic landscape.		guidance for historic environment desk-based assessments (CIfA, 2014), Principles of cultural heritage impact assessment guidance (IEMA, IHBC, CiFA, 2021) and DMRB LA 106 - Cultural heritage assessment (Highways England et al 2019).
The impact of operation and maintenance of the onshore substations on the character of the historic landscape	×	✓	×	Operation of the onshore substations could result in long-term but reversible impacts on the character of the historic landscape.		The impact of operation of the onshore substations on the character of the historic landscape will be assessed qualitatively, in accordance with the guidance for historic environment desk-based assessments (CIfA, 2014), Principles of cultural heritage impact assessment guidance (IEMA, IHBC, CiFA, 2021) and DMRB LA 106 - Cultural heritage assessment (Highways England et al 2019).

Table 8.4: Impacts proposed to be scoped out of the project assessment for historic environment.

Impact	Justification
The impact on buried archaeological resource (damage and permanent loss) arising from the operation and maintenance and decommissioning of the onshore elements of the Transmission Assets.	Activities associated with operation and maintenance and decommissioning of the onshore elements of the Transmission Assets will not require additional land take and are unlikely to damage or result in the permanent loss of buried archaeological resource. Therefore, the potential impact on buried archaeological resource during operation and maintenance and decommissioning of the onshore elements of the Transmission Assets is unlikely to result in significant effects and is proposed to be scoped out of the assessment for historic environment.
The impact on the setting of above ground heritage assets arising from operation and maintenance of the onshore elements of the Transmission Assets (excluding the onshore substations), including the onshore export cables and associated infrastructure.	Activities associated with operation and maintenance of the onshore export cables/landfall and associated infrastructure are unlikely to impact the setting of above ground heritage assets. Any impacts would be temporary and of very low magnitude. Therefore, the potential impact on the setting of above ground heritage assets during operation and maintenance of the onshore export cable and associated infrastructure is unlikely to result in significant effects and is proposed to be scoped out of the assessment for historic environment.

8.1.6 Measures adopted as part of the project

8.1.6.1 The following measures adopted as part of the project are relevant to the historic environment. These measures may evolve as the engineering design and the EIA progresses.

- A key mitigation measure would be the micro-siting of the onshore cable route and substation site selection process. This will include avoidance of important heritage assets, where practicable.
- CoCP – The CoCP may include potential ‘no-strip’ zones to protect buried archaeological remains. The CoCP may include measures to control temporary lighting and manage the reinstatement of land associated with the onshore export cable and temporary construction works areas.
- Landscape Management Plan – The Landscape Management Plan may include proposals for landscape and biodiversity planting, which may contribute to avoiding or reducing the potential visual impact of the onshore substations on the settings of above ground heritage receptors.
- Onshore Written Scheme of Investigation (WSI) – The onshore WSI will identify the scope and extent of further archaeological survey works (e.g., trial trenching, geophysical survey, borehole survey) if required.

8.1.6.2 Any archaeological works, including trial trenching will be undertaken in accordance with a Written Scheme of Investigation, agreed with the County Archaeologist.

8.1.6.3 The requirement for and feasibility of any mitigation measures will be dependent on the significance of effects and will be consulted upon with statutory and non-statutory consultees throughout the EIA process.

8.1.6.4 Requirements for additional historic environment mitigation measures will be determined through discussions with the Local Planning Authority archaeological advisors and Historic England.

8.1.7 Proposed assessment methodology

8.1.7.1 The assessment for the historic environment will consider the overall assessment methodology set out in part 1, section 5: EIA Methodology, of this EIA Scoping Report, in addition to the following established guidance where appropriate:

- DMRB LA 106 - Cultural heritage assessment (Highways England et al 2019)
- Standard and guidance for historic environment desk-based assessments (CIfA, 2014)
- National Planning Policy Framework (NPPF), section 16. Conserving and enhancing the historic environment (MHCLG, 2021)
- Planning Practice Guidance, Historic Environment (MHCLG, 2019)
- Principles of cultural heritage impact assessment guidance (IEMA, IHBC, CiFA, 2021)
- The Historic Environment in Local Plans: Historic Environment Good Practice in Planning 1 (Historic England, 2015)

- Managing Significance in Decision-Taking in the Historic Environment: Historic Environment Good Practice in Planning 2 (Historic England, 2015)
- The Setting of Heritage Assets: Historic Environment Good Practice in Planning 3 (Historic England, 2017)
- Code of Conduct (CIfA, 2019)
- Scheduled Monuments & nationally important but non-scheduled monuments (Department for Culture Media & Sport, 2013).

8.1.7.2 Despite being principally developed for the assessment of highway projects, the DMRB also provides guidance applicable to the assessment of other linear schemes, such as the onshore elements of the Transmission Assets (e.g., onshore export cables).

8.1.7.3 Although DMRB LA 106 (The Highways Agency et al 2019) has since been withdrawn and replaced by DMRB LA 106 - Cultural heritage assessment (Highways England et al 2020), it is considered that the 2019 version of DMRB LA 106 contains information which is of greater use to the historic environment assessment for the Transmission Assets.

8.1.8 Potential cumulative effects

8.1.8.1 There is potential for cumulative effects on sensitive receptors to occur when the Transmission Assets are considered with other developments. The potential cumulative effects between the onshore elements of the Transmission Assets and other developments with respect to the historic environment will be considered within the ES.

8.1.8.2 The cumulative effect assessment would be undertaken in accordance with the methodology set out in part 1, section 5: EIA Methodology, of this EIA Scoping Report.

8.1.9 Potential inter-related effects

8.1.9.1 The assessment of potential inter-related effects will be considered in the historic environment ES chapter. It will include consideration of project lifetime effects and receptor-led effects, in line with the approach outlined in part 1, section 5: EIA Methodology, of this EIA Scoping Report. For example:

- Seascape, landscape and visual resources:
  - Landscape and visual impacts during construction, operation and maintenance, and decommissioning of the onshore elements of the Transmission Assets may impact above ground heritage assets located within the historic environment study area. In addition, the Zone of Theoretical Visibility (ZTV) determined as part of the seascape, landscape and visual resources assessment will be used to inform the historic environment study area.
- Noise and vibration:
  - Noise and vibration impact during construction, operation and maintenance, and decommissioning of the onshore elements of the Transmission Assets may impact above ground historic assets and

below ground and buried archaeology located within the historic environment study area.

8.1.10 Potential transboundary impacts

8.1.10.1 A screening of transboundary impacts has been carried out and is presented in part 3, Annex A of this EIA Scoping Report. This screening exercise identified that there is no potential for transboundary impacts upon historic environment resources due to construction, operational and maintenance, and decommissioning impacts of the Transmission Assets.

8.2 Land use and recreation

8.2.1 Introduction

8.2.1.1 This section of the EIA Scoping Report identifies the land use and recreation receptors relevant to the onshore elements of the Transmission Assets. This section also considers the potential impacts arising from the construction, operation and maintenance, and decommissioning of the Transmission Assets and identifies the proposed scope of, and methodology for, the EIA process for land use and recreation.

8.2.2 Study area

8.2.2.1 The study area to be used for the assessment of land use and recreation (the land use and recreation study area) will be defined as land landward of MHWS to be temporarily or permanently occupied during construction, operation and maintenance, and decommissioning of the onshore elements of the Transmission Assets.

8.2.2.2 The recreational study area will also include land immediately adjacent to the onshore elements of the Transmission Assets or linking to it and any areas that may be required to mitigate for any temporary or permanent effects arising from the Transmission Assets.

8.2.2.3 The agricultural study area will also include the areas of wider agricultural land holdings associated with any land affected by the Transmission Assets.

8.2.2.4 With regard to the amenity of recreational resources, the potential impact of the onshore elements of the Transmission Assets (e.g., traffic, noise, vibration, air quality, visual effects) will be considered in relevant topic chapters of the ES.

8.2.2.5 The land use and recreation study area will be reviewed and modified, if necessary, in response to refinements made to the design of the Transmission Assets and/or any additional environmental and/or design constraints identified during the EIA process.

8.2.3 Data sources

8.2.3.1 The data sources used to inform the baseline assessment will include published material, which is publicly available. An initial desk-based review has identified several data sources that provide baseline data coverage of the Transmission Assets Scoping Boundary. These data sources are summarised in Table 8.5 below.

Table 8.5: Baseline data sources – land use and recreation.

Source	Summary
BGS Geology of Britain Viewer (classic)	Provides information regarding superficial and bedrock geology.
Definitive Public Rights of Way (PRoW) maps produced by the relevant local authorities	Provides information regarding the location of PRoW.
Department for Environment, Food & Rural Affairs (Defra) Agriculture (2016) Local authority level breakdown of cropping and livestock areas	Provides detailed annual statistics on the structure of the agricultural industry, including land and crop areas, livestock populations and agricultural workforce estimates.
Defra MAGIC Interactive Mapping System Agricultural Land Classification – Post 1988 (England) (2021);	Provides information regarding soil types and agricultural land.
High resolution satellite imagery	Provides information regarding the location of recreational resources.
Natural England Agricultural Land Classification Map North West Region (ALC002) (2018);	Provides information regarding soil types and agricultural land.
OS mapping data	Provides mapping data for land and recreational resources.
Soil Survey of England and Wales – Soils of Northern England Sheet 1 (1:250,000);	Provides information regarding soil types and agricultural land.
Soil Survey of England and Wales – Soils of the Preston District of Lancashire (1966)	Provides information regarding soil types and agricultural land.
Soil Survey of England and Wales – Soils of the South-West Lancashire Coastal Plain (1967)	Provides information regarding soil types and agricultural land.
Sustrans Interactive Mapping System Great Britain: National Cycle Network Map	Provides information regarding the location of the National Cycle Network.

8.2.3.2 In addition to the desk-based sources detailed above, site visits would be undertaken to verify the data. These surveys would be undertaken to establish the specific characteristics of agricultural land and soils, the nature of farm holdings affected and to provide an understanding of the use of recreational resources within and linking to the land use and recreation study area.

8.2.3.3 All surveys will be subject to gaining land access. Where access to land cannot be reasonably achieved, these surveys will be supplemented using secondary data sources and consultation with relevant stakeholders where possible.

8.2.3.4 The baseline data sources identified in this EIA Scoping Report will remain under review and may be updated in response to feedback from relevant statutory and non-statutory consultees during the EIA process, or in response to new sources of information becoming available.

8.2.4 Baseline environment

8.2.4.1 The assessment will consider the potential land use and recreation impacts of the onshore elements of the Transmission Assets on the following sensitive receptors:

- Soil types and patterns of soils which are located within the land use and recreation study area.
- The quality of agricultural land within the land use and recreation study area, in accordance with the Ministry of Agriculture, Fisheries and Food Agricultural Land Classification (ALC) Guidelines (MAFF, 1988), including 'best and most versatile' Grade 1, 2 and 3a ALC land.
- Farm holdings and/or enterprises which are located within the land use and recreation study area.
- Recreational resources (e.g., recreational facilities, areas of public access and PRoW located within the land use and recreation study area).
- Users of recreational resources, including pedestrians, cyclists, equestrians, and other recreational users.

Agricultural land

8.2.4.2 The provisional ALC mapping indicates that land within the Transmission Assets Scoping Boundary predominantly comprises Grade 2 (very good) and Grade 3 (good to moderate) land with comparatively smaller areas of Grade 4 (poor quality), Non-agricultural and Urban land.

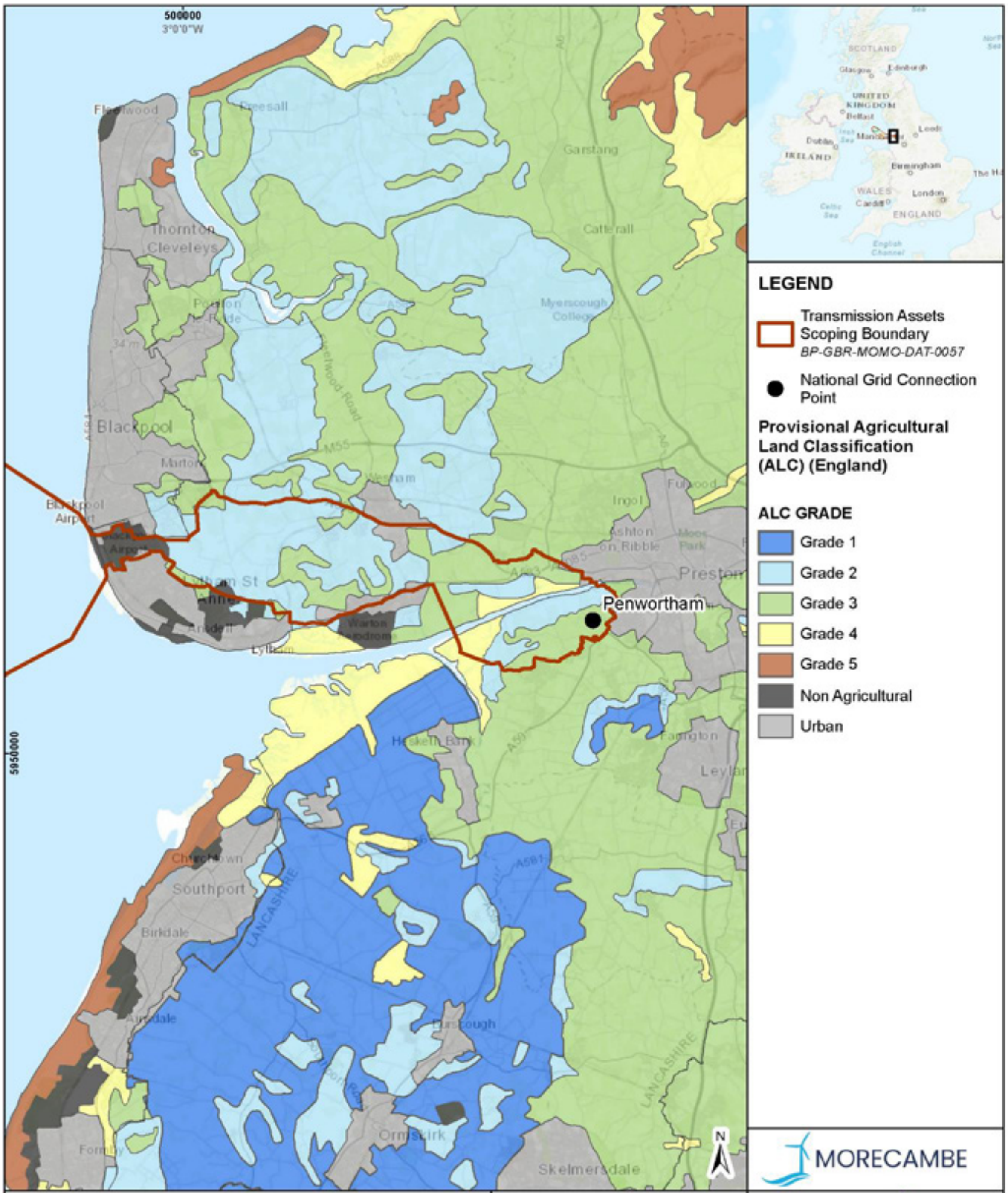
8.2.4.3 The quality of agricultural land within the Transmission Assets Scoping Boundary, according to the provisional ALC mapping, is presented in Figure 8.2

8.2.4.4 Detailed soil mapping and ALC survey work has also been undertaken at some locations within the Transmission Assets Scoping Boundary and will be taken into account within the EIA process.

8.2.4.5 The quality of agricultural land within the Transmission Assets Scoping Boundary, according to the detailed soil mapping and detailed ALC survey, is presented in Figure 8.3.

8.2.4.6 The Soil Survey of England and Wales (undertaken in the 1960s) identified large swathes of peaty and organic soils, which are depicted as areas of Grades 1 and 2 land on the provisional ALC mapping. Detailed ALC surveys of this region (carried out in 1988) indicate that these areas comprise typically Grade 2 and subgrades 3a and 3b land, where the peaty and organic materials are still present.

8.2.4.7 The agricultural land use within the Transmission Assets Scoping Boundary is dominated by intensive arable production with some vegetable production.



Service Layer Credits: Sources: Esri, HERE, Garmin, Intermap, increment P Corp., GEBCO, USGS, FAO, NPS, NRCAN, GeoBase, IGN, Kadaster NL, Ordnance Survey, Esri Japan, METI, Esri China (Hong Kong), (c) OpenStreetMap contributors, and the GIS User Community	Data Sources: BP, DEFRA	
Project Name: MORGAN AND MORECAMBE OFFSHORE WIND FARMS: TRANSMISSION ASSETS		Drawing Number: 12079-0246-02

Figure 8.2: Quality of agricultural land within the Transmission Assets Scoping Boundary, according to the Predictive ALC viewer.

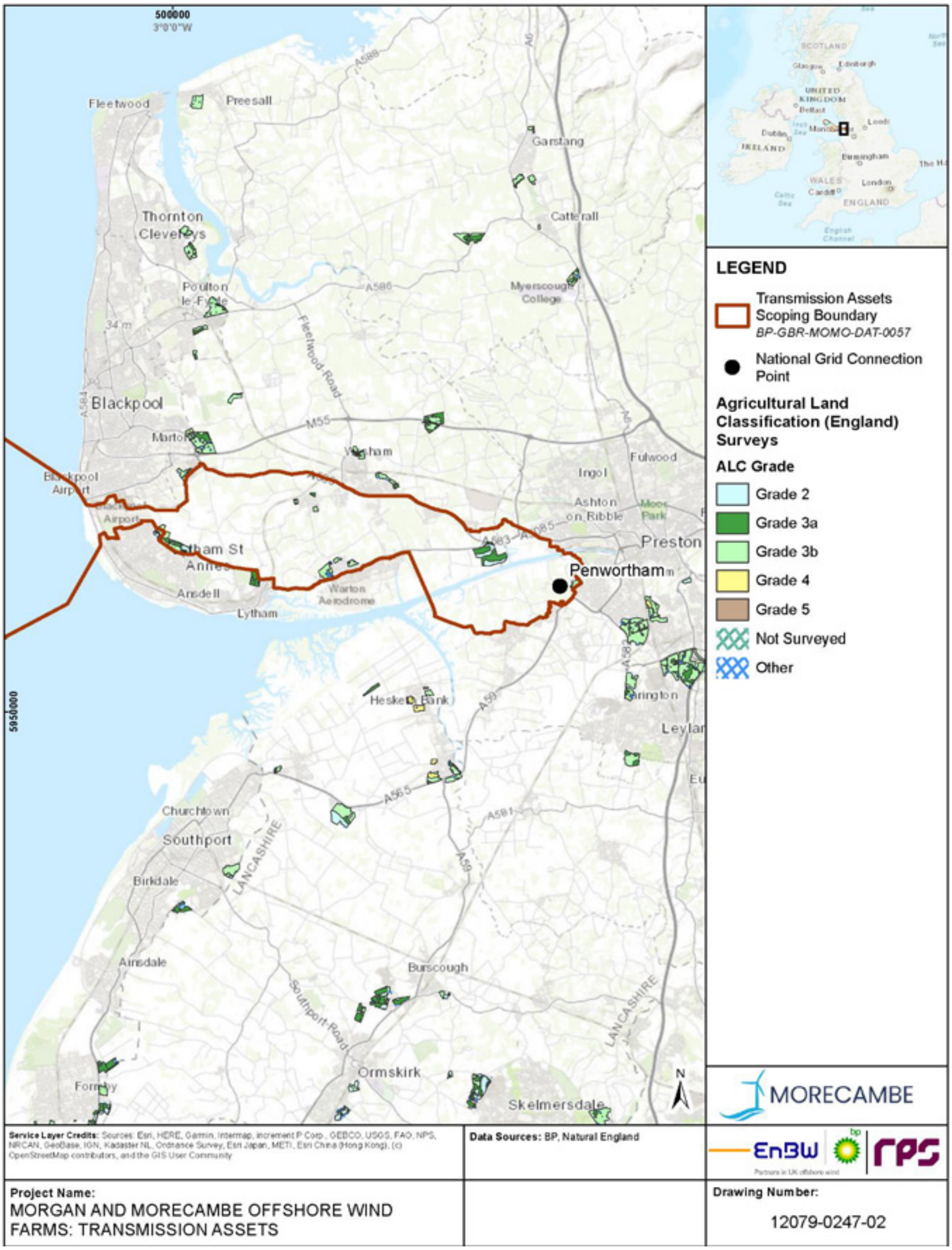


Figure 8.3: Quality of agricultural land within the Transmission Assets Scoping Boundary, according to the detailed ALC survey work.

Access land, common land and village greens

8.2.4.8 There is one area of Access and Registered Common Land as defined by the Countryside and Rights of Way Act (2000) within the Transmission Assets Scoping Boundary. This area of land is located to the west of the city of Preston and adjacent to the northern extent of the River Ribble.

8.2.4.9 The location of Access and Registered Common Land within the Transmission Assets Scoping Boundary is presented in Figure 8.4.

Public rights of way and cycle routes

8.2.4.10 No National Trails are located within the Transmission Assets Scoping Boundary, however, there are numerous PRoWs including the following promoted routes:

- Lancashire Coastal Way, which is long distance footpath and routes along the coast at the town of Lytham St Annes.
- Ribble Way, which is a long-distance footpath and routes along the River Ribble between the towns of Preston and Longton.

8.2.4.11 In addition, the following National Cycle Network routes are located within the Transmission Assets Scoping Boundary:

- Route 62:
  - This route travels on-road along the coast at Lytham St Anne's and then routes inland to the town of Kirkham. It then continues south from the city of Preston, utilising both a traffic-free and on-road route to the town of Southport.
- Route 90:
  - This route travels on-road north from the village of Warton through the villages of Bryning and Wrea Green and continues northwards until joining Route 62 at the village of Staining.
- Route 622:
  - This route encircles the city of Preston and is known locally as the 'Preston Guild Wheel'. It utilises both a traffic free and on-road route around Preston.

8.2.4.12 In addition, there are several on-road cycle routes located within the Transmission Assets Scoping Boundary which connect to Route 62, but do not form part of the National Cycle Network.

8.2.4.13 The location of PRoWs and National Cycle Network routes within the Transmission Assets Scoping Boundary is presented in Figure 8.4.

Other recreational resources

8.2.4.14 Other recreational resources located within the Transmission Assets Scoping Boundary include:

- The coastal dunes and beach at Lytham St Anne's, including the Starr Hill to St Annes Dunes System Local Nature Reserve (LNR).
- St Anne's Old Links Golf Club.

8.2.4.15 The Transmission Assets Scoping Boundary also coincides with Blackpool Airport, which is owned by Blackpool Council and provides a range of aviation and airport services, including executive travel and flight training.

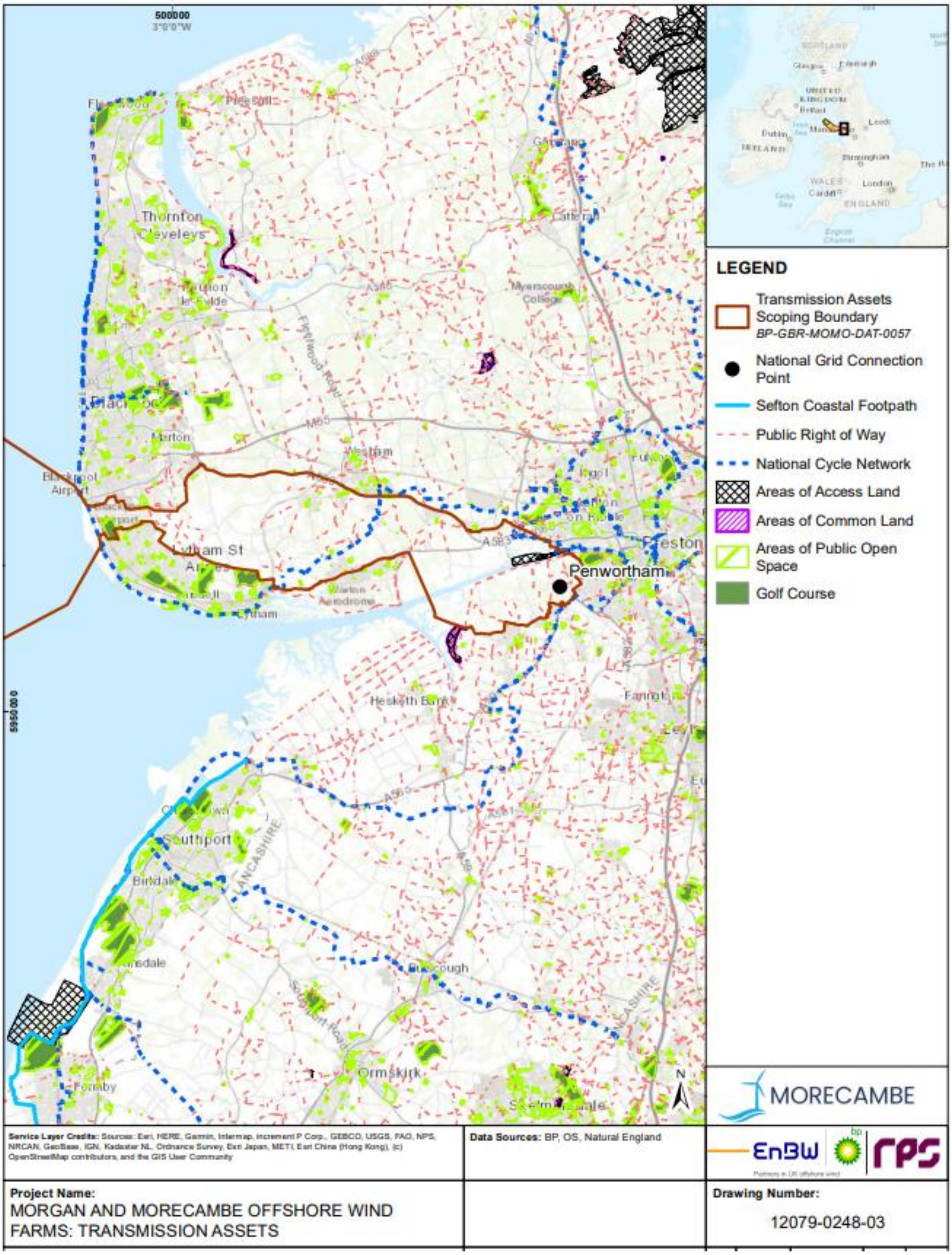


Figure 8.4: Land use and recreation receptors within the Transmission Assets Scoping Boundary.

Future baseline conditions

8.2.4.16 The EIA process will consider the existing baseline conditions within the study area, and future baseline conditions (as far as reasonably practicable) in accordance with the methodology set out in part 1, section 5 (see section 5.7.2 for the approach to consideration of future baseline conditions).

8.2.5 Potential project impacts

8.2.5.1 A range of potential impacts on land use and recreation have been identified which may occur during the construction, operation and maintenance, and decommissioning phases of the Transmission Assets.

8.2.5.2 The impacts that have been scoped into the assessment are outlined in Table 8.6 together with a description of any additional data collection (e.g., site-specific surveys) and supporting analyses that will be required to enable a full assessment of the impacts.

8.2.5.3 Potential impacts scoped out of the assessment are presented in Table 8.7, with justification for why the impact should be scoped out.

Table 8.6: Impacts proposed to be scoped into the assessment for land use and recreation (project phase refers to construction (C), operation and maintenance (O) and decommissioning (D)).

Impact	Project phase			Justification	Data collection and analysis required to characterise the baseline environment	Summary of proposed approach to assessment
	C	O	D			
The permanent loss of agricultural land, including Best and Most Versatile (BMV) land, arising from the construction of the onshore elements of the Transmission Assets.	✓	×	×	Construction of the substations (and, where applicable, very small areas associated with inspection covers for the onshore cable corridor and landfall) would result in a permanent impact as a result of land take. Other elements of the construction phase would result only in temporary impacts (considered below).	The quality and area of agricultural land within the land use and recreation study area to be permanently lost as a result of construction will be determined using desk-based analysis and ALC surveys (where existing baseline data provides insufficient coverage and where access is possible). The desk-based analysis and ALC surveys will be undertaken in accordance with the MAFF Agricultural Land Classification (ALC) Guidelines (1988). The presence of peaty and organic soil materials will also be determined through the desk-based analysis and the ALC surveys targeted to consider soil characteristics within identified soil types. In addition, the impact on farm holdings and farming operations within the land use and recreation study area will be informed through direct discussions with farmers and their representatives	The impact of loss of land and disruption and reduced access to agricultural land on farming operations will be assessed in accordance with the Design Manual for Roads and Bridges (DMRB) – LA 109 Geology and Soils (Highways England et al., 2019) and DMRB – LA 112 Population and Human Health (Highways England et al., 2020). The assessment will also consider information provided during discussions with farmers and/or representatives where relevant.
The temporary impact of disruption and reduced access to agricultural land during construction and decommissioning of the onshore elements of the Transmission Assets.	✓	×	✓	Construction and decommissioning of the onshore elements of the Transmission Assets would cause disruption to agricultural land quality, soils (including peaty and organic soil types) and farming operations and reduce the area of land available to farmers during the construction and decommissioning phase.	The quality and area of agricultural land within the land use and recreation study area to be temporarily lost during construction will be determined using desk-based analysis and targeted ALC surveys (where existing baseline data provides insufficient coverage and where access is possible). The desk-based analysis and ALC survey will be undertaken in accordance with the MAFF Agricultural Land Classification (ALC) Guidelines (1988).	The impact of temporary disruption and reduced access to agricultural land on farming operations will be assessed in accordance with the DMRB – LA 109 Geology and Soils (Highways England et al., 2019) and DMRB – LA 112 Population and Human Health (Highways England et al., 2020). The assessment will also consider information provided during discussions with farmers and/or representatives where relevant.

Impact	Project phase			Justification	Data collection and analysis required to characterise the baseline environment	Summary of proposed approach to assessment
	C	O	D			
					The presence of peaty and organic soil materials will also be determined through the desk-based analysis and the ALC surveys targeted to consider soil characteristics within identified soil types. In addition, the impact on farm holdings and farming operations within the land use and recreation study area will be informed through direct discussions with farmers and their representatives.	
The impact of disruption and reduced access to recreational resources (e.g., access land, common land and village greens, PRoW, cycle routes, other recreational resources) during construction and decommissioning of the onshore elements of the Transmission Assets.	✓	×	✓	Construction and decommissioning of the onshore elements of the Transmission Assets could cause disruption and reduce access to recreational resources during the construction and decommissioning phase.	Recreation resources located within the land use and recreation study area will be identified using desk-based analysis. In addition, targeted on-site surveys may be undertaken (where required) to establish the relative importance of recreational resources within the land use and recreation study area to the wider community.	The impact of disruption and reduced access to recreational resources will be assessed qualitatively, utilising professional judgement where required to determine the impact magnitude and sensitivity of identified receptors. The assessment will be undertaken in accordance with methodology set out in part 1, section 5: EIA Methodology of this EIA Scoping Report and will also consider information acquired from targeted on-site surveys where relevant.

Table 8.7: Impacts proposed to be scoped out of the project assessment for land use and recreation.

Impact	Justification
The impact of disruption and reduced access to agricultural land during operation and maintenance of the onshore elements of the Transmission Assets.	Impacts arising during of the operation of the onshore elements of the Transmission Assets will be limited to maintenance and repair activities (e.g., investigation of onshore export cables) and would be small in magnitude, short term and infrequent. In addition, any land impacted during maintenance and repair activities would be reinstated to its original condition. Any permanent effects on agricultural land would occur would during the construction phase and would be assessed as part of the assessment of effects for construction (as set out in the table above). Therefore, the potential impact on agricultural land during operation and maintenance of the onshore elements of the Transmission Assets is unlikely to result in significant effects and is proposed to be scoped out of the project assessment for land use and recreation.

Impact	Justification
The impact of disruption and reduced access to recreation resources (e.g., access land, common land and village greens, PRoW, cycle routes, other recreational resources) during operation and maintenance of the onshore elements of the Transmission Assets.	Impacts arising during of the operation of the onshore elements of the Transmission Assets will be limited to maintenance and repair activities (e.g., investigation of onshore export cables) and would be small in magnitude, short term and infrequent. Therefore, the potential impact on recreation resources during operation and maintenance of the onshore elements of the Transmission Assets is unlikely to result in significant effects and is proposed to be scoped out of the project assessment for land use and recreation. No common land is located within the Transmission Assets Scoping Boundary.

8.2.6 Measures adopted as part of the project

8.2.6.1 The following measures adopted as part of the project are relevant to land use and recreation. These measures may evolve as the engineering design and the EIA progresses.

- CoCP and CTMP – The measures to address any requirement to temporarily divert a public right of way or any other recreational route would be included in the CoCP. In addition, the CoCP and Construction Traffic Management Plan (CTMP) would set out any traffic management measures/procedures required to mediate the interface between construction vehicles and members of the public accessing recreational resources.
- CoCP - Construction of the onshore elements of the Transmission Assets would be undertaken in accordance with the relevant best practice measures as recommended in the Construction Code of Practice for the Sustainable Use of Soils on Construction Sites (Defra, 2009) and the Good Practice Guide for Handling Soils in Mineral Workings (Institute of Quarrying, 2021).

8.2.6.2 The requirement for and feasibility of any mitigation measures will be dependent on the significance of effects and will be consulted upon with statutory and non-statutory consultees throughout the EIA process.

8.2.7 Proposed assessment methodology

8.2.7.1 The land use and recreation assessment for the onshore elements of the Transmission Assets will be undertaken in accordance with the methodology set out in part 1, section 5: EIA Methodology, of this EIA Scoping Report, in addition to the following established guidance:

- Agricultural Land Classification of England and Wales. Revised guidelines and criteria for grading the quality of agricultural land (MAFF, 1988).
- DMRB LA 109 - Geology and Soils (Highways England, Transport Scotland, Welsh Government, Department for Infrastructure, 2019)
- DMRB LA 112 - Population and Human Health (Highways England, Transport Scotland, Welsh Government, Department for Infrastructure, 2020).
- A New Perspective on Land and Soil in Environmental Impact Assessment, IEMA (2022).

8.2.7.2 Although principally developed for the assessment of highway projects, the DMRB also provides guidance applicable to the assessment of other linear schemes, including the onshore elements of the Transmission Assets (e.g., onshore export cables).

8.2.8 Potential cumulative effects

8.2.8.1 There is potential for cumulative effects on sensitive receptors to occur when the Transmission Assets are considered together with other developments. The potential cumulative effects between the Transmission Assets and other developments with respect to land use and recreation will be considered within the ES.

8.2.8.2 The cumulative effect assessment would be undertaken in accordance with the methodology set out in part 1, section 5: EIA Methodology, of this EIA Scoping Report.

8.2.9 Potential inter-related effects

8.2.9.1 The assessment of potential inter-related effects will be considered in the land use and recreation ES chapter. It will include consideration of project lifetime effects and receptor-led effects, in line with the approach outlined in part 1, section 5: EIA Methodology, of this EIA Scoping Report. For example:

- Seascape, landscape and visual resources:
  - Construction and operation of the onshore elements of the Transmission Assets may impact the visual amenity of PRoWs and other recreational resources within the land use and recreation study area.
- Traffic and transport:
  - Additional vehicle movements required to facilitate construction of the onshore elements of the Transmission Assets may impact the accessibility of PRoWs and other recreational resources.
- Noise and vibration:
  - Noise generated during the construction and operation of the onshore elements of the Transmission Assets may impact the amenity of PRoWs and other recreational resources within the land use and recreation study area.
- Socio-economics and community:
  - Construction of the onshore elements of the Transmission Assets may cause disruption and reduce the area of land available to farmers, which may impact the economic viability of farming operations within the land use and recreation study area.

8.2.10 Potential transboundary impacts

8.2.10.1 A screening of transboundary impacts has been carried out and is presented in part 3, Annex A of this EIA Scoping Report. This screening exercise identified that there is no potential for transboundary impacts upon land use and recreation due to construction, operational and maintenance, and decommissioning impacts of the Transmission Assets.

8.3 Traffic and transport

8.3.1 Introduction

8.3.1.1 This section of the EIA Scoping Report sets out how the traffic and transport receptors relevant to the onshore elements of the Transmission Assets will be identified and the proposed approach to assessment. This section also considers the potential impacts arising from the construction, operation and maintenance, and decommissioning of the onshore elements of the Transmission Assets and identifies the proposed scope and scale of the EIA for traffic and transport.

8.3.1.2 A Transport Assessment will be prepared to support the EIA process. The Transport Assessment and the EIA would utilise the same baseline data, however, the Transport Assessment will be prepared in accordance with its own relevant guidance and best practice and will be subject to a separate scoping exercise with the relevant highway authorities. It will focus on the operational capacity of the highway network and the impact upon the operation and performance of key highway links and junctions.

8.3.2 Study area

8.3.2.1 Based on the refined locations for the onshore elements of the Transmission Assets, the study area for the assessment of traffic and transport (the traffic and transport study area) will focus on areas (landward of MHWS) where potential impacts are most likely to occur. This includes areas located near construction sites and access routes, the Local Road Network (LRN) and Strategic Road Network (SRN) to be used by construction traffic and will be defined using the ‘Rule 1’ and ‘Rule 2’ methodology set out in Section 8.3.8.

8.3.2.2 In using this methodology, the traffic and transport study area for transmission assets will also include additional temporary accesses and/or road improvements required to facilitate the construction of the onshore elements of the Transmission Assets.

8.3.2.3 The final location of the onshore elements of the Transmission Assets and the forecast construction traffic demand along the LRN and SRN is not yet known and so the study area cannot be defined at this time. In advance of this, an initial traffic and transport study area has been defined using judgement based upon the expected routes to be used by construction vehicles before which they would dissipate to levels where impacts would be not significant (Figure 8.5).

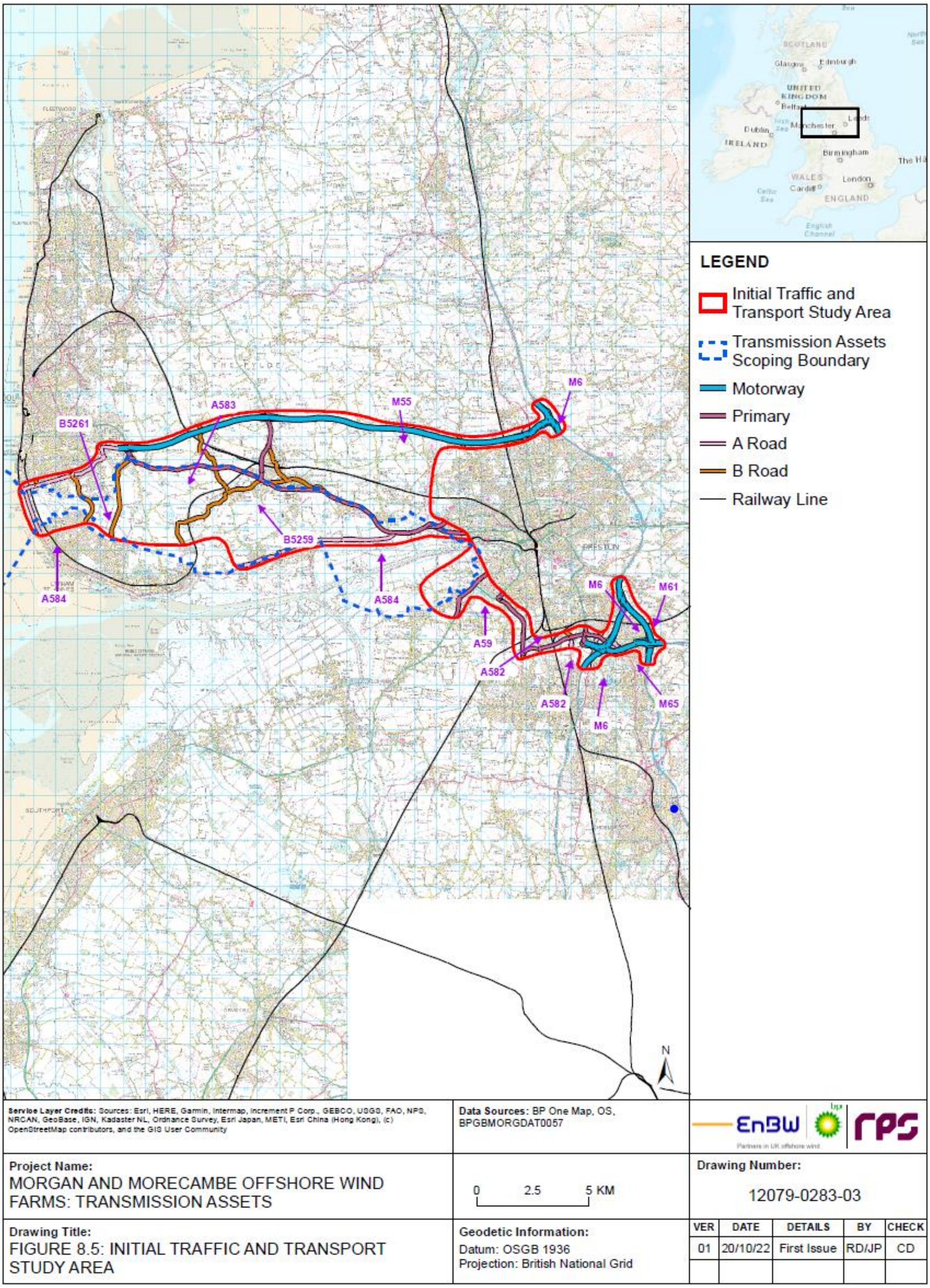


Figure 8.5: Initial Traffic and Transport Study Area

8.3.2.4 Agreement will be sought with the relevant highway authorities regarding any additional parts of the LRN and SRN that may need to be considered in the initial traffic and transport assessment.

8.3.2.5 The initial traffic and transport study area will be reviewed and modified, if necessary, in response to refinements made to the design of the Transmission Assets and/or any additional environmental and/or design constraints identified during the EIA process.

8.3.3 Data sources

8.3.3.1 The data sources used to inform the baseline assessment will include published material, which is publicly available and material available to purchase from the relevant highway authorities. These data sources will be supplemented by site visits to be undertaken by competent experts and the analysis of newly commissioned (by the Applicants) traffic survey data.

8.3.3.2 An initial desk-based review has identified a number of existing data sources that provide baseline data coverage of the initial traffic and transport study area. These data sources are summarised in Table 8.8 below.

Table 8.8: Baseline data sources – traffic and transport.

Source	Summary
Local Highway Authority and National Highways	Existing traffic flow information from the Local Highway Authority (and National Highways where relevant) to identify the current operation of the road network. This will include results from automatic traffic counts and manual classified counts.
www.crashmap.co.uk and the Local Highway Authority	Personal Injury Accident data for road traffic accidents will also be obtained from Crashmap and the Local Highway Authority.
Bus and rail service operators	Records of existing bus and rail services will be obtained from a desktop analysis of route maps and timetables published by the relevant service operators.
Local Highway Authority	Records of existing PRoWs and cycle routes will be obtained from the Local Highway Authority.
	Records of the adopted highway boundary along the LRN will be obtained from the Local Highway Authority.
Sustrans Interactive Mapping System Great Britain: National Cycle Network Map	Details of National Cycle Network routes located within each Local Planning Authority area within the traffic and transport study area.

8.3.3.3 Existing traffic flow information for the LRN and SRN, including automatic traffic counts and manual classified counts, has been obtained from the local and national highway authorities.

8.3.3.4 In addition to the baseline data sources identified above, site-specific traffic surveys were undertaken between 8th June and 16th June 2022 at key locations on the highway where the highway authorities do not hold any such data to inform the baseline assessment for traffic and transport. Automatic traffic counts recorded total traffic volumes, vehicle classifications and vehicle speeds via pneumatic tubes installed across the carriageway at key sections of the highway over a two-week period. Manual classified counts recorded total traffic turning movements and vehicle classifications at key junctions via video cameras over a daily period.

8.3.3.5 These baseline data sources will be discussed with the Local Highway Authority and National Highways to enable a single baseline year and future reference year scenarios to be created on an agreed basis.

8.3.3.6 The baseline data sources identified in this EIA Scoping Report will remain under review and may be updated in response to feedback from relevant authorities and interested parties during the EIA process, or in response to new sources of information becoming available.

8.3.4 Baseline environment

8.3.4.1 The traffic and transport assessment will consider the potential impact of the onshore elements of the Transmission Assets on receptors sensitive to changes in traffic located within the traffic and transport study area.

8.3.4.2 Effects will be assessed on users of the LRN, SRN, railways (where relevant), PRoWs and other active or promoted travel routes.

8.3.4.3 Receptors will be used to determine the sensitivity of highway links as part of the baseline environment, as shown in Table 8.9, for example:

- People located at home or within the workplace, including sensitive groups such as children, the elderly and the disabled.
- Hospitals, churches, schools or historical buildings.
- Recreational resources, including public open spaces, shopping areas and tourist attractions.
- Sites designated for nature conservation.

Road network

8.3.4.4 There are no parts of the SRN located within the Transmission Assets Scoping Boundary. However, the M55 routes broadly east to west and the M6 routes broadly north to south within the initial traffic and transport study area.

8.3.4.5 There are several ‘A’ classification roads located within the initial Traffic and Transport Study Area, which form part of the LRN.

8.3.4.6 The A583 routes broadly east to west between Preston and Blackpool along the northern boundary of the Transmission Assets Scoping Boundary. The A584 routes broadly east to west between the A583 and Blackpool and bisects the Transmission Assets Scoping Boundary.

8.3.4.7 The A59 routes southwest from Preston along a short section of the eastern boundary of the Transmission Assets Scoping Boundary to Omskirk and Maghull and to the M58.

8.3.4.8 The B5261 and B5259 both route broadly south to north between the A584 and A583 bisecting the western section of the Transmission Assets Scoping Boundary.

8.3.4.9 Other roads within the initial Traffic and Transport Study Area are of a lower classification and provide access to local areas.

Other transport receptors

8.3.4.10 There is one railway line located within the Transmission Assets Scoping Boundary, the Blackpool South to Preston line, which routes broadly southwest to northeast.

8.3.4.11 There are three National Cycle Network routes that intersect with the Transmission Assets Scoping Boundary. These include:

- Route 62, which travels broadly southeast to northwest through the Transmission Assets Scoping Boundary.
- Route 90, which travels from south to north through the centre of the Transmission Assets Scoping Boundary.
- Route 622, which forms a circular route around the city of Preston and coincides with the eastern boundary of the Transmission Assets Scoping Boundary.

8.3.4.12 There are several PRoWs located within and surrounding the Transmission Assets Scoping Boundary.

8.3.4.13 The location of other transport receptors, including National Cycle Network routes and PRoWs within the Transmission Assets Scoping Boundary is presented in part 2, section 8.2: Land use and recreation, of this EIA Scoping Report.

Future baseline conditions

8.3.4.14 The EIA process will consider the existing baseline conditions within the study area, and future baseline conditions (as far as reasonably practicable) in accordance with the methodology set out in part 1, section 5 (see section 5.7.2 for the approach to consideration of future baseline conditions).

8.3.5 Potential project impacts

8.3.5.1 A range of potential impacts on traffic and transport have been identified which may occur during the construction, operation and maintenance, and decommissioning phases of the onshore elements of the Transmission Assets.

8.3.5.2 The impacts that have been scoped into the assessment are outlined in Table 8.9 together with a description of any additional data collection (e.g., site-specific surveys) and supporting analyses (e.g., modelling) that will be required to enable a full assessment of the impacts.

8.3.5.3 There may be a requirement for new junctions to access construction works areas or the substation location. The Transport Assessment will assess the impacts of traffic flow and safety at all such new junctions in terms of their operational performance.

8.3.5.4 Potential impacts scoped out of the assessment are presented in Table 8.10, with justification for why the impact should be scoped out.

Table 8.9: Impacts proposed to be scoped into the assessment for traffic and transport (project phase refers to construction (C), operation and maintenance (O) and decommissioning (D)).

Impact	Project phase			Justification	Data collection and analysis required to characterise the baseline environment	Summary of proposed approach to assessment
	C	O	D			
The impact of increases in traffic flows as a result of construction traffic upon driver and pedestrian delay and pedestrian amenity for users of the LRN and SRN.	✓	×	×	Additional vehicle movements or works, such as trenching, required to facilitate construction of the onshore elements of the Transmission Assets may impact the effective operation of the LRN, SRN and other transport receptors (e.g., PRoWs) and cause driver and pedestrian delay/impact on pedestrian amenity.	The LRN, SRN and other transport receptors located within the initial traffic and transport study area will be identified using desk-based analysis. Records of existing public transport services will be obtained from the relevant public transport service operators. Existing traffic flow information for the LRN and SRN, including automatic traffic counts and manual classified counts, will be obtained from the local and national highway authorities. In addition, existing traffic data will be supplemented by further site-specific surveys that was undertaken by suitably qualified experts between 8th June and 16th June 2022. The scope of site-specific surveys will be agreed with the local and national highway authorities. These baseline data sources will be discussed with the Local Highway Authority and National Highways to enable a single baseline year and future reference year scenarios to be created on an agreed basis.	The type, number, frequency, distribution and assignment of additional vehicle movements on the LRN and SRN generated during construction of the onshore elements of the Transmission Assets will be predicted using first principles, from an understanding of the construction process, likely material quantities and construction programme. The location of any crossings, such as areas where cable trenching may cross a local road, will be identified. Where predicted traffic flows within the initial traffic and transport study area exceed Rule 1 and Rule 2 of the Guidance for Environmental Assessment of Road Traffic (IEMA, 1993), the impact of these increases in traffic flows upon driver and pedestrian delay, pedestrian amenity, community severance and public transport services for users of the LRN and SRN will be assessed in accordance with Guidance for Environmental Assessment of Road Traffic (IEMA, 1993). The impact of additional vehicle movements upon the effective operation and performance of key highway links and junctions of the LRN and SRN (jn terms of highway capacity) will be assessed in a separate Transport Assessment (to be submitted alongside the ES), which will undergo an independent scoping process in
The impact of increases in traffic flows as a result of constructuon traffic upon community severance for users of the LRN and SRN.	✓	×	×	Additional vehicle movements required to facilitate construction of the onshore elements of the Transmission Assets could limit the mobility/access of users of the LRN, SRN and other transport receptors (e.g., PRoW), causing severance between communities (including community facilities).		
The impact of temporary delays to public transport services caused by increases in traffic flows as a result of construction traffic.	✓	×	×	Construction of the onshore elements of the Transmission Assets may disrupt public transport services (e.g., bus, railway) due to the construction works themselves or additional vehicles movements causing delays.		

Impact	Project phase			Justification	Data collection and analysis required to characterise the baseline environment	Summary of proposed approach to assessment
	C	O	D			
						consultation with the local and national highway authorities. Assessments will be undertaken in accordance with Planning Practice Guidance: Travel Plans, Transport Assessments and Statements (MHCLG, 2014), Guidance for Environmental Assessment of Road Traffic (IEMA, 1993) and DMRB LA104: Environmental Assessment and Monitoring (Highways England, Transport Scotland, Welsh Government and Department for Infrastructure Northern Ireland, 2020).
The impact of increases in traffic flows as a result of construction traffic upon accidents and safety for users of the LRN, SRN and other transport receptors.	✓	×	×	Additional vehicle movements required to facilitate construction of the onshore elements of the Transmission Assets could impact the safety of users of the LRN, SRN and other transport receptors (e.g., PRoW).	The LRN, SRN and other transport receptors located within the initial traffic and transport study area will be identified using desk-based analysis. Personal Injury Accident data for the LRN and SRN will be obtained using a combination of Crash Map and records held by the Local Highway Authority. Records of existing public transport services will be obtained from the relevant public transport service operators.	The type, number, frequency, distribution and assignment of additional vehicle movements on the LRN and SRN generated during construction of the onshore elements of the Transmission Assets will be predicted using first principles, from an understanding of the construction process, likely material quantities and construction programme. An analysis of Personal Injury Accident data, including CrashMap, will be undertaken to identify locations on the LRN and SRN which exhibit concentrations of collisions with similar patterns or collisions rates above the national average. These locations on the LRN and SRN will be considered as receptors sensitive to changes in traffic flows and will be subject to further detailed impact assessment. The impact of these additional vehicle movements on accidents and safety for

Impact	Project phase			Justification	Data collection and analysis required to characterise the baseline environment	Summary of proposed approach to assessment
	C	O	D			
						users of the LRN and SRN will be assessed in accordance with Guidance for Environmental Assessment of Road Traffic (IEMA, 1993), in addition to the application of professional judgement where required.
The impact of Abnormal Indivisible Loads (AILs) on the safety of users of the LRN, SRN and other transport receptors.	✓	×	×	Construction of the onshore elements of the Transmission Assets may require the transportation of AILs, which may impact the safety of users of the LRN, SRN and other transport receptors (e.g., PRoW).	The LRN, SRN and other transport receptors located within the initial traffic and transport study area will be identified using desk-based analysis.	Once the route(s) for AILs has been identified, a qualitative assessment of the impact of AILs on accidents and the safety of users of the LRN, SRN and other transport receptors will be undertaken. This will comprise analysis to identify sections of the highway network which may require modifications to facilitate the transport of AILs. The impact of AILs on accidents and safety will be assessed in accordance with the methodology set out in part 1, section 5: EIA Methodology, of this EIA Scoping Report, in addition to the application of professional judgement where required.

Table 8.10: Impacts proposed to be scoped out of the project assessment for traffic and transport.

Impact	Justification
The impact of additional vehicle movements on the LRN and SRN on driver and pedestrian delay, pedestrian amenity, community severance, public transport delay and accidents and safety during construction, operation and maintenance of the offshore elements of the Transmission Assets.	All land-based traffic and transport movement generated by the offshore elements of the Transmission Assets would be via a base port (or ports). The selection of such a port (or ports) is not known at this time and is typically selected post-consent. Such facilities would operate under the port (or ports) existing planning consents or where any new consents are required would be subject to relevant new planning applications. Therefore, it is proposed to scope out an assesssment of the potential impact of additional vehicle movements on the LRN, SRN and other transport receptors during construction, operation and maintenance and decommisioning of the offshore elements of the Transmission Assets. This is consistent with the scope of other similar projects, for example Inch Cape, Alpha Bravo, Hornsea Project One, Hornsea Project Two, Hornsea Three, Race Bank, Gunfleet Sands and Burbo Bank amongst others
The impact of additional vehicle movements on the LRN and SRN on driver and pedestrian delay, pedestrian amenity, community severance, public transport delay and accidents and safety during operation and maintenance of the onshore elements of the Transmission Assets.	Operation and maintenance of the onshore elements of the Transmission Assets is likely to generate a limited number of additional vehicle movements on the LRN and SRN. The onshore elements of the Transmission Assets do not require any manned facilities and would be monitored remotely, requiring only maintenance activities. Therefore, the potential impact of additional vehicle movements on the LRN, SRN and other transport receptors during operation and maintenance of the onshore elements of the Transmission Assets is unlikely to result in significant effects and is proposed to be scoped out of the assessment for traffic and transport.
The impact of additional vehicle movements on the LRN and SRN on driver and pedestrian delay, pedestrian amenity, community severance, public transport delay and accidents and safety during decommissioning of the onshore elements of the Transmission Assets.	Decommissioning of the onshore elements of the Transmission Assets will generate a lower number of additional vehicle movements on the LRN and SRN than the construction phase. This is because retired infrastructure/ equipment will either be left in situ or transported away from site in bulk, reducing the number of additional vehicle movements required to facilitate decommissioning of the onshore elements of the Transmission Assets. In addition, measures to be included in the Construction Traffic Management Plan, updated as necessary, will also be employed during the decommissioning phase. Therefore, the potential impact of additional vehicle movements on the LRN, SRN and other transport receptors during decommissioning of the onshore elements of the Transmission Assets based upon future year baseline conditions that could be estimated at this time would be no higher than those impacts during the construction phase and is proposed to be scoped out of the assessment for traffic and transport.

8.3.6 Measures adopted as part of the project

8.3.6.1 The following measures adopted as part of the project are relevant to traffic and transport. These measures may evolve as the engineering design and the EIA progresses.

- Construction Traffic Management Plan (CTMP) – The movement of construction vehicles entering or exiting construction sites and utilising the LRN and SRN would be controlled, as to avoid or reduce potential impacts on sensitive receptors.

8.3.6.2 The requirement for and feasibility of any mitigation measures will be dependent on the significance of effects and will be consulted upon with statutory and non-statutory consultees throughout the EIA process.

8.3.6.3 Requirements for any additional mitigation measures will be determined through discussions with the relevant authorities and interested parties likely to be affected as part of the traffic and transport assessment.

8.3.7 Proposed assessment methodology

8.3.7.1 It is anticipated that the onshore export cable corridor may be required to cross public highways and/or railways located within the Transmission Assets Scoping Boundary.

8.3.7.2 Where the onshore cable corridor is required to cross major roads and/or infrastructure, railways, rivers, large wooded areas etc, it is anticipated that trenchless construction techniques will be used where possible as to avoid direct impacts on these receptors.

8.3.7.3 The proposed method for the installation of onshore export cables will be developed in consultation with the relevant highway authorities, Network Rail and/or the rail operator where appropriate.

8.3.7.4 Additional vehicle movements generated during construction of the onshore elements of the Transmission Assets will be determined using first principles, from an understanding of the construction process, likely material quantities and construction programme once the location of the onshore cable corridor, onshore substations and associated infrastructure has been defined.

8.3.7.5 A detailed analysis of the LRN and SRN will then be undertaken to identify key locations where potential traffic and transport impacts may occur. This analysis will identify road network constraints and inform the access strategy for construction related vehicles (i.e., types, numbers, frequency and timings).

8.3.7.6 The access strategy to be utilised during the construction of the onshore elements of the Transmission Assets will be consulted and agreed upon with the local and national highways authorities.

8.3.7.7 The traffic and transport assessment will predict the traffic flows generated on the LRN and SRN during the construction of the onshore elements of the Transmission Assets using first principles, from an understanding of the construction process, likely material quantities and construction programme. These predicted traffic flows will be assessed against forecast baseline traffic data to determine if an impact is likely to occur. The scope and duration of predicted impacts will be quantified for each phase of the construction programme.

8.3.7.8 In addition, the ES will include an outline of the proposed construction compounds, which will be further developed once the route is finalised, to indicate the potential size and broad spread of construction compounds that are likely to be required.

8.3.7.9 The traffic and transport assessment will be based on the following guidance:

- Planning Practice Guidance: Travel Plans, Transport Assessments and Statements (Department for Levelling Up, Housing and Communities and Ministry of Housing, Communities and Local Government, 2014).
- Guidelines for the Environmental Assessment of Road Traffic Guidance Note No. 1 (IEMA, 1993).
- DMRB LA104: Environmental Assessment and Monitoring (Highways England, Transport Scotland, Welsh Government and Department for Infrastructure Northern Ireland, 2020).

Assessment process

8.3.7.10 In terms of the assessment of the environmental impacts of traffic, the IEMA guidelines states that the following two 'rules' should be followed:

- Rule 1 - Include highway links where traffic flows will increase by more than 30% or where the number of Heavy Good Vehicles (HGVs) will increase by more than 30%.
- Rule 2 - Include any other specifically sensitive areas where traffic flows have increased by 10% or more.

8.3.7.11 The assessment will therefore identify the sensitivity of affected transport routes, taking into account the presence and location of sensitive receptors or route users. The determination of receptor sensitivity will be based on the criteria of value, adaptability and tolerance. Sensitivity will be categorised using professional judgement following the principles set out in Table 8.11.

Table 8.11: Definitions of sensitivity – traffic and transport

Sensitivity	Typical Descriptors
High	Those receptors with greatest sensitivity due to site-specific characteristics which make them particularly sensitive to changes in traffic flow including schools, colleges, playgrounds, accident black spots (with reference to accident data and PIA rates being above the national average), retirement homes, urban/residential/built-up roads without commensurate footway provision, high footfall, severley congested junctions.
Medium	Receptors of medium sensitivity to traffic flows including congested junctions, doctors' surgeries, hospitals, shopping areas with roadside frontage, roads with narrow footways, unsegregated cycleways, community centres, parks, recreation facilities, roads with PIA rates close to the national average.
Low	Receptors with some sensitivity to traffic flows including places of worship, public open space, nature conservation areas, listed buildings, tourist attractions, urban/residential/built-up areas with good footway provision commensurate for its use and footfall and other receptors with low sensitivity to traffic flows and those sufficiently distant from affected roads and junctions.
Negligible	Strategic / principal / major roads with no sensitive receptors / receptors with negligible sensitivity to traffic flows

8.3.7.12 Rules 1 and 2 are used as a screening tool to determine whether or not a full assessment of effects is required for any identified highway link. Highway links which are identified as negligible, low or medium sensitivity will be considered against the Rule 1 threshold. Highway links which are identified as high sensitivity will be considered against the Rule 2 threshold. Where predicted changes in traffic flow fall beneath these levels, a full assessment of effects will not be required and no significant effects upon that highway link will occur.

8.3.7.13 Consistent with the IEMA guidelines, the following will be considered within the traffic and transport assessment:

- Driver delay.
- Severance of routes.
- Pedestrian delay.
- Pedestrian amenity.
- Accidents and road safety.
- Abnormal Indivisible Loads.

8.3.7.14 Paragraph 4.5 of the IEMA guidelines recognises that professional judgement should be used as part of the assessment and states the following:

'For many effects there are no simple rules or formulae which define thresholds of significance and there is, therefore, a need for interpretation and judgement on the part of the assessor, backed-up by data or quantified information wherever possible. Such judgements will include the assessment of the numbers of people experiencing a change in environmental impact as well as the assessment of the damage to various natural resources'.

8.3.7.15 Based upon the advice contained within the IEMA guidelines, Table 8.12 sets out the considerations for defining the magnitude of change.

Table 8.12: Magnitude of change – traffic and transport.

Impact	Magnitude of Change			
	Negligible	Low	Medium	High
Driver Delay	Defined in conjunction with the Transport Assessment and a review of the change in operation of a junction or highway link with a particular focus on the weekday peak hour periods when baseline traffic flows are at their highest			
Severance	Change in total traffic flow of less than 30%	Change in total traffic flow of 30% to 60%	Change in total traffic flow of 60% to 90%	Change in total traffic flows of over 90%
Pedestrian Delay	Defined from a review of baseline traffic flows, pedestrian infrastructure and a guide (as set out in the IEMA Guidelines) that a 10 second pedestrian delay in crossing a road is considered to be perceptible or considered significant which broadly equates to a two-way traffic flow of approximately 1,400 vehicle movements per hour			
Pedestrian Amenity	Change in traffic flow (or HGV component) less than 100%		Change in traffic flow (or HGV component) more than 100%	
Accidents and Road Safety	Defined from a review of PIA data along highway links and the predicted changes in traffic flow			
Abnormal Indivisible Loads	Defined by an assessment of the suitability of the access routes to accommodate Abnormal Indivisble Loads			

8.3.8 Potential cumulative effects

8.3.8.1 There is potential for cumulative effects on sensitive receptors to occur when the construction of the onshore elements of the Transmission Assets is considered together with other developments. The potential cumulative effects between the construction of the onshore elements of the Transmission Assets and other developments with respect to traffic and transport will be considered within the ES.

8.3.8.2 Other emerging developments that are predicted to generate traffic within the initial traffic and transport study area during construction of the onshore elements of the Transmission Assets, which may contribute to a cumulative effect, will be identified in the cumulative effect assessment.

8.3.8.3 Other development proposals that emerge at the same time will be treated together and will be cumulatively assessed against the baseline scenario to determine their cumulative effect and any cumulative highway and transport mitigation requirements (if required).

8.3.8.4 The predicted traffic flows generated within the initial traffic and transport study area by each relevant emerging development, as part of the cumulative effect assessment, will be quantified (where data is available) using the methodology as that set out in part 2, section 8.3.7 of this EIA Scoping Report.

8.3.9 Potential inter-related effects

- Terrestrial ecology and ornithology (intertidal and onshore):
  - Noise, vibration and air emissions generated by additional vehicle movements on the LRN and SRN during construction may impact

sites designated for conservation and protected habitats and species within the traffic and transport study area.

- Land use and recreation:
  - Access to recreational resources may be disrupted by additional vehicle movements on the LRN and SRN during construction of the onshore elements of the Transmission Assets.
- Noise and vibration:
  - Additional vehicle movements predicted as part of the Transport Assessment will be used to identify areas within the noise and vibration study area for transmission assets which require further detailed noise and vibration assessment.
- Air quality:
  - Additional vehicle movements predicted as part of the Transport Assessment will be used to identify areas within the air quality study area which require further detailed air quality assessment, if the traffic generated exceeds the threshold for air quality assessment.
  - Effects of dust generated by construction vehicles will be considered in the detailed air quality assessment.
- Human health:
  - Additional vehicle movements predicted as part of the Transport Assessment will be used to identify areas within the human health study area for transmission assets which require further detailed assessment.

8.3.10 Potential transboundary impacts

8.3.10.1 A screening of transboundary impacts has been carried out and is presented in part 3, Annex A of this EIA Scoping Report. This screening exercise identified that there is no potential for transboundary impacts upon traffic and transport due to construction, operational and maintenance, and decommissioning impacts of the Transmission Assets.

8.4 Noise and vibration

8.4.1 Introduction

8.4.1.1 This section of the EIA Scoping Report identifies the noise and vibration receptors relevant to the Transmission Assets. This section also considers the potential impacts arising from the construction, operation and maintenance, and decommissioning of the Transmission Assets and identifies the proposed scope of, and methodology for, the EIA process for noise and vibration.

8.4.1.2 The potential impacts arising from underwater noise and vibration generated during the construction, operation and maintenance, and decommissioning of the offshore elements of the Transmission Assets are described in part 2: section 3.2, of this EIA Scoping Report.

8.4.2 Study area

8.4.2.1 Based on the refined locations for the onshore elements of the Transmission Assets, the study area for the assessment of noise and vibration impacts (the noise and vibration study area) will consider the potential impacts on noise sensitive receptors arising from the construction, operation and maintenance, and decommissioning of the Transmission Assets.

8.4.2.2 The noise and vibration study area will focus on receptors landward of MHWS where potential impacts are most likely to occur on receptors sensitive to noise and vibration.

8.4.2.3 As such, and in line with best practice, the noise and vibration study area to be used in the assessment will be defined as:

- The area of land to be temporarily or permanently occupied during the construction, operation and maintenance and decommissioning of the Transmission Assets.
- Noise sensitive receptors located within 1km of the landfall and onshore substations.
- Noise sensitive receptors located within 250m of the onshore cable corridor.
- Noise sensitive receptors located within 2km of the offshore export cable corridor.
- Noise sensitive receptors located within 50km of the offshore elements of the Transmission Assets where construction piling is required. This is due to the larger study area distances required to assess noise generated during the construction of the offshore elements of the Transmission Assets (e.g., foundation piling), which may coincide with noise sensitive receptors located landward of MHWS.
- Vibration sensitive receptors located within 100m of the construction of the onshore elements of the Transmission Assets.

8.4.2.4 The noise and vibration study area will be reviewed and modified, if necessary, in response to refinements made to the design of the Transmission Assets and/or any additional environmental and/or design constraints identified during the EIA process.

8.4.3 Data sources

8.4.3.1 Sound monitoring surveys will be undertaken to characterise the baseline sound levels. The location of baseline sound surveys will be determined through a desk-based review of OS mapping data and satellite imagery to identify sensitive receptors within the noise and vibration study area, which are most likely to be impacted by noise generated during construction, operation and maintenance and decommissioning of the Transmission Assets.

8.4.3.2 The location of baseline sound surveys will be suitably representative and agreed with the relevant the Environmental Health Officers (EHOs) from the relevant Local Planning Authority.

8.4.3.3 In addition, a weather station will be deployed at one (or more) locations to record site-specific meteorological conditions whilst baseline sound surveys are being undertaken. The meteorological information collected during baseline surveys would be reviewed and, if appropriate, data will be removed from the dataset to ensure that representative ambient and background noise levels can be derived.

8.4.3.4 The baseline sound surveys (and data scoping) will be undertaken in accordance with British Standard (BS) 4142:2014 Methods for rating and assessing industrial and commercial sound and BS 7445:1991 Description and measurement of environmental noise Part 2: Guide to the acquisition of data pertinent to land use.

8.4.4 Baseline environment

8.4.4.1 A large proportion of the Transmission Assets Scoping Boundary is located within a rural and agricultural setting, which may be indicative of low ambient sound levels. However, ambient sound levels within the Transmission Assets Scoping Boundary are likely to increase in areas located in proximity to urban areas, such as towns and villages.

8.4.4.2 In addition, higher ambient sound levels are likely to be experienced by sensitive receptors located in proximity to the local highway network or other forms of transport infrastructure (e.g., railways, airports) present within the Transmission Assets Scoping Boundary.

8.4.4.3 There are no statutory or non-statutory designations specifically related to matters of noise and vibration, or how it should be controlled. However, early engagement with the relevant Local Planning Authority EHO will be undertaken to ensure the noise and vibration assessment is robust and proportionate.

Future baseline conditions

8.4.4.4 The EIA process will consider the existing baseline conditions within the study area, and future baseline conditions (as far as reasonably practicable) in accordance with the methodology set out in part 1, section 5 (see section 5.7.2 for the approach to consideration of future baseline conditions).

8.4.5 Potential project impacts

8.4.5.1 A range of potential impacts on noise and vibration have been identified which may occur during the construction, operation and maintenance, and decommissioning phases of the Transmission Assets.

8.4.5.2 The impacts that have been scoped into the assessment are outlined in Table 8.13 together with a description of any additional data collection (e.g., site-specific surveys) and supporting analyses (e.g., modelling) that will be required to enable a full assessment of the impacts.

8.4.5.3 Potential impacts scoped out of the assessment are presented in Table 8.14, with justification for why the impact should be scoped out.

Table 8.13: Impacts proposed to be scoped into the assessment for noise and vibration (project phase refers to construction (C), operation and maintenance (O) and decommissioning (D)).

Impact	Project phase			Justification	Data collection and analysis required to characterise the baseline environment	Summary of proposed approach to assessment
	C	O	D			
The impact of noise and vibration generated by construction and decommissioning activities for the Transmission Assets on human receptors.	✓	×	✓	Activities required for the construction and decommissioning of the Transmission Assets would generate noise and vibration emissions which could adversely affect the health of human receptors.	Human receptors sensitive to noise and vibration located within the noise and vibration study area will be identified using desk-based analysis. Where existing baseline data coverage is insufficient, and where significant effects may occur, baseline sound levels will be obtained through sound monitoring surveys. The locations and durations of baseline sound surveys will be suitably representative, focused on key areas of impact and agreed with the EHO from the relevant Local Planning Authority.	Predicted noise and vibration levels arising from onsite construction and decommissioning activities will be calculated using modelling, in accordance with the methodology in BS 5228, where applicable. In some cases, such as where separation distances exceed the threshold in BS 5228 an alternative methodology such as International Standard Organisation (ISO) 9613-2 or Nord2000 may be used. The impact of noise and vibration on human receptors and historic assets, will be assessed in accordance with BS 5228 guidance. The significance of likely effects will be determined in accordance with IEMA Guidelines for Environmental Noise Impact Assessment (2014).
The impact of noise generated by additional vehicle movements on the local highway network during the construction and decommissioning phase for the Transmission Assets on human receptors.	✓	×	✓	Additional vehicle movements on the local highway network required to facilitate construction and decommissioning of the Transmission Assets would generate noise emissions which could adversely affect the health of human receptors.	Human receptors sensitive to noise and vibration located within the noise and vibration study area will be identified using desk-based analysis. Where existing baseline data coverage is insufficient, baseline sound levels will be obtained through sound monitoring surveys. The locations and durations of baseline sound surveys will be suitably representative and agreed with the EHO from the relevant Local Planning Authority.	Predicted noise levels arising from additional vehicle movements during the construction and decommissioning phase will likely be calculated using the Calculation of Road Traffic Noise (CRTN). If the traffic volumes fall below the thresholds of CRTN then an alternative method may be used, or corrections may be applied to the data, as appropriate. The guidance in DMRB LA 111 Noise and Vibration will be used as a basis for the impact of traffic noise on human receptors. However, as this is not a

Impact	Project phase			Justification	Data collection and analysis required to characterise the baseline environment	Summary of proposed approach to assessment
	C	O	D			
					The number of additional vehicle movements required to facilitate construction and decommissioning of the Transmission Assets will be determined as part of the assessment for Traffic and Transport (see part 2, section 8.3 of this EIA Scoping Report).	new road scheme, this guidance is not directly applicable, and a full assessment would not be required. The details of the scenarios to be assessed will be evaluated following receipt of the traffic data. The significance of likely effects will be determined in accordance with the IEMA Guidelines for Environmental Noise Impact Assessment (2014).
The impact of noise generated during operation and maintenance of the onshore substations on human receptors.	×	✓	×	Operation of the proposed onshore substations would generate noise emissions which could adversely affect the health of human receptors.	Human receptors sensitive to noise located within the noise and vibration study area will be identified using desk-based analysis. Where existing baseline data coverage is insufficient, baseline sound levels will be obtained through sound monitoring surveys. The locations and durations of baseline sound surveys will be suitably representative and agreed with the EHO from the relevant Local Planning Authority.	Predicted noise levels arising from operation of the onshore substations will be calculated using modelling implementing the methodology in ISO 9613-2. The impact of noise on human receptors will be assessed in accordance with BS 4142 and relevant World Health Organisation guidance. The significance of likely effects will be determined in accordance with the IEMA Guidelines for Environmental Noise Impact Assessment (2014).

Table 8.14: Impacts proposed to be scoped out of the project assessment for noise and vibration.

Impact	Justification
The impact on human receptors and heritage assets arising from vibration generated by additional vehicle movements on the local highway network during construction and decommissioning of the Transmission Assets.	Additional vehicle movements on the local highway network during construction and decommissioning of the Transmission Assets are unlikely to generate high levels of vibration. Therefore, the potential impact of vibration from additional vehicle movements on human receptors and heritage assets during construction of the Transmission Assets is unlikely to result in significant effects and is proposed to be scoped out of the assessment for noise and vibration.
The impact on human receptors and heritage assets arising from vibration generated during	Operation and maintenance of the Transmission Assets is unlikely to generate high levels vibration. In addition, the impact of vibration on sensitive receptors during maintenance activities would be intermittent, short term and temporary in nature. Therefore, the potential impact on human receptors and heritage assets during operation and maintenance of the

Impact	Justification
operation and maintenance of the Transmission Assets.	Transmission Assets is unlikely to result in significant effects and is proposed to be scoped out of the assessment for noise and vibration.
The impact of noise and vibration generated during operation and maintenance of the Transmission Assets (excluding the onshore substations), including the onshore export cable and associated infrastructure.	Operation and maintenance of the onshore export cable and associated infrastructure is unlikely to generate high levels of noise and vibration. The impact of noise and vibration on sensitive receptors during maintenance activities would be intermittent, short term and temporary in nature. Additional vehicle movements associated with operation and maintenance of the onshore export cable and associated infrastructure would also be intermittent, short term and temporary in nature and unlikely to exceed the thresholds that would warrant an assessment with the DMRB LA 111. Therefore, the potential impact on human receptors and heritage assets during operation and maintenance of the onshore export cable and associated infrastructure is unlikely to be significant and is proposed to be scoped out of the assessment for noise and vibration.

8.4.6 Measures adopted as part of the project

8.4.6.1 The following measures adopted as part of the project are relevant to noise and vibration. These measures may evolve as the engineering design and the EIA progresses.

- Construction Traffic Management Plan (CTMP) – The movement of construction vehicles entering or exiting construction sites and utilising the local highway network would be controlled as to avoid or reduce potential impacts of noise emissions on sensitive receptors.
- CoCP – Construction of the Transmission Assets would be undertaken in accordance with the relevant best practice measures as recommended in BS 5228.

8.4.6.2 The requirement for and feasibility of any mitigation measures will be dependent on the significance of effects and will be consulted upon with statutory and non-statutory consultees throughout the EIA process.

8.4.6.3 Any requirements for additional noise and vibration mitigation measures will be determined through discussions with the EHOs from each Local Planning Authority likely to be affected as part of the noise and vibration assessment.

8.4.7 Proposed assessment methodology

8.4.7.1 The noise and vibration assessment for the Transmission Assets will be undertaken in accordance with the methodology set out in part 1, section 5: EIA Methodology, of this EIA Scoping Report, in addition to the following established guidance:

- BS 4142 – Methods for rating and assessing industrial and commercial sound (2019).
- BS 5228 - Code of practice for noise and vibration control on construction and open sites – Part 1: Noise and Part 2: Vibration (2014).
- BS 7445 – Part 1 Description and measurement of environmental noise. Guide to quantities and procedures (2003).
- BS 7445 – Part 2 Description and measurement of environmental noise. Guide to the acquisition of data pertinent to land use (1991).
- BS 7445 – Part 3 Description and measurement of environmental noise. Guide to application to noise limits (1991).
- Calculation of Road Traffic Noise (1988).
- DMRB – LA111 – Noise and Vibration (Highways England, Transport Scotland, Welsh Government and Department for Infrastructure Northern Ireland, 2020).
- IEMA - Guidelines for Environmental Noise Impact Assessment (2014).
- ISO 9613 Acoustics - Attenuation of sound during propagation outdoors - Part 2: General method of calculation (1996).
- Nord2000 - Comprehensive Sound Propagation Model - Part 1: Propagation in an Atmosphere without Significant Refraction and Part 2: Propagation in an Atmosphere with Refraction (2006).
- World Health Organisation - Guidelines for Community Noise (2000).

8.4.7.2 Although principally developed for the assessment of highway projects, the DMRB also provides guidance applicable to the assessment of other linear schemes, including the Transmission Assets (e.g., onshore export cables).

8.4.7.3 The approach to assessment and level of detail will depend on the element of the Transmission Assets under consideration and whether effects are temporary or permanent.

8.4.8 Potential cumulative effects

8.4.8.1 There is potential for cumulative effects on sensitive receptors to occur when the Transmission Assets are considered together with other developments. The potential cumulative effects between the Transmission Assets and other developments with respect to noise and vibration will be considered within the ES.

8.4.8.2 The cumulative effect assessment would be undertaken in accordance with the methodology set out in part 1, section 5: EIA Methodology, of this EIA Scoping Report.

8.4.9 Potential inter-related effects

8.4.9.1 The assessment of potential inter-related effects will be considered in the noise and vibration ES chapter. It will include consideration of project lifetime effects and receptor-led effects, in line with the approach outlined in part 1, section 5: EIA Methodology, of this EIA Scoping Report. For example:

- Terrestrial ecology and ornithology (intertidal and onshore):
  - Noise and vibration emissions generated during construction, operation and maintenance, and decommissioning of the Transmission Assets may impact sites designated for nature conservation and protected habitats and species within the noise and vibration study area. The assessment will be led by the ecologists.
- Historic environment:
  - Noise and vibration generated during construction, operation and maintenance, and decommissioning of the Transmission Assets may impact the setting/integrity of designated heritage assets located within the noise and vibration study area. The assessment will be led by the heritage consultants.
- Traffic and transport:
  - Additional vehicle movements generated during construction of the Transmission Assets would be used to identify areas within the noise and vibration study area which require further detailed assessment.

8.4.10 Potential transboundary impacts

8.4.10.1 A screening of transboundary impacts has been carried out and is presented in part 3, Annex A of this EIA Scoping Report. This screening exercise identified that there is no potential for transboundary impacts upon noise and vibration due to construction, operational and maintenance, and decommissioning impacts of the Transmission Assets.

8.5 Air quality

8.5.1 Introduction

8.5.1.1 This section of the EIA Scoping Report identifies the air quality receptors relevant to the onshore elements of the Transmission Assets. This section also considers the potential impacts arising from the construction, operation and maintenance, and decommissioning of the Transmission Assets and identifies the proposed scope of, and methodology for, the EIA process for air quality.

8.5.1.2 The findings of the air quality assessment may be presented as either a chapter within the PEIR and ES or as a technical appendix, depending on whether or not an assessment of vehicle emissions is required. If traffic levels fall beneath the assessment thresholds for air quality such that these effects can be scoped out, the assessment of effects will concentrate on dust effects. This assessment of dust effects may be presented in the form of a technical appendix.

8.5.2 Study area

8.5.2.1 The study area for the assessment of air quality impacts in the ES (the air quality study area) will be based on the relevant Environmental Protection UK (EPUK), National Highways (formerly Highways England) and Institute of Air Quality Management (IAQM) guidance (see section 8.5.7 of this EIA Scoping Report below).

8.5.2.2 The air quality assessment will consider the potential impacts of the onshore elements of the Transmission Assets on the following sensitive receptors landward of MHWS:

Dust

- People and property located within 350m of the construction work area for the onshore elements of the Transmission Assets.
- Ecological receptors sensitive to dust located within 50m of the construction work area for the onshore elements of the Transmission Assets.
- People, property and ecological receptors sensitive to dust located within 50m of roads used by construction vehicles.
- People, property and ecological receptors sensitive to dust located within 500m of the entrance to a construction work area for the onshore elements of the Transmission Assets.

Vehicle emissions

- People, property and ecological receptors sensitive to vehicle emissions within 200m of the road network to be used by construction vehicles if either of the following indicative criteria are satisfied:
  - A change in light duty vehicle (LDV) flows of more than 100 annual average daily traffic (AADT) within or adjacent to an Air Quality Management Area (AQMA), or more than 500 AADT elsewhere.
  - A change in heavy duty vehicle (HDV) flows of more than 25 AADT within or adjacent to an AQMA, or more than 100 AADT elsewhere.

8.5.2.3 With regards to vehicle emissions, sensitive receptors located within 200m of the affected road network will be considered in the air quality assessment. IAQM guidance states that concentrations of air emissions originating from vehicles decreases with distance, whereby beyond 200m the road source contribution is typically indiscernible from background fluctuations.

8.5.2.4 The air quality study area will be reviewed and modified in response to refinements made to the onshore elements of the Transmission Assets and additional environmental and/or design constraints identified during the EIA process.

8.5.3 Data sources

8.5.3.1 The data sources used to inform the baseline assessment will primarily comprise published material which is publicly available. An initial desk-based review has identified several data sources, which provide baseline data coverage of the Transmission Assets Scoping Boundary. These data sources are summarised in Table 8.15 below.

Table 8.15: Baseline data sources – air quality.

Source	Summary
Defra	2018-based background mapping data for NO2, PM10 and PM2.5
Defra Interactive Air Quality Map	AQMA Boundaries Map based on information reported by local authorities for 2021.
Relevant Local Planning Authority websites	Air Quality Annual Status Reports which describe the status of air quality, including AQMAs within each Local Planning Authority area.
Air Pollution Information System (APIS)	Site-relevant critical loads, background pollution concentrations and deposition rates at ecological sites.

8.5.3.2 The baseline data sources identified in this EIA Scoping Report will remain under review and may be updated in response to feedback from relevant statutory and non-statutory consultees during the EIA process, or in response to new sources of information becoming available.

8.5.4 Baseline environment

8.5.4.1 People and property to be considered in the air quality assessment include residential and commercial properties (e.g., places of work), educational facilities (e.g., nurseries, schools, colleges), medical facilities (e.g., hospitals, care homes, GP surgeries) and recreational facilities (e.g., golf clubs, parks, PRoW).

8.5.4.2 Ecological receptors to be considered in the air quality assessment include sites designated for nature conservation and protected habitats and species of ecological importance, where these are sensitive to air pollution.

AQMAs

8.5.4.3 There are no AQMAs located within the Transmission Assets Scoping Boundary. Therefore, background levels of pollutants within the Transmission Assets Scoping Boundary are likely to be below national air quality objectives, and are unlikely to be exceeded during construction, operation and maintenance and decommissioning of the onshore elements of the Transmission Assets.

Ecological receptors

8.5.4.4 The Transmission Assets Scoping Boundary coincides with several sites designated for nature conservation. These designated sites are presented in Table 8.16 below.

Table 8.16: Statutory designated sites.

Site Name	Designation
International Designations	
Ribble & Alt Estuaries	Ramsar site
Ribble & Alt Estuaries	SPA
National Designations	
Ribble Estuary	SSSI
Newton Marsh	
Lytham Coastal Changes	
Lytham St Anne's Dunes	
Local Designations	
Lytham St Annes	LNR
Fishwick Bottoms	

8.5.4.5 Following submission of the EIA Scoping Report, a screening exercise will be undertaken to identify which ecological receptors are located within the air quality study area (informed by the selected onshore route corridor and substation location) and which are specifically sensitive to air pollution. This will also identify those sites which can be excluded from the air quality assessment in the ES.

8.5.4.6 The location of sites designated for nature conservation in relation to the Transmission Assets Scoping Boundary is presented in part 2, section 7.1: Terrestrial ecology and ornithology (intertidal and onshore), of this EIA Scoping Report.

8.5.4.7 Further information regarding the ecological baseline and potential impacts of the onshore elements of the Transmission Assets on sites designated for conservation is presented in part 2, section 7.1: Terrestrial ecology and ornithology (intertidal and onshore), of this EIA Scoping Report.

People and property

8.5.4.8 People and property located within the Transmission Assets Scoping Boundary include the occupiers of residential properties associated with the city of Blackpool and towns (or villages), including Peel, Lower Ballam, Westby, Moss Side, Wrea Green, Bryning, Hall Cross, Newton-with-Scales and Bottom of Hutton. Rural properties and occupants situated outside of existing settlements, but within the air quality study area, will also be considered in the air quality assessment.

8.5.4.9 Other sensitive receptors located within the air quality study area to be considered in the air quality assessment include commercial properties, education facilities and medical facilities.

Future baseline conditions

8.5.4.10 The EIA process will consider the existing baseline conditions within the study area, and future baseline conditions (as far as reasonably practicable) in accordance with the methodology set out in part 1, section 5 (see section 5.7.2 for the approach to consideration of future baseline conditions).

8.5.5 Potential project impacts

8.5.5.1 A small number of potential impacts on air quality have been identified which may occur during the construction, operation and maintenance, and decommissioning phases of the onshore elements of the Transmission Assets.

8.5.5.2 The impacts that have been scoped into the assessment are outlined in Table 8.17 together with a description of any additional data collection (e.g., site-specific surveys) and supporting analyses (e.g., risk assessments and modelling) that will be required to enable a full assessment of the impacts.

8.5.5.3 Potential impacts scoped out of the assessment are presented in Table 8.18, with justification for why the impact should be scoped out.

Table 8.17: Impacts proposed to be scoped into the assessment for air quality (project phase refers to construction (C), operation and maintenance (O) and decommissioning (D)).

Impact	Project phase			Justification	Data collection and analysis required to characterise the baseline environment	Summary of proposed approach to assessment
	C	O	D			
The impact of dust soiling (nuisance) on property arising from dust emissions generated by onsite construction and decommissioning activities.	✓	×	✓	Activities required for the construction and decommissioning of the onshore elements of the Transmission Assets (e.g., earthworks, vehicle track-out) would generate dust emissions which could result in dust soiling effects on human receptors, including people and property.	Properties sensitive to dust located within the air quality study area will be identified using desk-based analysis.	The impact of dust deposition on people and property will be assessed qualitatively, utilising a risk-based assessment to assess the potential impacts of dust generated by construction and decommissioning activities and the relative sensitivity of identified receptors. The risk-based assessment of dust will be undertaken in accordance with the Guidance on the assessment of dust from demolition and construction (IAQM, 2014) guidance.
The impact of an increase in suspended particulate matter on people arising from dust emissions generated by onsite construction and decommissioning activities.	✓	×	✓	Activities required for the construction and decommissioning of the onshore elements of the Transmission Assets (e.g., earthworks, vehicle track-out) would generate dust emissions which could result in adverse effects on the health of people.	People located within the air quality study area will be identified using desk-based analysis.	The impact of suspended particulate matter on people and property will be assessed qualitatively, utilising a risk-based assessment to assess the potential impacts of dust generated by construction and decommissioning activities and the relative sensitivity of identified receptors. The risk-based assessment of dust will be undertaken in accordance with the Guidance on the assessment of dust from demolition and construction (IAQM, 2014).
The impact on human receptors arising from air emissions generated by vehicles during the construction and decommissioning phase.	✓	×	✓	Additional vehicle movements required to facilitate construction and decommissioning of the onshore elements of the Transmission Assets would generate air emissions (e.g., NO2, PM10 and PM2.5). Impacts arising from this will be assessed if the traffic generated exceeds assessment thresholds (see section 8.5.2.2) and	Human receptors located within the air quality study area will be identified using desk-based analysis.	An initial screening assessment will be undertaken to identity any areas which may require more detailed assessment of road traffic emissions. The screening assessment will utilise screening criteria set out in the Land-use planning and development control: Planning for air quality (EPUK & IAQM, 2017) guidance document. If no such areas are

Impact	Project phase			Justification	Data collection and analysis required to characterise the baseline environment	Summary of proposed approach to assessment
	C	O	D			
				could therefore result in adverse effects on the health of human receptors.		identified, this topic will be scoped out of the assessment. The approach to the detailed assessment of road traffic emissions will be consistent with Local Air Quality Management Technical Guidance: LAQM.TG16 (Defra, 2018) and the Land-Use Planning & Development Control: Planning for Air Quality document (EPUK & IAQM, 2017).
The impact on ecological receptors arising from dust emissions generated by onsite construction and decommissioning activities.	✓	×	✓	Activities required for the construction and decommissioning of the onshore elements of the Transmission Assets (e.g., earthworks, vehicle track-out) would generate dust emissions which could result in adverse effects on ecological receptors.	Ecological receptors sensitive to dust located within the air quality study area will be identified using desk-based analysis.	The impact of dust deposition on ecological receptors will be assessed qualitatively, utilising a risk-based assessment to assess the potential impacts of dust generated by construction and decommissioning activities and the relative sensitivity of identified receptors. The risk-based assessment of dust will be undertaken in accordance with the Guidance on the assessment of dust from demolition and construction (IAQM, 2014) guidance.
The impact on ecological receptors arising from air emissions generated by vehicles during the construction and decommissioning phase.	✓	×	✓	Additional vehicle movements required to facilitate construction and decommissioning of the onshore elements of the Transmission Assets would generate air emissions (e.g., NOx)) which could result in adverse effects on ecological receptors.	Ecological receptors located within the air quality study area will be identified using desk-based analysis.	An initial screening assessment will be undertaken to identity areas which may require more detailed assessment of road traffic emissions. The screening assessment will use screening criteria set out in the DMRB LA 105 – Air Quality (Highways England et al., 2019) guidance. The approach to the detailed assessment of road traffic emissions will be consistent with DMRB LA 105 – Air Quality (Highways England et al., 2019) guidance document.

Table 8.18: Impacts proposed to be scoped out of the project assessment for air quality.

Impact	Justification
The impact on human and ecological receptors (dust soiling and human health) arising from fugitive dust emissions generated during operation and maintenance of the onshore elements of the Transmission Assets.	Activities associated with the operation and maintenance of the onshore elements of the Transmission Assets are unlikely to generate dust. Therefore, the potential impact on human or ecological receptors arising from fugitive dust emissions generated during operation and maintenance of the onshore elements of the Transmission Assets is unlikely to result in significant effects and is proposed to be scoped out of the onshore elements of the Transmission Assets assessment for air quality.
The impact on human and ecological receptors arising from air emissions generated by vehicle traffic during operation and maintenance of the onshore elements of the Transmission Assets.	Operation of the onshore elements of the Transmission Assets will generate a small number of additional two-way vehicle movements as result of staff trips and occasional maintenance activities. However, the additional two-way vehicle movements associated with operation and maintenance of the onshore elements of the Transmission Assets would not exceed the EPUK & IAQM indicative criteria for an air quality assessment (see part 2, section 8.5.7 of this EIA Scoping Report), irrespective of whether the air quality study area was located within or adjacent to an AQMA. Therefore, the potential impact on human or ecological receptors arising from air emissions generated by vehicle traffic during operation and maintenance of the onshore elements of the Transmission Assets is unlikely to be significant and is proposed to be scoped out of the assessment for air quality.
The impact on human and ecological receptors arising from air emissions generated by plants or stacks during operation and maintenance of the onshore elements of the Transmission Assets.	The Transmission Assets do not include proposals for any plant or emissions stacks which could give rise to air emissions during operation of the onshore elements of the Transmission Assets. Therefore, the potential impact on human or ecological receptors arising from plant or stack emissions would not occur and would not result in significant effects and is proposed to be scoped out of the assessment for air quality.

8.5.6 Measures adopted as part of the project

8.5.6.1 The following measures adopted as part of the project are relevant to air quality. These measures may evolve as the engineering design and the EIA progresses.

- CoCP – Construction of the onshore elements of the Transmission Assets would be undertaken in accordance with the appropriate best practice measures set out in the Guidance on the assessment of dust from demolition and construction (IAQM, 2014). The CoCP would include the development of a Dust Management Plan (DMP).
- Construction Traffic Management Plan (CTMP) – The movement of construction vehicles entering or exiting construction sites and utilising the local highway network would be suitably managed, as to avoid or reduce the potential impacts of air emissions on sensitive receptors.

8.5.6.2 The requirement for and feasibility of any mitigation measures will be dependent on the significance of effects and will be consulted upon with statutory and non-statutory consultees throughout the EIA process.

8.5.6.3 Any requirements for additional air quality and/or dust mitigation measures will be determined through discussions with the EHOs from each Local Planning Authority likely to be affected as part of the air quality assessment.

8.5.7 Proposed assessment methodology

8.5.7.1 The air quality assessment for the onshore elements of the Transmission Assets will be undertaken in accordance with the methodology set out in part 1, section 5: EIA Methodology, of the Scoping Report, in addition to the following established guidance:

- Local Air Quality Management Technical Guidance: LAQM.TG16 (Defra, 2018)
- Land-Use Planning & Development Control: Planning for Air Quality (EPUK & IAQM, 2017)
- Guidance on the assessment of dust from demolition and construction (IAQM, 2014)
- DMRB LA 105 – Air Quality (Highways England *et al*., 2019).

8.5.7.2 Although principally developed for the assessment of highway projects, the DMRB also provides guidance applicable to the assessment of other linear schemes, including the onshore elements of the Transmission Assets (e.g., onshore export cables). In this case, the assessment of vehicle emissions at ecological sites will be undertaken in accordance with DMRB guidance.

8.5.8 Potential cumulative effects

8.5.8.1 There is potential for cumulative effects on sensitive receptors to occur when the Transmission Assets are considered together with other developments. The potential cumulative effects between the onshore elements of the Transmission Assets and other developments with respect to air quality will be considered within the ES.

8.5.8.2 The cumulative effect assessment will be undertaken in accordance with the methodology set out in part 1, section 5: EIA Methodology, of this EIA Scoping Report.

8.5.9 Potential inter-related effects

8.5.9.1 The assessment of potential inter-related effects will be considered in the air quality ES chapter. It will include consideration of project lifetime effects and receptor-led effects, in line with the approach outlined in part 1, section 5: EIA Methodology, of this EIA Scoping Report. For example:

- Terrestrial ecology and ornithology (intertidal and onshore):
  - Dust and air emissions generated during construction of the onshore elements of the Transmission Assets may impact sites designated for nature conservation which support protected habitats and species.
- Historic environment:
  - Dust generated during construction of the onshore elements of the Transmission Assets may impact designated above ground heritage assets located within the air quality study area.
- Traffic and transport:
  - Additional vehicle movements generated during construction of the onshore elements of the Transmission Assets would be used to identify sites within the air quality study area which require air quality assessment.

8.5.10 Potential transboundary impacts

8.5.10.1 A screening of transboundary impacts has been carried out and is presented in part 3, Annex A of this EIA Scoping Report. This screening exercise identified that there is no potential for transboundary impacts upon air quality due to construction, operational and maintenance, and decommissioning impacts of the Transmission Assets.

9 Proposed technical assessments – impacts on the onshore and offshore environment

9.1 Seascape, landscape and visual resources

9.1.1 Introduction

9.1.1.1 This section of the EIA Scoping Report identifies the seascape, landscape and visual resources and receptors relevant to the onshore and offshore elements of the Transmission Assets. This section also considers the potential impacts arising from the construction, operation and maintenance, and decommissioning of the Transmission Assets and identifies the proposed scope of, and methodology for, the EIA process for seascape, landscape and visual effects.

9.1.2 Study area

9.1.2.1 The study area to be used in the assessment of seascape, landscape and visual resources (the seascape, landscape and visual study area) will be based on the findings of an analysis of the Zone of Theoretical Visibility (ZTV) for both the offshore and onshore elements of the Transmission Assets, which will also inform the identification of representative viewpoints.

9.1.2.2 Once the location of offshore and onshore elements of the Transmission Assets has been refined and the ZTV determined, representative viewpoints will be agreed with the relevant stakeholders, including local authorities, Natural England, National Park authorities and Areas of Outstanding Natural Beauty (AONB) partnerships.

9.1.2.3 Taking into account the known parameters of the offshore and onshore elements of the Transmission Assets and through professional judgement and experience, the following are likely to form the basis of the seascape, landscape and visual study area:

Onshore elements of the Transmission Assets

- Land to be temporarily occupied during construction of the onshore elements of the Transmission Assets, with an additional 1km buffer around the onshore export cable corridor, landfall and construction compounds. At the landfall site, the seascape, landscape and visual study area for the Transmission Assets will consider the intertidal zone where appropriate, landward of MLWS.
- Land to be permanently occupied during operation of the onshore elements of the Transmission Assets, with an additional buffer around the onshore substations (to be determined by the visibility but likely to be 5km to 10km around the substations).

Offshore elements of the Transmission Assets

- Area to be temporarily and permanently occupied during construction, operation and maintenance and decommissioning of the offshore elements of the Transmission Assets, with an additional 1km buffer either side of the offshore export cable corridor and a 20km buffer around the OSPs and Morgan offshore booster station in line with best practice.

9.1.2.4 The seascape, landscape and visual study area will be reviewed and modified in response to refinements made to the Transmission Asset design and additional environmental and/or design constraints identified during the EIA process.

9.1.3 Data sources

9.1.3.1 The data sources used to inform the baseline assessment will comprise a combination of published material publicly available online and site visits undertaken by competent experts.

9.1.3.2 An initial desk-based review has identified several data sources, which provide baseline data coverage of the Transmission Assets Scoping Boundary. These data sources are summarised in Table 9.1 below.

Table 9.1: Baseline data sources - seascape, landscape and visual resources.

Source	Summary
Published national and local seascape and landscape character assessments and studies.	Provides information regarding the character of the landscape at the national and local scale.
MAGIC (interactive mapping website), Natural England and Historic England websites. AONB Management Boards/National Park Authority management plans United Nations Educational, Scientific and Cultural Organisation (UNESCO) world heritage list. Local Plan designations, including heritage coast.	Descriptions of internationally and nationally designated landscapes, including publicly accessible Registered Parks and Gardens. Provides information regarding the nature of the internationally and nationally designated landscapes, including publicly accessible Registered Parks and Gardens.
Ordnance survey 1:25,000 maps and Definitive Public Rights of Way (PRoW) maps produced by the relevant local authorities.	Provides information regarding the location of visual receptors, including PRoW.
Aerial photography.	Provides information regarding the location of visual receptors, including PRoW.

9.1.3.3 In addition, site visits will be undertaken to survey the landfall and onshore cable corridor, the onshore substation location and the surrounding areas to verify the documented seascape, landscape and visual baseline, particularly the local landscape and seascape character. Site visits will be used to select and take photographs from the agreed representative viewpoints. This will include viewpoints of the location of both the onshore/offshore elements of the Transmission Assets.

9.1.3.4 The baseline data sources identified in this EIA Scoping Report will remain under review and may be updated in response to feedback from relevant statutory and non-statutory consultees during the EIA process, or in response to new sources of information becoming available.

9.1.4 Baseline environment

9.1.4.1 This section provides a high-level overview of the internationally and nationally designated landscapes within the Transmission Assets Scoping Boundary as set out within Figure 9.1. Where appropriate designated landscapes outside of the Transmission Assets Scoping Boundary have also been identified.

9.1.4.2 Not all of the landscapes detailed below will be impacted by the Transmission Assets. Those affected by the Transmission Assets and those with theoretical visibility of any part of the Transmission Assets will be identified following an analysis of the ZTV once the design and therefore, study area, has been refined.

9.1.4.3 There are no statutory designated landscapes located within the Transmission Assets Scoping Boundary. The closest designated landscape is the Forest of Bowland AONB, which is located approximately 13km northeast of the Transmission Assets Scoping Boundary.

9.1.4.4 The location and extent of landscape designations surrounding the Transmission Assets Scoping Boundary are presented below in Figure 9.1.

9.1.4.5 The location and extent of heritage assets, including World Heritage Sites and Registered Parks and Gardens within the Transmission Assets Scoping Boundary are presented in part 2, section 8.1: Historic environment, of this EIA Scoping Report.

Offshore elements of the Transmission Assets

9.1.4.6 In addition to the Forest of Bowland AONB, internationally and nationally designated landscapes located within 20km of the Transmission Assets Scoping Boundary are presented in Table 9.2 below. All of the designated landscapes within Table 9.2 are Registered Parks and Gardens as no World Heritage Sites or additional AONBs are situated within 20km of the Transmission Assets Scoping Boundary.

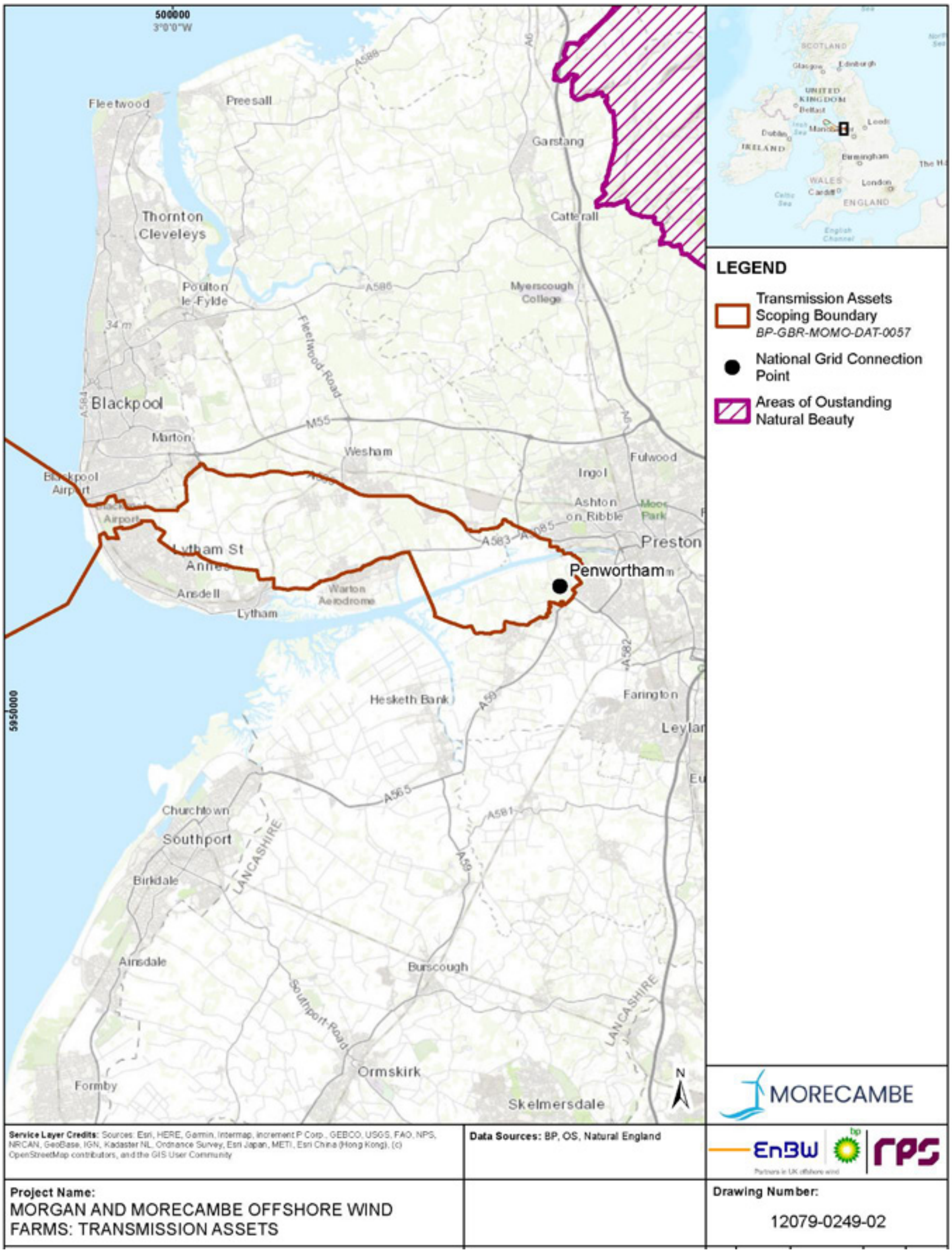


Figure 9.1: Landscape designations within and surrounding the Transmission Assets Scoping Boundary.

Table 9.2: Registered Parks and Gardens within 20km of the Transmission Assets Scoping Boundary

Grade	Name
Grade II	Bold Venture Park
	Sunnyhurst Woods
	Promenade Gardens, Lytham St Anne's
	Ashton Gardens
	Queen's Park Blackburn
	Avenham Walk
	The Willows
	Haslam Park
	Woodfold Park
	King's Gardens and South Marine Gardens
	Hoghton Tower
	Lever Park
	Lytham Hall
	Rivington Gardens
	Scarisbrick Hall
	Worden Hall
	Churchtown Botanic Gardens
	Astley Hall
	The Mount Including Surrounding Cobble Wall
	The Former Harris Orphanage
	Fleetwood Memorial Park
	Preston Cemetery
Grade II*	Corporation Park
	Moor Park
	Miller Park
	Stanley Park, Blackpool
	Hesketh Park
	Avenham Park

Onshore elements of the Transmission Assets

9.1.4.7 Registered Parks and Gardens located within 10km of the Transmission Assets Scoping Boundary are presented in Table 9.2 below

Table 9.3: Registered Parks and Gardens within 10km of the Transmission Assets Scoping Boundary

Grade	Name
Grade II	Ashton Gardens
	Promenade Gardens, Lytham St Annes's
	Lytham Hall
	Churchtown Botanic Gardens
	Worden Hall
	The Willows
	Haslam Park
	The former Harris Orphanage
	Preston Cemetery
	Avenham Walk
Grade II*	Stanley Park, Blackpool
	Moor Park
	Miller Park

9.1.4.8 Once the design of the Transmission Assets has been refined, the Preliminary Environmental Information (PEIR) and Environmental Statement (ES) will provide details of the baseline conditions within the seascape, landscape and visual study area for the offshore and onshore elements of the Transmission Assets, including the following seascape, landscape and visual receptors:

- National and local seascape and landscape character areas, including designated sites.
- Users of rights of way and areas of Access Land (as defined under the Countryside and Rights of Way Act 2000).
- Other recreational users of land, such as those people involved in outdoor sports.
- Dynamic users of transport routes, including both those people within motor vehicles as well as walkers, horse riders and cyclists.
- Residents, where there is the potential for such receptors to experience significant adverse effects. It is noted that, in addition, many views important to the community will also be captured by the above and below representative viewpoints.
- Tourists visiting specific destinations, including publicly accessible Registered Parks and Gardens and other historic assets.
- People on marine vessels or installations at sea, such as those people at work, passengers on ferries and recreational yachtsmen and other recreational users/those involved in watersports.

Future baseline conditions

9.1.4.9 The EIA process will consider the existing baseline conditions within the study area, and future baseline conditions (as far as reasonably practicable) in accordance with the methodology set out in part 1, section 5 (see section 5.7.2 for the approach to consideration of future baseline conditions).

9.1.5 Potential project impacts

9.1.5.1 A range of potential impacts on seascape, landscape and visual resources have been identified which may occur during the construction, operation and maintenance, and decommissioning phases of the onshore and offshore elements of the Transmission Assets.

9.1.5.2 The seascape, landscape and visual assessment will consider two key areas:

Seascape and landscape character

- A review of the seascape and landscape character (features, elements and characteristics) in the study area and its surroundings will be undertaken with reference to published seascape and landscape assessment documents and field survey, as well as individual landscape features and elements.

Visual receptors

- Considering the findings of the site visits and field appraisal, a range of viewpoint locations will be identified and agreed with the relevant statutory consultees. Photographs from viewpoint locations will be representative of views towards the Transmission Assets from areas identified by the ZTV. Photographs from representative viewpoint locations will typically be undertaken in both the summer and winter months. However, this may be dependent on the programme of submission and prevailing weather conditions at the time photographs are due to be undertaken.
- Night-time photography, from selected representative viewpoints, may also be undertaken if deemed necessary in liaison with the relevant statutory consultees.

9.1.5.3 The impacts that have been scoped into the assessment are outlined in Table 9.4 together with a description of any additional data collection (e.g., site-specific surveys) and supporting analyses that will be required to enable a full assessment of the impacts.

9.1.5.4 Potential impacts scoped out of the assessment are presented in Table 9.5, with justification.

Table 9.4: Impacts proposed to be scoped into the assessment of effects on seascape, landscape and visual resources (project phase refers to construction (C), operation and maintenance (O) and decommissioning (D)).

Impact	Project phase			Justification	Data collection and analysis required to characterise the baseline environment	Summary of proposed approach to assessment
	C	O	D			
The impact of the onshore and offshore elements of the Transmission Assets on seascape and landscape character during the construction, operation and maintenance and decommissioning phase.	✓	✓	✓	Activities required to facilitate the construction, operation and maintenance and decommissioning of the onshore and offshore elements of the Transmission Assets, including temporary and permanent lighting, may result in direct impacts upon the upon seascape and landscape character (designations, types, areas).	The seascape and landscape character within the seascape, landscape and visual study area will be determined using desk-based analysis, supported by contextual photography. The desk-based analysis will be undertaken in accordance with Guidelines for Landscape and Visual Impact Assessment: Third Edition (GLVIA3) (Landscape Institute and Institute of Environmental Management and Assessment (IEMA, 2013). In addition, the seascape and landscape character within the seascape, landscape and visual study area will be confirmed and refined during site visits undertaken by competent experts.	The impact of the onshore and offshore elements of the Transmission Assets on seascape and landscape character will be assessed in accordance with GLVIA3 (Landscape Institute and IEMA, 2013). The assessment will be informed by the ZTV, which will identify the seascape and landscape character areas that may be impacted during construction, operation and maintenance and decommissioning of the onshore and offshore elements of the Transmission Assets.
The impact of the onshore and offshore elements of the Transmission Assets on publicly accessible views during the construction, operation and maintenance and decommissioning phase.	✓	✓	✓	Activities required to facilitate the construction, operation and maintenance and decommissioning of the onshore and offshore elements of the Transmission Assets, including temporary and permanent lighting, may impact publicly accessible views from visual receptors, including users of PRoWs, Access Land, transport routes and other land and marine recreational resources.	Visual receptors located within the seascape, landscape and visual study area will be identified using desk-based analysis, supported by photography taken from representative viewpoints. The desk-based analysis will be undertaken in accordance with GLVIA3 (Landscape Institute and IEMA, 2013). In addition, the visual receptors within the seascape, landscape and visual study area will be confirmed and refined during site visits undertaken by competent experts.	The impact of the Transmission Assets on publicly accessible views will be assessed in accordance with GLVIA3 (Landscape Institute and IEMA, 2013). The assessment will be informed by the ZTV, which will identify the visual receptors that may be impacted during construction, operation and maintenance and decommissioning of the onshore and offshore elements of the Transmission Assets. Representative viewpoints from publicly accessible locations will be agreed with the relevant statutory consultees and the impact to these views would be assessed. Potential impacts on more

Impact	Project phase			Justification	Data collection and analysis required to characterise the baseline environment	Summary of proposed approach to assessment
	C	O	D			
						general views available by receptor groups would also be assessed. The assessment of operational effects will be further informed using wirelines and photomontages (where appropriate) to illustrate views of the onshore and offshore elements of the Transmission Assets from the perspective of representative viewpoints.

Table 9.5: Impacts proposed to be scoped out of the project assessment for seascape, landscape and visual resources.

Impact	Justification
The impact of construction, operation and maintenance and decommissioning of the onshore and offshore elements of the Transmission Assets on seascape and landscape character and visual resources located beyond the seascape, landscape and visual study area.	The potential impact of the onshore and offshore elements of the Transmission Assets on seascape and landscape character and visual resources located beyond the seascape, landscape and visual study area during the construction, operation and maintenance and decommissioning phase is unlikely to result in significant effects and is proposed to be scoped out of the assessment for seascape, landscape and visual resources.
The impact of operation and maintenance of the offshore and onshore export cables on seascape and landscape character and visual resources.	Offshore and onshore export cables would be fully submerged or buried underground respectively. Therefore, the potential impact of the offshore and onshore export cables on seascape and landscape character and visual resources during the operation and maintenance phase would not result in significant effects and is proposed to be scoped out of the assessment for seascape, landscape and visual resources.
The impact of decommissioning of the offshore and onshore export cables on seascape and landscape character and visual resources.	Activities required to facilitate decommissioning of the offshore and onshore export cables are unlikely to result in significant effects on seascape and landscape character and visual resources. It is anticipated that only structures above the seabed or ground level will require significant decommissioning activity. Therefore, the potential impact of the offshore and onshore export cables on seascape and landscape character and visual resources during the decommissioning phase is unlikely to result in significant effects and is proposed to be scoped out of the assessment for seascape, landscape and visual resources.

9.1.6 Measures adopted as part of the project

9.1.6.1 The following measures adopted as part of the project are relevant to seascape, landscape and visual resources. These measures may evolve as the engineering design and the EIA progresses.

- Site selection and micro-siting of the Transmission Assets (where practicable), including the onshore export cable corridor, onshore and offshore substation locations and the Morgan offshore booster station, to avoid or reduce potential impacts on seascape and landscape character and visual resources.
- CoCP – including control of temporary lighting and reinstatement of temporary earthworks associated with the onshore export cable corridor and temporary construction works areas.
- Development of a Landscape Management Plan primarily in relation to the landscape proposals at the onshore substation site, but also to reinstate hedgerows through which the cable corridor passes.

9.1.6.2 The requirement for and feasibility of any mitigation measures will be dependent on the significance of effects and will be consulted upon with statutory consultees throughout the EIA process.

9.1.7 Proposed assessment methodology

9.1.7.1 The principal objectives of the assessment of seascape, landscape and visual resources in the ES will be:

- To identify the existing seascape, landscape and visual resources that may be impacted during the construction, operation and maintenance and decommissioning of the onshore and offshore elements of the Transmission Assets.
- To assess the significance of the effects on seascape, landscape and visual resources, taking into account the measures proposed to mitigate any of the potential impacts identified.

9.1.7.2 The assessment will be undertaken in accordance with established guidelines, principally the GLVIA3 (Landscape Institute and IEMA, 2013), and will consider the likely significant effects of the Transmission Assets on the following sensitive receptors:

- Individual seascape, landscape and townscape features, elements and characteristics
- Seascape, landscape and townscape character
- Visual receptors (people) for whom the onshore and offshore elements of the Transmission Assets might be visible during the construction, operation and maintenance and decommissioning phase.

9.1.7.3 As set out in GLVIA3, the seascape/landscape and visual effects will be assessed separately. However, the procedure for assessing each of these areas is closely linked. A clear distinction will be drawn between seascape/ landscape and visual effects as described below:

- Seascape/landscape effects relate to the effects of the onshore and offshore elements of the Transmission Assets on the physical and other characteristics of the landscape and its resulting character and quality.

- Visual effects relate to the impacts on publicly accessible views experienced by visual receptors (e.g., users of PRoWs, open space or roads) and private views (e.g., occupiers of residential or commercial properties).

9.1.7.4 The temporary effects of the construction and decommissioning phases and the long-term effects relating to the operation and maintenance phase will be assessed. ZTVs will be generated to show the theoretical extent of visibility of the Transmission Assets within the seascape, landscape and visual study area.

9.1.7.5 Consideration will be given to the likely seasonal variations in the visibility of the onshore and offshore elements of the Transmission Assets, including variations in weather conditions and deciduous vegetation. Consideration will also be given to changes in the level of effects likely to take place as mitigation planting proposals mature and existing vegetation continues to grow.

9.1.7.6 The assessment process will take into account the overall assessment methodology set out in part 1, section 5: EIA Methodology, of this EIA Scoping Report, in addition to established guidance, such as GLVIA3. The assessment will be based on maximum design parameters in line with the overarching methodology set out in Part 1 of this EIA Scoping Report.

9.1.7.7 The assessment process will follow the approach set out in GLVIA3, regarding the identification of resource and receptor sensitivity (susceptibility and value), impact magnitude and evaluation of significance of effects.

9.1.7.8 The sensitivity of seascape, landscape and visual resources and receptors will be identified, together with the predicted magnitude of impact on that resource or receptor. Taking this into account, the significance of effect will be described for each resource (or receptor) during the construction, operation and maintenance and decommissioning of onshore and offshore elements of the Transmission Assets. In addition, the significance of effect will be described upon maturity (up to 10 years establishment) of mitigation planting proposals where relevant.

9.1.7.9 The evaluation of significance will be underpinned by a narrative approach, based on professional judgement.

9.1.8 Potential cumulative effects

9.1.8.1 The assessment will consider the effects of the onshore and offshore elements of the Transmission Assets together. There is potential for cumulative effects on sensitive receptors to occur when the Transmission Assets are considered together with other developments. The potential cumulative effects with other developments in the study area, including the generation assets of both the Morgan Offshore Wind Project and Morecambe Offshore Windfarm, plus other Irish Sea wind farms (including the Mona Offshore Wind Project) with respect to seascape, landscape and visual resources will be considered within the Preliminary Environmental Information Report (PEIR) and the ES.

9.1.8.2 The scope of the cumulative assessment (in terms of other proposed developments to be included) will be identified in consultation with stakeholders, including Natural England and relevant Local Authorities.

9.1.8.3 The cumulative effect assessment will be undertaken in accordance with the methodology set out in part 1, section 5: EIA Methodology, of this EIA Scoping Report and GLVIA3.

9.1.8.4 In accordance with GLVIA3, the types of cumulative effects that would be considered in the assessment of seascape, landscape and visual resources would include:

- Effects of extension to an existing development
- Filling an area with the same development or different types of development over time
- Interactions between different types of development
- Incremental change as a result of successive individual development
- Temporal cumulative effects
- Indirect effects of development such as enabling other further development
- Future actions that remove elements which may have consequences for other existing or proposed development.

9.1.8.5 Cumulative effects with the generation assets (i.e., the Morgan Offshore Wind Project and the Morecambe Offshore Windfarm) will be considered, together with cumulative effects with other Round 4 projects (such as the Mona Offshore Wind Project) and other infrastructure projects such as proposed wind farms and interconnectors, where relevant.

9.1.8.6 It is not considered that operation, maintenance and decommissioning of the offshore and onshore export cables will result in significant effects on seascape, landscape and visual resources either alone or cumulatively with other developments.

9.1.8.7 Therefore, it is proposed that the potential cumulative effects arising from operation, maintenance and decommissioning of the offshore and onshore export cables are scoped out of the cumulative effect assessment for seascape, landscape and visual resources.

9.1.9 Potential inter-related effects

9.1.9.1 The potential inter-related effects of the onshore and offshore elements of the Transmission Assets with respect to seascape, landscape and visual resources will be considered in relevant topic chapters of the ES. For example:

- Historic environment:
  - Seascape, landscape and visual impacts associated with construction, operation and maintenance and decommissioning of the onshore and offshore elements of the Transmission Assets may impact the setting of above ground heritage assets and historic landscape patterns.
- Land use and recreation:

- Seascape, landscape and visual impacts associated with construction, operation and maintenance and decommissioning of the onshore and offshore elements of the Transmission Assets may impact the visual amenity of users of PRoWs and other recreational resources.

9.1.10 Potential transboundary impacts

9.1.10.1 A screening of transboundary impacts has been carried out and is presented in part 3, Annex A of this EIA Scoping Report. This screening exercise identified that there is no potential for transboundary impacts upon seascape, landscape and visual resources due to construction, operational and maintenance, and decommissioning impacts of the Transmission Assets.

9.2 Aviation and radar

9.2.1 Introduction

9.2.1.1 This section of the EIA Scoping Report identifies the aviation and radar receptors relevant to the onshore and offshore elements of the Transmission Assets. This section also considers the potential impacts arising from the construction, operation and maintenance, and decommissioning of the Transmission Assets and identifies the proposed scope of, and methodology for, the EIA process for aviation and radar effects.

9.2.2 Study area

9.2.2.1 For the purposes of identifying aviation and radar receptors for the Transmission Assets, a study area has been defined. The Transmission Assets aviation and radar study area is presented in Figure 9.2 and described below.

9.2.2.2 The Transmission Assets aviation and radar study area has been defined as the airspace encompassing the Transmission Assets Scoping Boundary, plus a 2nm buffer which is used to define obstruction effects to helicopter main routes (HMRs). A 2nm buffer would be compliant with the Civil Aviation Publication (CAP) 764 CAA Policy and Guidance on Wind Turbines (Civil Aviation Authority (CAA), 2016) which states that 2nm either side of the HMR route centre-line should be kept obstacle free (CAA, 2016). This may be refined as the design of the Transmission Assets progresses (i.e., to a 2nm buffer around the offshore elements of the Transmission Assets).

9.2.3 Data sources

9.2.3.1 A number of sources were consulted in order to inform the aviation and radar section of this EIA Scoping Report, and these will be used to inform the EIA process. These are summarised in Table 9.4.

9.2.3.2 In addition to existing data, the assessment will be informed through stakeholder consultation.

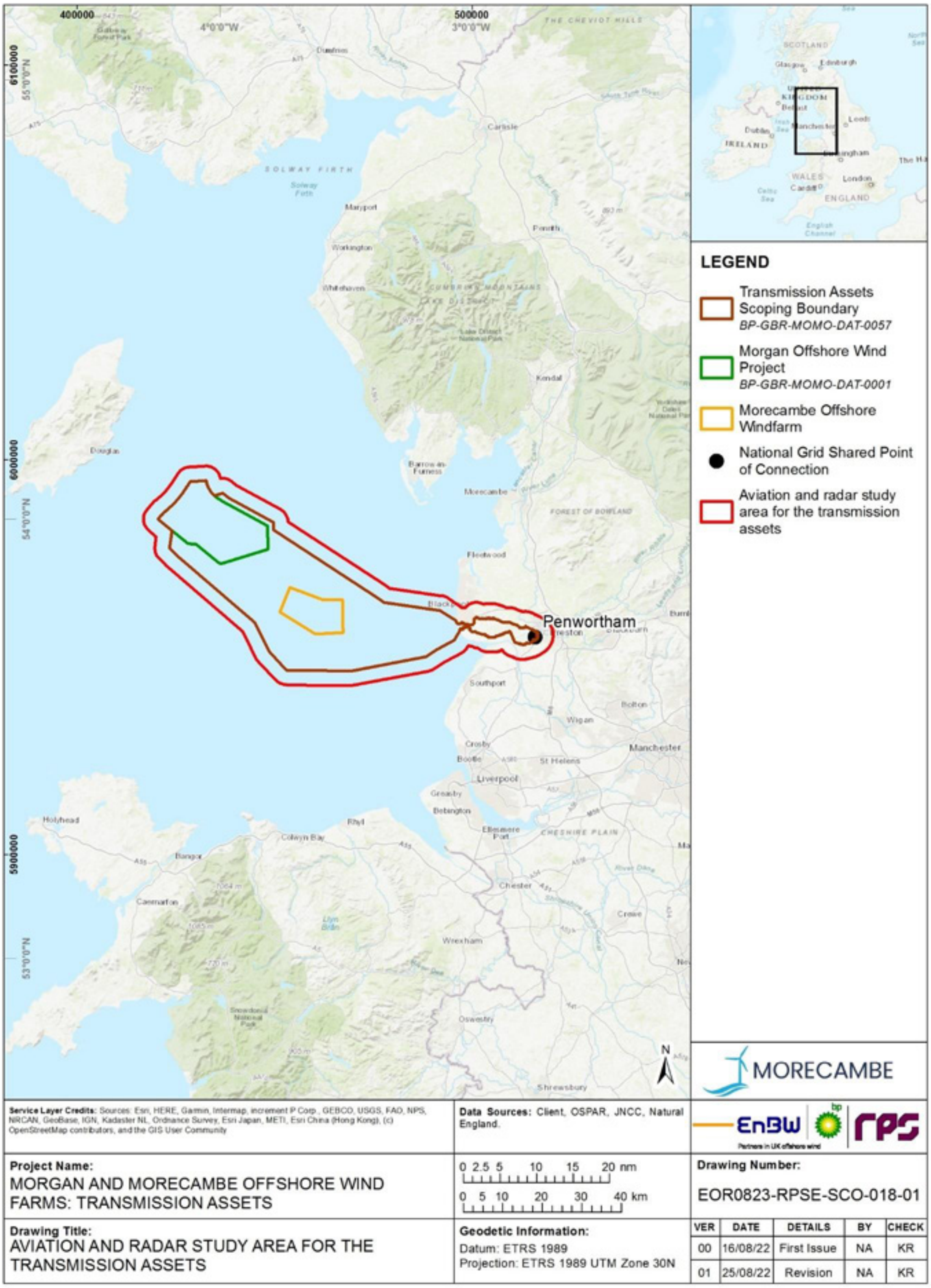


Figure 9.2: The Transmission Assets aviation and radar study area.

Table 9.6: Summary of key desktop datasets and reports - aviation and radar.

Title	Source	Year	Author
Search and Rescue (SAR) Locations	The Bristow Group	2021	The Bristow Group
Helicopter Main Routes (HMRs)	NATS En-Route charting	2019	NATS
Aerodromes and Ground Aids, Surveillance Radars, Navigational Aid areas	NATS Safeguarding	2012	NATS
Airfields	UK General Aviation (UKGA) Environmental Systems Research Institute (ESRI) Ordnance Survey Open Data	2022 2015 2021	UKGA ESRI Ordnance Survey
Military Practice and Exercise Areas	Oceanwise	2021	Emapsite
Offshore platforms and consultation zones	Oil and Gas Authority	2021	Oil and Gas Authority

9.2.4 Baseline environment

9.2.4.1 The Transmission Assets will be located within the Transmission Assets Scoping Boundary. The following sections describe the baseline environment within the Transmission Assets Scoping Boundary, within which the OSPs, offshore export cables, Morgan offshore booster station, landfall, onshore export cable corridor and onshore substation location will be located.

Civil aviation

9.2.4.2 HMRs support the transport of personnel and equipment to offshore oil and gas installations. HMRs are routes typically and routinely flown by helicopters operating to and from offshore destinations and are promulgated for the purpose of signposting concentrations of helicopter traffic to other airspace users. HMR promulgation does not predicate the flow of helicopter traffic. Whilst HMRs have no airspace status and assume the background airspace classification within which they lie (in the case of the Irish Sea, Class G), they are used by the Air Navigation Service Provider and helicopter operators for flight planning and management purposes. CAP 764 CAA Policy and Guidance on Wind Turbines (CAA, 2016) states that HMRs have no defined lateral dimensions (only route centre-lines are charted on navigation charts) and that 2nm either side of the route centre-line should be kept obstacle free (CAA, 2016). Three HMRs overlap with the Transmission Assets Scoping Boundary, as shown in Figure 9.3.

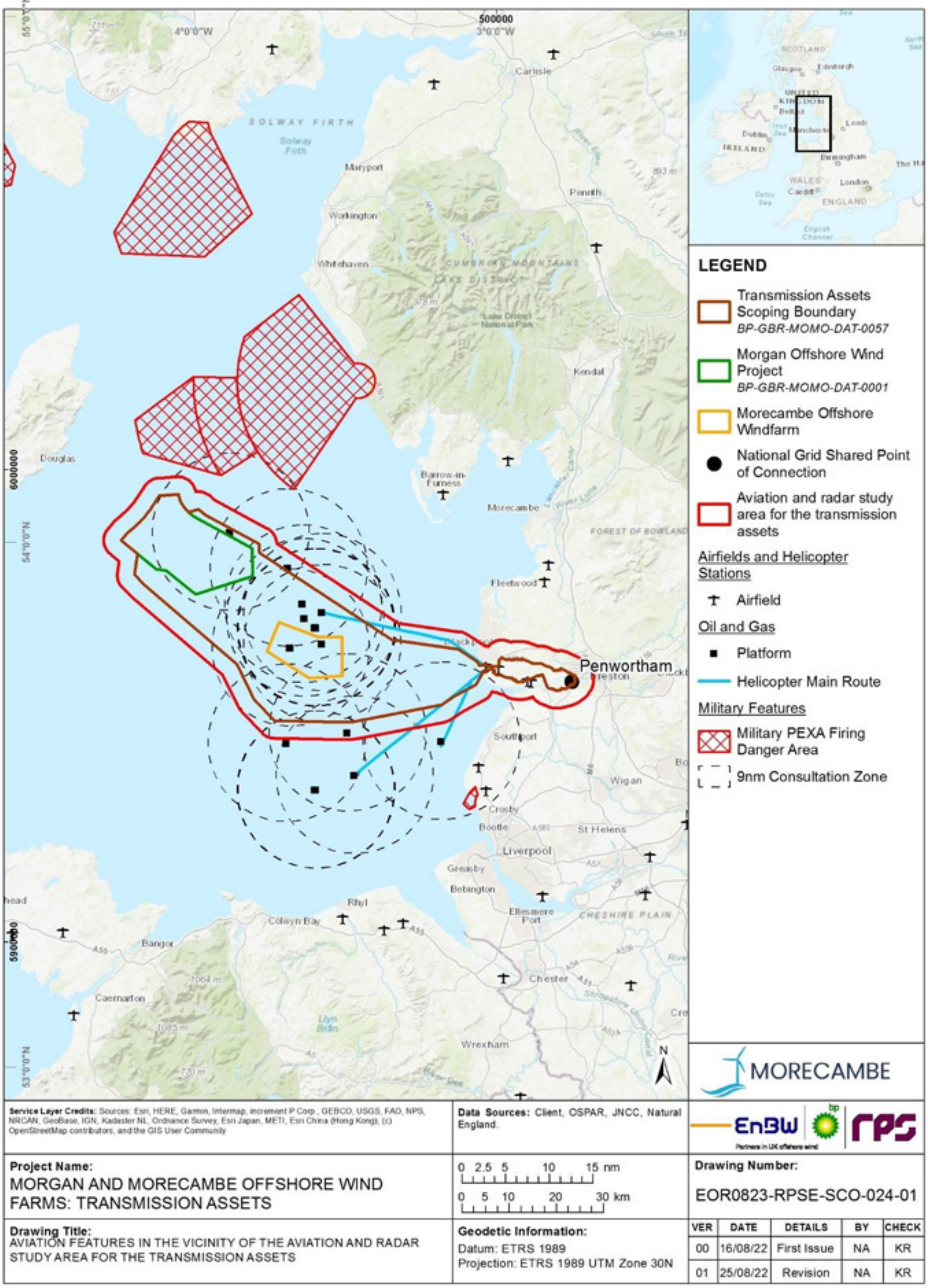


Figure 9.3: Aviation features in the vicinity of the Transmission Assets aviation and radar study area.

9.2.4.3 In order to maintain a safe operating environment, the CAA recommend a consultation zone of 9nm radius around offshore installations serviced by helicopters (CAA, 2016). This consultation zone is not considered a prohibition on development, but a trigger for consultation between offshore helicopter operators, the operators of existing installations and developers of proposed offshore wind farms, in order to determine a solution that maintains safe offshore helicopter operations. The Transmission Assets Scoping Boundary extends into the 9nm consultation zones established around 14 offshore platforms as presented in Figure 9.3. A 9nm consultation zone should also be a trigger for consultation with the operators of any subsea infrastructure and wells where mobile drilling rigs or vessels may require helicopter access.

Civil and military radar

9.2.4.4 All of the offshore and onshore elements of the Transmission Assets comprise stationary surface infrastructure (or below ground cables). Therefore, civil, military and meteorological radar systems have not been identified as sensitive receptors in relation to the Transmission Assets.

Airfields

9.2.4.5 The Transmission Assets Scoping Boundary is located in proximity to Blackpool Airfield, Woodvale Airfield, St Anne's Radar system and the boundary to Warton Airfield see (Figure 9.4).

Airborne search and rescue operations

9.2.4.6 The SAR helicopter force provides constant SAR cover in the UK from ten bases located across the UK. The bases are positioned close to SAR hotspots so aircraft can provide support as quickly and efficiently as possible. Bristow Helicopters was awarded the contract to provide helicopter SAR services for the UK in 2013, with the closest SAR base to the aviation and radar study area being at Caernarfon Airport, Gwynedd, 72.5km away. The Transmission Assets have the potential to affect airborne SAR operations due to the creation of obstructions.

Military practice and exercise areas

9.2.4.7 There is no Military Practice and Exercise Areas in the Transmission Assets aviation and radar study area (Figure 9.3). The closest is the Altcar Training Camp to the southeast, a facility for small arms marksmanship training 19km north of Liverpool and approximately 18km from the Transmission Assets aviation and radar study area.

Future baseline conditions

9.2.4.8 The EIA process will consider the existing baseline conditions within the study area, and future baseline conditions (as far as reasonably practicable) in accordance with the methodology set out in part 1, section 5 (see section 5.7.2 for the approach to consideration of future baseline conditions).

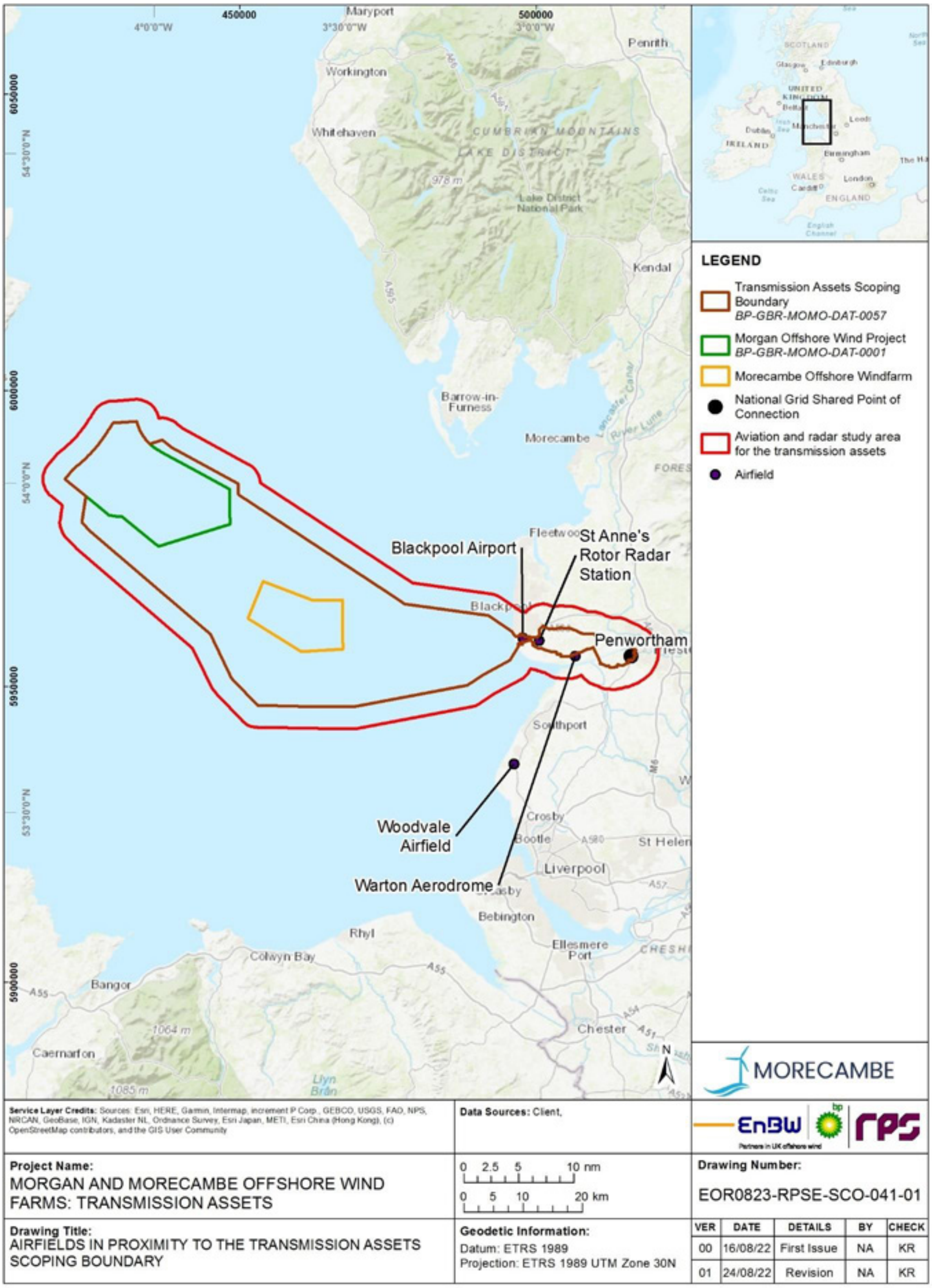


Figure 9.4: Airfields in proximity to the Transmission Assets aviation and radar study area.

9.2.5 Potential project impacts

9.2.5.1 A range of potential impacts on aviation receptors have been identified which may occur during the construction, operation and maintenance, and decommissioning phases of the Transmission Assets. The impacts that have been scoped into the assessment are outlined in Table 9.7 together with a description of any additional data collection and supporting analyses that will be required to enable a full assessment of the impacts.

9.2.5.2 On the basis of the baseline information currently available and the project description outlined in part 1, section 4: Project description, of this EIA Scoping Report, potential impacts to be scoped out of the assessment are presented in Table 9.8, with justification.

Table 9.7: Impacts proposed to be scoped into the assessment for aviation and radar (project phase refers to construction (C), operation and maintenance (O) and decommissioning (D)).

Impact	Project phase			Justification	Data collection and analysis required to characterise the baseline environment	Summary of proposed approach to assessment
	C	O	D			
Creation of a physical obstacle to low flying aircraft.	✓	✓	✓	The OSPs and the Morgan offshore booster station may create a physical obstruction to low flying aircraft operating offshore.	Consultation with potential airspace users to understand current airspace usage and potential for impact.	Qualitative assessment informed by consideration of the outcomes of consultation, Air Traffic Control service provision and the rules of the air.
Physical obstruction and potential for disruption to helicopter access/ egress to/ from offshore oil and gas platforms.	✓	✓	✓	The OSPs and the Morgan offshore booster station may be located within the 9nm consultation zones of offshore oil and gas platforms. The presence of a physical obstruction in proximity to the airspace utilised by helicopters operating to and from oil and gas platforms may disrupt helicopter operations to and from the potentially affected platforms.	Consultation with the operators of these platforms and their helicopter service providers to understand current and future helicopter access requirements (including any temporary access requirements to drilling rigs and vessels), and to understand any plans for decommissioning of assets.	In the event that the Morgan offshore booster station or OSPs are located within 9nm of an existing offshore oil and gas platform and dependent on the outcomes of consultation, a helicopter access report considering routine and emergency access procedures may be prepared for those platforms where ongoing helicopter operations will be required during all phases of the Transmission Assets.
Obstruction to SAR helicopter operations.	✓	✓	✓	The presence of infrastructure (and associated construction equipment) within a previously open sea area may cause an obstruction to SAR operations.	Consultation will be carried out with SAR operators and the Maritime and Coastguard Agency (MCA) to understand requirements and to inform the assessment.	Qualitative assessment based on industry guidance informed through review of the project description against the outcomes of consultation with SAR operators and the MCA.
Impacts to Blackpool Airfield, Woodvale Airfield, St Anne's radar system and Warton Airfield.	✓	✓	✓	Construction activities and the presence of infrastructure associated with the onshore elements of the Transmission Assets during the construction phase of the Transmission Assets may have the potential to impact the functioning of Blackpool Airfield, Woodvale Airfield, St Anne's Radar system and Warton Airfield.	Consultation with airfield operators to understand operations and discuss potential for impact.	Qualitative assessment for each aviation receptor (if required) in order to establish if relevant aviation safeguarded areas may be affected by construction infrastructure.

Table 9.8: Impacts proposed to be scoped out of the assessment for aviation and radar.

Impact	Justification
Potential disruption to HMRs due to the presence of the OSPs and the Morgan offshore booster station.	Three HMRs overlap with the Transmission Assets Scoping Boundary. In the event that an OSP or the Morgan offshore booster station is located in proximity to an HMR, consultation would take place with the relevant helicopter and platform owner in order to promote coexistence and as such this impact is unlikely to lead to a significant effect in EIA terms. Therefore, it is proposed that this potential impact is scoped out of the assessment for the transmission assets.
Increased helicopter traffic within the Transmission Assets Scoping Boundary may affect available airspace for other users.	The Transmission Assets may require helicopter operations during the construction, operation and maintenance and decommissioning phases, which may affect the available airspace for other users. The Transmission Assets will be located within Class G (uncontrolled airspace) where pilots are responsible for the avoidance of terrain, obstacles and other aircraft. The present operation of low flying aircraft in the Irish Sea is safe. This, together with the availability of an air traffic service, will remove aviation traffic risk therefore it is proposed that this impact is scoped out of the EIA.
Potential disruption to military Practice and Exercise Area.	There are no Practice and Exercise Areas overlapping with the Transmission Assets Scoping Boundary and therefore the Transmission Assets will not have an impact on any such receptor.

9.2.6 Measures adopted as part of the project

9.2.6.1 The following measures adopted as part of the project are relevant to aviation and radar. These measures may evolve as the engineering design and the EIA progresses.

- Appropriate lighting and marking of the OSPs and the Morgan offshore booster station will be established in accordance with CAA regulations and guidance (CAA, 2016; 2021) and in consultation with the CAA and the Defence Infrastructure Organisation.
- Prior to the start of construction and decommissioning, the UK Hydrographic Office (UKHO) will be informed of the location, height and lighting status of the OSPs and the Morgan offshore booster station, including estimated and actual dates of activities, and the maximum height of any equipment to be used, to allow inclusion on Aviation Charts.
- The Defence Infrastructure Organisation will be informed of the construction start and end dates; the maximum height of construction equipment; and the latitude and longitude of the OSPs and the Morgan offshore booster station.
- Development of, and adherence to, a Navigational Practice, Safety and Emergency Response (Emergency Response and Cooperation Plan (ERCoP)), including consideration of helicopters undertaking SAR operations.
- The Transmission Assets operator will issue, as necessary, requests to the UK Aeronautical Information Service to submit Notice to Airmen (NOTAM) in the event of any failure of aviation lighting.

9.2.6.2 The requirement for and feasibility of any further mitigation will be dependent on the significance of effects and will be consulted upon with statutory consultees throughout the EIA process.

9.2.7 Proposed assessment methodology

9.2.7.1 The aviation and radar assessment will follow the methodology set out in part 1, section 5: EIA methodology, of this EIA Scoping Report. Specific to the aviation and radar EIA, the following guidance documents will also be considered:

- CAP 168: Licensing of Aerodromes (CAA, 2022)
- CAP 393: Regulations made under powers in the Civil Aviation Act 1982 and the Air Navigation Order 2016 (CAA, 2021)
- CAP 670: Air Traffic Services Safety Requirements, Third Issue Amendment 1/2019 (CAA, 2019)
- OREIs – Guidance on UK Navigational Practice, Safety and Emergency Response, MGN 654 (M+F) (MCA, 2021a)
- Offshore Renewable Energy Installations: Requirements, guidance and operational considerations for SAR and Emergency Response (MCA, 2021b).

9.2.8 Potential cumulative effects

9.2.8.1 There is potential for cumulative effects to arise from other projects or activities within the east Irish Sea and within the Transmission Assets

Scoping Boundary where projects or activities could act collectively with the Transmission Assets to affect aviation and radar receptors.

9.2.8.2 Cumulative effects with the generation assets of the Morgan Offshore Wind Project and the Morecambe Offshore Windfarm will be considered, together with cumulative effects with other Round 4 projects (such as the Mona Offshore Wind Project) and other infrastructure projects such as proposed wind farms and interconnectors, where relevant.

9.2.8.3 The cumulative effects assessment will follow the approach outlined in part 1, section 5: EIA methodology, of this EIA Scoping Report.

9.2.9 Potential inter-related effects

9.2.9.1 The assessment of potential inter-related effects will be considered within the aviation and radar assessment. It will include consideration of project lifetime effects and receptor-led effects, in line with the approach outlined in part 1, section 5: EIA methodology, of this EIA Scoping Report.

9.2.10 Potential transboundary impacts

9.2.10.1 A screening of transboundary impacts has been carried out and is presented in part 3, Annex A of this EIA Scoping Report. This screening exercise identified that there is no potential for transboundary impacts upon aviation and radar due to construction, operation and maintenance, and decommissioning of the Transmission Assets.

9.3 Climate change

9.3.1 Introduction

9.3.1.1 This section of the EIA Scoping Report identifies the climate change receptors relevant to the onshore and offshore elements of the Transmission Assets. This section also considers the potential impacts arising from the construction, operation and maintenance, and decommissioning of the Transmission Assets and identifies the proposed scope of, and methodology for, the EIA process for climate change effects.

9.3.1.2 Under the Infrastructure Planning (Environmental Impact Assessment) Regulations 2017, Environmental Impact Assessment Guide to Assessing Greenhouse Gas Emissions and Evaluating their Significance (IEMA, 2022) and the Environmental Impact Assessment Guide to Climate Change Resilience & Adaptation (IEMA, 2020), the following aspects of climate change are relevant to the assessment:

- The emission of greenhouse gases (GHGs) contributing to climate change, including GHG emissions from the Transmission Assets arising from land use change and construction, operation and maintenance and decommissioning of the Transmission assets.
- The potential risks to the Transmission Assets arising from a changing climate and their vulnerability to climate change.

9.3.2 Study area

9.3.2.1 GHG emissions have a global effect rather than directly affecting any specific local receptor. The assessment will therefore focus on the impact of

GHG emissions on the global climate. This will be expressed in the form of the atmospheric concentration of the relevant GHGs, expressed in carbon dioxide-equivalents (CO_2e).

9.3.2.2 The GHG emissions will be assessed on a life-cycle basis for activities required for the construction, operation and maintenance and decommissioning of the Transmission Assets. This will consider GHG emissions caused directly and indirectly from sources at a variety of locations, including the onsite activities and the associated supply chain.

9.3.2.3 In addition, as the purpose of the Transmission Assets is to connect the generation assets (Morgan Offshore Wind Project and Morecambe Offshore Windfarm) to the grid, the cumulative effects with the generation assets will be considered, including the avoided or 'saved' baseline GHG emissions. This will account for energy generated from the Morgan Offshore Wind Project and Morecambe Offshore Windfarm generation assets, and their effects, in comparison to alternative grid-connected electricity generators (see part 2, section 9.3.8).

9.3.2.4 The climate change study area is therefore defined in terms of an assessment boundary rather than geographical area. The assessment boundary and relevant sources of GHG emissions are set out in section 9.3.7 of this EIA Scoping Report.

9.3.3 Data Sources

9.3.3.1 The data sources used to inform the baseline assessment will primarily comprise published material that is publicly available online. No baseline surveys would be required to support the climate change assessment. Where a date or edition has been specified, this is the current edition but the latest version available at the time of assessment would be used. These data sources are summarised in Table 9.9 of this EIA Scoping Report below.

Table 9.9: Baseline data sources – climate change.

Source	Summary
Climate Change Committee (CCC) – Progress Report to Parliament (2021)	Provides information regarding state of renewable energy generation in the UK
Digest of UK Energy Statistics (DUKES)	Provides statistics on UK renewable energy and electricity generation
Published Environmental Product Declarations (EPDs, the outputs of lifecycle analysis studies – LCAs)	Used to establish the embodied carbon emissions for a typical infrastructure including transformers and transmission cabling.
Valuation of Energy Use and Greenhouse Gas: Supplementary guidance to the HM Treasury Green Book, and supporting data tables	Used to establish baseline grid scenarios from which to compare to the development.
UK Government GHG Conversion Factors for Company Reporting	Current UK grid carbon intensity and other GHG emissions factors.
RICS, GBUK or OneClick Building Carbon Database for 'industrial/utilities' building;	Benchmark values per m2 of gross internal area (GIA) for an 'industrial building'
National Grid Future Energy Scenarios (2021)	Provides projected future energy scenarios to compare the development's renewable energy generation potential with

9.3.4 Baseline Environment

9.3.4.1 The current baseline environment shall be informed through consideration of the site-specific baseline. This will include review of the existing land use affected by construction activities, with particular reference to any areas of carbon-rich habitats, such as peaty soils or woodland.

Future baseline conditions

9.3.4.2 The future baseline GHG emissions for the land use in the absence of the Transmission Assets would be expected to remain similar to the existing land use, with a decrease in agriculture-related GHG emissions over time, in line with the UK's national climate change policies.

9.3.5 Potential project impacts

9.3.5.1 A range of potential impacts on climate change have been identified which may occur during the construction, operation and maintenance, and decommissioning phases of the Transmission Assets.

9.3.5.2 The impacts that have been scoped into the assessment are outlined in Table 9.10 together with a description of any additional data collection (e.g., site-specific surveys) and supporting analyses (e.g., modelling) that will be required to enable a full assessment of the impacts.

9.3.5.3 Potential impacts scoped out of the assessment are presented in Table 9.11, with justification.

Table 9.10: Impacts proposed to be scoped in to the assessment for climate change (project phase refers to construction (C), operation and maintenance (O) and decommissioning (D).

Impact	Project phase			Justification	Data collection and analysis required to characterise the baseline environment	Summary of proposed approach to assessment
	C	O	D			
The impact of GHG emissions arising from the manufacturing and installation of the Transmission Assets.	✓	✗	✗	GHG emissions arising from the manufacturing and installation of the Transmission Assets including substation buildings would contribute to the lifecycle total and net GHG balance of the Transmission Assets.	Emissions will be put into context using sources such as those outlined below. Use of published carbon intensity benchmark values for buildings and/ or project-specific materials estimates together with published Environmental Product Declarations concerning Life Cycle Assessment research into embodied carbon associated with construction of the substation building and associated infrastructure including switchgear, transformers and cabling.	The assessment will take into account the IEMA Environmental Impact Assessment Guide ‘Assessing Greenhouse Gas Emissions and Evaluating Their Significance’ (IEMA, 2022) or any updates to this guidance. It will be undertaken on a lifecycle basis, calculating the GHG emissions associated with the construction, operation and decommissioning of the Transmission Assets (where suitable information is available in relation to the decommissioning phase). The magnitude of impact will be expressed as tonnes of carbon dioxide equivalent (tCO2e), using 100-year global warming potential values for non-CO2 GHGs from the Intergovernmental Panel on Climate Change’s Sixth Assessment Working Group 1 Report (IPCC, 2021) or as otherwise defined in literature sources.
The impact of GHG emissions arising from the consumption of materials and activities required to facilitate the operation and maintenance phase.	✗	✓	✗	GHG emissions arising from the consumption of materials and activities required to facilitate the operation and maintenance phase would contribute to the lifecycle total and net GHG balance of the Transmission Assets.		
The impact of GHG emissions arising from land use change during the construction, operation and maintenance and decommissioning phase.	✓	✓	✓	GHG emissions arising from land use change during the construction, operation and maintenance and decommissioning phases will be considered as part of the overall GHG impact of the Transmission Assets. However, it is likely that most of the land affected would be agricultural land, which is not typically a significant carbon stock.	The baseline with regard to land use will be identified (whether agricultural land, woodland or peaty soils). Consideration would be given to whether the Transmission Assets would affect/ disturb areas of high soil or vegetation carbon stocks. Use of published data on agricultural land use classes, soil carbon stocks and GHG fluxes.	
The impact of GHG emissions arising from decommissioning works (e.g., plant, fuel and vessel use) and the recovery (or disposal) of materials.	✗	✗	✓	GHG emissions arising from decommissioning works (e.g., plant, fuel and vessel use) and the recovery (or disposal) of materials would contribute to the lifecycle total and net GHG balance of the Transmission Assets.	Use of published Environmental Product Declarationsconcerning Life Cycle Assessment research into embodied carbon associated with recycling and recovery activities at end of life for wind turbines and wind farm developments.	
The impact of climate change on the Transmission Assets	✗	✓	✗	The main climate risk to the onshore elements of the Transmission Assets is flooding, which will be assessed	Use of Met Office (2018) UKCP18 regional data for the onshore sustation.	The chapter will include the assessment of climate risks and adaptation. This will consider the potential climatic conditions

Impact	Project phase			Justification	Data collection and analysis required to characterise the baseline environment	Summary of proposed approach to assessment
	C	O	D			
				including appropriate allowances for changes in rainfall intensity and coastal change due to climate change in the flood risk assessment. Onshore elements of the Transmission Assets will include industrial type buildings (such as the substations), containing electrical equipment (largely self-operating) and buried cabling which are in a low-risk category with no vulnerable site users. The key risk for onshore elements of the Transmission Assets would be flooding, this would be addressed within a Flood Risk Assessment (FRA) submitted in support of the application. The main non-flooding risk would be increased cooling demand for the equipment because of climate change including global temperature increases and increased risk of heatwave (Met Office, 2018). To mitigate, cooling systems will be designed with sufficient capacity headroom and supplied by renewable electricity.		in the 2040-2069 and 2070-2099 time periods specific to the proposed developments 25 km grid square, based on the Met Office Hadley Centre 'UKCP18' probabilistic projections given the long lifetime of the residential buildings (MOHC, 2018). A high-level assessment of potential risks will be presented, which will inform potential resilience measures to be considered in the detailed design. The climate projections data will also be provided to ES topic authors to ensure that climatic changes can be considered, where relevant, for the topic-specific future baselines and sensitivity of receptors

Table 9.11: Impacts proposed to be scoped out of the project assessment for physical processes.

Impact	Justification
Climate Risk Assessment Construction and Decommissioning	The construction and decommissioning phases will not be lengthy enough for significant climate change risks compared to the present-day baseline to occur during these phases. The Applicants will employ good health & safety practices with respect to risks such as heatstroke or storm events offshore.
In-combination climate change effects	In-combination climate change effects are proposed to be scoped out of this chapter as they will be addressed individually within each applicable topic ES chapter. Each topic chapter will consider how potential climatic changes may affect the future baseline, including the sensitivity or resilience of receptors.

9.3.6 Measures adopted as part of the project

9.3.6.1 The measures will evolve as the EIA progresses. As a development that facilitates renewable energy development, climate change mitigation is an inherent aim and consequence of the Transmission Assets.

9.3.6.2 The Applicants will look for opportunities for the use of local workforce and suppliers where reasonably and commercially practical.

9.3.6.3 The requirement for and feasibility of any mitigation measures will be consulted upon with relevant statutory consultees throughout the EIA process.

9.3.7 Proposed assessment methodology

9.3.7.1 The climate change assessment will consider the IEMA Environmental Impact Assessment Guide 'Assessing Greenhouse Gas Emissions and Evaluating Their Significance' (IEMA, 2022) and the Environmental Impact Assessment Guide to Climate Change Resilience & Adaptation (IEMA, 2020). It will be undertaken on a lifecycle basis, calculating the GHG emissions associated with the construction, operation and decommissioning of Transmission Assets.

9.3.7.2 The sensitive receptor will be defined as the global atmospheric concentration of GHGs and it will be characterised as having a 'high' sensitivity, given the severe consequences of climate change and cumulative contributions of other sources. GHG emissions have a global effect rather than directly affecting specific local receptors to which levels of sensitivity can be assigned. The global atmospheric concentration of the relevant GHGs, expressed in CO_2-equivalents (CO_2e), will therefore be treated as a single receptor of high sensitivity (given the severe consequences of global climate change).

9.3.7.3 GHG emissions would contribute to the effect of global climate change. Assessment guidance from (IEMA, 2022) describes five levels of significance for emissions resulting from a development, each based on how the project contributes towards achieving a net zero and 1.5°C-aligned reduction trajectory. To aid in considering whether effects are significant, the guidance recommends that GHG emissions should be contextualised against pre-determined carbon budgets, or policy and performance standards where a budget is not available. It is a matter of professional judgement to integrate these sources of evidence and evaluate them in the context of significance.

9.3.7.4 The main sources of GHG emissions arising from the construction, operation and maintenance and decommissioning of the Transmission Assets would be:

- Embodied carbon associated with materials used for construction and maintenance of the Transmission Assets
- Fuel/energy use at the substations, in vehicles and vessels for the construction, operation and maintenance and decommissioning of the Transmission Assets
- GHG emissions arising from land use change.

9.3.7.5 Any GHG emissions generated by the Transmission Assets will be expressed as tonnes of carbon dioxide equivalent (tCO_2e). This would use 100-year global warming potential values for non-CO_2 GHGs from the Intergovernmental Panel on Climate Change's Sixth Assessment Working Group 1 Report (IPCC, 2021) or as otherwise defined in literature sources.

9.3.7.6 The IEMA (2022) guidance states that a development's GHG impacts should be contextualised, for example on a sectoral basis, compared to the UK's national carbon budget or compared to policy requirements and performance standards, to determine whether a project's carbon footprint will support or undermine a 1.5°C compatible trajectory towards net zero.

9.3.7.7 It is considered that broadly speaking, the significance of the Transmission Assets GHG emissions can be contextualised in the following ways:

- With reference to the absolute magnitude of net GHG emissions as a percentage of applicable carbon budgets at the UK, England and/or Local Planning Authority scale.
- Through considering any increase/reduction in absolute GHG emissions and GHG intensity compared with baseline scenarios, including projections for future changes in those baselines.
- With reference to whether the proposed development contributes to and is in line with the UK's national carbon budget goals and existing or emerging policy that supports for GHG emissions reduction consistent science-based commitments to limit global climate change to an internationally-agreed level.

9.3.7.8 The chapter will also include the assessment of climate risks and adaptation. This will consider the potential climatic conditions in the 2040-2069 and 2070-2099 time periods specific to the proposed developments 25 km grid square, based on the Met Office Hadley Centre 'UKCP18' probabilistic projections given the long lifetime of the residential buildings (MOHC, 2018). A high-level assessment of potential risks will be presented, which will inform potential resilience measures to be considered in the detailed design.

9.3.7.9 The climate projections data will also be provided to ES topic authors to ensure that climatic changes can be considered, where relevant, for the topic-specific future baselines and sensitivity of receptors.

9.3.8 Potential cumulative impacts

9.3.8.1 In general, all developments which emit GHGs have the potential to impact the atmospheric mass of GHGs as a receptor, and so may have a cumulative impact on climate change. Nevertheless, the fundamental link between the Transmission Assets and the generation assets of the Morgan Offshore Wind Project and the Morecambe Offshore Windfarm (the generation assets) requires consideration to provide the overall effect. Accounting for the Transmission Assets and the Morecambe and Morgan generation assets would ensure a whole life cycle assessment with regards to GHG emissions and subsequent effects has been carried out.

9.3.8.2 This will include consideration of:

- The emission of greenhouse gases (GHGs) contributing to climate change, including:

- GHG emissions from the generation and transmission assets
- Overall GHG emission savings when the Transmission Assets are considered together with the generating assets i.e., the Morgan Offshore Wind Project and Morecambe Offshore Windfarm.

9.3.8.3 This assessment will consider the avoided or ‘saved’ baseline GHG emissions. This will account for energy generated from the Morgan Offshore Wind Project and Morecambe Offshore Windfarm generation assets, and their effects, in comparison to alternative grid-connected electricity generators. This will allow identification of the net lifetime effects or whole project assessments for the Morgan Offshore Wind Project and the Morecambe Offshore Windfarm.

9.3.8.4 Notwithstanding the direct link between Transmission Assets and the Morecambe and Morgan generation assets, cumulative effects due to other specific local development projects are no more relevant to the assessment than those that are proposed further away. Therefore, other proposed developments, beyond the directly linked Morgan and Morecambe generation assets, in the vicinity will not be individually identified.

9.3.9 Potential transboundary impacts

9.3.9.1 All developments which emit GHGs have the potential to impact the atmospheric mass of GHGs as a receptor, and so may have a transboundary impact on climate change. Consequently, transboundary effects due to other specific international development projects are not individually identified but would be considered when evaluating the impact of the Transmission Assets by defining the atmospheric mass of GHGs as a high sensitivity receptor. Each country has its own policy and targets concerning carbon and climate change which are intended to limit GHG emissions to acceptable levels within that county’s defined budget and international commitments.

9.3.10 Potential inter-related effects

9.3.10.1 As stated in Table 9.11, inter-related effects of climate change during the construction, operation and maintenance and decommissioning of the Transmission Assets will be considered individually within the relevant topic chapters of the ES. Each topic chapter will assess how climate change may affect the future baseline scenario, including the sensitivity and/or resilience of identified receptors.

9.4 Socio-economics and community

9.4.1 Introduction

9.4.1.1 This section of the EIA Scoping Report identifies the socio-economic and community receptors relevant to the onshore and offshore elements of the Transmission Assets. This section also considers the potential impacts arising from the construction, operation and maintenance, and decommissioning of the Transmission Assets and identifies the proposed scope of, and methodology for, the EIA process for socio-economic and community effects.

9.4.2 Study area

9.4.2.1 The study area to be used for the assessment of socio-economic and community impacts (the socio-economic and community study area) will be based on the multiple spatial scales at which impacts to receptors landward of MHWS are likely to occur.

9.4.2.2 The spatial scales to be used in the socio-economic and community assessment will be defined according to the receptor type. These receptors comprise tourism and recreation receptors, employment and economy receptors, including Gross Value Added (GVA) and community receptors.

9.4.2.3 The approach to defining Local Impact Areas (LIAs) is focused on the likely centres of impact. This will ensure the assessment of impacts relative to the baseline is meaningful and is not masked as a result of large and high-level LIAs which are unrelated to the location of the potential impact.

Tourism and recreation receptors

9.4.2.4 It is considered that the potential impacts on tourism and recreation receptors will primarily be limited to LIAs centred on the location of onshore elements of the Transmission Assets and hub ports which will support the construction, operation and maintenance and decommissioning of the Transmission Assets.

9.4.2.5 The LIA will be informed by findings of other relevant topic chapters of the ES, such as seascape, landscape and visual resources, land use and recreation, and noise and vibration.

9.4.2.6 The LIA will also include also offshore recreational users as determined by the other sea users assessment (see part 2, section 5.4: Other sea users, of this EIA Scoping Report) and tourism and recreation receptors located within the ZTV of the offshore elements of the Transmission Assets, to be determined in the seascape, landscape and visual impact assessment (see part 2, section 9.1: Seascape, landscape and visual resources of this EIA Scoping Report).

9.4.2.7 To ensure consistency with LIAs for other socio-economic and community receptors, LIAs will be based on Local Planning Authority areas falling predominantly within a 60 minute drive time of the impact centres, in line with a best practice approach.

9.4.2.8 The selection of port locations to support construction, operation and maintenance and decommissioning of the Transmission Assets is unlikely to be confirmed prior to completion of the EIA.

9.4.2.9 On this basis, LIAs relevant to the port locations under consideration that fall within England and Wales will be considered. Additional information regarding ports will be provided at the PEIR and ES stages. The LIA impact centres, and the details of port options will be refined during the EIA process.

Employment and economy related receptors

9.4.2.10 It is considered that the potential impacts on employment and economy receptors, including GVA would occur both locally and over a much larger geographic area, because of the various stages in the supply chain during construction, operation and maintenance and decommissioning of the of the Transmission Assets.

9.4.2.11 Given the national significance and scale of investment required to facilitate the construction, operation and maintenance, and decommissioning of the Transmission Assets, it is considered appropriate to include a spatial scale that considers socio-economic impacts at the national level. The nations to be impacted by the Transmission Assets will form the National Impact Area (NIA). Employment and economy receptors, including GVA within the NIA will be considered in the assessment of socio-economics and community.

9.4.2.12 The LIAs will be centred on onshore elements of the Transmission Assets and port locations that have the potential to support the construction, operation and maintenance and decommissioning of the offshore and onshore elements of the Transmission Assets, once this information is available. LIAs will be based on Local Planning Authority areas falling predominantly within a 60 minute drive time of the impact centres to capture effect travel to work areas for assessing employment and labour market impacts.

9.4.2.13 The LIA and NIA identified in this EIA Scoping Report will remain under review and may be updated in response to feedback from relevant statutory and non-statutory consultees during the EIA process, or in response to new sources of information becoming available.

Community receptors

9.4.2.14 It is considered that potential community level effects will primarily fall within LIAs centred on onshore elements of the Transmission Assets and port locations that have the potential to support the construction, operation and maintenance and decommissioning of the Transmission Assets.

9.4.3 Data sources

9.4.3.1 The data sources used to inform the baseline assessment will primarily comprise published material which is publicly available online. An initial desk-based review has identified several data sources, which provide baseline data coverage of the Transmission Assets Scoping Boundary. These data sources are summarised in Table 9.12 below.

Table 9.12: Baseline data sources – socio-economics and community.

Source	Summary
Census data	Information regarding commuting patterns, housing tenure profiles
Gov.uk Compare School Performance Services	Data relating to primary and secondary school pupil populations
House price statistics for small areas in England and Wales	Data relating to median house prices and affordability ratios
Local Planning Authority websites	Data on school capacities and other local surveys and monitoring
NHS Digital	Data relating to healthcare facility registered patients
Office for National Statistics (ONS) mid-year population estimates	Information regarding population structure, dependency ratios, changes over time and population projections.
ONS Annual Population Survey	Information regarding economic activity (e.g., full-time, part-time, unemployed) and occupational breakdown.

Source	Summary
ONS Annual Survey of Hours and Earnings	Information regarding workplace and residence-based earnings.
ONS Business Register and Employment Survey (BRES)	Sectoral and size band structure of the employment base, including change over time and location quotients.
ONS Jobs Density	Jobs density is the number of jobs in an area divided by the resident population aged 16-64 in that area.
ONS regional and local GVA estimates	Information regarding trends in GVA for the main industrial sectors.
UK Marine Energy Council	Various documents on capacity of sector and supply chain
Visit Britain	Data relating to levels of tourism activity.

9.4.3.2 The baseline data sources identified in this EIA Scoping Report will remain under review and may be updated in response to feedback from relevant statutory and non-statutory consultees during the EIA process, or in response to new sources of information becoming available.

9.4.4 Baseline environment

Tourism and recreation receptors

LIA

9.4.4.1 The following baseline information will be identified and considered in the assessment of tourism and recreation receptors:

- Tourism sector employment based on the Office for National Statistics Business Register and Employment Survey (ONS BRES).
- The number of businesses in the sector based on ONS Business Demography.
- The number of visitors (day and overnight) and primary recreation activity – data availability dependent on Local Planning Authority records and Visit Britain surveys.
- The number of hotel/B&B beds and occupancy rates – the data availability will be dependent on Local Planning Authority records and Visit Britain surveys.
- The key attractions or assets.

Employment and economy receptors

LIAs and NIA

9.4.4.2 The following baseline information will be identified and considered in the assessment of employment and economy receptors for the LIAs and the NIA:

- Total employment and recent employment change based on ONS BRES and Jobs Density measures.
- Employment and recent employment change within sectors of relevance to the offshore wind industry based on ONS BRES.
- Total GVA and recent change based on ONS.
- GVA and recent change within sectors of relevance to the offshore wind industry based on ONS.

- Local labour market participation indicators including economic activity, inactivity and unemployment based on ONS APS.
- Local labour market profile indicators including occupations and qualifications based on ONS APS.
- Travel to work data based on ONS Census of Population.
- Other relevant data available at local level, particularly related to offshore wind industry and supply chain.

Community receptors

<u>LIA</u>

9.4.4.3 The following baseline information will be identified and considered in the assessment of socio-economics and community:

- Total population and how it has changed in recent years based on ONS.
- The education capacity, which will comprise a list of primary/secondary schools and colleges, with roll size and places available.
- Healthcare capacity, which will comprise a list of hospitals/health centres and GP surgeries and capacities. Individual healthcare facilities data can be extracted and analysed from NHS Digital data sources, but this is likely too much detail for scoping stage.
- Housing stock and tenure profile sourced from Census 2011 data, which will act as a guide.
- House prices and affordability ratios, which can be sourced from ONS.

Designated sites

9.4.4.4 There are no statutory or non-statutory designations specifically related to matters of socio-economics and community. However, some designated sites may attract visitors (e.g., national parks, world heritage sites) which may be of relevance to the assessment of socio-economics and community.

9.4.4.5 These designated sites will be identified in the relevant topic chapters of the ES. The socio-economics and community assessment will consider the potential impacts of the Transmission Assets on visitor numbers to designated sites located within the LIA.

Future baseline conditions

9.4.4.6 The EIA process will consider the existing baseline conditions within the study area, and future baseline conditions (as far as reasonably practicable) in accordance with the methodology set out in part 1, section 5 (see section 5.7.2 for the approach to consideration of future baseline conditions).

9.4.5 Potential project impacts

9.4.5.1 A range of potential impacts on socio-economics and community have been identified which may occur during the construction, operation and maintenance, and decommissioning phases of the offshore and onshore elements of the Transmission Assets.

9.4.5.2 The impacts that have been scoped into the assessment are outlined in Table 9.13 together with a description of any additional data collection (e.g., site-specific surveys) and supporting analyses (e.g., modelling) that will be required to enable a full assessment of the impacts.

9.4.5.3 Potential impacts scoped out of the assessment are presented in Table 9.14, with justification.

Table 9.13: Impacts proposed to be scoped in to the assessment for socio-economics and community (project phase refers to construction (C), operation and maintenance (O) and decommissioning (D)).

Impact	Project phase			Justification	Data collection and analysis required to characterise the baseline environment	Summary of proposed approach to assessment
	C	O	D			
The impact of disruption on tourism and recreation receptors during the construction, operation and maintenance, and decommissioning phase.	✓	✓	✓	Construction, operation and maintenance, and decommissioning of the Transmission Assets could lead to the disruption of tourism and recreation receptors.	Tourism and recreation receptors located within the LIA will be identified using desk-based analysis and informed by the relevant topic chapters of the ES. The desk-based analysis will be further informed through consultation with the relevant stakeholders.	A mixture of qualitative and quantitative approaches will be used to assess the impact of disruption on tourism and recreation receptors. The assessment will be further informed by the relevant topic chapters of the ES, other impacts to be considered in assessment of socio-economics and community (e.g., workforce accommodation needs) and consultation with the relevant stakeholders.
The impact on economic receptors including employment, GVA, and supply chain demand during the construction, operation and maintenance, and decommissioning phase.	✓	✓	✓	Construction, operation and maintenance, and decommissioning of the Transmission Assets could create additional economic activity which could impact economic receptors, including employment, GVA, and increase demand on supply chains.	Employment receptors, including GVA located within the LIA and NIA will be identified using desk-based analysis. The desk-based analysis will be further informed through consultation with the relevant stakeholders.	The impact on economic receptors including employment, GVA, and supply chain demand will be assessed using a bespoke economic impact model. This economic impact model will be used to estimate the direct, indirect, and induced employment impacts of expenditure during the construction, operation and maintenance, and decommissioning of the Transmission Assets.
The impact of increased employment opportunities arising from the construction, operation and maintenance and decommissioning phase.	✓	✓	✓	Construction, operation and maintenance, and decommissioning of the Transmission Assets could increase the range and supply of employment opportunities accessible to residents in the local area.	A desk-based analysis of the current labour market capacity and the existence of appropriately skilled residents in local impact areas. Desk-based analysis will be enhanced with stakeholder consultation.	The impact of increased local employment opportunities will be assessed using a bespoke economic impact model. This economic impact model will be used to estimate the direct, indirect, and induced employment impacts of expenditure during the construction, operation and maintenance, and decommissioning of the Transmission Assets. The local employment (workplace based) will be assessed against local labour market capacity and informed by stakeholder consultation.
The impact on the demand for housing, accommodation and local services	✓	✓	✓	Direct and indirect employment generated by the construction, operation and maintenance, and decommissioning of the Transmission Assets could increase the demand for housing accommodation and	A desk-based analysis of current capacity of local services and housing market. Consultation with relevant Local Planning Authority officers to ascertain current conditions and capacity in the supply of housing, accommodation and local services	The assessment will draw on the modelling of economic impacts, local labour market impacts and planned construction, operation and maintenance and decommissioning activities in order to assess the likely extent

Impact	Project phase			Justification	Data collection and analysis required to characterise the baseline environment	Summary of proposed approach to assessment
	C	O	D			
				local services and cause other community and social effects.	as well as other community and social effects.	of temporary or permanent relocation of workers and/or demand for local services.

Table 9.14: Impacts proposed to be scoped out of the assessment for socio-economics and community.

Impact	Justification
Tourism and community effects within the NIA	Tourism and community effects will be concentrated within particular localities related to the physical location of the Transmission Assets, centres of activity during the construction, operation and maintenance, and decommissioning phases. These are not anticipated to have any significant effects on tourism and community receptors outside the LIAs.

9.4.6 Measures adopted as part of the project

9.4.6.1 The following measures adopted as part of the project are relevant to socio-economics and community. These measures may evolve as the engineering design and the EIA progresses.

- CoCP, including measures to control construction effects.
- Construction Traffic Management Plan (CTMP), including measures to control effects arising from construction traffic.
- Employment and Skills Plan (including local procurement and local recruitment plans) which will ensure holistic consideration of the potential for betterment of the local economy by way of employment or skills training afforded by the proposed development.

9.4.6.2 The requirement and feasibility of any further mitigation will be dependent on the significance of effects and will be consulted upon with statutory consultees throughout the EIA process.

9.4.7 Proposed assessment methodology

9.4.7.1 There is no established or industry specific guidance which can be referred to when undertaking an assessment of socio-economics and community. Notwithstanding, the overarching NPS for energy (NPS EN-1) does provide guidance on how a socio-economic assessment should be undertaken, including the nature of impacts that may need to be considered. The approach to the assessment will also informed by the following:

- Guidance on assessing the socio-economic impacts of offshore wind farms Glasson, J; Durning B; Olorundami, T; and Welch, K (2020)
- UK Offshore Wind Charting the Right Course: Building the Offshore Wind Supply Chain (BWEA, 2009)
- A Guide to an Offshore Wind Farm (The Crown Estate, TCE, 2019)
- Socio-economic indicators of marine-related activities in the UK economy (TCE, 2008)
- State of the Sector: Economics for Wales (Marine Energy Wales, 2019)
- Offshore Wind Skills Intelligence Model Report (Offshore Wind Industry Council, 2011)
- Renewable Power Generation Costs in 2021 (IRENA, 2022).

9.4.7.2 The socio-economics and community assessment will be undertaken in accordance with the methodology set out in part 1, section 5: EIA Methodology, of this EIA Scoping Report, in addition to NPS EN-1 where relevant.

9.4.8 Potential cumulative effects

9.4.8.1 There is potential for cumulative effects to occur on sensitive receptors between the Transmission Assets and other developments. The potential cumulative effects between the construction of the Transmission Assets and other developments with respect to socio-economics and community will be considered within the ES.

9.4.8.2 The cumulative effect assessment would be undertaken in accordance with the methodology set out in part 1, section 5: EIA Methodology, of this EIA Scoping Report. Cumulative effects with the generation assets of the

Morgan Offshore Wind Project and the Morecambe Offshore Windfarm will be considered, together with cumulative effects with other Round 4 projects (such as the Mona Offshore Wind Project) and other infrastructure projects such as proposed wind farms and interconnectors, where relevant.

9.4.8.3 It is not considered that operation and maintenance of the Transmission Assets will result in significant effects on socio-economics and community either alone or cumulatively with other developments. Therefore, it is proposed that the potential effects arising from operation and maintenance of the Transmission Assets are scoped out of the cumulative impact assessment for socio-economics and community.

9.4.9 Potential inter-related effects

9.4.9.1 The assessment of potential inter-related effects will be considered within the socio-economics and community chapter of the ES. It will include consideration of project lifetime effects and receptor-led effects, in line with the approach outlined in part 1, section 5: EIA Methodology, of this EIA Scoping Report. For example:

- Commercial fisheries:
  - Impacts on commercial fisheries associated with construction, operation and maintenance and decommissioning of offshore and onshore elements of the Transmission Assets may impact socio-economic and community receptors located within the LIA.
- Seascape, landscape and visual resources:
  - The ZTV of the offshore and onshore elements of the Transmission Assets will be used to inform the LIA and the identification of tourism and recreation receptors to be considered in the socio-economics and community assessment.
- Land use and recreation:
  - Receptors identified within the land use and recreation assessment (e.g., recreational resources) will also be considered in the socio-economics and community assessment, where these receptors are located within the LIA.
- Historic environment:
  - Receptors identified within the historic environment assessment (e.g., world heritage sites) will also be considered in the socio-economics and community assessment, where these receptors are located within the LIA.

9.4.10 Potential transboundary impacts

9.4.10.1 A screening of transboundary impacts has been carried out and is presented in part 3, Annex A of this EIA Scoping Report. This screening exercise identified that there is no potential for transboundary impacts upon socio-economics and community due to construction, operational and maintenance, and decommissioning impacts of the Transmission Assets.

10 Proposed technical assessments – supporting technical information

10.1 Introduction

10.1.1.1 This section sets out the approach for the other environmental topics that are required to be considered within the EIA process under Schedule 4 of The Infrastructure Planning (Environmental Impact Assessment) Regulations 2017 (the 2017 EIA Regulations) and Schedule 3 of The Marine Works (Environmental Impact Assessment Regulations) 2007 (as amended) for which no Environmental Statement (ES) chapter is proposed. The section identifies the following:

- Topics proposed to be covered by a technical appendix to the ES (rather than as an ES chapter)
- Environmental topics which are considered elsewhere in the ES.

10.2 Topics proposed to be covered as a technical appendix

10.2.1 Human health

10.2.1.1 The potential impacts on human health arising from the construction, operation and maintenance, and decommissioning of the onshore elements of the Transmission Assets will be considered in the following topic chapters of the ES where relevant:

- Geology and ground conditions
- Hydrology and flood risk
- Land use and recreation
- Traffic and transport
- Noise and vibration
- Air quality
- Climate change
- Socio-economics and community.

10.2.1.2 The assessment will also include, as appropriate, any offshore or nearshore effects reported across the technical topics for the Transmission Assets, including for coastal water quality, noise and vibration and land use and recreation.

10.2.1.3 The details in relation to project impacts and consequent environmental or social effects that may affect people's health will be provided in these main topic chapters within the ES. In addition, the potential inter-related effects between the environmental topics listed above, will also be considered within these topic chapters of the ES where relevant.

10.2.1.4 It is proposed that a technical appendix be provided to draw the information relevant to human health together and to signpost where further details can be found. This appendix will include conclusions regarding the likely significant effects of the project on population health, meeting the EIA requirements in relation to human health.

Approach to assessment

10.2.1.5 The assessment will meet all relevant requirements in relation to health impact assessment (HIA) and the coverage of human health in EIA. The assessment will use the World Health Organization (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'*. As such, a wider determinants of health approach will be taken, covering relevant bio-physical, social, behavioural, economic and institutional determinants of health. Parity will be given to effects on physical health and mental health. Consideration will be given to the effect on health inequalities through consideration of effects to both the general population and to vulnerable groups. As set out in guidance for health in EIA (IAIA & EUPHA, 2020 and IPH, 2021) a population health approach will be adopted using qualitative assessment methods. These methods will have regard to IEMA guidance on health in EIA that is expected to be published later in 2022.

10.2.1.6 The appendix will draw from relevant topic chapters of the ES and will therefore utilise each topic's study area and reference baseline information where relevant. A health baseline will be set out, including reference to public health indicators e.g., Office of Health Improvement and Disparities (OHID) Fingertips, 2019 deprivation mapping and reference to relevant local health priorities in the most recent Health and Wellbeing Strategy and/or Joint Strategic Needs Assessment.

10.2.1.7 The scope of the human health statement will be modified in response to refinements made to the design of the offshore and onshore elements of the Transmission Assets and informed through consultation with the relevant statutory and non-statutory consultees, such as OHID and the UK Health Security Agency (UKHSA) and the Director of Public Health (DPH) for each Local Planning Authority.

Proposed scope of the assessment

10.2.1.8 The proposed scope of the assessment for the transmission assets will be as follows:

- Construction and decommissioning phases:
  - Impacts resulting from emissions to air, including dust emissions and other pollutants, such as emissions from traffic.
  - Impacts resulting from emissions to water, including runoff or spillages from construction areas to ground or surface water.
  - Impacts resulting from emissions to land and soil, including runoff or spillages from construction areas.
  - Impacts arising from any contamination risk to construction workers or the public, such as existing areas of contaminated land.
  - Impacts resulting from noise emissions and vibration during construction and decommissioning.
  - Impacts arising from construction of any new or amended highways junctions and/or from changes in traffic flow (severance/disruption).
  - Impacts arising from changes to access to PRoW or open space.
  - Impacts arising from employment and training opportunities and the impacts of the construction workforce.
- Operation and maintenance phase:

  - Impacts resulting from emissions to water (i.e., surface runoff) from the operation of the onshore substations.
  - Impacts resulting from noise emissions and vibration associated with operation of the onshore substations.
  - Impacts arising from operation of any new or amended highways junctions.
  - Impacts arising from electric and magnetic fields (EMFs) in terms of public understanding of risks affecting mental health and wellbeing. Further detail below.

Topics to be scoped out of the assessment

10.2.1.9 The following topics are proposed to be scoped out of the assessment:

- Operation and maintenance phase:
  - Impacts resulting from emissions to air, including dust emissions and other pollutants, such as emissions from traffic. No new dust emissions would be generated during the operational phase. No significant traffic flows would be associated with operation or maintenance of the transmission assets.
  - Impacts resulting from emissions to water, land and soil, including runoff or spillages from construction areas. No new emissions to land or soil would occur during the operational and maintenance phase.
  - Impacts arising from any contamination risk to workers or the public, such as existing areas of contaminated land. No new disturbance to land would be required during the operation and maintenance phase and, as such, no areas of contaminated land would be affected.
  - Impacts arising from changes to access to PRoW or open space. Once construction is completed, no further disruption to PRoW or areas of land would be required.
  - Impacts arising from employment opportunities. These are unlikely to result in significant effects for the operation and maintenance phase for the transmission assets.
  - Impacts arising from EMFs in terms of their actual risks to public health, due to adoption of relevant health protection standards. Further detail below.

Health effects of electromagnetic fields (heat and non-ionising radiation)

10.2.1.10 Details of the potential effects in relation to EMF are provided below. Effects are not likely to be significant. However, the human health appendix will consider the effects of EMF through a 'risk perception' section within the technical appendix. This section will detail how and why EMF will not constitute a credible health risk in this instance, taking into account the information presented below.

<u>Heat</u>

10.2.1.11 Construction, operation and maintenance and decommissioning of the offshore and onshore elements of the Transmission Assets are unlikely to generate significant levels of heat.

10.2.1.12 The technical specification of the onshore substations will take into account any heat generated within the design and this would, as is usual practice, prevent any overheating or heat effects.

10.2.1.13 With these measures in place, it is not considered likely that significant effects to population health in relation to heat will occur.

Non-ionising radiation

10.2.1.14 EMFs are part of the natural world, and are also produced wherever electricity is generated, transmitted or used. Public exposure to power-frequency EMFs comes from a range of sources including household wiring and appliances, low-voltage distribution power lines or underground cables, and high-voltage transmission power lines or underground cables. Exposure to static EMFs comes from the earth's natural magnetic field, atmospheric electrical field, and human sources such as appliances and electric rail lines.

10.2.1.15 Activities required to facilitate the construction and decommissioning of the offshore and onshore elements of the Transmission Assets, e.g., use of powered tools or vehicles, would not generate EMFs that differ from everyday exposures within society.

10.2.1.16 Operation and maintenance of the offshore and onshore export cables and onshore substations would produce greater and more sustained EMFs due to the voltage and flow of current through electrical infrastructure.

10.2.1.17 The UK Government (DECC, 2012) has adopted the 1998 Guidelines for Limiting Exposure to Electromagnetic Fields produced by the International Commission on Non-ionising Radiation Protection (ICNIRP, 1998). The ICNIRP guidance provides occupational and public exposure limits for EMF. This guidance was subsequently updated in the form of the 2020 Guidelines for Limiting Exposure to Electromagnetic Fields (100 kHz to 300 GHz) (ICNIRP, 2020). The 2020 ICNIRP guidance provides occupational and public exposure limits for EMF radiation.

10.2.1.18 EMF strengths drop rapidly with distance from the source. The distances will depend on voltage but, in general, levels set for heath protection are achieved within a few metres. Underground cables do not produce an external electric field at ground level that would be of concern to public health due to the shielding of the cable sheath and burial material.

10.2.1.19 For the substation connection levels set for health protection would be achieved at the perimeter fence. Furthermore, the location and surrounding land uses do not place people in prolonged exposure even at this distance, e.g., no adjacent dwellings.

10.2.1.20 All the electrical infrastructure associated with the offshore and onshore elements of the Transmission Assets would be designed to comply with current guidelines on levels of public exposure and design of electrical infrastructure (DECC, 2012 & ICNIRP 1998).

10.2.1.21 Taking the above into account, the potential for actual risks to health from EMFs produced during the operation and maintenance of the offshore and onshore elements of the Transmission Assets is likely to be negligible and any consequent effects would not be significant.

10.2.1.22 Therefore, the effects of EMF are not proposed to be quantitively assessed in the human health appendix. Potential health effects will be addressed through a 'risk perception' section within the technical appendix. This section will note how public understanding of risk may be associated with mental health and wellbeing effects; and how these can be mitigated through the sharing of non-technical information that health protection standards would be met because the project adoptions the DECC 2012 voluntary Code of Practice, including ICNIRP 1998.

10.2.2 Waste

10.2.2.1 The Applicants intend to submit a Site Waste Management Plan (SWMP) in support of the application for development consent for the Transmission Assets, which would be included as a technical appendix to the ES.

10.2.2.2 Contractors will be required to follow the measures for managing waste set out in the SWMP and recording the movement of waste from the area of construction to the waste management facilities. On that basis, the potential impacts arising from the disposal and recovery of waste during construction of the offshore and onshore elements of the Transmission Assets are unlikely to give rise to significant effects. Therefore, no standalone chapter within the ES is considered to be necessary.

10.2.2.3 The SWMP will identify the likely waste arisings from the construction of the offshore and onshore elements of the Transmission Assets and set out appropriate measures for managing the waste in accordance with the waste hierarchy. These measures will include measures to reduce waste; to use less harmful alternative materials; opportunities to use materials with recycled content; to provide appropriate waste storage; and the utilisation licensed/ registered waste carriers.

10.2.2.4 The SWMP will be prepared in accordance with the relevant legislation, policy, and guidance including:

- Environmental Protection Act 1990
- Environment Act 1995
- Hazardous Waste (England and Wales) Regulations 2005 (as amended)
- Waste Management (England and Wales) Regulations 2006
- Waste (England and Wales) Regulations 2011 (as amended)
- The Environmental Permitting (England and Wales Regulations) 2016.

10.2.2.5 The roles and responsibilities of person(s) overseeing the implementation of waste management procedures during the construction phase will be identified in the SWMP, including relevant mandatory training requirements (e.g., toolbox talks, method statements).

10.2.2.6 The SWMP will also set out requirements for ongoing monitoring (e.g., regular site inspections) to ensure that construction waste is being managed appropriately according to the waste management procedures prescribed in the SWMP.

Waste impacts proposed to be scoped out

Operational waste

10.2.2.7 Operation and maintenance of the Transmission Assets will generate limited amounts of operational waste (e.g., materials from maintenance activities). However, operational waste would be segregated, recycled (where possible) and disposed of in accordance with collection procedures as agreed by the relevant regulator and local authorities, including the Environment Agency. These waste collection procedures will be included in the operational procedures for the offshore and onshore elements of the Transmission Assets (which can be secured through an Operational Management Plan, if required).

10.2.2.8 On this basis the potential impact arising from operational waste is unlikely to be significant and is proposed to be scoped out of the EIA.

10.2.3 Underwater noise

10.2.3.1 The proposed approach to underwater noise is set out in section 3.2 of this EIA Scoping Report above. The results of the underwater noise assessment will be presented in the form of a technical appendix, which will in turn inform the relevant chapters of the PEIR and ES.

10.3 Topics covered elsewhere in the ES

10.3.1.1 To avoid duplication and ensure a proportionate EIA process, the following topics are not proposed to be subject to stand alone chapters or appendices within the ES. These environmental topics are already covered within the scope of work proposed in part 2, sections 3 to 9, of this EIA Scoping Report. Therefore, no further assessment is required.

10.3.2 Other residues and emissions

10.3.2.1 The potential impacts of residues and emissions (e.g., dust, pollutants, light, noise, vibration) arising from the construction, operation and maintenance, and decommissioning of the offshore and onshore elements of the Transmission Assets will be considered in the following topic chapters of the ES where relevant:

- Geology and ground conditions (impacts of emissions/residues to land on soil quality)
- Hydrology and flood risk (impacts of surface water runoff on water quality and flood risk)
- Terrestrial ecology and ornithology (intertidal and onshore) (impacts of emissions to water, land or air and noise emissions on ecological receptors)
- Benthic subtidal and intertidal ecology; fish and shellfish ecology; marine mammals and offshore ornithology (impacts of emissions to water and noise emissions on ecological receptors)
- Noise and vibration (impacts of noise emissions and vibration)
- Air quality (impacts of emissions to air, including dust and other pollutants).

10.3.2.2 On the basis that the potential impacts will be assessed in the relevant topic chapters of the ES, and in the interest of supporting proportionate EIA, it is proposed that a standalone chapter addressing the likely effects of emissions and residues is not required.

10.3.3 Material assets

10.3.3.1 The potential impacts on material assets arising from the construction, operation and maintenance, and decommissioning of the Transmission Assets will be considered in the following topic chapters of the ES:

- Other sea users
- Historic environment
- Land use and recreation
- Socio-economics and community.

10.3.3.2 On the basis that the potential impacts will be assessed in the relevant topic chapters of the ES, and in the interest of supporting proportionate EIA, it is proposed that a standalone chapter addressing the likely significant effects of the Transmission Assets on material assets is not required and should be scoped out of the EIA process.

10.3.4 Major accidents and disasters

10.3.4.1 The 2017 EIA Regulations require that significant effects be assessed on population and human health, biodiversity, land, soil, water, air and climate, material assets, cultural heritage and the landscape. These assessments will include, where relevant, significant effects arising from the vulnerability of the Transmission Assets to major accidents and disasters.

10.3.4.2 A description of how major accidents and disasters have been considered in the design of the Transmission Assets will be outlined in the project description chapter of the PEIR and ES.

Physical environment

10.3.4.3 The physical environment topic chapters of the ES will consider the risk of major accidents and disasters relating to:

- Reduction in groundwater quality and quantity:
  - part 2, section 6.1: Geology, hydrogeology and ground conditions, of this EIA Scoping Report.
- Impact on quality of surface water and watercourses:
  - part 2, section 6.2: Hydrology and flood risk, of this EIA Scoping Report.
- Increased flood risk:
  - part 2, section 6.2: Hydrology and flood risk, of this EIA Scoping Report.
- The vulnerability of the Transmission Assets to climate change:
  - part 2, section 9.3: Climate change, of this EIA Scoping Report.

Biological environment

10.3.4.4 The biological environment topic chapters of the ES will consider the risk of major accidents and disasters relating to:

- Accidental pollution:
  - part 2, section 4.1: Benthic subtidal and intertidal ecology, of this EIA Scoping Report.
  - part 2, section 4.2: Fish and shellfish ecology, of this EIA Scoping Report.
  - part 2, section 4.3: Marine mammals, of this EIA Scoping Report.
  - part 2, section 7.1: Terrestrial ecology, of this EIA Scoping Report.

Human environment

10.3.4.5 The human environment topic chapters of the ES will consider the risk of major accidents and disasters relating to:

- Risk of vessel anchor and gear snagging:
  - part 2, section 5.2: Shipping and Navigation, of this EIA Scoping Report.
- Reduction of under keel clearance:
  - part 2, section 5.2: Shipping and Navigation, of this EIA Scoping Report.
- Reduction of emergency response capability and reduced access for SAR responders:
  - part 3, section 5.2: Shipping and Navigation, of this EIA Scoping Report.
- Impact of construction traffic on accidents and safety:
  - part 2, section 8.3: Traffic and transport, of this EIA Scoping Report.
- Impact of Abnormal Indivisible Loads on safety:
  - part 2, section 8.3: Traffic and transport, of this EIA Scoping Report.

11 Topics proposed to be scoped out of the ES

11.1.1.1 The following topics are proposed to be scoped out of the EIA process. Details are provided below.

11.2 Local planning policy context

11.2.1.1 A description of the consenting process and the Planning Act will be provided within the introductory chapters of the ES.

11.2.1.2 For each environmental topic, the relevant legislative and planning policy context will be described within each topic chapter of the ES. The assessment of each topic included in the ES will consider the requirements and objectives set out in national, regional and local planning policy where relevant and appropriate.

11.2.1.3 In addition, a Planning Statement will be submitted in support of the application for development consent, which will outline how the transmission assets comply with relevant local plans and planning policy.

11.2.1.4 Taking the information above into account, and in the interest of supporting proportionate EIA, it is proposed that a standalone chapter addressing local planning policy context is not required and should be scoped out of the EIA process.

11.3 Daylight, sunlight and microclimate

11.3.1.1 The Transmission Assets will comprise offshore substations platforms, the Morgan offshore booster station, offshore export cables, landfall, onshore export cables, onshore substations and associated infrastructure.

11.3.1.2 The above ground elements do not include tall buildings. Any built elements, such as the onshore substations, would not be sufficiently tall or close to other buildings to result in significant effects in relation to daylight and sunlight. In addition, given the nature of the offshore and onshore elements of the Transmission Assets, these are not likely to result in microclimate changes and therefore this topic is proposed to be scoped out of the EIA.

11.3.1.3 The effects of the Transmission Assets on climate change would be considered separately in a climate change chapter of the ES, as described in part 2, section 9.3: Climate change, of this EIA Scoping Report.

11.4 Heat and Radiation

11.4.1 Heat

11.4.1.1 Construction, operation and maintenance, and decommissioning of the Transmission Assets are unlikely to generate significant levels of heat.

11.4.1.2 The technical specification of the onshore substations will consider any heat generated within the design and this would, as is usual practice, prevent any overheating or heat effects.

11.4.1.3 With these measures in place, it is not considered likely that significant effects in relation to heat will occur.

11.4.2 Radiation

11.4.2.1 As set out in section 10.2.1, EMFs are part of the natural world, and are also produced wherever electricity is generated, transmitted or used. Public exposure to power-frequency EMFs comes from a range of sources and exposure to static EMFs comes from the earth’s natural magnetic field, atmospheric electrical field, and human sources. It is considered that activities required to facilitate construction and decommissioning of the offshore and onshore elements of the Transmission Assets would generate negligible levels of EMFs.

11.4.2.2 Operation and maintenance of the offshore and onshore export cables and onshore substations would produce EMFs due to the voltage and flow of current through electrical infrastructure.

11.4.2.3 The UK Government (DECC, 2012) has adopted the 1988 Guidelines for Limiting Exposure to Electromagnetic Fields produced by the International Commission on Non-ionising Radiation Protection (ICNIRP, 1988). This guidance was subsequently updated in the form of the 2020 Guidelines (ICNIRP, 2020).

11.4.2.4 As set out in section 10.2.1.18, EMF strengths drop rapidly with distance from the source. The distances will depend on voltage but, in general, the strength of a magnetic field is well within international guidelines within a few metres. Underground cables do not produce an external electric field at ground level due to the shielding of the cable sheath and burial material.

11.4.2.5 Due to the distance between the onshore substation components and the closest publicly-accessible point (the perimeter fence), the greatest EMFs exposure in the vicinity of substations is typically from the overhead lines or underground cables entering and exiting them. Perimeter fencing provides screening of the electric field and this would not be expected to exceed the public exposure guidelines.

11.4.2.6 All of the electrical infrastructure associated with the offshore and onshore elements of the Transmission Assets would be designed to comply with current guidelines on levels of public exposure and design of electrical infrastructure.

11.4.2.7 Based on the information above it is proposed that a standalone chapter addressing heat and radiation is not required and should be scoped out of the EIA process.

12 Transmission Assets summary

12.1 Overview

12.1.1.1 The information set out in this EIA Scoping Report is provided to support the Applicant's request for a Scoping Opinion from the Secretary of State in relation to the development of the Transmission Assets.

12.1.1.2 The application for development consent will comprise full details of the Transmission Assets and will be accompanied by an ES, which will present the findings of the EIA process.

12.1.1.3 This EIA Scoping Report has identified the main aspects of the offshore and onshore physical, biological and human environment likely to be significantly affected by the construction, operation and maintenance and decommissioning of the Transmission Assets. Topics that have been scoped into the assessment are detailed in part 3, section 3 to section 10 of this EIA Scoping Report.

12.1.1.4 Table 12.1 provides an overview of the potential impacts that are proposed to be scoped into (considered further) or scoped out of (not considered further) the EIA process for the Transmission Assets.

Table 12.1: Summary of potential impacts of the Transmission Assets (project phase refers to construction (C), operation and maintenance (O) and decommissioning (D)).

Impact	Project phase		
	C	O	D
Section 3: Offshore physical environment			
Physical processes			
Increase in suspended sediments due to construction, operation and maintenance and/or decommissioning related activities, and the potential impact to physical features.	✓	✓	✓
Impacts to the wave regime due to presence of infrastructure and the associated potential impacts along adjacent shorelines.	✓	✓	✓
Impacts to the tidal regime due to presence of infrastructure and the associated potential impacts along adjacent shorelines.	✓	✓	✓
Impacts to sediment transport and sediment transport pathways due to presence of infrastructure and associated potential impacts to physical features and bathymetry.	✓	✓	✓
Impacts to sediment transport and sediment pathways at the export cable landfall.	✓	✓	✓
Changes to bathymetry due to depressions left by jack-up vessels.	×	×	×
Scour of seabed sediments during the operation and maintenance phase.	×	×	×
Underwater noise			
Effects of underwater noise on marine life due to construction, operation and maintenance and decommissioning vessels and rigs.	✓	✓	✓
Effects of underwater noise on marine life due to foundation installation for the OSP and Morgan offshore booster station foundations.	✓	×	×
Effects of underwater noise on marine life due to jacket or monopile cutting and removal.	×	×	✓
Effects of underwater noise on marine life due to clearance of unexploded ordnance (UXO) detonation.	✓	×	×
Effects of the particle motion element of underwater noise on fish and shellfish receptors.	✓	×	✓

Impact	Project phase		
	C	O	D
Effects of the particle motion element of underwater noise on marine mammals during all phases.	×	×	×
Section 4: Offshore biological environment			
Benthic subtidal and intertidal ecology			
Increased suspended sediment concentrations (SSC) and associated deposition	✓	✓	✓
Temporary habitat loss/disturbance	✓	✓	✓
Long term habitat loss	✓	✓	×
Increased risk of introduction and spread of INNS	✓	✓	✓
Colonisation of hard structures	×	✓	×
Changes in physical processes	×	✓	×
Removal of hard substrates	×	×	✓
Disturbance/remobilisation of sediment-bound contaminants	✓	✓	✓
Impacts to benthic invertebrates due to electromagnetic fields (EMF)	×	✓	×
Heat from subsea electrical cables	×	✓	×
Accidental pollution during construction, operation and maintenance and decommissioning	×	×	×
Fish and shellfish ecology			
Temporary habitat loss/disturbance	✓	✓	✓
Underwater noise impacting fish and shellfish receptors	✓	✓	✓
Underwater noise from non-piling activities during all phases	✓	✓	✓
Increased suspended sediment concentrations (SSCs) and associated sediment deposition	✓	✓	✓
Long term habitat loss	✓	✓	✓
Electromagnetic Fields (EMF) from subsea electrical cabling	✓	✓	✓
Colonisation of hard structures	✓	✓	✓
Disturbance/remobilisation of sediment-bound contaminants	✓	✓	✓
Accidental pollution during construction, operation and maintenance and decommissioning phases.	×	×	×
Marine mammals			
Injury and disturbance from underwater noise generated from piling	✓	×	×
Injury and disturbance from underwater noise generation from Unexploded ordnance (UXO) detonation.	✓	×	×
Disturbance to marine mammals from vessel use and other (non-piling) noise-producing activities	✓	✓	✓
Injury to marine mammals due to collision with vessels	✓	✓	✓
Effects on marine mammals due to changes in prey availability	✓	✓	✓
Disturbance to marine mammals from pre-construction surveys	✓	×	×
Accidental pollution during all phases.	×	×	×

Impact	Project phase		
	C	O	D
Increased suspended sediment concentrations (SSCs) and associated sediment deposition during all phases.	×	×	×
Impact of EMF (from surface lain or buried cables) during the operation and maintenance phase.	×	×	×
Offshore ornithology			
Disturbance and displacement from airborne noise, underwater noise, and presence of vessels and infrastructure.	✓	✓	✓
Indirect impacts from underwater noise affecting prey species.	✓	×	✓
Temporary habitat loss/disturbance and increased suspended sediment concentrations (SSCs).	✓	✓	✓
Collision risk during the operation and maintenance phase.	×	×	×
Barrier to movement during the operation and maintenance phase.	×	×	×
Accidental pollution during all phases of the Transmission Assets.	×	×	×
Section 5: Offshore human environment			
Commercial fisheries			
Loss or restricted access to fishing grounds.	✓	✓	✓
Displacement of fishing activity into other areas.	✓	✓	✓
Loss or damage to fishing gear due to snagging.	✓	✓	✓
Potential impacts on commercially important fish and shellfish resources.	✓	✓	✓
Supply chain opportunities for local fishing vessels.	✓	✓	✓
Interference with fishing activity.	×	×	×
Increase in steaming distances.	×	×	×
Shipping and navigation			
Deviations to commercial routes.	✓	✓	✓
Increased vessel to vessel collision risk.	✓	✓	✓
Increased allision (contact) risk to vessels.	✓	✓	✓
Increased risk of anchor and gear snagging for commercial vessels and commercial fishing vessels (in transit).	✓	✓	✓
Reduction of under keel clearance.	✓	✓	✓
Reduction of emergency response capability due to increased incident rates and reduced access for SAR responders.	✓	✓	✓
Interference with marine navigation, communications and position fixing equipment.	✓	✓	✓
Marine archaeology			
Sediment disturbance and deposition leading to indirect impacts on archaeological receptors.	✓	✓	✓
Direct damage to archaeological receptors.	✓	✓	✓
Alteration of sediment transport regimes.	×	✓	×
Other sea users			
Displacement of recreational activities.	✓	✓	✓

Impact	Project phase		
	C	O	D
Increased suspended sediment concentrations and associated deposition affecting recreational diving sites and designated bathing water sites.	✓	✓	✓
Impacts to existing cables or pipelines or restrictions on access to cables or pipelines.	✓	✓	✓
Increased suspended sediment concentrations and associated deposition affecting aggregate extraction areas.	✓	✓	✓
Alterations to sediment transport pathways affecting aggregate extraction areas.	×	✓	×
Reduction or restriction of oil and gas exploration activities (including surveys, drilling and the placement of infrastructure) within the Transmission Assets Scoping Boundary.	✓	✓	✓
Interference with offshore microwave fixed communication links.	×	✓	×
Section 6: Onshore physical environment			
Geology, hydrogeology and ground conditions			
The impact of partial or total loss of or damage to designated geological and geomorphological sites during the construction phase.	✓	×	×
The impact on groundwater levels or flow in sensitive groundwater dependent sites during the construction and decommissioning phase.	✓	×	✓
The impact of mobilisation of existing source areas of contamination causing a deterioration of groundwater quality in underlying superficial Secondary Aquifer units during the construction, operation and maintenance and decommissioning phase	✓	✓	✓
The impact of mobilisation of existing source areas of contamination and the possible creation of new transport pathways causing a deterioration in groundwater quality and quantity within the underlying bedrock Principal and Secondary Aquifer units, during the construction, operation and maintenance and decommissioning phase	✓	✓	✓
The impact of reduced groundwater quantity or quality in aquifer units, on protected groundwater abstractions (licensed or non-licensed) and/or change in groundwater resources status, during the construction, operation and maintenance and decommissioning phase	✓	✓	✓
The impact of a reduction in the quantity and quality of surface waters fed by groundwater and other groundwater dependent sites, during the construction and decommissioning phase.	✓	×	✓
The impact of a deterioration in groundwater quality through the accidental spillage/release of potentially polluting substances, during the construction and decommissioning phase	✓	×	✓
The impact of heat generated by the onshore export cables on groundwater quality, during the operation and maintenance phase	×	✓	×
The impact of ground gas generation on human health and other environmental receptors, during the construction, operation and maintenance and decommissioning phase.	✓	✓	✓
The impact of accidental spillages/contaminant release on the quality of groundwater ground receptors during operation and maintenance of the onshore elements of the Transmission Assets.	×	×	×
Hydrology and flood risk			
The impact of contaminated runoff on the quality of 'main rivers' arising from the construction and decommissioning of the onshore elements of the Transmission Assets.	✓	×	✓
The impact of contaminated runoff on the quality of ordinary watercourses arising from the construction and decommissioning of the onshore elements of the Transmission Assets.	✓	×	✓
The impact of accidental spillages/contaminant release on the quality of surface water and ground receptors during construction and decommissioning of the onshore elements of the Transmission Assets.	✓	×	✓
The impact of increased flood risk arising from additional surface water runoff during construction of the onshore elements of the Transmission Assets.	✓	×	×
The impact of increased flood risk arising from additional surface water runoff during operation of the onshore substations.	×	✓	×
The impact of increased flood risk arising from damage to existing flood defences during the construction and decommissioning of the onshore elements of the Transmission Assets.	✓	×	✓

Impact	Project phase		
	C	O	D
The impact of damage to existing field drainage during the construction and decommissioning of the onshore elements of the Transmission Assets.	✓	×	✓
The impact of damage to existing water pipelines during the construction and decommissioning of the onshore elements of the Transmission Assets.	✓	×	✓
Direct disturbance of surface water bodies and increased direct soil erosion and supply of fine sediment to surface watercourses during construction and decommissioning activities	✓	×	✓
The impact of contaminated runoff on the chemical and biological status of surface water receptors arising from the operation and maintenance of the onshore elements of the Transmission Assets.	×	×	×
The impact of accidental spillages/contaminant release on the quality of surface water and ground receptors during operation and maintenance of the onshore elements of the Transmission Assets.	×	×	×
The impact of increased flood risk arising from damage to existing flood defences during the operation and maintenance of the onshore elements of the Transmission Assets.	×	×	×
The impact of increased flood risk arising from additional surface water runoff during the operation and maintenance of the onshore export cable.	×	×	×
Section 7: Onshore biological environment			
Terrestrial ecology and ornithology (intertidal and onshore)			
The impact of temporary and permanent habitat loss during construction, operation and maintenance and decommissioning of the onshore elements of the Transmission Assets.	✓	×	✓
The impact of habitat disturbance during construction, operation and maintenance and decommissioning of the onshore elements of the Transmission Assets.	✓	✓	✓
The impact of habitat fragmentation and species isolation during construction, operation and maintenance and decommissioning of the onshore elements of the Transmission Assets.	✓	✓	✓
The impact of pollution caused by accidental spills/ contaminant release during construction and decommissioning of the onshore elements of the Transmission Assets.	✓	×	✓
The impact of spreading INNS during construction and decommissioning of the onshore elements of the Transmission Assets.	✓	×	✓
The impact of temporary and permanent habitat loss on protected habitats and species during operation and maintenance of the onshore elements of the Transmission Assets.	×	×	×
The impact of pollution caused by accidental spills/contaminant release on protected habitats and species during operation and maintenance of the onshore elements of the Transmission Assets.	×	×	×
The impact of construction, operation and maintenance and decommissioning of the onshore elements of the Transmission Assets on species not listed in paragraph 7.1.3.4 of this EIA Scoping Report, including red squirrel, brown hare, fish, and aquatic invertebrates.	×	×	×
Section 8: Onshore human environment			
Historic environment			
The impact of construction of the onshore elements of the Transmission Assets on buried archaeology resource	✓	×	×
The impact of construction and decommissioning of the onshore elements of the Transmission Assets on the setting of above ground historic assets.	✓	×	✓
The impact of operation and maintenance of the onshore substations on the setting of above ground heritage assets.	×	✓	×
The impact of construction and decommissioning of the onshore elements of the Transmission Assets on the character of the historic landscape	✓	×	✓
The impact of operation and maintenance of the onshore substations on the character of the historic landscape	×	✓	×
The impact on buried archaeological resource (damage and permanent loss) arising from the operation and maintenance and decommissioning of the onshore elements of the Transmission Assets.	×	×	×

Impact	Project phase		
	C	O	D
The impact on the setting of above ground heritage assets arising from operation and maintenance of the onshore elements of the Transmission Assets (excluding the onshore substations), including the onshore export cables and associated infrastructure.	×	×	×
Land use and recreation			
The permanent loss of agricultural land, including Best and Most Versatile (BMV) land, arising from the construction of the onshore elements of the Transmission Assets.	✓	×	×
The temporary impact of disruption and reduced access to agricultural land during construction and decommissioning of the onshore elements of the Transmission Assets.	✓	×	✓
The impact of disruption and reduced access to recreational resources (e.g., access land, common land and village greens, PRoW, cycle routes, other recreational resources) during construction and decommissioning of the onshore elements of the Transmission Assets.	✓	×	✓
The impact of disruption and reduced access to agricultural land during operation and maintenance of the onshore elements of the Transmission Assets.	×	×	×
The impact of disruption and reduced access to recreation resources (e.g., access land, common land and village greens, PRoW, cycle routes, other recreational resources) during operation and maintenance of the onshore elements of the Transmission Assets.	×	×	×
Traffic and transport			
The impact of driver and pedestrian delay/pedestrian amenity caused by construction works or construction traffic using the LRN and SRN.	✓	×	×
The impact of community severance caused by construction works or construction traffic using the LRN and SRN and the disruption of other transport receptors.	✓	×	×
The impact of temporary delays to public transport services caused by construction of the onshore elements of the Transmission Assets.	✓	×	×
The impact of construction traffic on accidents and safety for users of the LRN, SRN and other transport receptors.	✓	×	×
The impact of Abnormal Indivisible Loads (AILs) on the safety of users of the LRN, SRN and other transport receptors.	✓	×	×
The impact of additional vehicle movements on the LRN and SRN on driver and pedestrian delay, community severance, public transport delay and accidents and safety during operation and maintenance of the onshore elements of the Transmission Assets.	×	×	×
The impact of additional vehicle movements on the LRN and SRN on driver and pedestrian delay, community severance, public transport delay and accidents and safety during decommissioning of the onshore elements of the Transmission Assets.	×	×	×
Noise and vibration			
The impact of noise and vibration generated by onshore construction and decommissioning activities on human receptors.	✓	×	✓
The impact of noise generated by additional vehicle movements on the local highway network during the construction and decommissioning phase on human receptors.	✓	×	✓
The impact of noise generated during operation and maintenance of the onshore substations on human receptors.	×	✓	×
The impact on human receptors and heritage assets arising from vibration generated by additional vehicle movements on the local highway network during construction and decommissioning of the onshore elements of the Transmission Assets.	×	×	×
The impact on human receptors and heritage assets arising from vibration generated during operation and maintenance of the onshore elements of the Transmission Assets.	×	×	×
The impact of noise and vibration generated during operation and maintenance of the onshore elements of the Transmission Assets (excluding the onshore substations), including the onshore export cable and associated infrastructure.	×	×	×
Air quality			
The impact of dust soiling (nuisance) on property arising from dust emissions generated by onsite construction and decommissioning activities.	✓	×	✓

Impact	Project phase		
	C	O	D
The impact of an increase in suspended particulate matter on people arising from dust emissions generated by onsite construction and decommissioning activities.	✓	×	✓
The impact on human receptors arising from air emissions generated by vehicles during the construction and decommissioning phase.	✓	×	✓
The impact on ecological receptors arising from dust emissions generated by onsite construction and decommissioning activities.	✓	×	✓
The impact on ecological receptors arising from air emissions generated by vehicles during the construction and decommissioning phase.	✓	×	✓
The impact on human and ecological receptors (dust soiling and human health) arising from fugitive dust emissions generated during operation and maintenance of the onshore elements of the Transmission Assets.	×	×	×
The impact on human and ecological receptors arising from air emissions generated by vehicle traffic during operation and maintenance of the onshore elements of the Transmission Assets.	×	×	×
The impact on human and ecological receptors arising from air emissions generated by plants or stacks during operation and maintenance of the onshore elements of the Transmission Assets.	×	×	×
Section 9: Offshore and onshore combined topics			
Seascape, landscape and visual resources			
The impact of the onshore and offshore elements of the Transmission Assets on seascape and landscape character during the construction, operation and maintenance and decommissioning phase.	✓	✓	✓
The impact of the onshore and offshore elements of the Transmission Assets on publicly accessible views during the construction, operation and maintenance and decommissioning phase.	✓	✓	✓
The impact of construction, operation and maintenance and decommissioning of the onshore and offshore elements of the Transmission Assets on seascape and landscape character and visual resources located beyond the seascape, landscape and visual study area for the generation and transmission assets.	×	×	×
The impact of operation and maintenance of the offshore and onshore export cables on seascape and landscape character and visual resources.	×	×	×
The impact of decommissioning of the offshore and onshore export cables on seascape and landscape character and visual resources.	×	×	×
Aviation and radar			
Creation of a physical obstacle to low flying aircraft.	✓	✓	✓
Physical obstruction and potential for disruption to helicopter access/egress to/from offshore oil and gas platforms.	✓	✓	✓
Obstruction to SAR helicopter operations.	✓	✓	✓
Impacts to Blackpool Airfield, Woodvale Airfield, St Anne's Radar system and Warton Airfield.	✓	✓	✓
Potential disruption to HMRs due to the presence of the Morgan offshore booster station.	×	×	×
Increased helicopter traffic within the Transmission Assets Scoping Boundary may affect available airspace for other users.	×	×	×
Potential disruption to military Practice and Exercise Areas.	×	×	×
Climate Change			

Impact	Project phase		
	C	O	D
The impact of GHG emissions arising from the manufacturing and installation of the Transmission Assets.	✓	×	×
The impact of GHG emissions arising from the consumption of materials and activities required to facilitate the operation and maintenance phase.	×	✓	×
The impact of GHG emissions arising from land use change during the construction, operation and maintenance and decommissioning phase.	✓	✓	✓
The impact of GHG emissions arising from decommissioning works (e.g., plant, fuel and vessel use) and the recovery (or disposal) of materials.	×	×	✓
The impact of climate change on the Transmission Assets	×	✓	×
Climate Risk Assessment Construction and Decommissioning	×	×	×
In-combination climate change effects	×	×	×
Socio-economics and community			
The impact of disruption on tourism and recreation receptors during the construction, operation and maintenance, and decommissioning phase.	✓	✓	✓
The impact on economic receptors including employment, GVA, and supply chain demand during the construction, operation and maintenance, and decommissioning phase.	✓	✓	✓
The impact of increased employment opportunities arising from the construction, operation and maintenance and decommissioning phase.	✓	✓	✓
The impact on the demand for housing, accommodation and local services	✓	✓	✓
Tourism and community effects within the NIA	×	×	×
Topics to be scoped out			
Daylight, sunlight and microclimate	×	×	×
Operational waste	×	×	×
Local planning policy context	×	×	×
Heat	×	×	×
Radiation	×	×	×

12.2 Cumulative effects

12.2.1.1 This EIA Scoping Report has proposed an approach to CEA that is consistent with the Planning Inspectorate’s Advice Note Seventeen: Cumulative Effects Assessment (The Planning Inspectorate, 2019) and the RenewableUK Cumulative Impact Assessment Guidelines, specifically Guiding Principle 4 and Guiding Principle 7 (RenewableUK, 2013).

12.2.1.2 A detailed CEA will be undertaken to support the ES, in line with the methodology outlined in part 1, section 5: EIA methodology, of this EIA Scoping Report.

12.3 Transboundary impacts

12.3.1.1 A transboundary screening assessment for the Transmission Assets has been undertaken and is presented in part 3, Annex A: Transboundary

Impacts Screening, of this EIA Scoping Report. This screening has been carried out in accordance with the Planning Inspectorate's Advice Note Twelve: Transboundary Impacts and Process (The Planning Inspectorate, 2020).

12.3.1.2 Based on what is currently known of the likely spatial scale of effects arising from the Transmission Assets and the economic interests of other states in the vicinity, transboundary impacts have been screened into the EIA process for the following topics:

- Fish and shellfish ecology.
- Marine mammals.
- Offshore ornithology.
- Commercial fisheries.
- Shipping and navigation.
- Climate change.

12.4 Water Framework Directive screening

12.4.1.1 A preliminary Water Framework Directive (WFD) screening has been carried out and is presented in part 3, Annex B: WFD Screening, of this EIA Scoping Report. This screening has identified rivers and water bodies that could potentially be affected by the Transmission Assets.

12.5 Marine Conservation Zone screening

12.5.1.1 A preliminary screening of designated Marine Conservation Zones (MCZs) has been completed and is presented in part 3, Annex C: MCZ Screening, of this EIA Scoping Report. It is currently anticipated that the following designated MCZs will be carried forward for consideration in the Stage 1 MCZ Assessment:

- Fylde MCZ.
- West of Walney MCZ.
- West of Copeland MCZ.
- Ribble Estuary MCZ.

12.6 Consultation

12.6.1.1 Before an application for development consent is submitted to the Secretary of State, extensive consultation with key stakeholders (local authorities, statutory bodies, local communities and interest groups) is required. The proposed approach to stakeholder consultation during the pre-application phase is outlined in part 1, section 6: Consultation process, of this EIA Scoping Report.

12.6.1.2 Feedback provided within the Scoping Opinionn will be taken into account as part of the ongoing EIA process for the Transmission Assets. In addition to seeking a Scoping Opinion, the Applicants will carry out their Phase 1 public consultation. Over the consultation period, a number of events are proposed, which are likely to include online events, public exhibitions and pop-up events. Anyone who could potentially be affected by, or may have an active interest in, the Transmission Assets is encouraged to participate.

12.7 Next steps

12.7.1.1 Consultees are invited to consider the information presented in this EIA Scoping Report and advise on whether or not they agree with the conclusions. Several broad questions are presented below to encourage reflection of the key elements discussed in this EIA Scoping Report:

- Are there any additional baseline data sources available that could be used to inform the EIA?
- Does the reader agree that the proposed study areas are appropriate for each of the EIA topics?
- Have all potential impacts resulting from the Transmission Assets been identified for each of the EIA topics within this EIA Scoping Report?
- Does the reader agree with the impacts to be scoped in, and out, of the assessment?
- For those impacts scoped in, does the reader agree that the methods described are sufficient to inform a robust impact assessment?
- Are there any specific developments or infrastructure schemes which should be taken into account when considering potential cumulative impacts?

12.7.1.2 Following receipt of the Scoping Opinion from the Secretary of State, a Preliminary Environmental Information Report (PEIR) is planned to be produced and consulted. The PEIR will provide an initial statement of the environmental information available for the Transmission Assets, including descriptions of the likely environmental effects and measures adopted as part of the project. The PEIR is intended to allow statutory consultees, local communities and interested parties to understand the nature, scale, location and likely significant environmental effects of the Transmission Assets, such that they can make an informed contribution to the process of pre-application consultation under the Planning Act 2008 and to the EIA process.

12.7.1.3 The Applicants expects that they will further refine the Transmission Assets based upon the consultation responses received from the pre-application consultation in addition to environmental constraints identified during the EIA process. The final results of the EIA will be presented in an ES and a summary of all consultation responses received will be presented in a Consultation Report, both of which will accompany the application for development consent which is planned to be submitted to the Secretary of State in 2024.

13 References

13.1 Introduction

None.

13.2 Site selection and alternatives

None.

13.3 Offshore physical environment

13.3.1 Physical processes

ABPmer (2008) WebVision Atlas of UK Marine Renewable Energy Resources. Available: https://www.renewables-atlas.info/explore-the-atlas/. Accessed: August 2022

ABPmer (2018) Data Explorer. Available: https://www.seastates.net/explore-data/ Accessed: August 2022.

Barnes M.D. (2017) Guidance on EIS and NIS Preparation for Offshore Renewable Energy Projects, Report for the Environmental Working Group of the Offshore Renewable Energy Steering Group and the Department of Communications, Climate Action and Environment, Dublin: Department of Communications, Climate Action and Environment

BOWind (2008) Barrow Offshore Wind Farm Post-Construction Monitoring Report. First annual report. 15 January 2008, 60pp.

British Geological Survey (BGS) (2022). Sediment sample data. Available at https://mapapps2.bgs.ac.uk/geoindex_offshore. Accessed June 2022.

British Oceanographic Data Centre (BODC) (2021). UK tide gauge network. Available at: https://www.bodc.ac.uk/data/hosted_data_systems/sea_level/uk_tide_gauge_network/. Accessed 24 June 2022.

Brooks, AJ., Whitehead, PA., and Lambkin, DO. (2018) Guidance on Best Practice for Marine and Coastal Physical Processes Baseline Survey and Monitoring Requirements to inform EIA of Major Development Projects, NRW Report No: 243, 119 pp

Centre for Environment, Fisheries and Aquaculture Science (Cefas) (2016). Suspended Sediment Climatologies around the UK, CEFAS. Available at: https://data.cefas.co.uk/view/18133. Accessed June 2022.

Centre for Environment, Fisheries and Aquaculture Science (Cefas) (2022). Wave data. Available at https://wavenet.cefas.co.uk/map. Accessed June 2022.

Celtic Array Ltd., (2014) Environmental Impact Assessment Offshore Scoping Report, Section 6: Physical Processes.

Cooper, W., Saulter, A. and Hodgetts, P. (2008). Guidelines in the use of metocean data through the lifecycle of a marine renewables development.

Coughlan, M., Guerrinid, M., Creanece, S., O'Sheade, M., Ward, S., Van Landeghem, K., Murphy, J., Doherty, P. (2021) A new seabed mobility index for the Irish Sea: Modelling seabed shear stress and classifying sediment mobilisation to help predict erosion, deposition, and sediment distribution. Continental Shelf Research, Vol 229, 104574.

Department of the Environment, Climate and Communications (2018). Guidance on Marine Baseline Ecological Assessments and Monitoring Activities for Offshore Renewable Energy Projects Parts 1 and 2. Available at: https://www.gov.ie/en/publication/3d6efb-guidance-documents-for-offshore-renewable-energy-developers/ Accessed: June 2022

Department for Environment Food and Rural Affairs (2022). Bathymetry and SSSI information. Available at https://environment.data.gov.uk/DefraDataDownload. Accessed June 2022.

European Centre for Medium-range Weather Forecast (ECMWF) (2022), Long term wind and wave datasets. https://www.ecmwf.int/en/forecasts/datasets. Accessed April 2022

EMODnet (2022a). EODnet Bathymetry. Available at: https://www.emodnet-bathymetry.eu/. Accessed June 2022.

EMODnet (2022b). EODnet Geology. Available at: https://www.emodnet-geology.eu/. Accessed June 2022.

EMODnet (2022c). EODnet Geology. Available at: https://www.emodnet-physics.eu/. Accessed June 2022.

EMU (2013) Irish Sea Zone, Hydrodynamic measurement campaign October 2010-October 2012. Data Marine Data Exchange https://www.marinedataexchange.co.uk/ Report issued to Centrica Energy Renewable Investments.

Fugro (2022) Metocean Data Report, Morgan and Mona Offshore Wind Projects. Ref: 210674_190291-MDR-01 02

GEMS (2011) Metocean data collection, Ormonde wind farm project. Report prepared for: Offshore Design Engineering Ltd. Document number: GSL10108-FIN-001-01

Haigh, I., Wadey, M., Gallop, S., Loehr, H., Nicholls, R., Horsburgh, K., Brown, J., Bradshaw, E. (2015) A user-friendly database of coastal flooding in the United Kingdom from 1915–2014, Scientific data 2 150021.

Howarth, M.J. (2005) Hydrography of the Irish Sea, SEA6 Technical Report, POL Internal document 174.

HR Wallingford, (2016), Review of aggregate dredging off the Welsh coast. Available at: https://gov.wales/sites/default/files/publications/2018-05/review-of-aggregate-dredging-off-the-coast.pdf Accessed June 2022

Integrated Mapping for the Sustainable Developments of Ireland's Marine Resource (INFOMAR) (2022), Seabed mapping data Geological Survey Ireland (GSI) and Marine Institute. Available at http://www.infomar.ie/. Accessed February 2022.

JNCC (2022). Marine Protected Areas and Designations. Available at: https://jncc.gov.uk/mpa-mapper/. Accessed June 2022.

Lambkin, D.O., Harris, J.M., Cooper, W.S., and Coates, T. (2009) Coastal Process Modelling for Offshore Wind Farm Environmental Impact Assessment: Best Practice Guide. COWRIE.

Mellett, C., Long, D., Carter, G., Chiverell, R., and Van Landeghem, K. (2015) Geology of the seabed and shallow subsurface: The Irish Sea. British Geological Survey Commissioned Report, CR/15/057. 52pp

Met Office (2018) UK Climate Projections (UKCP).

Marine Environmental Data Information Network (MEDIN) (2021). Bathymetry data. Available at: https://data.admiralty.co.uk/portal/apps/sites/#/marine-data-portal. Accessed March 2022.

Natural Resources Wales, Marine Programming Planning and Delivery Group (2020) Physical processes guidance to inform EIA baseline survey, monitoring and numerical modelling requirements for major development projects with respect to marine, coastal and estuarine environments, GN041.

National Network of Regional Coastal Monitoring Programmes (2022). Metocean data. Available at https://coastalmonitoring.org/cco/. Accessed June 2022.

National Oceanic and Atmospheric Administration (NOAA) (2022). Metocean data. Available at https://www.dhigroup.com/data-portals/metocean-data-portal. Accessed April 2022.

Price, D et al. (2010). Cell Eleven wave, tide and sediment study. Proceedings of the 2010 MIKE by DHI Modelling in a World of Change – Past Experiences & Future Challenges, Copenhagen.Pye, K., Blott, S.J., and Brown, J. (2017) Advice to Inform Development of Guidance on Marine, Coastal and Estuarine Physical Processes Numerical Modelling Assessments. NRW Report No 208, 139pp.

Ramsar (2022), Designated sites. Available at https://rsis.ramsar.org/. Accessed July 2022.The Environment Agency National LiDAR Programme (2022). LiDAR data. Available at data.gov.uk. Accessed May 2022.

UKHO (2022), Admiralty Tide Tables – Volume 1B.

13.3.2 Underwater noise

Andersson, M., Sigray, P. and Persson, L. (2011) Operational Wind Farm Noise and Shipping Noise Compared with Estimated Zones of Audibility for Four Species of Fish. Journal of The Acoustical Society of America. Vol.129. 10

Bailey, H., Senior, B., Simmons, D., Rusin, J., Picken, G., and Thompson, P. (2010) Assessing Underwater Noise Levels during Pile-Driving at an Offshore Windfarm and Its Potential Effects on Marine Mammals. Marine Pollution Bulletin 60 (6): 888–97.

Boisseau, O., McGarry, T., Stephenson, S., Compton, R., Cucknell, A. C., Ryan, C., McLanaghan, R. and Moscrop, A. (2021). Minke whales *Balaenoptera acutorostrata* avoid a 15 kHz acoustic deterrent device (ADD). Marine Ecology Progress Series, 667, 191-206.

Etter, P.C. (2018). Underwater acoustic modelling and simulation. CRC press.

Nedwell J.R., Collett A.G., Barham R.J., Mason T.I., and Bird H.V. (2012). Measurement and Assessment of Underwater Noise during Ormonde Offshore Wind Farm's Operational Phase. Subacoustech Report No. E354R0104

JNCC (2010) Statutory nature conservation agency protocol for minimising the risk of injury to marine mammals from piling noise. Available online at: https://data.jncc.gov.uk/data/31662b6a-19ed-4918-9fab-8fbcff752046/JNCC-CNCB-Piling-protocol-August2010-Web.pdf.

JNCC (2017) JNCC guidelines for minimising the risk of injury to marine mammals from geophysical surveys. Available online at: https://data.jncc.gov.uk/data/e2a46de5-43d4-43f0-b296-c62134397ce4/jncc-guidelines-seismicsurvey-aug2017-web.pdf.

JNCC (2020) Guidance on noise management in harbour porpoise SACs. Available online at: https://hub.jncc.gov.uk/assets/2e60a9a0-4366-4971-9327-2bc409e09784.

National Physical Laboratory (2014) Good Practice Guide No. 133 – Underwater Noise Measurement. Available online at: https://www.npl.co.uk/special-pages/guides/gpg133underwater. Accessed October 2021.

Nedwell, J.R., Collett, A.G., Barham, R.J., Mason, T.I., Bird, H.V. (2012) Measurement and Assessment of Underwater Noise during Ormonde Offshore Wind Farm's Operational Phase, Subacoustech Report No. E354R0104.

NMFS (2018) Technical Guidance for Assessing the Effects of Anthropogenic Sound on Marine Mammal Hearing: Underwater Acoustic Thresholds for Onset of Permanent and Temporary Threshold Shifts. National Marine Fisheries Service (NOAA).

Otani, Seiji and Naito, Yasuhiko and Kato, Akiko and Kawamura, Akito. (2001) Oxygen consumption and swim speed of the harbor porpoise *Phocoena*. Fisheries Science. 67. 894-898. 10.1046/j.1444-2906.2001.00338.x.

Popper, Arthur, N., Anthony, D., Hawkins, Richard, R., Fay, David, A., Mann, Soraya Bartol, Thomas, J., Carlson, and Sheryl Coombs (2014) ASA S3/SC1.4 TR-2014 Sound Exposure Guidelines for Fishes and Sea Turtles: A Technical Report Prepared by ANSI-Accredited Standards Committee S3/SC1 and Registered with ANSI. Springer.

Schulkin, M., and J. A. Mercer. (1985) Colossus Revisited: A Review and Extension of the Marsh-Schulkin Shallow Water Transmission Loss Model (1962). DTIC Document.

Sigray, P. and Andersson, M. (2011) Particle Motion Measured at an Operational Wind Turbine in Relation to Hearing Sensitivity in Fish. The Journal of the Acoustical Society of America. 130. 200-7.

Sims, D.W., Speedie, C.D. and Fox, A.M. (2000) Movements and growth of a female basking shark resighted after a three year period. Journal of the Marine Biological Association of the U.K. 80: 1141-1142.

Southall, B.L., Nowacek, D.P., Bowles, A.E., Senigaglia, A., Bejder, L., Tyack, P.L. (2021) Marine Mammal Noise Exposure Criteria: Assessing the Severity of Marine Mammal Behavioural Responses to Human Noise, Aquatic Mammals 27:421-464.

Southall, B., Finneran, J. J., Reichmuth, C., Nachtigall, P. E., Ketten, D. R., Bowles, A. E., Ellison, W. T., Nowacek, D., and Tyack, P. (2019) Marine Mammal Noise

Exposure Criteria: Updated Scientific Recommendations for Residual Hearing Effects. Aquatic Mammals 45:125-232.

Southall, B, L., Bowles, A.E., Ellison, T.W., Finneran, J.J., Gentry, R.L., Greene Jr, C.R., Kastak, D., (2007) Marine Mammal Noise-Exposure Criteria: Initial Scientific Recommendations. Aquatic Mammals 33 (4): 411–521.

Thompson, D., Brownlow, A., Onoufriou, J. & Moss, S. (2015) Collision Risk and Impact Study: Field tests of turbine blade-seal carcass collisions. Sea Mammal Research Unit, University of St Andrews, Report to Scottish Government, no. MR 5, St Andrews, 16pp.

Toso, Giovanni, Paolo Casari, and Michele Zorzi. (2014) The Effect of Different Attenuation Models on the Performance of Routing in Shallow-Water Networks. In Underwater Communications and Networking (UComms), 2014, 1–5. IEEE.

Weston D.E. (1976) Propagation in water with uniform sound velocity but variable-depth lossy bottom, J. Sound Vib., 47, pp.473-483, 1976.

Wang, Heaney, Pangerc, Theobald, Robinson and Ainslie. (2014) Review of underwater acoustic propagation models. National Physical Laboratory AC 12.

13.4 Offshore biological environment

13.4.1 Benthic subtidal and intertidal ecology

BEIS (2021) Draft national policy statement for renewable energy infrastructure (EN-3), September 2021.

Camacho-Ibar, V. (1991) Trace elements and polychlorinated biphenyls (PCB) congeners in Liverpool Bay Sediments. PhD. Thesis. University of Wales, Bangor.

Cefas (2021) OneBenthic web app. Available: https://rconnect.cefas.co.uk/onebenthic_dashboard/. Accessed: December 2021

Celtic Array Ltd (2014a) Rhiannon Offshore Wind Farm, Environmental Statement PEI- Benthic Ecology. Rev03

Chartered Institute of Ecology and Environmental Management (CIEEM) (2016) Guidelines for Ecological Impact Assessment in the UK and Ireland. {online] Available at: https://cieem.net/resource/guidelines-for-ecological-impact-assessment-ecia/

CMACS (2005) Burbo Bank offshore wind farm pre construction contaminants investigation. Document: J3034 Contaminants v1.0

CMACS (2012) Ormonde Offshore Wind Farm Year 1 post construction benthic monitoring technical survey report (2012 survey). Report to RPS Energy. November 2012.

CMACS (2013) Walney Offshore Wind Farm Year 2 post construction benthic monitoring technical survey report. (2013 survey). Report to Walney Offshore Wind Farms (UK) Ltd/DONG Energy. November 2013.

CMACS (2014). Walney Offshore Wind Farm Year 3 post construction benthic monitoring technical survey report (2014 survey). Report to Walney Offshore Wind Farms (UK) Ltd/DONG Energy. December 2014.

Cole, S., Codling, I.D., Parr, W. and Zabel, T. (1991) Guidelines for managing water quality impacts within UK European marine sites. Prepared for the UK Marine SAC Project.

Covey, R. (1998) Marine Nature Conservation Review Sector 11. Liverpool Bay and the Solway Firth: area summaries. Peterborough, Joint Nature Conservation Committee. (Coasts and seas of the United Kingdom. MNCR series).

CSA Ocean Sciences Inc. and Exponent (2019) Evaluation of Potential EMF Effects on Fish Species of Commercial or Recreational Fishing Importance in Southern New England. U.S. Dept. of the Interior, Bureau of Ocean Energy Management, Headquarters, Sterling, VA. OCS Study BOEM 2019-049. 59 pp.

Dong Energy (2013) Walney Extension offshore wind farm, vol 1 environmental statement, chapter 10 benthic ecology.

European Marine Observation and Data Network (EMODnet) (2016) [online] Available at: https://www.emodnet-seabedhabitats.eu/ [Accessed November 2021].

Irving, R. (2009) Identification of the Main Characteristics of Stony Reef Habitats under the Habitats Directive. Summary of an Inter Agency Workshop 26-27 March 2008. Joint Nature Conservation Committee, JNCC Report No. 432, 28pp.

Jenkins, C., Eggleton J., Barry, J., O'Connor, J., Advances in assessing Sabellaria spinulosa reefs for ongoing monitoring, Ecology and Evolution, Vol8, Issue 15, July 2018.

JNCC, 2022, Marine Habitat Classification for Britain and Ireland, available: https://mhc.jncc.gov.uk/. Accessed March 2022.

Leah, R.T., Evans, S.J., and Johnson, M.S. (1992) Arsenic in plaice (*Pleuronectes platessa*) and whiting (*Merlangius merlangus*) from the North east Irish Sea. Marine Pollution Bulletin. 24.pp 544-9.

Limpenny, D.S., Foster-Smith, R.L., Edwards, T.M., Hendrick, V.J., Diesing, M., Eggleton, J.D., Meadows, W.J., Crutchfield, Z., Pfeifer, S. and Reach, I.S. (2010) Best Methods for Identifying and Evaluating *Sabellaria spinulosa* and Cobble Reef. Natural England Supported Through Defra's Aggregates Levy Sustainability Fund, ALSF Ref No. MAL0008, 149pp.

Moore J., Jones J. and Robinson, K. (2017) NRW Rhiannon *Modiolus* survey 2015: video and still image analysis. NRW Evidence Report Series, Report No: 215, 31pp.

Nagpal, N.K., Pommen, L.W. and Swain, L.G. (2001) A compendium of working water quality guidelines for British Columbia. Water Management Branch, Environmental and Resource Management Department, Ministry of Environment, Lands and Parks.

OSPAR (2008) OSPAR Guidance on Environmental Considerations for Offshore Wind Farm Development (Reference number: 2008-3).

Thornton, I., Watling, H. and Darracott, A. (1975) Geochemical studies in several rivers and estuaries used for oyster rearing. Science of the total environment. Vol 4, pp 325-345.

Tyler-Walters, H., Tillin, H.M., d'Avack, E.A.S., Perry, F., Stamp, T. (2018) Marine Evidence-based Sensitivity Assessment (MarESA) – A Guide. Marine Life Information Network (MarLIN). Marine Biological Association of the UK, Plymouth, pp. 91. Available from https://www.marlin.ac.uk/publications.

13.4.2 Fish and shellfish ecology

Aires, C., Gonzales-Irusta, J.M., and Watret, R., (2014) Updating Fishereis Sensitivity Maps in British Waters. Scottish Marine and Freshwater Science Report Volume 5 Number 10

Brown and May Marine Ltd (2009) Walney Offshore Wind Farm Pre Construction Fish Survey.

Brown and May Marine Ltd (2012) West of Duddon Sands Offshore Wind Farm, Adult and Juvenile Fish and Epibenthic Pre Construction Surveys.

Brown and May Marine Ltd (2013) Walney Offshore Wind Farm, Year 2 Post construction Monitoring Fish and Epibenthic Survey, FINAL Ref WOWPCOB03.

Cefas (2004) Offshore Wind Farms: Guidance Note for Environmental Impact Assessment in Respect of FEPA and CPA Requirements, June 2004.

Cefas and Environment Agency (2017) Assessment of Salmon Stocks and Fisheries in England and Wales.

CIEEM (2019) Guidelines for ecological impact assessment in the UK and Ireland: Terrestrial, Freshwater, Coastal and Marine. September 2018 Version 1.1 - updated September 2019. Chartered Institute of Ecology and Environmental Management, Winchester.

Celtic Array Ltd (2014b) Celtic Array offshore wind farm preliminary environmental information chapter 10: fish and shellfish ecology. Document number SE-D-EV-075-0002-000000-010.

CMACS (2006) Burbo Bank offshore wind farm, pre construction commercial fish survey (2m beam trawl).

CMACS (2007) Burbo Bank Offshore Wind Farm, Electromagnetic Fields and Marine Ecology Study. Prepared for Seascape Energy. Report reference J3034 EMF v2 (09-07).

CMACS (2010a) Burbo Bank Offshore Wind Farm, Post construction (Year 3) Commercial Fish Survey.

CMACS (2010b) Celtic Array (Zone 9) Autumn fish trawl survey. CMACS ref: J3152(Irish Sea Zone R3 Autumn Benthic Trawl Survey v1).

CMACS (2011) Gwynt y Môr Offshore Wind Farm baseline pre- construction benthic survey report (2010 survey). Report to Gwynt y Môr OWF Ltd. July 2011.

Coastal Fisheries Conservation and Management (2006) Rhyl Flats Offshore Wind Farm, Fish and Fisheries baseline study. Prepared for Npower Renewables.

Coull, K.A., Johnstone, R., and S.I. Rogers (1998) Fisheries Sensitivity Maps in British Waters. Published and distributed by UKOOA Ltd.

Delargy, A., Hold, N., Lambert, G.I., Murray L.G., Hinz H., Kaiser M.J., McCarthy, I., and Hiddink J.G. (2019) – Welsh waters scallop surveys and stock assessment. Bangor University, Fisheries and Conservation Report No. 75. pp 48.

Dickey-Collas, M., Nash, R.D.M. and Brown, J. (2001) The location of spawning Irish Sea herring (*Clupea harengus*). Journal of the Marine Biological Association of the United Kingdom, 81: 713–714.

Doherty P.D., J. M. Baxter, F. R. Gell, B. J. Godley, R. T. Graham, G. Hall, J. Hall, L. A. Hawkes, S. M. Henderson, L. Johnson, C. Speedie and M. J. (2017) Witt Long-term satellite tracking reveals variable seasonal migration strategies of basking sharks in the north-east Atlantic, Scientific Reports, article number 42837

Ellis, J.R., Milligan, S.P., Readdy, L., Taylor, N. and Brown, M.J. (2012) Mapping the spawning and nursery grounds of selected fish for spatial planning. Report for Cefas, Science Series Technical Report no. 147.

Gardiner, R., Main, R., Davies, I., Kynoch, R., Gilbey, J., Adams, C., and Newton M. (2018) Recent Investigations into the Marine Migration of Salmon Smolts in the Context of Marine Renewable Development. Conference Presentation. Environmental Interactions of Marine Renewables (EIMR) Conference, Kirkwall, 24-26 April 2018.

ICES. (2021) ICES Working Group on Surveys on Ichthyoplankton in the North Sea and adjacent Seas (WGSINS; outputs from 2020 meeting) ICES Scientific Reports. 3:14. 31pp. https://doi.org/10.17895/ices.pub.7910.

JNCC (2019) MPA Mapper, Available: https://jncc.gov.uk/mpa-mapper/ Accessed: October 2021.

JNCC (2020) Marine Recorder Public UK Snapshot. Available: https://hub.jncc.gov.uk/assets/b9934e31-39b6-41f9-9364-d1e93db68307 Accessed: October 2021.

Judd (2012) Guidelines for data acquisition to support marine environmental assessment of offshore renewable energy projects, Final, issued 2 May 2012.

Lambert, G.I., Murray L.G., Kaiser M.J., Salomonsen H., and Cambie, G. (2013) Welsh waters scallop survey – Cardigan Bay to Liverpool Bay July-August 2013. Bangor University, Fisheries and Conservation Report No. 30. pp 44.

Moore, A.B.M., Bater R., Lincoln H., Simpson S.J., Brewin, J., Chapman, T., Heney, C., Southworth, L., Spencer, J., Hold, N., and McCarthy I.D. (2020) Bass and ray ecology in Liverpool Bay. Bangor University Sustainable Fisheries and Aquaculture Group, Fisheries Report 3. 56 pages.

NBN Atlas (2019) Species records, Available: https://nbnatlas.org/ Accessed: October 2021.

OSPAR (2008) OSPAR Guidance on Environmental Considerations for Offshore Wind Farm Development. (Reference number: 2008-3). Available at: http://www.vliz.be/imisdocs/publications/ocrd/224682.pdf. Accessed October 2021.

Popper, Arthur, N., Anthony, D., Hawkins, Richard, R., Fay, David, A., Mann, Soraya Bartol, Thomas, J., Carlson, and Sheryl Coombs (2014) ASA S3/SC1.4 TR-2014 Sound Exposure Guidelines for Fishes and Sea Turtles: A Technical Report Prepared by ANSI-Accredited Standards Committee S3/SC1 and Registered with ANSI. Springer.

RPS Energy (2010) Ormonde Offshore Wind Farm, Construction (Year 1) Environmental Monitoring. Volume 1 Main Report.

Southall E.J., D.W., Sims J.D., Metcalfe O .J.I., Doyle P , S. Fanshawe P.C., Lacey J., Shrimpton, J.L., Solandt P., and C.D., Speedie (2005) Spatial distribution patters of basking sharks on the European shelf, preliminary comparison of satellite-tag geolocation, survey and public sightings data. Journal of Marine Biology Associate UK., Vol 85, p1083-1088.

Titan Environmental Surveys Ltd (2005) Walney and West of Duddon Sands Offshore Wind Farms, Baseline Benthic Survey – Epifaunal Beam Trawl Results.

13.4.3 Marine mammals

Baines, M.E. and Evans, P.G.H. (2012) Atlas of Marine Mammals of Wales. CCW Monitoring Report No. 68. 2nd edition. 139pp.

BOWind (2006) Barrow offshore wind farm construction monitoring report, 02 November 2006 Rev01.

Brasseur, S., Aarts, G., Meesters, E., van Polanen Petel, T., Dijkman, E., Cremer, J. and Reijnders, P. (2012) Habitat preference of harbour seals in the Dutch coastal area: analysis and estimate of effects of offshore wind farms.

Carter, M. I. D. (2020) Habitat-based predictions of at-sea distribution for grey and harbour seals in the British Isles. Sea Mammal Research Unit, University of St Andrews, Report to BEIS, OESEA-16-76/OESEA-17-78.

CEFAS (2010) Strategic review of offshore wind farm monitoring data associated with FEPA licence conditions – annex 4: underwater noise., Cefas report ME1117.

Celtic Array Ltd (2014c) Rhiannon Offshore Wind Farm, Environmental Statement PEI- Chapter 11 marine mammals, basking shark and turtles. Document number: SE-D-EV-001-0002-000000-001

CIEEM (2019) Guidelines for ecological impact assessment in the UK and Ireland: Terrestrial, Freshwater, Coastal and Marine. September 2018 Version 1.1 - updated September 2019. Chartered Institute of Ecology and Environmental Management, Winchester.

CMACS (2011) Walney offshore wind farm marine mammal mitigation during construction, final report v3.

Copping, A. (2018) The State of Knowledge for Environmental Effects Driving Consenting/Permitting for the Marine Renewable Energy Industry. Prepared for Ocean Energy Systems On behalf of the Annex IV Member Nations, January 2018.

Czech-Damal, N. U., Dehnhardt, G., Manger, P. and Hanke, W. (2013) Passive electroreception in aquatic mammals. Journal of Comparative Physiology A-Neuroethology Sensory Neural and Behavioural Physiology 199:555-563.

DHI Water and Environment (2006) Walney and West of Duddon Sands Environmental Impact Assessment - Marine Mammals in the NW3 Area, Irish Sea.

Diederichs, A., Nehls, G., Dähne, M., Adler, S., Koschinski, S. and Verfuß, U. (2008) Methodologies for measuring and assessing potential changes in marine mammal behaviour, abundance or distribution arising from the construction, operation and decommissioning of offshore windfarms.

Dong Energy (2013) Burbo Bank offshore wind farm Environmental Statement Volume 2- Chapter 14: Marine Mammals.

European Commission (2010) Guidance Document: Wind Energy Developments and Natura 2000.

Hammond, P., Lacey, C., Gilles, A., Viquerat, S., Börjesson, P., Herr, H., Macleod, K., Ridoux, V., Santos, M., Scheidat, M., Teilmann, J., Vingada, J. and Øie. N. (2021) Estimates of cetacean abundance in European Atlantic waters in summer 2016 from the SCANS-III aerial and shipboard surveys - revised June 2021.

Hammond, P., Lacey, C., Gilles, A., Viquerat, S., Börjesson, P., Herr, H., Macleod, K., Ridoux, V., Santos, M., Scheidat, M., Teilmann, J.,. Vingada, J., and Øien, N. (2017) Estimates of cetacean abundance in European Atlantic waters in summer 2016 from the SCANS-III aerial and shipboard surveys.

Hastie, G. D., Russell, D. J., Benjamin, S., Moss, S., Wilson, B., and Thompson, D., (2016) Dynamic habitat corridors for marine predators; intensive use of a coastal channel by harbour seals is modulated by tidal currents. Behavioural Ecology and Sociobiology:1-14.

Heinänen, S. and Skov, H. (2015) The identification of discrete and persistent areas of relatively high harbour porpoise density in the wider UK marine area, JNCC Report No.544 JNCC, Peterborough.

IEEM (2010) Guidelines For Ecological Impact Assessment In Britain And Ireland Marine And Coastal Guidelines For Ecological Impact Assessment In The United Kingdom. Winchester: Chartered Institute of Ecology and Environmental Management.

IAMMWG (2021) Updated abundance estimates for cetacean Management Units in UK waters. JNCC Report No. 680, JNCC Peterborough, ISSN 0963-8091.JNCC (2020a) Marine Recorder Public UK Snapshot. Available https://hub.jncc.gov.uk/assets/b9934e31-39b6-41f9-9364-d1e93db68307. Accessed November 2021

JNCC (2020b) Guidance on noise management in harbour porpoise SACs. Available online at: https://hub.jncc.gov.uk/assets/2e60a9a0-4366-4971-9327-2bc409e09784.

JNCC (2019a) JNCC MPA mapper. Available: https://jncc.gov.uk/our-work/marine-protected-area-mapper/ Accessed November 2021

JNCC (2019b) European Community Directive on the Conservation of Natural Habitats and of Wild Fauna and Flora (92/43/EEC) Fourth Report by the United Kingdom under Article 17 on the implementation of the Directive from January 2013 to December 2018 Conservation status assessment for the species: S1351 - Harbour porpoise (*Phocoena phocoena*) United Kingdom.

JNCC (2019c) European Community Directive on the Conservation of Natural Habitats and of Wild Fauna and Flora (92/43/EEC) Fourth Report by the United Kingdom under Article 17 on the implementation of the Directive from January 2013 to December 2018 Conservation status assessment for the species: S2618 - Minke whale (*Balaenoptera acutorostrata*) United Kingdom.

JNCC (2019d) European Community Directive on the Conservation of Natural Habitats and of Wild Fauna and Flora (92/43/EEC) Fourth Report by the United Kingdom under Article 17 on the implementation of the Directive from January 2013 to December 2018 Conservation status assessment for the species: S2032 - White beaked dolphin (*Lagenorhynchus albirostris*) United Kingdom.

JNCC (2019e) European Community Directive on the Conservation of Natural Habitats and of Wild Fauna and Flora (92/43/EEC) Fourth Report by the United Kingdom under Article 17 on the implementation of the Directive from January 2013 to December 2018 Conservation status assessment for the species: S1349 - Bottlenose dolphin (*Tursiops truncatus*) United Kingdom.

JNCC (2019f) European Community Directive on the Conservation of Natural Habitats and of Wild Fauna and Flora (92/43/EEC) Fourth Report by the United

Kingdom under Article 17 on the implementation of the Directive from January 2013 to December 2018 Conservation status assessment for the species: S1364 - Grey seal (*Halichoerus grypus*) United Kingdom.

JNCC (2019g) European Community Directive on the Conservation of Natural Habitats and of Wild Fauna and Flora (92/43/EEC) Fourth Report by the United Kingdom under Article 17 on the implementation of the Directive from January 2013 to December 2018 Conservation status assessment for the species: S1350 - Common dolphin (*Delphinus delphis*) United Kingdom.

JNCC (2019h) European Community Directive on the Conservation of Natural Habitats and of Wild Fauna and Flora (92/43/EEC) Fourth Report by the United Kingdom under Article 17 on the implementation of the Directive from January 2013 to December 2018 Conservation status assessment for the species: S2030 - Risso's dolphin (*Grampus griseus*) United Kingdom.

JNCC (2017) JNCC guidelines for minimising the risk of injury to marine mammals from geophysical surveys. Available online at: https://data.jncc.gov.uk/data/e2a46de5-43d4-43f0-b296-c62134397ce4/jncc-guidelines-seismicsurvey-aug2017-web.pdf.

JNCC (2010) Statutory nature conservation agency protocol for minimising the risk of injury to marine mammals from piling noise. Available online at: https://data.jncc.gov.uk/data/31662b6a-19ed-4918-9fab-8fbcff752046/JNCC-CNCB-Piling-protocol-August2010-Web.pdf.

Lindeboom, H. J., Kouwenhoven, H. J., Bergman, M. J. N., Bouma, S. Brasseur, S., Daan, R., Fijn, R.C., de Haan, D., Dirksen, S., van Hal, R., Hille Ris Lambers, R., ter Hofstede, R., Krijgsveld, K.L., Leopold, M. and Scheidat, M. (2011) Short-term ecological effects of an offshore wind farm in the Dutch coastal zone; a compilation. Environmental Research Letters 6:1-13.

Lohrengel, K., Evans, P.G.H., Lindenbaum, C.P., Morris, C.W. and Stringell, T.B. (2018) Bottlenose dolphin monitoring in Cardigan Bay 2014-2016. NRW Evidence Report No: 191, Natural Resources Wales, Bangor. Available at: https://naturalresources.wales/evidence- and-data/research-and-reports/marine-reports/marine-and-coastal-evidencereports/?lang=en

Madsen, P. T., Wahlberg, M., Tougaard, J., Lucke, K. and Tyack, P. (2006) Wind turbine underwater noise and marine mammals: implications of current knowledge and data needs. Marine Ecology Progress Series 309:279-295.

Manx whale and dolphin watch (2022) Recent sightings in Max waters. Available: https://www.mwdw.net/recent-sightings/?frm-page-3048=15 Accessed: February 2022

Marubini, F., Gimona, A., Evans, P. G.,, P. J. and Pierce G. J. (2009) Habitat preferences and interannual variability in occurrence of the harbour porpoise *Phocoena phocoena* off northwest Scotland. Marine Ecology Progress Series 381:297-310.

C.D. Morris & C.D. Duck (2019) Aerial thermal-imaging survey of seals in Ireland, 2017 to 2018. Irish Wildlife Manuals, No. 111 National Parks and Wildlife Service, Department of Culture, Heritage and the Gaeltacht, Ireland.

National Biodiversity Network (2019) Available: https://nbn.org.uk/ Accessed: November 2021.

National Marine Fisheries Service (2018) 2018 Revisions to: Technical Guidance for Assessing the Effects of Anthropogenic Sound on Marine Mammal Hearing (Version 2.0): Underwater Thresholds for Onset of Permanent and Temporary Threshold Shifts. U.S. Dept. of Commer., NOAA. NOAA Technical Memorandum NMFS-OPR-59, 167 p.

National Marine Fisheries Service (2016) Technical Guidance for Assessing the Effects of Anthropogenic Sound on Marine Mammal Hearing: Underwater Acoustic Thresholds for Onset of Permanent and Temporary Threshold Shifts. U.S. Dept. of Commer., NOAA. NOAA Technical Memorandum NMFS-OPR-55, 178 p

Normandeau Inc, Exponent Inc, Tricas, T. and Gill, A. (2011) Effects of EMFs from Undersea Power Cables on Elasmobranchs and Other Marine Species. U.S. Dept. of the Interior, Bureau of Ocean Energy Management, Regulation, and Enforcement, Pacific OCS Region, Camarillo, CA. OCS Study BOEMRE 2011-09.

OSPAR (2008) OSPAR Guidance on Environmental Considerations for Offshore Wind Farm Development. (Reference number: 2008-3). Available at: http://www.vliz.be/imisdocs/publications/ocrd/224682.pdf. Accessed November 2021.

Paxton, C. G. M., Scott-Hayward, L., Mackenzie, M., Rexstad, E., and Thomas L. (2016) Revised Phase III Data Analysis of Joint Cetacean Protocol Data Resources. JNCC Report No. 517, JNCC, Peterborough.

Pierpoint, C. (2008) Harbour porpoise (*Phocoena phocoena*) foraging strategy at a high energy, nearshore site in southwest Wales, UK. Journal of the Marine Biological Association of the UK 88:1167-1173.

Plunkett, R, Sparling, C. and Kidney, D. (2014) Anglesey skerries marine mammal monitoring: land based vantage point survey trial. report number smrum-mct-2014-012 provided to MCT, November 2014 (unpublished).

Reid, J.B., Evans, P.G.H. and Northridge, S.P. (2003) Atlas of Cetaceans Distributions in North-west European Waters, Joint Nature Conservation Committee, Peterborough.

Riley, T., Waggitt, J., and Davies, A. (2020) Distribution modelling of the Eurasian Otter (*Lutra lutra*) on the Isle of Anglesey, Wales. OTTER, the Journal of the International Otter Survival Fund, 6, 30-39. https://www.otter.org/public/MediaAndResources_Resources_Journal.aspx

RPS Energy (2012) Ormonde offshore wind farm 2010 construction (year 1) environmental monitoring report, Volume 1: main report.

Russell, D. J., Brasseur, S. M., Thompson, D., Hastie, G. D., Janik, V. M., Aarts, G., McClintock, B. T., Matthiopoulos, J., Moss, S. E.and McConnell B. (2014) Marine mammals trace anthropogenic structures at sea. Current Biology 24:R638-R639.

Russell D.J.F., Jones E.L. and Morris C.D., (2017) Updates Sea Usage Maps: The estimates at -sea distribution of grey and harbour seals, Scottish Marine and Freshwater Science Report Vol 8 No 25.

RWE (2022) Awel y Mor offshore wind farm Category 6: Environmental Statement, April 2022.

Seawatch Foundation (2012) The White-beked dolphin in UK waters fact sheet. Available: https://seawatchfoundation.org.uk/wp-content/uploads/2012/07/White-beaked_Dolphin.pdf Accessed: December 2021

Scheidat, M., Tougaard, J., Brasseur, S., Carstensen, J., van Polanen Petel, T., Teilmann, J. and Reijnders P. (2011) Harbour porpoises (*Phocoena phocoena*) and wind farms: a case study in the Dutch North Sea. Environmental Research Letters 6:1-10.

SCOS (2021) Scientific Advice on Matters Related to the Management of Seal Populations: 2020.

Southall, B., Finneran, J. J., Reichmuth, C., Nachtigall, P. E.,Ketten, D. R., Bowles, A. E., Ellison, W. T., Nowacek, D. and Tyack, P. (2019) Marine Mammal Noise Exposure Criteria: Updated Scientific Recommendations for Residual Hearing Effects. Aquatic Mammals 45:125-232.

Southall, B.L., Nowacek, D.P., Bowles, A.E., Senigaglia, A., Bejder, L., Tyack, P.L. (2021) Marine Mammal Noise Exposure Criteria: Assessing the Severity of Marine Mammal Behavioural Responses to Human Noise, Aquatic Mammals 27:421-464.

Teilmann, J., Tougaard, J. and Carstensen J. (2006a) Summary on harbour porpoise monitoring 1999-2006 around Nysted and Horns Rev Offshore Wind Farms.

Teilmann, J., Tougaard, J., Cartensen, J., Dietz, R. and Tougaard S. (2006b) Summary on seal monitoring 1999-2005 around Nysted and Horns Rev Offshore Wind Farms.

UKBAP (1999) UK Biodiversity Group, Tranche 2 Action Plans. Maritime Species and habitats.

Wall, D., Murray, C., O'Brien, J., Kavanagh, L., Wilson, C., Ryan, C., Glanville, B., Williams, D., Enlander, I., O'Connor, I., McGrath, D.,Whooley P., and Berrow, S. (2013) Atlas of the distribution and relative abundance of marine mammals in Irish offshore waters 2005 - 2011. Irish Whale and Dolphin Group, Merchants Quay, Kilrush, Co Clare.

13.4.4 Offshore ornithology

Bradbury, G., Trinder, M., Furness, B., Banks, A.N., Caldow, R.W. and Hume, D., (2014) Mapping seabird sensitivity to offshore wind farms.PloS one, 9(9), p.e106366.

Celtic array Ltd (2012) Round 3 Irish Sea Zone Rhiannon Wind Farm Ltd Preliminary Environmental information.

Cleasby, I. R., Owen, E., Wilson, L., Wakefield, E. D., O'Connell, P. and Bolton, M. (2020) Identifying important at-sea areas for seabirds using species distribution models and hotspot mapping. Biological Conservation, 241, 108375.

CMACS (2012) West of Duddon Sands offshore wind farm ornithology survey report 2012. Prepared for DONG Energy.

CMACS (2014) Walney I & III & II Ornithology Final Report. Prepared for: Walney (UK) Offshore Wind Farms Ltd.

Ecological Consultancy Ltd. (2012) Zone 9 Celtic Array bird and marine mammal surveys.

Furness, R.W. (2015) Non-breeding season populations of seabirds in UK waters: Population sizes for Biologically Defined Minimum Population Scales (BDMPS). Natural England Commissioned Reports, No. 164. Available at: http://publications.naturalengland.org.uk/publication/6427568802627584.

Furness, R.W., Wade, H.M. and Masden, E.A., (2013) Assessing vulnerability of marine bird populations to offshore wind farms. Journal of Environmental Management, 119, pp. 56-66.

JNCC (2021a) Marine Recorder Public UK Snapshot. Available https://hub.jncc.gov.uk/assets/b9934e31-39b6-41f9-9364-d1e93db68307. Accessed November 2021

JNCC (2021b) Seabird Population Trends and Causes of Change: 1986–2019 Report (https://jncc.gov.uk/our-work/smp-report-1986-2019). Joint Nature Conservation Committee, Peterborough. Updated 20 May 2021.

Lawson, J., Kober, K., Win, I., Allcock, Z., Black, J., Reid, J.B., Way, L. & O'Brien, S.H., (2016) An assessment of the numbers and distributions of wintering waterbirds and seabirds in Liverpool Bay/Bae Lerpwl area of search, JNCC Report No. 576. JNCC, Peterborough, ISSN 0963-8091.

Mackey and Giménez (2006) SEA678 Data Report for Offshore Seabird Populations. Coastal & marine resources centre environmental research institute university college cork.

National Biodiversity Network (NBN) Atlas, 2019, Available https://nbnatlas.org/. Accessed November 2021

Natural England (2015). Written Submission for Deadline 4. Hornsea Offshore Wind Farm - Project Two Application. Planning Inspectorate Reference: EN010053. Natural England, Peterborough.

Parsons, M., Lawson, J., Lewis, M., Lawrence, R. & Kuepfer, A. (2015) Quantifying foraging areas of little tern around its breeding colony SPA during chick-rearing, JNCC Report No. 548, JNCC, Peterborough, ISSN 0963-8091.

Peterson K., Groom G., Stjernholm M., Nielsen D. (2012) Ornithological surveys in the Walney and Ormond offshore wind farm areas, January 2012. Department of Bioscience, University of Aarhus, Report commissioned by DONG Energy.

Statutory Nature Conservation Bodies (SNCBs) (2017) Joint SNCB Interim Displacement Advice Note. Advice on how to present assessment information on the extent and potential consequences of seabird displacement from Offshore Wind Farm (OWF) developments January 2017

Thaxter, C.B. & Burton, N.H.K. (2009) High Definition Imagery for Surveying Seabirds and Marine Mammals: A Review of Recent Trials and Development of Protocols. British Trust for Ornithology Report Commissioned by Cowrie Ltd.

Thaxter, Lascelles and Cook (2012) Seabird foraging ranges as a preliminary tool for identifying candidate Marine Protected Areas. Biological Conservation 156. December 2012.

Wade H.M., Masden. E.A., Jackson, A.C. and Furness, R.W. (2016) Incorporating data uncertainty when estimating potential vulnerability of Scottish seabirds to marine renewable energy developments. Marine Policy 70, 108–113. Available online at doi:10.1016/j.marpol.2016.04.045.

Waggitt, J. J., Evans , P. G. H., Andrade, J., Banks, A. N., Boisseau, O., Bolton, M., Bradbury, G., Brereton, T., Camphuysen, C. J., Durinck, J., Felce, T., Fijn, R. C., Garcia-Baron, I., Garthe, S., Geelhoed, S. C. V., Gilles, A., Goodhall, M., Haelters, J., Hamilton, S. and Hiddink, J. G. (2020) Distribution maps of cetacean and seabird populations in the North-East Atlantic. Journal of Applied Ecology, 57(2), 253-269. Available at: https://doi.org/10.1111/1365-2664.13525.

Wakefield, E.D., Owen, E., Baer, J., Carroll, M.J., Daunt, F., Dodd, S.G., Green, J.A., Guilford, T., Mavor, R.A., Miller, P.I., Newell, M.A., Newton, S.F., Robertson, G.S., Shoji, A., Soanes, L.M., Votier, S.C., Wanless, S. and Bolton, M. (2017) Breeding density, fine-scale tracking, and large-scale modeling reveal the regional distribution of four seabird species. Ecological Applications, 27(7), 2074-2091.

Wilson, L.J., Black, J., Brewer, M.J., Potts, J.M., Kuepfer, A., Win, I., Kober, K., Bingham, C., Mavor, R. & Webb, A. (2014) Quantifying usage of the marine environment by terns Sterna sp. around their breeding colony SPAs, JNCC Report No. 500, JNCC, Peterborough, ISSN 0963-8091.

Woodward, I., Thaxter, C.B., Owen, E. & Cook, A.S.C.P. (2019) Desk-based revision of seabird foraging ranges used for HRA screening. Report by the British Trust for Ornithology on behalf of NIRAS and The Crown Estate. BTO Research Report No. 724.

13.5 Offshore human environment

13.5.1 Commercial fisheries

Blyth-Skyrme, R.E. (2010) Options and opportunities for marine fisheries mitigation associated with windfarms. Final report for Collaborative Offshore Wind Research Into the Environment contract FISHMITIG09. COWRIE Ltd, London. 125 pp. Available: https://tethys.pnnl.gov/sites/default/files/publications/Blyth-Skyrme-2010.pdf. [Accessed 02/03/2022]

Department of Energy and Climate Change (DECC) (2016) UK Offshore Energy Strategic Environmental Assessment. Available: https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/536672/OESEA3_Post_Consultation_Report.pdf. [Accessed 02/03/2022]

European Subsea Cables Association (ESCA) (2016) ESCA Guideline No.7 Guidelines for the Use of Rock Placement. Available: https://www.escaeu.org/guidelines/. [Accessed 02/03/2022]

Fishing Liaison with Offshore Wind and Wet Renewables Group (FLOWW) (2014) FLOWW Best Practice Guidance for Offshore Renewables Developments: Recommendations for Fisheries Liaison. Available: https://www.sff.co.uk/wp-content/uploads/2016/01/FLOWW-Best-Practice-Guidance-for-Offshore-Renewables-Developments-Jan-2014.pdf. [Accessed 02/03/2022]

Fishing Liaison with Offshore Wind and Wet Renewables Group (FLOWW) (2015) FLOWW Best Practice Guidance for Offshore Renewables Developments: Recommendations for Fisheries Disruption Settlements and Community Funds. Available: https://www.thecrownestate.co.uk/media/1776/floww-best-practice-guidance-disruption-settlements-and-community-funds.pdf. [Accessed 02/03/2022]

International Cable Protection Committee (ICPC) (2009) Fishing and Submarine Cables – Working Together. Available: https://www.iscpc.org/documents/?id=142.

The Marine Management Organisation (MMO) (2021) UK sea fisheries annual statistics report 2020. Available at: https://www.gov.uk/government/statistics/uk-sea-fisheries-annual-statistics-report-2020. [Accessed 02/03/2022]

United Kingdom Fisheries Economics Network (UKFEN) (2012) Best Practice Guidance for Fishing Industry Financial and Economic Impact Assessments. Available: https://www.seafish.org/document/?id=AA0CB236-1E2A-4D2A-9F86-49CEB2B6DD5E. [Accessed 02/03/2022]

13.5.2 Shipping and navigation

International Association of Marine Aids to Navigation and Lighthouse Authorities (IALA) (2021) G1162 ED1.0 The Marking of Man-Made Offshore Structures. Available: https://www.iala-aism.org/product/g1162-ed1-0-the-making-of-offshore-man-made-structures/. [Accessed 18/03/2022]

International Maritime Organization (IMO) (2018) Formal Safety Assessment. Available: https://wwwcdn.imo.org/localresources/en/OurWork/Safety/Documents/MSC-MEPC%202-Circ%2012-Rev%202.pdf/. [Accessed 02/03/2022]

Marine and Coastguard Agency (MCA) (2008) Marine Guidance Notice 372, OREIs: Guidance to Mariners Operating in the Vicinity of UK OREIs. Available: https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/940185/MGN_372.pdf. [Accessed 02/03/2022]

Marine and Coastguard Agency (MCA) (2021a) Safety of Navigation: Offshore Renewable Energy Installations (OREIs) – Guidance on UK Navigational Practice, Safety and Emergency Response. Available: https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/980898/MGN_654_-_FINAL.pdf. [Accessed 02/03/2022]

Marine and Coastguard Agency (MCA) (2021b) Methodology for Assessing Marine Navigational Safety and Emergency Response Risks of Offshore Renewable Energy Installations (OREI). Available: https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/980900/MGN_654_Annex_1_NRA_Methodology_2021.pdf. [Accessed 02/03/2022]

Royal Yachting Association (RYA) (2019) The RYA's position on offshore renewable energy developments: Paper 1 (of 4) – wind energy. Available: https://dns.planninginspectorate.gov.uk/wp-content/ipc/uploads/projects/DNS/3234121/DNS-3234121-001778-MMC237%20MOR-POL-DOC-040%20RYA%20Position%20OREI%20Wind%20Energy.pdf. [Accessed 02/03/2022]

13.5.3 Marine archaeology

Burns, A. (2021) 'The Mesolithic Footprints Retained in One Bed of the Former Saltmarshes at Formby Point, Sefton Coast, North West England'. In: A. Pastoors, T. Lenssen-Erz (eds) Reading Prehistoric Human Tracks. Open Access, available at: Reading Prehistoric Human Tracks | SpringerLink [Accessed 21/09/2022]

Coles, B.J. (1998) 'Doggerland: a speculative survey', Proceedings of the Prehistoric Society, 64: 45-81.

Fitch, S., Gaffney, V., Ramsey, E., and Kitchen, E. (2011) West Coast Palaeoloandscapes Survey. Online, available at: https://www.dyfedarchaeology.org.uk/lostlandscapes/WCPStechnical.pdf. [Accessed 03/03/2022]

The Crown Estate (TCE) (2014) Protocol for Archaeological Discoveries: Offshore Renewables Projects. Available at: 03-PAD Offshore Renewables_Crown Estate (thecrownestate.co.uk).

Wessex Archaeology. (2007) COWRIE Historic Environment Guidance for the Offshore Renewable Energy Sector.

Wessex Archaeology. (2008) Aircraft Crash Sites at Sea: A Scoping Study. Archaeological Desk-based Assessment, Unpublished Report 66641.02.

Wessex Archaeology for The Crown Estate. (2021) Archaeological Mitigation for Offshore Wind Farms: Model Clauses for Written Schemes of Investigation. Available online:guide-to-archaeological-requirements-for-offshore-wind.pdf (thecrownestate.co.uk). [Accessed 03/03/2022]

13.5.4 Other sea users

Blue Mink Boat Charters. Available at: blueminkboatcharters.co.uk. [Accessed 28/02/2022]

Centre for Environment, Fisheries and Aquaculture Science (Cefas) (2021) Participation, effort, and catches of sea anglers resident in the UK in 2018 & 2019. Available at: https://www.substance.net/wp-content/uploads/Sea_angling-_2018-19_report_final.pdf. [Accessed 28/02/2022]

Department of Energy & Climate Change (DECC) (2011) UK Offshore Energy Strategic Environmental Assessment 2: Environmental Report. Available at: https://www.gov.uk/government/publications/uk-offshore-energy-strategic-environmental-assessment-2-environmental-report. [Accessed 28/02/2022]

Eni (2020) Eni Liverpool Bay Project: a clean growth opportunity for the UK, Available at: https://www.eni.com/en-IT/operations/united-kingdom-liverpool-bay.html. [Accessed 28/02/2022]

Environment Agency (2021) Locations of designated bathing water sites. Available at: https://environment.data.gov.uk/bwq/profiles/. [Accessed 28/02/2022]

European Subsea Cables UK Association (ESCA) (2016) Guideline No. 6, the proximity of offshore renewable energy installations and submarine cable infrastructure in UK waters. Available at: https://www.escaeu.org/download/?Id=123&source=guidelines. [Accessed 28/02/2022]

HyNet (2021) What is HyNet? Available at: https://hynet.co.uk/about/. [Accessed 28/02/2022]

International Cable Protection Committee (ICPC) (2015) Recommendation No.2-11B: Cable routing and reporting criteria. Available at: https://www.iscpc.org/publications/recommendations/. [Accessed 28/02/2022]

International Cable Protection Committee (ICPC) (2014) Recommendation No. 3-10C: Telecommunications Cable and Oil Pipeline/Power Cables Crossing Criteria. Available at: https://www.iscpc.org/publications/recommendations/. [Accessed 28/02/2022]

International Cable Protection Committee (ICPC) (2013) Recommendation No.13-2C: The proximity of offshore renewable wind energy installations and submarine cable infrastructure in national waters. Available at: https://www.iscpc.org/publications/recommendations/. [Accessed 28/02/2022]

Manx Sea Fishing, Available at: www.manxseafishing.com. [Accessed 28/02/2022]

Oil and Gas Authority (OGA) (2020) Energy integration in action: Eni project awarded carbon storage licence. Press release. Available at: Oil and Gas Authority: Energy integration in action: Eni project awarded carbon storage licence - 2020 - News - News &
publications (ogauthority.co.uk). [Accessed 28/02/2022]

Oil and Gas UK (2015) Guidelines for the Abandonment of Wells, Issue 5. Available at: http://oilandgasuk.co.uk/product/op071/. [Accessed 28/02/2022]

Oil and Gas UK (2021) Pipeline crossing agreement and proximity agreement pack. Available at: https://oguk.org.uk/product/pipeline-crossing-agreement-proximity-agreement-pack/. [Accessed 28/02/2022]

Royal Yachting Association (RYA) (2019) The RYA's position on offshore renewable energy developments: Paper 1 (of 4) – Wind Energy. Available at: https://dns.planninginspectorate.gov.uk/wp-content/ipc/uploads/projects/DNS/3234121/DNS-3234121-001778-MMC237%20MOR-POL-DOC-040%20RYA%20Position%20OREI%20Wind%20Energy.pdf. [Accessed 28/02/2022]

Royal Yachting Association (RYA) (2019) UK Coastal Atlas of Recreational Boating. Available at: https://www.rya.org.uk/knowledge/planning-licensing/uk-coastal-atlas-of-recreational-boating. [Accessed 28/02/2022]

Sea Fishing Trips in North Wales. Available at: https://sea-fishing-trips.co.uk/. [Accessed 28/02/2022]

The Crown Estate (TCE) (2012) Submarine cables and offshore renewable energy installations proximity study. Available at: https://www.thecrownestate.co.uk/media/1784/submarine-cables-and-offshore-renewable-energy-installations-proximity-study.pdf. [Accessed 28/02/2022]

UK Diving, Map of North Wales. Available at: www.ukdiving.co.uk. [Accessed 28/02/2022]

13.6 Onshore physical environment

13.6.1 Geology, hydrogeology and ground conditions

British Geological Survey (BGS) (2015) Baseline chemistry of groundwater in UK aquifers. Available: https://www2.bgs.ac.uk/groundwater/quality/BaselineUK/home.html Accessed: December 2021.

British Geological Survey (BGS) Aquifer designation data. Available: https://www.bgs.ac.uk/datasets/aquifer-designation-data/ Accessed: December 2021.

British Geological Survey (BGS) BGS maps portal – maps and sections 1832 to 2014. Available: https://webapps.bgs.ac.uk/data/maps/?_ga=2.213553372.975515887.1642429324-310520161.1642429324 Accessed: December 2021.

British Geological Survey (BGS) Borehole records. Available: https://www.bgs.ac.uk/information-hub/borehole-records/ Accessed: December 2021.

British Geological Survey (BGS) GeoIndex (Onshore). Available: https://www.bgs.ac.uk/map-viewers/geoindex-onshore/ Accessed: December 2021.

British Geological Survey (BGS) Geology of Britain Viewer. Available: https://www.bgs.ac.uk/map-viewers/geology-of-britain-viewer/ Accessed: December 2021.

British Geological Survey (BGS) Hydrogeological maps of the United Kingdom. Available: https://webapps.bgs.ac.uk/data/maps/maps.cfc?method=listResults&mapName=&series=HYDRO&scale=&pageSize=100 Accessed: December 2021.

CIRIA (2001) Contaminated Land Risk Assessment: A Guide to Good Practice. CIRIA (552). Available: https://www.ciria.org/CIRIA/Home/CIRIA/default.aspx?hkey=b9b32704-f151-4cb8-83fc-c9da82a10893 Accessed: December 2021.

CIRIA (2006) Control of water pollution from linear construction projects: Site guide CIRIA (C649). Available: https://www.ciria.org/CIRIA/Home/CIRIA/default.aspx?hkey=b9b32704-f151-4cb8-83fc-c9da82a10893 Accessed: December 2021.

CIRIA (2006) Control of water pollution from linear construction projects: Technical guidance. CIRIA (C648). Available: https://www.ciria.org/CIRIA/Home/CIRIA/default.aspx?hkey=b9b32704-f151-4cb8-83fc-c9da82a10893 Accessed: December 2021.

CIRIA (2007) Assessing Risks Posed by Hazardous Ground Gases to Buildings CIRIA (C665). December 2007. Available: https://www.ciria.org/CIRIA/Home/CIRIA/default.aspx?hkey=b9b32704-f151-4cb8-83fc-c9da82a10893 Accessed: December 2021.

Defra (2021) MAGIC Interactive Mapping System. Available: https://magic.defra.gov.uk/ Accessed: December 2021.

EA (2017) Groundwater protection technical guidance. March 2017. Available: https://www.gov.uk/government/publications/groundwater-protection-technical-guidance/groundwater-protection-technical-guidance Accessed: December 2021.

EA (2017) Land contamination groundwater compliance points: quantitative risk assessments. March 2017. Available: https://www.gov.uk/guidance/land-contamination-groundwater-compliance-points-quantitative-risk-assessments Accessed: December 2021.

EA (2018) The EA’s approach to groundwater protection. February 2018.Available: https://www.gov.uk/government/publications/groundwater-protection-position-statements Accessed: December 2021.

EA (2021) Land contamination risk management (LCRM). April 2021. Available: https://www.gov.uk/government/publications/land-contamination-risk-management-lcrm Accessed: December 2021.

EA (2021) Water quality data archive. Available: https://environment.data.gov.uk/water-quality/view/landing Accessed: December 2021.

EA (2021) WFD Groundwater Bodies Cycle 2. Available: https://data.gov.uk/dataset/2a74cf2e-560a-4408-a762-cad0e06c9d3f/wfd-groundwater-bodies-cycle-2 Accessed: December 2021.

EA. Catchment Data Explorer. Available: https://environment.data.gov.uk/catchment-planning/ Accessed: December 2021.

European Parliament (2000) Water Framework Directive (WFD) 2000/60/EC. October 2000. Available: https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=CELEX:32000L00 Accessed: December 2021.

European Parliament (2006) Groundwater Directive (GWD) 2006/118/EC. Available: https://eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=OJ:L:2006:372:0019:0031:EN:PDF Accessed: December 2021.

Highways England, Transport Scotland, Welsh Government and Department for Infrastructure Northern Ireland (2020) DMRB LA104 Environmental assessment and monitoring. Available. : https://standardsforhighways.co.uk/dmrb/search/0f6e0b6a-d08e-4673-8691-cab564d4a60a Accessed: December 2021.

Highways England, Transport Scotland, Welsh Government and Department for Infrastructure Northern Ireland (2020) DMRB LA109 Geology and soils. Available. https://www.standardsforhighways.co.uk/dmrb/search/adca4c7d-4037-4907-b633-76eaed30b9c0 Accessed: December 2021.

Highways England, Transport Scotland, Welsh Government and Department for Infrastructure Northern Ireland (2020) DMRB LA113 Road drainage and the water environment Available. https://www.standardsforhighways.co.uk/dmrb/search/d6388f5f-2694-4986-ac46-b17b62c21727. Accessed: December 2021

UK Government (1990) The Environmental Protection Act 1990. Available: https://www.legislation.gov.uk/ukpga/1990/43/contents Accessed: December 2021.

UK Government (2016) The Environmental Permitting (England and Wales Regulations) Regulations 2016. Available: https://www.legislation.gov.uk/uksi/2016/1154/contents/made Accessed: December 2021.

UK Soil Observatory (UKSO) UKSO map viewer. Available: http://www.ukso.org/ Accessed: December 2021.

13.6.2 Hydrology and flood risk

CIRIA (2006) C648 – Control of water pollution from linear construction projects. Available: https://www.ciria.org/ProductExcerpts/C648.aspx Accessed: December 2021.

Defra (2021) MAGIC Interactive Mapping System. Available: https://magic.defra.gov.uk/ Accessed: November 2021.

Defra and EA (2021) Catchment Data Explorer. September 2021. Available: https://environment.data.gov.uk/catchment-planning Accessed: November 2021.

EA Flood map for planning. Available: https://check-long-term-flood-risk.service.gov.uk/map Accessed: November 2021.

Fylde Borough Council (2011) Strategic Flood Risk Assessment Fylde Borough Council. Available: https://new.fylde.gov.uk/wp-content/uploads/2019/11/SFRA-2011.pdf Accessed: December 2021.

Highways England, Transport Scotland, Welsh Government and Department for Infrastructure Northern Ireland (2020) DMRB LA104 Environmental assessment and monitoring. Available: https://standardsforhighways.co.uk/dmrb/search/0f6e0b6a-d08e-4673-8691-cab564d4a60a .

Highways England, Transport Scotland, Welsh Government and Department for Infrastructure Northern Ireland (2020) DMRB LA113 Road drainage and the water environment Available.
https://www.standardsforhighways.co.uk/dmrb/search/d6388f5f-2694-4986-ac46-b17b62c21727. Accessed: December 2021

Knowsley Metropolitan Borough Council and Sefton Metropolitan Borough Council (2009) Knowsley Council and Sefton Council Strategic Flood Risk Assessment. Executive Summary. Available:
http://www.knowsley.gov.uk/pdf/SFRA%20Exec%20Summary.pdf Accessed: December 2021.

Knowsley Metropolitan Borough Council (2017) Knowsley Local Flood Risk Management Strategy and Summary Note. Available:
https://www.knowsley.gov.uk/knowsleycouncil/media/Documents/kmbc-local-flood-risk-management-strategy-summary-note-october-2017.pdf Accessed: December 2021.

Knowsley Metropolitan Borough Council (2012) Knowsley Metropolitan Borough Council Level 2 Strategic Flood Risk Assessment. Available: Accessed:
https://www.knowsley.gov.uk/knowsleycouncil/media/Documents/kmbc-level-2-strategic-flood-risk-assessment-vol-1-and-2-dec-2016.pdf December 2021.

Lancashire County Council (2021) Local Flood Risk Management Strategy for Lancashire 2021 – 2027. Available: https://www.lancashire.gov.uk/council/strategies-policies-plans/environmental/lancashire-and-blackpool-flood-risk-management-strategy/ Accessed: December 2021.

MHCLG (2021) National Planning Policy Framework. Available:
https://www.gov.uk/government/publications/national-planning-policy-framework--2 Accessed: December 2021.

MHCLG (2021) Planning practice guidance. Available:
https://www.gov.uk/government/collections/planning-practice-guidance Accessed: December 2021.

North West and North Wales Coastline (2019) SMP (shoreline management plan) 22 Great Ormes Head to Scotland. Available: https://www.mycoastline.org.uk/shoreline-management-plans/ Accessed: December 2021.

North West river basin district River basin management plan. Updated: December 2015. Available: https://www.gov.uk/government/publications/north-west-river-basin-district-river-basin-management-plan Accessed: December 2021.

Ordnance Survey (OS) Open Rivers. Available:
https://www.ordnancesurvey.co.uk/business-government/products/open-map-rivers Accessed: November 2021.

OS DTM 50. Available: https://www.ordnancesurvey.co.uk/business-government/products/terrain-50 Accessed: December 2021.

Preston City Council, South Ribble Borough Council and Chorley Borough Council, (2007) Central Lancashire Strategic Flood Risk Assessment Level 1,. Available: https://www.preston.gov.uk/media/1693/CL-Flood-risk-assessment/pdf/EVL-08-Central-Lancs-Strategic-Flood-Risk-Assessment-Level-1-Final-Report-Dec-2007_1.pdf?m=636977626435930000&ccp=true#cookie-consent-prompt Accessed: December 2021.

Sefton Metropolitan Borough Council (2014) Sefton Metropolitan Borough Council Local Flood Risk Management Strategy. Available: https://modgov.sefton.gov.uk/documents/s62809/Strategic%20Environmental%20Assessment.pdf Accessed: December 2021.

Sefton Metropolitan Borough Council (2013) Sefton Metropolitan Borough Council Strategic Flood Risk Assessment. Available: https://geosmartinfo.co.uk/wp-content/uploads/2020/03/Sefton-SFRA-FINAL-Mar2013.pdf Accessed: December 2021.

Sefton Metropolitan Borough Council (2011) Sefton Metropolitan Borough Council Surface Water Management Plan. Available: https://modgov.sefton.gov.uk/documents/s34252/Sefton_SWMP_NTSI_V1%202.pdf Accessed: December 2021.

South Ribble Borough Council (2009) Ribble Catchment Flood Management Plan Summary Report. Available: https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/293727/Ribble_Catchment_Flood_Management_Plan.pdf Accessed: December 2021.

West Lancashire Borough Council (2020) West Lancashire Borough Council Level 2 Strategic Flood Risk Assessment. Available: https://www.westlancs.gov.uk/planning/planning-policy/the-local-plan/the-local-plan-2023-2040/evidence-base/strategic-flood-risk-assessment.aspx Accessed December 2021.

West Lancashire Local Plan - Strategic Flood Risk Assessment Level 1 (December 2019). Available: https://www.westlancs.gov.uk/planning/planning-policy/the-local-plan/the-local-plan-2023-2040/evidence-base/strategic-flood-risk-assessment.aspx Accessed: December 2021.

13.7 Onshore biological environment

13.7.1 Terrestrial ecology and ornithology (intertidal and onshore)

Amphibian and Reptile Groups of the United Kingdom (ARG UK) (2010) ARG UK Advice Note 5. Great Crested Newt Habitat Suitability Index. May 2010. Available: https://www.arguk.org/info-advice/advice-notes/9-great-crested-newt-habitat-suitability-index-arg-advice-note-5/file Accessed: December 2021.

Biggs J, Ewald N, Valentini A, Gaboriaud C, Griffiths RA, Foster J, Wilkinson J, Arnett A, Williams P and Dunn F (2014) Analytical and methodological development for improved surveillance of the Great Crested Newt. Appendix 5. Technical advice note for field and laboratory sampling of great crested newt (*Triturus cristatus*) environmental DNA. Freshwater Habitats Trust, Oxford.

Bright, P., Morris, P. and Mitchell-Jones, T (2006) The dormouse conservation handbook second edition. English Nature.

CIEEM (2017) Guidelines for Preliminary Ecological Appraisal. Second Edition. December 2017. Available: https://cieem.net/wp-content/uploads/2019/02/Guidelines-for-Preliminary-Ecological-Appraisal-Jan2018-1.pdf Accessed: November 2021.

CIEEM (2018) Guidelines for Ecological Impact Assessment in the UK and Ireland. Available: https://cieem.net/wp-content/uploads/2018/08/ECIA-Guidelines-2018-Terrestrial-Freshwater-Coastal-and-Marine-V1.1Update.pdf Accessed: November 2021.

Collins, J. (ed.) (2016) Bat Surveys for Professional Ecologists Good Practice Guidelines (3rd edn) Bat Conservation Trust, London. Available: https://www.bats.org.uk/resources/guidance-for-professionals/bat-surveys-for-professional-ecologists-good-practice-guidelines-3rd-edition Accessed: December 2021.

Dean, M., Strachan, R., Gow, D. and Andrews, R. (2016) The Water Vole Mitigation Handbook (The Mammal Society Mitigation Series). Eds Fiona Mathews and Paul Chanin. The Mammal Society, London.

Defra (2021) MAGIC Interactive Mapping System. Available: https://magic.defra.gov.uk/ Accessed: November 2021.

English Nature (2001) Great Crested Newt Mitigation Guidelines. English Nature: Peterborough Available: https://cieem.net/resource/great-crested-newt-mitigation-guidelines/ Accessed: December 2021.

Froglife (1999) Reptile Survey: and introduction to planning, conducting and interpreting surveys for snake and lizard conservation. Froglife Advice Sheet 10. Halesworth.

Gent,T. & Gibson, S. (eds) (2003) Herpetofauna Workers' Manual (revised reprint). JNCC, Peterborough. Available: https://hub.jncc.gov.uk/assets/9d7da8c4-9d76-4b65-8263-6b925b3433a4 Accessed: December 2021.

JNCC (2004) Common Standards Monitoring Guidance for Reptiles and Amphibians, Version. Available: https://hub.jncc.gov.uk/assets/43e8e8ed-5f05-4613-a277-f116b34829f4 Accessed: December 2021.

Mitchell-Jones, A.J. (2004) Bat Mitigation Guidelines English Nature, Peterborough.

Natural England (2021) The Biodiversity Metric 3.0 (JP039). Available: http://nepubprod.appspot.com/publication/6049804846366720 Accessed: December 2021.

Scottish Natural Heritage (2016) Assessing Connectivity with Special protection Areas (SPAs) Guidance. Version 3. Available: https://www.nature.scot/doc/assessing-connectivity-special-protection-areas. Accessed: September 2022.

UK Government (1981) The Wildlife and Countryside Act 1981. Available: https://www.legislation.gov.uk/ukpga/1981/69 Accessed: December 2021.

UK Government (1997) The Hedgerows Regulations 1997. Available: https://www.legislation.gov.uk/uksi/1997/1160/contents/made Accessed: December 2021.Amphibian and Reptile Groups of the United Kingdom (ARG UK) (2010) ARG

UK Advice Note 5. Great Crested Newt Habitat Suitability Index. May 2010. Available: https://www.arguk.org/info-advice/advice-notes/9-great-crested-newt-habitat-suitability-index-arg-advice-note-5/file Accessed: December 2021.

13.8 Onshore human environment

13.8.1 Historic Environment

CIfA (2014) Standard and Guidance for Historic Environment Desk-Based Assessment. Available: https://www.archaeologists.net/sites/default/files/CIfAS%26GDBA_4.pdf Accessed: December 2021.

CIfA (2019) Code of conduct: professional ethics in archaeology. Available: https://www.archaeologists.net/sites/default/files/Code%20of%20conduct%20revOct2022.pdf Accessed: September 2022.

Department for Culture Media & Sport (2013) Scheduled Monuments & nationally important but non-scheduled monuments. Available: https://www.gov.uk/government/publications/scheduled-monuments-policy-statement Accessed: September 2022.

Highways England et al. (2019) DMRB LA 106 - Cultural heritage assessment. Available: https://www.standardsforhighways.co.uk/dmrb/search/a0c03b39-4b3c-4204-a5ae-c54901c0190a Accessed: September 2022.

IEMA, IHBC, CIfA (2021) Principles of Cultural Heritage Impact Assessment in the UK. Available: https://ihbconline.co.uk/toolbox/docs/Principles%20of%20Cultural%20Heritage%20Impact%20Assessment.pdf Accessed: December 2021.

Ministry of Housing, Communities & Local Government (2021) National Planning Policy Framework, section 16. Conserving and enhancing the historic environment. Available: https://www.gov.uk/government/publications/national-planning-policy-framework--2 Accessed: September 2022.

13.8.2 Land use and recreation

British Geological Survey (BGS) (2021) Geology of Britain Viewer (classic). Available: https://mapapps.bgs.ac.uk/geologyofbritain/home.html Accessed: November 2021.

Defra (2011) Construction code of practice for the sustainable use of soils on construction sites. Available: https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/716510/pb13298-code-of-practice-090910.pdf Accessed: November 2021.

Defra (2020) Agriculture in the United Kingdom 2020. Annual statistics about agriculture in the United Kingdom to 2020. July 2021. Available: https://www.gov.uk/government/statistics/agriculture-in-the-united-kingdom-2020 Accessed: November 2021.

Defra (2021) MAGIC Interactive Mapping System. Available: https://magic.defra.gov.uk/ Accessed: November 2021.

Highways England, Transport Scotland, Welsh Government and Department for Infrastructure Northern Ireland (2019) DMRB Sustainability and Environment Appraisal LA 109 Geology and Soils. Available: https://www.standardsforhighways.co.uk/prod/attachments/adca4c7d-4037-4907-b633-76eaed30b9c0?inline=true Accessed: November 2021.

Highways England, Transport Scotland, Welsh Government and Department for Infrastructure Northern Ireland (2020) DMRB Sustainability and Environment Appraisal LA 112 Population and Human Health. Available: https://www.standardsforhighways.co.uk/dmrb/search/1e13d6ac-755e-4d60-9735-f976bf64580a Accessed: November 2021.

IEMA (2022) A New Perspective on Land and Soil in Environmental Impact Assessment.

Institute of Quarrying (2021) Good Practice Guide for Handling Soils on Mineral Sites. Available: https://www.quarrying.org/soils-guidance Accessed: November 2021.

Knowsley Council (2015) Highways Information in Knowsley. Available: https://highways.knowsley.gov.uk/ Accessed: November 2021.

Lancashire County Council (2021) Public rights of way map. Available: https://www.lancashire.gov.uk/roads-parking-and-travel/public-rights-of-way/public-rights-of-way-map/ Accessed: November 2021.

Liverpool City Council (2004) Definitive Rights of Way Map – City of Liverpool. Available: https://liverpool.gov.uk/media/1357407/definitive-map-21-may-2004.pdf Accessed: November 2021.

MAFF (1988) Agricultural Land Classification of England and Wales. Revised guidelines and criteria for grading the quality of agricultural land. Available: http://publications.naturalengland.org.uk/publication/6257050620264448 Accessed: November 2021

Natural England (2018) Agricultural Land Classification map North West Region (ALC002). Available: http://publications.naturalengland.org.uk/publication/144015?category=5954148537204736 Accessed: November 2021.

Ordnance Survey (OS) (2021) mapping data. Available: https://osmaps.ordnancesurvey.co.uk/ Accessed: November 2021.

Soil Survey of England and Wales (1966) Soils of the Preston District of Lancashire Accessed: November 2021.

Soil Survey of England and Wales (1967) Soils of the South-West Lancashire Coastal Plain Accessed: November 2021.

Sustrans Interactive Mapping System Great Britain (2021) National Cycle Network Map. Available: https://www.sustrans.org.uk/national-cycle-network Accessed: November 2021.

UK Government (2000) Countryside and Rights of Way Act. Available: https://www.legislation.gov.uk/ukpga/2000/37/contents Accessed: November 2021.

Visit Sefton and West Lancashire (2021) Visitor information. Available: https://visitseftonandwestlancs.co.uk . Accessed: December 2021.

13.8.3 Traffic and transport

CrashMap (2020) UK Road Safety Map. Available: https://www.crashmap.co.uk/ Accessed: December 2021.

Department for Levelling Up, Housing and Communities and Ministry of Housing, Communities and Local Government (2014) Planning Practice Guidance: Travel Plans, Transport Assessments and Statements. Available: https://www.gov.uk/guidance/travel-plans-transport-assessments-and-statements Accessed: December 2021.

Highways England, Transport Scotland, Welsh Government and Department for Infrastructure Northern Ireland (2020) Design Manual for Roads and Bridges LA104: Environmental Assessment and Monitoring. Available: https://standardsforhighways.co.uk/dmrb/search/0f6e0b6a-d08e-4673-8691-cab564d4a60a Accessed: December 2021.

IEMA (1993) Guidelines for the Environmental Assessment of Road Traffic. 1993.

13.8.4 Noise and vibration

BS (2019) 4142:2014+A1:2019. Methods for rating and assessing industrial and commercial sound. Available: https://www.bsigroup.com/en-GB/standards/bs-4142/ Accessed: November 2021.

BS (2014) 5228-1:2009+A1:2014. Code of practice for noise and vibration control on construction and open sites – Noise. Available: https://shop.bsigroup.com/products/code-of-practice-for-noise-and-vibration-control-on-construction-and-open-sites-noise Accessed: November 2021.

BS (2014) 5228-2:2009+A1:2014. Code of practice for noise and vibration control on construction and open sites – Vibration. Available: https://shop.bsigroup.com/products/code-of-practice-for-noise-and-vibration-control-on-construction-and-open-sites-noise Accessed: November 2021.

BS (2003) 7445-1:2003. Part 1 - Description and measurement of environmental noise. Guide to quantities and procedures. Available: https://landingpage.bsigroup.com/LandingPage/Series?UPI=BS%207445 Accessed: November 2021.

BS (2003) 7445-2:1991. Part 2 - Description and measurement of environmental noise. Guide to the acquisition of data pertinent to land use. Available: https://landingpage.bsigroup.com/LandingPage/Series?UPI=BS%207445 Accessed: November 2021.

BS (2003) 7445-3:1991. Part 3 - Description and measurement of environmental noise. Guide to application of noise limits. Available: https://landingpage.bsigroup.com/LandingPage/Series?UPI=BS%207445 Accessed: November 2021.

Berglund, B. *et al*. Guidelines for Community Noise. World Health Organisation. 2000.

Department of Transport. Calculation of Road Traffic Noise. HMSO. 1988.

Highways England, Transport Scotland, Welsh Government and Department for Infrastructure Northern Ireland (2020) LA 111 – Noise and Vibration. Available: https://www.standardsforhighways.co.uk/dmrb/search/cc8cfcf7-c235-4052-8d32-d5398796b364 Accessed: November 2021.

IEMA (2014) Guidelines for Environmental Noise Impact Assessment 2014. Available: https://s3.eu-west-2.amazonaws.com/iema.net/documents/knowledge/policy/impact-assessment/2014-Noise-and-EIA-IEMA.pdf Accessed: November 2021.

International Standard Organisation (ISO) 9613-2:1996. Acoustics - Attenuation of sound during propagation outdoors - Part 2: General method of calculation. 1996.

Plovsing B. and Kragh, J. Nord2000 (2006) Comprehensive Sound Propagation Model. Part 1: Propagation in an Atmosphere without Significant Refraction, DELTA Acoustics & Vibration, Revised Report AV 1849/00, 2006.

Plovsing B. and Kragh J. Nord2000 (2006) Comprehensive Sound Propagation Model. Part 2: Propagation in an Atmosphere with Refraction, DELTA Acoustics & Vibration, Revised Report AV 1851/00.

13.8.5 Air quality

Air Pollution Information System (APIS) for Site Relevant Critical Loads and Source Attribution. Available: http://www.apis.ac.uk/srcl Accessed: November 2021.

Defra (2018a) Local Air Quality Management Technical Guidance (TG16). Available: https://laqm.defra.gov.uk/documents/LAQM-TG16-February-18-v1.pdf Accessed: November 2021.

Defra (2018b) Background mapping data for local authorities, 2018-based background maps for years 2018 to 2030. Available: https://uk-air.defra.gov.uk/data/laqm-background-maps?year=2018. Accessed: November 2021.

Defra (2021) Interactive Air Quality Management Area boundaries map based on information reported by local authorities for 2021. Available: https://uk-air.defra.gov.uk/aqma/maps/. Accessed: November 2021.

EPUK and IAQM (2017) Guidance on land-use planning and development control: Planning for air quality. Available: http://www.iaqm.co.uk/text/guidance/air-quality-planning-guidance.pdf Accessed: November 2021.

Highways England, Transport Scotland, Welsh Government and Department for Infrastructure Northern Ireland (2019) LA 105 – Air Quality. Available: https://www.standardsforhighways.co.uk/dmrb/search/10191621-07df-44a3-892e-c1d5c7a28d90 Accessed: November 2021.

IAQM (2014) Guidance on the assessment of dust from demolition and construction. 2014. Available: https://iaqm.co.uk/text/guidance/construction-dust-2014.pdf Accessed: November 2021.

13.9 Offshore and onshore combined topics

13.9.1 Seascape, landscape and visual resources

Landscape Institute and the Institute of Environmental Management and Assessment (2013) Guidelines for Landscape and Visual Impact Assessment: Third Edition. April 2013. Available: https://www.landscapeinstitute.org/technical/glvia3-panel/ Accessed: December 2021.

13.9.2 Climate Change

Climate Change Committee (2021) 2021 Progress Report to Parliament - The CCC's annual assessment of UK progress in reducing emissions and biennial assessment of progress in adapting to climate change. Available: https://www.theccc.org.uk/publication/2021-progress-report-to-parliament Accessed: December 2021.

Department for Business, Energy and Industrial Strategy (2021) Conversation Factors 2021. https://www.gov.uk/government/publications/greenhouse-gas-reporting-conversion-factors-2021. Accessed January 2021.

HM Government (2021) Digest of UK Energy Statistics (DUKES). Available: https://www.gov.uk/government/collections/digest-of-uk-energy-statistics-dukes Accessed: December 2021.

Institute of Environmental Management and Assessment (IEMA) (2017) Environmental Impact Assessment Guide to Assessing Greenhouse Gas Emissions and Evaluating their Significance. Available: assessing-greenhouse-gas-emissions-and-evaluating-their-significance (iema.net). Accessed: December 2021.

Institute of Environmental Management and Assessment (IEMA) (2020) Environmental Impact Assessment Guide to Climate Change Resilience & Adaptation (iema.net). Accessed: December 2021.

IPCC (2021) Climate Change 2021: The Physical Science Basis. Contribution of Working Group I to the Sixth Assessment Report of the Intergovernmental Panel on Climate Change [Masson-Delmotte, V., P. Zhai, A. Pirani, S.L. Connors, C. Péan, S. Berger, N. Caud, Y. Chen, L. Goldfarb, M.I. Gomis, M. Huang, K. Leitzell, E. Lonnoy, J.B.R. Matthews, T.K. Maycock, T. Waterfield, O. Yelekçi, R. Yu, and B. Zhou (eds.)]. Cambridge University Press. In Press.

Met Office, Lowe, J.A., Bernie, D., Bett, P., Bricheno, L., Brown, S., Calvert, D., Clark, R., Eagle, K., Edwards, T., Fosser, G. and Fung, F. (2018) UKCP18 science overview report. Met Office Hadley Centre: Exeter, UK.

National Grid ESO (2021) Future Energy Scenarios 2021.Available: https://www.nationalgrideso.com/future-energy/future-energy-scenarios/fes-2021. Accessed: December 2021.

13.9.3 Socio-economics and community

British Wind Energy Association (BWEA) (2009) UK Offshore Wind: Charting the Right Course: Building the Offshore Wind Supply Chain.

BVG Associates, Catapult Offshore Renewable Energy, The Crow Estate (TCE) (2012) A Guide to an Offshore Wind Farm. Available: https://guidetoanoffshorewindfarm.com/ Accessed: December 2021.

BVG Associates, RenewableUK (2011) Offshore Wind: Forecasts of future costs and benefits. Available: https://bvgassociates.com/cases/offshore-wind-forecasts-future-costs-benefits/ Accessed: December 2021.

Depart of Energy & Climate Change (2011) Overarching National Policy Statement for Energy (EN-1). Available: https://www.gov.uk/government/publications/national-policy-statements-for-energy-infrastructure Accessed: December 2021.

Glasson, J; Durning B; Olorundami, T; and Welch, K (2020) Guidance on assessing the socio-economic impacts of offshore wind farms (OWFs).

International Renewable ENery Agency (IRENA) (2022) Renewable Power Energy Costs in 2021. Available https://irena.org/-/media/Files/IRENA/Agency/Publication/2022/Jul/IRENA_Renewable_Power_Generation_Costs_2021.pdf. Accessed September 2021.

Marine Energy Wales (2019) State of the Sector: Economics for Wales. Available: https://www.marineenergywales.co.uk/about/state-of-the-sector-2019/ Accessed: December 2021.

NHS Digital. NHS Digital Data. Available: https://digital.nhs.uk/data Accessed: December 2021.

Office for National Statistics (2011) 2011 Census Data. Available: https://www.ons.gov.uk/census/2011census Accessed: December 2021.

Office for National Statistics (2012) Annual population survey (APS) QMI. Available: https://www.ons.gov.uk/employmentandlabourmarket/peopleinwork/employmentandemployeetypes/methodologies/annualpopulationsurveyapsqmi Accessed: December 2021.

Office for National Statistics (2017) Regional economic activity by gross value added (balanced), UK:1998 to 2017. Available: https://www.ons.gov.uk/economy/grossvalueaddedgva/bulletins/regionalgrossvalueaddedbalanceduk/1998to2017 Accessed: December 2021.

Office for National Statistics (2020) Employees in the UK Statistical bulletins. Available: https://www.ons.gov.uk/employmentandlabourmarket/peopleinwork/employmentandemployeetypes/bulletins/businessregisterandemploymentsurveybresprovisionalresults/previousReleases Accessed: December 2021.

Office for National Statistics (2020) Population estimates for the UK, England and Wales, Scotland and Norther Ireland: mid-2020. Available: https://www.ons.gov.uk/peoplepopulationandcommunity/populationandmigration/populationestimates/bulletins/annualmidyearpopulationestimates/mid2020 Accessed: December 2021.

Office for National Statistics (2021) Employee earnings in the UK Statistical bulletins. Available: https://www.ons.gov.uk/employmentandlabourmarket/peopleinwork/earningsandworkinghours/bulletins/annualsurveyofhoursandearnings/previousReleases Accessed: December 2021.

Office for National Statistics (2021) House price statistics for small areas in England and Wales Statistical bulletins. Available: https://www.ons.gov.uk/peoplepopulationandcommunity/housing/bulletins/housepricestatisticsforsmallareas/previousReleases Accessed: December 2021.

Office for National Statistics (2021) Labour market in the regions of the UK: December 2021. Available: https://www.ons.gov.uk/employmentandlabourmarket/peopleinwork/employmentandemployeetypes/bulletins/regionallabourmarket/december2021 Accessed: December 2021.

Offshore Wind Industry Council (2021) Offshore Wind Skills Intelligence Model Report. Summary. Available: https://www.nsar.co.uk/wp-content/uploads/2021/03/OWIC-Offshore-Wind-Skills-Intelligence-report-2021-26.pdfAccessed: September 2021.

The Crown Estate (2008) Socio-economic indicators of marine-related activities in the UK economy.

The Crown Estate (2019) Guide to Offshore Wind Farm. Published on behalf of The Crown Estate and the offshore Energy Catapult. Available: https://www.thecrownestate.co.uk/media/2861/guide-to-offshore-wind-farm-2019.pdf. Accessed: September 2022.

UK Government. Find and compare schools in England. Available: https://www.gov.uk/school-performance-tables?_ga=2.29580476.2051004004.1642412336-685822578.1642412336 December 2021.

UK Marine Energy Council. Available: http://www.marineenergycouncil.co.uk/ Accessed: December 2021.

Visit Britain (2021) Visit Britain Official statistics. Available: https://www.visitbritain.org/official-statistics Accessed: December 2021.

13.9.4 Aviation and radar

Civil Aviation Authority (CAA) (2019) CAP 670: Air Traffic Services Safety Requirements Third Issue Amendment 1/2019. Available: http://publicapps.caa.co.uk/docs/33/CAP670%20Issue3%20Am%201%202019(p).pdf [Accessed 08/03/2022]

Civil Aviation Authority (CAA) (2022) CAP 168: Licensing of Aerodromes. Available: https://publicapps.caa.co.uk/docs/33/CAP%20168%20Licensing%20of%20Aerodromes%20v12.pdf [Accessed 08/03/2022]

Civil Aviation Authority (CAA) (2021) CAP 393: The Air Navigation Order 2016. Available: https://publicapps.caa.co.uk/docs/33/Air%20Navigation%20Order%202016%20Sept%202021.pdf [Accessed 08/03/2022]

Marine and Coastguard Agency (MCA) (2021a) MGN 654 (M+F): Offshore Renewable Energy Installations (OREIs) - Guidance on UK Navigational Practice, Safety and Emergency Response. Available: https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/980898/MGN_654_-_FINAL.pdf [Accessed 08/03/2022]

Marine and Coastguard Agency (MCA) (2021b) Offshore Renewable Energy Installations: Requirements, guidance and operational considerations for SAR and Emergency Response. Available: https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/1034158/OREI_SAR_Requirements_v3.pdf [Accessed 08/03/2022]

The Bristow Group (2021) United Kingdom Locations for SAR bases. Available: https://www.bristowgroup.com/locations/bristow-locations/country/united-kingdom [Accessed 08/03/2022]

13.10 Other Environmental Topics

CL:AIRE (2011) Definition of Waste: Development Industry Code of Practice. Available: https://www.claire.co.uk/ Accessed: December 2021.

Department of Energy and Climate Change (2012) Power Lines: Demonstrating compliance with EMF public exposure guidelines. A voluntary Code of Practice. London, Department of Energy and Climate Change. Available: https://www.gov.uk/government/publications/demonstrating-compliance-with-emf-public-exposure-guidelines-voluntary-code-of-practice. Accessed: December 2021.

Defra (2013) Waste management plan for England 2013. Available: https://www.gov.uk/government/publications/waste-management-plan-for-england Accessed: December 2021.

Defra (2018) Resources and waste strategy for England. Available: https://www.gov.uk/government/publications/resources-and-waste-strategy-for-england Accessed: December 2021.

Defra (2018) Waste duty of care: code of practice. Available: https://www.gov.uk/government/publications/waste-duty-of-care-code-of-practice/waste-duty-of-care-code-of-practice Accessed: December 2021.

European Union (1993) Waste Framework Directive (1993/31/EC). Available: https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=celex%3A31999L0031 Accessed: December 2021.

ICNIRP (1988) Guidelines for Limiting Exposure to Electromagnetic Fields produced by the International Commission on Non-ionising Radiation Protection. Available: https://www.icnirp.org/cms/upload/publications/ICNIRPemfgdl.pdf Accessed: December 2021.

International Commission on Non-ionising Radiation Protection (ICNIRP) (2020) 2020 Guidelines for Limiting Exposure to Electromagnetic Fields (100 kHz to 300 GHz). Available: https://www.icnirp.org/en/publications/index.html Accessed: December 2021.

UK Government (1990) Environmental Protection Act 1990. Available: https://www.legislation.gov.uk/ukpga/1990/43/contents Accessed: December 2021.

UK Government (1995) Environment Act 1995. Available: https://www.legislation.gov.uk/ukpga/1995/25/contents Accessed: December 2021.

UK Government (2005) The Hazardous Waste (England and Wales) Regulations 2005. Available: https://www.legislation.gov.uk/uksi/2005/894/contents/made Accessed: December 2021.

UK Government (2006) The Waste Management (England and Wales Regulations 2006. Available: https://www.legislation.gov.uk/uksi/2006/937/made Accessed: December 2021.

UK Government (2011) The Waste (England and Wales) Regulations 2011. Available: https://www.legislation.gov.uk/uksi/2011/988/contents/made Accessed: December 2021.

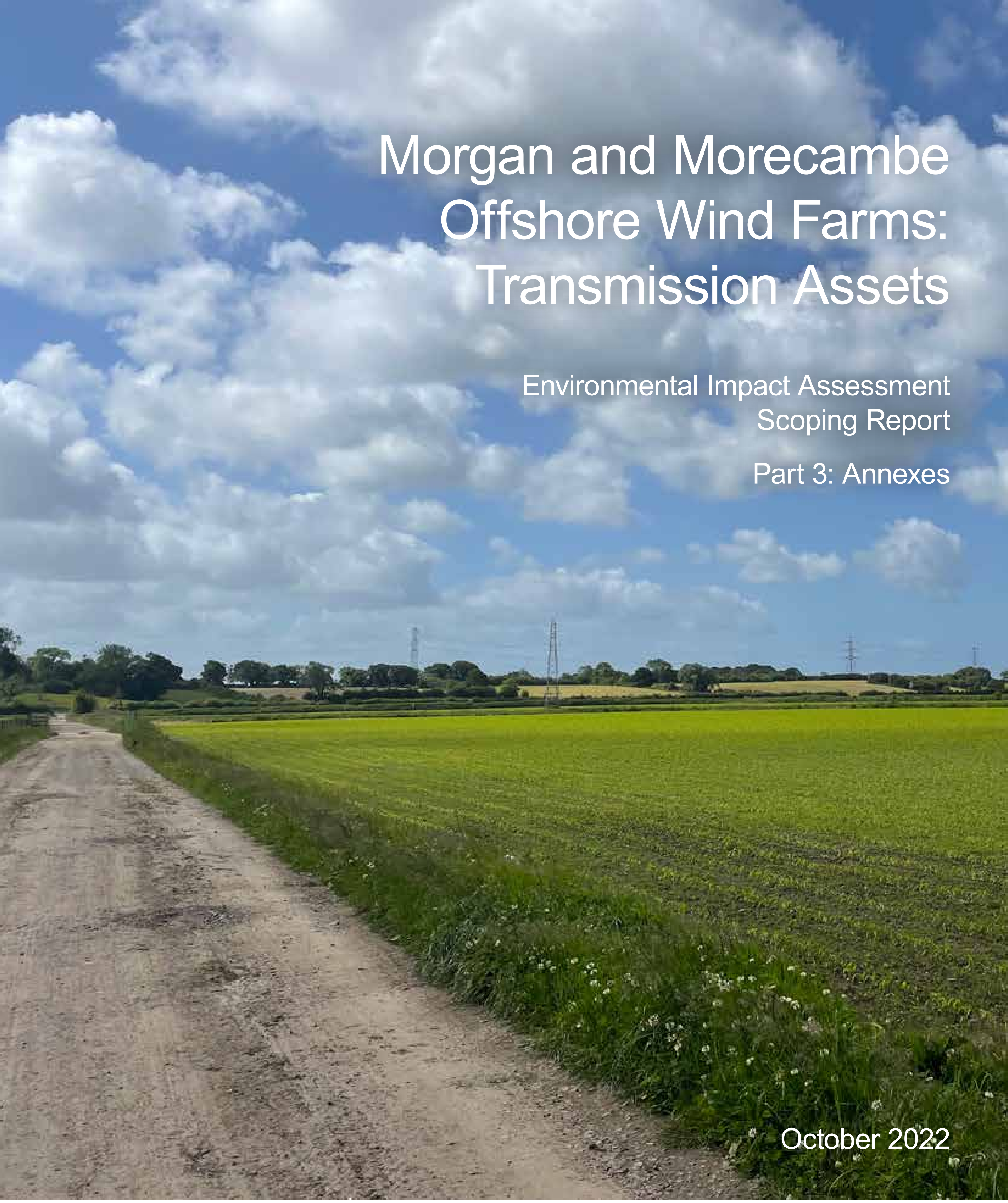
UK Government (2016) The Environmental Permitting (England and Wales) Regulations 2016. Available: https://www.legislation.gov.uk/uksi/2016/1154/contents/made Accessed: December 2021.

13.11 Transmission assets summary

RenewableUK (2013) Cumulative Impact Assessment Guidelines - Guiding Principles for Cumulative Impact Assessment in Offshore Wind Farms.

The Planning Inspectorate (2019) Advice Note Seventeen: Cumulative Effects Assessment.

The Planning Inspectorate (2020) Advice Note Twelve: Transboundary Impacts and Process.



Morgan and Morecambe Offshore Wind Farms: Transmission Assets

Environmental Impact Assessment Scoping Report

Part 3: Annexes

October 2022

Partners in UK offshore wind

Morgan and Morecambe Offshore Wind Farms: Transmission Assets

EIA Scoping Report

Part 3: Annexes

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Glossary

Term	Meaning
Applicants	Morgan Offshore Wind Limited (Morgan OWL) and Morecambe Offshore Windfarm Limited (Morecambe OWL)
Crown Dependency	The Crown Dependencies are not part of the UK but are self-governing dependencies of the Crown. This means they have their own directly elected legislative assemblies, administrative, fiscal and legal systems and their own courts of law.
European Economic Area	The European Economic Area was established via the Agreement on the European Economic Area, an international agreement which enables the extension of the European Union's single market to member states of the European Free Trade Association.
Exclusive Economic Zone	An Exclusive Economic Zone (EEZ) is an area of the sea under the territorial ownership of a single country. This area is guaranteed by UN Convention on the Law of the Sea (UNCLOS).
Generation assets	The generation assets associated with the Morgan Offshore Wind Project and the Morecambe Offshore Windfarm include the offshore wind turbines, together with other electrical infrastructure that contributes to electricity production, including inter-array cables, offshore substation platforms[1] and possible interconnector cables to connect offshore substations.
Landfall	The area in which the offshore export cables make landfall (come on shore) and the transitional area between the offshore cabling and the onshore cabling.
Morgan and Morecambe Offshore Wind Farms: Transmission Assets	The transmission assets for the Morgan Offshore Wind Project and the Morecambe Offshore Windfarm. This includes the offshore substation platforms[1], interconnector cables, Morgan offshore booster station, offshore export cables, landfall site, onshore export cables, onshore substations, 400kV cables and associated grid connection infrastructure such as circuit breaker compounds. Also referred to in this report as the Transmission Assets, for ease of reading.
Morecambe OWL	Morecambe Offshore Windfarm Limited is a joint venture between Cobra Instalaciones y Servicios, S.A. (Cobra) and Flotation Energy Ltd.
Morgan OWL	Morgan Offshore Wind Limited is a joint venture between bp and Energie Baden-Württemberg AG (EnBW).
Offshore booster station	A fixed structure located along the offshore export cables, containing electrical equipment to ensure bulk wind farm capacity can be fully transmitted to the onshore substations.
Offshore export cables	The cables which would bring electricity from the offshore substation platforms to the landfall.
Offshore substation platform(s) (OSPs)	Fixed structures located within the wind farm sites, containing electrical equipment to aggregate the power from the wind turbine generators and convert it into a more suitable form for export to shore[1].
Onshore export cables	The cables which would bring electricity from landfall to the onshore substations.
Scour protection	Protective materials to avoid sediment being eroded away from the base of the foundations due to the flow of water.
Substation	Part of an electrical transmission and distribution system. Substations transform voltage from high to low, or the reverse by means of electrical transformers.
Transboundary impact	Impacts that may arise from an activity within one state that affect the environment or other interests of another state.
Transmission Assets	See Morgan and Morecambe Offshore Wind Farms: Transmission Assets (above)
Transmission Assets Scoping Boundary	The Scoping Boundary within which all elements of the Transmission Assets will be located and used to inform this EIA Scoping Report. This area will be refined through future site selection work, with details presented in the PEIR and ES.

1 It is possible that all or part of the offshore substation platforms will be classed as generation assets as the Transmission Assets are refined in the future, but for the purpose of this EIA Scoping Report a precautionary approach has been taken and all infrastructure that may form part of the Transmission Assets has been included. A similar precautionary approach has been taken in scoping the generation assets.

Acronyms

Acronym	Meaning
dML	Deemed Marine Licence
EA	Environmental Agency
EEZ	Exclusive Economic Zone
EIA	Environmental Impact Assessment
EQR	Ecological Quality Ratio
ES	Environmental Statement
EU	European Union
GHG	Green House Gas
HDD	Horizontal Directional Drilling
HRA	Habitats Regulations Assessment
MCAA	Marine and Coastal Access Act 2009
MCZ	Marine Conservation Zone
MHWS	Mean High Water Springs
MLWS	Mean Low Water Springs
MMO	Marine Management Organisation
NSIP	Nationally Significant Infrastructure Project
PEIR	Preliminary Environmental Information Report
PSR	Primary Surveillance Radar
RBMP	River Basin Management Plan
rMCZ	Recommended MCZs
SAC	Special Area of Conservation
SNCB	Statutory Nature Conservation Bodies
SPA	Special Protection Area
SSC	Suspended Sediment Concentration
SSSI	Site of Special Scientific Interest
TRaC	Transitional and Coastal
UNECE	United Nations Economic Commission for Europe
UXO	Unexploded Ordnance
WFD	Water Framework Directive

Units

Unit	Description
GW	Gigawatt
kV	Kilovolt
km	Kilometres
km^2	Kilometres squared
m	Metre
MW	Megawatt
nm	Nautical Mile

1 Annex A - Transboundary Impacts Screening

1.1 Introduction

1.1.1 Background

1.1.1.1 Morgan Offshore Wind Limited (Morgan OWL), a joint venture between bp and Energie Baden-Württemberg AG (EnBW), is developing the Morgan Offshore Wind Project, located in the east Irish Sea. The Morgan Offshore Wind Project is located 22.3km (12 nautical miles (nm)) from the Isle of Man and 36.3km (19.6nm) from the northwest coast of England (when measured from Mean High Water Springs (MHWS)). The anticipated nominal capacity of the Morgan Offshore Wind Project is 1500 Megawatts (MW).

1.1.1.2 Morecambe Offshore Windfarm Limited (Morecambe OWL), a joint venture between Cobra Instalaciones y Servicios, S.A. (Cobra) and Flotation Energy Ltd., is developing the Morecambe Offshore Windfarm. The Morecambe Offshore Windfarm is also located in the east Irish Sea approximately 28.75km (15.5nm) from the northwest coast of England (when measured from MHWS). The anticipated nominal capacity of the Morecambe Offshore Windfarm is 480MW.

1.1.1.3 Both the Morgan Offshore Wind Project and the Morecambe Offshore Windfarm have been scoped into the Pathways to 2030 workstream under the Offshore Transmission Network Review (OTNR). Under the OTNR, the National Grid Electricity System Operator is responsible for conducting a Holistic Network Design Review to assess options to improve the coordination of offshore wind generation connections and transmission networks. In July 2022, the UK Government published the Pathway to 2030 Holistic Network Design documents, which set out the approach to connecting 50GW of offshore wind to the UK electricity network (National Grid ESO, 2022). The output of this process concluded that the Morgan Offshore Wind Project and the Morecambe Offshore Windfarm should work collaboratively in connecting the wind farms to the National Grid at Penwortham, Lancashire. As described in part 1, section 3 of this EIA Scoping Report, the developers were involved in this process and agree with this output.

1.1.1.4 The design philosophy for the Transmission Assets is for the Morgan Offshore Wind Project and Morecambe Offshore Windfarm to be electrically independent. Therefore, each wind farm project will have its own set of transmission assets (i.e., cable and substation infrastructure). The location of the cable infrastructure will be co-ordinated within shared offshore and onshore export cable corridors to onshore substations, thereafter connecting to the National Grid electricity transmission network at Penwortham.

1.1.1.5 This Environmental Impact Assessment (EIA) Scoping Report supports the Applicants' request for a Scoping Opinion from the Secretary of State for this grid connection, known as the Morgan and Morecambe Offshore Wind Farms: Transmission Assets. In this report, for ease of reading, the term Transmission Assets is used.

1.1.1.6 Transboundary impacts are those that may arise from an activity within one state and affect the environment or other interests of another state. This transboundary screening annex of the EIA Scoping Report sets out the potential for such impacts to occur on the environment or interests of other states, and the potential to for such impacts to result in significant effects. This screening assessment is based on what is currently known of the likely spatial scale of impacts (drawing on information presented in part 2 of the EIA Scoping Report) and the interests of other states in the vicinity.

1.1.1.7 This annex is intended to provide information to the Planning Inspectorate such that the Secretary of State can evaluate the likelihood of such impacts and effects occurring and the need, if any, for transboundary consultation with other states during the pre-application period. The screening of transboundary impacts will be revisited during the EIA process for the Transmission Assets once the preliminary assessments are completed. This will ensure that any significant transboundary effects are fully considered within the Environmental Statement (ES) submitted alongside the application for development consent.

1.2 Legislative context

1.2.1.1 The need to consider transboundary impacts (and the resulting effects) has been embodied by The United Nations Economic Commission for Europe (UNECE) Convention on Environmental Impact Assessment in a Transboundary Context, adopted in 1991 in the Finnish city of Espoo and commonly referred to as the ‘Espoo Convention’. The Convention requires that assessments are extended across borders between Parties to the Convention when a planned activity may cause significant adverse transboundary effects.

1.2.1.2 The Espoo Convention has been ratified by the United Kingdom (on behalf of the United Kingdom of Great Britain and Northern Ireland, the Bailiwick of Jersey, the Bailiwick of Guernsey, the Isle of Man and Gibraltar) and the European Union (EU). It is aimed at preventing, mitigating and monitoring environmental damage by ensuring that explicit consideration is given to transboundary environmental factors before a final decision is made as to whether to approve a project. The Espoo Convention requires that the Party of origin notifies affected Parties about activities listed in Appendix I of the Convention and likely to cause a significant adverse transboundary effect.

1.2.1.3 The Isle of Man is a Crown Dependency of the UK and is not therefore considered to be a transboundary consultee for the Transmission Assets. As such, potential impacts upon environmental receptors within the Isle of Man, which will be fully addressed in the EIA process and reported in the ES, are not considered to be transboundary.

1.2.1.4 The Espoo Convention was implemented by EU Directive 2011/92/EU, as amended by Directive 2014/52/EU, on the assessment of the effects of certain public and private projects on the environment (the EIA Directive). Following the UK’s departure from the EU, the United Kingdom (UK) has no direct obligations under the EIA Directive, however, the requirements established under the EIA Directive (as transposed into UK law) continue to apply.

1.2.1.5 The EIA Directive is transposed into UK law by the Infrastructure Planning (Environmental Impact Assessment) Regulations 2017 (as amended) for Nationally Significant Infrastructure Projects (NSIPs) (the 2017 EIA Regulations). Regulation 32 of the 2017 EIA Regulations sets out a prescribed process of consultation and notification in relation to transboundary effects. In addition, The Planning Inspectorate's Advice Note Twelve: Transboundary Impacts (The Planning Inspectorate, 2020) sets out the procedures for consultation in association with an application for development consent where a project may have significant transboundary effects.

1.2.1.6 The Advice Note sets out the roles of the Planning Inspectorate, other states and developers. Applicants have no formal role under the Regulation 32 process, as the duties prescribed by Regulation 32 in notifying and consulting with other states on potential transboundary impacts are the responsibility of the Secretary of State. However, developers are advised to:

- Consider, when preparing documents for consultation and application, that The Planning Inspectorate may notify the relevant state of their particular project.
- Carry out preparatory work to complete a transboundary screening matrix to assist the Secretary of State in determining the potential for likely significant effects on the environment in other states.
- Submit the transboundary screening matrix along with the scoping request, if a scoping opinion is sought by the developer.

1.2.1.7 This transboundary screening annex is provided in response to this advice. It provides information about the Transmission Assets, which will be the subject of the application for development consent. It also sets out information relating to the potential effects of the Transmission Assets and the interests of the other states in the vicinity, to assist the Planning Inspectorate in forming a view on the likelihood of significant transboundary effects arising from the Transmission Assets. The information contained within the Annex to Advice Note Twelve, which sets out the criteria and relevant considerations that will be taken into account by the Planning Inspectorate during screening, have also been used in the preparation of this transboundary screening annex.

1.3 Consultation

1.3.1.1 The Applicants will conduct pre-application consultation for the Transmission Assets in accordance with the Planning Act 2008 plus associated guidance and regulations, including the 2017 EIA Regulations. If there are potential transboundary impacts, the Applicants will consider how best to consult with the relevant states.

1.4 Screening of transboundary impacts and effects

1.4.1 Introduction

1.4.1.1 A series of screening matrices for potential transboundary impacts associated with the Transmission Assets are presented for the offshore physical and biological environment (Table 1.2), offshore human environment (Table 1.3), onshore environment (Table 1.4) and offshore and onshore combined topics (Table 1.5). These screening matrices have been based upon an initial understanding of the potential impacts arising from the Transmission Assets (on the basis of the project description presented in part 1, section 4: Project description, of the EIA Scoping Report) gathered during the EIA Scoping process and follow the suggested format set out by The Planning Inspectorate (2020).

1.4.1.2 The screening matrices consider all potential transboundary impacts that may occur from all phases of the Transmission Assets (i.e., construction, operation and maintenance, and decommissioning phases). The matrices also address the predicted spatial and temporal scale of potential transboundary impacts for those interests that are proposed to be screened into the assessment within the ES.

1.4.1.3 Potential impacts upon European designated sites within other states are considered separately within the screening process for the Habitats Regulations Assessment (HRA).

1.4.1.4 The distance of the Transmission Assets from the jurisdictional boundary of the nearest other state is presented in Table 1.1.

Table 1.1: Summary of approximate distance to the nearest applicable states.

State	Distance from the Transmission Assets Scoping Boundary to nearest border (km)
Ireland	77.3

1.4.2 Offshore transboundary impacts and effects

Physical and biological environment

1.4.2.1 A transboundary screening matrix has been completed for offshore transboundary impacts for the offshore physical and biological environment and is presented in Table 1.2. The conclusions of the transboundary screening for each offshore physical and biological environment topic are presented in the following sections, together with additional justification.

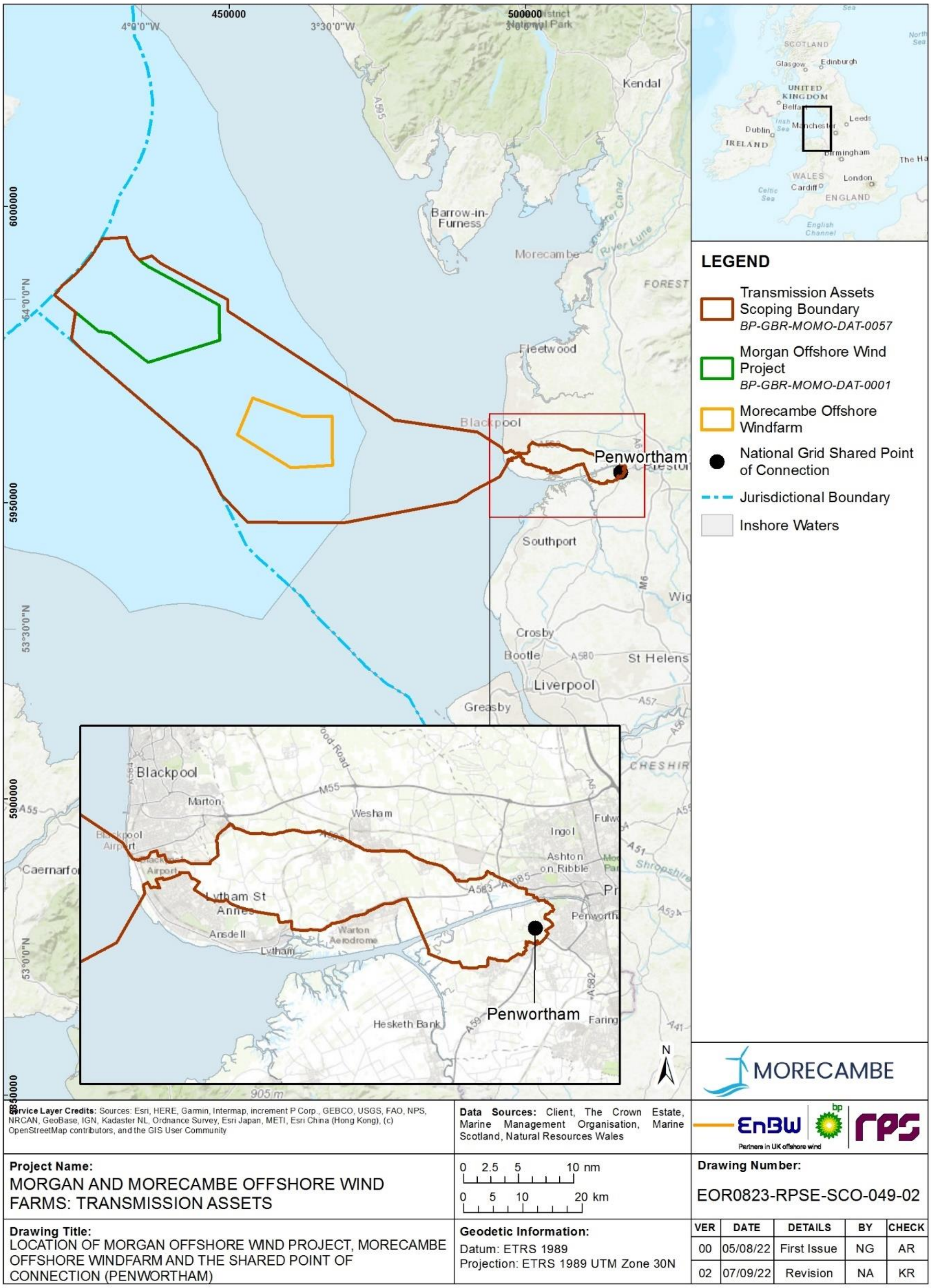


Figure 1.1: Location of the proposed Transmission Assets and relevant jurisdictional boundaries for the purposes of transboundary impacts.

Physical processes

1.4.2.2 The offshore components of the Transmission Assets and the Transmission Assets physical processes study area (one tidal excursion around the Transmission Assets Scoping Boundary) are located within UK and Isle of Man territorial waters. Any impacts on physical processes (i.e., potential changes to the wave regime, tidal regime and sediment transport due to the presence of infrastructure, and potential changes in suspended sediment concentrations due to construction and maintenance activities) are likely to be confined to within one tidal excursion of the offshore elements of the Transmission Assets. One tidal excursion is based on the tidal excursion ellipses, which create a tidal excursion (and therefore study area) which extends between 9.1km (to the southwest) and 2.9km (to the south) from the Transmission Assets Scoping Boundary. Therefore, no transboundary impacts upon physical processes are anticipated and no significant effects would arise. Therefore, it is proposed that transboundary impacts and effects upon physical processes are screened out of the EIA process.

Benthic subtidal and intertidal ecology

1.4.2.3 It is considered that there is no pathway by which direct or indirect impacts arising from the Transmission Assets could result in impacts on the benthic subtidal or intertidal ecology of another state. The extent of any predicted impacts upon benthic subtidal and intertidal ecological receptors is likely to be limited to the footprint of the offshore elements of the Transmission Assets (for temporary and long-term habitat loss and colonisation or removal of hard substrates) and within one spring tidal excursion of the Transmission Assets (for changes in suspended sediment concentrations and associated deposition and changes in physical processes). Therefore, potential transboundary impacts upon benthic subtidal and intertidal ecology are not anticipated and no significant effects would arise. Therefore, it is proposed that transboundary impacts and effects on benthic subtidal and intertidal ecology are screened out of the EIA process.

Fish and shellfish ecology

1.4.2.4 There is some potential for transboundary impacts on fish and shellfish ecology due to construction, operation and maintenance and decommissioning of the offshore elements of the Transmission Assets.

1.4.2.5 These include direct impacts due to underwater noise from piling operations and indirect impacts caused by loss of fish and shellfish habitat or disturbance to habitat due to increased suspended sediment concentrations (SSCs) and associated sediment deposition from the installation and decommissioning of foundations and cables.

1.4.2.6 These activities have the potential to directly affect Annex II migratory fish species that are listed as features of European sites in other states, or species that are of commercial importance for fishing fleets of other states. Indirect impacts could include loss of or disturbance to fish spawning and nursery habitats in the Irish Sea that are important for migratory fish species either designated as Annex II species or of commercial importance to other states. The fish and shellfish receptors likely to be present within the Transmission Assets fish and shellfish study area are outlined in part 2, section 4.2: Fish and shellfish ecology, of the EIA Scoping Report and include a number of commercially important species as well as diadromous species likely to be found in the area. Part 2, section 4.2: Fish and shellfish ecology, of the EIA Scoping Report also identifies the spawning and nursery grounds located within and around the Transmission Assets Scoping Boundary.

1.4.2.7 The probability of impacts occurring during construction is potentially high, particularly as a result of underwater noise from piling associated with construction of the offshore substation platforms (OSPs) and the Morgan offshore booster station, although the extent cannot be determined at this stage and will be considered during the EIA process. The majority of impacts during construction are, however, considered likely to result in short term and temporary effects. The operation and maintenance phase is considered less likely to result in significant effects than construction, due to impacts being highly limited spatially (i.e. within the boundaries of the Transmission Assets fish and shellfish ecology study area), although the resulting effects arising from long term habitat loss are, by nature, longer term effects which may be reversible depending on the decommissioning strategy.

1.4.2.8 Therefore, it is proposed that transboundary impacts on fish and shellfish ecology and their nature conservation interests are screened into the EIA process. Potential impacts (and resulting effects) upon fish that are a qualifying feature of European sites or the National Site Network and that occur within the Transmission Assets fish and shellfish ecology study area will be considered within the information to support the appropriate assessment (ISAA) where there is a clear impact/receptor pathway on these sites and features.

Marine mammals

1.4.2.9 There is potential for transboundary impacts upon marine mammals due to the mobile nature of marine mammal species and the proximity of the offshore elements of the Transmission Assets to the border of Ireland. The marine mammal species likely to be present in the Transmission Assets marine mammal study area are outlined in part 2, section 4.3: Marine mammals, of the EIA Scoping Report, and include, but are not limited to, harbour porpoise, bottlenose dolphin and grey seal.

1.4.2.10 Direct impacts may occur due to underwater noise generated during construction and decommissioning, including noise associated with construction activities and vessel activities. Pile driving during the installation of the OSPs and Morgan offshore booster station foundations and any pre-construction clearance of unexploded ordnance (UXO) may give rise to elevated underwater noise. Indirect impacts on marine mammal receptors from changes in prey availability could occur as a result of e.g., habitat loss, underwater noise, increased SSCs and associated sediment deposition and other impacts scoped in for fish and shellfish receptors. The operation and maintenance phase is considered less likely to result in impacts.

1.4.2.11 The probability of impacts to marine mammals occurring during construction is potentially high, particularly as a result of underwater noise from piling associated with construction of the OSPs and the Morgan offshore booster station and any UXO clearance, although the extent cannot be determined at this stage and will be subject to the EIA. The majority of impacts and resulting effects during construction are, however, considered likely to be short term and temporary.

1.4.2.12 Overall, it is proposed that transboundary impacts and effects upon marine mammals and their nature conservation interests are screened into the EIA process. Potential impacts effects upon marine mammals that are a qualifying feature of European sites or the National Site Network and that occur within the Transmission Assets regional marine mammal study area will be considered within the ISAA where there is a clear impact/receptor pathway on these sites and features.

Offshore ornithology

1.4.2.13 There is potential for transboundary impacts upon offshore ornithological receptors due to the wide foraging and migratory ranges of typical bird species in the Irish Sea. In addition, a number of bird species that have been recorded in the vicinity of the Transmission Assets include those that are listed as qualifying features of European sites in other states. The bird species likely to be present in the Transmission Assets Scoping Boundary are outlined in part 2, section 4.4: Offshore ornithology, of the EIA Scoping Report and include true pelagic seabirds (e.g., kittiwake, guillemot and gannet), other species that spend part of their annual life cycle at sea (e.g., divers and gulls) as well as non-seabird migrants (e.g., wildfowl, waders and passerines).

1.4.2.14 Direct impacts to offshore ornithological receptors may occur due to temporary habitat loss/disturbance across all phases of the offshore elements of the Transmission Assets. Indirect impacts may cause disturbance to prey (fish) species from important bird feeding areas or changes to prey availability due to changes to physical processes and habitat as a result of the presence of operational infrastructure.

1.4.2.15 It is likely that there will be impacts to offshore ornithological receptors occurring during the operation and maintenance phase. This would arise from disturbance and displacement due to the presence of OSPs and the Morgan offshore booster station, and activities associated with major maintenance works, such as increased vessel activity associated with the offshore elements of the Transmission Assets (see part 2, section 4.4: Offshore ornithology, of this EIA Scoping Report). The magnitude of these impacts is not known at this stage and will be subject to assessment in the EIA process. Unlike the majority of impacts during construction, which are considered likely to be short term and temporary, impacts during the operation and maintenance phase (presence of OSPs and the Morgan offshore booster station) are likely to be long term, continuous and of varying spatial extent depending on the species, although it is likely that they will be reversible following the decommissioning of the offshore elements of the Transmission Assets. Collision risk is not a potential impact and has been scoped out of the EIA process for transboundary impacts.

1.4.2.16 Therefore, it is proposed that transboundary impacts and their resulting effects upon birds and their nature conservation interests are screened into the EIA process. Potential impacts and effects upon birds that are a qualifying feature of European sites or the National Site Network, that are within foraging range of the Transmission Assets, will be considered within the ISAA.

Table 1.2: Offshore transboundary screening matrix for the Transmission Assets – offshore physical and biological environment.

<table>
<tr><th>Screening criteria</th><th>Physical processes</th><th>Benthic subtidal and intertidal ecology</th><th>Fish and shellfish ecology</th><th>Marine mammals</th><th>Offshore ornithology</th></tr>
<tr><td>Characteristics of the development</td><td colspan="5">For a detailed description, see part 1, section 3: Project description, of the EIA Scoping Report.
Key offshore components of the Transmission Assets include: the OSPs, interconnector cables, Morgan offshore booster station and offshore export cables.</td></tr>
<tr><td>Location of development (including existing use) and geographical area</td><td colspan="5">The Transmission Assets Scoping Boundary is 1,667.9km^2 (onshore and offshore). The offshore Transmission Assets Scoping Boundary extends from the Morgan Offshore Wind Project and the Morecambe Offshore Windfarm to the coast of Lancashire.</td></tr>
<tr><td>Environmental importance</td><td rowspan="3">No transboundary impacts are predicted (see section 1.4.2).</td><td rowspan="3">No transboundary impacts are predicted (see section 1.4.2).</td><td rowspan="3">Potential transboundary impact (see section 1.4.2).</td><td rowspan="3">Potential transboundary impact (see section1.4.2).</td><td rowspan="3">Potential transboundary impact (see section1.4.2).</td></tr>
<tr><td>Potential impacts and carrier</td></tr>
<tr><td>Extent</td></tr>
<tr><td>Magnitude</td><td colspan="5">The magnitude of the impacts (taking into consideration the spatial extent, duration, frequency and reversibility of the impact) will be subject to the assessment to be undertaken for the EIA and has, therefore, not been determined at this stage.</td></tr>
<tr><td>Probability</td><td rowspan="4">No transboundary impacts are predicted (see section 1.4.2).</td><td rowspan="4">No transboundary impacts are predicted (see section 1.4.2).</td><td rowspan="4">Potential transboundary impact (see section 1.4.2).</td><td rowspan="4">Potential transboundary impact (see section 1.4.2).</td><td rowspan="4">Potential transboundary impact (see section 1.4.2).</td></tr>
<tr><td>Duration</td></tr>
<tr><td>Frequency</td></tr>
<tr><td>Reversibility</td></tr>
<tr><td>Cumulative impacts</td><td>See part 2, section 3.1: Physical processes, of the EIA Scoping Report</td><td>See part 2, section 4.1: Benthic subtidal and intertidal ecology, of the EIA Scoping Report</td><td>See part 2, section 4.2: Fish and shellfish ecology of the EIA Scoping Report</td><td>See part 2, section 4.3: Marine mammals of the EIA Scoping Report</td><td>See part 2, section 4.4: Offshore ornithology of the EIA Scoping Report</td></tr>
<tr><td>Conclusion – potential for significant effects</td><td>No significant transboundary effects</td><td>No significant transboundary effects</td><td>Transboundary effects will be considered within the EIA process</td><td>Transboundary effects will be considered within the EIA process</td><td>Transboundary effects will be considered within the EIA process</td></tr>
</table>

Offshore human environment

1.4.2.17 A transboundary screening matrix has been completed for offshore transboundary impacts for the offshore human environment and is presented in Table 1.3. The conclusions of the transboundary screening for each offshore human environment topic are presented in the following sections, together with additional justification.

Commercial fisheries

1.4.2.18 The commercial fisheries likely to be operating in the Transmission Assets commercial fisheries study areas are outlined in part 2, section 5.1: Commercial fisheries, of the EIA Scoping Report and include fleets from other states, including Ireland and Belgium. Due to the highly mobile nature of both commercial fish species and fishing fleets, there is the potential for transboundary impacts upon commercial fisheries to arise from two sources:

- Loss or restricted access to fishing grounds affecting fleets from the Republic of Ireland and Belgium.
- Displacement of fishing activity into other areas affecting fleets from the Republic of Ireland and Belgium.

1.4.2.19 Potential exists for impacts to occur during the operation and maintenance phase as a result of the presence of the offshore infrastructure associated with the Transmission Assets (Morgan offshore booster station, OSPs and export cables). The exact extent of such impacts cannot be determined at this stage and will therefore be subject to assessment in the EIA process. Although such impacts have the result in long term effects, it is likely that following completion of construction, most fishing activity may be able to resume, depending upon the final design of the infrastructure, and that any impacts and effects would be reversible after decommissioning.

1.4.2.20 Greater probability exists for impacts to occur during the construction phase, due to the presence of temporary exclusion zones around inter-array cable installation vessels.

1.4.2.21 Therefore, it is proposed that transboundary impacts and effects upon commercial fisheries are screened into the EIA process.

Shipping and navigation

1.4.2.22 The Transmission Assets are situated in the east Irish Sea where a number of shipping routes presently operate. The shipping and navigation baseline for the Transmission Assets Scoping Boundary is outlined in part 2, section 5.2: Shipping and navigation.

1.4.2.23 There is potential for transboundary impacts upon shipping routes which transit to/from other states, including Ireland. The probability of impacts occurring during the operation and maintenance phase is likely to be high, as a result of the presence of the OSPs and the Morgan offshore booster station, and the extent of the impact will be subject to assessment during the EIA process. Although such impacts may give rise to long term effects, it is likely that they would be reversible after decommissioning, as it is anticipated that all structures above the seabed will be completely removed. The construction phase is considered less likely to result in impacts that could give rise to significant effects, although the effects associated with the presence of infrastructure on shipping and navigation will progressively increase as the construction phase progresses.

1.4.2.24 Therefore, it is proposed that transboundary impacts and effects upon shipping and navigation are screened into the EIA process.

Marine archaeology

1.4.2.25 The marine archaeology baseline for the Transmission Assets Scoping Boundary is outlined in part 2, section 5.3: Marine archaeology, of the EIA Scoping Report.

1.4.2.26 The extent of any predicted impacts upon marine archaeology receptors are likely to be limited in extent to the footprint of the Transmission Assets. As the Transmission Assets marine archaeology study area (the offshore elements of the Transmission Assets Scoping Boundary with an additional 2km buffer which allows the site-specific data to be put into a wider context) is located entirely within UK and Isle of Man territorial waters, there is considered to be no pathway for transboundary impacts.

1.4.2.27 Therefore, no potential for transboundary impacts upon marine archaeology are anticipated and no significant effects would arise. Therefore, it is proposed that transboundary impacts and effects on marine archaeology are screened out of the EIA process.

Other sea users

1.4.2.28 The other sea users baseline for the Transmission Assets other sea users study area is outlined in part 2, section 5.4: Other sea users, of the EIA Scoping Report.

1.4.2.29 Potential transboundary impacts associated with the Transmission Assets identified for other sea user receptors include displacement of recreational sailing and motor cruising activities between the UK and Ireland and potential impacts to existing cables between the UK, Ireland (ESAT2, Havingsten 1.1 and Rockabill cables) and the United States (Hibernia Atlantic Seg. A cable). The extent of any potential impacts on recreational activities is likely to be localised and short term, as individual vessels may be displaced along their routes due to construction, maintenance or decommissioning activities occurring at any one location. Potential impacts on recreational activities are also likely to be infrequent, due to the likely lower levels of offshore cruising and racing between the UK and Ireland. The extent of any potential impacts on existing cables is also likely to be localised, short term and infrequent, associated with any construction, operation and maintenance or decommissioning activities which may overlap or cross the existing cables. Any such activities would be subject to standard cable crossing agreements and cable proximity agreements as described in part 2, section 5.4: Other sea users, of the EIA Scoping Report.

1.4.2.30 Therefore, it is considered that there is no potential for significant transboundary effects upon other users receptors and it is proposed that transboundary impacts and effects upon other sea users are screened out of the EIA process.

Table 1.3: Offshore transboundary screening matrix for the Transmission Assets – offshore human environment.

Screening criteria	Commercial fisheries	Shipping and navigation	Marine archaeology	Other sea users
Characteristics of the development	For a detailed description, see part 1, section 3: Project description, of the EIA Scoping Report. Key offshore components of the Transmission Assets include: the OSPs, interconnector cables, Morgan offshore booster station and offshore export cables.			
Location of development (including existing use) and geographical area	The Transmission Assets Scoping Boundary is 1,667.9km^2 (onshore and offshore). The offshore Transmission Assets Scoping Boundary extends from the Morgan Offshore Wind Project and the Morecambe Offshore Wind Farm to the coast of Lancashire.			
Environmental importance	Potential transboundary impact (see section 1.4.2).	Potential transboundary impact (see section1.4.2).	No transboundary impacts are predicted (see section 1.4.2).	No transboundary impacts are predicted (see section 1.4.2).
Potential impacts and carrier				
Extent				
Magnitude	The magnitude of the impacts (taking into consideration the spatial extent, duration, frequency and reversibility of the impact) will be subject to the assessment to be undertaken for the EIA and has, therefore, not been determined at this stage.			
Probability	Potential transboundary impact (see section 1.4.2).	Potential transboundary impact (see section 1.4.2).	No transboundary impacts are predicted (see section 1.4.2).	No transboundary impacts are predicted (see section 1.4.2).
Duration				
Frequency				
Reversibility				
Cumulative impacts	See part 2, section 5.1: Commercial fisheries, of the EIA Scoping Report.	See part 2, section 5.2: Shipping and navigation, of the EIA Scoping Report.	See part 2, section 5.3: Marine archaeology, of the EIA Scoping Report.	See part 2, section 5.4: Other sea users, of the EIA Scoping Report.
Conclusion – potential for significant effects	Transboundary effects will be considered within the EIA process	Transboundary effects will be considered within the EIA process	No significant transboundary effects	No significant transboundary effects

1.4.3 Onshore transboundary impacts

1.4.3.1 A transboundary screening matrix has been completed for onshore transboundary impacts and is presented in Table 1.4. The conclusions of the transboundary screening for each onshore topic are presented, together with additional justification, in the following sections.

Geology and ground conditions

1.4.3.2 Any impacts on geology and ground conditions arising from the construction, operation and maintenance and decommissioning of the Transmission Assets will be confined to a localised area affected by the footprint of the onshore elements of the Transmission Assets. These impacts would occur within the Transmission Assets Scoping Boundary. There is no pathway by which direct or indirect impacts arising from the Transmission Assets could result in significant effects on the geology or ground conditions of another state. It is therefore proposed that transboundary impacts and effects on geology and ground conditions are screened out of the EIA process.

Hydrology and flood risk

1.4.3.3 Any impacts on hydrology and flood risk arising from the construction, operation and maintenance and decommissioning of the Transmission Assets will be confined to a localised area affected by the footprint of the onshore elements of the Transmission Assets. These impacts would occur within the Transmission Assets Scoping Boundary and/or its immediate surrounding area. There is no pathway by which direct or indirect impacts arising from the Transmission Assets could result in significant effects on the hydrology and flood risk of another state. It is therefore proposed that transboundary impacts and effects on hydrology and flood risk are screened out of the EIA process.

Terrestrial ecology and intertidal birds

1.4.3.4 Any impacts on terrestrial ecology and intertidal birds arising from the construction, operation and maintenance and decommissioning of the Transmission Assets will be confined to a localised area around the footprint of the onshore elements of the Transmission Assets and/or its immediate surrounding area. These impacts would occur within the Transmission Assets Scoping Boundary.

1.4.3.5 Estuarine Special Protection Areas (SPAs) and Ramsar sites in close proximity to the Transmission Assets Scoping Boundary may include a number of migratory species of bird as qualifying interest features. These species are migratory and will occur as qualifying interests in their own right, or as important assemblage features, in numerous Natura 2000 sites in other states. Therefore, there is potential for transboundary, or long range, impacts. However, guidelines relating to transboundary impacts make it clear that proximity is an important factor and that transboundary impacts are primarily concerned with offshore wind energy developments where effects on highly mobile seabird species could be associated with protected sites in other states (Department for Business, Energy and Industrial Strategy (DECC), 2015). This implies that the qualifying feature potentially affected should originate from the protected site in the other state, rather than the idea that the qualifying feature potentially affected might also spend some of its time at a protected site in another state.

1.4.3.6 The Transmission Assets onshore transmission infrastructure, as defined in part 1, section 4: Project description, of this EIA Scoping Report, has the potential to affect the qualifying features of estuarine or terrestrial European sites and the National Site Network through short-term disturbance during construction, operation and maintenance activities and decommissioning. Due to the large distance between the Transmission Assets Scoping Boundary and Natura 2000 sites located outside the UK, it is not considered feasible that migratory birds directly associated with Natura 2000 sites in other states would be disturbed or suffer from loss of foraging or resting opportunities in any way that would be likely to result in significant effects on those Natura 2000 sites. It is therefore proposed that transboundary impacts and effects on terrestrial ecology and intertidal birds are screened out of the EIA process.

Historic environment

1.4.3.7 Any impacts on the onshore historic environment arising from the construction, operation and maintenance and decommissioning of the Transmission Assets will be confined to a localised area within the footprint of the onshore elements of the Transmission Assets. These impacts would occur within the Transmission Assets Scoping Boundary and/or its immediate surrounding area. There is no pathway by which direct or indirect impacts arising from the Transmission Assets could result in significant effects on the onshore historic environment of another state. It is therefore proposed that transboundary impacts and effects on the onshore historic environment are screened out of the EIA process.

Land use and recreation

1.4.3.8 Any impacts on land use and recreation arising from the construction, operation and maintenance and decommissioning of the Transmission Assets will be confined to a localised area within the footprint of the onshore elements of the Transmission Assets. These impacts would occur within the Transmission Assets Scoping Boundary. There is no pathway by which direct or indirect impacts arising from the Transmission Assets could result in significant effects on the land use and recreation of another state. It is therefore proposed that transboundary impacts and effects on land use and recreation are screened out of the EIA process.

Traffic and transport

1.4.3.9 Any impacts on traffic and transport arising from the construction, operation and maintenance and decommissioning of the Transmission Assets will be confined to a localised area of the UK highway infrastructure. There is no pathway by which direct or indirect impacts arising from the Transmission Assets could result in significant effects on traffic and transport in another state. It is therefore proposed that transboundary impacts and effects on traffic and transport are screened out of the EIA process.

Noise and vibration

1.4.3.10 Any noise and vibration impacts arising from the construction, operation and maintenance and decommissioning of the Transmission Assets will be confined to a localised area in the vicinity of the Transmission Assets Scoping Boundary. There is no pathway by which direct or indirect impacts arising from the Transmission Assets could result in significant effects in another state. It is therefore proposed that transboundary impacts and effects on noise and vibration are screened out of the EIA process.

Air quality

1.4.3.11 Potential transboundary impacts to air quality arising from the construction, operation and maintenance and decommissioning of the Transmission Assets are anticipated to be minor and localised in extent and will be confined to the duration of the construction phase only. There is no pathway by which direct or indirect impacts arising from the Transmission Assets could result in significant effects in another state. It is therefore proposed that transboundary impacts and effects on air quality are screened out of the EIA process.

Table 1.4: Onshore environment transboundary screening matrix for the Transmission Assets.

Screening criteria	Geology and ground conditions	Hydrology and flood risk	Terrestrial ecology and intertidal birds	Historic environment	Land use and recreation	Traffic and transport	Noise and vibration	Air quality
Characteristics of the development	For a detailed description, see part 1, section 3: Project description, of the EIA Scoping Report. Key onshore components of the Transmission Assets include: the landfall site, onshore export cables, onshore substations, circuit breaker compounds and 400kV cables.							
Location of development (including existing use) and geographical area	The Transmission Assets Scoping Boundary is 1,667.9km^2 (onshore and offshore). The onshore Transmission Assets Scoping Boundary includes land between the landfall site at the coast and the existing National Grid substation at Penwortham.							
Environmental importance	No transboundary impacts are predicted (see section 1.4.3).							
Potential impacts and carrier								
Extent								
Magnitude	The magnitude of the impacts (taking into consideration the spatial extent, duration, frequency and reversibility of the impact) will be subject to the assessment to be undertaken for the EIA and has, therefore, not been determined at this stage.							
Probability	No transboundary impacts are predicted (see section 1.4.3).							
Duration								
Frequency								
Reversibility								
Cumulative impacts	See part 2, section 6.1: Geology and ground conditions, of the EIA Scoping Report.	See part 2, section 6.2: Hydrology and flood risk, of the EIA Scoping Report.	See part 2, section 7.1: Terrestrial ecology and intertidal birds, of the EIA Scoping Report.	See part 2, section 8.1: Historic environment, of the EIA Scoping Report.	See part 2, section 8.2: Land use and recreation, of the EIA Scoping Report.	See part 2, section 8.3: Traffic and transport, of the EIA Scoping Report.	See part 2, section 8.4: Noise and vibration, of the EIA Scoping Report.	See part 2, section 8.5: Air quality, of the EIA Scoping Report.
Conclusion – potential for significant effects	No significant transboundary effects	No significant transboundary effects	No significant transboundary effects	No significant transboundary effects	No significant transboundary effects	No significant transboundary effects	No significant transboundary effects	No significant transboundary effects

1.4.4 Offshore and onshore combined topics transboundary impacts

1.4.4.1 A transboundary screening matrix has been completed for those topics falling under the offshore and onshore combined topics and this is presented in Table 1.4. The conclusions of the transboundary screening for each combined topic are presented in the following sections, together with additional justification.

Seascape, landscape and visual resources

1.4.4.2 The seascape, landscape and visual resources baseline for the Transmission Assets seascape, landscape and visual resources study area is outlined in part 2, section 6.1: Seascape, landscape and visual resources, of the EIA Scoping Report.

1.4.4.3 The extent of potential impacts to seascape, landscape and visual resources receptors arising from the Transmission Assets is considered to be focused on receptors based in the UK and the Isle of Man, with no likely potential impacts at the UK/Ireland boundary (Ireland is 77.3km from the Transmission Assets Scoping Boundary).

1.4.4.4 Any impacts on landscape and visual resources arising from the construction, operation and maintenance and decommissioning of the Transmission Assets will be confined to a localised area in the vicinity of the Transmission Assets Scoping Boundary. There is no pathway by which direct or indirect impacts arising from the Transmission Assets could result in significant effects on the landscape and visual resources of another state.

1.4.4.5 Therefore, significant transboundary effects upon seascape, landscape and visual resources are not anticipated and it is proposed that transboundary impacts and effects on seascape, landscape and visual resources are screened out of the EIA process.

Socio-economics and community

1.4.4.6 The socio-economics baseline for the Transmission Assets is outlined in part 2, section 6.2: Socio-economics and community, of the EIA Scoping Report.

1.4.4.7 There are unlikely to be potential socio-economics and community transboundary impacts due to the construction, operation and maintenance and decommissioning of the Transmission Assets. Any ports required to support the construction, operation and maintenance and decommissioning of the Transmission Assets will be located within the UK. The Transmission Assets will promote opportunities for local procurement and local skills and recruitment through the preparation and implementation of mitigation measures.

1.4.4.8 Therefore, significant transboundary effects upon socio-economics and community are not anticipated and it is proposed that transboundary impacts and effects on socio-economics and community are screened out of the EIA process.

Aviation and radar

1.4.4.9 The aviation and radar baseline for the Transmission Assets Scoping Boundary is outlined in part 2, section 6.3: Aviation and radar, of the EIA Scoping Report.

1.4.4.10 Potential transboundary impacts due to the construction, operation, maintenance and decommissioning of the Transmission Assets upon aviation and radar include interference with Primary Surveillance Radar (PSR), creation of physical obstacles to low flying aircraft, obstruction and disruption to helicopter access/egress to/from oil and gas platforms, and obstruction to Search and Rescue (SAR) operations. All potential receptors identified are located in the UK and the Isle of Man and therefore no transboundary impacts are predicted.

1.4.4.11 Therefore, no significant transboundary effects upon aviation and radar are anticipated and it is proposed that transboundary impacts and effects upon aviation and radar are screened out of the EIA process.

Climate change

1.4.4.12 The climate change baseline for the Transmission Assets is outlined in part 2, section 8.2: Climate change, of the EIA Scoping Report.

1.4.4.13 Potential transboundary impacts associated with the Transmission Assets have been identified in part 2, section 8.2: Climate change, of the EIA Scoping Report. It is noted that over the lifetime of the Transmission Assets, when considered cumulatively with the Morgan Offshore Wind Project and the Morecambe Offshore Windfarm, potential transboundary impacts and resulting effects will be beneficial. All development processes which emit greenhouse gases (GHGs) have the potential to impact the atmospheric mass of GHGs as a receptor, and so may have a transboundary impact on climate change. Transboundary impacts due to other specific international development projects will be taken into account when evaluating the impact of the Transmission Assets by defining the atmospheric mass of GHGs as a high sensitivity receptor.

1.4.4.14 It is therefore proposed that transboundary impacts and effects on climate change are screened into the EIA process.

Table 1.5: Offshore and onshore combined topics transboundary screening matrix for the Transmission Assets.

Screening criteria	Seascape, landscape and visual resources	Socio-economics	Aviation and radar	Climate change
Characteristics of the development	For a detailed description, see part 1, section 3: Project description, of the EIA Scoping Report. Key components of the Transmission Assets include: the OSPs, Morgan offshore booster station, offshore export cables, interconnector cables, landfall site, onshore export cables, onshore substations, circuit breaker compounds and 400kV cables. The Transmission Assets will include all associated offshore and onshore transmission infrastructure.			
Location of development (including existing use) and geographical area	The Transmission Assets Scoping Boundary is 1,667.9km^2 (onshore and offshore). The offshore Transmission Assets Scoping Boundary extends from the Morgan Offshore Wind Project and the Morecambe Offshore Wind Farm to the coast of Lancashire. Within the onshore Transmission Assets Scoping Boundary, the onshore transmission infrastructure will connect both windfarms to the existing National Grid substation at Penwortham.			
Environmental importance	No transboundary impacts are predicted (see section 1.4.4).	No transboundary impacts are predicted (see section 1.4.4).	No transboundary impacts are predicted (see section 1.4.4).	Potential transboundary impact (see section 1.4.4).
Potential impacts and carrier				
Extent				
Magnitude	The magnitude of the impacts (taking into consideration the spatial extent, duration, frequency and reversibility of the impact) will be subject to the assessment to be undertaken for the EIA and has, therefore, not been determined at this stage.			
Probability	No transboundary impacts are predicted (see section 1.4.4).	No transboundary impacts are predicted (see section 1.4.4).	No transboundary impacts are predicted (see section 1.4.4).	Potential transboundary impact (see section 1.4.4).
Duration				
Frequency				
Reversibility				
Cumulative impacts	See part 2, section 6.1: Seascape, landscape and visual resources, of the EIA Scoping Report.	See part 2, section 6.2: Socio-economics and community, of the EIA Scoping Report.	See part 2, section 6.3: Aviation and radar, of the EIA Scoping Report.	See part 2, section 6.4: Climate change, of the EIA Scoping Report.
Conclusion – potential for significant effects	No significant transboundary effects	No significant transboundary effects	No significant transboundary effects	Transboundary effects will be considered within the EIA process

1.5 Conclusions

1.5.1.1 This annex has been prepared in accordance with The Planning Inspectorate's Advice Note twelve and associated Annex. The primary purpose of this annex is to provide a screening assessment of potential transboundary impacts which have the potential to affect other states.

1.5.1.2 On the basis of the current information available, as detailed within part 2 of the EIA Scoping Report, the Transmission Assets are considered likely to have the potential for impacts (and resulting effects) on the environment in other states for the following topics, which have been screened into the EIA process:

- Fish and shellfish ecology.
- Marine mammals.
- Offshore ornithology.
- Commercial fisheries.
- Shipping and navigation.
- Climate change.

2 Annex B - Water Framework Directive Screening

2.1 Introduction

2.1.1 Background

2.1.1.1 Morgan Offshore Wind Limited (Morgan OWL), a joint venture between bp and Energie Baden-Württemberg AG (EnBW), is developing the Morgan Offshore Wind Project, located in the east Irish Sea. The Morgan Offshore Wind Project is located 22.3km (12 nautical miles (nm)) from the Isle of Man and 36.3km (19.6nm) from the northwest coast of England (when measured from Mean High Water Springs (MHWS)). The anticipated nominal capacity of the Morgan Offshore Wind Project is 1500 Megawatts (MW).

2.1.1.2 Morecambe Offshore Windfarm Limited (Morecambe OWL), a joint venture between Cobra Instalaciones y Servicios, S.A. (Cobra) and Flotation Energy Ltd., is developing the Morecambe Offshore Windfarm. The Morecambe Offshore Windfarm is also located in the east Irish Sea approximately 28.75km (15.5nm) from the northwest coast of England (when measured from MHWS). The anticipated nominal capacity of the Morecambe Offshore Windfarm is 480MW.

2.1.1.3 Both the Morgan Offshore Wind Project and the Morecambe Offshore Windfarm have been scoped into the Pathways to 2030 workstream under the Offshore Transmission Network Review (OTNR). Under the OTNR, the National Grid Electricity System Operator is responsible for conducting a Holistic Network Design Review to assess options to improve the coordination of offshore wind generation connections and transmission networks. In July 2022, the UK Government published the Pathway to 2030 Holistic Network Design documents, which set out the approach to connecting 50GW of offshore wind to the UK electricity network (National Grid ESO, 2022). The output of this process concluded that the Morgan Offshore Wind Project and the Morecambe Offshore Windfarm should work collaboratively in connecting the wind farms to the National Grid at Penwortham, Lancashire. As described in part 1, section 3 of this EIA Scoping Report, the developers were involved in this process and agree with this output.

2.1.1.4 The design philosophy for the Transmission Assets is for the Morgan Offshore Wind Project and Morecambe Offshore Windfarm to be electrically independent. Therefore, each wind farm project will have its own set of transmission assets (i.e., cable and substation infrastructure). The location of the cable infrastructure will be co-ordinated within shared offshore and onshore export cable corridors to onshore substations, thereafter connecting to the National Grid electricity transmission network at Penwortham.

2.1.1.5 This Environmental Impact Assessment (EIA) Scoping Report supports the Applicants' request for a Scoping Opinion from the Secretary of State for this grid connection, known as the Morgan and Morecambe Offshore Wind Farms: Transmission Assets. In this report, for ease of reading, the term Transmission Assets is used.

2.1.1.6 The Water Framework Directive (WFD) (Council Directive 2000/60/EC establishing a framework for community action in the field of water policy) was adopted by the European Commission in December 2000. The WFD is transposed into law in England and Wales by The Water Environment (Water Framework Directive) (England and Wales) Regulations 2017 (the 2017 WFD Regulations). The WFD is retained EU legislation and is still applicable in England and Wales, as set out in sections 2 and 3 of the European Union (Withdrawal) Act 2018 and the Floods and Water (Amendment etc.) (EU Exit) Regulations 2019.

2.1.1.7 Whilst EIA is an efficient mechanism to gather the relevant information for a WFD Compliance Assessment, this information needs to be interpreted in relation to the WFD. According to Environment Agency (EA) guidance, impacts of biology, chemistry and hydromorphology need to be considered specifically in relation to WFD status classes and to be reported under a specific WFD section in any environmental statement or report produced or in a separate WFD compliance report (EA, 2010).

2.1.1.8 Therefore, as part of the application for development consent, a WFD Compliance Assessment will be undertaken to demonstrate how any impact on WFD receptors caused by activities associated with the Transmission Assets fits with the objectives of any affected WFD water bodies. The WFD Compliance Assessment will also provide the opportunity to inform the detailed design of the Transmission Assets to avoid, minimise, mitigate, or compensate for the risks to WFD water body receptors where risk assessment determines that the activities have the potential to:

1. Cause a surface water body, including coastal water bodies or groundwater body to deteriorate from one WFD status class to another or cause significant localised effects that could contribute to this happening.
2. Prevent or undermine action to get surface water bodies or groundwater bodies to good status (e.g., compromise the programme of measures put in place to achieve the ultimate water body objective).

2.1.1.9 This annex provides a screening report to identify the resources that need to be considered within a site-specific WFD assessment that will be prepared for the Transmission Assets.

2.1.1.10 This annex also outlines the approach that will be taken for the WFD Compliance Assessment of the Transmission Assets. The approach to the assessment is included in Section 2.2.

2.1.2 Project overview

2.1.2.1 Whilst the Transmission Assets design has not been finalised, key elements that have the potential to impact on the WFD objectives are outlined below. These are provided for indicative purposes only to present an understanding of the nature of the construction works and how these have the potential to impact on the environmental objectives of the water bodies affected. More detail on the nature of these activities is provided in part 1, section 3: Project description of the EIA Scoping Report.

- Offshore substation platforms (OSPs): Platforms to transform electricity generated by the wind farms to a higher voltage allowing the power to be efficiently transmitted to shore.
- Interconnector cables: Cables to connect the OSPs to each other.
- Offshore booster station: Also known as a mid-point reactive power compensation substation. This may be required for the Morgan Offshore Wind Project.
- Offshore export cable corridor: The area within which the offshore export cables will be located. These cables will link the Morgan Offshore Wind Project and the Morecambe Offshore Windfarm to the landfall site.
- Landfall site: This is where the offshore export cables make contact with land and the transitional area where the offshore cabling connects to the onshore cabling.
- Onshore export cable corridor: The area within which the onshore export cables will be located between the landfall site and the onshore substations.
- Onshore infrastructure: Any temporary ancillary onshore infrastructure required for the construction phase of the onshore export cable corridor and substations (such as construction compounds or temporary accesses).
- Onshore substation site: Purpose-built substations will be required to contain the electrical equipment required to adjust the power quality and power factor to meet the UK Grid Code as required to supply the National Grid. To maintain electrical independence, one substation will be required for the Morgan Offshore Wind Project and one for the Morecambe Offshore Windfarm. It is anticipated that the substations will share a substation location, where possible.
- 400kV cable corridor: The corridor between the new substations and the existing National Grid substation at Penwortham in which the onshore 400kV grid connection cables will be located. It is anticipated that two circuit breaker compounds will also be required.

2.1.2.2 As part of the cable installation and construction process, the following elements may also be relevant to the WFD assessment:

- Joint Bays and link boxes - These are typically concrete lined pits that provide a clean and dry environment for jointing the sections of cable together.
- Crossings - The onshore cable corridor may cross infrastructure and obstacles such as roads, railways and watercourses. The method employed will depend on the sensitivity and the scale of the feature crossed. Where trenchless crossings are used it is likely that these components of the project can be screened out of the WFD Compliance Assessment.
- Access routes and temporary haul roads – These are particularly important if they cross watercourses. The method of construction to be used would be considered, e.g., clear span bridge versus temporary culverts.
- Construction compounds - Construction compounds will be required along the onshore cable corridor (including any compounds associated with Horizontal Directional Drilling) and at the onshore substation location, for laydown and storage of materials, plant and staff, as well

as space for small temporary offices, welfare facilities, security and parking. These will occur within the Transmission Assets Scoping Boundary.

2.1.2.3 Based on the above, the activities which have the potential to impact the achievement of the WFD objectives will be identified for consideration within the WFD Compliance Assessment. An initial review of the Transmission Assets has identified the following activities that may potentially pose a detrimental risk to the water environment in the absence of mitigation:

- Topsoil stripping, excavation, and stockpiled earth (including reinstatement) for the cable corridors, crossings, substations and landfall.
- Use of oils, chemicals, and cement.
- Construction and operation of temporary bridges and culverts to facilitate crossing of watercourses by machinery should this be required resulting in temporary impacts to the morphology of the channel and banks.
- De-watering of trenches, if required.
- Temporary abstractions from surface water/groundwater, if required.
- Offshore cable installation and maintenance, methods including prelay ploughing, trenching or jetting.
- Landfall cable installation and maintenance.
- Installation and maintenance of cable protection in the nearshore subtidal environment.
- Seabed clearance in the nearshore subtidal environment.
- Use of jack-up vessels for cable installation and maintenance in the nearshore subtidal or intertidal environment.
- Unexploded ordnance detonation in the nearshore subtidal or intertidal environment.

2.2 Methodology

2.2.1 Legislation

2.2.1.1 The WFD requires the prevention of deterioration and the protection, enhancement, and restoration of all bodies of water. This means that any new development should not adversely impact upon on the ability of a water body to achieve its environmental objectives.

2.2.1.2 The 2017 WFD Regulations provide for the implementation of the WFD through the designation of all surface waters (rivers, lakes, transitional (estuarine) and coastal waters (out to 1nm from low water)) and groundwaters (water in aquifers) as water bodies and the establishment of targets to achieve their environmental objectives.

2.2.1.3 The WFD applies to WFD water bodies. The WFD Compliance Assessment will therefore apply to all surface water bodies and groundwater bodies that have the potential to be impacted by the Transmission Assets.

Water body classification

2.2.1.4 The WFD specifies the quality elements that are used to assess the ecological and chemical status of a water body. Quality elements are generally biological (e.g., fish, invertebrates, macrophytes) or chemical (e.g., heavy metals, pesticides, nutrients). Classifications indicate where the quality of the environment is good, where it may need improvement, and what may need to be improved. They can also be used, over the years, to plan improvements, show trends and to monitor the effectiveness of the programme of measures identified. There are three status classifications which are commonly reported: chemical, ecological and quantitative.

2.2.1.5 Chemical status is assessed from compliance with environmental standards for chemicals that are priority substances and/or priority hazardous substances for surface water and groundwater bodies. These are known as ‘Annex X’ substances listed in the 2017 WFD Regulations. Chemical status is recorded as ‘good’ or ‘fail’. The chemical status of groundwater also considers electrical conductivity. Chemical status for a water body is determined by the worst scoring chemical (one-out-all-out approach).

2.2.1.6 Ecological status classifications can be composed of up to four different assessments and apply to surface water bodies only. These are:

- An assessment of status indicated by a biological quality element such as fish, invertebrates, or algae. The presence of invasive species is also assessed as a separate test.
- An assessment of compliance with environmental standards for supporting physio-chemical conditions, such as dissolved oxygen, phosphorus, or ammonia.
- An assessment of compliance with environmental standards for concentrations of specific pollutants, such as zinc, cypermethrin or arsenic (these are known as ‘Annex VIII’ substances).
- In determining high status only, a series of tests is included to make sure that hydromorphology is largely undisturbed.

2.2.1.7 Ecological status is recorded as high, good, moderate, poor or bad. ‘High’ represents ‘largely undisturbed conditions’. Other classes show increasing deviation from undisturbed or reference conditions. This deviation must be expressed as an Ecological Quality Ratio (EQR) which ranges from zero for bad status to one for high status. As with chemical status, ecological status is determined by the worst scoring component (one-out-all-out approach).

2.2.1.8 Biological status is a sub-set of ecological status where the results of the biological quality elements are assessed (and so ignore physio-chemical and Annex VIII substances and hydromorphology). The one-out-all-out rule is applied again here to give a biological status classification.

2.2.1.9 Quantitative status measures the degree to which a body of groundwater is affected by direct and indirect abstractions (i.e., the available groundwater resource must not be exceeded by the long-term annual average rate of abstraction). Groundwater abstraction must also not cause failure of ‘Good’ ecological status in dependent surface waters. This also applies to surface water bodies.

2.2.1.10 Overall status is a composite measure that looks at ecological status, chemical status and quantitative status dependent on the water body type. So, overall status considers all four assessment types under ecological status (biology, physio-chemical, Annex VIII substances and hydromorphology) as well as incorporating the results of the chemical status assessment (priority substances) and quantitative status (for groundwater bodies). The one-out-all-out rule is applied again here, so a water body must be of good (pass) or better ecological status, good chemical status and good quantitative status assessment to be given a good overall status.

Water body objectives

2.2.1.11 The completion of a WFD Compliance Assessment is a staged process where data on the study area and work proposals are assessed with respect to the requirements of the WFD to ascertain whether the proposals will or will not have a detrimental impact on the status of water bodies associated with a development or project. If the assessment concludes, after taking account of the mitigation proposed, that the project may either reduce the quality status of the water bodies or prevent them from reaching the required status, then this represents a failure to achieve the WFD objectives that should not go ahead unless justification for the new modification is demonstrated under Article 4.7 of the Directive. The four objectives of the WFD Compliance Assessment are:

- Objective 1: To prevent deterioration in the ecological status of the water body.
- Objective 2: To prevent the introduction of impediment to the attainment of Good WFD status for the water body.
- Objective 3: To ensure the attainment of the WFD objectives for the water body is not compromised.
- Objective 4: To ensure the achievement of WFD objectives in other water bodies within the same catchment is not permanently excluded or compromised.

2.2.2 WFD Compliance Assessment scope

2.2.2.1 The WFD Compliance Assessment to be undertaken as part of the EIA process will draw upon a number of other disciplines in determining the potential impact to the environmental objectives of the water bodies that have the potential to be impacted. These will include hydrology and water quality, terrestrial and aquatic ecology, hydrogeology and the Habitat Regulations Assessment (HRA).

2.2.2.2 To achieve the aims outlined within section 2.1.1, a staged approach will be adopted in undertaking the WFD Compliance Assessment in accordance with guidance from the EA on WFD assessment of estuarine (transitional) and coastal waters, ‘Clearing the waters for All’ (Environment Agency, 2017) and the Planning Inspectorate’s Advice Note 18: The Water Framework Directive (Planning Inspectorate, 2017).

2.2.2.3 The WFD Compliance Assessment is typically undertaken in three stages:

- Screening – excludes any activities associated with the Transmission Assets that do not need to go through the scoping or impact assessment stages.
- Scoping – identifies the receptors that are potentially at risk from an activity associated with the Transmission Assets and need impact assessment.

- Impact assessment – considers the potential impacts of an activity associated with the Transmission Assets, identifies ways to avoid or minimise impacts, and shows whether an activity may cause deterioration or jeopardise the water body achieving good status.

2.2.2.4 A flow chart, taken from Advice Note 18 (Planning Inspectorate, 2017) for assessing activities and projects for compliance with the WFD has been included in Figure 2.1. This provides an overview of the recommended process to address the WFD during the pre-application process. This process will be followed for the WFD Compliance Assessment to be undertaken as part of the EIA process for the Transmission Assets.

2.2.2.5 An initial screening exercise has been undertaken in this annex to review the Transmission Assets Scoping Boundary in terms of potential impact to the water environment. This initial screening summarises the potential impact to the water environment for each component of each WFD quality element. This screening will assist in defining the scope of the detailed assessment. It identifies potential issues and provides an opportunity to engage with the Environment Agency (as the Competent Authority for the implementation of the WFD in England) to agree the scope of the detailed assessment.

2.2.2.6 The detailed WFD Compliance Assessment for the Transmission Assets will then examine the potential impact on water bodies (including cumulative impacts) and suggest mitigation measures and enhancements where appropriate. The WFD Compliance Assessment will also consider whether the Transmission Assets will contribute to the delivery of the relevant River Basin Management Plan (RBMP).

2.3 Identification of relevant water bodies

2.3.1 Introduction

2.3.1.1 For the purposes of this WFD Screening Annex, water bodies that are within, intersect with or which are hydrologically connected to the Transmission Assets Scoping Boundary have been identified and considered as relevant water bodies.

2.3.1.2 There are parts of the Transmission Assets Scoping Boundary that fall within the small coastal inter basins that drain directly, or via smaller streams, to the transitional and coastal water bodies. These areas are not within a formal WFD water body, but the potential impact of the Transmission Assets will be considered in the potential for impact to the downstream marine (transitional or coastal) water bodies.

2.3.2 Water bodies within the zone of influence

2.3.2.1 The water bodies that occur within the Transmission Assets Scoping Boundary are included in Figure 2.2. These water bodies may fall within the zone of influence of the Transmission Assets. These water bodies will be refined in discussion and agreement with consultees once the design for the Transmission Assets has been refined. This refinement may mean that some of the water bodies identified in this screening annex would not be affected by the final design. The impacts of the different elements of the

Transmission Assets on these water bodies will be considered in the WFD Compliance Assessment. Groundwater bodies are not shown on this figure but will be considered in the WFD Compliance Assessment, their current status classification is included in Table 2.1.

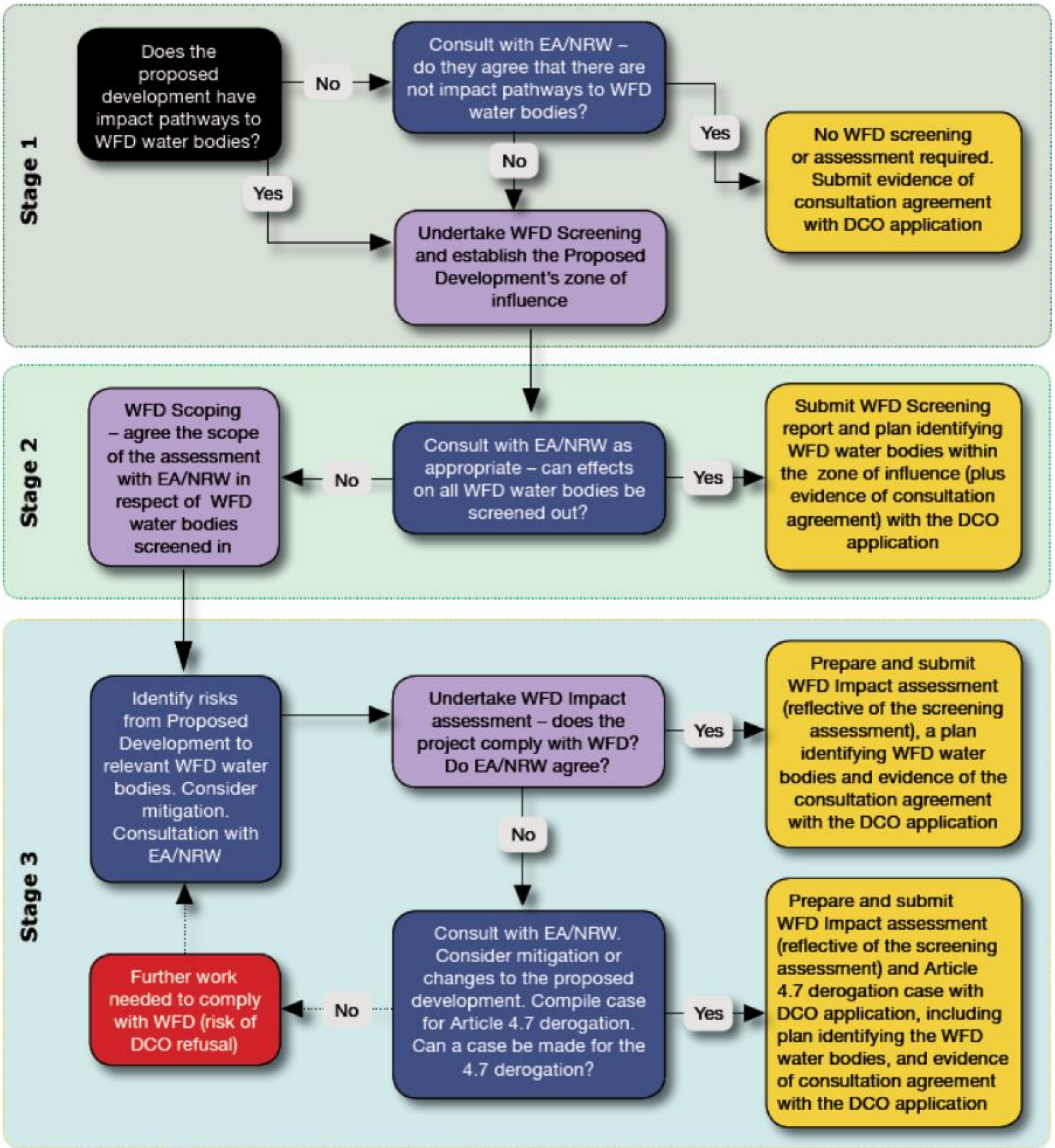
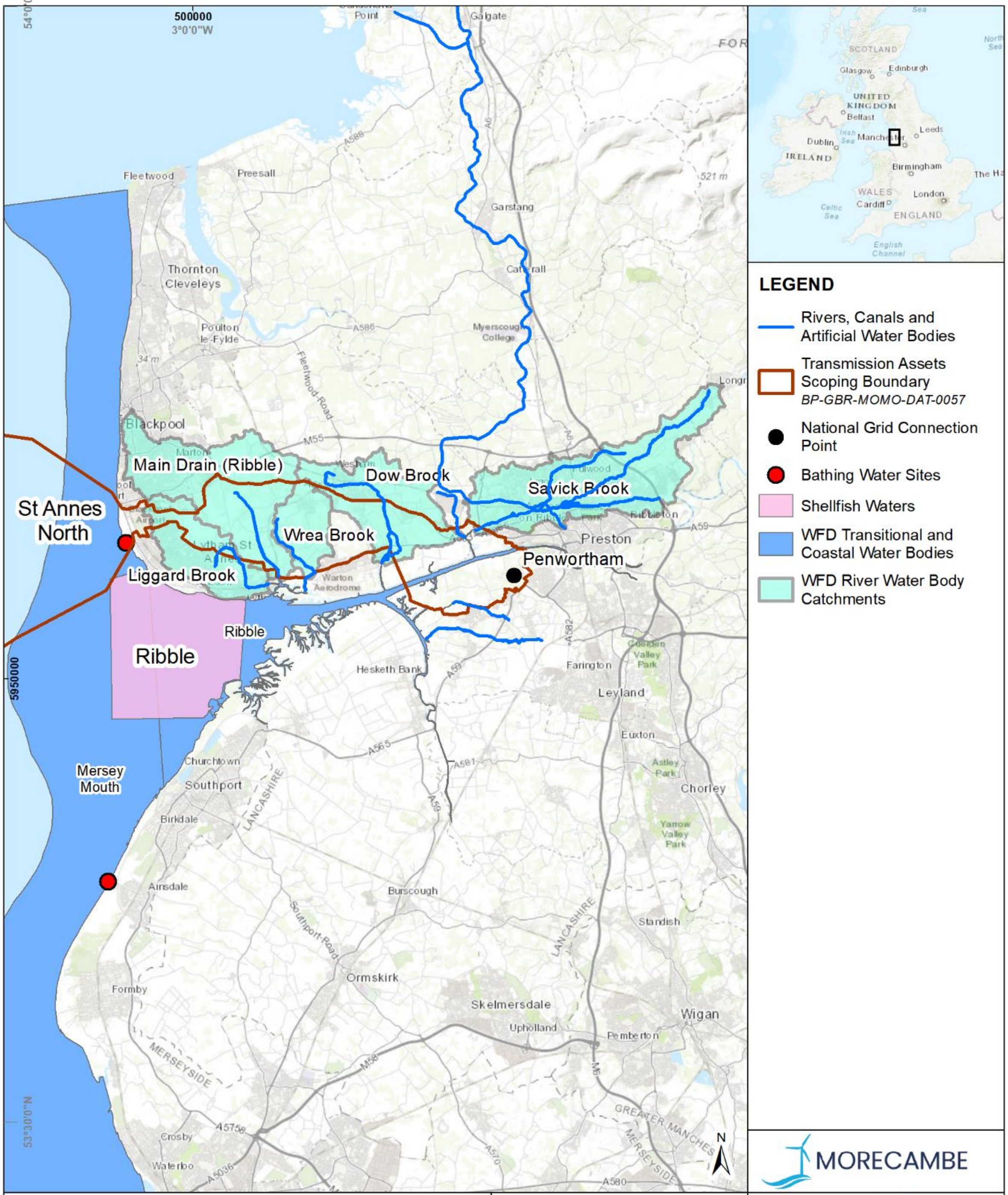


Figure 2.1: Flow chart illustrating the WFD compliance assessment process (Planning Inspectorate, 2017).



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Data Sources: EA Catchment Explorer

EnBW | bp | rps — Partners in UK offshore wind

Project Name:
MORGAN AND MORECAMBE OFFSHORE WIND FARMS: TRANSMISSION ASSETS

Drawing Number:
RPS-12079-0255-003

Drawing Title:
TRANSMISSION ASSETS WFD SURFACE WATERS (RIVERS, TRANSITIONAL AND COASTAL WATER BODIES), BATHING AND SHELLFISH WATERS

Geodetic Information:
Datum: ETRS 1989
Projection: ETRS 1989 UTM Zone 30N

VER	DATE	DETAILS	BY	CHECK
1	22/08/22	First Issue	MS	AR
2	07/09/22	2nd Issue	RD	AR

Figure 2.2: Transmission Assets Scoping Boundary overlapping with WFD surface waters (river, transitional and coastal water bodies), bathing and shellfish waters.

Table 2.1: WFD status classification for surface water (river, transitional and coastal) and groundwater bodies that overlap with the Transmission Assets Scoping Boundary, and the key elements driving status classification.

Operational Catchment	Water Body Name & ID	Water Body Type	HMWB	Supporting elements (Surface Water)	Other Pollutants	Specific Pollutants	Physio-Chemical quality elements	Biological quality elements	Overall Ecological Status	Overall Chemical	Qualitative Groundwater Status	Quantitative Groundwater Status	Overall Groundwater Status
Savick Brook and Fylde South Drains	Savick Brook, GB112071065470	River	Y	Moderate	-	-	Moderate	Moderate	Moderate	Fail	-	-	-
Savick Brook and Fylde South Drains	Liggard Brook, GB112071065650	River	Y	Moderate	-	-	Moderate	Bad	Bad	Fail	-	-	-
Savick Brook and Fylde South Drains	Main Drain (Ribble), GB112071065651	River	Y	Moderate	-	-	Moderate	Bad	Bad	Fail	-	-	-
Savick Brook and Fylde South Drains	Dow Brook, GB112071065670	River	Y	Moderate	-	-	Moderate	Bad	Bad	Fail	-	-	-
Savick Brook and Fylde South Drains	Wrea Brook, GB112071065680	River	Y	Moderate	-	-	-	-	-	Fail	-	-	-
Ribble Estuary	RIBBLE, GB531207112400	Transitional	Y	Moderate	Good	-	Moderate	Bad	Bad	Fail	-	-	-
North West Region Coastal Waters	Mersey Mouth, GB641211630001	Coastal	Y	Moderate	Good	High	Moderate	Moderate	Moderate	Fail	-	-	-
West Lancashire Quaternary Sand and Gravel Aq	West Lancashire Quaternary Sand and Gravel Aquifers, GB41202G912700	Groundwater	N/A	-	-	-	-	-	-	-	Good	Good	Good
Fylde Permo-Triassic Sandstone Aq	Fylde Permo-Triassic Sandstone Aquifers, GB41201G100500	Groundwater	N/A	-	-	-	-	-	-	-	Good	Poor	Poor

2.3.3 WFD water body status classification

2.3.3.1 The overall, ecological and chemical status of the surface water bodies listed in Table 2.1 has been established through consultation with the Environment Agency Catchment Data Explorer (Environment Agency, 2021).

2.3.3.2 Table 2.1 highlights the overall, ecological, and chemical status as well as the contributing elements to the status classification based on the 2018 baseline. The RBMP states that the 2018 water body classification is the baseline from which deterioration should be avoided. This table forms the basis of the initial screening from which activities associated with the different components of the Transmission Assets are scoped into the detailed WFD Compliance Assessment. Note, Tarra Carr Gutter is within close proximity to the Transmission Assets Scoping Boundary but is not included in Table 2.1 as there is no land drain connectivity.

2.3.4 Protected areas for the WFD

2.3.4.1 A number of waters in the Transmission Assets Scoping Boundary are protected under other existing EU legislation which applied directly or indirectly to the UK before December 2020 and has been retained in UK law as retained EU legislation. These water dependent protected areas require special protection due to their sensitivity to pollution or their particular economic, social or environmental importance. All the areas requiring special protection have been identified, mapped and listed in a register of protected areas (required under Article 5 of the WFD). The register of protected areas includes:

- Drinking Water Areas.
- Economically Significant Waters (including shellfish waters).
- Recreational Waters (including bathing waters).
- Nutrient Sensitive Areas.
- Special Protection Areas (SPAs).
- Special Areas of Conservation (SACs).

2.3.4.2 Protected areas for the WFD are the areas of land and bodies of water that have specific uses which require special protection (relevant areas listed in Table 2.2). These include waters used for drinking water, bathing (recreational waters), commercial shellfish harvesting (economically significant), nutrient sensitive (both in terms of the Urban Wastewater Treatment Directive and the Nitrates Directive) and those that sustain the most precious wildlife species and habitats (European sites). These areas have legally binding objectives in place that protect those uses from potentially harmful activities and new developments.

2.3.4.3 Table 2.2 and Figure 2.2 show that there is one bathing water within the Transmission Assets Scoping Boundary, St Annes North, as well as an economically significant shellfish water, the Ribble Estuary.

Table 2.2: Protected Areas for the WFD within water bodies that overlap with the Transmission Assets Scoping Boundary.

Water Body Name & ID	Protected Area Type					
	Drinking waters	Recreational waters (Bathing Waters)	Economically significant waters (Shellfish Waters)	Nutrient Sensitive Areas	SACs	SPAs
Savick Brook, GB112071065470	×	×	×	×	×	×
Liggard Brook, GB112071065650	×	×	×	×	×	×
Main Drain (Ribble), GB112071065651	×	×	×	×	×	×
Dow Brook, GB112071065670	×	×	×	×	×	×
Wrea Brook, GB112071065680	×	×	×	×	×	×
RIBBLE, GB531207112400	×	✓	×	✓	×	×
Mersey Mouth, GB641211630001	×	✓	✓	×	✓	✓
West Lancashire Quaternary Sand and Gravel Aquifers, GB41202G912700	✓	×	×	✓	×	×
Fylde Permo-Triassic Sandstone Aquifers, GB41201G100500	✓	×	×	✓	×	×

Note: ✓denotes that the Water Body is characterised as a Protected Area Type, whilst × denotes that it is not.

2.4 Screening of potential impacts on WFD objectives

2.4.1.1 The Guidance ‘Clearing the waters for All’ (Environment Agency, 2017) identifies certain activities that can be screened out for WFD Compliance Assessments as they represent low risk activities. These activities include:

- A self-service marine licence activity or an accelerated marine licence activity that meets specific conditions.
- Maintaining pumps at pumping stations.
- Removing blockages or obstacles like litter or debris within 10m of an existing structure to maintain flow.
- Replacing or removing existing pipes, cables or services crossing over a water body – but not including any new structure or supports, or new bed or bank reinforcement.
- ‘over water’ replacement or repairs to, for example bridge, pier and jetty surfaces – if you minimise bank or bed disturbance.

2.4.1.2 The activities associated with the construction of the Transmission Assets cannot be screened out due to the risk to the hydromorphological supporting conditions, biology and physio-chemical elements of ecological status.

2.4.1.3 Table 2.3 and Table 2.4 summarise the potential impacts associated with the Transmission Assets on the surface water bodies and groundwater bodies which are screened into the WFD Compliance Assessment. More detailed justification for the inclusion of these impacts can be found in the relevant sections of part 2 of the EIA Scoping Report. The detailed WFD Compliance Assessment will be based on these activities and water bodies.

Table 2.3: Potential impacts associated with the construction, operation and maintenance, and decommissioning of the Transmission Assets on surface and coastal water bodies screened into the WFD Compliance Assessment.

Impact	Transitional and Coastal (TRaC) Water Bodies		River Water Bodies				
	Mersey Mouth	Ribble	Savick Brook	Liggard Brook	Main Drain	Dow Brook	Wrea Brook
Increase in suspended sediments due to construction, operational and maintenance and/or decommissioning related activities, and the potential impact to physical features.	✓	✓	✓	✓	✓	✓	✓
Temporary habitat loss/disturbance during construction.	✓	✓	✓	✓	✓	✓	✓
Long term habitat loss.	✓	✓	✓	✓	✓	✓	✓
Increased risk of introduction and spread of invasive and invasive non-native species (INNS) during construction and decommissioning phases.	✓	✓	✓	✓	✓	✓	✓
Changes in physical processes including alterations to tidal/flow regime and impacts to shoreline and riparian zone associated with construction and operational and decommissioning phases.	✓	✓	✓	✓	✓	✓	✓
Changes in physical processes, hydromorphology associated with structures or alterations to the physical characteristics of a water body during construction, operational and decommissioning phases.	✓	✓	✓	✓	✓	✓	✓
The impact of contaminated runoff on the quality of 'water bodies' arising from the construction and decommissioning of the onshore elements of the Transmission Assets.	×	×	✓	✓	✓	✓	✓
The impact of increased surface water runoff on the hydromorphology of water bodies during construction and operation of the onshore elements of the Transmission Assets.	×	×	×	✓	✓	✓	✓

Note: ✓denotes that the potential impact is considered relevant for the Water Body and will be screened into the WFD Compliance Assessment, whilst × denotes that it is not.

Table 2.4: Potential impacts associated with the construction, operation and maintenance, and decommissioning of the Transmission Assets on groundwater bodies screened into the WFD Compliance Assessment.

Impact	West Lancashire Quaternary Sand and Gravel Aquifers	Fylde Permo-Triassic Sandstone Aquifers
Disturbance of existing contamination and deterioration of groundwater quality in Secondary aquifers Also reduction in WFD status.	✓	✓
Deterioration in groundwater quality and quantity of the principal aquifer including at Source Protection Zones. Also reduction in WFD status.	✓	✓
Reduction in quantity and deterioration in quality of surface waters fed by groundwater. Also, reduction in WFD status.	✓	✓
Thermal effects from the underground cables on groundwater quality.	✓	✓

Note: ✓denotes that the potential impact is considered relevant for the groundwater body and will be screened into the WFD Compliance Assessment

2.5 Conclusion

2.5.1.1 The water bodies and impacts that have been initially screened in this WFD Screening Annex will be further refined alongside the design for the Transmission Assets. This refinement will be undertaken in discussion and agreement with consultees through the Evidence Plan process. A full WFD Compliance Assessment following the stages outlined in Figure 2.1 will be presented in the ES, with a draft presented within the Preliminary Environmental Impact Report (PEIR).

3 Annex C – Marine Conservation Zone Screening

3.1 Introduction

3.1.1 Background

3.1.1.1 Morgan Offshore Wind Limited (Morgan OWL), a joint venture between bp and Energie Baden-Württemberg AG (EnBW), is developing the Morgan Offshore Wind Project, located in the east Irish Sea. The Morgan Offshore Wind Project is located 22.3km (12 nautical miles (nm)) from the Isle of Man and 36.3km (19.6nm) from the northwest coast of England (when measured from Mean High Water Springs (MHWS)). The anticipated nominal capacity of the Morgan Offshore Wind Project is 1500 Megawatts (MW).

3.1.1.2 Morecambe Offshore Windfarm Limited (Morecambe OWL), a joint venture between Cobra Instalaciones y Servicios, S.A. (Cobra) and Flotation Energy Ltd., is developing the Morecambe Offshore Windfarm. The Morecambe Offshore Windfarm is also located in the east Irish Sea approximately 28.75km (15.5nm) from the northwest coast of England (when measured from MHWS). The anticipated nominal capacity of the Morecambe Offshore Windfarm is 480MW.

3.1.1.3 Both the Morgan Offshore Wind Project and the Morecambe Offshore Windfarm have been scoped into the Pathways to 2030 workstream under the Offshore Transmission Network Review (OTNR). Under the OTNR, the National Grid Electricity System Operator is responsible for conducting a Holistic Network Design Review to assess options to improve the coordination of offshore wind generation connections and transmission networks. In July 2022, the UK Government published the Pathway to 2030 Holistic Network Design documents, which set out the approach to connecting 50GW of offshore wind to the UK electricity network (National Grid ESO, 2022). The output of this process concluded that the Morgan Offshore Wind Project and the Morecambe Offshore Windfarm should work collaboratively in connecting the wind farms to the National Grid at Penwortham, Lancashire. As described in part 1, section 3 of this EIA Scoping Report, the developers were involved in this process and agree with this output.

3.1.1.4 The design philosophy for the Transmission Assets is for the Morgan Offshore Wind Project and Morecambe Offshore Windfarm to be electrically independent. Therefore, each wind farm project will have its own set of transmission assets (i.e., cable and substation infrastructure). The location of the cable infrastructure will be co-ordinated within shared offshore and onshore export cable corridors to onshore substations, thereafter connecting to the National Grid electricity transmission network at Penwortham.

3.1.1.5 This Environmental Impact Assessment (EIA) Scoping Report supports the Applicants' request for a Scoping Opinion from the Secretary of State for this grid connection, known as the Morgan and Morecambe Offshore Wind Farms: Transmission Assets. In this report, for ease of reading, the term Transmission Assets is used.

3.1.1.6 Consideration of Marine Conservation Zones (MCZs) is required for any marine licence application or application for development consent which includes a deemed marine licence (dML). Under Section 126 of the Marine and Coastal Access Act 2009, the Marine Management Organisation (MMO) has specific duties with regards to MCZs and marine licence decision making.

3.1.1.7 Guidelines issued by the MMO in 'Marine Conservation Zones and marine licensing' (MMO, 2013) outline how MCZ assessments can be undertaken and recommend a staged approach. Initially, a screening exercise should be undertaken to identify whether Section 126 should apply to the Transmission Assets and which MCZs may potentially be impacted. If the Transmission Assets are screened in, they are then considered under a two-staged assessment process, specifically a 'Stage 1 Assessment' followed by a 'Stage 2 Assessment'. Further detail on these stages is provided in section 3.2 below.

3.1.1.8 This MCZ Screening Annex provides a summary of the proposed approach to the MCZ assessment for the Transmission Assets (section 3.2), which will be presented in the Preliminary Environmental Information Report (PEIR) and Environmental Statement (ES). The MCZ assessment is relevant to the offshore elements of the Transmission Assets only (OSPs, Morgan offshore booster station and offshore export cable corridor).

3.1.1.9 This annex also presents the results of a preliminary screening of MCZs (section 3.3), which the Applicants propose to carry forward for consideration in the MCZ assessment in the PEIR and ES.

3.2 Methodology

3.2.1 Introduction

3.2.1.1 A standalone MCZ assessment will be prepared and presented as an appendix to the PEIR and ES.

3.2.1.2 The following sections outline the proposed approach to the Transmission Assets MCZ assessment.

3.2.2 Preliminary Screening

3.2.2.1 To determine whether Section 126 of the MCAA 2009 applies and whether an MCZ assessment is required for the Transmission Assets, a preliminary screening exercise has been carried out within this MCZ Screening Annex. According to the MMO (2013) guidance, Section 126 of the MCAA will apply if both of the below apply:

- The licensable activity is taking place within or near an area being put forward or already designated as an MCZ.
- The licensable activity is capable of affecting (other than insignificantly) either (i) the protected features of an MCZ; or (ii) any ecological or geomorphological process on which the conservation of any protected feature of an MCZ is (wholly or in part) dependant.

3.2.2.2 The MMO recommends the use of a risk-based approach when determining the ‘nearness’ of an activity to MCZs, including applying an appropriate buffer zone to the MCZ features under consideration as well as a consideration of risks associated with activities occurring at greater distances from features of the MCZ(s). The preliminary screening stage undertaken in this MCZ Screening Annex considers the proximity of the Transmission Assets Scoping Boundary to MCZs. To determine the 'nearness' of the activities associated with the Transmission Assets, in respect of benthic features of the MCZs, the following screening criteria are proposed, based on the proximity to the Transmission Assets Scoping Boundary:

- Direct impacts only occur as a result of the Transmission Assets and therefore will be within the Transmission Assets Scoping Boundary.
- Indirect impacts to benthic features of the MCZs (e.g., increases in suspended sediment concentrations and associated deposition) may occur within one spring tidal excursion from the Transmission Assets Scoping Boundary, as per part 2, section 3.1: Physical processes of this EIA Scoping Report. One spring (mean) tidal excursion from the Transmission Assets Scoping Boundary is therefore predicted to be the maximum extent of the zone of influence for benthic ecology MCZ features. This distance will be used as the screening boundary for MCZs (the Transmission Assets MCZ Screening Boundary) (Figure 3.1).

3.2.2.3 In addition to benthic features of MCZs, there are also some MCZs with fish species as features. MCZs in the east Irish Sea that are designated for fish features are designated for smelt (*Osmeridae*). Smelt are coastal and estuarine species and are unlikely to travel to the offshore parts of the Transmission Assets Scoping Boundary (Fish Base, 2022). Underwater noise is expected to originate mainly within the offshore parts of the Transmission Assets Scoping Boundary during piling associated with construction of the offshore substation platforms (OSPs) and the Morgan offshore booster station. The Morgan offshore booster station is likely to be located between the midpoint of MWHS to the Morgan Array Area, and the Morgan Array Area.

3.2.2.4 Underwater noise originating in the Transmission Assets Scoping Boundary associated with piling of multiple OSP foundations could extend over a longer period of time compared to cable installation activities and piling for the Morgan offshore booster station within the Transmission Assets Scoping Boundary. Therefore, MCZs that overlap with the Transmission Assets MCZ Screening Boundary have been screened in, as well as West of Walney MCZ, Ribble Estuary MCZ and Wyre Lune MCZ which are within close proximity to the Transmission Assets MCZ Screening Boundary.

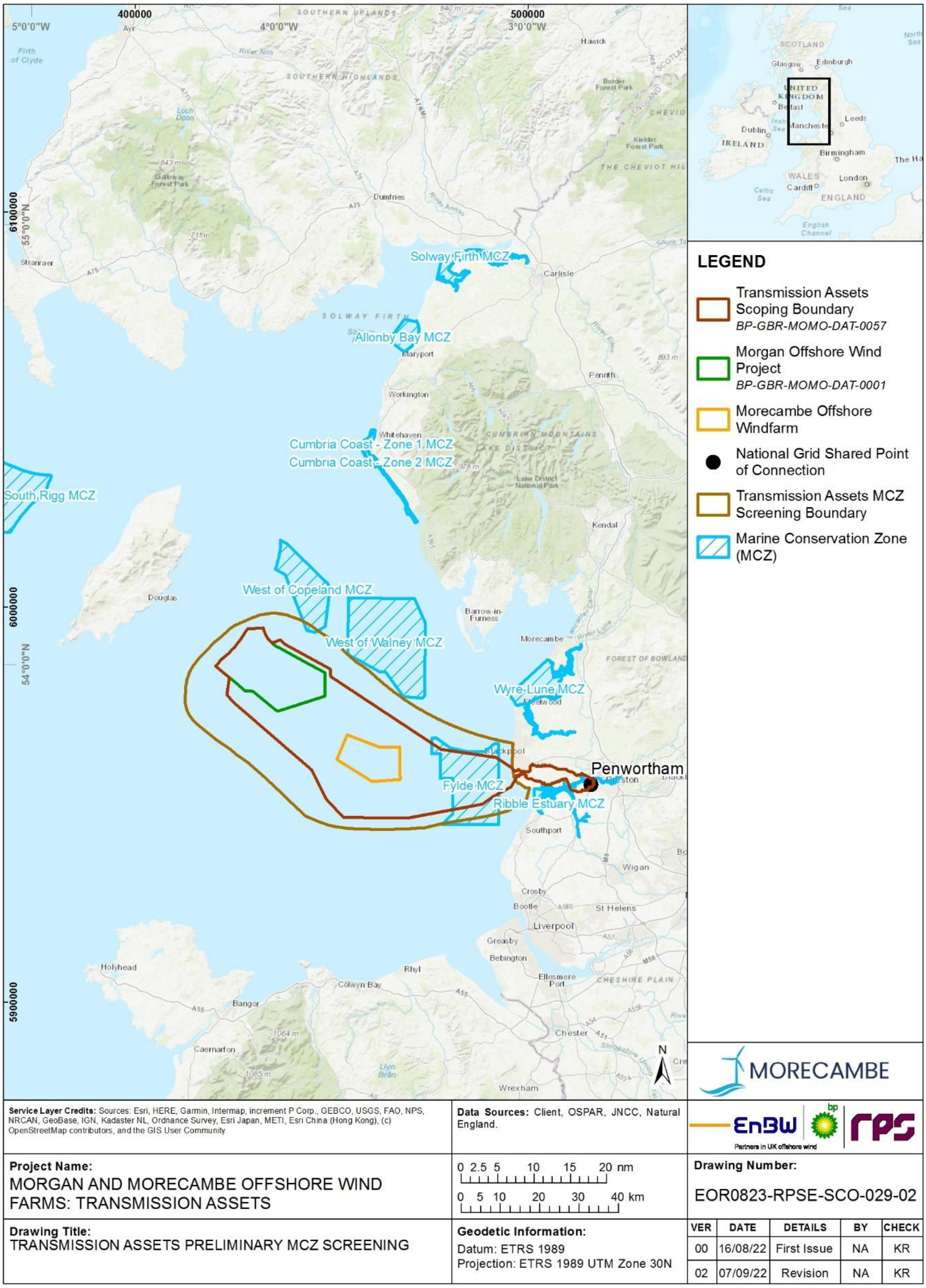

Figure 3.1: Proposed Transmission Assets Marine Conservation Zone (MCZ) screening boundary.

3.2.2.5 Within the MCZ assessment undertaken in the PEIR and ES, further screening criteria will be considered. If this preliminary screening stage identifies that the proposed activity is within, or near to, an MCZ, consideration will then be given as to whether there is the potential for an impact that could result in a significant effect upon the MCZ. In determining 'insignificance', the MMO (2013) guidance states that this should take into account the likelihood of an activity causing an impact, the magnitude of the impact should it occur, and the potential effect or risk any such impact may cause on either the protected features of an MCZ or any ecological or geomorphological process on which the conservation of any protected feature of an MCZ is (wholly or in part) dependant. It is proposed that this will be determined for the Transmission Assets through the assessments made in the appropriate offshore ecology PEIR and ES chapter, and cross referenced in the MCZ assessment which will accompany the PEIR and ES.

3.2.3 Stage 1 Assessment

3.2.3.1 The Stage 1 assessment (if/as required) will be presented in the PEIR and ES and will consider whether the condition in section 126(6) of the MCAA 2009 can be met, namely can the decision maker reasonably be satisfied there is no significant risk of the activity hindering the achievement of the conservation objectives stated for the MCZ. Between the preliminary screening and the stage 1 assessment, there will be a level of refinement of the Transmission Assets design. The preliminary screening has been undertaken on a precautionary basis, with the MCZ Screening Boundary based on a relatively large Transmission Assets Scoping Boundary, within which the Transmission Assets will be located. Once the design has been refined, it is likely that any potential impacts on MCZs will be less than those presented in this preliminary screening.

3.2.3.2 The MMO (2013) guidelines suggest the decision maker would use the information supplied by the Applicants with the licence application, advice from the Statutory Nature Conservation Bodies (SNCBs) and any other relevant information to determine whether:

- There is no significant risk of the activity hindering the achievement of the conservation objectives stated for the MCZ.
- In addition, the MMO can exercise its functions to further the conservation objectives stated for the MCZ.

3.2.3.3 At this stage, the conservation objectives for the MCZ features will need to be considered. The conservation objectives for MCZ features are high level criteria describing the desired condition of the MCZ features. There are two objectives for features within an MCZ:

- Whether the features are in the desired favourable condition and need to be maintained in this condition.
- Whether the features are not in the desired favourable condition and need to be recovered to that condition.

3.2.3.4 The MCZ assessment will therefore consider whether the Transmission Assets could potentially affect, and hinder, these conservation objectives for each of the MCZs screened into the assessment. Within this stage of the assessment, the MMO advise that “hinder‟ would be any act that could, either alone or in combination:

- In the case of a conservation objective of “maintain”, increase the likelihood that the current status of a protected feature would go downwards (e.g., from favourable to degraded) either immediately or in the future (i.e. these protected features would be placed on a downward trend), or
- In the case of a conservation objective of “recover”, decrease the likelihood that the current status of a protected feature could move upwards (e.g. from degraded to favourable) either immediately or in the future (i.e. these protected features would be placed on a flat or downward trend).

3.2.3.5 If the criteria in section 126(6) of the MCAA 2009 cannot be met, the Stage 1 assessment will also consider (in accordance with MMO guidance) whether the condition in section 126(7)(a) can be met and must determine whether:

- There is no other means of proceeding with the act which would create a substantially lower risk of hindering the achievement of the conservation objectives stated for the MCZ. This should include proceeding with it (a) in another manner, or (b) at another location.

3.2.3.6 The Stage 1 assessment enables committed mitigation measures to be considered within the assessment. If mitigation to reduce the impacts to an acceptable level cannot be secured, and there are no other alternative locations, then a Stage 2 assessment will be required.

3.2.4 Stage 2 Assessment

3.2.4.1 The Stage 2 MCZ assessment (if/as required) will be presented in the PEIR and ES and considers whether the conditions in section 126(7)(b) and (c) of the MCAA 2009 can be met, and the socio-economic impact of the plan or 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 the above is true, can the Applicants demonstrate that they can secure, or undertake arrangements to secure, measures of equivalent environmental benefit for the damage the project will have on the MCZ features?

3.2.4.2 In determining ‘public benefit’, the MMO will consider benefits at a national, regional or local level. Guidance from the MMO on what constitutes measures of equivalent environmental benefit states that measures can be based on those considered appropriate when securing compensatory habitat for projects deemed to have an adverse effect on internationally designated sites under the Habitats Directive.

3.3 Results: Preliminary MCZ screening

3.3.1.1 MCZs which coincide with the Transmission Assets MCZ Screening Boundary shown in Figure 3.1, Table 3.1 and Table 3.2 will be screened into the Stage 1 Assessment on the basis that the construction, operation and maintenance and decommissioning of the Transmission Assets has the potential to directly or indirectly affect the interest features of these sites. On that basis, the following MCZs have been identified as being relevant:

- Fylde MCZ which overlaps the landward end of the offshore part of the Transmission Assets Scoping Boundary (Figure 3.1)
- West of Walney MCZ which is located just outside of the Transmission Assets MCZ Screening Boundary (Figure 3.1). However, it has been included due to its proximity to this boundary
- West of Copeland MCZ which is within the northern boundary of the Transmission Assets MCZ Screening Boundary (Figure 3.1)
- Ribble Estuary MCZ which is located just outside of the Transmission Assets MCZ Screening Boundary (Figure 3.1). However, it has been included due to its proximity to this boundary
- Wyre Lune MCZ which is located just outside of the Transmission Assets MCZ Screening Boundary (Figure 3.1). It has been included due to its proximity to this boundary.

Table 3.1: Summary of MCZs within the vicinity of the Transmission Assets (includes MCZs screened into the MCZ assessment in bold).

Designated Site	Distance to the Transmission Assets MCZ Screening Boundary (km)	Features
Fylde MCZ	**0**	• **Subtidal sand** • **Subtidal mud**
West of Copeland MCZ	**0**	• **Subtidal coarse sediment** • **Subtidal sand** • **Subtidal mixed sediment**
West of Walney MCZ	**0.5**	• **Subtidal sand** • **Subtidal mud** • **Sea pen and burrowing megafauna communities**
Ribble Estuary MCZ	**1.2**	• **Smelt (*Osmeridae*)**
Wyre Lune MCZ	**5.3**	• **Smelt (*Osmeridae*)**
Cumbria Coast MCZ	36.8	• High energy intertidal rock • Honeycomb worm (*Sabellaria alveolata*) reefs • Intertidal biogenic reefs • Intertidal sand and muddy sand • Intertidal underboulder communities • Moderate energy infralittoral rock • Peat and clay exposures • Razorbill (*Alca torda*)

Designated Site	Distance to the Transmission Assets MCZ Screening Boundary (km)	Features
Queenie Corner MCZ	44.9	• Sea pen and burrowing megfauna communties • Subtidal mud
South Rigg MCZ	57.4	• Moderate energy circalittoral rock • Subtial coarse sediment • Subtidal sand • Subtidal mud • Subtidal mixed sediment • Sea pen and burrowing megfauna communties
Allonby Bay MCZ	70.0	• Blue mussel (*Mytilus edulis*) beds
Solway Firth MCZ	89.9	• Smelt (*Osmeridae*)

3.3.2 Fylde MCZ

3.3.2.1 Fylde MCZ overlaps the landward end of the offshore part of the Transmission Assets Scoping Boundary (Figure 3.1) and was designated in 2013. The Fylde MCZ is located in Liverpool Bay between 3km and 20km off the Fylde coast and Ribble Estuary.

3.3.2.2 The MCZ protects an area of approximately 260km^2 of subtidal mud and subtidal sand habitats. These sediment features are considered to be good representatives of the seabed habitats and communities found on the eastern side of Liverpool Bay. The depth of the seabed within the site ranges from almost being exposed on low tide, to 22m at its deepest part. The seabed in this area is highly productive. It supports an abundance of animals such as crabs, starfish, shrimp-like crustaceans and bivalve shellfish, including the commonly found small nut-shell *Nucula nitidosa*, a razor shell *Pharus legumen* and the white furrow shell *Abra alba*. Flatfish, including sole *Solea solea* and plaice *Pleuronectes platessa*, are also supported by the habitat within the site (NE, 2016).

3.3.2.3 The designated features of the Fylde MCZ and their general management approach are outlined in Table 3.2.

3.3.3 West of Walney MCZ

3.3.3.1 The West of Walney MCZ is located just outside of the Transmission Assets MCZ Screening Boundary on the northern boundary (Figure 3.1) and was designated in 2016. The West of Walney MCZ is location in the Irish Sea, 8km west of Walney Island.

3.3.3.2 The MCZ protects an area of seabed of approximately 388km^2 in mainly inshore waters but also offshore waters. The West of Walney MCZ is designated for subtidal sands, subtidal muds, and sea pen and burrowing megafauna communities. The subtidal mud is an important habitat for a range of animals including worms, molluscs, sea urchins, crustaceans, including the commercially important Norway lobster and sea pens. Sea pen and burrowing megafauna communities occur on the subtidal mud habitats and are listed as a protected feature of the MCZ. Collectively these animals create a network of burrows and tunnels, helping to shelter other small creatures and allow oxygen to penetrate deeper into the sediment. The subtidal sands within the MCZ support high densities of burrowing brittle stars, along with flatfish (NE, 2018).

3.3.3.3 The designated features of the West of Walney MCZ and their general management approach are outlined in Table 3.2.

3.3.4 West of Copeland MCZ

3.3.4.1 West of Copeland MCZ is located on the northern boundary of the Transmission Assets MCZ Screening Boundary (Figure 3.1) and was designated in 2019. The West of Copeland MCZ is located in the eastern part of the Irish Sea and covers an area of $158km^2$.

3.3.4.2 The West of Copeland MCZ is designated for subtidal sand, subtidal coarse sediment and subtidal mixed sediments. This range of habitats supports a wide variety of species including bivalve molluscs (such as *Venus* clams and razor clams), worms, sea urchins, anemones, starfish, crabs and sea mats (NE, 2019).

3.3.4.3 The designated features of the West of Copeland MCZ and their general management approaches are outlined in Table 3.2.

3.3.5 Ribble Estuary MCZ

3.3.5.1 The Ribble Estuary MCZ is located within the landward extent of the Transmission Assets MCZ Screening Boundary (Figure 3.1) and was designated in 2019. The Ribble Estuary MCZ is located on the northwest coast of England, near Preston.

3.3.5.2 The MCZ protects an area of seabed of approximately $15km^2$ overlapping with the River Ribble Estuary. The Ribble Estuary MCZ is designated for smelt *Osmerus eperlanus*. Smelt were once widespread in estuaries in the UK but have declined considerably over the past 200 years. They congregate in large shoals in lower estuaries and migrate into freshwater where they spawn in spring. The Ribble Estuary provides important habitats for smelt feeding and post-larval development (Defra, 2019a).

3.3.5.3 The designated features of the Ribble Estuary MCZ and their general management approach are outlined in Table 3.2.

3.3.6 Wyre Lune MCZ

3.3.6.1 The Wyre Lune MCA is located to the north east of the Transmission Assets MCZ Screening Boundary (Figure 3.1) and was designated in 2019. The Wyre Lune MCZ is located on the northwest coast of England, near Fleetwood.

3.3.6.2 Wyre Lune MCZ is an inshore site that covers an area of approximately $92km^2$, located in the southern part of Morecambe Bay. The Wyre Lune MCZ is designated for smelt *Osmerus eperlanus*. Smelt were once widespread in estuaries in the UK but have declined considerably over the past 200 years. They congregate in large shoals in lower estuaries and migrate into freshwater where they spawn in spring. Estuaries such as the

Wyre and Lune provide important habitats for smelt feeding and post-larval development (Defra, 2019b)

3.3.6.3 The designated features of the Wyre Lune MCZ and their general management approach are outlined in Table 3.2.

Table 3.2: Sites proposed to be screened into the MCZ assessment, their designated features and general management approach.

Designated Sites	Features	Type of feature	General management approach
Fylde MCZ	Subtidal sand	Broadscale marine habitat	Maintain in favourable condition
	Subtidal mud	Broadscale marine habitat	Maintain in favourable condition
West of Walney MCZ	Subtidal sand	Broadscale marine habitat	Recover to favourable condition
	Subtidal mud	Broadscale marine habitat	Recover to favourable condition
	Sea-pen and burrowing megafauna communities	Habitat Feature of Conservation Importance	Recover to favourable condition
West of Copeland MCZ	Subtidal sand	Broadscale marine habitat	Maintain in favourable condition
	Subtidal coarse sediment	Broadscale marine habitat	Recover to favourable condition
	Subtidal mixed sediment	Broadscale marine habitat	Recover to favourable condition
Ribble Estuary MCZ	Smelt	Highly Mobile Species Features of Conservation Importance	Recover to favourable condition
Wyre Lune MCZ	Smelt	Highly Mobile Species Features of Conservation Importance	Recover to favourable condition

3.3.6.4 A full screening exercise will be undertaken and presented in the PEIR and ES to confirm the MCZs which may be carried forward for consideration in the Stage 1 assessment (and building on the preliminary screening assessment presented above), and if required Stage 2 assessment, described in section 3.2.

4 References

4.1 Annex A Transboundary Impacts Screening

Department of Energy and Climate Change (DECC) (2015) Guidelines on the assessment of transboundary impacts of energy developments on Natura 2000 sites outside the UK. Department of Energy and Climate Change, London.

The Planning Inspectorate (2020), Advice Note Twelve: Transboundary Impacts and Process: https://infrastructure.planninginspectorate.gov.uk/legislation-and-advice/advice-notes/advice-note-twelve-transboundary-impacts-and-process/. [Accessed 25 January 2022].

4.2 Annex B - Water Framework Directive Screening

Environment Agency (2017) *WFD Assessment of estuarine (transitional) and coastal waters, 'Clearing the waters for All'*. https://www.gov.uk/guidance/water-framework-directive-assessment-estuarine-and-coastal-waters

Environment Agency (2010) *Assessing new modifications for compliance with WFD: Detailed supplementary guidance*. NEAS Supplementary Guidance 488_10_SD01. Environment Agency, Bristol.

Environment Agency (2021) Catchment data explorer. https://environment.data.gov.uk/catchment-planning

Planning Inspectorate (2018) *Advice Note Eighteen: The Water Framework Directive*. (https://infrastructure.planninginspectorate.gov.uk/legislation-and-advice/advice-notes/advice-note-18/)

4.3 Annex C - Marine Conservation Zone Screening

Fish Base, (2022) Osmerus eperlanus, European Smelt. Available: https://www.fishbase.se/summary/osmerus-eperlanus.html. Accessed January 2022

Defra (2019a) Ribble Estuary Marine Conservation Zone, fact sheet. Available: https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/915673/mcz-ribble-estuary-2019.pdf. Accessed November 2021.

Defra (2019b) Wyre Lune Marine Conservation Zone Fact Sheet, Available: https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/915506/mcz-wyre-lune-2019.pdf. Accessed September 2022.

Marine Management Organisation (2013) Marine conservation zones and marine licensing. April 2012. Available at: https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/410273/Marine_conservation_zones_and_marine_licensing.pdf

National Grid ESO (2022) Pathway to 2030 Holistic Network Design. Available at: download (nationalgrideso.com). Accessed July 2022.

Natural England (2019a) West of Copeland Marine Conservation Zone Fact Sheet, Available: https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/915435/mcz-west-copeland-2019.pdf. Accessed November 2021.

Natural England (2018) Natural England and JNCC Conservation Advice for Marine Protected Areas, West of Walney MCZ, Site Information, Updated March 2018. Available: https://designatedsites.naturalengland.org.uk/Marine/MarineSiteDetail.aspx?SiteCode=UKMCZ0045&SiteName=walney&SiteNameDisplay=West%20of%20Walney%20MCZ&countyCode=&responsiblePerson=&SeaArea=&IFCAArea=&NumMarineSeasonality=&HasCA=1#SiteInfo Accessed: November 2021.

Natural England (2016) Fylde Marine Conservation Zone Fact Sheet, available: http://publications.naturalengland.org.uk/publication/4933233460379648. Accessed November 2021.