MORGAN AND MORECAMBE OFFSHORE WIND FARMS: TRANSMISSION ASSETS

Environmental Statement

Non-Technical Summary

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Glossary

Term	Meaning
400 kV grid connection cables	Cables that will connect the proposed onshore substations to the existing National Grid Penwortham substation.
400 kV grid connection cable corridor	The corridor within which the 400 kV grid connection cables will be located.
Applicants	Morgan Offshore Wind Limited (Morgan OWL) and Morecambe Offshore Windfarm Ltd (Morecambe OWL).
Development Consent Order	An order made under the Planning Act 2008, as amended, granting development consent.
Environmental Statement	The document presenting the results of the Environmental Impact Assessment process.
Generation Assets	The generation assets associated with the Morgan Offshore Wind Project and the Morecambe Offshore Windfarm include the offshore wind turbines, inter-array cables, offshore substation platforms and platform link (interconnector) cables to connect offshore substations.
Intertidal area	The area between Mean High Water Springs and Mean Low Water Springs.
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. This term applies to the entire landfall area at Lytham St. Annes between Mean Low Water Springs and the transition joint bays inclusive of all construction works, including the offshore and onshore cable routes, intertidal working area and landfall compound(s).
Marine licence	The Marine and Coastal Access Act 2009 requires a marine licence to be obtained for licensable marine activities. Section 149A of the Planning Act 2008 allows an applicant for to apply for 'deemed marine licences' in English waters as part of the development consent process.
Mean High Water Springs	The height of mean high water during spring tides in a year.
Mean Low Water Springs	The height of mean low water during spring tides in a year.
Morecambe Offshore Windfarm: Generation Assets	The offshore generation assets and associated activities for the Morecambe Offshore Windfarm.
Morecambe Offshore Windfarm: Transmission Assets	The offshore export cables, landfall and onshore infrastructure required to connect the Morecambe Offshore Windfarm to the National Grid.
Morecambe OWL	Morecambe Offshore Windfarm Ltd is a joint venture between Zero-E Offshore Wind S.L.U. (Spain) (a Cobra group company) (Cobra) and Flotation Energy Ltd.
Morgan and Morecambe Offshore Wind Farms: Transmission Assets	The offshore and onshore infrastructure connecting the Morgan Offshore Wind Project and the Morecambe Offshore Windfarm to the national grid. This includes the offshore export cables, landfall site, onshore export cables, onshore substations, 400 kV grid connection 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.
Morgan Offshore Wind Project: Generation Assets	The offshore generation assets and associated activities for the Morgan Offshore Wind Project.

Term	Meaning
Morgan Offshore Wind Project: Transmission Assets	The offshore export cables, landfall and onshore infrastructure required to connect the Morgan Offshore Wind Project to the National Grid.
Morgan OWL	Morgan Offshore Wind Limited is a joint venture between bp Alternative Energy Investments Ltd and Energie Baden-Württemberg AG (EnBW).
National Grid Penwortham substation	The existing National Grid substation at Penwortham, Lancashire.
Non-statutory consultee	Organisations that an applicant may choose to consult in relation to a project who are not designated in law but are likely to have an interest in the project.
Offshore export cables	The cables which would bring electricity from the Generation Assets to the landfall.
Offshore export cable corridor	The corridor within which the offshore export cables will be located.
Offshore Wind Leasing Round 4	The Crown Estate auction process which allocated developers preferred bidder status on areas of the seabed within Welsh and English waters and ends when the Agreements for Lease are signed.
Onshore export cables	The cables which would bring electricity from landfall to the onshore substations.
Onshore export cable corridor	The corridor within which the onshore export cables will be located.
Planning Inspectorate	The agency responsible for operating the planning process for applications for development consent under the Planning Act 2008.
Preliminary Environmental Information Report	A report that provides preliminary environmental information in accordance with the Infrastructure Planning (Environmental Impact Assessment) Regulations 2017. This is information that enables consultees to understand the likely significant environmental effects of a project and which helps to inform consultation responses.
Statutory consultee	Organisations that are required to be consulted by an applicant pursuant to section 42 of the Planning Act 2008 in relation to an application for development consent. Not all consultees will be statutory consultees (see non-statutory consultee definition).
Substation	Part of an electrical transmission and distribution system. Substations transform voltage from high to low, or the reverse by means of electrical transformers.
The Secretary of State for Energy Security and Net Zero	The decision maker with regards to the application for development consent for the Transmission Assets.
Transmission Assets	See Morgan and Morecambe Offshore Wind Farms: Transmission Assets (above).
Transmission Assets Order Limits	The area within which all components of the Transmission Assets will be located, including areas required on a temporary basis during construction and/or decommissioning.

1 Introduction

1.1 The Transmission Assets

1.1.1 Purpose of this document

1.1.1.1 This document is the Non-Technical Summary of the Environmental Statement (ES) prepared for the Morgan and Morecambe Offshore Wind Farms: Transmission Assets (referred to in this document as the 'Transmission Assets').

1.1.1.2 The ES sets out the findings of the Environmental Impact Assessment (EIA) process and accompanies an application for development consent for the Transmission Assets. This Non-Technical Summary is intended to act as a stand-alone document that provides an overview of the Transmission Assets and its likely significant effects in non-technical language. Further detailed information is provided in the ES, which can be viewed at www.morecambeandmorgan.com/transmission.

1.1.2 Introduction to the Transmission Assets

1.1.2.1 The UK Government's ambition is to lead the world in combatting climate change, reducing reliance on fossil fuels and embracing a future where renewable energy powers homes and businesses. At the centre of this drive is a commitment to reducing UK greenhouse gas emissions and reaching net zero by 2050. The UK government has an ambition to generate 50 gigawatts of clean, renewable energy from offshore wind by 2030.

1.1.2.2 In July 2022, the UK Government published its 'Pathway to 2030 Holistic Network Design' documents, which set out the approach to connecting 50 gigawatts of offshore wind to the National Grid. A key output of this process was the conclusion that the Morgan Offshore Wind Project and the Morecambe Offshore Windfarm should work collaboratively in connecting their two wind farms (located in the East Irish Sea) to the National Grid electricity transmission network at Penwortham in Lancashire.

1.1.2.3 Connecting these wind farms to the National Grid will contribute to:

- the UK Government's ambition to deliver 50 GW of offshore wind by 2030;
- delivering much needed investment and securing construction and operations jobs in the UK;
- securing our energy supply; and
- the UK's response to the climate change crisis.

1.1.2.4 Morgan Offshore Wind Limited (Morgan OWL) and Morecambe Offshore Windfarm Ltd (Morecambe OWL) (hereafter referred to as 'the Applicants') are therefore jointly seeking a single consent for two aligned but electrically separate sets of transmission works. The location of the Transmission Assets is shown in **Figure 1.1a** and **Figure 1.1b**.

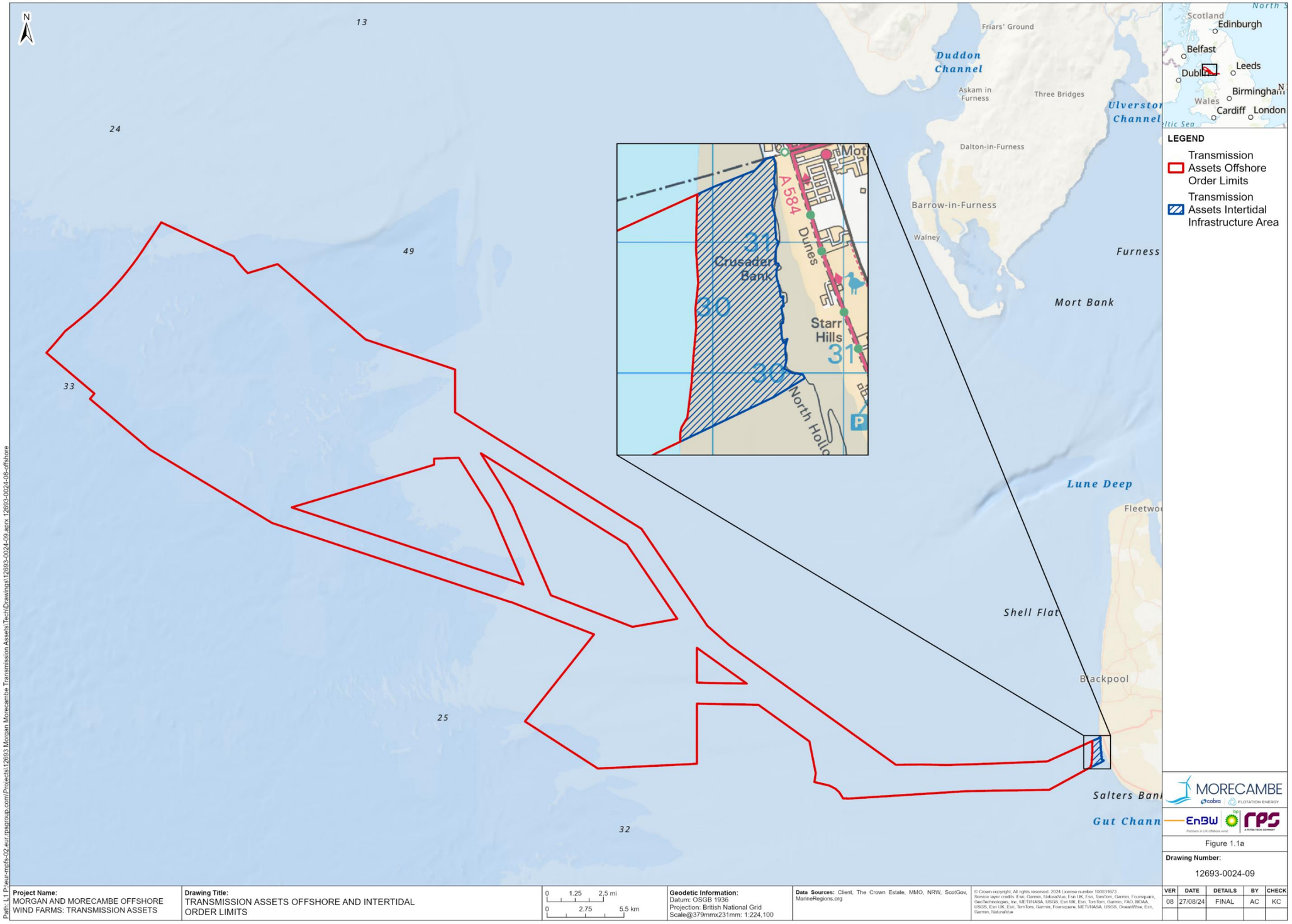


Figure 1.1a: Transmission Assets Offshore and Intertidal Infrastructure Area

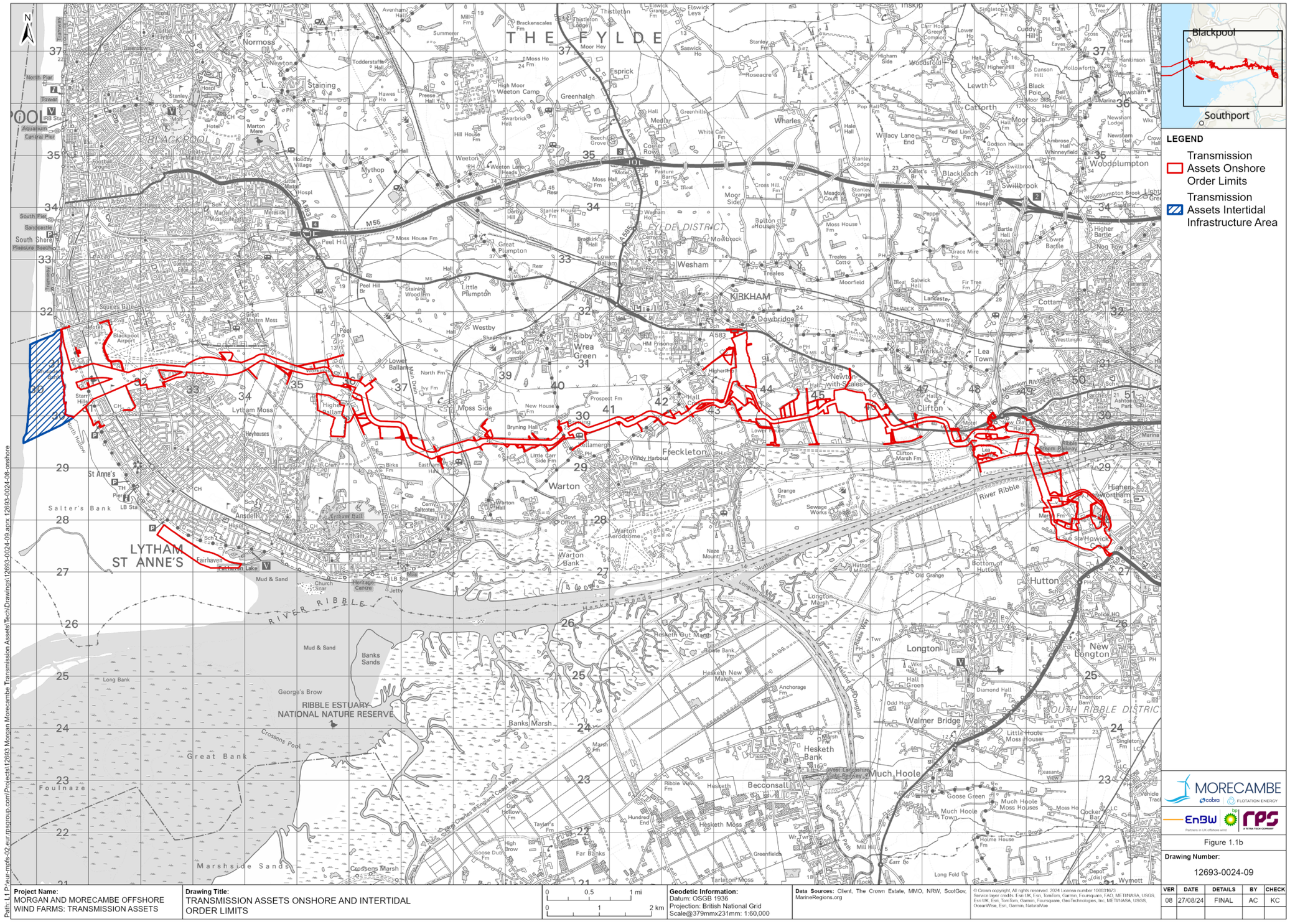


Figure 1.1b: Transmission Assets Onshore Order Limits and Intertidal Infrastructure Area

2 Policy and legislative context

2.1 Consenting regime

2.1.1.1 The Morgan Offshore Wind Project and the Morecambe Offshore Windfarm are Nationally Significant Infrastructure Projects under the Planning Act 2008, as they exceed the threshold for an offshore generating station of 100 megawatts.

2.1.1.2 Following a request from the Applicants, on 4 October 2022 the Secretary of State issued a direction under section 35 of the Planning Act 2008 that the Transmission Assets should be treated as development for which development consent is required under the Planning Act 2008. Applications for development consent under the Planning Act 2008 are submitted to and examined by the Planning Inspectorate and determined by the relevant Secretary of State. At the time of writing, this is the Secretary of State for Energy Security and Net Zero.

2.1.1.3 The key stages of the consenting process under the Planning Act 2008 are summarised in **Figure 2.1**.

2.2 Environmental Impact Assessment

2.2.1.1 EIA is the process of identifying and assessing the significant effects on the environment likely to arise from a project. This requires consideration of the likely changes to the environment where these arise as a consequence of a project. For the Transmission Assets, the legislative requirements for EIA are set by The Infrastructure Planning (Environmental Impact Assessment) Regulations 2017, as amended (referred to in this report as the EIA Regulations).

2.2.1.2 The results of the EIA process are presented in an Environmental Statement (ES). The ES provides the decision maker with information on the likely significant effects of the environment arising from a project, taking into account the mitigation measures proposed.

2.3 Planning policy context

2.3.1.1 National planning policy has been taken into account during the EIA process, including the designated National Policy Statements for energy projects, which were published in 2023 and adopted in 2024.

2.3.1.2 The onshore elements of the Transmission Assets are located within the administrative areas of Fylde Council, Blackpool Council, South Ribble Borough Council and Preston City Council (and Lancashire County Council at the County level). Adopted and emerging local plan documents have been taken into account throughout the EIA process.

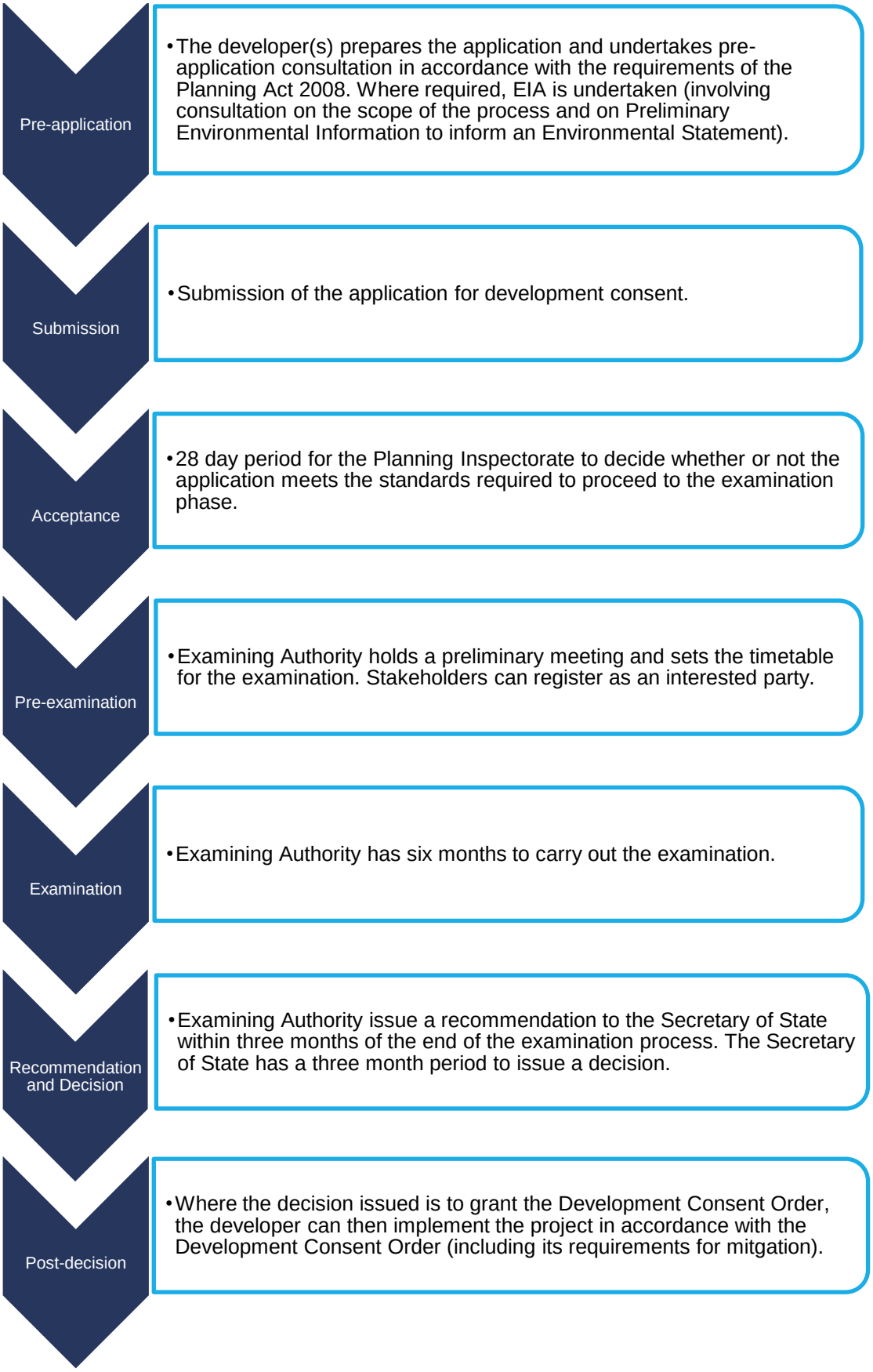


Figure 2.1: Overview of the Planning Act 2008 consenting process

3 Consultation and engagement

3.1 EIA scoping

3.1.1.1 Scoping is the process of identifying the relevant environmental topics to consider within the EIA process (establishing the scope of the assessment). Scoping is therefore an important preliminary stage, which sets the context for the EIA process. Through scoping, the key environmental impacts are identified at an early stage, which permits subsequent work to concentrate on those topics for which significant effects may arise.

3.1.1.2 The scoping process is informed by increasing knowledge acquired through the EIA process, as set out in **Figure 3.1.**

Figure 3.1: Overview of the scoping process

3.1.1.3 Consultation on the approach to EIA was undertaken at the EIA scoping stage. The Scoping Report, which contained details of the approach to EIA for each topic was submitted to the Planning Inspectorate on 28 October 2022. The Applicants received the Scoping Opinion on 8 December 2022. The Applicants met with a range of stakeholders to discuss the feedback in more detail and to consider design refinements.

3.2 Engagement and the Evidence Plan process

3.2.1 Overview

3.2.1.1 Following scoping, engagement continued in order to facilitate proportionate EIA and the iterative design process.

3.2.1.2 A key part of this engagement includes the Evidence Plan process. An Evidence Plan process Steering Group was set up to include the following:

- the Applicants and their EIA consultants;
- the Planning Inspectorate;
- statutory consultees including Natural England, the Marine Management Organisation, the Centre for Environment, Fisheries and Aquaculture Science and Historic England; and
- local authorities, including Blackpool Council, Fylde Council, Preston City Council, South Ribble Borough Council and Lancashire County Council.

3.2.1.3 The Steering Group has met at key milestones throughout the EIA process. Details of all meetings are provided in the Consultation Report (document reference E1).

3.2.2 Non-statutory community engagement

3.2.2.1 Alongside stakeholder engagement via the Evidence Plan process, two rounds of non-statutory consultation with communities have been undertaken to date, as set out below.

- 2 November to 13 December 2022: to introduce the Transmission Assets, share early plans and give an opportunity for comment.
- 19 April to 4 June 2023: to seek feedback from the community on key elements of the Transmission Assets, including:
  - the landfall area;
  - the indicative onshore export cable corridor and associated temporary and permanent areas; and
  - the indicative search areas for onshore substation locations.

3.2.2.2 Each round of consultation has included in-person drop in consultation events, pop-up events and online webinars.

3.2.3 Statutory consultation

3.2.3.1 The Applicants published the Preliminary Environmental Information Report (PEIR) (and accompanying documentation) in October 2023 to form the basis of statutory consultation under the Planning Act 2008. The PEIR presented the preliminary findings of the EIA process in accordance with Regulation 12 of the 2017 EIA Regulations. Statutory consultation ran between the 12 October and 23 November 2023.

3.2.3.2 Public exhibitions and online webinars were held during the statutory consultation period. At these events, the Applicants consulted stakeholders and the local community on the contents of the PEIR alongside a suite of other documents. Feedback has helped to refine the design of the Transmission Assets and inform the EIA process.

3.2.3.3 After PEIR statutory consultation, additional periods of targeted statutory consultation were undertaken by the Applicants, including where new

persons with an interest in land were identified following refinement and amendments of the boundary of the onshore elements of Transmission Assets.

3.2.3.4 All consultation materials are available online at:

- https://morecambeandmorgan.com/

4 Environmental assessment methodology

4.1 Approach to EIA

4.1.1 Design envelope approach

4.1.1.1 At this stage of the EIA and consenting process, the project description for the Transmission Assets is indicative, with confirmed commitments that will guide the final design and its construction, operation and maintenance, and decommissioning phases.

4.1.1.2 In such cases, a Project Design Envelope approach is used. This approach defines a design envelope and parameters within which the final design will sit. The adoption of this approach allows meaningful EIA to take place by defining a 'maximum design scenario' on which to base the identification of likely environmental effects. By identifying the maximum design scenario for any given impact, it can be concluded that the impact (and therefore the resulting effect) as built would be no greater than what has been assessed within the ES.

4.1.1.3 The final design for the Transmission Assets will be selected after development consent has been granted, from within the parameters set out in the ES and draft Development Consent Order.

4.1.2 Mitigation and the iterative design process

4.1.2.1 During the EIA process, environmental issues have been taken into account as part of an ongoing iterative design process. The process of EIA has therefore been used as a means of informing the design. This design process is shown in **Figure 4.1** and allows for the use of good design principles alongside the identification of key constraints to inform the design process.

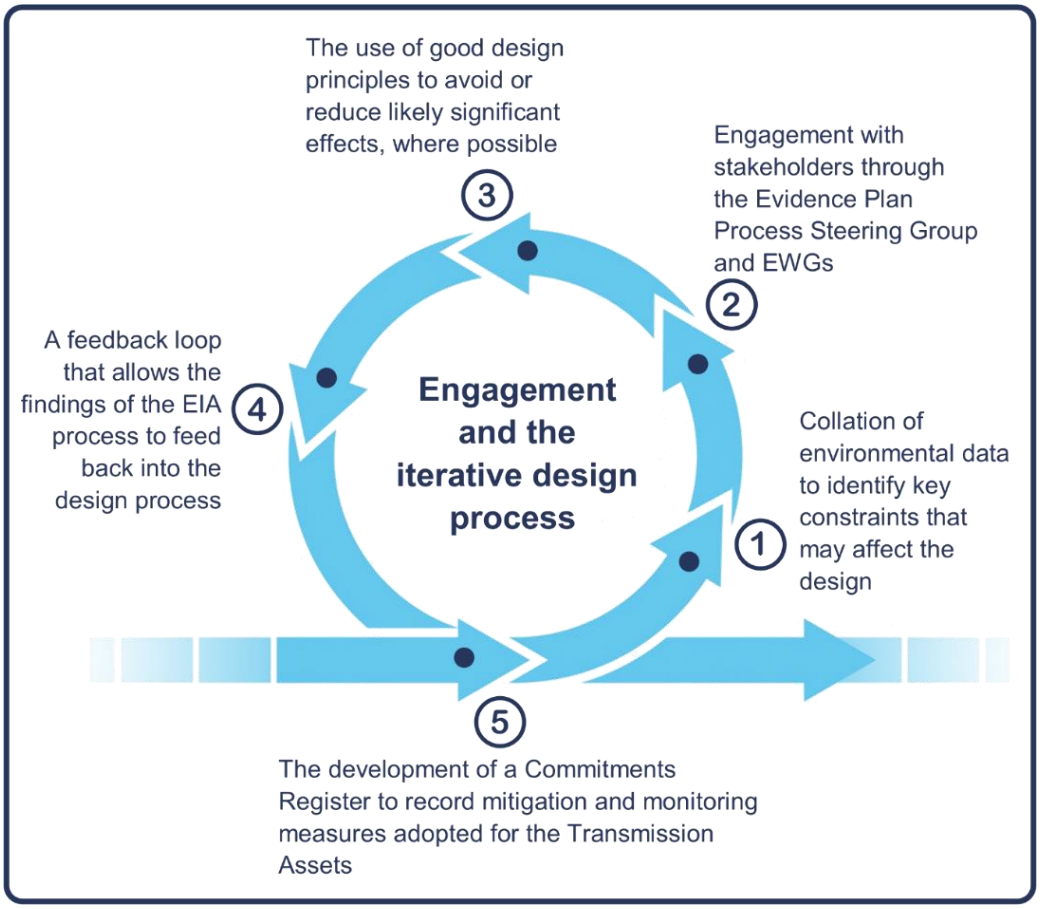


Figure 4.1: Engagement and the iterative design process

4.1.2.2 For the purposes of the ES, the term ‘measures adopted as part of the Transmission Assets’ is used to refer to mitigation measures that have been identified during the EIA process and are committed to by the Applicants.

4.1.3 Assessment of effects

4.1.3.1 EIA is a means of identifying and collating information to inform an assessment of the likely significant environmental effects of a development. For each of the key environmental topics in the ES, information about the following is provided:

- assessment methodology;
- description of the existing environmental (baseline) conditions;
- identification and assessment of the significance of likely effects arising from the Transmission Assets;
- identification of any mitigation measures proposed to avoid, reduce and, if possible, remedy adverse effects; and
- assessment of any cumulative effects with other proposed developments planned in the area, transboundary effects and inter-relationships between environmental topics.

4.1.3.2 The Transmission Assets have the potential to create a range of 'impacts' and consequent 'effects' with regard to the environment. The term 'impact' is

defined as a change that is caused by an action. The term 'effect' is defined as the consequence of an impact. For example, the laying of a cable (action) results in disturbance (impact), with the potential to disturb habitats and species (effect). This Non-Technical Summary sets out the impacts and effects considered within the EIA process and a summary of the findings, including identification of the likely significant effects that may occur as a result of the Transmission Assets.

4.1.4 Cumulative effects with other projects

4.1.4.1 Cumulative effects are defined as those that result from incremental changes caused by other proposed developments, alongside the Transmission Assets. This includes projects that were not present at the time of data collection or survey and, as such, are not considered as part of the baseline for the topic being assessed.

4.1.4.2 An assessment of cumulative effects has been undertaken, including four scenarios:

- Scenario 1: Transmission Assets with the Morecambe Offshore Windfarm: Generation Assets;
- Scenario 2: Transmission Assets with the Morgan Offshore Wind Project: Generation Assets;
- Scenario 3: Transmission Assets with the Morecambe Offshore Windfarm: Generation Assets and Morgan Offshore Wind Project: Generation Assets (referred to together as the Generation Assets); and
- Scenario 4: Transmission Assets, Generation Assets, and other projects, plans and activities.

4.1.4.3 This Non-Technical Summary sets out the cumulative impacts and effects considered within the EIA process and a summary of the findings, including identification of the likely significant effects of the Transmission Assets with other projects.

4.1.5 Transboundary effects

4.1.5.1 Transboundary effects arise when impacts from a project within one European Economic Area affect the environment of another. Transboundary effects have been identified within the ES and are set out within this Non-Technical Summary where relevant.

5 Project description

5.1 Overview

5.1.1 Key elements of the Transmission Assets

5.1.1.1 The application for development consent for the Transmission Assets includes the transmission infrastructure required to connect the Morgan Offshore Wind Project: Generation Assets and the Morecambe Offshore Windfarm: Generation Assets to the National Grid, as shown on **Figure 5.1**.

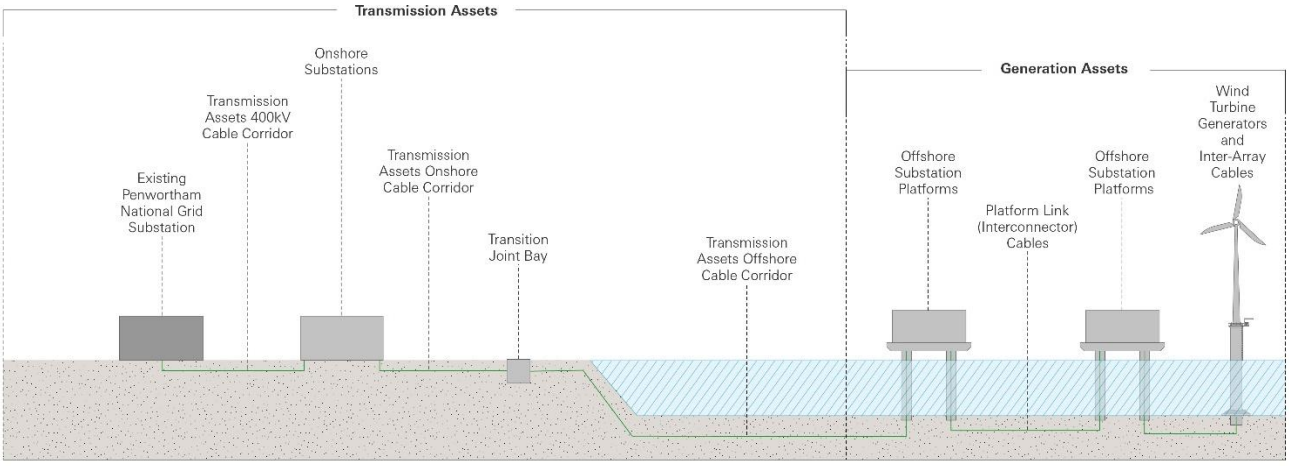


Figure 5.1: Key elements of the Transmission Assets

5.1.1.2 The design philosophy is for the transmission infrastructure for each wind farm to remain electrically independent (i.e., each wind farm to have its own sets of cabling and substation infrastructure). However, the location of the infrastructure will be aligned within offshore and onshore cable corridors, where possible, to minimise impacts to the environment and the community.

5.1.1.3 The key elements of the Transmission Assets include the following:

- Offshore elements:
  - offshore export cables: these export cables will bring the electricity generated by the Generation Assets to the landfall for onward transmission.
- Landfall:
  - landfall site: this is where the offshore export cables are jointed to the onshore export cables via the transition joint bays. This term applies to the entire area between mean low water springs and the transition joint bays.
- Onshore elements:
  - onshore export cables: these export cables will be jointed to the offshore export cables via the transition joint bays at the landfall site, and will bring the electricity generated by the Generation Assets to the onshore substations;

- onshore substations: the two electrically separate onshore substations will contain the components for transforming the power supplied via the onshore export cables up to 400 kV;
- 400 kV grid connection cables: these export cables will bring the electricity generated by the Generation Assets from the two electrically separate onshore substations to the existing National Grid substation at Penwortham;
- environmental mitigation areas: temporary and/or permanent areas, including accesses identified to provide environmental mitigation only; and
- biodiversity benefit areas: temporary and/or permanent areas, including accesses identified to provide biodiversity benefit only.

5.1.1.4 The onshore export cables and the 400 kV grid connection cables will be completely buried underground for their entire length. No overhead pylons will be installed as part of the Transmission Assets.

5.1.1.5 In addition to the permanent elements outlined in **paragraph 5.1.1.3**, temporary onshore infrastructure would be required for the construction phase, including construction compounds and construction access routes.

5.1.1.6 All of the above elements will be located within the Transmission Assets Order Limits shown on **Figure 5.2**. The key parameters used for the environmental assessment, comprising for example the maximum number or maximum length of a component are presented in **Table 5.1**.

Table 5.1: Key parameters for the Transmission Assets

Parameter	Morgan Offshore Wind Project	Morecambe Offshore Windfarm	Total/maximum parameter
Offshore Infrastructure			
Maximum number of offshore export cables	4	2	6
Maximum length of offshore export cables (km) – per cable	100	42	N/A
Maximum length of offshore export cables (km) – all cables	400	84	484
Onshore Infrastructure			
Maximum number of onshore export cables	12 (4 circuits)	6 (2 circuits)	18 (6 circuits)
Maximum number of 400 kV grid connection cables	6 (2 circuits)	6 (2 circuits)	12 (4 circuits)
Maximum length of onshore export cable corridor (km)	17	17	N/A
Maximum number of onshore substations	1	1	2
Maximum height of onshore substations (m)	15	13	N/A
Maximum length of 400 KV grid connection corridor (km)	13	13	N/A

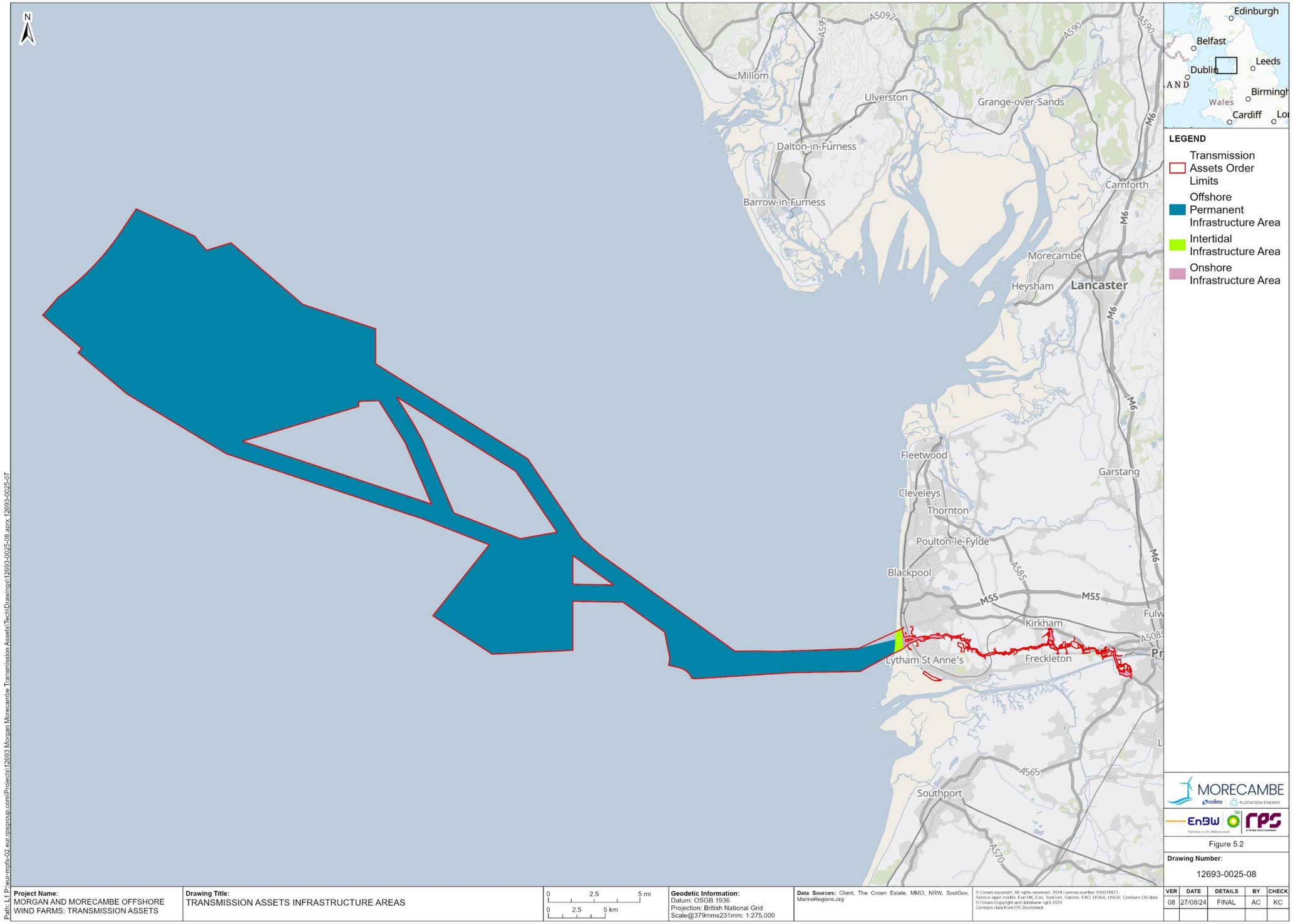


Figure 5.2: Transmission Assets Infrastructure Areas

5.1.2 Programme

5.1.2.1 At this stage, the timing of construction activities is indicative. Both the Morgan Offshore Wind Project and the Morecambe Offshore Windfarm are intended to be fully operational by 2030. Therefore, it is likely that all elements of the Transmission Assets will need to be completed by this time.

5.1.2.2 However, to allow for any unexpected circumstances (such as delay to one project), a range of scenarios have been considered for the environmental assessment including construction of the transmission assets for each wind farm sequentially or concurrently.

5.2 Offshore elements of the Transmission Assets

5.2.1 Introduction

5.2.1.1 The permanent offshore infrastructure will be located within the Offshore Permanent Infrastructure Area as shown on **Figure 5.2**.

5.2.2 Pre-construction site investigation surveys

5.2.2.1 Pre-construction site investigation surveys will be undertaken to provide detailed information on seabed conditions and to identify the presence/absence of any potential obstructions or hazards. Geophysical surveys will also be undertaken in the area of the offshore export cables to provide more detailed mapping of unexploded ordnance, bedform and boulders, as well as an overview of the seabed and subsoil layers.

5.2.3 Offshore export cables

5.2.3.1 Offshore export cables are used for the transfer of power from the offshore wind farms to the landfall. Up to six offshore export cables will be required (up to four for the Morgan Offshore Wind Project and up to two for the Morecambe Offshore Windfarm).

5.2.3.2 The offshore export cables will be buried below the seabed wherever possible and protected with cable protection where adequate burial is not achievable. The offshore export cables would be installed using a range of techniques, such as trenching, plough, jetting or mechanical cutting.

5.3 Landfall

5.3.1.1 The landfall is the area where the offshore export cables come onshore. This is the transitional area between the offshore cabling and the onshore cabling. The landfall will be located along the north west coast of England near Lytham St. Annes, Lancashire as shown on **Figure 5.2.** It includes the area between mean low water springs and the transition joint bays. Six transition joint bays would be required (one per cable circuit).

5.3.1.2 The offshore export cables will be installed using trenchless techniques from the transition joint bays at Blackpool Airport to an exit location on the beach. The use of trenchless techniques would mean that the cables pass beneath

the golf course, the A584, the Preston to Blackpool South Railway Line and the sand dunes at Lytham St. Annes Dunes Site of Special Scientific Interest. Cable installation from the exit location across the intertidal (beach) area at Lytham St. Annes will be by open trenching technique.

5.3.1.3 The offshore export cables will be jointed to the onshore export cables at transition joint bays. The transition joint bays are underground concrete structures.

5.4 Onshore elements of the Transmission Assets

5.4.1 Introduction

5.4.1.1 The permanent onshore infrastructure will be located within the Onshore Infrastructure Area shown on **Figure 5.2**. The onshore elements are shown in more detail in **Figure 5.3**.

5.4.2 Onshore export cables

5.4.2.1 The onshore export cables will provide a cable connection between the landfall site and the proposed onshore substations. The onshore cable corridor will be up to 17 km in length.

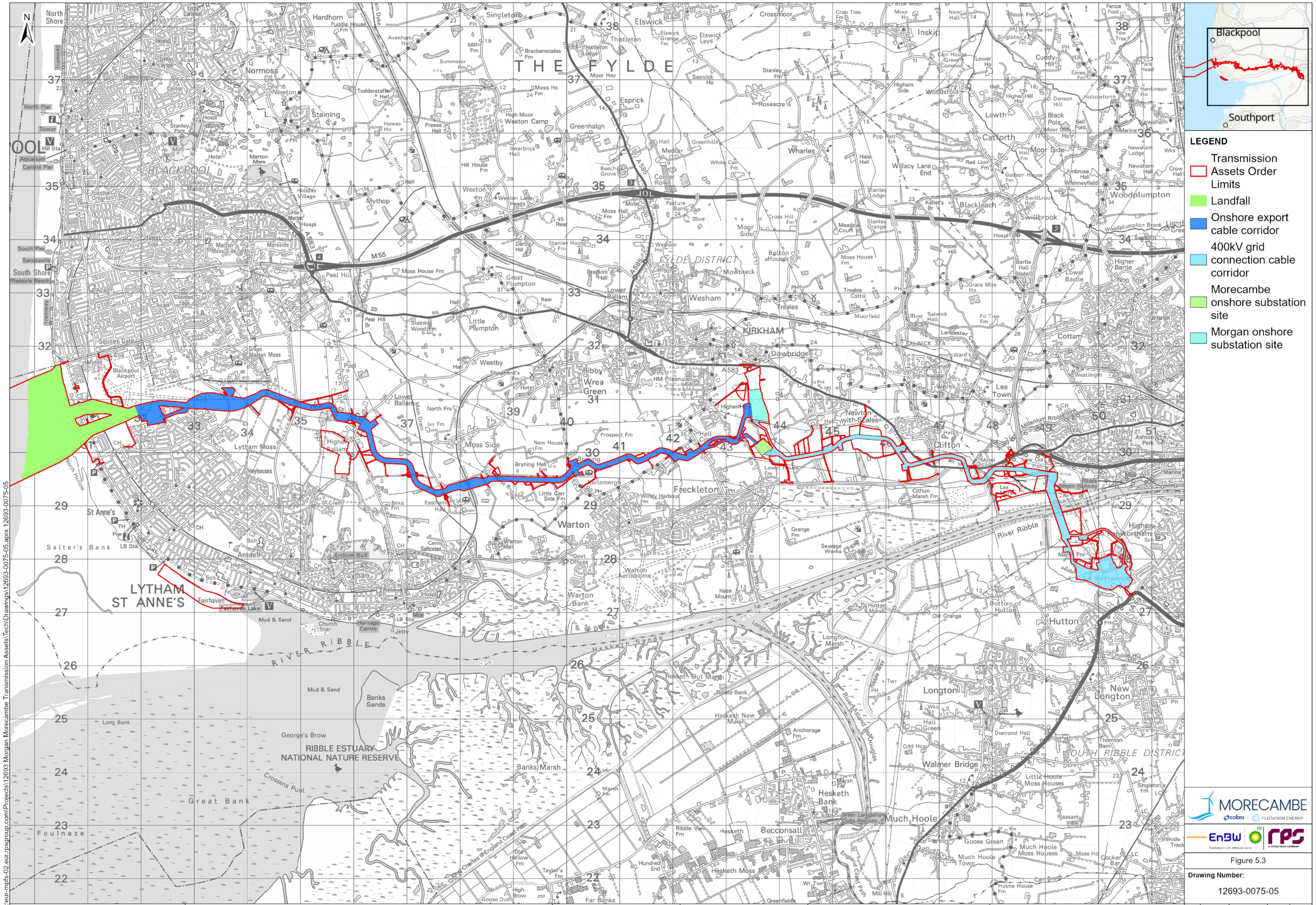
5.4.2.2 From the landfall, the onshore export cable corridor will route east inland away from the coast. In the vicinity of Blackpool Airport, the cable route would split, with some cables passing in the northerly section of the Onshore Infrastructure Area through Blackpool Airport and the remaining cables passing further south through Blackpool Airport and the Blackpool Road Playing Field.

5.4.2.3 Beyond Blackpool Airport and Queensway (B5261), the onshore export cable route corridor narrows and routes south east towards North Houses Lane. It then passes to the north of Higher Ballam.

5.4.2.4 The onshore export cable corridor then continues north east towards Halls Cross, north of Freckleton before reaching the onshore substation just west of Newton-with-Scales.

5.4.2.5 Up to 18 onshore export cables are anticipated to be required (up to twelve for the Morgan Offshore Wind Project and up to six for the Morecambe Offshore Windfarm). These will generally be installed through open cut techniques, but trenchless techniques, such as horizontal directional drilling, will be used where required, for example beneath roads and watercourses.

5.4.2.6 An indicative cross section for a typical part of the construction corridor is shown in **Figure 5.4**. Once installed, the cables will typically occupy a corridor up to 70 m wide.



Project Name:	Drawing Title:	Geodetic Information:	Data Sources:
MORGAN AND MORECAMBE OFFSHORE WIND FARMS: TRANSMISSION ASSETS	LANDFALL AND ONSHORE ELEMENTS OF THE TRANSMISSION ASSETS	Datum: OSGB 1936 Projection: British National Grid Scale@379mmx231mm: 1:60,000	Client, The Crown Estate, MMO, NRW, ScotGov, MarineRegions.org

Scale: 0 – 0.5 – 1 mi; 0 – 1 – 2 km

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Path: L1 P:\eur-mpfs-02.eur.rpsgroup.com\Projects\12693 Morgan Morecambe Transmission Assets\Tech\Drawings\12693-0075-05.aprx 12693-0075-05

Figure 5.3

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Figure 5.3: Landfall and onshore elements of the Transmission Assets

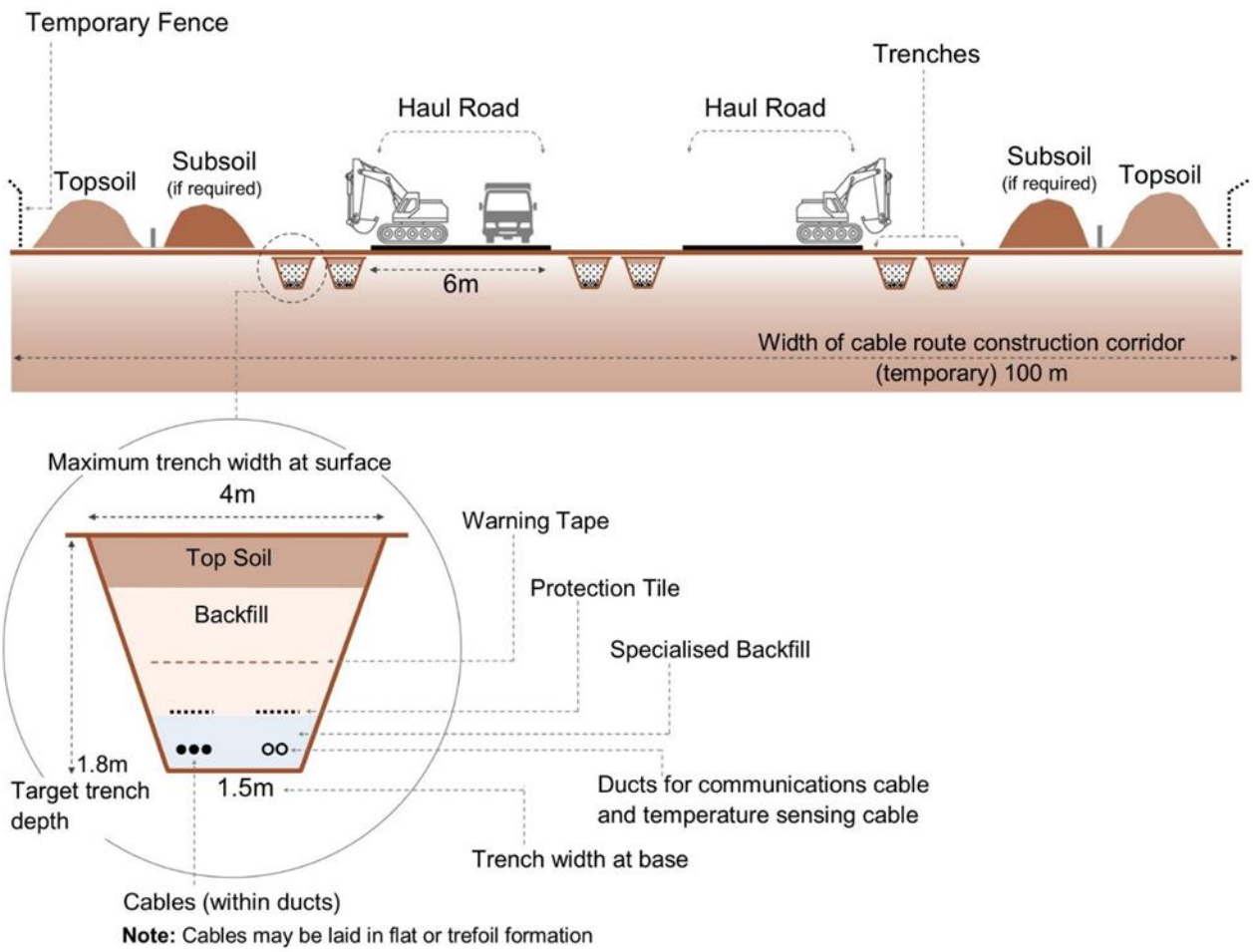

Figure 5.4: Indicative temporary cable corridor cross section

5.4.3 Onshore substations

5.4.3.1 The proposed onshore substations will transform the power supplied through the onshore export cables to 400 kV, to allow a connection to the National Grid substation at Penwortham.

5.4.3.2 To maintain electrical independence, one substation will be required for the Morgan Offshore Wind Project and one for the Morecambe Offshore Windfarm. The two substations will, however, be located close to one another. The onshore substation sites are shown on **Figure 5.5.**

5.4.3.3 The Morgan substation site is located between Kirkham and Freckleton, directly to the south of the A583 Kirkham Bypass. HM Prison Kirkham is to the north west of the site and Newton-with-Scales is to the east. It would occupy a footprint of 164,000 m^2 including landscape planting, access, flood attenuation and drainage and the main buildings will be up to 15 m high.

5.4.3.4 The Morecambe onshore substation site is located to the south of the Morgan onshore substation site, east of Lower Lane and to the north of Freckleton. It would occupy a footprint of 59,500 m^2 including landscape planting, access, flood attenuation and drainage and the main buildings will be up to 13 m high.

5.4.3.5 Further information about the considerations that will inform the detailed design of the onshore substations is provided in an Outline Design Principles document that accompanies the application for development consent (document reference J3).

5.4.4 400 kV grid connection cables

5.4.4.1 The connection between the proposed new onshore substations for the Transmission Assets and the existing National Grid Penwortham substation will be achieved by the 400 kV grid connection cables. The cable route is likely to be up to 13 km long.

5.4.4.2 Up to twelve 400 kV grid connection cables are anticipated to be required. The cables are predicted to be buried in up to four separate trenches (one circuit per trench, with up to two cable circuits/trenches for the Morgan Offshore Wind Project and two for the Morecambe Offshore Windfarm). These will generally be installed through open cut techniques, but trenchless techniques, such as horizontal directional drilling, direct pipe or micro-tunnels, will be used where required, for example beneath the River Ribble.

5.4.5 Onshore environmental mitigation and biodiversity benefit

Environmental Mitigation

5.4.5.1 The Applicants aim to mitigate effects on habitats arising as a result of the Transmission Assets and to deliver biodiversity benefit, where practicable.

5.4.5.2 A number of areas have been identified and included within the Onshore Order Limits to allow for environmental mitigation in **Figure 5.6.**

Biodiversity Benefit

5.4.5.3 Areas have been identified in order to deliver biodiversity benefit. Measures to be delivered as part of the Outline Onshore Biodiversity Benefit Statement (document reference J11) include, but are not limited to:

- hedgerow and woodland planting;
- construction of new ponds; and,
- creation of species rich grassland and meadow.

5.4.6 Construction environmental management

Code of Construction Practice

5.4.6.1 An Outline Code of Construction Practice (document reference J1) has been prepared and is submitted as part of the application for development consent (document reference J1). This includes measures to reduce temporary disturbance to residential properties, recreational users and existing land users during the construction phase. It includes strategies and control measures for managing the potential environmental effects of construction

and limiting disturbance from construction activities as far as reasonably practicable.

5.4.6.2 Construction will be undertaken in accordance with detailed Code(s) of Construction Practice, which will be developed post-consent and will set out the key management measures that each Applicant will require their contractors to adopt and implement for all relevant construction activities for the landfall and onshore elements of the Transmission Assets.

Working hours

5.4.6.3 Core working hours for the construction of the intertidal and onshore works will be as follows:

- Monday to Saturday: 07:00 - 19:00 hours; and
- up to one hour before and after core working hours for mobilisation ("mobilisation period") i.e. 06:00 to 20:00.

5.4.6.4 Activities carried out during the mobilisation period will not generate significant noise levels (such as piling or other such noisy activities). In certain circumstances, specific construction works may have to be undertaken outside the core working hours. This will include, but is not limited to, works being undertaken within and/or adjacent to Blackpool Airport and cable installation at landfall and at the River Ribble. Advance notice of such works will be given to the relevant planning authority.

Local community liaison

5.4.6.5 The Applicants will establish an approach for liaising with the local community and stakeholders during the construction process, which will build on the engagement undertaken throughout the EIA process. A project website, email address and phone number will remain in place.

5.4.6.6 The Outline Code of Construction Practice (document reference J1), submitted as part of the application for development consent, includes provision for a Community Liaison Officer, who will actively work with the local community to ensure the local community is kept up to date with progress and that any queries arising are dealt with appropriately. The final Code of Construction Practice(s) will also include a procedure for dealing with enquiries or complaints from the public, local authorities or statutory consultees.

5.4.6.7 The Outline Code of Construction Practice (document reference J1) includes provision for an agricultural liaison officer, who will act as the main point of contact for landowners, to provide project updates and to resolve any queries arising during the construction phase.

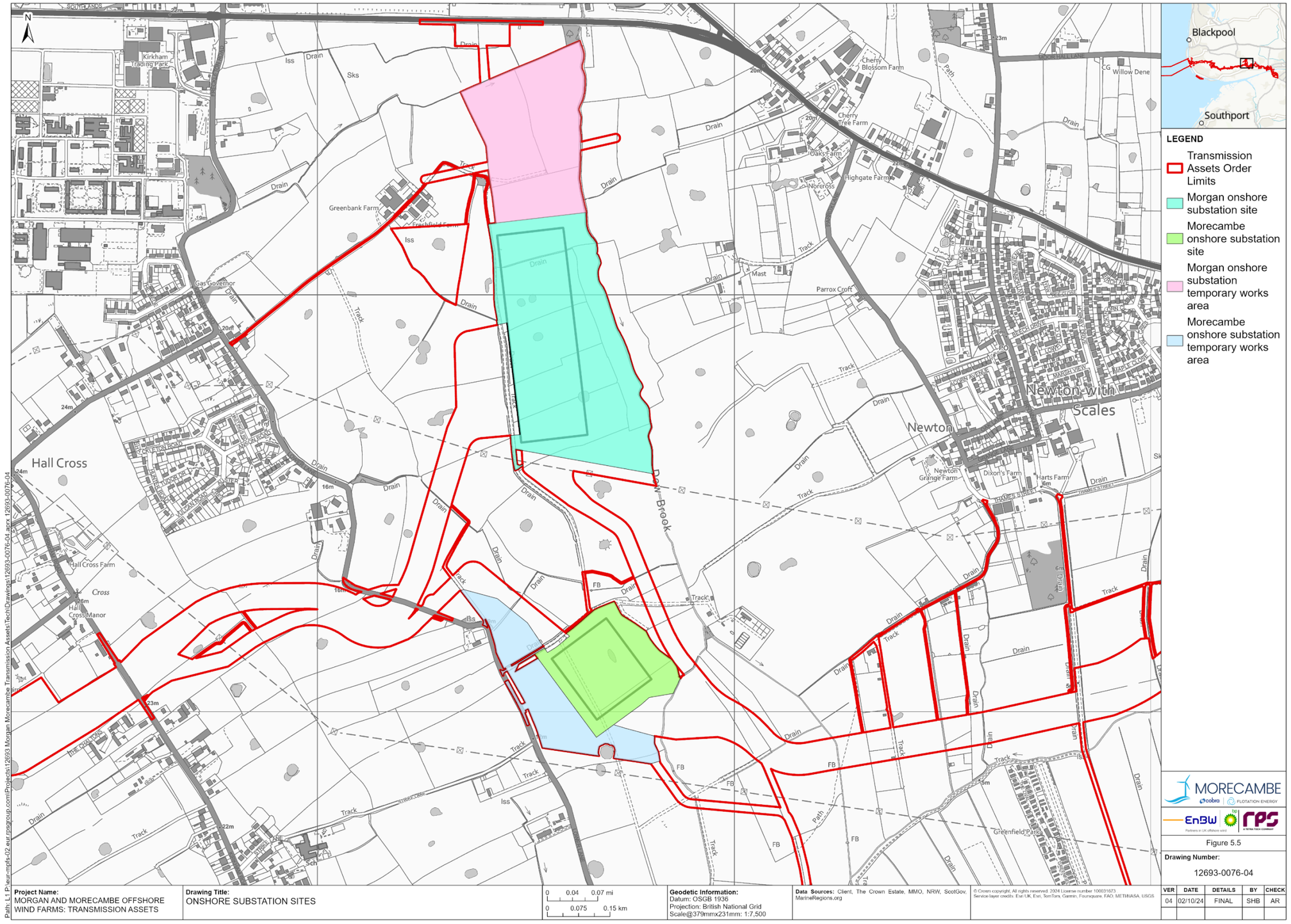

Figure 5.5: Onshore substation sites

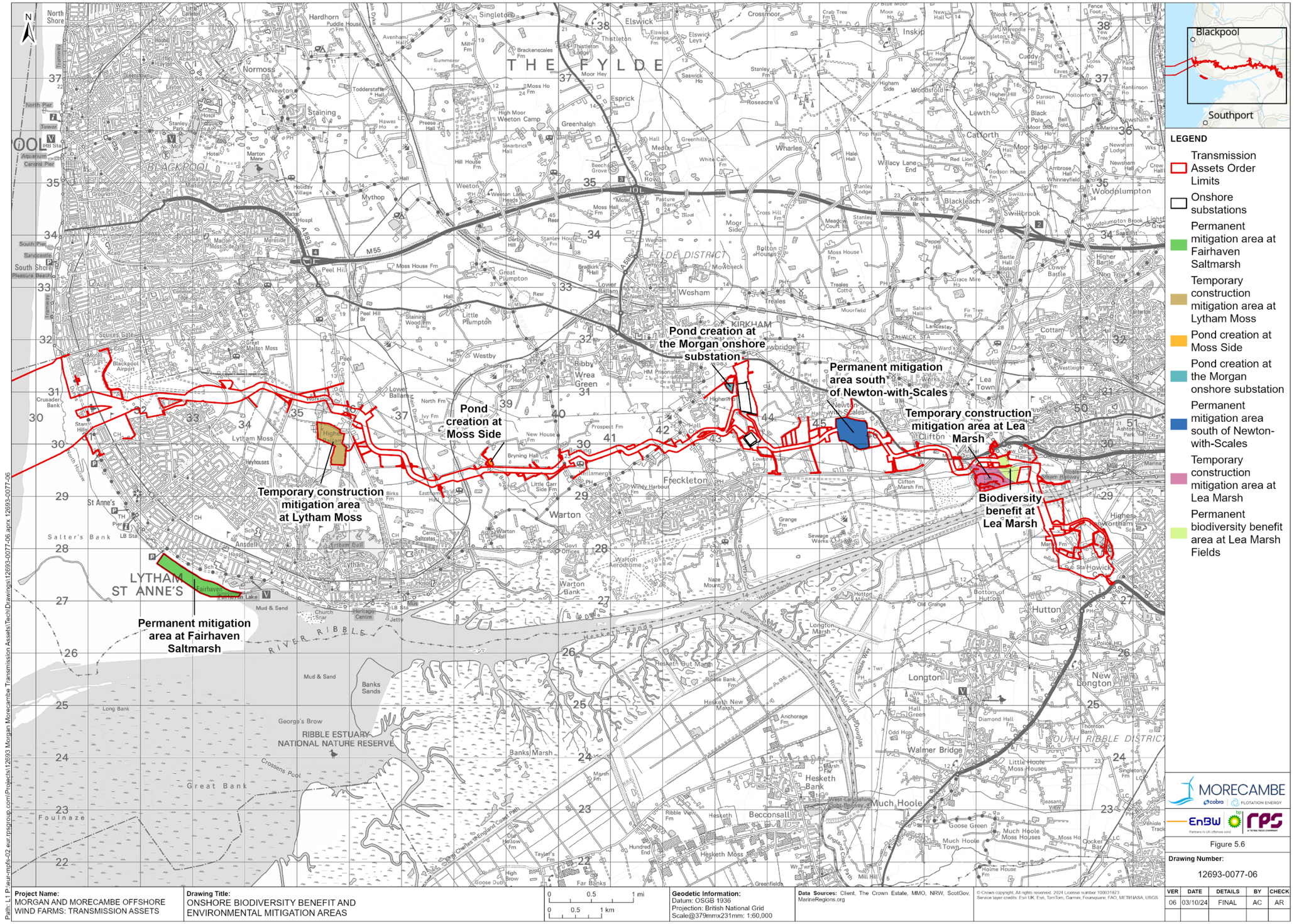

Figure 5.6: Onshore biodiversity benefit and environmental mitigation areas

5.5 Operation and maintenance phase

5.5.1 Offshore operation and maintenance activities

5.5.1.1 The operation and maintenance requirements for the offshore elements of the Transmission Assets are set out within the Outline Offshore Operations and Maintenance Plan which is submitted alongside the application for development consent (document reference J19).

5.5.1.2 Routine inspections of offshore export cables will be undertaken to ensure the cables are buried to an adequate depth and not exposed. The integrity of the cables and cable protection systems will also be checked. It is expected that on average the cables will require up to one visit per year.

5.5.2 Landfall and onshore operation and maintenance activities

5.5.2.1 Link boxes will provide access to the transition joint bays via inspection covers. Access will be required for an annual check and where corrective activities are required (e.g., cable failure requiring replacement or repair).

5.5.2.2 The operation and maintenance requirements for the onshore export cables and 400 kV grid connection cables will involve infrequent on-site inspections of the cables and corrective maintenance activities. The cables will be continuously monitored remotely.

5.5.2.3 The onshore substations will be unmanned but will be continuously monitored remotely.

5.5.3 Electromagnetic fields

5.5.3.1 All onshore electrical cables will be buried underground. As a result, the electromagnetic fields (EMF) they produce are not capable of reaching levels which exceed the public health exposure guideline limits due to the shielding of the cable sheath and burial material.

5.5.3.2 Whilst a detailed design and EMF modelling exercise has not been completed, it can be expected that the strength of EMF at the ground's surface would be below the guideline level and is, therefore, deemed not to have an impact on public health.

5.5.3.3 The Applicants have made the commitment that that all onshore electricity infrastructure built as part of the Transmission Assets will be designed to comply with guidelines and a voluntary code of practice to ensure the threshold for impacts to humans is not met and or exceeded. Further information is provided in the EMF compliance statement (document reference F1.3.4).

5.6 Decommissioning phase

5.6.1.1 An Onshore Decommissioning Plan and Offshore Decommissioning Programme will be developed prior to decommissioning in a timely manner and will be in line with the latest relevant available guidance. It is anticipated that all onshore, above ground structures would be completely removed. It is

anticipated that offshore cables and any offshore cable protection may be left *in situ*, to minimise environmental impacts associated with their removal.

5.6.1.2 To minimise the environmental disturbance during decommissioning, the onshore cables may be recovered and removed by pulling the cables through the ducts (e.g., for recycling). Otherwise, they will be left in place in the ground with the cable ends cut, sealed and securely buried as a precautionary measure.

5.6.1.3 Joint 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.

6 Site selection and alternatives

6.1.1 Overview

6.1.1.1 The Applicants have followed an iterative site selection and design process from inception to finalisation of design for application in order to identify the most suitable locations and configuration, based on the criteria outlined below for the Transmission Assets. The process has taken account of environmental, physical, technical, commercial, and social considerations and opportunities as well as engineering requirements.

6.1.1.2 The aim has been to identify sites and routes that will be environmentally acceptable, deliverable and consentable, whilst also enabling the benefits in the long term of the lowest energy cost to be passed to the consumer.

6.1.2 Point of interconnection

6.1.2.1 Both the Morgan Offshore Wind Project and the Morecambe Offshore Windfarm were scoped into the 'Pathways to 2030' workstream under the Offshore Transmission Network Review (OTNR). The OTNR aims to consider, simplify, and wherever possible facilitate a collaborative approach to offshore wind projects connecting to the National Grid.

6.1.2.2 A number of potential grid connection locations and options were considered by NGESO through the Holistic Network Design (HND) process based on an understanding of the grid infrastructure capacity in relation to the location of the Morgan Offshore Wind Project and Morecambe Offshore Windfarm Agreement for Lease areas (i.e., where the offshore wind farms would be located) (and considering other Round 4 offshore wind projects coming forwards in the Irish Sea). A key output of the HND process was the conclusion that the two offshore wind farms should collaborate in consenting their connections to the national grid electricity transmission network at Penwortham in Lancashire.

6.1.3 Landfall

6.1.3.1 The landfall point is where the offshore export cables would be brought ashore before being connected to the onshore export cables. One of the key considerations for landfall was the location of the Morgan Offshore Wind Project: Generation Assets and Morecambe Offshore Windfarm: Generation Assets (referred to as the Generation Assets) and the location of the National Grid substation at Penwortham. An initial area of search area was identified for the landfall between the towns of Blackpool and Formby.

6.1.3.2 Broad landfall zones were then identified based on initial constraints analysis and guided by the overarching design principles of:

- selecting the shortest route possible;
- where possible, avoiding key sensitive receptors; and
- selecting an area with adequate space.

6.1.3.1 Of the six potential landfall locations initially identified, those locations south of the Ribble Estuary were primarily discounted due to designations and built up areas as well as generally resulting in longer and less direct cable routes. Coastal landfall constraints to the south of the Ribble Estuary also included more potential to interact with populated areas, Special Category Land (e.g., Royal Air Force/Ministry of Defence land), infrastructure crossings, main rivers and non-statutory nature designations. These, coupled with engineering constraints relating to the extent of shallow water depths nearshore and larger intertidal/estuarine environments, resulted in the landfall locations south of the Ribble Estuary being discounted.

6.1.3.2 The Lytham St. Annes Landfall Zone north of the Ribble was therefore the only landfall zone taken forward from the Scoping stage and refined up to the development consent application with the final landfall alignment shown on **Figure 5.3.**

6.1.4 Offshore elements

6.1.4.1 The offshore export cable corridor routing exercise sought to identify the shortest route from the Generation Assets to the selected landfall location at Lytham St Annes, whilst avoiding environmental sensitivities and third-party/existing seabed users.

6.1.4.2 Initially, five potential export routes were identified:

- Route 1: Morgan cables exit the Morgan Offshore Wind Project: Generation Assets from north and travel east through the northern part of the gas fields. Route 1 aligns with the Morecambe cables exiting the eastern side of the Morecambe Offshore Windfarm: Generation Assets and the aligned corridor (Route 1 and 5) heads east to the coast.
- Route 2: Morgan cables exit the Morgan Offshore Wind Project: Generation Assets from north and travel east through the southern part of the gas fields and along the northern boundary of the Morecambe Offshore Windfarm: Generation Assets. Route 2 aligns with the Morecambe cables exiting the eastern side of the Morecambe Offshore Windfarm: Generation Assets and the aligned corridor (Route 2 and 5) heads east to the coast.
- Route 3: Morgan cables exit the Morgan Offshore Wind Project: Generation Assets from south and travel east through the southern part of the gas fields and along the northern boundary of the Morecambe Offshore Windfarm: Generation Assets. Route 3 aligns with the Morecambe cables exiting the eastern side of the Morecambe Offshore Windfarm: Generation Assets and the aligned corridor (Route 3 and 5) heads east to the coast.
- Route 4: Morgan cables exit the Morgan Offshore Wind Project: Generation Assets from south and travel to the coast to the south of the Morecambe Offshore Windfarm: Generation Assets. Route 4 aligns with the Morecambe cables exiting the eastern side of the Morecambe Offshore Windfarm: Generation Assets and the aligned corridor (Route 4 and 5) heads east to the coast.

- Route 5: Morecambe cables exit eastern side of the Morecambe Offshore Windfarm: Generation Assets and aligns with Morgan cable routes (Route 1, 2, 3 or 4) and the aligned corridor heads east to the coast.

6.1.4.3 After completion of an initial constraints analysis and engineering feasibility studies, Route 4 was discounted largely due to the density and proximity to third party cables/pipeline. The other four routes were retained for PEIR (Routes 1, 2, 3 and 5). For PEIR, two booster station search areas were also included located near to the halfway point along the PEIR cable corridors.

6.1.4.4 The refinement of offshore infrastructure between PEIR and the DCO application focused largely on changes to the design envelope, most notably the removal of the Offshore Substation Platforms (OSPs, which are now included in the respective Generation Assets DCO applications) and the booster station. Slight refinements were also made to the Offshore Order Limits to align with the Morecambe Offshore Windfarm: Generation Asset revisions and removal of a small corner to the northwest of the Offshore Order Limits. The final offshore export cable corridors are shown in **Figure 5.2**.

6.1.5 Onshore substations

6.1.5.1 As each of the wind farms are electrically independent, two new onshore substations, one for each wind farm, are required.

6.1.5.2 An 8 km area of search was drawn around the National Grid substation at Penwortham. This area was then assessed for its suitability to accommodate the onshore substations based on a number of factors including, but not limited to:

- environmental sensitivities e.g., statutory and non-statutory designated sites such as priority habitats, flood risk and contaminated land;
- ground conditions, such as topography;
- analysis of baseline environmental survey data, including ornithology (breeding bird and wintering bird) surveys;
- accessibility to the existing road network;
- proximity to residential properties and receptors;
- proximity to other developments/Major Accident Hazard sites; and
- utility infrastructure (mains and high pressure gas and water pipelines, and overhead pylons and lines).

Onshore substations search zones

6.1.5.3 Subsequently, four onshore substation search zones were identified in the area of search as follows:

- Zone 1 - is an area southeast of Kirkham, northeast of Freckleton and west of Newton-with-Scales. It does not include Kirkham Prison;

- Zone 2 - is an area south of Newton-with-Scales bordered by the Preston New Road (A584) and the Blackpool Road (A583) to the northeast. It does not include Newton Bluecoat Primary School;
- Zone 3 - is an area south of the River Ribble, north of Longton and west of Hutton. It does not include Hutton and Longton Marshes; and
- Zone 4 - is an area south of the River Ribble, north of Hutton and east of Howick Cross and Penwortham. It includes the existing National Grid substation near Penwortham.

6.1.5.4 The four zones were assessed for their suitability for siting the onshore substations and, in addition, a non-statutory consultation event held between April and June 2023 sought feedback on the onshore substation zones and to obtain local knowledge about the surrounding area.

6.1.5.5 Zone 1 was considered to be the most preferable as it was the least constrained with an absence of priority habitat or protected and notable species compared to other zones. It was subsequently taken forward for further assessment as the onshore substation's consultation area at PEIR whilst the other three zones were discounted from further consideration.

6.1.5.6 A further site selection exercise was then undertaken to identify appropriate areas within Zone 1 that aligned with the site selection principles and that could accommodate the onshore substations. This enabled the following potential substation site options to be identified within Zone 1 for PEIR:

- One preferred onshore substation site for the Morgan Offshore Wind Project: Transmission Assets; and
- Two onshore substation site options for the Morecambe Offshore Windfarm: Transmission Assets
  - Morecambe substation site option 1 (north); or
  - Morecambe substation site option 2 (south).

6.1.5.7 The formal consultation period for PEIR provided the opportunity for statutory stakeholders, landowners, nearby residents and members of the public to comment on the site selected for the Morgan substation and site options for the Morecambe substation.

Morgan Offshore Wind Project: Transmission Assets onshore substation

6.1.5.8 For the Morgan onshore substation, the key refinement made to address the comments received for PEIR was to relocate the Morgan substation site further to the east. The siting of the substation to the east lessened the impact on agricultural activities and holdings. The new location also addressed concerns from nearby residents who felt the substation was too close to the residential areas of Kirkham South and Hall Cross. The increased distance allows more opportunity to utilise existing screening to reduce views of the substation from these areas.

6.1.5.9 Further refinement saw the Morgan substation construction compound being located to the north of the substation site. This meant that both construction

and operational access could be taken directly from the A583 via a new access, eliminating the requirement for any construction traffic to traverse Lower Lane. It also meant that the Public Right of Way (PRoW) was no longer located between the construction compound and the substation platform, thus reducing the direct impact to the PRoW during construction.

Morecambe Offshore Windfarm: Transmission Assets onshore substation

6.1.5.10 Following consultation on two potential Morecambe onshore substation locations, an assessment was undertaken to identify the best location for the substation. This considered consultation feedback from statutory stakeholders, landowners, nearby residents and members of the public, potential environmental constraints and engineering considerations. Following this process, Option 2 (south) was selected due to being further away from a greater number of residential receptors than Option 1 (north). Option 2 (south) will utilise access from the A584 Preston New Road. Selection of Option 1 (north) would mean all construction traffic would take access from the A583, which is the road the Morgan substation will use for its access. Option 2 (south) results in a significant reduction in cable length for both the Morecambe onshore export cable and the grid connection cable corridors. Option 2 (south) would also avoid the need to cross the Morgan onshore export cable and grid connection cable corridors.

6.1.5.11 The construction and operational access route options from the A584 road into the Morecambe onshore substation were subsequently designed considering landowner feedback as well as environmental and engineering constraints. The preferred construction access was the most suitable route for the substation as it is further away from farm buildings addressing landowner concerns, partly uses an existing track, and presents the least engineering constraints. This construction access track would also be retained for use for future heavy goods vehicle (HGV) and abnormal indivisible load (AIL) deliveries, with the main operational access for light goods vehicles being taken off Lower Lane.

6.1.5.12 In parallel to the selection of access tracks the position of the temporary and permanent substation areas were reconfigured from those presented at PEIR. The location of the temporary compounds for Option 2 (south) were re-orientated west and optimised to align to the construction access from the A584. In addition, the permanent substation area, encompassing the substation platform, was moved to the east, thus moving it further away from receptors on Lower Lane.

6.1.6 Onshore export cable corridor

6.1.6.1 Electricity generated from offshore wind farms is transported to the Morgan OWL and Morecambe OWL onshore substations via the onshore export cable corridor. The guiding principles for the siting of the onshore export cable corridor was to reduce impacts to the communities and the environment.

6.1.6.2 The location of the most westerly point of the onshore export cable corridor was driven by the location landfall the most easterly point was driven by the point of interconnection at Morgan OWL and Morecambe OWLs respective onshore substations.

6.1.6.3 The onshore export cable corridor has been routed based on the identification of environmental and engineering constraints, as well as landowner, commercial and engineering considerations guided by principles such as selecting the shortest route possible, avoiding environmental sensitivities and residential properties amongst others. Principles were also established to identify suitable temporary and permanent access points to ensure that access was available during both the construction and operational and maintenance phases of the project and temporary construction compounds were identified.

6.1.6.4 Meetings were held with landowners along the proposed onshore export cable corridor route between February and May 2023, to discuss and obtain any feedback on the identified route. Between 19 April and 4 June 2023, a second phase of non-statutory consultation was held, which focused on potential cable route options. The feedback was then considered along with defined infrastructure parameters and key changes were made to the onshore export cable corridor presented at PEIR including:

- removal of residential areas from the PEIR Red Line Boundary, where practicable;
- alignment of the PEIR Red Line Boundary, along field margins to reduce severance to landowners; and,
- avoidance of key ecological constraints such as ponds.

6.1.6.5 Further refinement of the onshore export cable corridor route options was undertaken following statutory consultation on PEIR. The main refinement was a reduction in the width of the temporary construction working corridors width from 122 m to 100 m. This enabled the avoidance of a greater number of sensitive receptors along the route.

6.1.7 400 kV grid connection cable corridor search area

6.1.7.1 The 400 kV grid connection cable corridor connects the Morgan OWL and Morecambe OWL onshore substations to the National Grid substation at Penwortham. The 400 kV grid connection cable corridor search area was reduced, primarily to the west in the vicinity of the Ribble River due to the longer and more challenging requirements for a trenchless crossing at the River Ribble between Scoping and PEIR.

6.1.7.2 Following formal consultation on PEIR, the 400 kV grid connection cable corridor has been defined based on the identification of environmental and engineering constraints, as well as landowner, commercial and engineering considerations guided by the same principles applied to the onshore export cable corridor (e.g., selecting the shortest route possible, avoiding environmental sensitivities and residential properties amongst others).

6.1.8 Biodiversity benefit, mitigation and enhancement

6.1.8.1 Throughout the design of the Transmission Assets, the principles of the mitigation hierarchy of avoid, mitigate, compensate below were followed influencing the approach to the engineering and environmental design.

6.1.8.2 Wherever possible measures were taken to avoid impacts on ornithology and terrestrial ecology. Such features include designated sites, habitats, trees, visual receptors and species populations. Where this was not possible, solutions were sought to minimise the impacts. Only then were mitigation measures proposed.

6.1.8.3 Seven areas for ecological and or ornithological mitigation have been identified, using the criteria of ecological connectivity; spatial scale; deliverability/feasibility; and ecological efficacy. Further details can be found within Outline Ecological Management Plan (document reference J6).

6.1.8.4 One area for biodiversity benefit has been identified: Lea Marsh. This area was considered the most appropriate due the close proximity to an area identified for mitigation and Masons Wood (BHS). Further information regarding biodiversity benefit can be found in the Outline Biodiversity Benefit Statement (document reference: J11).

7 Environmental effects – offshore

7.1 Introduction

7.1.1.1 This section sets out the potential significant environmental effects for the following:

- physical processes;
- benthic subtidal and intertidal ecology;
- fish and shellfish ecology;
- marine mammals;
- offshore ornithology;
- commercial fisheries;
- shipping and navigation;
- marine archaeology; and
- other sea users.

7.1.1.2 Key offshore environmental constraints are shown in **Figure 7.1**.

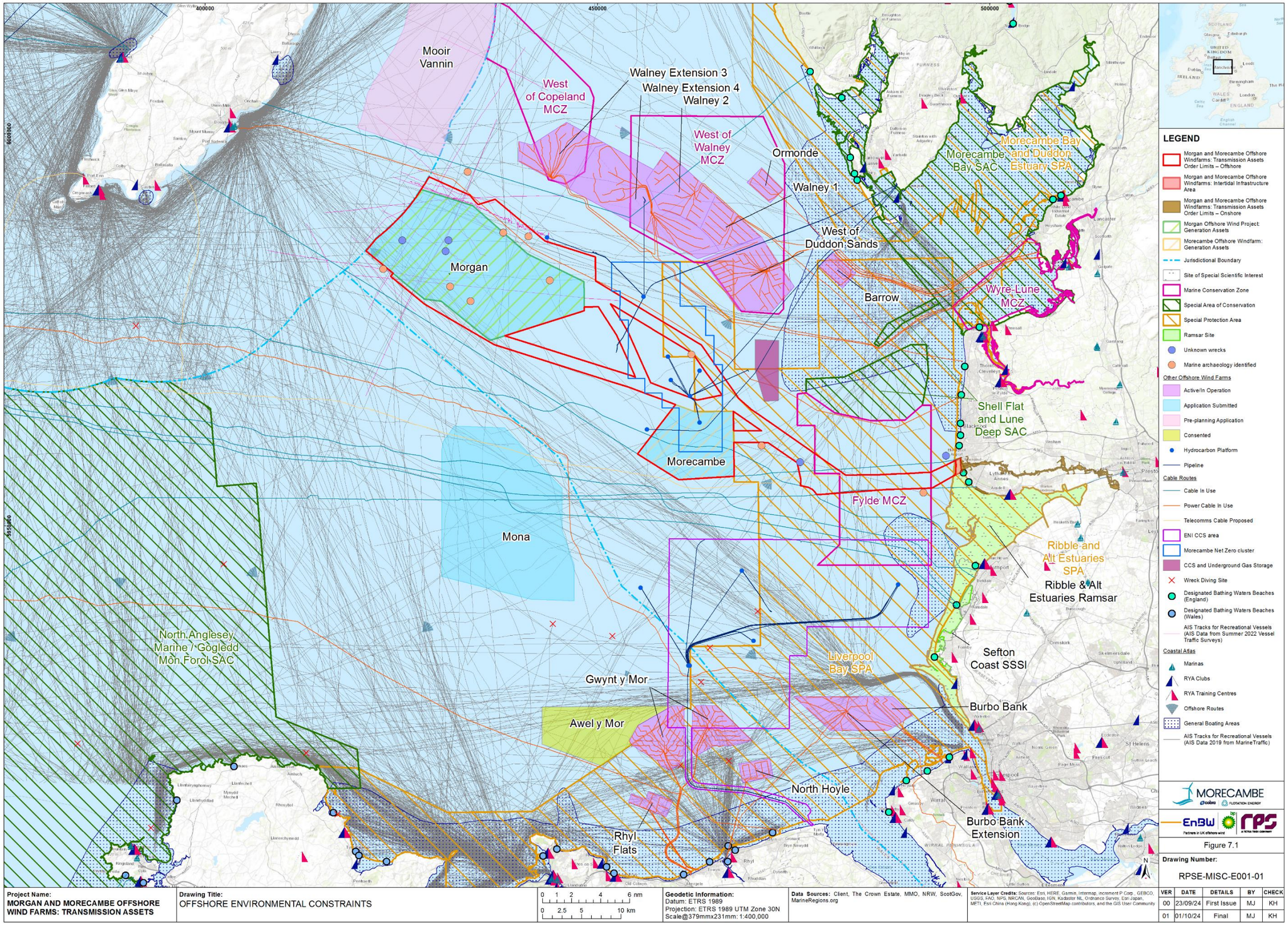

Figure 7.1: Offshore environmental constraints

7.2 Physical processes

7.2.1 Introduction

7.2.1.1 Volume 2, Chapter 1 of the ES (document reference F2.1) sets out the assessment of effects in relation to physical processes. The term physical processes refer to coastal and marine processes and their relationship with the physical environment. This includes tidal currents, the wave climate and the sediment transport regime.

7.2.2 Approach

7.2.2.1 The assessment of physical processes for the Transmission Assets has been informed by modelling undertaken for the Morgan Offshore Wind Project and site-specific survey data. This has been considered together with a detailed review of existing studies and datasets, including those relating to the Mona Offshore Wind Project, Morgan Offshore Wind Project and the Morecambe Offshore Windfarm.

7.2.3 Baseline environment

7.2.3.1 The existing seafloor includes several distinct features, including sandwaves (a seafloor structure that forms across the direction of tidal flow), megaripples (giant ripples typically of sand exposed to tidal action), sediment waveforms (large scale sediment forms created by currents near the seafloor) and outcrops. The majority of the area within the Offshore Order Limits comprises regions of soft sediment. However, the north west part of the Offshore Order Limits falls within a central gravel belt containing coarser sands and gravels.

7.2.3.2 The existing wave climate is described as dominated by short period, south westerly/westerly waves. Tidal currents move towards the land and away from the sea to the east/north east and move away from the land and towards the sea to the west/south west. Relatively strong flows are present in the offshore region during spring tides. However, the residual current speeds are several orders of magnitude smaller than those along the coastline. Sediment transport rates are highest during spring tides.

7.2.4 Measures adopted as part of the Transmission Assets (commitments)

7.2.4.1 The measures proposed by the Applicants include the following.

- Production of an Offshore Cable Specification and Installation Plan(s) in accordance with the Outline Offshore Cable Specification and Installation Plan (document reference J15) with details of cable burial depths, cable protection and cable monitoring.
- Construction Method Statement(s) will be produced post-consent and will include details of cable installation and methodology.
- The requirement for removal of cable protection within the Fylde Marine Conservation Zone will be agreed with stakeholders and regulators at the

time of decommissioning. Removal of cable protection will be in accordance with the Offshore Decommissioning Programme(s).

7.2.5 Assessment of effects

7.2.5.1 The assessment has considered:

- increases in suspended sediment concentrations due to construction, operation and maintenance and/or decommissioning related activities, and the potential impact to physical features;
- impacts to physical processes, seabed morphology and the associated potential impacts to physical features and adjacent shorelines; and
- impacts to sediment transport and sediment pathways at the offshore export cable landfall.

7.2.5.2 During construction, increases in suspended sediment concentrations may arise due to seabed preparation works (which may require sandwave clearance) and the installation of offshore export cables. Sediment plumes produced during construction would be localised. Sediment increase would not influence key receptors, such as sandbanks, mudflats and sandflats.

7.2.5.3 During the operation and maintenance phase, the requirement for cable protection may lead to changes in impacts to the tidal regime, wave regime, sediment transport (and associated pathways). However, impacts would be very localised, occurring in close proximity to cable protection in shallow water, and would be mitigated through the use of profiled/tapered cable protection. No cable protection would be placed in the intertidal zone. The limited magnitude of changes observed would not result in changes to sandbanks.

7.2.5.4 Effects during the decommissioning phase would be of lesser magnitude than during the construction phase.

7.2.5.5 Overall, the assessment has not identified any significant effects upon physical processes arising from the Transmission Assets during the construction, operation and maintenance, or decommissioning phases.

7.2.6 Cumulative effects

7.2.6.1 Cumulative effects with other developments (in line with **section 4.1.4**) have been assessed. Overall, the assessment has not identified any significant cumulative effects upon physical processes.

7.3 Benthic subtidal and intertidal ecology

7.3.1 Introduction

7.3.1.1 Volume 2, Chapter 2 of the ES (document reference F2.2) sets out the assessment of effects in relation to benthic ecology. Benthic ecology refers to the communities of animals and plants that live on or in the seabed and the relationships that they have with each other and with their physical environment. Subtidal ecology relates to the ecology present beneath mean

low water springs, while intertidal relates to the area between mean low water springs and mean high water springs. Effects on the protected features associated with the Fylde Marine Conservation Zone are set out within the Marine Conservation Zone Assessment (document reference E4).

7.3.2 Approach

7.3.2.1 The assessment for benthic ecology has been informed by a series of site-specific surveys using standard sampling techniques and underwater video. An intertidal survey was also undertaken.

7.3.3 Baseline environment

7.3.3.1 Site-specific surveys indicated that the subtidal seabed supports a variety of plant and animal communities that are typical of this area. Benthic communities are characterised by high numbers of marine worms and brittlestars in coarser sediments, with a brittlestar bed recorded on sediment in the north west of the area within which surveys were undertaken. Muddy sands were present in the centre and nearshore parts of the surveyed area, which were associated with molluscs and a range of different species of marine worms. Sandy sediments were found immediately adjacent to the landfall area, with this area dominated by a relatively limited range of mollusc species.

7.3.3.2 No reef habitats were recorded within the Offshore Order Limits. A habitats assessment recorded the presence of burrows within the Offshore Order Limits, and these areas were considered to potentially represent a seapens and burrowing megafauna community, although no seapens were specifically recorded.

7.3.3.3 The Offshore Order Limits overlap with the Fylde Marine Conservation Zone. The Shell Flat and Lune Deep Special Area of Conservation, the West of Walney Marine Conservation Zone and the West of Copeland Marine Conservation Zone are located to the north of the Offshore Order Limits.

7.3.3.4 The intertidal survey identified a relatively low diversity range of plants and animals, typical of an exposed sandflat shore. The upper and mid shore contained fine sand shores arranged in largely barren sandbars, between which were waterlogged troughs of muddy sand characterised by marine worms and molluscs. The lower shore reflected the conditions in these troughs, but with higher densities of marine worms, urchins and molluscs in a complex mosaic of species across the shore.

7.3.4 Measures adopted as part of the Transmission Assets (commitments)

7.3.4.1 The measures proposed by the Applicants include the following.

- Production of an Offshore Cable Specification and Installation Plan(s) in accordance with the Outline Offshore Cable Specification and Installation Plan (document reference J15) with details of cable burial depths, cable

protection and cable monitoring including limiting the extent of cable protection required within the Fylde Conservation Zone.

- Offshore Environmental Management Plan(s) will be developed, to include a marine pollution contingency plan to address the risks, methods and procedures to deal with any spills and collision incidents during construction and operation, as well as action proposed to minimise invasive species.
- All permanent infrastructure located in the intertidal area will be buried to a target depth of 3 metres, subject to further pre-construction surveys.
- The requirement for removal of cable protection within the Fylde Marine Conservation Zone will be agreed with stakeholders and regulators at the time of decommissioning. Removal of cable protection will be in accordance with the Offshore Decommissioning Programme(s).

7.3.5 Assessment of effects

7.3.5.1 The assessment has considered:

- temporary habitat loss/disturbance;
- increased suspended sediment concentrations and associated deposition;
- disturbance/remobilisation of sediment-bound contaminants;
- Long term habitat loss;
- introduction of artificial structures;
- increased risk of introduction and spread of invasive non-native species;
- removal of hard substrate;
- changes in physical processes;
- impacts due to electromagnetic fields; and
- heat from undersea cables.

7.3.5.2 With respect to temporary habitat loss/disturbance, the proportion of habitat disturbed is predicted to be small overall in the context of available habitats in the wider area.

7.3.5.3 In terms of longer term habitat loss, no long term habitat loss is predicted within the intertidal zone. Within the subtidal area, the overall area of new hard infrastructure, compared to the extensive soft sediments present in the wider area, would be small.

7.3.5.4 Temporary increases in suspended sediment concentrations and associated deposition would be short term, with sediments expected to disperse to background concentrations rapidly, with most biological features having a low sensitivity to this impact.

7.3.5.5 Overall, the assessment has not identified any significant effects upon benthic subtidal and intertidal ecology arising from the Transmission Assets

during the construction, operation and maintenance, or decommissioning phases.

7.3.6 Cumulative effects

7.3.6.1 Cumulative effects with other developments have been assessed (in line with section **4.1.4**). One significant cumulative effect has been identified with the Morgan Offshore Wind Project, in relation to temporary habitat disturbance/loss. The significance of this cumulative effect is predicted to decrease in the long term as the sediments and associated benthic communities will recover over time. In the longer term, no significant cumulative effects are predicted upon subtidal and intertidal benthic ecology.

7.4 Fish and shellfish ecology

7.4.1 Introduction

7.4.1.1 Volume 2, Chapter 3 of the ES (document reference F2.3) sets out the assessment of effects in relation to fish and shellfish ecology. Fish and shellfish ecology refers to communities of animals (various commercially and ecologically important fish, crustacean and mollusc species). This includes those that live in the water column or on and in the seabed, including diadromous fish (those that move between freshwater and saltwater) which move into freshwater environments for spawning activity and the relationships these organisms have with each other and the physical environment.

7.4.2 Approach

7.4.2.1 The fish and shellfish ecology assessment has been informed primarily by a literature review of the large amount of data available on the species found in the Irish Sea. Relevant data from seabed characterisation surveys were also considered to better understand the habitats present.

7.4.3 Baseline environment

7.4.3.1 The work has identified the presence of a range of fish (including shark and ray) and shellfish species with spawning or nursery grounds in the vicinity of the Transmission Assets and in the wider east Irish Sea. Species of particular ecological and commercial interest include herring, with important spawning grounds to the immediate north west of the Transmission Assets. Sandeel species were also noted as having important populations and spawning grounds in this area, with these being of interest as sandeel are an important food source for a wide range of predators. Datasets for populations of basking shark, angel shark and tope shark, all considered threatened species, were also examined, including the potential for these passing through the area, although the likelihood of this occurring for basking shark and angel shark is considered low.

7.4.4 Measures adopted as part of the Transmission Assets (commitments)

7.4.4.1 The measures proposed by the Applicants include the following.

- Production of an Offshore Cable Specification and Installation Plan(s) in accordance with the Outline Offshore Cable Specification and Installation Plan (document reference J15) with details of cable burial depths, cable protection and cable monitoring including limiting the extent of cable protection required within the Fylde Conservation Zone.
- Construction Method Statement(s) will be produced post-consent and will include details of cable installation and methodology.
- Offshore Environmental Management Plan(s) will be developed, to include a marine pollution contingency plan to address the risks, methods and procedures to deal with any spills and collision incidents during construction and operation, as well as action proposed to minimise invasive species.
- Vessel Traffic Management Plan(s) will be developed, in accordance with the Outline Vessel Traffic Management Plan (document reference J21). The management plan will be developed in line with legislation, guidance and industry best practice which will:
  - determine vessel routing to and from construction areas and ports;
  - include vessel standards and a code of conduct for vessel operators; and
  - minimise, as far as reasonably practicable, encounters with marine mammals and basking sharks.
- The crossing beneath the River Ribble will be undertaken using trenchless installation techniques.

7.4.5 Assessment of effects

7.4.5.1 The assessment has considered:

- temporary habitat loss/disturbance;
- underwater sound;
- increased suspended sediment concentrations and associated sediment deposition;
- long term habitat loss;
- electromagnetic fields from subsea electrical cabling;
- introduction and colonisation of hard substrates;
- injury to basking shark due to increased risk of collision with vessels; and
- disturbance/remobilisation of sediment-bound contaminants;

7.4.5.2 There is potential for herring to be subject to effects from underwater sound, should unexploded ordnance clearance occur during the known spawning

period for this species, however given the very short duration, highly intermittent nature of potential clearance activities and implementation of the proposed mitigation, this is an unlikely scenario.

7.4.5.3 Cod is also considered sensitive to underwater sound. However, based upon the short term and intermittent nature of potential unexploded ordnance clearance events, and the application of the proposed mitigation, no significant effect for cod, along with herring and other fish and shellfish species is predicted.

7.4.5.4 In terms of temporary and long term habitat loss or disturbance, the proportion of habitat lost, including spawning and nursery grounds, associated with the Transmission Assets is predicted to be small in the context of available habitats in the wider area and natural behaviours are expected to return following short term habitat disturbance.

7.4.5.5 Overall, the assessment has not identified any significant effects upon fish and shellfish ecology arising from the Transmission Assets during the construction, operation and maintenance or decommissioning phases.

7.4.6 Cumulative effects

7.4.6.1 Cumulative effects with other developments have been assessed (in line with section **4.1.4**). Overall, the assessment has not identified any significant cumulative effects upon fish and shellfish ecology.

7.5 Marine mammals

7.5.1 Introduction

7.5.1.1 Volume 2, Chapter 4 of the ES (document reference F2.4) sets out the assessment of effects in relation to marine mammals.

7.5.2 Approach

7.5.2.1 Two site-specific aerial digital survey campaigns that fall within the Offshore Order Limits have informed the baseline characterisation. These were undertaken for the Morgan Offshore Wind Project and the Morecambe Offshore Windfarm.

7.5.2.2 In addition, an extensive review of existing studies and datasets, including other plans and projects within the study area, was undertaken to characterise the baseline environment for marine mammals. Data from research surveys have also been considered.

7.5.3 Baseline environment

7.5.3.1 Several species of cetacean (whales, dolphins and porpoises) as well as grey seal and harbour seal have been recorded in the Irish Sea. Seven species have been identified as being key receptors and taken forward for assessment. These species are harbour porpoise, bottlenose dolphin, short-beaked common dolphin, Risso's dolphin, minke whale, grey seal and harbour seal.

7.5.4 Measures adopted as part of the Transmission Assets (commitments)

7.5.4.1 The measures proposed by the Applicants include the following.

- Detailed Marine Mammal Mitigation Protocols developed and implemented in accordance with the Outline Marine Mammal Mitigation Protocol (document reference J18) The protocols will include measures to apply in advance of and during surveys and unexploded ordnance clearance.
- Offshore Environmental Management Plan(s) will be developed, to include measures to minimise disturbance to marine mammals from vessels, as well as proposals to minimise invasive species.
- Vessel Traffic Management Plan(s) will be developed, in accordance with the Outline Vessel Traffic Management Plan (document reference J21). The management plan will be developed in line with legislation, guidance and industry best practice which will:
  - determine vessel routing to and from construction areas and ports;
  - include vessel standards and a code of conduct for vessel operators; and
  - minimise, as far as reasonably practicable, encounters with marine mammals and basking sharks.

7.5.5 Assessment of effects

7.5.5.1 The assessment has considered:

- injury and disturbance from elevated underwater sound during unexploded ordnance clearance;
- injury and disturbance from elevated underwater sound due to vessel use and other sound-producing activities;
- increased likelihood of injury due to collision with vessels;
- effects on marine mammals due to changes in prey availability; and
- injury and disturbance from underwater sound generated from pre-construction survey sources.

7.5.5.2 A single significant effect has been identified for harbour porpoise only. This relates to the potential injury and disturbance from elevated underwater sound during high order unexploded ordnance clearance, where standard mitigation measures may not be sufficient to reduce the risk of injury. This is precautionary and applies only to the largest size of ordnance and where alternative clearance methods cannot be employed. The Applicants have committed to the development of and adherence to detailed Marine Mammal Mitigation Protocols.

7.5.5.3 The Applicants will, where practically possible and safe to do so, use alternative clearance methods, such as low order techniques. Where

alternative clearance methods can be employed, it is considered that there would be no significant effect on any marine mammal species.

7.5.6 Cumulative effects

7.5.6.1 One significant cumulative effect has been identified, relating to potential injury from unexploded ordnance clearance for harbour porpoise, where a potentially significant cumulative effect has been identified if high order detonation is required. This effect will be mitigated by adherence to detailed Marine Mammal Mitigation Protocols. As set out above, the Applicants will, where practically possible and safe to do so, use alternative clearance methods, such as low order techniques. Where alternative clearance methods can be employed, it is considered that there would be no significant effect on any marine mammal species.

7.6 Offshore ornithology

7.6.1 Introduction

7.6.1.1 Volume 2, Chapter 5 of the ES (document reference F2.5) sets out the assessment of effects in relation to offshore ornithology. Offshore ornithology refers to the communities of birds that utilise or fly over the area seaward of mean low water springs.

7.6.2 Approach

7.6.2.1 The identification of existing conditions was informed by desk-based studies and supporting survey data from surveys of the Morecambe Offshore Windfarm: Generation Assets and the Morgan Offshore Wind Project: Generation Assets. The benthic and fish and shellfish assessments chapters of the Environmental Statement were used to inform the assessment, in order to determine potential impacts on prey species.

7.6.3 Baseline environment

7.6.3.1 The Transmission Assets are situated in the central part of the Irish Sea. There have been 21 species of seabird reported as regularly nesting on beaches or cliffs around the Irish Sea and a large proportion of the Manx shearwater population has been found breeding on offshore islands around the Irish Sea. Most of the global Manx shearwater population is found in the UK and over 90% of the population is found on the Islands of Rum, Egg (Scotland), Skomer and Skokholm (Wales). Other abundant and widespread seabird species in the central Irish Sea include gannet, guillemot, herring gull, kittiwake, lesser black-backed gull, Manx shearwater and razorbill.

7.6.3.2 During the non-breeding season, large populations of common scoter and red-throated diver use the shallow waters of Liverpool Bay.

7.6.3.3 Populations on the Isle of Man exceed 1% of the UK or British Isles breeding seabird populations for herring gull, little tern, shag and cormorant and for over-wintering populations of shag, herring gull, great black-backed gull and

black-throated diver. In addition, they exceed the 0.5% levels for breeding great black-backed gull, black guillemot and over-wintering cormorant.

7.6.3.4 The area studied encompasses the following designated sites.

- Liverpool Bay Special Protection Area, which is designated for qualifying features including its non-breeding (wintering) populations of red-throated diver and little gull and for providing foraging areas for breeding little tern and common tern. The Special Protection Area also qualifies for its non-breeding (wintering) population of common scoter as well as its wintering waterbird assemblage, which includes over 1% of the Great Britain population of cormorant and red-breasted merganser.
- Ribble and Alt Estuaries Special Protection Area and Ramsar site, designated for:
  - its breeding population of lesser black-backed gull;
  - spring/autumn passage populations of ringed plover, grey plover, knot Calidris, sanderling, dunlin, black-tailed godwit, redshank and lesser black-backed gull; and
  - winter populations of Bewick's swan, whooper swan, pink-footed goose, shelduck, wigeon, teal, pintail, oystercatcher and bar-tailed godwit.

7.6.4 Measures adopted as part of the Transmission Assets (commitments)

7.6.4.1 The measures proposed by the Applicants include the following.

- Offshore Cable Specification and Installation Plan(s) will be produced, in accordance with the Outline Offshore Cable Specification and Installation Plan (document reference J15). The specifications will restrict the Applicants to completing one cable pull in (a maximum of five weeks) per wintering season (i.e., during the months of November – February, inclusive), unless otherwise agreed with the Marine Management Organisation, in consultation with Natural England.
- Offshore Environmental Management Plan(s) will be developed, to include a marine pollution contingency plan to address minimise disturbance to rafting birds from vessels, measures to control vessel numbers actively working within the Liverpool Bay/Bae Lerpwl Special Protection Area in the wintering period, as well as action proposed to minimise invasive species.
- Vessel Traffic Management Plan(s) will be developed, in accordance with the Outline Vessel Traffic Management Plan (document reference 21). The management plan will be developed in line with legislation, guidance and industry best practice which will:
  - determine vessel routing to and from construction areas and ports;
  - include vessel standards and a code of conduct for vessel operators; and

  - minimise, as far as reasonably practicable, encounters with marine mammals and basking sharks.
- An Ecological Management Plan will be produced in accordance with the principles set out in the Outline Ecological Management Plan (document reference J6). This will include measures to ensure that where construction activities are undertaken within the Intertidal Infrastructure Area, mitigation measures will be provided at Fairhaven saltmarsh to reduce disturbance upon roosting wader features of Ribble and Alt Estuary Special Protection Area.
- All permanent infrastructure located in the intertidal area will be buried to a target depth of 3 metres, subject to further pre-construction surveys.
- Offshore Decommissioning Programme(s) will be developed prior to decommissioning.

7.6.5 Assessment of effects

7.6.5.1 The assessment has considered:

- disturbance and/or displacement from airborne sound, underwater sound and presence of vessels and infrastructure;
- indirect impacts from underwater sound, habitat loss and increased suspended sediment concentrations affecting prey species; and
- temporary habitat loss/disturbance and increased suspended sediment concentrations.

7.6.5.2 Some of the ornithological receptors that occur within the area are considered to be of high or very high sensitivity to disturbance and displacement, such as common scoter and red-throated diver. However, due to the minor, localised and temporary nature of the installation of offshore export cables, disturbance and displacement impacts resulting from habitat loss, effects on prey, airborne sound, underwater sound and presence of vessels and infrastructure are considered to be negligible.

7.6.5.1 Overall, the assessment has not identified any significant effects upon offshore ornithology arising from the Transmission Assets during the construction, operation and maintenance or decommissioning phases.

7.6.6 Cumulative effects

7.6.6.1 Cumulative effects with other developments have been assessed (in line with section **4.1.4**). Overall, the assessment has not identified any significant cumulative effects upon offshore ornithology.

7.7 Commercial fisheries

7.7.1 Introduction

7.7.1.1 Volume 2, Chapter 6 of the ES (document reference F2.6) sets out the assessment of effects in relation to commercial fisheries. Commercial

fisheries are defined as any form of fishing activity where the catch is sold for taxable profit.

7.7.2 Approach

7.7.2.1 The existing commercial fisheries conditions were characterised through a review of publicly available data, site-specific surveys and consultation with fisheries stakeholders.

7.7.3 Baseline environment

7.7.3.1 Within the region, fish landings (catch brought ashore) are dominated by dredge vessels, and shellfish are the most important species group in terms of landed weight and value. Within the northern most area of the Offshore Order Limits, there is a queen scallop ground of commercial importance to dredging vessels which come from the west coast of Scotland. These vessels, as well as vessels from the Isle of Man and nomadic vessels from Ireland and Northern Ireland, also engage in the king scallop fishery in the region.

7.7.3.2 English static gear vessels targeting whelk and crab operate out of Fleetwood and Whitehaven and are active within the east Irish Sea. Beam trawl vessels from Belgium and the south coast of England are also occasionally present within the vicinity targeting flatfish, such as sole and plaice. Vessels from Ireland and Northern Ireland, deploying trawls and nets that target herring, are active across the region. Norway lobster grounds off the coast of Cumbria are of particular importance to vessels that deploy demersal trawls and otter trawls, which are predominantly from England and Northern Ireland.

7.7.4 Measures adopted as part of the Transmission Assets (commitments)

7.7.4.1 The measures proposed by the Applicants include the following.

- Production of an Offshore Cable Specification and Installation Plan(s) in accordance with the Outline Offshore Cable Specification and Installation Plan (document reference J15) with details of cable burial depths, cable protection and cable monitoring.
- Detailed Fisheries Liaison and Coexistence Plan(s) will be developed in accordance with the Outline Fisheries Liaison and Coexistence Plan (document reference J13) and will include details for providing advance warning and information on accurate locations for construction and maintenance activities, associated Safety Zones, and advisory passing distances to be given via Notifications to Mariners to ensure navigation safety. The plans will seek to minimise the duration for which the offshore export cable corridors will be closed to vessels during construction, to limit disruption to commercial fishing activities, if and where practicable. This will include the appointment of a company fisheries liaison officer.

- Offshore Environmental Management Plan(s) will be developed, to include details of a Fisheries Coexistence and Liaison Plan.
- Offshore Decommissioning Programme(s) will be developed prior to decommissioning.

7.7.5 Assessment of effects

7.7.5.1 The assessment has considered:

- 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; and
- supply chain opportunities for local fishing vessels.

7.7.5.2 Impacts are limited by the temporary and intermittent nature of the offshore export cable works during the construction phase and the relatively large operational ranges of most fishing vessels that operate within the Offshore Order Limits.

7.7.5.3 Overall, the assessment has not identified any significant effects arising from the Transmission Assets during the construction, operation and maintenance, or decommissioning phases in relation to commercial fisheries.

7.7.6 Cumulative effects

7.7.6.1 Cumulative effects with other developments have been assessed (in line with section **4.1.4**). Overall, the assessment has not identified any significant cumulative effects in relation to commercial fisheries.

7.8 Shipping and navigation

7.8.1 Introduction

7.8.1.1 Volume 2, Chapter 7 of the ES (document reference F2.7) sets out the assessment of effects in relation to shipping and navigation. The chapter is supported by the Navigation Risk Assessment (document reference F2.7.1). The shipping and navigation assessment considers impacts upon maritime safety and the activities of commercial shipping, ferries, ports/harbours, commercial fisheries, recreational cruising and other maritime operations.

7.8.2 Approach

7.8.2.1 The existing shipping and navigation conditions were identified through a review of relevant publications, collection and analysis of historic vessel traffic and incident data as well as consultation with key stakeholders.

7.8.3 Baseline environment

7.8.3.1 The Offshore Order Limits are located in an area frequently utilised by a variety of different maritime users. Existing offshore wind farms, oil and gas and aggregate activities are present throughout the region/east Irish Sea. Key commercial shipping routes bound for the Port of Liverpool pass clear of the Offshore Order Limits; however, smaller shipping routes to Douglas and Heysham cross through the Offshore Order Limits. Regular ferry services between the UK, Isle of Man and Ireland operate in the east Irish Sea, and fishing by static and mobile gear takes place, throughout the east Irish Sea. Offshore recreational cruising routes between the UK and the Isle of Man were also identified operating throughout the east Irish Sea, although the numbers of vessels using them is low. Tug and service activities supporting existing offshore infrastructure is widespread in the region.

7.8.3.2 Adverse weather, particularly from the prevailing south west, was demonstrated to have an influence on vessel traffic patterns. Historic incident data demonstrated that relatively few navigational incidents had occurred within the east Irish Sea, with the majority analysed occurring in the approaches to Liverpool.

7.8.4 Measures adopted as part of the Transmission Assets (commitments)

7.8.4.1 The measures proposed by the Applicants include the following.

- Production of an Offshore Cable Specification and Installation Plan(s) in accordance with the Outline Offshore Cable Specification and Installation Plan (document reference J15) with details of cable details to ensure safe navigation is not compromised, including consideration of under keel clearance.
- Aids to navigation (marking and lighting) will be deployed in accordance with international maritime regulations and the latest relevant available standard industry guidance.
- Construction Method Statement(s) will be produced post-consent and will include details of cable installation and methodology.
- An Offshore Environmental Management Plan will be developed.
- A Safety Zone Statement has been submitted as part of the application for development consent (document reference J33). Advisory exclusion zones of 500 m will be applied during construction.
- Vessel Traffic Management Plan(s) will be developed, in accordance with the Outline Vessel Traffic Management Plan (document reference J21). The management plan will be developed in line with legislation, guidance and industry best practice which will:
  - determine vessel routing to and from construction areas and ports;
  - include vessel standards and a code of conduct for vessel operators; and

  - minimise, as far as reasonably practicable, encounters with marine mammals and basking sharks.
- Offshore Emergency and Response and Safety Plan(s) will be prepared post-consent.
- The Applicants will ensure compliance with guidance on vessel traffic monitoring and continuous watch, where appropriate, in consultation with the Maritime Coastguard Agency.
- Advance warning will be provided via Notice to Mariners to ensure that the appropriate authorities are informed of offshore construction, operation and maintenance, and decommissioning activities.
- Offshore Decommissioning Programme(s) will be developed prior to decommissioning.

7.8.5 Assessment of effects

7.8.5.1 The assessment has considered:

- impact on recognised sea lanes essential to international navigation;
- impact to commercial operators including strategic routes and lifeline ferries;
- impact to adverse weather vessel routeing;
- impact on access to ports and harbours;
- impact on emergency response capability due to increased incident rates and reduced access for search and rescue responders;
- impact on vessel to vessel collision risk;
- impact on marine navigation, communications, electromagnetic interference and radar and positioning systems;
- impact on recreational craft passages and safety;
- impact on snagging risk to vessel anchors and fishing gear;
- impact to oil and gas navigation, operations and safety; and
- impact on under keel clearance.

7.8.5.2 Overall, the assessment has not identified any significant effects arising from the Transmission Assets during the construction, operation and maintenance, or decommissioning phases in relation to shipping and navigation.

7.8.5.3 Hazards were assessed within the Navigation Risk Assessment (document reference F2.7.1). Four hazards were assessed as medium risk to tolerable (but as low as reasonably possible. All other hazards were ranked as low risk-broadly acceptable.

7.8.6 Cumulative effects

7.8.6.1 Cumulative effects with other developments have been assessed (in line with section **4.1.4**).

7.8.6.2 No significant cumulative effects have been identified when the Transmission Assets are considered together with the Morecambe Offshore Wind Farm: .

7.8.6.3 Assessment of cumulative effects of the Transmission Assets with the Morgan Offshore Wind Project identified significant effects due to deviations to one Stena Line ferry route which would be required around the Morgan Offshore Wind Project in adverse weather.

7.8.6.4 Assessment of cumulative effects of the Transmission Assets with the other projects (including Mooir Vannin offshore wind farm) identified additional significant effects relating to:

- The impact to adverse weather routeing; and
- The impact on vessel to vessel collision risk.

7.8.6.5 The contribution of the Transmission Assets to the above significant effects is considered to be insubstantial when compared to the effects of the wind farm array areas for the Generation Assets. Commitments are set out by the Applicants to mitigate the risk and minimise the contribution of the Transmission Assets to the cumulative effects. This will include Notices to Mariners and marine co-ordination and a Vessel Traffic Management Plan, and an offshore operations and maintenance plan, amongst several others. Commitments also set out separately by the Morgan Offshore Wind Project, Morecambe Offshore Windfarm and Mona Offshore Wind Project will also mitigate against the effects on commercial operators, for those operating within the east Irish Sea. This will also include Notices to Mariners and continuation of the marine co-ordination through the Marine Navigation Engagement Forum which will include Transmission Assets related matters where required.

7.9 Marine archaeology

7.9.1 Introduction

7.9.1.1 Volume 2, Chapter 8 of the ES (document reference F2.8) sets out the assessment of effects in relation to marine archaeology. Marine archaeology refers to the physical remains of the human past that survive within the marine environment. This includes maritime archaeology, such as shipwrecks and submerged prehistoric archaeological material.

7.9.2 Approach

7.9.2.1 The existing marine archaeology conditions have been characterised through a review of existing data and studies alongside an assessment of site-specific geophysical and geotechnical surveys.

7.9.3 Baseline environment

7.9.3.1 The site-specific geophysical and geotechnical survey data corroborates academic theories that the now submerged coastal areas of the east Irish Sea would have previously formed a partially terrestrial landscape during the Upper Palaeolithic and into the Mesolithic periods. Submergence to the

modern coastline would have occurred towards the end of the Mesolithic periods (circa 6000 years before present). This partially terrestrial landscape would have allowed humans the opportunity to exploit the resources of the intertidal zone during these times.

7.9.3.2 The east Irish Sea was an area of historically high maritime traffic with ~~147~~ 128 anomalies of potential archaeological interest identified within the Offshore Order Limits. Of these, eight have been classified as high potential anomalies and twelve~~thirteen~~ as medium potential anomalies. The high potential anomalies include the identification of seven wrecks and one potential wreck site. These include the locations of *Ben Rein (identified in two surveys), Limesfield*, *Ravenbourne*, *Hibernian*, and *Lucy* alongside the wreck of an unknown vessel and one potential wreck.

7.9.4 Measures adopted as part of the Transmission Assets (commitments)

7.9.4.1 The measures proposed by the Applicants include the following.

- Production of an Offshore Cable Specification and Installation Plan(s) in accordance with the Outline Offshore Cable Specification and Installation Plan (document reference J15) with details of cable burial depths, cable protection and cable monitoring An Outline Offshore Written Scheme of Investigations for archaeology has been prepared and submitted with the application for development consent (document reference J17). The Outline Offshore WSI for Archaeology includes:
  - the requirement for Archaeological Exclusion Zones and Temporary Archaeological Exclusion Zones;
  - implementation of a Protocol for Archaeological Discoveries;
  - the incorporation of marine archaeology specification and analysis in further pre-construction surveys;
  - operational awareness and avoidance, where possible, of low potential anomalies;
  - where avoidance of low potential anomalies is not possible, mitigation measures for potential direct impacts to marine archaeology; and
  - details of reporting and archival requirements.
- Detailed Offshore Written Scheme(s) of Investigations will be developed in accordance with the Outline Offshore Written Scheme of Investigations, in consultation with Historic England.

7.9.5 Assessment of effects

7.9.5.1 The assessment has considered:

- sediment disturbance and deposition leading to indirect effects on marine archaeology receptors;
- direct damage to near surface marine archaeology receptors; and

- alteration of sediment transport regimes.

7.9.5.2 Overall, the assessment has not identified any significant effects upon marine archaeology arising from the Transmission Assets during the construction, operation and maintenance or decommissioning phases.

7.9.6 Cumulative effects

7.9.6.1 Cumulative effects with other developments have been assessed (in line with section **4.1.4**). Overall, the assessment has not identified any significant cumulative effects upon marine archaeology.

7.10 Other sea users

7.10.1 Introduction

7.10.1.1 Volume 2, Chapter 9 of the ES (document reference F2.9) sets out the assessment of effects in relation to other sea users. Other sea users include:

- aggregate extraction and disposal sites.
- recreational diving and bathing sites.
  - recreational activities such as sailing, motor cruising, recreational fishing and inshore water sports.
- offshore infrastructure such as:
  - offshore wind farms;
  - oil and gas activities;
  - Carbon Capture Storage (CCS) activities;
  - Offshore hydrocarbon platforms;
  - cables; and
  - pipelines.

7.10.2 Approach

7.10.2.1 Data has been collated based on existing data sources at both a regional and local level. No site-specific surveys have been undertaken to inform the EIA process for other sea users. This is because a sufficient amount of information relating to other sea users is already readily available.

7.10.3 Baseline environment

7.10.3.1 There are no marine aggregate extraction sites or recreational dive sites within the area studied.

7.10.3.2 There is one closed marine disposal site within the area studied. This is the Preston site, which was used for dredge spoil dumping and does not overlap with the Offshore Order Limits

7.10.3.3 There are four recreational bathing sites identified within the area studied. These are, from north to south:

- Blackpool Central;
- Blackpool South;
- St. Annes North (the only one of these sites to overlap with the Transmission Assets Order Limits (within the Intertidal Infrastructure Area)); and
- St. Annes.

The following offshore infrastructure is identified within the area studied:

- Two proposed offshore wind farms;
- Five active cables;
- Six oil and gas licence blocks (currently licensed);
- Two oil and gas exploration licence blocks; and
- Seven oil and gas platforms, and 29 associate pipelines;

7.10.4 Measures adopted as part of the Transmission Assets (commitments)

7.10.4.1 The measures proposed by the Applicants include the following.

- Production of an Offshore Cable Specification and Installation Plan(s) in accordance with the Outline Offshore Cable Specification and Installation Plan (document reference J15) with details of cable burial depths, cable protection and cable monitoring Crossing and proximity agreements with known existing pipeline and cables operators.
- The United Kingdom Hydrographic Office will be notified of both the commencement, progress and completion of offshore construction works to allow marking of all installed infrastructure on nautical charts.
- A Safety Zone Statement has been submitted as part of the application for development consent (document reference J33). Advisory exclusion zones of 500 m will be applied during construction.
- Ongoing liaison with the fishing industry through the appointment of a Company Fisheries Liaison Officer(s) and adherence to good practice guidance with regards to fisheries liaison.
- The United Kingdom Hydrographic Office will be notified of both the commencement, progress and completion of offshore construction works to allow marking of all installed infrastructure on nautical charts.

7.10.5 Assessment of effects

7.10.5.1 The assessment has considered:

- displacement of recreational activities;

- 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; and
- reduction or restriction of other offshore energy activities.

7.10.5.2 Overall, the assessment has not identified any significant effects upon other sea users arising from the Transmission Assets during the construction, operation and maintenance or decommissioning phases.

7.10.6 Cumulative effects

7.10.6.1 Cumulative effects with other developments have been assessed (in line with section **4.1.4**). Overall, the assessment has not identified any significant cumulative effects upon other sea users.

8 Environmental effects – onshore

8.1 Introduction

8.1.1.1 This section sets out the potential significant effects for the following:

- geology, hydrogeology and ground conditions;
- hydrology and flood risk;
- onshore ecology and nature conservation;
- onshore and intertidal ornithology;
- historic environment;
- land use and recreation;
- traffic and transport;
- noise and vibration;
- air quality;
- landscape and visual resources; and
- aviation and radar.

8.1.1.2 Key onshore environmental constraints are shown in **Figure 8.1a** and **Figure 8.2b**.

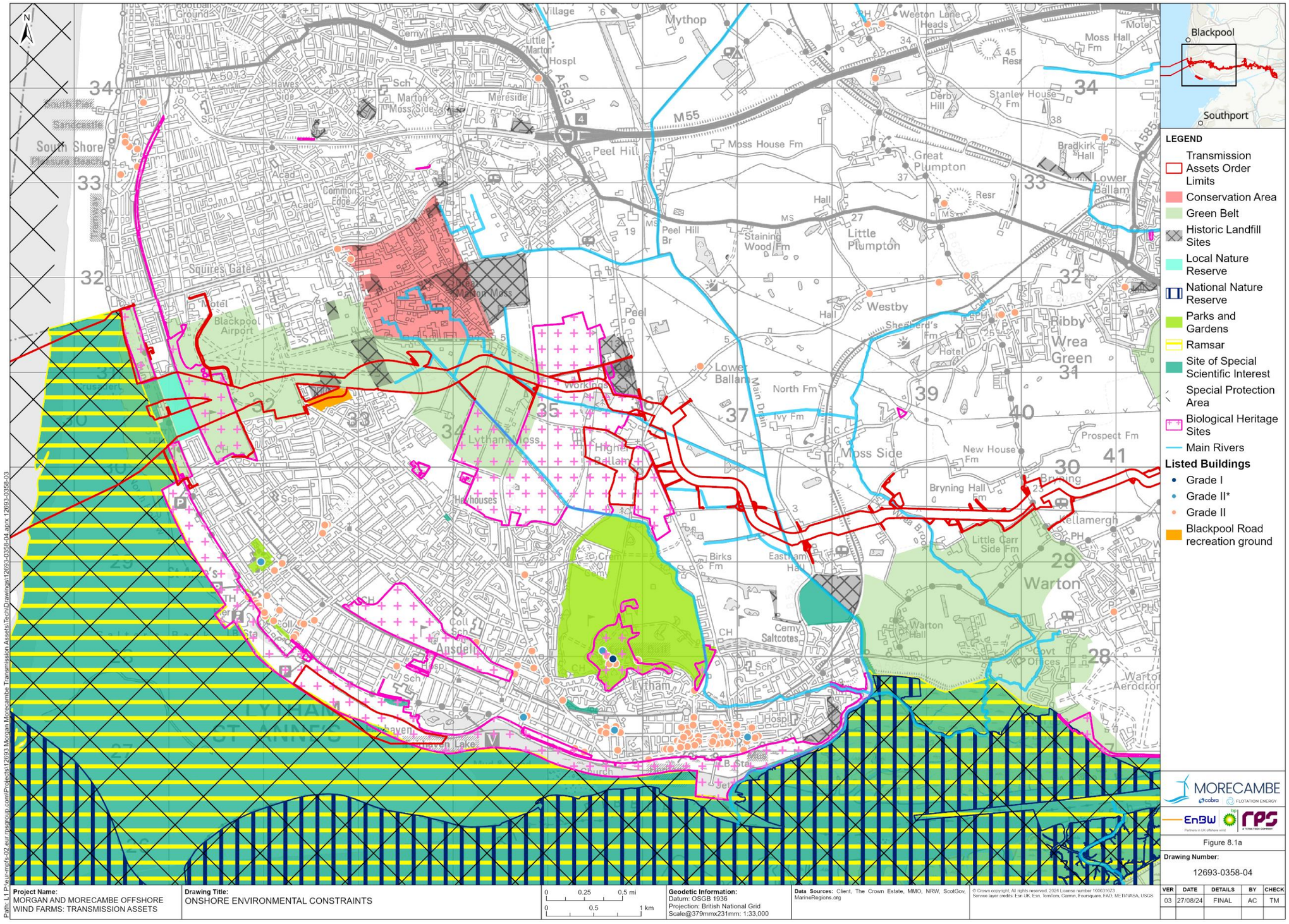

Figure 8.1a: Onshore environmental constraints

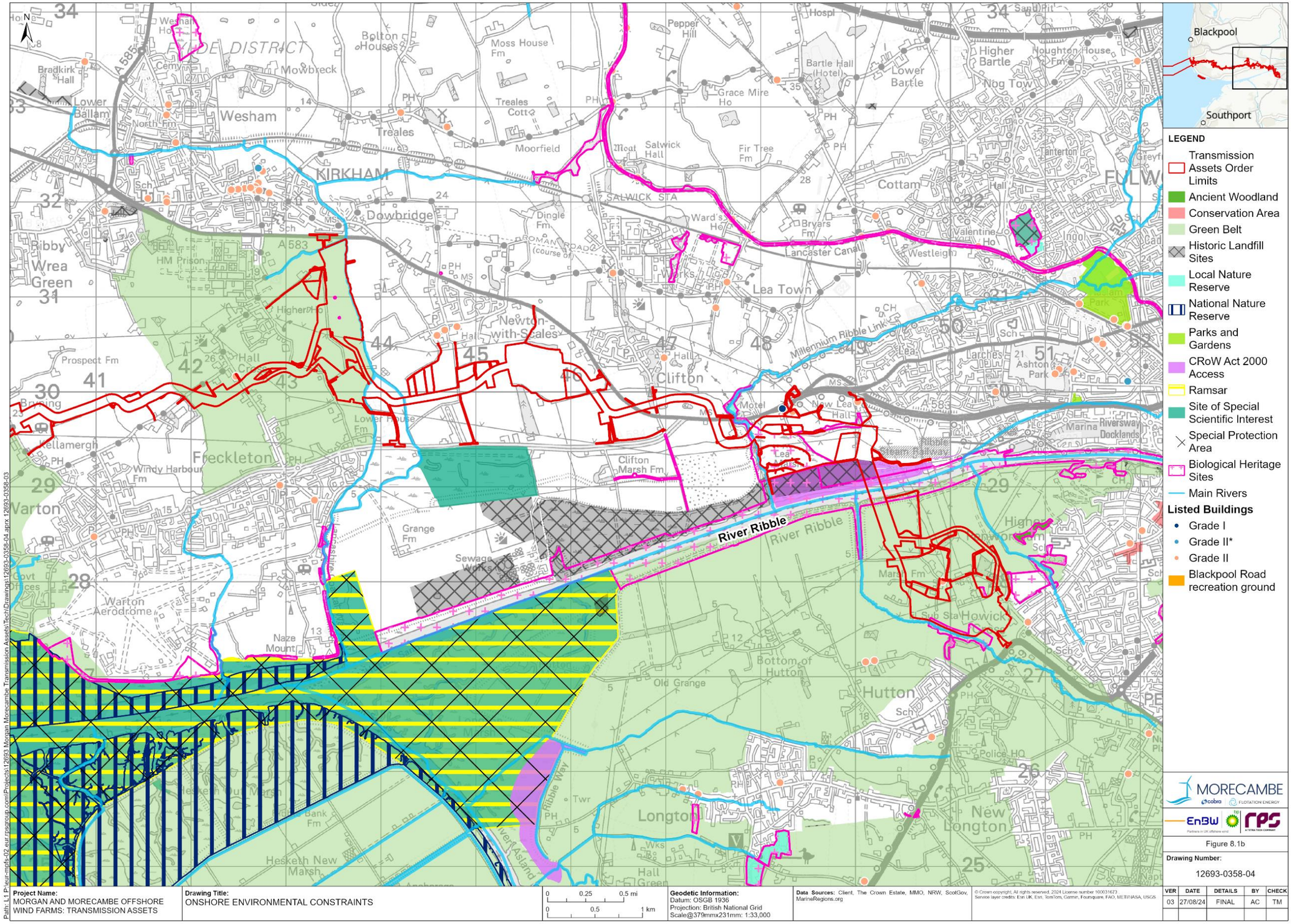

Figure 8.2b: Onshore environmental constraints

8.2 Geology, hydrogeology and ground conditions

8.2.1 Introduction

8.2.1.1 Volume 3, Chapter 1 of the ES (document reference F3.1) sets out the assessment of effects in relation to geology, hydrogeology and ground conditions. This includes consideration of effects in relation to geological and land conditions (including land contamination), as well as effects on groundwater.

8.2.2 Approach

8.2.2.1 The assessments undertaken have been based on a desktop review of publicly available information, online data sources and published literature. A Phase 1 Geo-Environmental Preliminary Risk Assessment has been produced to support the assessment.

8.2.3 Baseline environment

8.2.3.1 The Transmission Assets cross a low lying, coastal area that is underlain by a thick sequence of superficial deposits. These unconsolidated deposits are dominated by blown sands (sand that has been transported by wind or sand consisting of mainly wind-borne particles) (restricted to the west), glacial till (a mix of clay, sand gravel and boulders of varying size) and tidal flat deposits (a mix of sediment, mainly mud and/or sand). The superficial deposits cover the bedrock of the Mudstone in western and central areas and sandstones in the east. These blown sand deposits form dune systems, which are nationally and locally designated for geological importance at Lytham St. Annes.

8.2.3.2 The blown sand deposits and sands contained in the glacial till form a locally important aquifer that supports modest groundwater abstraction (an aquifer is a body of rock and/or sediment that holds groundwater). However, the clay-rich glacial till and tidal flat deposits do not support groundwater dependent surface features. Mudstones of the Mercia Mudstone Group do not support groundwater abstraction in this area.

8.2.3.3 Sandstones of the Sherwood Sandstone Group are classified as an important groundwater unit, although the clay-rich glacial till forms an effective barrier that separates this bedrock aquifer from surface activities and the surface superficial aquifers. The blown sand aquifer and Sherwood Sandstone Group bedrock aquifer both constitute Water Framework Directive groundwater bodies.

8.2.3.4 Sites designated for their geological interest within the Onshore Infrastructure Area include the dunes at Lytham St Annes, which are nationally and locally designated, as an example of dune systems and coastal geology.

8.2.3.5 There are two key areas in the study area, which due to current or historic land uses and/or activities, have the potential to cause contamination of soil or groundwater. These are land around Blackpool Airport, where several historic landfills are located and a developed area situated immediately north

of the River Ribble, which includes active and historic landfills; licensed wastes sites; a large sewage works; and multiple historic fuel stations sites on the A584 and A583.

8.2.4 Measures adopted as part of the Transmission Assets (commitments)

8.2.4.1 The measures proposed by the Applicants include the following.

- The crossing beneath the Lytham St Annes dunes SSSI will be undertaken using trenchless installation techniques.
- The crossing beneath the River Ribble will be undertaken using trenchless installation techniques.
- Detailed Code(s) of Construction Practice (CoCP(s)) will be prepared in accordance with the Outline CoCP submitted with the application for development consent (document reference J1). The CoCP will include

  measures to maintain and address geology, ground conditions and the water environment.
- Where the onshore export cable corridor or 400 kV grid connection cable corridor cross sites of particular sensitivity, hydrogeological risk assessment(s) will be undertaken where necessary to inform a site-specific crossing method statement(s).
- Detailed Pollution Prevention Plan(s) will be prepared in accordance with the Outline Pollution Prevention Plan submitted with the application for development consent (document reference J1.4).
- Detailed Contaminated Land and Groundwater Discovery Strategies will be prepared in accordance with the Outline Contaminated Land and Groundwater Discovery Strategy submitted with the application for development consent (document reference J1.14). This will identify any suspected areas of contamination and any remedial measures which may be required.
- Where areas of potentially significant contamination cannot be avoided within the Transmission Assets Order Limits, ground investigation or other appropriate measures will be implemented to mitigate potential impacts to, or effects on sensitive receptors. Where ground investigation identifies potential risks to sensitive receptors from contamination, a remediation strategy would be prepared in consultation with the Environment Agency.
- Appropriate personal protective equipment will be used and relevant good working practices applied to avoid potential risk to human health including from any potential ground contamination, in line with relevant available guidance.
- An Onshore Decommissioning Plan will be developed prior to decommissioning in a timely manner and will be in line with the latest relevant available guidance.

8.2.5 Assessment of effects

8.2.5.1 The assessment has considered:

- the impact of partial loss of, or damage to, designated geological or geomorphological sites;
- the impact of mobilisation of existing areas of contamination causing a deterioration of groundwater quality in underlying aquifer units;
- the impact on groundwater levels in aquifer units:
- the impact of reduced groundwater quantity or quality in aquifer units;
- the impact of existing contamination to human receptors;
- change in groundwater quality through the accidental release or spillage of potentially polluting substances;
- the impact of changes in groundwater levels, flow or quality on other sensitive groundwater dependent sites, including surface waters fed by groundwater (groundwater- dependent receptors);
- the impact of ground gas generation on human health and other receptors;
- sterilisation of existing safeguarded mineral resources; and
- the impact of heat generated by the onshore export cables on groundwater quality.

8.2.5.2 Whilst potential significant adverse effects are identified in relation to mobilisation of existing areas of contamination; reduced groundwater quantity and quality affecting groundwater (licensed abstractions and private supplies); and impact of ground gas generation on human health and other receptors, with the proposed mitigation measures listed above in place, there will be no significant effects arising from the Transmission Assets during the construction, operation and maintenance or decommissioning phases.

8.2.6 Cumulative effects

8.2.6.1 Cumulative effects with other developments has been assessed. Overall, the assessment has not identified any significant cumulative effects.

8.3 Hydrology and flood risk

8.3.1 Introduction

8.3.1.1 Volume 3, Chapter 2 of the ES (document reference F3.2) sets out the assessment of effects in relation to hydrology and flood risk. This includes effects on onshore surface waterbodies, including rivers and streams.

8.3.2 Approach

8.3.2.1 Information on hydrology and flood risk has been collected through a detailed desktop review of existing studies and datasets and walkover survey. A

Flood Risk Assessment and a Water Framework Directive assessment have been undertaken.

8.3.3 Baseline environment

8.3.3.1 The Transmission Assets are located within the wider north west river basin district. The portion of the study area to the north of the River Ribble is located within the Ribble management catchment, whilst land to the south is located within the Douglas management catchment.

8.3.3.2 The Environment Agency is responsible for the management of Main Rivers in England, while the Lead Local Flood Authority, Lancashire County Council, manages ordinary watercourses. There are multiple named watercourses located within the study area. There are no Internal Drainage Boards located in the study area. Part of the site is within a Source Protection Zone (designed to protect groundwater quality).

8.3.3.3 Flood risk is categorised into zones, with Zone 1 representing the lowest risk of flooding and Zone 3 representing the highest. The Transmission Assets are located within Flood Zones 1, 2 and 3, with flooding associated with river and tidal sources. The locations of the onshore substations lie within Flood Zone 1 (i.e., having a less than 0.1% annual probability of river or sea flooding), with some access tracks located in areas at higher risk of flooding. Construction compounds associated with the export cable corridor, 400 kV grid connection cable corridor onshore substations and associated temporary construction compounds and temporary access tracks are located within Flood Zones 1, 2 and 3. The landfall compounds are located within Flood Zone 1.

8.3.4 Measures adopted as part of the Transmission Assets (commitments)

8.3.4.1 The measures proposed by the Applicants include the following.

- The crossing beneath the Lytham St Annes dunes SSSI will be undertaken using trenchless installation techniques.
- Trenchless techniques will be used to install cables beneath all Environment Agency main rivers. In particular, the crossing beneath the River Ribble will be undertaken using trenchless installation techniques.
- Detailed Code(s) of Construction Practice (CoCP(s)) will be prepared in accordance with the Outline CoCP submitted with the application for development consent (document reference J1). The CoCP will include measures to maintain and address the water environment and drainage.
- Where the onshore export cable corridor or 400 kV grid connection cable corridor cross sites of particular sensitivity, hydrogeological risk assessment(s) will be undertaken to inform a site-specific crossing method statement(s) where required.
- Detailed Pollution Prevention Plan(s) will be prepared in accordance with the Outline Pollution Prevention Plan submitted with the application for development consent (document reference J1.4).

- Bentonite used in trenchless crossings would be controlled through the Outline Bentonite Breakout Plan submitted as part of the application for development consent (document reference J1.13).
- Detailed Operational Drainage Management Plan(s) will be prepared for the onshore substation sites in accordance with the Outline Operational Drainage Management Plan submitted with the application for development consent (document reference J10). The Plan(s) will include measures to limit discharge rates and attenuate flows to maintain greenfield runoff rates at the onshore substations. It will also include measures to control surface water runoff, including measures to prevent flooding of the working areas or offsite and to ensure any runoff is treated appropriately.
- An Onshore Decommissioning Plan will be developed prior to decommissioning in a timely manner and will be in line with the latest relevant available guidance.

8.3.5 Assessment of effects

8.3.5.1 The assessment has considered:

- the impact of contaminated runoff on the quality of surface water receptors;
- the impact of increased flood risk arising from additional surface water runoff;
- the impact of increased flood risk arising from damage to existing flood defences;
- the impact of increased flood risk arising from watercourse crossings;
- the impact of damage to existing field drainage; and
- the impact of damage to existing water supply and drainage pipelines.

8.3.5.2 The Flood Risk Assessment undertaken demonstrates that the onshore elements of the Transmission Assets meet the requirements of relevant local and national planning policy, including the requirement to ensure that the Transmission Assets would not result in any increase in flood risk elsewhere.

8.3.5.3 Taking into account the measures proposed, the assessment has not identified any significant effects arising from the Transmission Assets during the construction, operation and maintenance or decommissioning phases.

8.3.6 Cumulative effects

8.3.6.1 Cumulative effects with other developments have been assessed. Overall, the assessment has not identified any significant cumulative effects.

8.4 Onshore ecology and nature conservation

8.4.1 Introduction

8.4.1.1 Volume 3, Chapter 3 of the ES (document reference F3.3) sets out the assessment of effects in relation to onshore ecology and nature conservation. Ecology refers to the communities of animals and plants which live in the environment and the relationships that they have with each other and with the physical environment.

8.4.2 Approach

8.4.2.1 The assessment of effects has been informed by both collection of existing data including records of protected sites and species and site-specific surveys.

8.4.3 Baseline environment

8.4.3.1 The Ribble and Alt Estuaries Special Protection Area and Ramsar site are partly within the Intertidal Infrastructure Area. In addition, the Lytham St Annes Dunes Site of Special Scientific Interest and the Ribble Estuary Site of Special Scientific Interest are located partly within the Onshore Order Limits. A number of other nationally and locally designated sites have been identified and considered within the assessment.

8.4.3.2 The baseline surveys have identified a range of habitat types of varying quality, including habitats of importance such as coastal and floodplain grazing marsh, coastal saltmarsh, coastal sand dunes, lowland mixed deciduous woodland, good quality semi-improved grassland, mudflats, lowland fens, lowland meadows and traditional orchard.

8.4.3.3 The identified habitats have the potential to support a range of protected species including bats, great crested newts, sand lizards, otters, fish, aquatic and terrestrial invertebrates and plant species.

8.4.4 Measures adopted as part of the Transmission Assets (commitments)

8.4.4.1 The measures adopted by the Applicants include the following.

- The site selection process has avoided designated sites (including Sites of Special Scientific Interest, Local Nature Reserves, Local Wildlife Sites, Lancashire Wildlife Trust Reserves and Ancient Woodland), where practicable. Where possible, unprotected areas of woodland, mature and protected trees (i.e., veteran trees) have been avoided.
- The crossing beneath the Lytham St Annes dunes SSSI will be undertaken using trenchless installation techniques. The exit pits associated with the trenchless installation will be at least 100 m seaward of the western boundary of the Sites of Special Scientific Interest.
- At the detailed design stage, hydrogeological risk assessment(s) will be undertaken in relation to this crossing to inform the crossing design and

mitigate any potential impacts to the hydrologically-dependant surface water features of the sand dune system.

- Trenchless techniques will be used to install cables beneath all Environment Agency main rivers. In particular, the crossing beneath the River Ribble will be undertaken using trenchless installation techniques.
- Detailed Code(s) of Construction Practice (CoCP(s)) will be prepared in accordance with the Outline CoCP submitted with the application for development consent (document reference J1). The CoCP will include measures to maintain and address ecology and nature conservation.
- Detailed Pollution Prevention Plan(s) will be prepared in accordance with the Outline Pollution Prevention Plan submitted with the application for development consent (document reference J1.4). This will include details of emergency spill procedures and control measures based on the latest available guidance.
- Bentonite use in trenchless crossings would be controlled through the Outline Bentonite Breakout Plan submitted as part of the application for development consent (document reference J1.13).
- Impacts on invasive non-native species will be controlled through the Outline Biosecurity Protocol submitted as part of the application for development consent (document reference J1.12).
- Construction site lighting will only operate when required and will be positioned and directed to avoid unnecessary illumination to residential properties, sensitive ecological receptors and footpath users, and minimise glare to users of adjoining public highways.
- Land required temporarily for construction (e.g., for temporary compounds and land above joint bays) will be reinstated.
- Detailed Ecological Management Plan(s) will be developed in accordance with the Outline Ecological Management Plan submitted as part of the application for development consent (document reference J6). This will include measures relating to habitats and protected or notable species, species mitigation licences and the role of the Ecological Clerk of Works where relevant.
- The Applicants will join the Lancashire District Level Licensing scheme in relation to Great Crested Newts, as detailed within the Outline Ecological Management Plan.
- An Onshore Decommissioning Plan will be developed prior to decommissioning in a timely manner and will be in line with the latest relevant available guidance.

8.4.4.2 In addition, the approach to biodiversity benefit is set out in the Biodiversity Benefit Statement.

8.4.5 Assessment of effects

8.4.5.1 The assessment has considered:

- Ribble and Alt estuaries Ramsar site, Ribble Estuary Site of Special Scientific Interest and National Nature Reserve;
- Lytham St Annes Dunes Site of Special Scientific Interest and Lytham St Annes Local Nature Reserve;
- Biological Heritage Sites;
- ecological networks;
- ancient woodland;
- veteran trees;
- priority habitats;
- bats;
- great crested newt;
- sand lizard;
- otter;
- fish assemblage the River Ribble;
- aquatic invertebrates; and
- terrestrial invertebrates and plants as part of Site of Special Scientific Interest and Biological heritage Site designations.

8.4.5.2 There is potential for significant effects from temporary or permanent habitat loss in relation to three locally designated Biological Heritage Sites, bats, great crested newts, otters and aquatic invertebrates. In addition, potentially significant effects from habitat fragmentation and isolation have been identified for two Biological Heritage Sites, bats (in relation to a maternity roost), great crested newts, otters and terrestrial invertebrates.

8.4.5.3 In addition, potentially significant effects have been identified associated with potential hydrogeological changes on the Lytham St Annes Dunes Site of Special Scientific Interest and Lytham St Annes LNR and the sand lizards in this location.

8.4.5.4 Mitigation measures are proposed to address the potential significant effects. With these measures in place, the only significant effect that remains is the partial loss of Mill Brook Valley Biological Heritage Site .

8.4.5.5 An area has been identified as having potential for biodiversity benefit, including provision of new habitat and opportunities for enhancement of habitats including waterbodies, hedgerows, and grassland. This will result in some long term beneficial effects on ecology and nature conservation.

8.4.6 Cumulative effects

8.4.6.1 Cumulative effects with other developments have been assessed. Overall, the assessment has not identified any significant cumulative effects.

8.5 Onshore and intertidal ornithology

8.5.1 Introduction

8.5.1.1 Volume 3, Chapter 4 of the ES (document reference F3.4) sets out the assessment of effects in relation to onshore and intertidal ornithology. This includes consideration of the bird population from mean low water springs and landward to Penwortham.

8.5.2 Approach

8.5.2.1 The assessment of effects has been informed by information on breeding, wintering and migratory birds from a desk based review of existing studies and datasets and also through site-specific surveys, including two years-worth of breeding, wintering and migratory bird surveys.

8.5.3 Baseline environment

8.5.3.1 The Ribble and Alt Estuaries Special Protection Area and Ramsar site are partly within the Intertidal Infrastructure Area, while Liverpool Bay/Bae Lerpwl Special Protection Area and other internationally designated sites are located within 20 km of the Intertidal Infrastructure Area.

8.5.3.2 Breeding, wintering and migratory birds use both the terrestrial and intertidal habitats located within or near to the Intertidal Infrastructure Area and Onshore Order Limits. Waterbird and seabird species that depend on wetlands and the marine environment for survival at some point in their life cycle use the intertidal habitats and nearshore waters close to the landfall and River Ribble in winter and during passage periods (i.e., spring and autumn).

8.5.3.3 In addition, terrestrial habitats near the landfall and along the onshore cable routes provide a range of functions (e.g., foraging, non-foraging activities and nesting) for breeding birds and wintering and migratory birds.

8.5.3.4 The site-specific intertidal ornithological surveys indicated that the intertidal habitats at the landfall support a wader assemblage which is of importance in the context of the Ribble and Alt Estuaries Special Protection Area and Ramsar site population. The arable and pasture dominated landscape landward of high tide support large numbers of birds foraging in the crops and flooded fields.

8.5.3.5 Both the desk-based study and site-specific surveys show that the area is important during winter and migration periods either locally or nationally for several ornithological features, including waders, raptor, passerine, goose, duck and swan species.

8.5.3.6 The site-specific breeding bird surveys undertaken found a wide range of species identified as breeding, including species of duck, wader, raptor, owl, but mostly passerine species, predominantly species associated with farmland, scrub and woodland habitats, although there are some breeding waders (predominately oystercatcher and lapwing) located within the Onshore Order Limits.

8.5.4 Measures adopted as part of the Transmission Assets (commitments)

8.5.4.1 The measures proposed by the Applicants include the following.

- The site selection process has avoided designated sites (Sites of Special Scientific Interest, Local Nature Reserves, Local Wildlife Sites, Lancashire Wildlife Trust Reserves, Ancient Woodland and Royal Society for the Protection of Birds (RSPB) Reserves), where practicable. Where possible, unprotected areas of woodland, mature and protected trees (i.e., veteran trees) have been avoided.
- The onshore export cables and the 400 kV grid connection cables will be completely buried underground for the entire length. No overhead pylons will be installed as part of the Transmission Assets.
- The crossing beneath the designated sites at Lytham St Annes dunes will be undertaken using trenchless installation techniques.
- With respect to the intertidal area, Offshore Cable Specification and Installation Plan(s) will be produced, in accordance with the Outline Offshore Cable Specification and Installation Plan (document reference J15). The specifications will restrict the Applicants to completing one cable pull in (a maximum of five weeks) per wintering season (i.e., during the months of November – February, inclusive), unless otherwise agreed with the Marine Management Organisation, in consultation with Natural England.
- Trenchless techniques will be used to install cables beneath all Environment Agency main rivers. In particular, the crossing beneath the River Ribble will be undertaken using trenchless installation techniques.
- Detailed Code(s) of Construction Practice (CoCP(s)) will be prepared in accordance with the Outline CoCP submitted with the application for development consent (document reference J1).
- Impacts on invasive non-native species will be controlled through the Outline Biosecurity Protocol submitted as part of the application for development consent (document reference J12).
- Land required temporarily for construction (e.g., for temporary compounds and land above joint bays) will be reinstated.
- Detailed Ecological Management Plan(s) will be developed in accordance with the Outline Ecological Management Plan submitted as part of the application for development consent (document reference J6). This will include a Breeding Bird Protection Plan.
- To mitigate for potential permanent habitat loss associated with each of the onshore substations, mitigation areas south of Newton-with-Scales will be provided for waders and farmland birds. Measures within these areas may include measures, such as, the creation of scrapes and thickening of hedgerows.

- Where construction activities are undertaken along the onshore export cable corridor in proximity to Higher Ballam and Lower Ballam, a mitigation area will be provided for supplementary feeding of pink-footed goose and whooper swan during the core wintering bird period (November to March, inclusive).
- Where construction activities are undertaken within the Intertidal Infrastructure Area, mitigation measures will be provided at Fairhaven saltmarsh to reduce disturbance upon roosting wader features of Ribble and Alt Estuary Special Protection Area.
- An Onshore Decommissioning Plan will be developed prior to decommissioning in a timely manner and will be in line with the latest relevant available guidance.

Assessment of effects

8.5.4.2 The assessment has considered:

- the impact of permanent loss of supporting habitats;
- the impact of temporary loss of supporting habitat and/or resource availability;
- the impact of disturbance and displacement;
- the impact of pollution caused by accidental spills and/or contaminant release;
- the impact of spreading invasive non-native species;
- the impact of habitat fragmentation and species isolation; and
- the provision of ecological mitigation and biodiversity benefit habitats.

8.5.4.3 Taking into account the measures proposed, the assessment has not identified any significant effects arising from the Transmission Assets during the construction, operation and maintenance or decommissioning phases on onshore and intertidal ornithology.

8.5.5 Cumulative effects

8.5.5.1 Cumulative effects with other developments have been assessed. Overall, the assessment has not identified any significant cumulative effects.

8.6 Historic environment

8.6.1 Introduction

8.6.1.1 Volume 3, Chapter 5 of the ES (document reference F3.5) sets out the assessment of effects in relation to the historic environment. Historic environment encompasses all aspects of the past including buried archaeological remains, deposits of geoarchaeological or palaeoenvironmental interest (i.e., deposits containing information about past

environments and human interaction with these past environments), built heritage and the character of the historic landscape.

8.6.2 Approach

8.6.2.1 The assessment of effects on the historic environment has been informed by a combination of desk-based research, site visits and site-specific fieldwork including geophysical survey and trial trenching.

8.6.3 Baseline environment

8.6.3.1 Land within the Onshore Order Limits and Intertidal Infrastructure Area has the potential to contain archaeological sites and features of all periods, along with deposits of geoarchaeological and/or palaeoenvironmental interest. Consideration of this potential is intrinsically linked to an understanding of the physical processes which have led to the development of the current landscape across the south western coastal plain of the Fylde peninsula, within which elements of the Transmission Assets sit. Due to the low-lying nature of this landscape, the history of the area throughout the Quaternary period and including the Holocene period is a complex one, as sea levels changed in accordance with the series of glacial episodes.

8.6.3.2 A series of wetlands developed behind the coastal strip, some were interconnected and most have now been drained. Organic material accumulated over time within these wetlands to create raised bogs, known as ‘mosses’. The onshore export cable corridor crosses two named mosses (Lytham Moss and Marton Moss), within which there is potential for sites and features of Late Upper Palaeolithic and Mesolithic date. The slightly elevated land adjacent to these mosses has an enhanced potential for sites of Neolithic and Bronze Age date.

8.6.3.3 The potential for sites and features of Iron Age date to be present within the Onshore Order Limits and Intertidal Infrastructure Area is considered to be low, with very little material from this period having been identified. Roman activity is concentrated around a known fort close to Kirkham, with Early Medieval and Medieval activity represented mostly through place name evidence rather than artefacts and sites.

8.6.3.4 Designated heritage assets are present in the vicinity of the Onshore Order Limits and Intertidal Infrastructure Area, including Registered Parks and Gardens of Historic Interest, Conservation Areas and Listed Buildings.

8.6.4 Measures adopted as part of the Transmission Assets (commitments)

8.6.4.1 The measures proposed by the Applicants include the following.

- A range of sensitive historical areas have been avoided where possible during the site selection process, including listed buildings, scheduled monuments, registered parks and gardens conservation areas and non-designated built heritage assets.

- An Onshore and Intertidal Written Scheme of Investigation(s) will be developed in line with the Outline Onshore and Intertidal Written Scheme of Investigation (document reference J9). This will provide details on the surveys and archaeological mitigation in advance for each stage of work, any ground breaking works and during construction.
- Detailed Code(s) of Construction Practice (CoCP(s)) will be prepared in accordance with the Outline CoCP submitted with the application for development consent (document reference J1). This will include measures to maintain and address the historic environment.
- Land required temporarily for construction (e.g., for temporary compounds and land above joint bays) will be reinstated.
- An Onshore Decommissioning Plan will be developed prior to decommissioning in a timely manner and will be in line with the latest relevant available guidance.

8.6.5 Assessment of effects

8.6.5.1 The assessment has considered:

- loss of, or harm to, buried archaeological remains and deposits of geoarchaeological and palaeoenvironmental interest;
- the impact of the Transmission Assets onshore works (other than the onshore substations) on designated heritage assets as a result of change within their setting;
- the impact of the Transmission Assets onshore works on the character of the historic landscape; and
- The impact of the onshore substations on designated heritage assets as a result of change within their setting.

8.6.5.2 No designated heritage asset would be directly physically impacted by the construction, operation and maintenance and decommissioning phases of the Transmission Assets.

8.6.5.3 There are potential significant effects on the historic environment arising from the Transmission Assets during the construction, operation and maintenance or decommissioning phases which would arise from loss of, or harm to, buried archaeological remains and deposits of geoarchaeological and palaeoenvironmental interest during construction. This is a precautionary assessment and further investigation will be undertaken ahead of and during construction to identify any currently unknown buried archaeology.

8.6.5.4 All of the impacts on designated heritage assets identified with regard to the Transmission Assets represent less than substantial harm to the significance of those assets. None of the identified impacts would represent substantial harm as defined in the Government's Planning Practice Guidance.

8.6.6 Cumulative effects

8.6.6.1 Cumulative effects with other developments have been assessed. Overall, the assessment has not identified any significant cumulative effects.

8.7 Land use and recreation

8.7.1 Introduction

8.7.1.1 Volume 3, Chapter 6 of the ES (document reference F3.6) considers existing land uses, including agriculture and recreation, which may be directly or indirectly affected during the construction, operation and maintenance and decommissioning phase of the Transmission Assets. The assessment considered the potential impacts on agricultural land quality, land holdings and recreational resources (e.g., coastal areas, golf courses, caravan parks, stables), including public rights of way (e.g., footpaths, bridleways) and other promoted routes, such as National Cycle Routes and Long Distance Paths.

8.7.2 Approach

8.7.2.1 Existing land uses were identified through a combination of desk-based analysis and site-specific surveys. Desk based analysis of existing studies and datasets were used to identify the quality of agricultural land, the types and patterns of soils, farm holdings and recreational resources, including public rights of way. In addition, soil surveys were also undertaken in 2024 to confirm the quality and characteristics of agricultural land within the Onshore Order Limits.

8.7.3 Baseline environment

8.7.3.1 The desk based analysis and soil surveys determined that the Onshore Order Limits predominantly comprised Agricultural Land Classification Grade 2 (very good) and Grade 3 (good to moderate) agricultural land, with smaller areas of Grade 4 (poor) agricultural land, non-agricultural land and urban land. In addition, the onshore substations and associated infrastructure coincide with land belonging to two separate land holdings.

8.7.3.2 Desk based analysis identified several recreational resources within or in proximity to the Onshore Order Limits, which comprised the Coastal Area, land designated under the Country Side of Way Act 2000, areas of open greenspace (e.g. golf courses, playing fields), Canal and Rivers Trust Waterways (Ribble Link), recreational facilities at Blackpool Airport, caravan parks and livery yards and stables. In addition, multiple public rights of way intersect the Onshore Order Limits, including public footpaths, public bridleways, Long Distance Footpaths (Lancashire Coastal Way, Ribble Way) and National Cycle Routes 62 and 622.

8.7.4 Measures adopted as part of the Transmission Assets (commitments)

8.7.4.1 Several measures have been adopted as part of the Transmission Assets (commitments) to mitigate potential impacts on land use and recreation:

- The onshore export cables and the 400 kV grid connection cables will be completely buried underground for the entire length. No overhead pylons will be installed as part of the Transmission Assets.
- The crossing beneath the St Annes Old Links Golf Course will be undertaken using trenchless installation techniques.
- Installation of cables at Blackpool Road Playing Fields would be by trenchless techniques, avoiding the need to trench through this area.
- Detailed Code(s) of Construction Practice (CoCP(s)) will be prepared in accordance with the Outline CoCP submitted with the application for development consent (document reference J1). This will include measures to address soil management and recreation.
- Detailed Soil Management Plan(s) will be developed in accordance with the Outline Soil Management Plan provided as part of the application for development consent (document reference J1.7). The Plan(s) will aim to characterise and manage soil materials during construction. Soil types would be determined via site-specific survey work.
- Prior to the commencement of works, the contractor (or project appointed Land Agent) will undertake a record of condition.
- Detailed Public Rights of Way Management Plans will be provided in accordance with the An Outline Public Rights of Way Management Plan submitted with the application for development consent (document reference J1.5). This will include measures to minimise the disturbance to public rights of way, where practicable.
- An Outline Open Space Management Plan has been appended to the Outline PRoW Management Plan, which includes measures to minimise potential impacts to the users of Lytham St Annes beach and Blackpool Road Recreation Ground.
- Land required temporarily for construction (e.g., for temporary compounds and land above joint bays) will be reinstated. Post-construction, the working area will be reinstated to pre-existing condition as far as reasonably practical in line with good practice guidance.
- An Onshore Decommissioning Plan will be developed prior to decommissioning in a timely manner and will be in line with the latest relevant available guidance.

8.7.5 Assessment of effects

8.7.5.1 The assessment has considered:

- the permanent and temporary loss of agricultural land;

- the impact on farm holdings; and
- the temporary impact to the use of recreational resources.

8.7.5.2 Taking into account the mitigation measures described above, the following significant effects are likely to occur with respect to land use and recreation.

- Temporary adverse effect on farm holdings during construction.
- Permanent adverse effect as a result of the permanent loss of best and most versatile agricultural land. Occurring during construction of the Transmission Assets.

8.7.6 Cumulative effects

8.7.6.1 The following significant cumulative effects are likely to occur with respect land use and recreation.

- Permanent adverse cumulative effect as a result of the permanent loss of Best and Most Versatile agricultural land during construction of the Transmission Assets, when the Transmission Assets is considered together with other proposed developments in the area.

8.8 Traffic and transport

8.8.1 Introduction

8.8.1.1 Volume 3, Chapter 7 of the ES (document reference F3.7) sets out the assessment of effects in relation to traffic and transport. Traffic and transport relate to the movement demand generated by the Transmission Assets and its effects upon other road users and surroundings.

8.8.2 Baseline environment

8.8.2.1 A traffic and transport study area has been identified in liaison with the local highway authorities including relevant parts of the strategic road network and local road network determined as likely to be used by construction generated vehicles. A baseline position has been established by obtaining publicly available traffic flow data, undertaking new traffic surveys, assessing road safety and analysing public transport services and provision and facilities for pedestrians and cyclists.

8.8.3 Measures adopted as part of the Transmission Assets (commitments)

8.8.3.1 The measures proposed by the Applicants include the following.

- Trenchless techniques will be used to install cables beneath all A, B and C roads (including the Preston Western Distributor Road, A582 South Ribble Western Distributor Upgrade and M55 Heyhouses Link Road; excluding Leech Lane);
- Where practicable, during construction, access routes within the onshore export cable corridor and 400 kV grid connection corridor (i.e., for

example, the use of haul roads) will be used, to minimise potential impacts to the local road network.

- Detailed Code(s) of Construction Practice (CoCP(s)) will be prepared in accordance with the Outline CoCP submitted with the application for development consent (document reference J1). This will include measures to maintain and address traffic and transport.
- Detailed Construction Traffic Management Plan(s) will be produced in accordance with the Outline Construction Traffic Management Plan submitted with the application for development consent (document reference J5). This will include measures to include:
  - managing the numbers and routing of Heavy Goods Vehicles during the construction phase;
  - managing the movement of construction worker traffic during the construction phase;
  - details of measures to manage the safe passage of Heavy Goods Vehicle traffic via the local highway network; and
  - details of localised road improvements if and where these may be necessary to facilitate safe use of the existing road network.
- Temporary access points from the public highway will be installed to facilitate vehicular access into the onshore export cable corridor, 400 kV grid connection cable corridor and onshore substations, during construction, in accordance with the indicative outline highway access designs set out within Outline Highways Access Management Plan, prepared and submitted with the application for development consent (document reference J8).
- Vehicle movements associated with operation and planned maintenance of the onshore infrastructure will operate only during the daytime and evening periods (i.e., 07:00 – 23:00). Vehicle movements may however be subject to unscheduled events outside these hours.
- An Onshore Decommissioning Plan will be developed prior to decommissioning in a timely manner and will be in line with the latest relevant available guidance.

8.8.4 Assessment of effects

8.8.4.1 The assessment has considered:

- the impact of driver delays caused by construction works or construction traffic (including temporary delays to public transport services as part of that driver delay);
- the impact on non-motorised delay caused by construction works or construction traffic;
- the impact on fear and intimidation (non-motorised user amenity) caused by construction works or construction traffic;

- the impact on severance caused by construction works or construction traffic;
- the impact on road safety caused by construction traffic;
- the impact of abnormal loads on the safety of users of the local road network, strategic road network and other transport receptors.

8.8.4.2 The construction phase of the Transmission Assets will generate the greatest number of vehicle movements as the transportation of construction materials will incur the greatest number of heavy goods and staff vehicle movements and it is therefore this phase that the traffic and transport assessment focusses on.

8.8.4.3 The operation and maintenance of the onshore elements of the Transmission Assets would generate only a limited number of additional vehicle movements. The onshore elements of the Transmission Assets do not require any manned facilities and would be monitored remotely, requiring only maintenance activities.

8.8.4.4 Taking into account the measures proposed, the assessment has not identified any significant effects arising from the Transmission Assets during the construction, operation and maintenance or decommissioning phases.

8.8.4.5 There is potential for inter-related effects from transport with noise and vibration, air quality and human health. The construction phase has the highest likelihood of receptor-led effects. However, these effects would be managed through measures set out in the CoCP. Further details of inter-related effects are provided in Volume 4, Chapter 3: Inter-relationships of the ES.

8.8.5 Cumulative effects

8.8.5.1 Cumulative effects with other developments have been assessed. Overall, the assessment has not identified any significant cumulative effects.

8.9 Noise and vibration

8.9.1 Introduction

8.9.1.1 Volume 3, Chapter 8 of the ES (document reference F3.8) sets out the assessment of effects in relation to noise and vibration for receptors landward of mean low water springs. Unwanted noise and vibration can lead to adverse impacts on existing residential amenity and public health. As such, it is important that the impacts of noise and vibration predicted from the construction and operation of new developments be assessed and mitigated as far as reasonably practicable.

8.9.2 Approach

8.9.2.1 The existing sound environment has been characterised via a desk-based review of existing studies and datasets and site-specific surveys where long

term noise monitoring provided data for the determination of impact assessment criteria.

8.9.3 Baseline environment

8.9.3.1 The long term sound survey highlighted that much of the area affected by the Transmission Assets has a fairly low existing noise climate due to the rural nature of certain areas. The dominant source of noise is from distant traffic on local roads.

8.9.3.2 Receptors sensitive to noise include homes and commercial properties.

8.9.4 Measures adopted as part of the Transmission Assets (commitments)

8.9.4.1 The measures proposed by the Applicants include the following.

- Core working hours for the construction of the intertidal and onshore works will be as follows:
  - Monday to Saturday: 07:00 - 19:00 hours; and
  - up to one hour before and after core working hours for mobilisation ("mobilisation period") i.e. 06:00 to 20:00.

  Activities carried out during the mobilisation period will not generate significant noise levels (such as piling, or other such noisy activities). In circumstances outside of core working practices, specific works may have to be undertaken outside the core working hours. This will include, but is not limited to, works being undertaken within and/or adjacent to Blackpool Airport and cable installation at landfall and at the River Ribble. Advance notice of such works will be given to the relevant planning authority.
- All trenchless crossings will be undertaken by non-impact methods such as horizontal directional drilling (or other trenchless techniques), excluding preparatory works, in order to minimise construction noise and vibration beyond the immediate location of works.
- Based on noise modelling results, where noise has the potential to cause significant adverse effects, mufflers and acoustic barriers will be used, where practicable.
- Detailed Code(s) of Construction Practice (CoCP(s)) will be prepared in accordance with the Outline CoCP submitted with the application for development consent (document reference J1). This will include measures to maintain and address noise and vibration.
- Detailed Construction Noise and Vibration Management Plan(s) will be developed in accordance with the Outline Construction Noise and Vibration Management Plan submitted as part of the application for development consent (document reference J1.3). This includes measures to mitigate noise from construction activities associated with the Transmission Assets.

- Operational Noise Management Plan(s) for the onshore substations will be prepared and submitted for approval prior to the commencement of operations. The Plan(s) will identify the noise limits for the operation of the onshore substations and the measures for how these limits would be monitored.
- An Onshore Decommissioning Plan will be developed prior to decommissioning in a timely manner and will be in line with the latest relevant available guidance.

8.9.5 Assessment of effects

8.9.5.1 The assessment has considered:

- noise impacts due to the onshore export cables at landfall (excluding trenchless techniques;
- noise impacts due to the onshore export cables at landfall (trenchless techniques;
- noise impacts due to the onshore construction and decommissioning landward of the transition joint bays (open-cut trenching);
- noise impacts due to the onshore construction and decommissioning landward of the transition joint bays (trenchless techniques);
- noise impacts due to the construction of the onshore substations;
- vibration impacts due to the construction of the Transmission Assets;
- the impact of generated by additional vehicle movements on the local highway network; and
- the impact of noise generated during operation and maintenance of the onshore substations.

8.9.5.2 Taking into account the measures proposed, the assessment has not identified any significant effects arising from the Transmission Assets during the construction, operation and maintenance or decommissioning phases.

8.9.6 Cumulative effects

8.9.6.1 Cumulative effects with other developments have been assessed. Overall, the assessment has not identified any significant cumulative effects.

8.10 Air quality

8.10.1 Introduction

Volume 3, Chapter 9 of the ES (document reference F3.9) sets out the assessment of effects in relation to air quality. The term air quality is a measure used to describe the level of pollutants present within the air.

8.10.2 Approach

8.10.2.1 Existing air quality data has been obtained from available sources, including local monitoring studies and national or government data sources, including the Department for Environment, Food & Rural Affairs (Defra) UK AIR Air Information Source national pollution maps.

8.10.3 Baseline environment

8.10.3.1 The nearest Air Quality Management Area designated to manage and improve existing air quality is over 3 km to the east of the Onshore Order Limits in Penwortham. There is also an Air Quality Management Area in Blackpool, near Talbot Road. Both have been designated due to elevated concentrations of nitrogen dioxide.

8.10.3.2 For the assessment, the baseline concentrations of nitrogen dioxide and particulate matter have used the highest measured concentrations at the nearest monitoring location which is Blackpool Marton Automatic Urban and Rural Network site.

8.10.3.3 For the purposes of the assessment potential human receptors have been identified. Also designated ecological sites within and near to the Onshore Order Limits have been identified where they could be affected by construction activities such as having sensitivities to dust.

8.10.4 Measures adopted as part of the Transmission Assets (commitments)

8.10.4.1 The measures proposed by the Applicants include the following.

- Detailed Code(s) of Construction Practice (CoCP(s)) will be prepared in accordance with the Outline CoCP submitted with the application for development consent (document reference J1). This will include measures to maintain and address air quality and dust management.
- Detailed Dust Management Plan(s) will be produced in accordance with the Outline Dust Management Plan prepared as part of the application for development consent (document reference J1.2). Detailed CoCP(s) will be developed in accordance with the Outline CoCP.
- An Onshore Decommissioning Plan will be developed prior to decommissioning in a timely manner and will be in line with the latest relevant available guidance.

8.10.5 Assessment of effects

8.10.5.1 The assessment has considered:

- the impact of dust and suspended particulates on human and ecological receptors; and
- the impact of emissions from traffic.

8.10.5.2 There will be no significant effects arising from the Transmission Assets during the construction, operation and maintenance or decommissioning phases in relation to dust and construction traffic related emissions.

8.10.6 Cumulative effects

8.10.6.1 Cumulative effects with other developments have been assessed. Overall, it is concluded that there will be no significant cumulative effects.

8.11 Landscape and visual resources

8.11.1 Introduction

8.11.1.1 Volume 3, Chapter 10 of the ES (document reference F3.10) sets out the assessment of effects in relation to landscape and visual impacts. Landscape and visual resources refer to the existing character and physical elements of the landscape, areas designated for their scenic or landscape related qualities, and views from publicly accessible locations such as settlements, transport routes, and public rights of way.

8.11.2 Approach

8.11.2.1 The landscape and visual baseline comprises two distinct but connected aspects; landscape character baseline, including international, national and local designated landscapes, and the visual baseline. Both resources were collated via a desktop analysis of publicly available data, site-specific surveys and fieldwork.

8.11.2.2 The visual baseline analysis involved a desktop exercise and consultation process to identify appropriate visual receptors and representative viewpoints. A Zone of Theoretical Visibility has been created, which is a computer-generated tool which identifies the likely extent (theoretical) of visibility of the Transmission Assets on the terrain and helps to identify locations for representative viewpoints and visual receptors.

8.11.2.3 The representative viewpoints have been selected to represent a broad range of locations and sensitive visual receptors across the study area. Fieldwork was undertaken to verify the visual receptors and representative viewpoint locations and photography captured.

8.11.2.4 As there are no offshore structures that are above sea-level, and therefore no sea-piercing permanent infrastructure, as part of the application for development consent for the Transmission Assets, seascape character and marine based visual receptors have not been considered in this assessment.

8.11.3 Baseline environment

8.11.3.1 National landscape character areas and relevant regional landscape character areas within the study area have been identified.

- Lancashire and Amounderness Plain National Character Areas
- Local character areas as identified in the Lancashire landscape strategy.

8.11.3.2 No designated landscape areas of international, national or local importance are located within the study area.

8.11.3.3 After consultation with stakeholders, 18 representative viewpoints have been selected to support the assessment to demonstrate the effects attributable to the onshore substations. One location on the beach south of Blackpool supports the assessment to demonstrate effects attributable to the landfall construction activities.

8.11.4 Measures adopted as part of the Transmission Assets (commitments)

8.11.4.1 The measures proposed by the Applicants include the following.

- The onshore export cables and the 400 kV grid connection cables will be completely buried underground for the entire length. No overhead pylons will be installed as part of the Transmission Assets.
- Detailed Code(s) of Construction Practice (CoCP(s)) will be prepared in accordance with the Outline CoCP submitted with the application for development consent (document reference J1). This will include measures to maintain and address landscape and visual.
- Land required temporarily for construction (e.g., for temporary compounds and land above joint bays) will be reinstated. Post-construction, the working area will be reinstated to pre-existing condition as far as reasonably practical in line with good practice guidance.
- Construction site lighting will only operate when required and will be positioned and directed to avoid unnecessary illumination to residential properties, sensitive ecological receptors and footpath users, and minimise glare to users of adjoining public highways.
- Detailed Landscape Management Plan(s) will be developed in accordance with the Outline Landscape Management Plan (document reference J2). This will include details of mitigation planting at the onshore substation sites, including the number, location, species and details of management and maintenance of planting. Where practicable, landscape mitigation planting will be established as early as reasonably practicable in the construction phase.
- An Onshore Decommissioning Plan will be developed prior to decommissioning in a timely manner and will be in line with the latest relevant available guidance.

8.11.5 Assessment of effects

8.11.5.1 The assessment has considered:

- impacts of landfall and onshore export cable corridor on onshore landscape character;
- impacts of onshore substations on onshore landscape character;

- impacts of 400 kV grid connection cable corridor on onshore landscape character;
- visual impacts: substations;
- visual impacts – landfall and onshore export cable corridor; and
- visual impacts – 400 kV grid connection cable corridor.

8.11.5.2 A number of potential daytime and night time impacts upon landscape and visual resources associated with the construction, operation and maintenance and decommissioning phases of the Transmission Assets have been identified.

8.11.5.3 There will be the following significant effects arising from the Transmission Assets during the construction, operation and maintenance or decommissioning phases.

- Effects on landscape character as a result of elements of the Transmission Assets/landfall:
  - Local Character Area 19a: Coastal Dunes – Fylde Coastal Dunes – construction.
- Effects on landscape character as a result of substations:
  - LCA 15d: Coastal Plain – Fylde – construction and operation year 1.
- Effects on visual amenity as a result of the onshore substations:
  - Viewpoints from public rights of way: 1 (south of Morgan onshore substation), 3 (west of Morgan onshore substation) and 6 (south of Morecambe onshore substation);
  - Sequential effects on people using local rights of way – construction, operation year 1 and year 15.
- Effects on visual amenity as a result of onshore cable/landfall:
  - people using beach – construction;
  - people using Blackpool Recreation Ground – construction;
  - people using a number of local rights of way – construction;
  - people using National Cycle Route 62 at Hillock Lane – construction; and
  - occupiers of residential properties at Bridge Farm, Bridge Hall Farm, Moss Side Farm, The Old Dairy, Hillock Cross Farm, Savick Brook Farm and Marsh Farm – construction.

8.11.5.4 There will be no significant long term operational effects on landscape character as a result of the Transmission Assets. The only long term significant effects on visual amenity would be sequential effects on equestrians and walkers using the linked PRoW immediately adjacent and near to the Morgan and Morecambe substation sites.

8.11.6 Cumulative effects

8.11.6.1 Cumulative effects with other developments have been assessed. Overall, it is concluded that there will be the following significant cumulative effects from the Transmission Assets alongside other projects/plans during construction and operation.

- Cumulative effects on visual amenity as a result of onshore cable routes:
  - people using public rights of way; and
  - occupiers of residential properties.

8.12 Aviation and radar

8.12.1 Introduction

8.12.1.1 Volume 3, Chapter 11 of the ES (document reference F3.11) sets out the assessment of effects in relation to aviation and radar. Aviation and radar refers to the stakeholders/receptors that operate in the UK and international airspace, interacting with each other, the air traffic management provided and the relationship/effects of the physical environment.

8.12.2 Approach

8.12.2.1 The aviation receptors around the Transmission Assets have been characterised via a desk study utilising UK and international aviation guidance material and site-specific study of regional aviation.

8.12.3 Baseline environment

8.12.3.1 The information on aviation and radar was collected through detailed review of existing guidance and datasets. This included defining Military Practice and Exercise Areas, aerodromes, flight procedures, other aviation communications, navigation and surveillance infrastructure, helicopter main route indicators and other low flying operations such as Ministry of Defence and helicopter search and rescue activities.

8.12.3.2 Several discrete operators utilise the airspace around the Transmission Assets. The Transmission Assets Onshore Order Limits encompass Blackpool Airport and are located within 15 km of the boundary of Warton Aerodrome.

8.12.3.3 The study area is located in close proximity to the NATS St. Anne’s Radar system.

8.12.4 Measures adopted as part of the Transmission Assets, Commitments

8.12.4.1 The measure proposed by the Applicants is as follows.

- No construction works within the operational (i.e., airside) boundary of Blackpool Airport will commence until Civil Aviation Publication 791 Parts

1 & 2 approval has been obtained from the Civil Aviation Authority in connection with those works. Part 3 will be finalised on the Civil Aviation Authority inspection of the completed works.

8.12.5 Assessment of effects

8.12.5.1 The assessment has considered:

- onshore trenching activity (including temporary above surface structures) at/near Blackpool Airport (impacts to airfield); and
- electromagnetic fields.

8.12.5.2 With mitigation in place, there will be no likely significant effects arising from the Transmission Assets during the construction, operation and maintenance and decommissioning phases.

8.12.6 Cumulative effects

8.12.6.1 Cumulative effects with other developments have been assessed. Overall, it is concluded that there will be no significant cumulative effects.

9 Environmental effects – offshore and onshore

9.1 Introduction

9.1.1.1 This section sets out the potential significant environmental effects for the following:

- climate change;
- socio-economics; and
- inter-related effects.

9.2 Climate change

9.2.1 Introduction

9.2.1.1 Volume 4, Chapter 1 of the ES (document reference F4.1) sets out the assessment of effects in relation to climate change. Climate change in this context refers to the long-term shifts in temperatures and weather patterns that are fundamentally driven by human activities.

9.2.1.2 The assessment considers the impacts and effects of the Transmission Assets on climate change during the construction, operation and maintenance and decommissioning phases. The purpose of the Transmission Assets is to connect the Morgan Offshore Wind Project and the Morecambe Offshore Windfarm to the National Grid, contributing to:

- the UK Government's ambition to deliver 50 gigawatts of offshore wind by 2030;
- delivering much needed investment and securing construction and operations jobs in the UK;
- securing our energy supply; and
- the UK's response to the climate change crisis.

9.2.1.3 The Morgan Offshore Wind Project and Morecambe Offshore Windfarm , therefore, have an important part to play in securing the timely delivery of the Government's renewable energy strategy and achieving legally binding emissions reduction targets.

9.2.1.4 The Morgan Offshore Wind Project and the Morecambe Offshore Windfarm will be consented separately. Therefore, the focus of the assessment in the ES is on the impacts of the Transmission Assets.

9.2.1.5 However, given their purpose, the Transmission Assets would never operate in isolation. As such, the cumulative impacts of the Transmission Assets with the Generation Assets on the global atmospheric mass of carbon dioxide have been assessed.

9.2.2 Approach

9.2.2.1 The greenhouse gas emissions arising from the Transmission Assets have been characterised by a series of desk-based assessments and articles

using published data to determine both the impact of the Transmission Assets on climate change and the impact of climate change on the Transmission Assets. The potential risks to the Transmission Assets from a changing climate have also been assessed.

9.2.3 Baseline environment

9.2.3.1 With regards to greenhouse gas emissions, the current baseline comprises the offshore environment, consisting of various subtidal habitats of mixed sediments and intertidal mudflats, and the onshore environment consisting of agricultural land. Of most importance is any land that is high in carbon stores, i.e., woodland and peat.

9.2.3.2 With regards to climate change risk, the offshore baseline environment is characterised by varied temperature, rainfall and wind speeds in the Irish Sea and North West England.

9.2.4 Measures adopted as part of the Transmission Assets (commitments)

9.2.4.1 The measures proposed by the Applicants include the following.

- A Greenhouse Gas (GHG) Reduction Strategy has been prepared and submitted with the application for development consent (document reference J4). The GHG Reduction Strategy outlines options to reduce construction-related emissions.

9.2.5 Assessment of effects

9.2.5.1 The assessment has considered:

- the impact of greenhouse gas emissions;
- the impact of greenhouse gas emissions arising from land use change;
- climate change risk; and
- net whole life greenhouse gas emissions and context.

9.2.5.2 Without mitigation there will be a significant adverse effect at the construction phase due to greenhouse gas emissions from the manufacturing and installation of the Transmission Assets. However, with the proposed Greenhouse Gas Reduction Strategy in place, there will not be a significant effect.

9.2.6 Cumulative effects

9.2.6.1 The Transmission Assets form one element of a wider proposed network of offshore wind farms, including the Morgan Offshore Wind Project and the Morecambe Offshore Windfarm. The Transmission Assets enable the renewable energy generated by these offshore wind farms to be transported to the UK electricity grid.

9.2.6.2 Overall, the cumulative effect of the Transmission Assets, together with the Morgan Offshore Wind Project and the Morecambe Offshore Windfarm on the global climate will be significant and beneficial as a result of the generation of renewable energy and contribution to the urgent national need for renewable energy infrastructure.

9.3 Socio-economics

9.3.1 Introduction

9.3.1.1 Volume 4, Chapter 2 of the ES (document reference F4.1) sets out the assessment of effects in relation to socio-economics. It addresses effects on the economy (including employment), housing and tourism. The assessment of the potential impact of the Transmission Assets on socio-economics considered the following categories.

- Economic: assessing the potential employment and Gross Value Added (GVA) impacts associated with Transmission Assets, the associated impacts on local employment opportunities and changes to aviation activities (at Blackpool Airport and Blackpool Airport Enterprise Zone).
- Social: assessing the potential impacts of the workforce associated with the Transmission Assets on housing, accommodation and population (including local services).
- Tourism: assessing the potential indirect impacts associated with visual amenity, overnight accommodation and recreation on tourism.

9.3.2 Approach

9.3.2.1 The socio-economics impact assessment considers the local economies and populations which are located at a number of spatial levels that might be affected by the Transmission Assets. This includes the areas closest to offshore and onshore activities as well as other important locations that may be used to support the construction, operation and maintenance and decommissioning activities related to the Transmission Assets (e.g., laying cables offshore, installing onshore substation etc.). These areas are primarily related to the regions where potential support facilities (i.e., ports) within the relevant spatial levels are located and the onshore substation which will be located at Penwortham.

9.3.3 Baseline environment

9.3.3.1 The offshore wind sector is identified as a high priority industry within national, regional and local policies across the UK. This reflects the opportunities the sector provides for supporting economic development and growth and providing jobs and incomes for UK residents. The offshore wind sector is identified as a potential employment opportunity for workers transitioning from other related industries, in particular activities that will require a significant degree of adaptation due to the continuation of efforts to decarbonise the economy.

9.3.3.2 The tourism sector is an important sector within the relevant policy environments. North Wales is known for its opportunities to experience the natural landscapes and supports a wide range of adventurous activities which draw in visitors. North west England has a wide range of recreation assets to offer, with a mixture of rural and urban landscapes. With access to the coast and the Cumbrian landscape as well as large urban centres, such as Liverpool and Manchester, the region is able to draw a great number of visitors each year.

9.3.4 Measures adopted as part of the Transmission Assets (commitments)

9.3.4.1 The measures proposed by the Applicants include the following.

- Detailed Employment and Skills Plan(s) will produced in accordance with the Outline Employment and Skills submitted with the application for development consent (document reference J31). This will detail how the Applicants will engage with local workers and training providers for anticipated employment opportunities associated with the Transmission Assets.

9.3.5 Assessment of effects

9.3.5.1 The assessment has considered the following impacts:

- the impact on economic receptors including employment, Gross Value Added and supply chain demand;
- the impact of increased employment opportunities;
- the economic impact of changes to aviation activities (at Blackpool Airport and Blackpool Airport Enterprise Zone);
- the impact on population, housing and accommodation; and
- the impact on tourism.

9.3.5.2 There will be no significant effects upon socio-economics arising from the Transmission Assets during the construction, operation and maintenance or decommissioning phases.

9.3.6 Cumulative effects

9.3.6.1 Cumulative effects with other developments have been assessed. There will be significant beneficial socio-economic cumulative effects during construction, operation and maintenance on economic receptors including employment and Gross Value Added.

9.4 Human health

9.4.1.1 Volume 1, Annex 5.1 of the ES (document reference F1.5.1) sets out the assessment of effects in relation to human health. The assessment was informed by a review of relevant chapters of the ES, public health evidence

sources, including scientific literature, baseline data, health policy, local health priorities and health protection standards with reference to:

- transport modes, access and connections (see also section **8.8**);
- open space, leisure and play (see also section **8.7**);
- employment and socio-economic opportunities (see section **9.3**);
- air quality (see also section **8.10**);
- water quality (see also section **8.3**);
- land quality (see also section **8.2**);
- noise exposure (see also section **8.9**); and
- radiation in relation to risk perception of electromagnetic fields (see also section **5.5.3**).

9.4.1.2 Overall, it is concluded that there will be no significant adverse effects arising from the Transmission Assets during the construction, operation and maintenance or decommissioning phases.

9.5 Transboundary effects

9.5.1.1 An assessment of transboundary effects has been undertaken.

9.5.1.2 Transboundary impacts relate to those impacts that may arise from an activity within one state that affect the environment or other interests of another state.

9.5.1.3 On the basis of the information available presented within the ES, only climate change had the potential for likely significant beneficial transboundary effects.

9.5.1.4 There is no potential for any other likely significant transboundary effects as a result of the Transmission Assets.

9.6 Inter-related effects

9.6.1.1 An assessment of inter-related effects has been undertaken. This considers the potential offshore and onshore inter-related effects associated with potential impacts of the Transmission Assets during the construction, operation and maintenance, and decommissioning phases, where effects could accumulate between project phases and/or environmental topics.

9.6.1.2 These have been reviewed to identify receptors likely to be affected by project life time effects (effects throughout construction, operation and maintenance and decommissioning) and one or more of the environmental topics.

9.6.1.3 Following the implementation of mitigation measures adopted as part of the project and further mitigation (if required), project lifetime effects arising during the construction, operation and maintenance, and decommissioning phases of the Transmission Assets are unlikely to result in effects of greater significance than those reported individually in the ES.

9.6.1.4 For receptor led effects, overall, it is unlikely that receptors would experience increased significance of inter-related effects than that which has already been reported in the individual chapters for the identified receptors. Therefore, there is no change resulting from inter-related assessment.