MORGAN AND MORECAMBE OFFSHORE WIND FARMS: TRANSMISSION ASSETS

Cable Statement

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Prepared by:

Morgan Offshore Wind Limited, Morecambe Offshore Windfarm Ltd

Prepared for:

Morgan Offshore Wind Limited, Morecambe Offshore Windfarm Ltd

Contents

Tables

Figures

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.
Energy balancing infrastructure	The onshore substations include energy balancing infrastructure. These provide valuable services to the electrical grid, such as storing energy to meet periods of peak demand and improving overall reliability.
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 Infrastructure Area	The temporary and permanent areas between MLWS and MHWS.
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 bay inclusive of all construction works, including the offshore and onshore cable routes, intertidal working area and landfall compound(s).
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 export cables, landfall and onshore infrastructure for the Morgan Offshore Wind Project and the Morecambe Offshore Windfarm. 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.

Term	Meaning
Morgan Offshore Wind Project: Generation Assets	The offshore generation assets and associated activities for the Morgan Offshore Wind Project.
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.
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.
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.
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.
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.
Transmission Assets Order Limits: Offshore	The area within which all components of the Transmission Assets seaward of Mean Low Water Springs will be located, including areas required on a temporary basis during construction and/or decommissioning.
Transmission Assets Order Limits: Onshore	The area within which all components of the Transmission Assets landward of Mean High Water Springs will be located, including areas required on a temporary basis during construction and/or decommissioning (such as construction compounds).
Voltage	Voltage is the pressure from an electrical circuit's power source that pushes charged electrons (current) through a conducting loop.

Acronyms

Acronym	Meaning
ES	Environmental Statement
HDD	Horizonal Directional Drilling
HVAC	High Voltage Alternating Current
MCZ	Marine Conservation Zone
MHWS	Mean High Water Springs
MLWS	Mean Low Water Springs
NGESO	National Grid Electricity System Operator
OFTO	Offshore Transmission Operator
OTNR	Offshore Transmission Network Review
SoS	Secretary of State (for Energy Security and Net Zero)
TJB	Transition Joint Bay

Units

Unit	Description
km	Kilometre
kV	Kilovolt
GW	Gigawatt
MW	Megawatt

1 CABLE STATEMENT

1.1 Background

1.1.1 Introduction and summary

1.1.1.1 This Cable Statement has been produced as part of the Morgan and Morecambe Offshore Wind Farms: Transmission Assets (referred to hereafter as 'the Transmission Assets').

1.1.1.2 The Morgan Offshore Wind Limited, a joint venture of bp Alternative Energy Investments Ltd (bp) and Energie Baden-Württemberg AG (EnBW) and Morecambe Offshore Windfarm Ltd, a joint venture Zero-E Offshore Wind S.L.U. (Spain) (a Cobra group company) (Cobra) and Flotation Energy Ltd (together, the Applicants), as part of their joint application to the Secretary of State for a DCO for the construction, operation and decommissioning of the Transmission Assets.

1.1.1.3 The Applicants are jointly seeking a single DCO for their electrically separate transmission assets comprising aligned offshore export cable corridors to landfall where the offshore export cables are jointed to the onshore export cables via the transition joint bays and aligned onshore export cable corridors to separate onshore substations, and onward connection to the National Grid at Penwortham, Lancashire.

1.1.1.4 The information contained within this Cable Statement on the proposed export cable corridors and cable installation methods, is intended to be a summary of the associated information contained within Volume 1, Chapter 3: Project description and Volume 1, Chapter 4: Site selection and consideration of alternatives of the ES (document references F1.3 and F1.4, respectively).

1.1.1.5 This document details the proposed export cable corridor routes (please refer to Section 1.3.1) and methods of installation for any cables offshore, at the landfall site and onshore (please refer to Sections 1.5, 1.6 and 1.7).

1.1.1.6 This Cable Statement forms part of the suite of documents submitted to the Secretary of State (SoS) in support of the application for a DCO. All parts should be read in conjunction with the application documents.

1.1.2 Project overview

1.1.2.1 Morgan Offshore Wind Limited (Morgan OWL), a joint venture between bp Alternative Energy Investments Ltd. (bp) and Energie Baden-Württemberg AG (EnBW), is developing the Morgan Offshore Wind Project. The Morgan Offshore Wind Project is a proposed wind farm in the east Irish Sea.

1.1.2.2 Morecambe Offshore Windfarm Ltd (Morecambe OWL), a joint venture between Zero-E Offshore Wind S.L.U. (Spain) (a Cobra group company) (Cobra) and Flotation Energy Ltd., is developing the Morecambe Offshore Windfarm, also located in the east Irish Sea.

1.1.2.3 Morgan OWL and Morecambe OWL (the Applicants) are jointly seeking a single consent for their electrically separate transmission assets comprising aligned offshore export cable corridors to landfall and aligned onshore export cable corridors to separate onshore substations, and onward connection to the National Grid at Penwortham, Lancashire.

1.1.2.4 The purpose of the Transmission Assets is to connect the Morgan Offshore Wind Project: Generation Assets and Morecambe Offshore Windfarm: Generation Assets (referred to collectively as the 'Generation Assets') to the National Grid. The key components of the Transmission Assets include offshore element, landfall and onshore elements as explained in paragraph 1.1.2.5 below. Details of the activities and infrastructure associated with the Transmission Assets are set out in Volume 1, Chapter 3: Project Description of the Environmental Statement (ES) (document reference F1.3).

1.1.2.5 This Cable Statement has been developed for both the onshore and offshore elements of Transmission Assets. The key components of the Transmission Assets include:

- Offshore:
  - 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 (MLWS) 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 separate onshore substations will contain the components for transforming the power supplied via the onshore export cables up to 400 kV; and
  - 400 kV grid connection cables: these export cables will bring the electricity generated by the Generation Assets from the onshore substation to the existing National Grid substation at Penwortham.

1.1.2.6 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.

1.1.2.7 Both Morgan OWL and Morecambe OWL are applying to install HVAC transmission infrastructure only. The electrical systems for each of the offshore wind farms will be electrically separate and independent of the other.

1.1.2.8 The Grid Connection Agreements for the two electrically separate connections between Morgan OWL and Morecambe OWL to the National

Grid at Penwortham are in place. The projected connections for Morgan OWL and Morecambe OWL are both anticipated in 2029.

1.1.3 Purpose of the Cable Statement

1.1.3.1 This Cable Statement has been prepared by the Applicant in accordance with Regulation 6(1)(b)(i) of the Infrastructure Planning (Applications: Prescribed Forms and Procedures) Regulations 2009 (the 'APFP Regulations'), which requires the Applicants for a Development Consent Order (DCO) to provide details of the proposed route (please refer to section 1.3) and method of installation for any cable (please refer to section 1.5 and section 1.6). This Cable Statement forms part of the suite of documents submitted to the Secretary of State (SoS) in support of the DCO application for the Transmission Assets. The application also includes a Safety Zone Statement (document reference J33) in line with Regulation 6(1)(b)(ii) of the APFP Regulations.

1.1.3.2 The information contained within this Statement on the proposed cable corridors and cable installation methods is intended to be a summary of the information contained within the Project Description chapter of the Environmental Statement (ES) (Volume 1, Chapter 4: Project Description of the ES, document reference F1.3).

1.1.3.3 This Cable Statement has been drafted based on Volume 1, Chapter 3: Project description and Volume 1, Chapter 4: Site selection and consideration of alternatives of the ES (document references F1.3 and F1.4, respectively).

1.1.3.4 This Cable Statement references the following documents:

- Works Plans – Onshore and Offshore (document reference B8);
- Outline Offshore Cable Specification and Installation Plan (document reference J15); and
- Outline Cable Burial Risk Assessment (document reference J14).

1.1.4 Structure of this document

1.1.4.1 This document is set out as follows:

- Section 1.1.1 presents an introduction to this document.
- Section 1.2 provides an overview of the Offshore Transmission Network Review.
- Section 1.3 provides an overview of the site selection of the proposed Export Cable Corridors.
- Section 1.4 gives a description of the grid connection works.
- Section 1.5 provides an overview of the proposed offshore cable installation methods and protection.

- Section 1.6 details proposed cable installation methods and reinstatement for the landfall, onshore export cable corridors and 400kV grid connection cable corridors.
- Section 1.7 provides an overview of the proposed onshore installation cable methods.

1.2 Offshore Transmission Network Review

1.2.1.1 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.

1.2.1.2 Under the OTNR, the National Grid Electricity System Operator (NGESO) is responsible for assessing options to improve the coordination of offshore wind generation connections and transmission networks and has undertaken a Holistic Network Design Review (HNDR). In July 2022, the UK Government published the 'Pathway to 2030 Holistic Network Design' documents, which set out the approach to connecting 50 GW of offshore wind to the National Grid (NGESO, 2022). A key output of the HNDR process was the recommendation that the Morgan Offshore Wind Project and the Morecambe Offshore Windfarm should work collaboratively in connecting the two offshore wind farms to the National Grid electricity transmission network at Penwortham in Lancashire.

1.2.1.3 The Applicants are jointly seeking a single DCO for their electrically separate transmission assets comprising aligned offshore export cable corridors to landfall and aligned onshore export cable corridors to separate onshore substations, and onward connection to the National Grid at Penwortham, Lancashire.

1.2.1.4 For the purposes of assessment, the earliest anticipated construction start date for the Transmission Assets (i.e., both Morgan Offshore Wind Project: Transmission Assets and Morecambe Offshore Windfarm: Transmission Assets) is 2027.

1.2.1.5 At this stage, the timing of construction activities set out within this ES is indicative. Both the Morgan Offshore Wind Project and the Morecambe Offshore Windfarm intend to be fully operational by 2030 at the time of writing.

1.3 Proposed Export Cable Corridors

1.3.1 Selection of the proposed export cable corridors

1.3.1.1 The site selection process has sought to align the siting of the infrastructure, for example, through the co-location of adjacent offshore and onshore export cable corridor routes, where this has been practicable. The degree to which is has been possible to align the areas identified varies depending on factors such as the design parameters and site-specific environmental or engineering constraints.

1.3.1.2 The Applicants have followed an iterative site selection and design process from inception to the point of DCO submission to identify the most suitable locations of the cable corridors. This is detailed within the Site selection and consideration of alternatives chapter of the Environmental Statement (ES) (Volume 1, Chapter: Site selection and consideration of alternatives chapter, document reference F1.4).

1.3.1.3 Alongside published principles and guidance such as the Horlock Rules, the following site selection principles were developed and applied at the outset of the site selection process for the Transmission Assets. These are drawn from the experience of the Applicants and technical expertise of consultants supporting the process and comprise:

- Shortest route preference to reduce impacts by minimising footprint for the Transmission Assets offshore and onshore Cable Corridors as well as considering cost (hence ultimately reducing the cost of energy to the consumer) and minimising transmission losses;
- Avoidance of key sensitive features / receptors where possible; and
- The space to accommodate the range of technology within the high-level design envelope (see Volume 1, Chapter 3: Project description of the ES, document reference F1.3).

1.3.2 Transmission Assets offshore export cable corridors

1.3.2.1 The permanent offshore infrastructure for the Transmission Assets includes the offshore export cables. 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). Offshore export cable corridors have been identified, within which the offshore export cables will be located as shown on Figure 1.

1.3.2.2 Offshore export cables are used for the transfer of power from the Generation Assets to the transition joint bays at landfall. Where possible, an aligned offshore export cable corridors has been developed for the offshore export cables for the Morgan Offshore Wind Project: Transmission Assets and the Morecambe Offshore Windfarm: Transmission Assets.

1.3.2.3 The Transmission Assets Order Limits: Offshore (hereafter referred to as the Offshore Order Limits) are designed to provide sufficient space for up to six cable trenches (including the potential need to micro-site the offshore export cable corridors around any sensitive features confirmed during the pre-construction stage) as well as temporary works such as anchoring and any future operation and maintenance activities such as cable reburial or repairs. The detailed coordinates for the offshore cable corridors are included in the Offshore Order Limits and Grid Coordinates Plan (document reference B5).

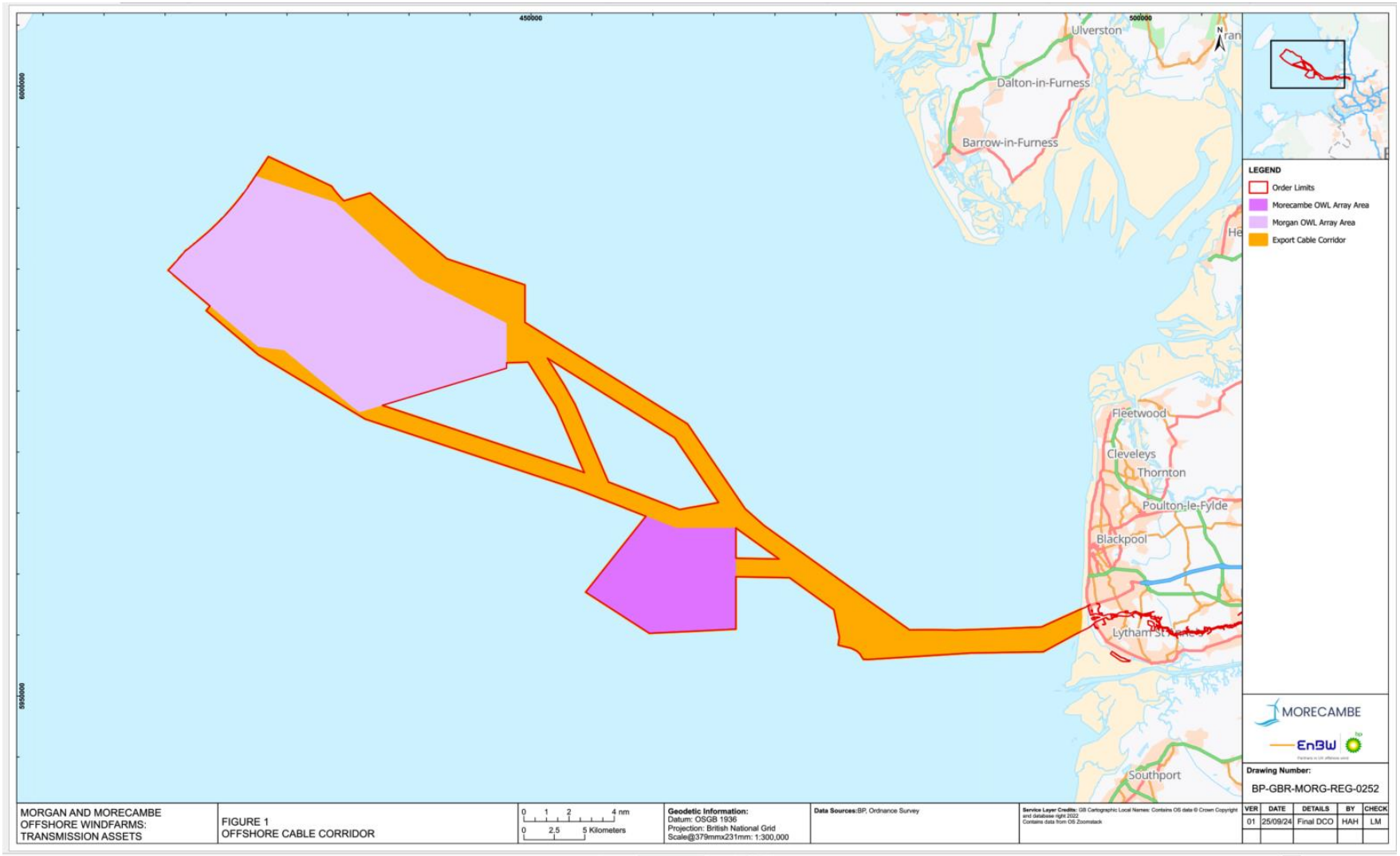

Figure 1: Offshore Cable Corridor

1.3.3 Transmission Assets landfall (including Intertidal Infrastructure Area)

1.3.3.1 The offshore export cables make landfall along the north west coast of England to the north of Lytham St. Anne's near Blackpool Airport, Lancashire. Landfall refers to 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 (TJBs) inclusive of all construction works, including the offshore and onshore cable routes, intertidal working area and landfall compound(s). This is shown on Figure 2 below.

Figure 2: Landfall Area

1.3.4 Transmission Assets onshore export cable corridors

1.3.4.1 The onshore export cables will provide a cable connection between the TJBs (within Blackpool Airport) and the proposed onshore substations. Onshore export cable corridors have been identified, within which the onshore export cables will be located as shown on Figure 3.

1.3.4.2 From the TJBs, the onshore export cable corridor routes east away from the coast. In the vicinity of Blackpool Airport, the cable route would diverges into two routes, with some cables passing through Blackpool Airport and other cables passing through Blackpool Airport and the Blackpool Road Playing Field.

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

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

1.3.4.5 Installation methods for the export cable corridor are outlined in Section 1.5 (offshore) and section 1.6 (onshore).

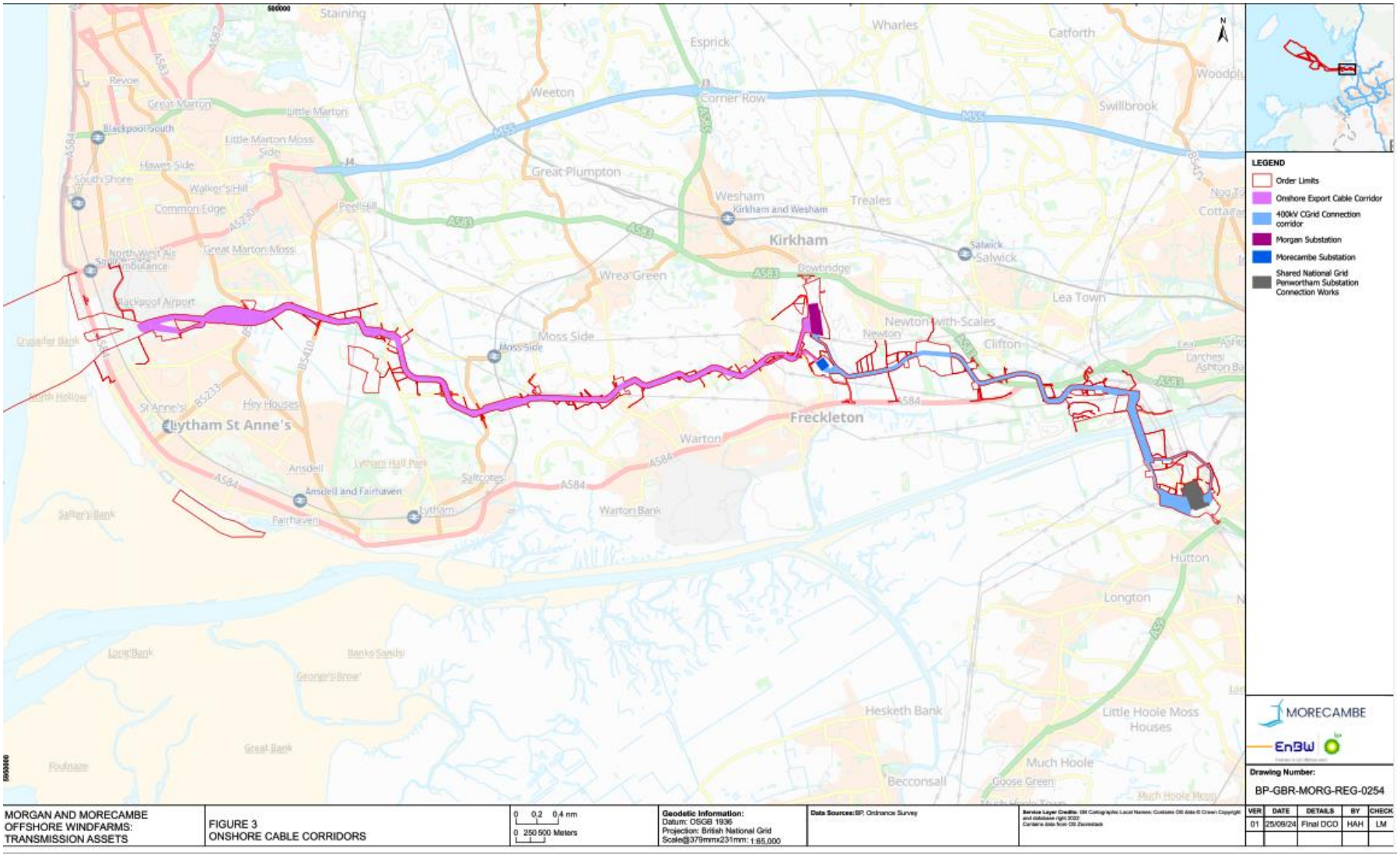

Figure 3: Onshore Cable Corridors

1.4 Description of grid connection works

1.4.1 Transmission systems

1.4.1.1 The DCO application for the Transmission Assets contains the electrical grid connection works. In general, the wind farm transmission system is used to transport the power produced at the Generation Assets (wind turbines and delivered by the array cables), to the UK National Grid. The system transforms the Medium Voltage (MV) power produced at the turbines to High Voltage at the offshore transformer substations (part of the Generation Assets), and transports this via export cables and a number of other offshore and onshore components.

1.4.2 Project capacity

1.4.2.1 The Generation Assets and Transmission Assets of the Morgan Offshore Wind Project and the Generation Assets and Transmission Assets of the Morecambe Offshore Windfarm Ltd are anticipated to generate and transport almost 2GW of new renewable electricity capacity (anticipated to be up to 1.5GW and up to 480MW, respectively) to the National Grid.

1.4.3 Circuit description

1.4.3.1 A circuit is an electrical system that allows the flow of electrons from one location to another. The onshore transmission infrastructure associated with the Transmission Assets will be High Voltage Alternating Current (HVAC) infrastructure. Typical HVAC transmission systems are three phase designs and require three conductors per electrical circuit to transport the power.

1.4.3.2 Onshore export cables will be installed in cable circuits, with each circuit typically comprising three cables. The onshore export cable will be installed in ducts, as opposed to direct lay.

1.4.4 Onshore substations

1.4.4.1 The purpose of the proposed onshore substations is to transform the power supplied through the onshore export cables into an appropriate voltage to allow a connection to the National Grid substation at Penwortham.

1.4.4.2 To maintain electrical independence, one substation is required for the Morgan Offshore Wind Project and one is required for the Morecambe Offshore Windfarm. The two substations will, however, be located close to one another, approximately 300 m apart. These are shown in Figure 3: Onshore Cable Corridors and are described in below.

1.4.4.3 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. Public bridleway BW0505016 runs from Lower Lane, Hall Cross, located to the west of the of the site, and connects to other public rights of way to the north of Freckleton. It runs adjacent to the full western extent of the site. Dow Brook

runs adjacent to the eastern extent of the site. The site is an irregular shape, set by field boundaries and Dow Brook, and is used for cattle grazing. It gently slopes in an easterly direction, from approximately 16 m AOD at its highest point down towards Dow Brook.

1.4.4.4 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. A public bridleway and Dow Brook run to the east of the site. The land at the Morecambe onshore substation site is relatively flat at between 9 to 12 m AOD. The Morecambe onshore substation will be located within a single compound.

1.4.4.5 The site selection methodology for the onshore substations is described in Volume 1, Chapter 4: Site selection and consideration of alternatives of the ES (document reference F1.4).

1.5 Offshore cable installation

1.5.1 Cable installation methods

1.5.1.1 The Applicants require flexibility in type, location, depth of burial and protection measures for the offshore export cable corridors to ensure that anticipated physical and technical constraints and changes in available technology can be accommodated within the high-level design envelope (see Volume 1, Chapter 3: Project description of the ES, document reference F1.3).

1.5.1.2 Following the completion of all pre-construction activities and surveys, including satisfying pre-construction statutory consent conditions, including those in the DCO and dMLs in relation to offshore infrastructure, engineering, design and procurement and detailed site surveys, seabed preparation (e.g. clearance of unexploded ordnance, sandwave clearance, boulder clearance) is one of the first elements of the offshore construction process.

1.5.1.3 In some areas within the offshore export cable corridor, existing sandwaves and similar bedforms may require removal before cables are installed. Many of the cable installation tools require a stable, flat seabed surface. In addition, cables must be buried to a depth where they can be expected to stay buried for the lifetime of the Transmission Assets.

1.5.1.4 The Applicants have limited sandwave clearance to up to 5% of the offshore export cable route within the Fylde MCZ and 9% over the rest of the route as detailed in the Outline Offshore Cable Specification and Installation Plan (document reference J14, Commitment CoT47, see Volume 1, Annex 5.3: Commitments Register (document reference F1.5.3). Table 1.1 sets out the maximum design parameters for sandwave clearance.

Table 1.1: Maximum design parameters for sandwave clearance

Parameter	Maximum design parameter		
	Morgan Offshore Wind Project	Morecambe Offshore Windfarm	Total
Sandwave clearance: offshore export cable (m3)	1,080,000	346,800	1,426,800
Sandwave clearance outwith the MCZ (m3)	907,200	249,600	1,156,800
Sandwave clearance within the Fylde MCZ (m3)	172,800	97,200	270,000

1.5.1.5 Following seabed preparation, possible installation technique methods for the offshore export cables include trenching, plough, or cutting into the seabed by mechanical means or jetting, that uses high speed water injection jets.

1.5.1.6 The offshore export cable installation methodology will be finalised at the final design stage (post-consent) within the maximum design parameters presented within the Project Description chapter of the (ES) (Volume 1, Chapter 4: Project Description, document reference F1.4), informed by environmental and pre-construction site investigation survey results.

1.5.1.7 Each offshore export cable will be installed in a separate trench with a typical separation distance of approximately 200 m between cables. Only in very shallow water would the separation distance reduce to as close as 20 m as the cables converge to the direct pipe exit pit locations on the beach at Lytham St Annes. Further detail is contained within the Project Description chapter of the (ES) (Volume 1, Chapter 4: Project Description, document reference F1.4).

1.5.1.8 The maximum design parameters for offshore export cable installation is outlined in Table 1.2Table 1.2. Further detail is set out in Volume 1, Chapter 3: Project Description of the ES (document reference F1.3).

Table 1.2: Maximum design parameters for offshore export cables

Parameter	Maximum design parameter		
	Morgan Offshore Wind Project	Morecambe Offshore Windfarm	Maximum design parameter
Number of offshore export cables	4	2	6
HVAC/HVDC	HVAC	HVAC	HVAC
Anticipated maximum external cable diameter (mm)	350	350	350
Indicative maximum length per cable (km)	100	42	N/A

Indicative maximum total length of offshore export cables (km)	400	84	484
Indicative maximum cable burial depth (m)	3	3	3
Indicative minimum burial depth (m)	0.5	0.5	0.5
Indicative maximum trench width (m)	3	3	3
Indicative maximum width of seabed disturbance from installation tools (m)	20	20	20
Indicative maximum footprint of seabed disturbance – total (km^2)	8	1.7	9.7

1.5.2 Cable protection

1.5.2.1 Cable burial is the preferred method of installation for the offshore cables, and additional cable protection will only be used where cable burial is not appropriate or achievable. In some cases where the minimum cable burial depth cannot be achieved or where it is necessary to cross an existing cable, it will be necessary to use alternative methods to protect the cable from external damage. This could involve rock placement, concrete mattresses or other solutions.

1.5.2.2 The Applicants have committed to limit the extent of cable protection to 10% across the overall route, noting a reduced level of cable protection of up to 3% in the Fylde Marine Conservation Zone (MCZ) as detailed in the Outline Offshore Cable Specification and Installation Plan (document reference J14, CoT47, see Volume 1, Annex 5.3: Commitments Register (document reference F1.5.3) Within the Fylde MCZ, external cable protection will only be used where deemed to be essential, e.g. for cable crossings or in the instance that adequate burial / reburial is not possible for any section of the route through the Fylde MCZ.

1.5.2.3 The requirements for cable protection will be informed through the undertaking of survey works pre-construction.

1.5.2.4 The maximum design parameters associated with cable protection due to ground conditions is presented in Table 1.3Table 1.2. The maximum design parameters associated with cable protection due to asset crossings is presented Table 1.4Table 1.4Table 1.2. Further detail is set out in Volume 1, Chapter 3: Project Description of the ES (document reference F1.3).

Table 1.3: Design envelope - cable protection due to ground conditions

Parameter	Maximum design parameter		
	Morgan Offshore Wind Project	Morecambe Offshore Windfarm	Maximum design parameter
Offshore export cables, cable protection due to ground conditions			
Cable protection type (ground conditions)	Rock dump, rock armour, mattresses, articulated pipe		
Indicative maximum height of cable protection (m)	2	2	2
Indicative maximum width of cable protection per cable (m)	10	10	10
Maximum offshore export cable corridor with cable protection coverage (%)**, whole route.**	10%	10%	10%
Maximum total cable protection footprint for offshore export cable corridor (m)**, whole route.**	400,000	84,000	484,000
Maximum total cable protection volume for offshore export cable corridor (m3)**, whole route.**	400,000	68,640	468,650

Table 1.4: Design envelope - cable protection due to asset crossings

Parameter	Maximum design parameter		
	Morgan Offshore Wind Project	Morecambe Offshore Windfarm	Maximum design parameter
Offshore export cables, cable protection due to asset crossings			
Cable crossing protection type	Rock dump, rock armour, mattresses, articulated pipe		
Maximum number of individual cable crossings, whole route	45	6	51
Indicative maximum total area of crossings (m2), whole route	65,500	27,000	92,500
Indicative maximum total volume of crossing protection material (m3), whole route	90,100	37,800	127,900

1.6 Landfall cable installation

1.6.1 Cable installation methods

1.6.1.1 Landfall refers to the area where the offshore export cables come on shore (i.e. make landfall) and are jointed to the onshore export cables via TJBs.

1.6.1.2 TJBs are underground structures that consist of a concrete lined excavation into which the offshore and onshore export cables are pulled before the cables are jointed together. Up to six TJBs will be required and situated within Blackpool Airport (one per offshore cable circuit; i.e. up to four for Morgan Offshore Wind Project: Transmission Assets – and up to two for Morecambe Offshore Windfarm: Transmission Assets).

1.6.1.3 Between the TJBs and the beach, cables will be installed using a direct pipe trenchless technique (CoT 44, see Volume 1, Annex 5.3: Commitments Register, document reference F1.5.3). The direct pipe will exit on the beach with a minimum offset distance of 100m from boundary of the Lytham St Annes Dunes SSSI. From the exit pits of the direct pipe the cables will be installed via open trenching for up to 300m. The open trench will transition to a beach trencher through the intertidal to facilitate the offshore export cable pull in and burial. The direct pipe trenchless installation area is presented in Work Plans-Onshore and Intertidal (document reference B8). Further detail on the direct pipe installation and associated maximum design parameters, is set out in Volume 1, Chapter 3: Project Description of the ES (document reference F1.3).

1.7 Onshore cable installation

1.7.1.1 The Applicants have made the following commitment, CoT43, (see Volume 1, Annex 5.3: Commitments Register, document reference F1.5.3):

"The onshore export cables will be installed within the onshore export cable corridor in cable ducts, as opposed to using direct lay installation method".

1.7.1.2 The onshore export cable corridors will be approximately 17 km in length and the 400kV Grid Connection Cable Corridors will be approximately 13 km in length. The Transmission Assets Order Limits: Onshore includes but is not limited to the onshore export cable corridor and 400kV grid connection cable corridor and the TJBs (Transition Joint Bays) (where the offshore export cables are joined to the onshore export cables).

1.7.1 Cable installation methods along the onshore export cable corridors

1.7.1.1 Onshore export cables will be installed in up to six cable circuits (with each circuit typically comprising three cables). Maximum design parameters for offshore export cables are presented in Table 1.5Table 1.5.

Table 1.5: Maximum design parameters for Transmission Assets onshore infrastructure

Parameter	Morgan Offshore Wind Project	Morecambe Offshore Windfarm	Total
Onshore Infrastructure			
Maximum number of onshore export cables	12 (4 circuits)	6 (2 circuits)	18 (6 circuits)

Parameter	Morgan Offshore Wind Project	Morecambe Offshore Windfarm	Total
Maximum number of 400 kV grid connection cables	6 (2 circuits)	6 (2 circuits)	12 (4 circuits)
Maximum length of onshore export cables (km)	17	17	17
Maximum number of onshore substations	1	1	2
Maximum length of 400 KV grid connection cables (km)	13	13	13

1.7.1.2 The majority of the cable circuits will be installed using open trenching methods. The cable circuits along the onshore export cable corridor will be buried in up to six separate trenches (up to four for the Morgan Offshore Wind Project: Transmission Assets and two for the Morecambe Offshore Windfarm: Transmission Assets).

1.7.1.3 Where open trenching is used, topsoil and subsoil will be removed from the trench and stored next to the trench (topsoil and subsoil stored separately) within the temporary working corridor.

1.7.1.4 The trenches will be excavated using a mechanical excavator or trencher. Cable ducts will be installed into the open trench with specialised backfill material that ensures a consistent structural and thermal environment for the onshore export cables.

1.7.1.5 Each trench would have a typical depth of approximately 1.8 m. This burial depth may be exceeded where the route crosses features such as pipelines and land drains. It is also noted that the trench depth may vary according to ground conditions.

1.7.1.6 Protective tiles or protective tape and marker tape will be installed in the trenches above the cable ducts to ensure the cable is not damaged by any third party.

1.7.1.7 Once the cable ducts are installed, the trenches will be backfilled with the excavated material; first with the subsoil, followed by the topsoil and the land reinstated back to its previous use.

1.7.1.8 Following installation of the ducts and backfilling of the trenches, the cables will be pulled through the ducts from the joint bays. This may require the use of a temporary cable pulling pad adjacent to the joint bays (for example, in the event of bad weather).

1.7.1.9 The onshore export cable corridors are currently anticipated to have a maximum width of up to 100 m during construction, except at the at complex crossings of sensitive receptors.

1.7.1.10 The maximum design parameters for the onshore export cables and 400kV grid connection cables are provided in Table 1.6.

Table 1.6: Maximum design parameters for onshore and 400kV export cables

Parameter	Maximum design parameter					
	Morgan Offshore Wind Project		Morecambe Offshore Windfarm		Maximum design parameter	
	Onshore export cables	400 kV cables	Onshore export cables	400 kV cables	Onshore export cables	400 kV cables
Maximum number of export cables	12	6	6	6	18	12
Maximum number of fibre-optic cables	8	4	4	4	12	8
Maximum number of cable circuits	4	2	2	2	6	4
Typical permanent cable corridor width (m)	45	25	25	25	70	50
Indicative maximum diameter of duct (mm) excluding at trenchless crossing locations	300	300	300	300	N/A	N/A
Joint bays						
Number of joint bays	72	30	38	30	110	60
Indicative maximum distance between joint bays (on one circuit) (m)	2,000	2,000	2,000	2,000	2,000	2,000
Indicative minimum distance between joint bays (on one circuit) (m)	500	500	500	500	500	500
Link Boxes						
Maximum number of link boxes	72	30	38	30	110	60
Indicative maximum distance between joint bays (on one circuit) (m)	2,000	2,000	2,000	2,000	2,000	2,000
Indicative minimum distance between joint bays (on one circuit) (m)	500	500	500	500	500	500

1.7.1.11 Installation of the onshore export cables is anticipated to be undertaken in the following broad sequence. However, some sequencing may differ once contractors are appointed by both Morgan OWL and Morecambe OWL.

- Completion of any pre-construction surveys.
- Ecological pre-construction work (for instance, hedgerow removal or creation of mitigation badger setts).

- Establishment of construction compounds and new access points from the highway where required.
- Installation of fencing around the construction areas.
- Site preparation works, installation of pre-construction drainage, topsoil removal and storage, establishment of temporary compounds, installation of temporary haul roads.
- Horizontal Directional Drilling (HDD) works (or other trenchless techniques) at identified locations.
- Trench excavation works, installation of backfill materials and installation of ducts and protective tape.
- Backfilling of trench to subsoil level.
- Excavation and construction of joint bays along the route.
- Installation of power and fibre optic cables though installed ducts between joint bays and installation of link boxes and inspection covers.
- Jointing together of cables at joint bay locations.
- Installation of post-construction drainage, removal of haul roads, removal of temporary compounds and fencing.
- Replacement of topsoil along the cable corridor and reinstatement to previous land use.
- Removal of temporary access points and planting of any sections of replacement hedgerow.
- Removal/ reinstatement of construction compounds.

1.7.1.12 The Applicants have made the following commitment, CoT43, (see Volume 1, Annex 5.3: Commitments Register, document reference F1.5.3) that:

“All trenchless crossings will be undertaken by non-impact methods such as HDD (or other trenchless techniques including micro tunnelling and direct pipe), excluding preparatory works, in order to minimise construction noise and vibration beyond the immediate location of works.”.

1.7.1.13 The following features will be crossed by HDD (or other trenchless techniques not including micro tunnelling and direct pipe), as set out in the Onshore Crossing Schedule (document reference F1.3.2) and CoT02 (see Volume 1, Annex 5.3: Commitments Register, document reference F1.5.3), that:

- A, B and Classified unnumbered roads (known as C roads) (including the Preston Western Distributor Road, A582 South Ribble Western Distributor Upgrade and M55 Heyhouses Link Road; and excluding Leech Lane);
- the following Environment Agency main rivers, Moss Sluice, east of Midgeland Road; along Pegs Lane; Wrea Brook southeast of Cartmell Lane; Dow Brook east of Lower Lane between the A584 and the A583; Middle Pool north of Lund Way; and

- Railway crossings (including the railway crossings at the Network Rail crossing along the line which runs between Blackpool North and Preston, south of Cartmell Lane.
- The following Network Rail crossing along the line which runs to Blackpool North, south east of Squires Gate, parallel to the A584 will be crossed by HDD (or trenchless techniques including micro tunnel and direct pipe).

1.7.2 Cable installation methods along the 400kV grid connection cable corridor

1.7.2.1 The 400 kV grid connection cables will be connected to the National Grid substation at Penwortham. Installation of the 400 kV grid connection cables within the grid connection area will take place in the same manner as the onshore export cable corridor and 400 kV grid connection corridor. The 400 kV grid connection cables will be installed and connected to the National Grid substation in ducts either by open cut or trenchless installation techniques. The cable circuits along the 400kV grid connection cable corridor will be buried in up to four separate trenches (up to two for the Morgan Offshore Wind Project: Transmission Assets and two for the Morecambe Offshore Windfarm: Transmission Assets). The maximum design parameters for the 400kV grid connection cables are provided in Table 1.6.

1.7.2.2 Connection to the National Grid substation will include the installation of electrical infrastructure such as busbar circuit breakers, disconnectors, earth switches, current and voltage transformers, surge arresters, post insulators, cable sealing ends, steel structures, 400 kV cable connection protection systems, marshalling building/room, marshalling cabinets and electrical earthing.

1.7.3 Reinstatement

1.7.3.1 Following the installation of all cables and joint pits and the completion of testing and commissioning, the construction working width will be cleared and reinstated in accordance with the Outline Code of Construction Practice (document reference J1). Further details can be found in Volume 1, Chapter 3: Project Description of the ES (document reference F1.3).

1.8 References

National Grid (2003) Horlock Rules. Available: [redacted] Accessed 07 August 2024.