



MORGAN AND MORECAMBE OFFSHORE WIND FARMS: TRANSMISSION ASSETS

Outline Landfall Construction Method Statement



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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).
Commitment	This term is used interchangeably with mitigation and enhancement measures. The purpose of commitments is to avoid, prevent, reduce or, if possible, offset significant adverse environmental effects. Primary and tertiary commitments are taken into account and embedded within the assessment set out in the ES.
Design envelope	A description of the range of possible elements and parameters that make up the Transmission Assets options under consideration, as set out in detail in Volume 1, Chapter 3: Project Description. This envelope is used to define the Transmission Assets for EIA purposes when the exact engineering parameters are not yet known. This is also referred to as the Maximum Design Scenario or Rochdale Envelope approach.
Development Consent Order	An order made under the Planning Act 2008, as amended, granting development consent.
Direct pipe	A cable installation technique which involves the use of a mini (or micro) tunnel boring machine and a hydraulic (or other) thruster rig to directly install a steel pipe between two points.
Environmental Impact Assessment	The process of identifying and assessing the significant effects 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, through comparison with the existing and projected future baseline conditions.
Environmental Statement	The document presenting the results of the Environmental Impact Assessment process.
Evidence Plan Process	A voluntary consultation process with specialist stakeholders to agree the approach to, and information to support, the EIA and Habitats Regulations Assessment processes for certain topics.
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.
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).

Term	Meaning
Local Authority	A body empowered by law to exercise various statutory functions for a particular area of the United Kingdom. This includes County Councils, District Councils and County Borough Councils.
Local Highway Authority	A body responsible for the public highways in a particular area of England and Wales, as defined in the Highways Act 1980.
Main rivers	The term used to describe a watercourse designated as a Main River under the Water Resources Act 1991 and shown on the Main River Map. These are usually larger rivers or streams and are managed by the Environment Agency.
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
Maximum design scenario	The realistic worst case scenario, selected on a topic-specific and impact specific basis, from a range of potential parameters for the Transmission Assets.
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.
Micro-tunnel / micro-tunnelling	A tunnelling technique involving the use of a hydraulic (or other) jacking rig and a mini (or micro) tunnel boring machine to install a concrete tunnel between two points.
Mitigation measures	This term is used interchangeably with Commitments. The purpose of such measures is to avoid, prevent, reduce or, if possible, offset significant adverse environmental effects.
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 Limited is owned by Copenhagen Infrastructure Partners' (CIP) fifth flagship fund, Copenhagen Infrastructure V (CI V).
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.
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 JERA Nex bp (JNbp and Energie Baden-Württemberg AG (EnBW).

Term	Meaning
National Grid Penwortham substation	The existing National Grid substation at Penwortham, Lancashire.
National Policy Statement(s)	The current national policy statements published by the Department for Energy and Net Zero in 2023 and adopted in 2024.
Offshore booster station	A fixed structure located along the offshore export cable route, containing electrical equipment to ensure bulk wind farm capacity can be fully transmitted to the onshore substations.
Offshore substation platform(s)	A fixed structure located within the wind farm sites, containing electrical equipment to aggregate the power from the wind turbine generators and convert it into a more suitable form for export to shore.
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 Permanent Infrastructure Area	The area within the Transmission Assets Offshore Order Limits (up to MLWS) where the permanent offshore electrical infrastructure (i.e. offshore export cables) will be located.
Offshore Order Limits	See Transmission Assets Order Limits: Offshore (below).
Onshore substations	The onshore substations will include a substation for the Morgan Offshore Wind Project: Transmission Assets and a substation for the Morecambe Offshore Windfarm: Transmission Assets. These will each comprise a compound containing the electrical components for transforming the power supplied from the generation assets to 400 kV and to adjust the power quality and power factor, as required to meet the UK Grid Code for supply to the National Grid.
Offshore substation platform(s)	A fixed structure located within the wind farm sites, containing electrical equipment to aggregate the power from the wind turbine generators and convert it into a more suitable form for export to shore.
Onshore export cables	The cables which would bring electricity from the landfall to the onshore substations.
Onshore export cable corridor	The corridor within which the onshore export cables will be located.
Onshore Infrastructure Area	The area within the Transmission Assets Order Limits landward of MHWS. Comprising the offshore export cable corridor from MHWS to the transition joint bay, onshore export cable corridor, onshore substations and 400 kV grid connection cable corridor, and associated temporary and permanent infrastructure including temporary and permanent compound areas and accesses. Those parts of the Transmission Assets Order Limits proposed only for ecological mitigation and/or biodiversity benefit are excluded from this area.
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 (such as construction compounds).
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

Term	Meaning
	required on a temporary basis during construction and/or decommissioning. Also referred to in this report as the Offshore Order Limits, for ease of reading.
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). Also referred to in this report as the Onshore Order Limits, for ease of reading.

Acronyms

Acronym	Meaning
CLV	Cable Lay Vessel
CoCP	Code of Construction Practice
CoT	Commitments Register
DCO	Development Consent Order
HDD	Horizontal Directional Drilling
MHWS	Mean High Water Springs
MLWS	Mean Low Water Springs
MMO	Marine Management Organisation
MTBM	Micro-tunnel Boring Machine
NRW	Natural Resources Wales
RNLI	Royal National Lifeboat Institute
PRoW	Public Rights of Way
SSSI	Site of Special Scientific Interest
TJB	Transition Joint Bays
TSV	Trenching Support Vessel

Units

Unit	Description
%	Percentage
M	Metres
m ²	Square metres

1 OUTLINE LANDFALL CONSTRUCTION METHOD STATEMENT

1.1 Background

1.1.1 Introduction

- 1.1.1.1 This Outline Landfall Construction Method Statement supports the application for a Development Consent Order (DCO) for the Morgan and Morecambe Offshore Wind Farms: Transmission Assets (referred to hereafter as ‘the Transmission Assets’).

1.2 Implementation

- 1.2.1.1 This Outline Landfall Construction Method Statement forms an appendix to the Outline Code of Construction Practice (CoCP) (Document reference J1), which seeks to manage the onshore and intertidal environmental impacts of the Transmission Assets’ construction process.
- 1.2.1.2 Following the grant of development consent for the Transmission Assets, detailed Landfall Construction Method Statement(s) will be prepared as a part of the detailed Code of Construction Practice(s) on behalf of Morgan OWL and/or Morecambe OWL for each project, prior to commencement of the relevant stage of works. These will follow the principles established in this Outline Landfall Construction Method Statement. The detailed Landfall Construction Method Statement(s) will require approval by the relevant planning authority following consultation with relevant stakeholders. The Applicants and all appointed contractors will be responsible for the implementation of the detailed Landfall Construction Method Statement(s), as approved.
- 1.2.1.3 The Applicants have committed to implementation of detailed Onshore Construction Method Statements (and will update the draft DCO (document reference: C1) at Deadline 5 to include reference to the Landfall Construction Method Statement) via commitment CoT35 (see Volume 1, Annex 5.3: Commitments Register, document reference F1.5.3), which is secured by Requirement 8 of the draft Development Consent Order (DCO) (document reference C1) Schedules 2A & 2B. The requirement wording for Project A is as follows (Project B’s requirement mirrors that of Project A and is, therefore, not repeated):
- 8.—(1) No stage of the Project A onshore works or Project A intertidal works may commence until for that stage a code of construction practice has been submitted to and approved by the relevant planning authority following consultation as appropriate with Lancashire County Council, Natural England, the Environment Agency and, in relation to the Project A intertidal works or, if applicable to the Project A offshore works, the MMO.*
- (2) Each code of construction practice must accord with the outline code of construction practice and include, as appropriate to the relevant stage, -*

(p) onshore Construction Method Statement (in accordance with the outline onshore construction method statement.

(3) The code of construction practice approved in relation to the relevant stage of the Project A onshore works must be followed in relation to that stage of the Project A onshore works.

(4) Onshore site preparation works must be carried out in accordance with the applicable details set out in the outline code of construction practice.

- 1.2.1.4 Pursuant to Requirement 3 of Schedules 2A and 2B to the draft DCO, which requires notification to be submitted to the relevant planning authority/authorities detailing whether Project A or Project B relevant works will be constructed in a single stage; or in two or more stages, prior to the commencement of construction works, the Applicants may adopt a staged approach to the delivery of the Transmission Assets. If so, they would mirror this staged approach in relation to discharge of DCO requirements for each respective project. This will enable requirements to be approved, in part or in whole, prior to the commencement of the relevant stage of works.

1.2.2 Purpose of the Outline Landfall Construction Method Statement

- 1.2.2.1 This Outline Landfall Method Statement sets out the key elements of the construction methodology and environmental considerations associated with the construction of the landfall for the Transmission Assets, including:
- Cable pull-in and burial activities
- 1.2.2.2 Trenchless installation below sensitive receptors (further details are provided in Section 1.7 Trenchless Techniques at Landfall)
- Transition Joint Bays (TJBs)
 - Establishment of temporary construction compounds
 - Site specific surveys
- 1.2.2.3 This document will also detail how the Applicants will work together to plan and deliver their respective landfall and beach work activities. This is an outline document that is based on the maximum design scenario (MDS) assessed in the Environmental Statement (see Volume 1, Chapter 3: Project description of the Environmental Statement (Document Reference F1.3)).
- 1.2.2.4 The Outline Landfall Construction Method Statement should be read in conjunction with the Outline CoCP (Document reference J1) and its supporting appendices.

1.3 Scope of the Outline Landfall Construction Method Statement

- 1.3.1.1 This Outline Landfall Construction Method Statement applies to onshore site preparation works and construction activities for the Transmission Assets at Landfall, inclusive of the TJBs.

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- 1.3.1.2 Onshore site preparation works are defined in article 2 of the draft DCO (document reference C1). The intertidal and landfall works will be carried out in the area within the Transmission Assets Order Limits between MLWS and the TJBs, inclusive, and are defined in the draft DCO as follows (Project B's definition mirrors that of Project A and is, therefore, not repeated):
- "Project A intertidal works" means Work No. 4A situated between MHWS and MLWS together with any other authorised development associated with those works and related ancillary works;*
- "Project A landfall works" means Work Nos. 3A, 4A, 5A, 6A, 7A, 8A, 9A, 10A, 36A, 38A, 42A, 43A and 47A/47B shown in Figure 1 (Figure 1). This together with any other authorised development associated with those works and related ancillary works;*
- 1.3.1.3 These works include all temporary and permanent areas (e.g. temporary construction compounds and accesses and operational accesses) for both projects. The Work Nos. related to the intertidal and landfall area are used throughout this outline document and are visually represented in Figure 1 below.
- 1.3.1.4 The Outline Landfall Construction Method Statement does not include the works relating to the cable installation seaward of MLWS, however it is acknowledged that vessel activity will occur beyond MLWS during cable pull-in and burial works. Details regarding the offshore export cable installation are set out in the Outline Cable Specification and Installation Plan (CSIP) (Document reference J15) and the Cable Burial Risk Assessment (CBRA) (Document reference J14).
- 1.3.1.5 Onshore site preparation works will be undertaken prior to the commencement of construction. These works will be undertaken in accordance with the Outline Code of Construction Practice (Document Reference J1) as certified through the draft DCO (Document Reference C1).
- 1.3.1.6 For this Outline Landfall Construction Method Statement, the term 'construction' includes all related engineering, construction and restoration activities as authorised by the DCO within the Order Limits.

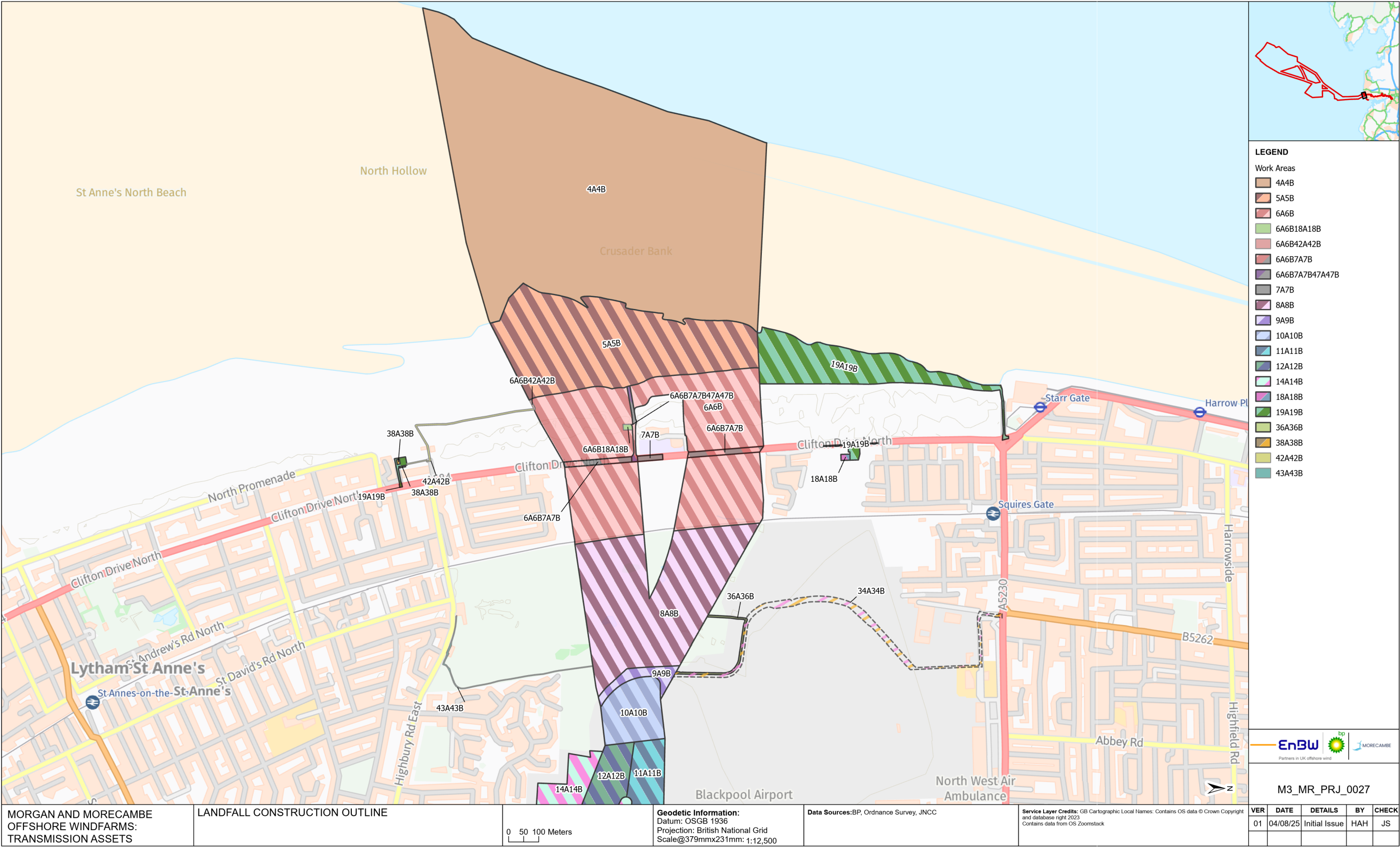


Figure 1 Intertidal and Landfall Works Areas

1.4 Roles and Responsibilities

- 1.4.1.1 The key roles and associated responsibilities with regard to this Outline Landfall Construction Method Statement are set out within the oCoCP (Document Reference J1). The Construction (Design and Management) Regulations 2015 (CDM 2015) also identify the legal duties, responsibilities and obligations of all the major roles within the construction team. The responsibilities of each role will be refined in the detailed CoCP(s).

1.5 Consultation

- 1.5.1.1 As secured through Requirement 8(1) of Schedule 2A and 2B of the draft DCO (Document Reference C1), the approval of the detailed CoCP(s) (Document Reference J1) by the relevant planning authority following consultation with the relevant bodies listed within the DCO requirement. This process will also apply to the Landfall Construction Method Statement as one of the documents that forms part of the CoCP in advance of commencing works where the DCO requirement specifically requires consultation with the MMO in respect of the intertidal works (Requirement 8 (1)(d)).

1.6 Measures adopted as part of the Transmission Assets (Commitments)

- 1.6.1.1 Through the Environmental Impact Assessment process, a range of mitigation measures have been identified to avoid or reduce potential effects. All measures to be adopted by the Transmission Assets are called 'Commitments' (CoTs). The CoTs will form the basis of the final design and details for construction, operation and maintenance, and decommissioning phases.
- 1.6.1.2 The identified mitigation measures are presented in Volume 1, Annex 5.3: Commitments Register (document reference: F1.5.3). The CoTs relevant to the outline Landfall Construction Method Statement are summarised in Table 1.

Table 1: Measures (commitments adopted as part of the Transmission Assets relevant to the outline Landfall Construction Method Statement

Commitment (CoT) number	Measure Adopted	How the measure will be secured
CoT08	Post-construction, the working area will be reinstated to pre-existing condition as far as reasonably practical in line with the DEFRA Construction Code of Practice for the Sustainable Use of Soils on Construction Sites (PB13298), Institute of Quarrying (IQ) Good Practice Guide for Handling Soils in Mineral Workings (IQ, 2021) and British Society of Soil Science (BSSS) Working with Soil Guidance Note on Benefitting from Soil Management in Development and Construction (BSSS, 2022).	DCO Schedules 2A & 2B, Requirement 16 (Restoration of land used temporarily for construction); DCO Schedules 2A & 2B, Requirement 8 (Code of Construction Practice)
CoT09	The Outline Code of Construction Practice (CoCP) has been submitted as part of the application for development consent. Detailed CoCP(s) will be developed in accordance with the outline CoCP. The Outline CoCP includes information about drainage during construction.	DCO Schedules 2A & 2B, Requirement 8 (Code of Construction Practice)
CoT18	Core working hours for the construction of the intertidal and onshore works will be as follows: • Monday to Friday: 07:00 - 19:00 hours; • Saturday: 07:00 – 13:00 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.	DCO Schedules 2A & 2B, Requirement 14 (Construction hours)
CoT27	All temporary compounds will be removed and sites will be reinstated when construction has been completed.	DCO Schedules 2A & 2B, Requirement 8 (Code of Construction Practice); DCO Schedules 2A & 2B, Requirement 16 (Restoration of land used temporarily for construction)

Commitment (CoT) number	Measure Adopted	How the measure will be secured
CoT35	An Outline Code of Construction Practice (CoCP) has been prepared and submitted with the application for development consent. Detailed CoCP(s) will be developed in accordance with the Outline CoCP. The Outline CoCP includes measures to maintain and address: - flood protection and control measures; - water environment and drainage; - pollution prevention; - geology and ground conditions; - ecology and nature conservation (including protected species and invasive species); - historic environment; - soil management; - traffic and transport; - noise management measures; - air quality and dust management; - landscape and visual; - recreation; - bentonite breakout; and - construction methods.	DCO Schedules 2A & 2B, Requirement 8 (Code of Construction Practice)
CoT37	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 – 19:00). Vehicle movements may however be subject to unscheduled events outside these hours.	DCO Schedules 2A & 2B, Requirement 9 (Traffic and Transport)
CoT39	Fences, walls, ditches and drainage outfalls will be retained at the landfall and along the onshore export cable corridor and 400 kV grid connection cable corridor, where possible. Where it is not reasonably practicable to retain them, any damage will be repaired and reinstated as soon as reasonably practical. The Environment Agency and Lead Local Flood Authority must be notified if damage occurs to any Environment Agency main river and ordinary watercourse or related flood infrastructure respectively.	DCO Schedules 2A & 2B, Requirement 8 (Code of Construction Practice)
CoT40	An Onshore and Intertidal Written Scheme of Investigation(s) (WSI) will be developed in line with the Outline Onshore and Intertidal WSI. The Onshore and Intertidal WSI(s) will provide details on the surveys and archaeological mitigation in advance for each stage of the Project any ground breaking works and during construction.	DCO Schedules 2A & 2B, Requirement 11 (Onshore archaeology)
CoT43	The onshore export cables including fibre optics or other communications cables, will be installed within the onshore export cable corridor and 400kV grid connection corridor within cable ducts or other protective covers or sheaths or mini- or micro-tunnels, as opposed to using direct lay installation method.	DCO Schedules 2A & 2B, Requirement 8 (Code of Construction Practice)

Commitment (CoT) number	Measure Adopted	How the measure will be secured
CoT44	The Project Description (Volume 1, Chapter 3 of the Environmental Statement) sets out that the installation of the offshore export cables under Lytham St Annes SSSI and the St Annes Old Links Golf Course will be undertaken by direct pipe trenchless installation technique. The exit pits associated with the direct pipe installation will be at least 100 m seaward of the western boundary of the SSSI.	DCO Schedules 2A & 2B, Requirement 8 (Code of Construction Practice)
CoT85	An Outline Code of Construction Practice (CoCP) has been prepared and submitted with the application for development consent. Detailed CoCP(s) will be developed in accordance with the outline CoCP. The Outline CoCP will include that temporary haul road(s) will be installed using permeable gravel aggregate with a geotextile or other type of protective matting, or plastic or metal plates or grating, where required.	DCO Schedules 2A & 2B, Requirement 8 (Code of Construction Practice)
CoT97	The Outline Code of Construction Practice (CoCP) has been submitted as part of the application for development consent. Detailed CoCP(s) will be developed in accordance with the Outline CoCP. The Detailed CoCPs detail that where necessary at the compounds located within the landfall area, construction measures will be adopted to maintain the existing level of flood protection during construction. These measures will be discussed with the Environment Agency. If applicable, these measures could include scheduling work windows against tide times and briefing site personnel regarding weather conditions, tide times and heights. If a Flood Warning/Flood Alert is issued for the 'Lancashire coastline at Lytham St. Annes, along the coast from Squires Gate to Warton Bank' Flood Warning Area (reference 012FWCTL13A) and the 'Coast at Lytham St Annes' Flood Alert area (reference 012WACLS) works within the relevant areas within the landfall area would also be stopped whilst the Flood Warning/Flood Alert is active.	DCO Schedules 2A & 2B, Requirement 8 (Code of Construction Practice)
CoT110	Construction activities associated with the offshore cable pull in for the Morgan Offshore Wind Project and Morecambe Offshore Windfarm Limited will be undertaken in accordance with the Outline Offshore Cable Specification and Installation Plan (CSIP). This will include a timing restriction on all cable pull activities at landfall on Lytham St Annes beach between November and March (inclusive) unless otherwise agreed with the MMO, in consultation with Natural England. Detailed CSIP(s) will be developed in accordance with the Outline CSIP.	DCO Schedule 14 (Marine Licence 1: Morgan Offshore Wind Project Transmission Assets) Part 2 - Condition18(1)(e) (Pre-construction plans and documentation) and DCO Schedule 15 (Marine Licence 2: Morecambe Offshore Wind Farm Transmission Assets), Part 2 - Condition18(1)(e) (Pre-construction plans and documentation)

Commitment (CoT) number	Measure Adopted	How the measure will be secured
CoT111	Development of, and adherence to, an offshore Environmental Management Plan(s) which will include Measures to minimise disturbance to marine mammals and rafting birds from vessels. The Measures to minimise disturbance to marine mammals and rafting birds from vessels includes a timing restriction on all offshore export cable installation activities between November and March (inclusive) within the original boundary of the Liverpool Bay/Bae Lerpwl SPA (as designated in 2010), including a 2 km buffer, unless otherwise agreed with the MMO, in consultation with Natural England.	DCO Schedule 14 (Marine Licence 1: Morgan Offshore Wind Project Transmission Assets) Part 2 – Condition 18(1)(f) (Pre-construction plans and documentation) and DCO Schedule 15 (Marine Licence 2: Morecambe Offshore Wind Farm Transmission Assets), Part 2 – 18(1)(f) (Pre-construction plans and documentation)
CoT114	All permanent infrastructure located between Mean Low Water Springs (MLWS) and Mean High Water Springs (MHWS) will be buried to a target depth of 3 metres, subject to further pre-construction surveys to be reported within Detailed Cable Burial Risk Assessments (CBRAs). An Outline CBRA has been prepared and submitted with the application for development consent.	DCO Schedule 14 (Marine Licence 1: Morgan Offshore Wind Project Transmission Assets) Part 2 – Condition 18(1)(e)(iii) (Pre-construction plans and documentation) and DCO Schedule 15 (Marine Licence 2: Morecambe Offshore Wind Farm Transmission Assets), Part 2 - Condition 18(1)(e)(iii) (Pre-construction plans and documentation)
CoT119	Subject to landowner approval, at detailed design stage, hydrogeological risk assessment(s) will be undertaken at St Annes Old Links Golf Club (abstraction borehole ref: GWA_01), if necessary. The hydrogeological risk assessment(s) would be informed by ground investigation information, where relevant and practicable. If undertaken, the risk assessment(s) will inform a detailed site-specific crossing design for the installation of the offshore export cables beneath Lytham St Annes SSSI and the St Annes Old Links Golf Course.	DCO Schedules 2A & 2B, Requirement 8 (Code of Construction Practice)
CoT125	The Project Description (Volume 1, Chapter 3 of the Environmental Statement) sets out that the siting and number of compounds associated with the construction activities at the landfall have been sited, where practicable, to avoid key constraints, including the Ribble and Alt Estuaries SPA and the Lytham St. Annes Dunes SSSI, to reduce disturbance upon roosting waders.	DCO Schedule 1 (Authorised Development)

Commitment (CoT) number	Measure Adopted	How the measure will be secured
CoT128	An Outline Hydrogeological Risk Assessment will be prepared in relation to the crossing of Lytham St Annes SSSI to mitigate potential impacts to the hydrologically dependant surface water features of the sand dune system. This will form part of the Outline Code of Construction Practice. At detailed design stage, Hydrogeological Risk Assessment (will be developed in accordance with the Outline Hydrogeological Risk Assessment. The hydrogeological risk assessment(s) will be informed by ground investigation information, where necessary and practicable. These assessment(s) will used to inform the detailed site-specific crossing design for the installation of the offshore export cables beneath Lytham St Annes SSSI.	DCO Schedules 2A & 2B, Requirement 8 (Code of Construction Practice)
CoT129	No construction activities at landfall on Lytham St Annes beach will be undertaken by the Morgan Offshore Wind Project and Morecambe Offshore Windfarm Limited between November and March (inclusive). This is to mitigate disturbance to roosting wader features of Ribble and Alt Estuary SPA and Ramsar site. This is detailed within the Outline Ecological Management Plan.	DCO Schedules 2A & 2B, Requirement 12 (Ecological Management Plan)
CoT133	No cable/scour protection shall be permanently deployed in the intertidal area between Mean Low Water Springs (MLWS) and Mean High Water Springs (MHWS).	Outline Offshore Cable Specification and Installation Plan. DCO Schedule 14 (Marine Licence 1: Morgan Offshore Wind Project Transmission Assets) Part 2 - Condition 18(1)(e) (Pre-construction plans and documentation) and DCO Schedule 15 (Marine Licence 2: Morecambe Offshore Wind Farm Transmission Assets), Part 2 - Condition 18(1)(e) (Pre-construction plans and documentation)

1.7 Trenchless Techniques at Landfall

1.7.1.1 The Transmission Assets have committed to installing the offshore export cables at under Lytham St Annes SSSI and St Annes Old Links Golf Course via trenchless techniques (CoT44, Table 1). This embedded mitigation ensures the Transmission Assets:

- Avoid potential direct impacts on Lytham St Anne's Dunes SSSI ecology, as no surface works will be taking place in the SSSI.

- Minimise the surface working area as the majority of the landfall works will take place underground.
- Minimise disruption and disturbance to intertidal ornithology.
- Minimise potential impacts with onshore receptors including the Lytham St Annes Local Nature Reserve, the A584 Clifton Road North, St Annes Old Links Golf Club, and the Lytham St Anne's Dunes Site of Special Scientific Interest (SSSI).

1.7.1.2 The trenchless technique exit pit locations for the offshore export cables will be at approximately MHWS with a minimum distance of 100m from the western boundary of Lytham St Annes Dunes SSSI (CoT44), with the final location of the cable exit pits subject to the results of further post-consent survey and detail design. The export cable circuits between St Annes beach and the TJBs will be installed by pulling the cables through underground ducts installed using trenchless techniques. As a result, any surface construction activity between the exit pits and the TJBs will be limited to access purposes for construction e.g. monitoring progress of trenchless drill works. Further details regarding the construction methodology are provided in Section 1.13 Construction at Landfall.

1.8 Surveys

1.8.1 Future surveys

1.8.1.1 To inform the detailed design of the cable installation at landfall further pre-construction surveys may be undertaken. These could include:

- Boreholes: Drilled to underlying rockhead to provide a profile of soil characteristics through the full depth.
- Hydrological monitoring: At least one borehole will be fitted with hydrological monitoring equipment (i.e. stand pipe and piezometer) to provide ongoing data on groundwater hydrology.
- Geotechnical, chemical and environmental laboratory testing: Testing undertaken on samples retrieved during the investigation to provide detailed ground soil profile characteristics and parameter to aid design.

1.9 Overview of the landfall construction

1.9.1.1 The installation of cable ducts between the Transition Joint Bays at Blackpool Airport (Work No 10A/10B) and the trenchless technique exit pits on the beach (Work No 4A/4B and/or Work No 5A/5B) will be undertaken via trenchless techniques. The exit pits will be located at least 100 m seaward of the western boundary of the Lytham St Annes Dunes SSSI, as secured in Schedule 2A & 2B, Requirement 8 of the Draft DCO (CoT44).

1.9.1.2 The final location of the exit pits will be confirmed following further surveys (as set out in Section 1.8) and detailed design.

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- 1.9.1.3 The landfall construction will comprise onshore and offshore elements. The following onshore elements will be included in the detailed Landfall Construction Method Statement(s):
- Construction of the landfall compounds and associated access.
 - Construction of the duct welding and storage compound.
 - Intertidal cable burial.
 - Construction of the TJBs.
 - Trenchless technique and support equipment.
 - HV testing of the onshore and offshore export cables from the TJB.
 - Jointing of the onshore to the offshore export cables in the TJBs.
 - Demobilisation of equipment and site reinstatement.
- 1.9.1.4 The following elements will also be set out in the detailed Landfall Construction Method Statement(s):
- Trenchless Technique entry pit locations (Work no. 10A/10B).
 - Trenchless Technique exit pit locations (Work no. 4A/4B and 5A/5B).
 - Vertical and horizontal alignment of the trenchless drill profile.

1.10 Construction Working Hours

- 1.10.1.1 Core working hours (CoT18, Table 1) for the construction of the landfall elements of the Transmission Assets are set out in Requirement 14 in Schedules 2A and 2B of the draft DCO (Document reference C1) as referenced in the outline CoCP (Document reference J1).
- 1.10.1.2 In certain circumstances, specific works may need to be undertaken on a continuous working basis i.e. 24 hour working. These include:
- Trenchless installation technique works, cable pull-in and burial works.
 - Cable jointing operations at the TJBs.
 - Testing operations.
- 1.10.1.3 24-hour working would not be employed for routine construction activities. Continuous periods of construction, such as those associated with the landfall works, are permitted within the draft DCO under Requirement 14(4) in Schedule 2A and 2B (Document Reference C1). This is subject to the timing and duration of such construction works being approved in advance by the relevant planning authority.

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- 1.10.1.4 The maximum assessed construction periods for the landfall works are 36 months for Morgan OWL and 30 months for Morecambe OWL, aligning with the overall construction duration of the Transmission Assets. However, the maximum assessed construction durations do not equate to continuous working at the landfall, as works will be phased and subject to seasonal restrictions, in accordance with the defined maximum durations for specific landfall activities as set out in the Project Description (Document Reference F1.3).

1.10.2 Seasonal Restrictions

- 1.10.2.1 As detailed within the outline Ecological Management Plan (Document reference J6), no construction activities on Lytham St Annes beach will be undertaken by the Transmission Assets annually between November and March (inclusive) (CoT129, Table 1). This is secured in requirement 12 within Schedules 2A and 2B of the draft DCO (Document reference C1).

1.11 Construction Sequencing

- 1.11.1.1 The landfall is an area where both Morgan OWL and Morecambe OWL can undertake works. Due to the complexity and environmental constraints of the landfall area, only one project can work in this area at any given time as set out in section 3.10.2 and section 3.14.5.15 of Volume 1, Chapter 3: Project description (document reference: F1.3).
- 1.11.1.2 The sequencing of construction activities between Morgan OWL and Morecambe OWL will be determined post consent and this information will be provided within the detailed Landfall Construction Method Statement(s).

1.12 Site Set Up

1.12.1 Landfall temporary construction compounds and working area

- 1.12.1.1 Up to four temporary construction compounds are required to support construction activities between the TJBs and MLWS. The indicative location of these compounds is presented in Figure 31.13 Construction at Landfall. A TJB working area will be located within Blackpool Airport within Work No. 10A/10B, to support to trenchless techniques entry pit activities and cable pull-in. The maximum size and durations of the required compounds and working areas are set out in Table 2.

Table 2 Landfall Temporary Compounds

Compounds	Maximum total area of landfall compound (m ²)	Maximum durations including mobilisation and demobilisation (Isolation)		Maximum total durations (concurrent)	Maximum total durations (Sequential)
		Morgan OWL	Morecambe OWL		
Compound 1 (Welfare Compound at North Beach Car Park)	300	24 weeks (within 36 months)	12 weeks (within 30 months)	36 weeks (within 36 months)	36 weeks (within 66 months)
Compound 2	2,500	32 weeks (within 36 months)	16 weeks (within 30 months)	48 weeks (within 36 months)	48 weeks (within 66 months)
Compound 3	510	32 weeks (within 36 months)	16 weeks (within 30 months)	48 weeks (within 36 months)	48 weeks (within 66 months)
Clifton Drive North Compound (Compound 4)	600	24 months (within 36 months)	12 months (within 30 months)	36 months	66 months
TJB working area (m ²) within work nos 10A/10B	Morgan: 4,900 Morecambe: 2,800	18 months active construction within an overall construction duration of 24 months	11 months active construction within an overall construction duration of 21 months	24 months	29 months of active construction within an overall construction duration of 45 months

1.12.1.2 The temporary construction compounds will be set up prior to, or as required during landfall construction and will follow the sequence of activities below:

- Establishment of access to the working area for the TJBs.
- Installation of security fencing or other means of enclosure in line with the details in the Detailed Construction Fencing Plan(s) (Document Reference J1.10) (secured as part of the Detailed CoCP(s) (Document Reference: J1)).
- Stripping and storage of topsoil, where appropriate, following the procedures set out in the Detailed Soil Management Strategy(s) (Document reference J1.7) (secured as part of the Detailed CoCP(s) (Document Reference: J1)).
- Surfacing works for the temporary compounds, followed by site setup works and delivery of welfare facilities.
- Installation of site surface water and drainage measures in line with the Detailed Surface and Ground Water Management Plan(s)

(Document Reference: J1.9) (secured as part of the Detailed CoCP(s) (Document Reference: J1)).

- Installation of welfare facilities including connection of temporary services such as water, power, lighting and telecoms.
- Delivery of the drill rig and associated equipment and setup ready for drilling operations.
- Installation of temporary lighting in line with the Detailed Artificial Light Emissions Management Plan(s) (Document Reference: J1.11) (secured as part of the Detailed CoCP(s) (Document Reference: J1)).

1.12.1.3 At the end of any programme of work, the temporary construction compounds will be removed, and if necessary, remobilised upon the commencement of works.

1.12.1.4 The construction compound located within North Beach Car Park (Work No. 38A/38B) will temporarily remove 22 of the available 126 standard parking bays from public use for a maximum of 36 weeks over a 36-month period. The location of the compound works at North Beach Car Park are presented in Figure 2. Vehicle laydown areas will be located within Compounds 2 and 4 and refueling of plant and machinery will be confined to these compounds. Vehicles and plant accessing Compound 2 on the beach will use the existing access from A584/Clifton Drive North. The access track, as shown in Figure 1 (Work Nos 7A/7B) will have a maximum width of 6m and will not encroach upon the Lytham St Annes Dunes SSSI. Removable track matting or similar membrane may also be required to transition from the track to the beach.



Figure 2 North Beach Carpark Welfare Compound 1

1.12.2 Construction noise control

- 1.12.2.1 Detailed construction Noise and Vibration Plan(s) will be prepared post-consent for approval by the local planning authority, in line with the outline Construction Noise and Vibration Management Plan (Document Reference: J1.3) (secured as part of the Outline CoCP (Document Reference: J1)). The Construction Noise and Vibration Management Plan will set out the specific measures in relation to the control of construction phase noise, which will be reflective of the sensitivities of the receptors within the vicinity of the landfall.

1.13 Construction at Landfall

1.13.1 Detailed Landfall Construction method statement(s)

- 1.13.1.1 The detailed Landfall Construction Method Statement(s) will contain full details of the construction methodology for the landfall works and will be submitted to the relevant planning authority for approval in consultation with the MMO for the aspects below MHWS. However, an outline summary of the activities is provided below.

1.13.2 Outline description of proposed works

- 1.13.2.1 The trenchless installation of the offshore export cables will be undertaken by two distinct construction activities, noting that only one Applicant will carry out construction works at any given time (as set out in section 3.10.2 and section 3.14.5.15 of Volume 1, Chapter 3: Project description (document reference: F1.3)):

1. The trenchless installation of underground cable ducts between the Transition Joint Bays at Blackpool Airport (Work No 10A/10B) and the exit pits on the beach (Work No 4A/4B and/or Work No 5A/5B).
2. The pull-in of the offshore export cables through the pre-installed ducts and burial of the cable within the intertidal area.

The following sections provide an outline of the construction methodology of the landfall works.

1.13.3 Direct Pipe Trenchless Installation

- 1.13.3.1 The installation of the offshore export cable circuits at the landfall will be undertaken by direct pipe trenchless technique installation (CoT44, Table 1). The direct pipe entry pits will be located within Blackpool Airport (Work No. 10A/10B), and the exit pits located on the beach (Work No. 4A/4B and/or 5A/5B). Further detail on the direct pipe trenchless technique is provided in the Project Description (Document Reference F1.3).

- 1.13.3.2 The following section sets out the typical construction methodology for direct pipe. The sequence presented assumes that onshore site preparation works have already been undertaken, and haul road access associated with the Blackpool Airport works already installed:

- Stage 1 – Entry pit and plant mobilisation

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- The entry pit will be excavated and constructed within Work No. 10A/10B, this will include a thrust wall/jacking frame to support drilling equipment. The micro tunnel boring machine (MTBM), pipe thruster, drilling fluid mixing and separation plant, and quality assurance/welding facilities will be mobilised.
 - Stage 2 – Direct pipe installation
 - Installation will be carried out by launching the MTBM from the excavated entry pit. Steel casing pipe will be welded in section lengths and connected to the MTBM, and the whole assembly jacked/drilled towards the beach exit location by hydraulic rams or thrusters.
 - The drill depth will range from a minimum of 10 m to a maximum of 30 m, with a maximum drill length of 1500m as set out in Table 3.13 of the Project Description (Document Reference F1.3).
 - Stage 3 – Exit pit and establishment and temporary cofferdam installation
 - Up to six exit pits will be established in total, to accommodate up to 4 cable circuits for Morgan OWL and up to 2 cable circuits for Morecambe OWL. Note that there will never be six exit pits located at the beach at the same time, as only one Applicant will carry out construction works at any given time (as set out in section 3.10.2 and section 3.14.5.15 of Volume 1, Chapter 3: Project description (document reference: F1.3)).
 - As described in Table 3.13 in the Project Description (document reference F1.3), the maximum working area of each exit pit, with or without cofferdams, is up to 875m² per cable circuit. Each working area will be at least 100m seaward of the Lytham St Annes sand dunes SSSI (CoT44, Table 1) as secured in Schedule 2A & 2B, Requirement 8 of the draft DCO (Document Reference C1).
 - A temporary cofferdam, approximately 15m by 5m (maximum 75m² as per Table 3.13 of the Project Description (document reference: F1.3)), may be installed inside the exit pit working area to create a dry and stable working area and prevent the ingress of seawater as the trenchless drilling reaches the exit pit.
 - Stage 4 – Drill punch-out on the beach
 - Punch out of the MTBM will occur within the exit pit/cofferdam. The MTBM will be recovered, with the steel casing (which forms the permanent duct) either trimmed and finished, or with the duct segments pulled back towards the entry pit until the required depth is reached. Each duct will be capped and secured, pending the commencement of the cable pull-in activities

1.13.3.3 To ensure public safety, trenchless technique working areas will be fenced off and secured while construction works are taking place. Public access between the exit pit working areas and the sea, including movements by the Royal National Lifeboat Institute (RNLI), will remain

unrestricted. However, during drilling activities, access between the exit pits and the sand dunes may be temporarily managed (but not blocked) for up to two weeks per exit pit. This is to maintain public safety while the trenchless technique machines are working below the surface of the beach. Detail about public access to the beach during the construction phase is further detailed in Appendix A, of the Outline Public Rights of Way (PRoW) Management Plan (Document reference J1.5). Indicative locations of the exit pits and compound locations are provided in Figure 3 below.

- 1.13.3.4 Up to four temporary construction compounds may be established to support the trenchless installation construction activities and are further described above in Section 1.12. Temporary construction compound 2 (see Figure 3) will not be located on the beach between MHWS and MLWS in front of the Thursby Care Home to maintain access for lifeboat recovery by the RNLI. This area has been identified in Figure 3 as the Temporary Construction Compound Exclusion Zone, and further defined by the grid co-ordinates within Table 3

ID	Easting - British National Grid	Northing - British National Grid
Point 1	330538.43	430570.96
Point 2	330763.25	430639.26
Point 3	330538.00	430397.11
Point 4	330846.54	430504.08

Table 3 Grid Co-ordinates for Temporary Compound Exclusion Zone

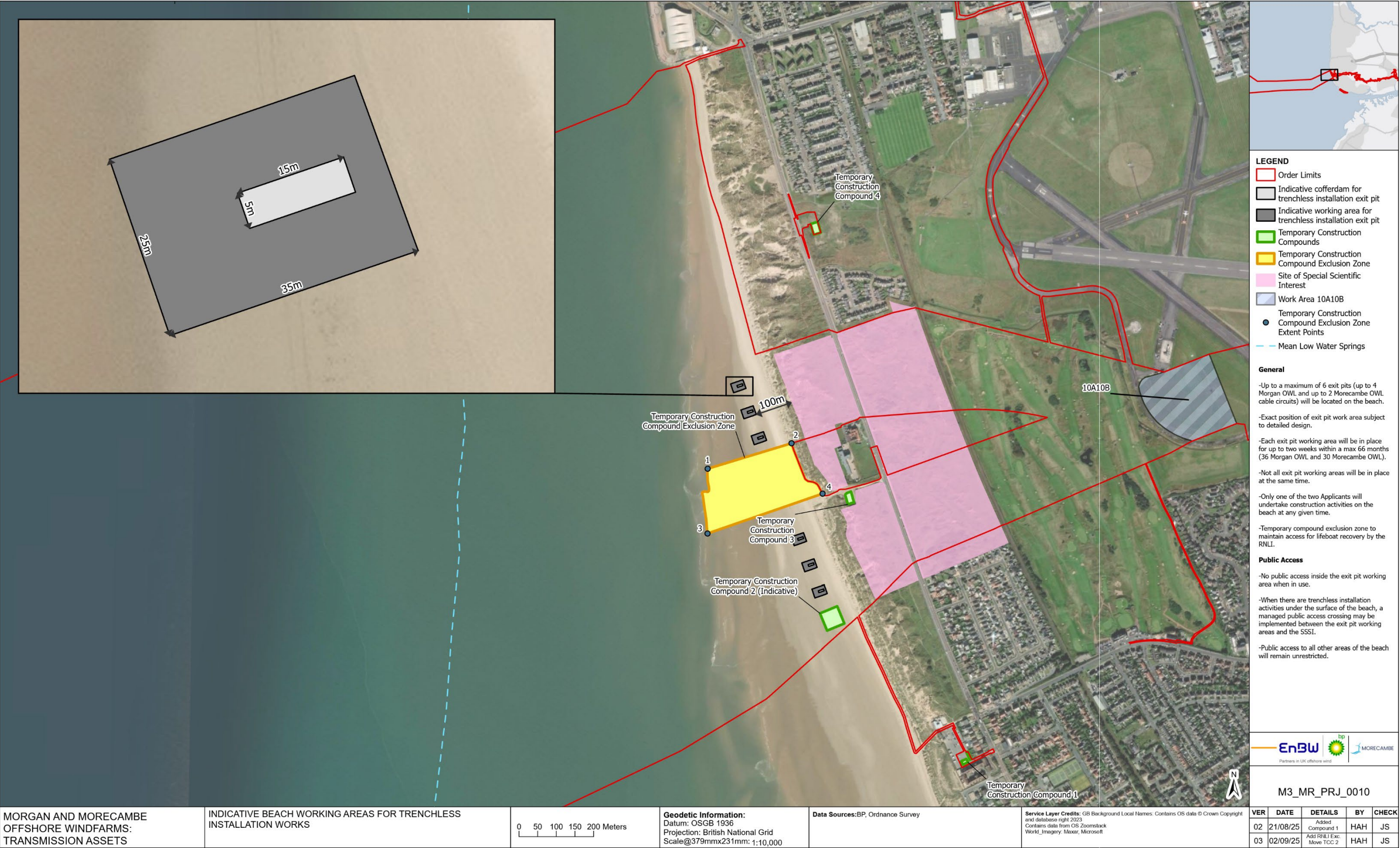


Figure 3 Indicative Beach Working Areas for Trenchless Installation Works

1.13.4 Offshore Export Cable Pull-ins

1.13.4.1 During the offshore export cable pull-in activities, the cables will be paid out from the cable lay vessel (CLV) positioned in the nearshore area and floated/pulled to the previously installed underground ducts at the landfall. The cable pull-in will then continue to pull the cable up the ducts to the TJBs. Once cable is pulled in up to the TJB, the cable lay vessel will then commence laying away towards the offshore. To facilitate these activities, a defined working area extending 25m either side of the offshore export cable and exit pits will be established for cable preparation and installation activities.

1.13.4.2 The following section sets out the typical construction methodology for cable pull-in activities. The sequence presented assumes that required temporary construction compounds and welfare facilities have already been established:

- Stage 1 – Beach set-up and plant mobilisation
 - The cable pull-in working areas will be fenced and secured, with signage and exclusion zones in accordance with the detailed Public Rights of Way Management Plan(s) (Document Reference J1.5).
 - Temporary rollers will be installed along the cable route on the beach in preparation for cable pull-in.
 - Temporary cofferdams will be installed within the exit-pit working area (where required) to stable the beach and prevent the duct opening from being buried.
 - Beach support plant will then be mobilised in support of commencing the cable pull in activities.
- Stage 2 – Cable lay vessel (CLV) approach and positioning
 - When ready, the CLV will approach the nearshore during a suitable weather/tidal window and will beach/hold position in a determined location.
 - A winch will be installed within the entry pit at Blackpool Airport (Work no. 10A/10B), which will draw the cable through the pre-installed cable ducting.
- Stage 3 – Cable pull-in through the installed ducting
 - The cable will be fed out from the CLV and guided over the beach rollers towards the exit pit.
 - The winch cabling will draw the offshore cable through the permanent steel ducting to the entry pit location.
- Stage 4 – Lay-away and cable burial
 - Once the cable is pulled into the entry pit, the CLV will re-float on the next suitable tide and commence lay-away offshore

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- A trenching support vessel (TSV) will mobilise with a marinized cable burial tool, and will bury the cable within the wet intertidal and nearshore sections to the target burial depth.
 - The dry upper beach section will be excavated to bury the cable using the open-cut method.
 - Stage 5 – Demobilisation and reinstatement
 - Sectional testing will be carried out following pull-in and burial
 - Upon completion of testing, the temporary equipment will be removed (eg. Roller and sheet piles/cofferdams) and the working areas will be reinstated.
 - Managed pedestrian crossings will be removed, any residual fencing taken down and the beach returned to public use.

1.13.4.3 Public access, including for the RNLI, between the cable pull-in working areas and the sand dunes will remain largely unrestricted throughout the cable installation works, as the cable installation working area will be maintained at least 100m seaward of the Lytham St Annes Sand Dunes SSSI (CoT44) as secured in Schedule 2A & 2B, Requirement 8 of the draft DCO (Document reference C1). However, during the offshore cable pull-in and burial, a section of the beach from the exit pits to MLWS would need to be closed off to public access, while certain activities are taking place. In such cases, the Applicants will implement managed crossings either to the seaward or landward side to allow users to maintain access from one side of the works area, to the other. Further details of the public access of the beach during construction is further detailed in Appendix A, of the Outline Public Rights of Way (PRoW) Management Plan (Document reference J1.5)

1.13.4.4 Up to four temporary construction compounds may be established to support the cable pull-in, further described above in Section 1.12. The final alignment of the cables and positioning of exit pits will be determined post consent during detailed design. Figure 4 presents possible offshore cable pull locations.

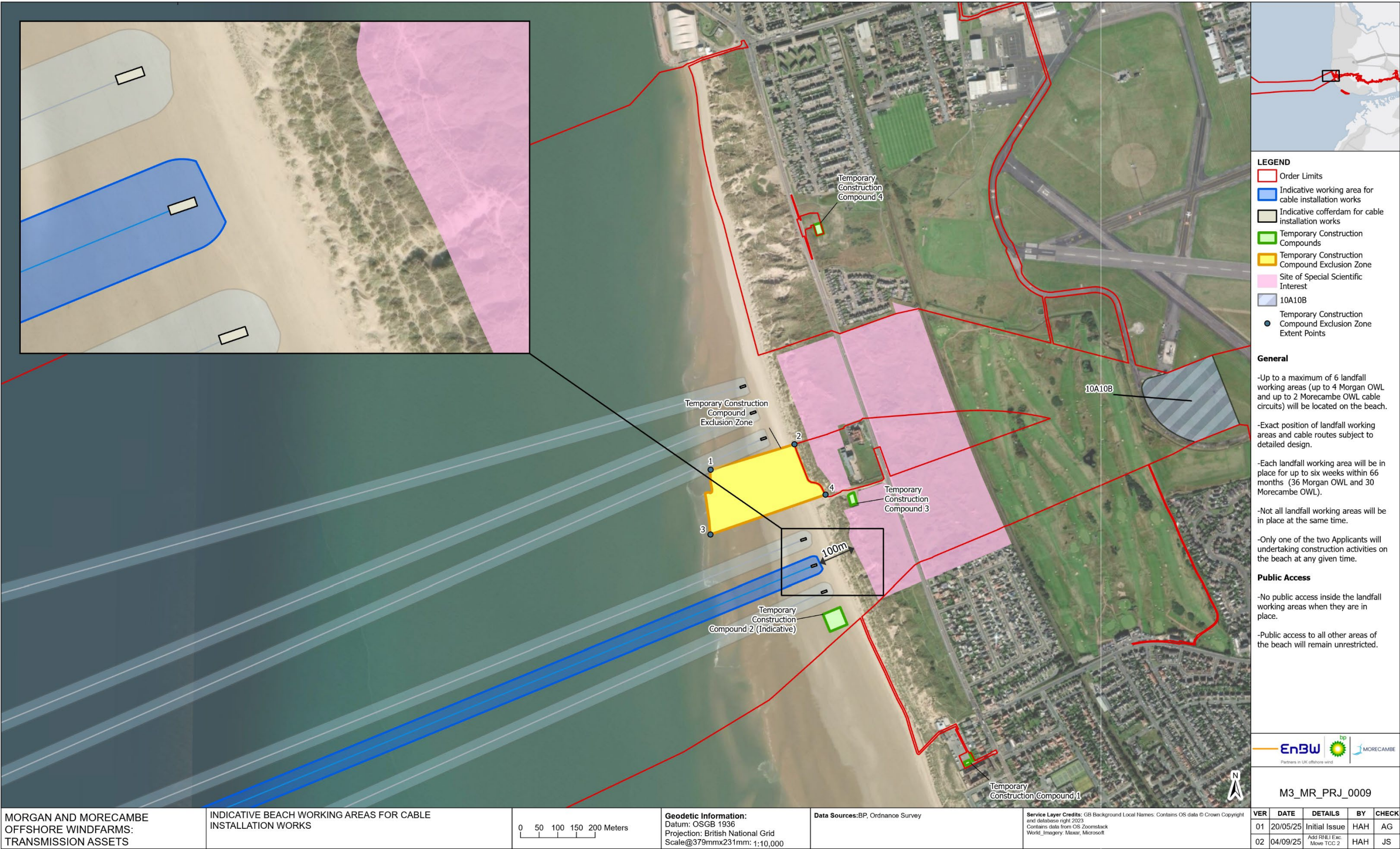


Figure 4 Indicative Beach Working Areas for Cable Installation Works

1.13.5 Transition Joint Bays

- 1.13.5.1 The offshore export cables will be connected to the onshore export cables at the TJBs. The TJBs will be constructed within Blackpool Airport within Work No. 10 as shown in Figure 1.
- 1.13.5.2 A TJB is a concrete floored pit, into which the offshore and onshore export cables are pulled before they are jointed together. The TJBs will have a maximum depth of 4 m. Up to six TJBs are required, one for each cable circuit, i.e. up to four for Morgan OWL and up to two for Morecambe OWL.
- 1.13.5.3 Once the cable joint has been completed, the TJBs will be backfilled with a combination of cement bound sand and the previously excavated material and the land will be reinstated. Link pit chambers will be constructed at the TJBs with surface manhole covers to allow inspections during the operations and maintenance phase.

1.13.6 Plant and vehicles

- 1.13.6.1 The onshore plant used specifically for the landfall construction is likely to include:
- Mobile crane.
 - Flat bed articulated trucks.
 - 360 excavators.
 - Compressors.
 - Piling equipment.
 - Lighting towers and CCTV equipment.
 - Concrete mixer lorries and pumps.
 - Trenchless boring equipment.
 - Mud mixing and recycling plant.
 - Steel and plastic welding plant (butt fusion welders).
 - Cable winches.
 - Cable drums.
 - Compaction rollers.
 - Jointing containers.
 - HV test lorries.
 - Water pumping equipment.
 - Stone delivery trucks.
- 1.13.6.2 Construction support vehicles / plant will be used to support and monitor the cable installation under the beach and railway and to provide an emergency response where required. The following vehicles / plant could be required:

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- 4 x 4 type vehicles.
 - Telehandler.
 - back hoe / excavator.
 - Tractor and trailer.

1.14 References

CDM (2015) The Construction (Design and Management) Regulations 2015

Appendix A Outline Trenchless Crossing Mitigation Plan

1.1 Introduction

- 1.1.1.1 This appendix of the Outline Landfall Construction Method Statement provides a summary of potential construction risks for the landfall direct pipe trenchless technique and the controls and mitigations in place to ensure successful installation of the offshore export cable circuits. The Applicants have provided this information in order to satisfy Natural England's comment in the Risk and Issue's Log (REP4-139).
- 1.1.1.2 The installation of the offshore export cable circuits at landfall will be undertaken by direct pipe trenchless technique installation (CoT44, Table 1). As set out in the Volume 1, Chapter 3: Project Description (Document reference F1.3), the direct pipe installation technique is a fully cased system which significantly reduces the risks of potential drilling fluid breakout when compared with Horizontal Directional Drilling (HDD).
- 1.1.1.3 The drilling fluid used during direct pipe generally comprises a mixture of water and bentonite (a naturally occurring clay). The bentonite is delivered to site as a dried and finely ground powder and is mixed with water to form a slurry.
- 1.1.1.4 In order to manage the potential risk from bentonite breakout during direct pipe trenchless installation works, the Applicants will adhere to the measures set out in the detailed Bentonite Breakout Plan(s) (the Outline Bentonite Breakout Plan is Document reference J1.13) as approved by the relevant local authority, in consultation with the relevant stakeholders including Natural England, prior to the commencement of construction.
- 1.1.1.5 The direct pipe installation will cross several sensitive features, including the Lytham St Annes Dunes SSSI, St Annes Old Links golf course, Blackpool South railway line, and the A584 Clifton Drive North.
- 1.1.1.6 A high level risk assessment, which sets out the risks and mitigations associated with the direct pipe technique is provided in Table 1 below.

Table 1 Outline Direct Pipe Risk Assessment

Risk	Potential Impacts	Risk Before Mitigation	Control Measures / Mitigation	Residual Risk
Failure of Direct Pipe Technique (Micro-Tunnel Boring Machine (MTBM) cannot complete drive)	Schedule delay; cost increase; damage/loss of equipment	Medium	Further detailed provided in Section 1.2.2 Detailed ground investigations and topographical surveys to confirm expected ground conditions, required direct pipe cutting tool, loads, alignment and drill profile. Continuous monitoring during drilling of the required thrust, torque, rate of drilling progress, cutting fluid pressure and fluid return volumes, as well as ensuring the drill path is in alignment with design. Spare bore holes will be included in design in case of issues of deviation and unexpected ground features	Low

Risk	Potential Impacts	Risk Before Mitigation	Control Measures / Mitigation	Residual Risk
Breakout of drilling fluid (Bentonite)	Impacts to sensitive receptors (e.g. Lytham St. Annes Dunes SSSI, St Annes's Old Links Golf Club; Stoppage of work	Low	Further detailed provided in Section 1.2.1 Use of direct pipe (drilling fluid contained within steel casing) Continuous monitoring of drilling fluid pressure and return flowrates using real time instrumentation in the MTBM and separation plant, any reduction in either reading will trigger in immediate response and corrective action. Emergency access via golf course (Work Nos 36A/36B, Document Reference B12) identified for any potential incident response, as secured in the draft Development Consent Order (DCO) (document reference C1) Schedules 2A & 2B Spill kits, pollutions controls materials and equipment to be on standby on site at all times during drilling works. notification of regulators as per Section 1.7.10 of the CoCP (Document Reference J1) Bentonite breakout response to be in line with the Outline Bentonite Breakout Plan (Document reference J1.13).	Low

Risk	Potential Impacts	Risk Before Mitigation	Control Measures / Mitigation	Residual Risk
Exit pit situated on Lytham St Annes Beach flooding due to surface and ground water	Health and safety; Delay; Uncontrolled sediment mobilisation	Medium	Installation of temporary cofferdams within exit pits working area to keep pits dry and stable where required, as detailed in Section 3.14.3 of the Project Description (Document Reference F1.3) Dewatering equipment to be used in excavations where required Weather forecast will be monitored, with works planned around tidal windows. No construction activities on Lytham St Annes beach will be undertaken by the Transmission Assets annually between November and March (inclusive) (CoT129 Document reference F1.5.3) avoiding wetter months.	Low

Risk	Potential Impacts	Risk Before Mitigation	Control Measures / Mitigation	Residual Risk
Public safety and beach user interface (Inclusive of RLNI)	Health and safety	Medium	Fence and secure working areas Maintaining public access routes during construction activities as per Public Right of Way Plan (Document Reference J1.5) Access routes agreed with RNLI and a communication plan in place to update on project works, as per Communications Plan (Document Reference J1.1) Banksperson utilised for moving plant interaction with public where required,	Low

Risk	Potential Impacts	Risk Before Mitigation	Control Measures / Mitigation	Residual Risk
Existing Services (underground and overground including Blackpool Airport)	Risk of injury or equipment damage Impact to service users	Medium	Initial utilities search completed as part of feasibility study. Enquiries to be submitted at detailed design and construction Stage to ensure crossing schedule is up to date. Adherence to agreed protective provisions which prescribe statutory undertakers requirements for works in proximity to equipment. Airport will be approached to provide up to date utilities information. Adherence to HSE HSG47 &GS6 requirements	Low
Potential for UXO	Risk of injury or equipment damage	Medium	Specialist UXO contractors to be used and studies undertaken, with on-site training provided	Low
Noise and vibration	Disturbance to residents	Low	Use of direct pipe (shorter duration/less impact to beach when compared with HDD) Adherence to core working hours Monitoring and community liaison	Low

1.2 Risk of Drill failure and Mitigations

1.2.1 Risk of drilling fluid breakout

- 1.2.1.1 Breakout occurs when pressurised drilling fluid escapes through the permeable, or pre-existing fractures in the strata surrounding the borehole, and migrates to the surface. This most commonly occurs during HDD trenchless installations at the drill entry and exit pits, where the bore is at its shallowest. In HDD, the drilled bore remains uncased during construction and relies on drilling fluids to both transport drilling cuttings and arisings, and to provide temporary stability and support the open bore hole. In order to maintain the circulation of drilling fluid through an uncased open bore, fluid flow and pressure has to be closely monitored to ensure the pressure used does not exceed the ground pressure design parameters. If this pressure is exceeded, fluids can migrate through the surrounding ground and result in a bentonite breakout.
- 1.2.1.2 This is not the case with the direct pipe trenchless installation that is being utilised at landfall. With direct pipe, a steel casing is installed simultaneously as the cutting head progresses along the drill profile. This results in there being no open, uncased, unsupported bore behind the drilling head through which drilling fluids can escape. Drilling fluids along with cuttings are collected through the open drill cutter face. From there they are then pumped through an enclosed cutting returns pipe within the steel casing pipe, back to the drilling fluid separation/recycling plant. As a result, the amount of ground exposure to pressurised drilling fluid is greatly reduced, with fluid pressures involved significantly less when compared with HDD.
- 1.2.1.3 By using the direct pipe technique, the risk of drilling-fluid breakout is therefore greatly reduced, as fluids are not used at high pressure and remain predominantly contained within the installed steel casing throughout the operation. If drilling fluid breakout were to occur, this would be able to be identified quickly due to falling fluid levels within the mud tanks, allowing works to be stopped and action taken. Notification and response breakout will be in line with the detailed Bentonite Breakout Plan(s) (the Outline Bentonite Breakout Plan, Document reference J1.13) as approved by the relevant local authority.

1.2.2 Mitigations and Contingency against drill failure

- 1.2.2.1 Drill failure during direct pipe installation can occur if the micro-tunnelling boring machine (MTBM) is unable to complete the drive. This risk is managed through a combination of pre-construction ground investigation, detailed design and closely monitored operational controls.
- 1.2.2.2 To ensure the successful installation the offshore cable circuits, a competent principal contractor will be selected through a robust selection process. Mitigation measures will include the following;
- Ground investigation data will be used to confirm geological conditions, including soil strength and ground water levels.

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- Feasibility of the drill profile will be assessed to ensure alignment is technically achievable within jacking and torque limits.
 - Drill cutter tooling requirements will be identified based on ground conditions to optimise drill progress and reduce wear.
 - Jacking loads and torque requirements will be modelled and verified in design to ensure sufficient thrust and rotational capacity is available for the drive.

1.2.2.3 During operation of the direct pipe, continuous monitoring of ground conditions, drill trajectory, jacking loads torque and drill progress will be undertaken to detect any abnormal conditions at an early stage, allowing for pre-emptive action before failure.