

MORGAN AND MORECAMBE OFFSHORE WIND FARMS: TRANSMISSION ASSETS

Environmental Statement

Volume 1, Annex 4.3: Selection and Refinement of the Onshore Infrastructure



September 2024
Rev: ES Issue

MOR001-FLO-CON-ENV-RPT-0065
MRCNS-J3303-RPS-10030

PINS Reference: EN020028
APFP Regulations: 5(2)(a)
Document reference: F1.4.3

Document status

Version	Purpose of document	Approved by	Date	Approved by	Date
ES	For issue	AS	September 2024	IM	September 2024

Prepared by:

**Morgan Offshore Wind Limited
Morecambe Offshore Windfarm Ltd**

Prepared for:

**Morgan Offshore Wind Limited
Morecambe Offshore Windfarm Ltd**

Contents

4	SITE SELECTION AND REFINEMENT OF ONSHORE INFRASTRUCTURE	1
4.1	Introduction	1
4.1.1	Overview	1
4.1.2	Purpose of this annex	1
4.2	Consultation and engagement	5
4.3	Guiding Principles for Onshore Infrastructure	7
4.3.2	Horlock Rules	7
4.3.3	BRAG Methodology	9
4.4	Measures adopted as a part of the Transmission Assets (Commitments)	10
4.5	Onshore Substation Site Selection	15
4.5.2	National Grid connection offer	15
4.5.3	Onshore substation design principles	15
4.5.4	Stage 2c: Identification of onshore substation search areas	16
4.5.5	Stage 3c: Refinement of onshore substation search areas for PEIR	20
4.5.6	Stage 4c: Refinement of onshore substation search areas for DCO Application	32
4.6	Onshore Cable Corridors Site Selection	49
4.6.1	Stage 2d: Identification of onshore cable route search area	49
4.6.2	Stage 3d: Refinement of onshore cable route options for PEIR	52
4.6.3	Stage 4d: Refinement of onshore cable route options for DCO Application	71
4.7	Conclusion	101
4.8	References	102

Tables

Table 4.1: Site Selection and Refinement Stages	2
Table 4.2: Summary of programme stages and activities undertaken for the Transmission Assets relevant to site selection and refinement.....	5
Table 4.3: Onshore infrastructure application of the Horlock Rules	8
Table 4.4: BRAG Definitions.....	10
Table 4.5: Measures (commitments) adopted as a part of the Transmission Assets relevant to Onshore Site Selection	11
Table 4.6: Onshore Substations infrastructure parameters for site selection (PEIR).....	16
Table 4.7: Summary BRAG Appraisal of Onshore Substations Search Zones.....	27
Table 4.8: Morgan Substation Formal Consultation	32
Table 4.9: Morecambe Substation Formal Consultation	33
Table 4.10: Summary BRAG Appraisal of Morecambe Substations Options	36
Table 4.11: Morecambe Substation Access Track Options	45
Table 4.12: Summary of key themes of feedback received as part of Non- Statutory Consultation on Scoping Boundaries	49
Table 4.13: Summary of key parameters for the Transmission Assets for Stage 3d relating to the onshore cable corridors.....	52
Table 4.14: Onshore Export Cable Corridors BRAG Criteria for Stage 3d	55
Table 4.15: Examples of refinements made to the Onshore Export Cable Corridors at Stage 3d.....	69
Table 4.16: Refinements to key infrastructure parameters at Stage 4d	71
Table 4.17: Examples of refinements made to the Onshore Export Cable Corridors at Stage 4d.....	74
Table 4.18: 400kV Grid Connection Cable Corridors (excluding the River Ribble crossing) BRAG Criteria for Stage 4d.....	82
Table 4.21: River Ribble BRAG Constraints Summary	88
Table 4.19: River Ribble crossing BRAG Criteria for Stage 4d	89
Table 4.20: River Ribble RAG Analysis Summary	93
Table 4.22: Examples of refinements made to the Transmission Assets Order Limits: Onshore at Stage 4d.....	98

Figures

Figure 4.1: Site Selection Annex Areas	4
Figure 4.2: Initial Area of Search (With Constraints)	17
Figure 4.3: Onshore Substation Scoping Boundary	19
Figure 4.4: Substation Zone Heatmapping Sheet 1	21
Figure 4.5: Substation Zone Heatmapping Sheet 2	22
Figure 4.6: Onshore substation site selection search zones with constraints	24
Figure 4.7: Onshore substation site selection search zones	25
Figure 4.8: Potential substation sites zone 1	31
Figure 4.9: Morgan PEIR substation site and DCO substation site	40
Figure 4.10: Morgan PEIR substation site and DCO substation site (Work Nos)	42
Figure 4.11: Morecambe Onshore Substation Access Track Options	47
Figure 4.12: Morecambe DCO substation site	48
Figure 4.13: Onshore Cable Corridors Search Area at Scoping	51
Figure 4.14: Onshore Export Cable Corridors Search Area Constraints	54
Figure 4.15: Onshore Export Cable Corridors BRAG Mapping at Stage 3d	58
Figure 4.16: Temporary Construction Access Points for the Onshore Export Cable Corridors at Stage 3d	61
Figure 4.17: Temporary Construction Compounds for the Onshore Export Cable Corridors at Stage 3d	63
Figure 4.18: 400kV Grid Connection Cable Corridors Search Area at Stage 3d	65
Figure 4.19: Stage 3d: Areas of Mitigation, Enhancement and Net Gain	67
Figure 4.20: Summary of refinements made to the Onshore Export Cable Corridors at Stage 3d	70
Figure 4.21: Changes to the Onshore Export Cable Corridors at Stage 4d	75
Figure 4.22: Temporary access tracks at Stage 4d	77
Figure 4.23: Temporary construction compounds refinements at Stage 4d	79
Figure 4.24: Constraints plan of the 400kV Grid Connection Cable Corridors	81
Figure 4.25: 400kV Grid Connection Cable Corridors BRAG Mapping at Stage 4d	85
Figure 4.26: River Ribble Crossing Zones	87
Figure 4.27: Environmental Mitigation and Biodiversity Benefit areas at DCO Application	97
Figure 4.28: Key Changes to the Onshore Cable Corridors	100

Glossary

Term	Meaning
Applicants	Morgan Offshore Wind Limited (Morgan OWL) and Morecambe Offshore Windfarm Limited (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.
Development Consent Order	An order made under the Planning Act 2008, as amended, granting development consent.
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.
Expert Working Group	A forum for targeted engagement with regulators and interested stakeholders through the Evidence Plan process.
Generation Assets	The generation assets associated with the Morgan Offshore Wind Project and the Morecambe Offshore Windfarm include the offshore wind turbines, inter-array cables, offshore substation platforms and platform link (interconnector) cables to connect offshore substations.
Intertidal Infrastructure Area	The temporary and permanent areas between Mean High Water Springs and Mean Low Water Springs.
Intertidal area	The area between Mean High Water Springs and Mean Low Water Springs.
Landfall	The area in which the offshore export cables make landfall (come on shore) and the transitional area between the offshore cabling and the onshore cabling. This term applies to the entire landfall area between Mean Low Water Springs and the transition joint bay inclusive of all construction works, including the offshore and onshore cable routes, intertidal infrastructure area and landfall compound(s).
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 Spring	The height of mean high water during spring tides in a year.
Mean Low Water Spring	The height of mean low water during spring tides in a year.

Term	Meaning
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 a joint venture between Zero-E Offshore Wind S.L.U. (Spain) (a Cobra group company) (Cobra) and Flotation Energy Ltd.
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 Morecambe Offshore Windfarm to the National Grid.
Morgan and Morecambe Offshore Wind Farms: Transmission Assets	<p>The offshore and onshore infrastructure connecting the Morgan Offshore Wind Project and the Morecambe Offshore Windfarm to the National Grid. This includes the offshore export cables, landfall site, onshore export cables, onshore substations, 400 kV grid connection cables and associated grid connection infrastructure such as circuit breaker compounds.</p> <p>Also referred to in this report as the Transmission Assets, for ease of reading.</p>
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.
Offshore Permanent Infrastructure Area	The area within the Transmission Assets Offshore Order Limits (seaward of Mean Low Water Springs) where the permanent offshore electrical infrastructure (i.e. offshore export cables) will be located.
Offshore Order Limits	See Transmission Assets Order Limits: Offshore (below).
Offshore Wind Leasing Round 4	The Crown Estate auction process which allocated developers preferred bidder status on areas of the seabed within Welsh and English waters and ends when the Agreements for Lease are signed.
Onshore export cables	The cables which would bring electricity from the landfall to the onshore substations.
Onshore export cable corridor	The corridor within which the onshore export cables will be located.

Term	Meaning
Onshore Infrastructure Area	The area within the Transmission Assets Order Limits landward of Mean High Water Springs. Comprising the offshore export cables from Mean High Water Springs to the transition joint bays, onshore export cables, onshore substations and 400 kV grid connection cables , 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/biodiversity benefit are excluded from this area.
Onshore Order Limits	See Transmission Assets Order Limits: Onshore (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.
Point of Interconnection	The point where an offshore wind farm connects to the National Grid.
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.
Ramsar sites	Wetlands of international importance that have been designated under the criteria of the Ramsar Convention. In combination with Special Protection Areas and Special Areas of Conservation, these sites contribute to the national site network.
Scoping Opinion	Sets out the Planning Inspectorate’s response (on behalf of the Secretary of State) to the Scoping Report prepared by the Applicants. The Scoping Opinion contains the range of issues that the Planning Inspectorate, in consultation with statutory stakeholders, has identified should be considered within the Environmental Impact Assessment process.
Scoping Report	A report setting out the proposed scope of the Environmental Impact Assessment process. The Transmission Assets Scoping Report was submitted to The Planning Inspectorate (on behalf of the Secretary of State) for the Morgan and Morecambe Offshore Windfarms Transmission Assets in October 2022.
Special Areas of Conservation	A site designation specified in the Conservation of Habitats and Species Regulations 2017. Each site is designated for one or more of the habitats and species listed in the Regulations. The legislation requires a management plan to be prepared and implemented for each SAC to ensure the favourable conservation status of the habitats or species for which it was designated. In combination with Special Protection Areas and Ramsar sites, these sites contribute to the national site network.
Special Protection Areas	A site designation specified in the Conservation of Habitats and Species Regulations 2017, classified for rare and vulnerable birds, and for regularly occurring migratory species. Special Protection Areas contribute to the national site network.

Term	Meaning
Statutory consultee	Organisations that are required to be consulted by an applicant pursuant to section 42 of the Planning Act 2008 in relation to an application for development consent. Not all consultees will be statutory consultees (see non-statutory consultee definition).
Substation	Part of an electrical transmission and distribution system. Substations transform voltage from high to low, or the reverse by means of electrical transformers.
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 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.
Transmission Assets PEIR Boundary	The term used to define the boundary used at the time the Preliminary Environmental Impact Report (PEIR) was submitted
Transmission Assets Scoping Boundary	The term used to define the boundary used at the time the Scoping Report was submitted

Acronyms

Acronym	Meaning
DCO	Development Consent Order
DECC	Department of Energy and Climate Change
DESNZ	Department for Energy Security & Net Zero
ECRA	Export Cable Region Assessment
EIA	Environmental Impact Assessment
EPP	Evidence Plan Process
ES	Environmental Statement
EWG	Expert Working Group
HDD	Horizontal Directional Drilling
HND	Holistic Network Design
HRA	Habitats Regulations Assessment
JNCC	Joint Nature Conservation Committee
LNR	Local Nature Reserve
MCZ	Marine Conservation Zone
MHWS	Mean High Water Springs
MLWS	Mean Low Water Springs
MMO	Marine Management Organisation
MNEF	Maritime Navigation Engagement Forum
MPA	Marine Protected Area
NGESO	National Grid Electricity System Operator
NNR	National Nature Reserve
NPS	National Policy Statement
OSP	Offshore Substation Platform
PDE	Project Design Envelope
PEIR	Preliminary Environmental Information Report
PoI	Point of Interconnection
SAC	Special Area of Conservation
SoS	Secretary of State
SPA	Special Protection Area
SSSI	Site of Special Scientific Interest
TCE	The Crown Estate
UK	United Kingdom

Units

Unit	Description
%	Percentage
dB	Decibels
Kg	Kilogram
km	Kilometres
km ²	Square kilometres
m	Metres
m ²	Metres squared
m ³	Metres cubed
%	Percentage
km ²	Square kilometres
nm	Nautical mile

4 Site selection and refinement of Onshore Infrastructure

4.1 Introduction

4.1.1 Overview

4.1.1.1 This document forms Annex 4.3: Site Selection and Refinement of Onshore Infrastructure to Chapter 4: Site Selection and Consideration of Alternatives of the Environmental Statement (ES) prepared for the Morgan and Morecambe Offshore Wind Farms: Transmission Assets (referred to hereafter as ‘the Transmission Assets’). The ES presents the findings of the Environmental Impact Assessment (EIA) process for the Transmission Assets.

4.1.1.2 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 Generation Assets are each subject to separate applications for development consent.

4.1.2 Purpose of this annex

4.1.2.1 This annex sets out the stages of siting and design iterations that the Transmission Assets onshore infrastructure has been through from inception to DCO submission.

4.1.2.2 The Transmission Assets Order Limits (Figure 3.1, see Volume 1: Figures) represents the area within which all components of the Transmission Assets will be located, including areas required temporarily for construction and areas where permanent infrastructure will be located. The Transmission Assets Order Limits has been further divided to facilitate the EIA. This annex focuses on the following components:

- Onshore export cable corridors – where the permanent onshore export cables will be located, including temporary construction compounds, and temporary and permanent accesses;
- Onshore substations – where the permanent onshore electrical substation infrastructure and connections to the onshore export cables are proposed to be located, including temporary and permanent accesses;
- 400 kV grid connection cable corridors – where the permanent 400 kV export cables will be located, including temporary construction compounds, and temporary and permanent accesses. The 400 kV export cables will connect the onshore substations to the National Grid substation at Penwortham;
- Environmental mitigation only area(s) – temporary and/or permanent areas proposed for environmental mitigation only, including temporary and permanent accesses for these areas. No

electrical infrastructure is proposed within these areas. Further information on the potential measures proposed in these areas is provided in Outline Ecological Mitigation Plan (document reference J6); and

- Biodiversity benefit only area(s) – permanent areas within which biodiversity benefit measures are proposed, including temporary and permanent accesses for these areas. No electrical infrastructure is proposed within these areas. Further information on the potential measures proposed in these areas is provided in Onshore Biodiversity Benefit Statement (document reference: J11).

4.1.2.3 An important part of the Transmission Assets design process is the consideration, selection, and refinement of potential siting options for landfall and communicating to consultees and stakeholders the rationale for how decisions have been reached and how adverse effects have been avoided, minimised and/or mitigated as far as practicable.

4.1.2.4 The site selection and refinement process followed an iterative approach to ensure the most appropriate and efficient solution was identified with consideration for environmental and engineering constraints. The site selection has been progressed through four stages, incorporating feedback received at each phase to further refine the siting and design of the landfall infrastructure in the next stage. These four stages are described in **Table 4.1** and shown in **Figure 4.1**.

Table 4.1: Site Selection and Refinement Stages

Stage	Associated Document
Stage 1 – Identification of Point of Interconnection (Pol)	Volume 1, Chapter 4: Site selection and consideration of Alternatives
Stage 2 – Identification of areas of search	
Stage 2a – Identification of landfall areas of search	Volume 1, Annex 4.1: Selection and Refinement of Cable Landfall
Stage 2b – Identification of offshore infrastructure search area	Volume 1, Annex 4.2: Selection and Refinement of Offshore Infrastructure
Stage 2c – Identification of onshore substations search areas	Volume 1, Annex 4.3: Selection and Refinement of Onshore Infrastructure
Stage 2d – Identification of onshore export cable route search area	Volume 1, Annex 4.3: Selection and Refinement of Onshore Infrastructure
Stage 3 – Refinement of the siting and design of the Transmission Assets for PEIR	
Stage 3a – Refinement of landfall for PEIR	Volume 1, Annex 4.1: Selection and Refinement of Cable Landfall
Stage 3b – Refinement of offshore infrastructure options for PEIR	Volume 1, Annex 4.2: Selection and Refinement of Offshore Infrastructure
Stage 3c – Refinement of onshore substations search areas for PEIR	Volume 1, Annex 4.3: Selection and Refinement of Onshore Infrastructure
Stage 3d – Refinement of onshore export cable route options for PEIR	Volume 1, Annex 4.3: Selection and Refinement of Onshore Infrastructure

Stage	Associated Document
Stage 4: Refinement of the siting and design of the Transmission Assets for DCO Application	
Stage 4a – Refinement of landfall design for DCO Application	Volume 1, Annex 4.1: Selection and Refinement of Cable Landfall
Stage 4b – Refinement of offshore infrastructure for DCO Application	Volume 1, Annex 4.2: Selection and Refinement of Offshore Infrastructure
Stage 4c – Refinement of onshore substations search areas for DCO Application	Volume 1, Annex 4.3: Selection and Refinement of Onshore Infrastructure
Stage 4d – Refinement of onshore export cable route options for DCO Application	Volume 1, Annex 4.3: Selection and Refinement of Onshore Infrastructure

4.1.2.5 This annex focuses on the onshore elements landward of landfall undertaken as part of Stages 2c, 2d, 3c, 3d, 4c and 4d as detailed in **Table 4.1**.

4.1.2.6 In particular, this annex:

- Outlines the approach taken to defining the spatial boundaries and constituent parts of the assets listed in **section 4.1.2**;
- Explains the siting decisions taken by the Applicants; and
- Details the reasonable alternatives considered for the Transmission Assets, including location and infrastructure options.

4.1.2.7 For the purposes of this annex, each of the onshore elements is considered in turn; however, the alignment of the cable route and the substations evolved together during the site selection process.

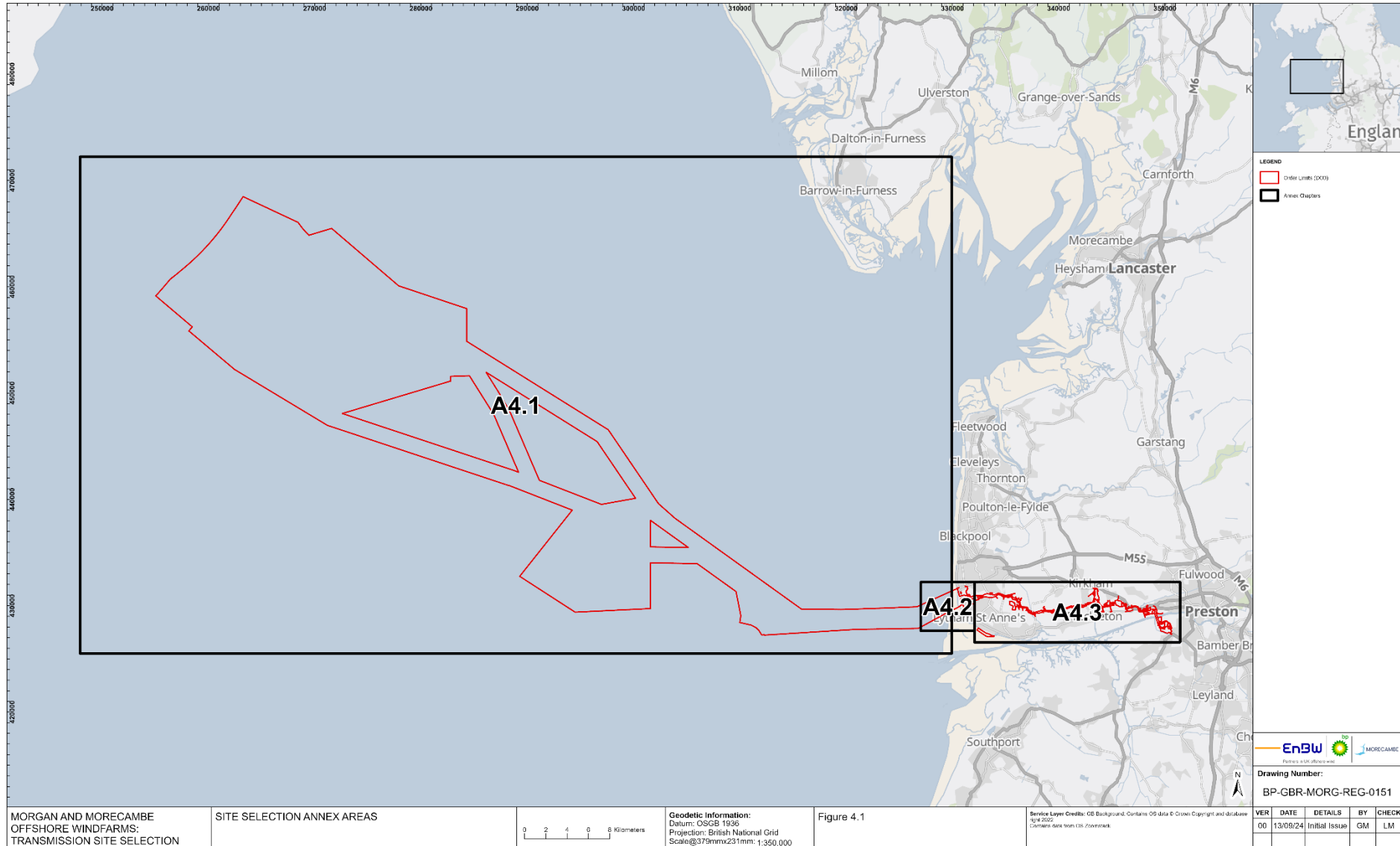


Figure 4.1: Site Selection Annex Areas

4.2 Consultation and engagement

4.2.1.1 Stakeholder engagement and public consultation is recognised as vitally important for shaping the approach to development throughout each programme stage of development. **Table 4.2** provides a high level programme of key activities undertaken between Scoping and DCO application submission for the offshore infrastructure, landfall and onshore infrastructure.

Table 4.2: Summary of programme stages and activities undertaken for the Transmission Assets relevant to site selection and refinement

Programme Stage	Description of activities
EIA scoping October 2022	Submission of Scoping Report for Transmission Assets covering: <ul style="list-style-type: none"> • Scoping boundary of 1,667.9 km² • Landfall • Offshore infrastructure search area • Onshore infrastructure search area
Non-statutory consultation November 2022	Non-statutory public consultation events to present: <ul style="list-style-type: none"> • Overview of the Transmission Assets project and how separate DCO applications are needed for the Morgan and Morecambe Transmission Assets, Morgan Generation Assets and Morecambe Generation Assets • Highlighting Pathways to 2030 and how both offshore windfarms are working to align infrastructure for the Transmission Assets • Request for feedback from stakeholders and communities • Landowner liaison • Evidence Process Plan (EPP) Steering Groups and Expert Working Groups (EWGs) on the scoping report and scoping boundary through to PEIR submission
Non-statutory consultation April 2023	Overview of project refinements since scoping covering: <ul style="list-style-type: none"> • Selected Landfall option • Indicative onshore export cable corridor and associated temporary and permanent areas • Four indicative onshore substation search areas • Request for feedback from stakeholders and communities

Programme Stage	Description of activities
PEIR October 2023	Submission of PEIR covering: <ul style="list-style-type: none"> • PEIR boundary of 697.8 km² • Landfall • Offshore substation platforms (OSPs) and interconnector cables • Morgan offshore booster station search areas • Three Morgan offshore export cable options and aligned Morgan and Morecambe offshore export cable route • One onshore substation statutory consultation area with preferred onshore substation sites (one for Morgan and two for Morecambe) • Two onshore cable route options • 400 kV grid connection cable corridor search area • Indicative construction compounds and access • Preliminary identification of areas for biodiversity benefit Section 42 and Section 47 Consultation Feedback from stakeholders and members of the public on the environmental assessment and site selection undertaken to date. Further engagement via the EWGs with stakeholders
Targeted Consultation February 2024	<ul style="list-style-type: none"> • Consultation on minor amendments to PEIR red line boundary covering: 11 minor adjustments to temporary access tracks • Two minor adjustments to temporary construction compounds • Addition of 23 operation access routes. • Alternation of onshore cable route between Huck Lane and Bryning Lane • Four minor adjustments to export cable corridor
DCO Application September 2024	Submission of DCO covering: <ul style="list-style-type: none"> • Application boundary of 624 km² • Landfall • Three Morgan offshore export cable options and Morecambe offshore cable corridor which includes an aligned Morgan and Morecambe offshore export cable route • Onshore export cable corridor • Onshore substations • 400kV grid connection cable corridor

4.2.1.2 From project inception to submission of the DCO application, the Applicants have engaged with a range of stakeholders on the site selection and design of the Transmission Assets through the Evidence Plan Process (EPP). An EPP was developed for the Transmission Assets, seeking to ensure engagement with the relevant aspects of the EIA process throughout the pre-application phase. The development and monitoring of the Evidence Plan and its subsequent progress was undertaken by the EPP Steering Group. The Steering Group comprises

the Planning Inspectorate, the Applicants, the Marine Management Organisation (MMO), Natural England, Historic England, the Environment Agency and the Local Planning Authorities as the key regulatory and bodies. Additionally, Expert Working Groups (EWGs) were set up to discuss and agree topic specific issues with the relevant stakeholders and to disseminate site and design refinements.

4.2.1.3 A summary of the key topics raised during consultation activities undertaken to date specific to the site selection and refinement of the onshore infrastructure is presented in Volume 1, Chapter 4: Site selection and consideration of the alternatives of the ES. Formal responses are provided for all consultation responses received and can be accessed in the Consultation Report (document reference E1).

4.3 Guiding Principles for Onshore Infrastructure

4.3.1.1 Alongside existing legislative, policy and guidance framework for the site selection process as detailed in Chapter 4: Site Selection and Consideration of Alternatives of the ES, the following principles guided the onshore infrastructure selection and refinement process:

- Cable routes should be as straight and as direct as practicable.
- Substations should be sited in proximity to each other.
- Directly avoid international, European and national designations, where practicable.
- Avoid areas of woodland.
- Avoid direct impact to residential properties.
- Minimise routing through challenging ground conditions (e.g. potentially contaminated land and wetlands).
- Minimise the number and length of complex crossings, where practicable (e.g. railways and pipelines) and cross the asset as close to 90 degrees as possible.

4.3.1.2 Each step of the process as described in **Table 4.2** and detailed for the onshore infrastructure in this report involved gathering desktop and survey data and feedback from stakeholders and the public to define and assess the Transmission Assets onshore infrastructure options. Internal workshops were then held to collate and review the data gathered and feedback to reach cross-discipline decisions about refining the site and design options.

4.3.2 Horlock Rules

4.3.2.1 The relevance of planning and environmental considerations in the siting of onshore substations was set out by the Central Electricity Generating Board and more recently reviewed and adopted by NGET in the 'Horlock Rules'. The Horlock Rules are a set of guidelines produced by NGET to assist those responsible for siting and designing substations to mitigate the environmental effects of such developments (National Grid, 2003). They are still referred to and used by National

Grid (and endorsed in ministerial decisions and at public inquiry) when undertaking planning studies for new infrastructure although they now have to be considered alongside the relevant policy set out in National Policy Statements, Development Plan documents, local planning policies and other sources.

4.3.2.2 The principles embedded in the Horlock rules are relevant to the Transmission Assets and are detailed below in **Table 4.3**.

Table 4.3: Onshore infrastructure application of the Horlock Rules

Horlock Rules overarching guidelines	Further detail on the Projects consideration of the guidelines
<p>Amenity, Cultural or Scientific Value of Sites</p> <p>The siting of new NGC substations, sealing end compounds and line entries should as far as reasonably practicable seek to avoid altogether internationally and nationally designated areas of the highest amenity, cultural or scientific value by the overall planning of the system connections. [Horlock Rules – Section III paragraph 2]</p> <p>Areas of local amenity value, important existing habitats and landscape features including ancient woodland, historic hedgerows, surface and ground water sources and nature conservation areas should be protected as far as reasonably practicable. [Horlock Rules – Section III paragraph 3]</p>	<p>The consideration of environmental constraints including internationally and nationally designated areas has been incorporated within the BRAG criteria for the site selection and refinement of the onshore substations further details can be found in sections 4.5.4, 4.5.5 and 4.5.6.</p> <p>All internationally and nationally designated sites have been avoided as part of the onshore substation site selection.</p>
<p>Local Context, Land Use and Site Planning</p> <p>The siting of substations, extensions and associated proposals should take advantage of the screening provided by land form and existing features and the potential use of site layout and levels to keep intrusion into surrounding areas to a reasonably practicable minimum. [Horlock Rules – Section III paragraph 4]</p> <p>The proposals should keep the visual, noise and other environmental effects to a reasonably practicable minimum. [Horlock Rules – Section III paragraph 5]</p> <p>The land use effects of the proposal should be considered when planning the siting of substations or extensions. [Horlock Rules – Section III paragraph 6]</p>	<p>The stages to siting the onshore substation including the consideration of land use impacts is provided in sections 4.5.4, 4.5.5 and 4.5.6.</p> <p>Screening around the onshore substations is detailed in Volume 3; Chapter 10: Landscape, and Visual Impact Assessment of this ES. Proposals to minimise visual and other environmental impacts, including the provision of screening is provided within the Outline Landscape Management Plan (document reference J2) and Outline Design Principles document (document reference J3).</p>

Horlock Rules overarching guidelines	Further detail on the Projects consideration of the guidelines
<p>Design</p> <p>In the design of new substations or line entries, early consideration should be given to the options available for terminal towers, equipment, buildings and ancillary development appropriate to individual locations, seeking to keep effects to a reasonably practicable minimum. [Horlock Rules – Section III paragraph 7]</p> <p>Space should be used effectively to limit the area required for development consistent with appropriate mitigation measures and to minimise the adverse effects on existing land use and rights of way, whilst also having regard to future extension of the substation. [Horlock Rules – Section III paragraph 8]</p> <p>The design of access roads, perimeter fencing, earthshaping, planting and ancillary development should form an integral part of the site layout and design to fit in with the surroundings. [Horlock Rules – Section III paragraph 9]</p>	<p>The coordinated approach and consideration to the site selection and refinement of the onshore substations is detailed below in sections 4.5.4, 4.5.5 and 4.5.6.</p> <p>The initial footprints of the Onshore Substations have been determined based on the Applicants current substation designs. The design of the onshore substations may be subject to further refinement during the detailed design phase, post consent. Note: the reference to the “future extension of the substation” is related to the future extension of National Grid substations. This is not considered as part of the site selection process for the Transmission Assets.</p>
<p>Line Entries</p> <ol style="list-style-type: none"> 1. In open landscape especially, high voltage line entries should be kept, as far as possible, visually separate from low voltage lines and other overhead lines so as to avoid a confusing appearance. 2. The inter-relationship between towers and substation structures and background and foreground features should be studied to reduce the prominence of structures from main viewpoints. Where practicable the exposure of terminal towers on prominent ridges should be minimised by siting towers against a background of trees rather than open skylines. 	<p>The Applicants have not included overhead lines within the project design envelope. All cables will be buried underground, as per CoT12, (Volume 1, Annex 5.3: Commitments Register)</p>

4.3.2.3 In the Horlock Rules, NGET states that it will encourage generators to adopt the guidelines when working with NGET on proposals for substations, sealing end compounds, or line entries. These guidelines also confirm that consideration must be given to environmental issues at the earliest stage in order to keep adverse effects to a reasonably practical minimum in the planning of new substations. The Horlock Rules are considered in detail in Chapter 4: Site Selection and Consideration of Alternatives of the ES.

4.3.3 BRAG Methodology

4.3.3.1 A Black/Red/Amber/Green (BRAG) methodology has been used to inform the different aspects of site selection. This is considered appropriate to compare different locations for the siting of the onshore Transmission Assets, given the ability to capture and classify the main differentiating issues into four fundamental categories as detailed in

Table 4.4. A BRAG analysis of this type enables a clear and direct comparison between areas.

Table 4.4: BRAG Definitions

Rating	Summary
Black	Potential showstopper to development
Red	High potential to constrain development
Amber	Intermediate potential to constrain development
Green	Low potential to constrain development

4.3.3.2 Development considerations captured within the BRAG assessment include archaeology and cultural heritage, ecology, landscape, hydrology and hydrogeology, engineering, community, landscape and visual, property, and planning. These were defined by a team of specialists comprising engineers, Environmental Impact Assessment (EIA) consultants, and landscape, archaeology and ecological experts that have experience in undertaking site selection BRAG analysis. The BRAG analysis qualitatively assesses the influence of future developments, either using defined parameters, professional judgement, or assessing the issue relative to other potential options.

4.3.3.3 Further details on the BRAG criteria utilised are found in the relevant sections below.

4.4 Measures adopted as a part of the Transmission Assets (Commitments)

4.4.1.1 Throughout the design of the Project, the principles of the Mitigation Hierarchy of avoid, mitigate, compensate were applied; influencing the approach to the engineering and environmental design to align with National Planning Policy Framework, Section 15 (Ministry of Housing, Communities and Local Government, 2024) and National Policy Statement EN-1.

4.4.1.2 All measures to be adopted by the Transmission Assets are called ‘Commitments’ (CoTs). The CoTs will be used to inform the final design and details for construction, operation and maintenance, and decommissioning phases.

4.4.1.3 All CoTs directly relevant to the Onshore Site Selection and refinement of onshore infrastructure and design are outlined in **Table 4.5**. The full list of CoTs can be found in (see Volume 1, Annex 5.3: Commitments Register).

Table 4.5: Measures (commitments) adopted as a part of the Transmission Assets relevant to Onshore Site Selection

Commitment (CoT) number	Measure adopted	How the measure will be secured
CoT02	<p>The following features will be crossed by trenchless techniques, as set out in the Onshore Crossing Schedule submitted as part of the application for development consent:</p> <ul style="list-style-type: none"> - 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; excluding Leech Lane). - All Environment Agency Main Rivers, including: Moss Sluice, east of Midgeland Road along Pegs Lane; Savick Brook, south of A583; 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 - All Network Rail crossings, including along the line which runs between Blackpool North and Preston, south of Cartmell Lane; and at the Network Rail crossing along the line which runs to Blackpool North, south east of Squires Gate, parallel to the A584. 	<p>DCO Schedules 2A & 2B, Requirement 5(2) (Detailed design parameters onshore); DCO Schedules 2A & 2B, Requirement 8 (Code of Construction Practice)</p>
CoT03	<p>A range of sensitive historical, cultural and ecological conservation areas (including statutory and non-statutory designations) have been directly avoided where practicable during the site selection process for Morgan and Morecambe Offshore Wind Farms: Transmission Assets footprint. The Works Plans identify the areas where different works are currently proposed.</p> <p>These include, but are not restricted to:</p> <ul style="list-style-type: none"> • Listed Buildings • Scheduled Monuments • Registered Parks and Gardens • Onshore Conservation Areas • Onshore National Site Network • Offshore National Site Network • Sites of Special Scientific Interest (Onshore only) • Local Nature Reserves • Local Wildlife sites • Lancashire Wildlife Trust Reserves • Royal Society for the Protection of Birds (RSPB) Reserves • National Trust land; • Ancient Woodland sites and known Tree Preservation Orders (TPOs); & • non-designated built heritage assets. 	<p>DCO Article 3(1); Works Plans - Onshore and Intertidal</p>

Commitment (CoT) number	Measure adopted	How the measure will be secured
	Where possible, unprotected areas of woodland, mature and protected trees (i.e. veteran trees) have and will also be avoided, including the veteran tree located to the north east of National Grid Penwortham substation.	
CoT06	<p>The construction area associated with onshore export cable corridor will be 100 m working width and the 400kv grid connection cable corridor will be working width 76 m to minimise the construction footprint, except at complex trenchless technique crossings, including, but not limited to:</p> <ul style="list-style-type: none"> • Network Railway Crossings; • A, B and Classified unnumbered roads (known as C roads), including B5261 (Queensway); • the approach to landfall; • river and water course crossings; and • sensitive utility assets (e.g. high pressure gas pipelines). <p>The widths of both the onshore export cable corridor and 400kv grid connection cable corridor also increases up to 270 m in width, on the access and egress to the onshore substations, to facilitate consideration of trenchless crossings as well as being subject to detailed design. These increased widths and crossing methodologies are set out in the Onshore Crossing Schedule and Works Plans-Onshore.</p>	<p>DCO Schedules 2A & 2B, Requirement 5 (Detailed design parameters onshore);</p> <p>Works Plans - Onshore and Intertidal</p>
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)
CoT10	<p>Where trenchless techniques are proposed for Environment Agency Main Rivers, the following distances will be used:</p> <ul style="list-style-type: none"> •8 m from the bank of the Environment Agency Main River or landward toe of any associated flood defence structure; •16 m from tidal Environment Agency Main Rivers or the landward toe of any flood defences, where the Main River is a sea defence structure; and •a minimum of 2 m vertical clearance will be maintained below the hard bed of all Environment Agency Main Rivers, including the landward toe of any associated flood defences. <p>Final vertical clearance depths beneath Environment Agency Main Rivers will be identified during detailed design stage, in consultation with the Environment Agency, to ensure the export cables remain buried for the operational lifetime of the project.</p>	<p>DCO Schedules 2A & 2B, Requirement 8 (Code of Construction Practice);</p> <p>DCO Schedule 10, Part 9</p>
CoT13	Where hedgerows and/or trees require removal, this will be undertaken prior to topsoil removal. Sections of hedgerows and trees which are removed will be replaced using like for like hedgerow species.	DCO Schedules 2A & 2B, Requirement 8 (Code of Construction Practice); and Requirement 12

Commitment (CoT) number	Measure adopted	How the measure will be secured
		(Ecological Management Plan)
CoT24	Where practicable, during construction, access routes within the onshore export cable corridor and 400kV grid connection corridor (i.e. for example, the use of haul roads) will be used, to minimise potential impacts to the local road network.	DCO Schedules 2A & 2B, Requirement 9 (Traffic and Transport); Access to Works Plan
CoT31	Ponds identified during the route planning and site selection process have been avoided where possible. During construction any newly identified ponds will be avoided through micro-siting of the onshore export cable corridor and 400 kV grid connection cable corridor where reasonably practicable.	DCO Schedules 2A & 2B, Requirement 12 (Ecological Management Plan)
CoT32	An Outline Public Rights of Way (PRoW) Management Plan has been prepared as part of the Outline CoCP in order to minimise the disturbance to PRoWs, where practicable. Where practically possible the impact will be temporary and PRoWs will be reinstated as soon as reasonably practicable. An Outline Open Space Management Plan has been appended to the Outline PRoW Management Plan, which includes measures to minimise potential impacts to the users of Lytham St Annes beach and Blackpool Road Recreation Ground. Detailed PRoW Management Plans will include details of temporary and permanent diversions, closures, gated crossings and signage to be provided during construction and details to reinstate all PRoWs potentially affected during construction.	DCO Schedules 2A & 2B, Requirement 8 (Code of Construction Practice)
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)
CoT91	An Outline Public Rights of Way (PRoW) Management Plan as part of the Outline CoCP, has been prepared and submitted with the application for development consent. Detailed Public Rights of Way (PRoW) Management Plan(s) will be developed in accordance with the Outline Public Rights of Way (PRoW) Management Plan and Outline CoCP. These will detail measures to mitigate against temporary disruption or reduced access on the Lancashire Coastal Way Long Distance Path and the Ribble Way Long Distance Path, as well as all other PRoWs to be crossed.	DCO Schedules 2A & 2B, Requirement 8 (Code of Construction Practice)
CoT102	Where sections of PRoWs are required to be closed during the construction of the onshore export cable corridor and 400 kV grid connection cable corridor, they will not be closed for any longer than three months at any one time, or for six months in total over the whole construction period. Where closures are required for longer periods due to unforeseen	DCO Schedules 2A & 2B, Requirement 8

Commitment (CoT) number	Measure adopted	How the measure will be secured
	<p>circumstances encountered during construction, Lancashire County Council will be informed in writing. This will be in accordance with the Outline PRow Plan that has been prepared, as part of the Outline CoCP and submitted as part of the application for development consent.</p>	<p>(Code of Construction Practice)</p>
CoT123	<p>The Project Description (Volume 1, Chapter 3 of the Environmental Statement) sets out that the installation of the Onshore Export Cable Corridor at Blackpool Road Recreation Ground will be undertaken by HDD (or other trenchless techniques). This trenchless technique installation is anticipated to last a maximum of 5 months of total active construction within the grounds. Appropriate exclusion fencing between the entry and exit pits will only be erected for a maximum of 2 months within the 5 months of active construction to mitigate potential impacts to users.</p>	<p>DCO Schedules 2A & 2B, Requirement 8 (Code of Construction Practice); DCO Schedules 2A & 2B, Requirement 5 (Detailed design parameters onshore)</p>

4.5 Onshore Substation Site Selection

4.5.1.1 The purpose of the Onshore Substations is to transform the power supplied through the onshore export cables into an appropriate voltage and to adjust the power quality and power factor, as required to meet the UK Grid Code for supply to the National Grid.

4.5.1.2 This section describes the site selection process for the Onshore Substations undertaken since the identification of the grid connection at the National Grid Substation at Penwortham. The process for identifying the grid connection at Penwortham is outlined in **section 4.5.2** and described in detail in Volume 1, Chapter 4: Site selection and consideration of alternatives of the ES. The identification and refinement of the Onshore Substations area is detailed in the following sections, culminating in the selection and refinement of the two Onshore Substation sites (i.e. one for Morgan OWL and one for Morecambe OWL) for ES submission.

4.5.2 National Grid connection offer

4.5.2.1 As detailed in Section 4.2 Volume 1, Chapter 4: Site selection and consideration of alternatives of the ES, 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 UK electricity network (National Grid ESO, 2022). The output of this process concluded that the preferred connection option representing the most optimal design (economic, efficient and coordinated) considering all criteria (i.e. technical, cost, environmental and deliverability) was for the Morgan Offshore Wind Project and the Morecambe Offshore Windfarm to work collaboratively to consent their wind farm connections to the National Grid at Penwortham in Lancashire. The location of Penwortham therefore forms the starting point for the substation site selection work.

4.5.2.2 As each of the wind farms are electrically independent, two new onshore substations, one for each wind farm, are required. To maintain an aligned approach to the onshore export cables and 400kV cables, the substations will be constructed in proximity to each other. The identification of a site of sufficient size to accommodate both substations was thus a key consideration in identifying suitable substation sites.

4.5.3 Onshore substation design principles

4.5.3.1 Prior to commencing site selection, key infrastructure parameters for the substation areas were established as detailed in **Table 4.6**.

Table 4.6: Onshore Substations infrastructure parameters for site selection (PEIR)

Parameter	Maximum design parameter		
	Morgan Offshore Wind Project	Morecambe Offshore Windfarm	Maximum design parameter
Permanent footprint of substations (combined) (m ²), including landscape planting and drainage	125,000	60,000	185,000
Temporary compound (combined) (m ²), includes working and laydown areas (excludes permanent substation footprint)	86,000	52,500	138,500

4.5.4 Stage 2c: Identification of onshore substation search areas

- 4.5.4.1 The selection of appropriate sites for electrical infrastructure requires a robust process that considers technical, environmental, commercial feasibility factors, and stakeholder feedback. The site selection process for the Onshore Substations sought to provide the optimal site, on balance, in consideration of each of these aspects.
- 4.5.4.2 To commence site selection an initial 5 km buffer, was drawn around the POI at the National Grid Substation at Penwortham. This radius was used to minimise the length of the 400 kV grid connection cables that would link the new substations to the POI, to minimise cable reactive power issues, to mitigate transmission losses, and to minimise adverse effects on economic efficiency.
- 4.5.4.3 An exercise was undertaken to identify zones within the 5km buffer with the greatest potential to accommodate the Onshore Substations. Due to the presence of numerous constraints within 5 km (e.g. flood zones, priority habitat and high pressure gas mains), the search area buffer was increased to 8 km as illustrated on **Figure 4.2**.

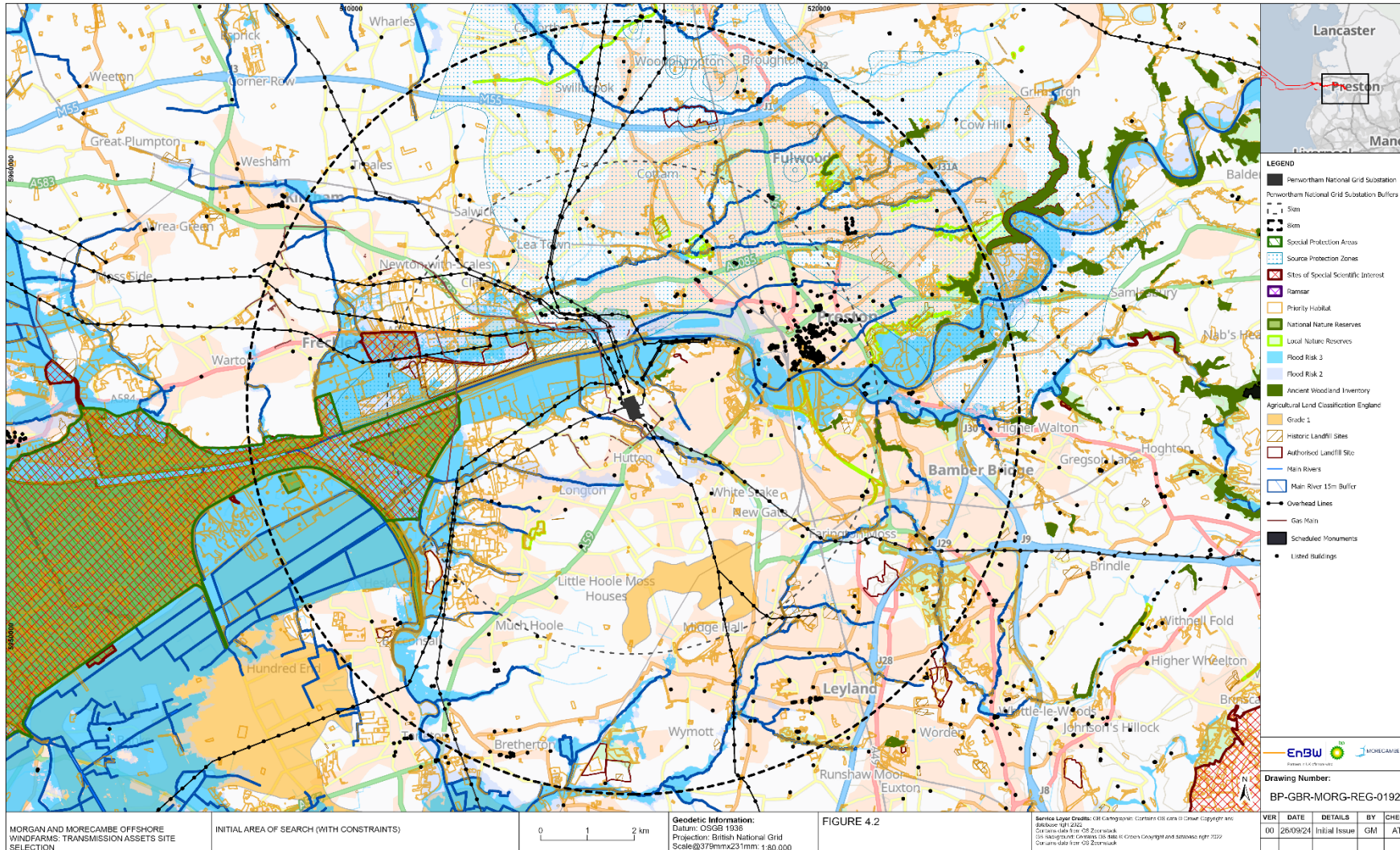


Figure 4.2: Initial Area of Search (With Constraints)

- 4.5.4.4 After establishing the initial area of search, a process of constraints mapping (**Figure 4.2**) and refinement was undertaken with due consideration to the overarching guidelines outlined within the Horlock Rules (see **section 4.3.2**) and to the design requirements set out in **Table 4.3**, which resulted in:
- The eastern half of the initial area of search being discounted to avoid the dense commercial and residential areas of Penwortham and Preston, as well as the railway line across Preston;
 - The area to the south of the National Grid Substation at Penwortham was removed to avoid the built up and residential areas of Walmer Bridge, Longton, Hutton and New Longton, as well as the Grade 1 agricultural land to the north of Midge Hall, Leyland; and
 - The area to the west removed as it is environmentally designated and had unsuitable ground conditions.
- 4.5.4.5 The removal of these areas resulted in the Onshore Substations Search Area that was presented at Scoping as shown in **Figure 4.3**.

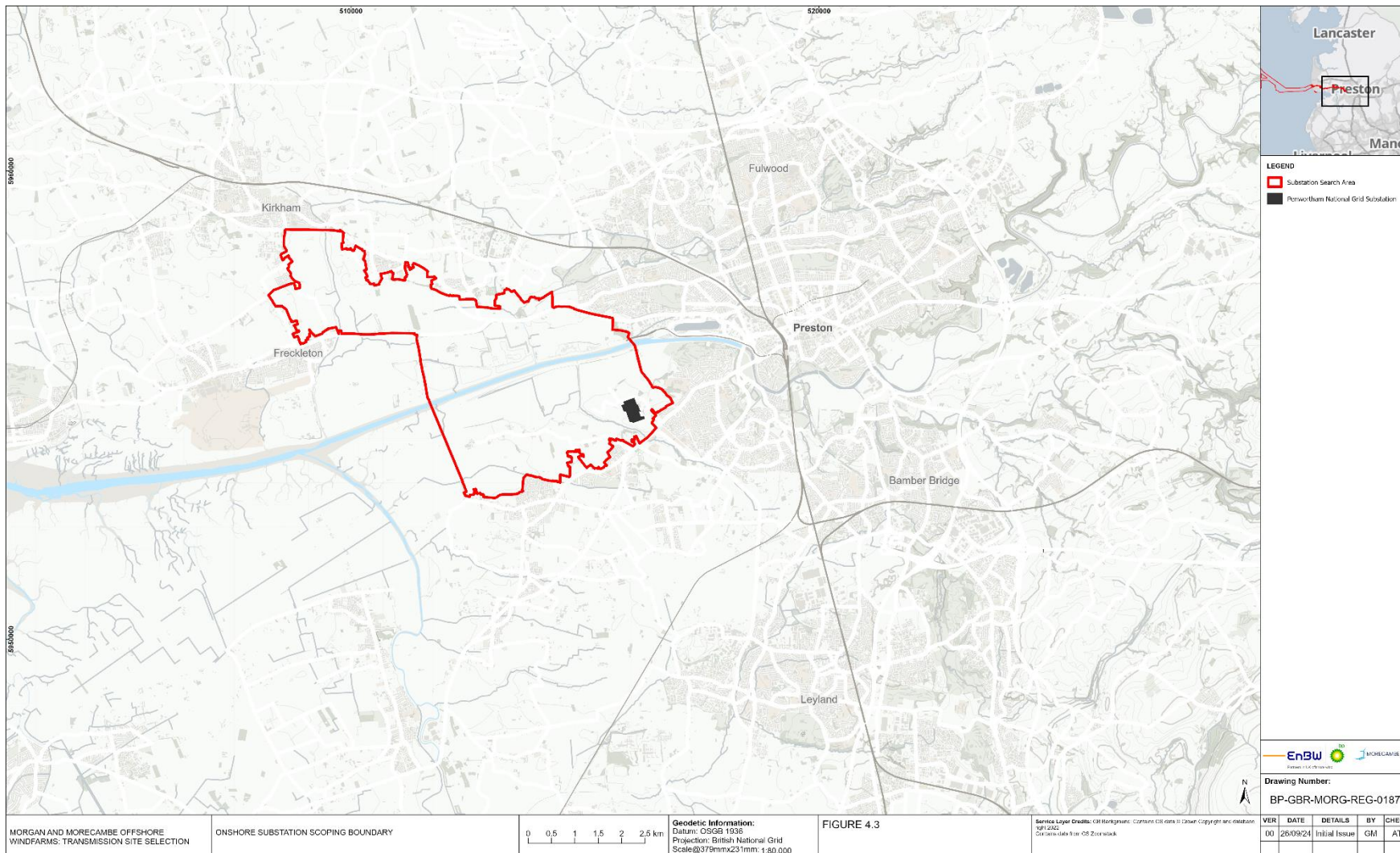


Figure 4.3: Onshore Substation Scoping Boundary

4.5.5 Stage 3c: Refinement of onshore substation search areas for PEIR

Heat Mapping Exercise

4.5.5.1 After establishing the scoping boundary, a constraints-based heat mapping exercise was undertaken. A heat map is a graphical representation of data that uses a system of colour coding to represent Black/Red/Amber/Green criteria. The exercise utilised environmental datasets to highlight and overlay key constraints within the search area.

4.5.5.2 The following constraints were used for the heat mapping exercise:

- Terrain / topography;
- Utilities (cables and pipelines);
- Flood Zone data;
- Overhead lines;
- Environmental designated sites/ protected areas;
- Residential receptors; and
- Road networks (access).

4.5.5.3 The heat mapping outputs are shown in **Figure 4.4** and **Figure 4.5**.

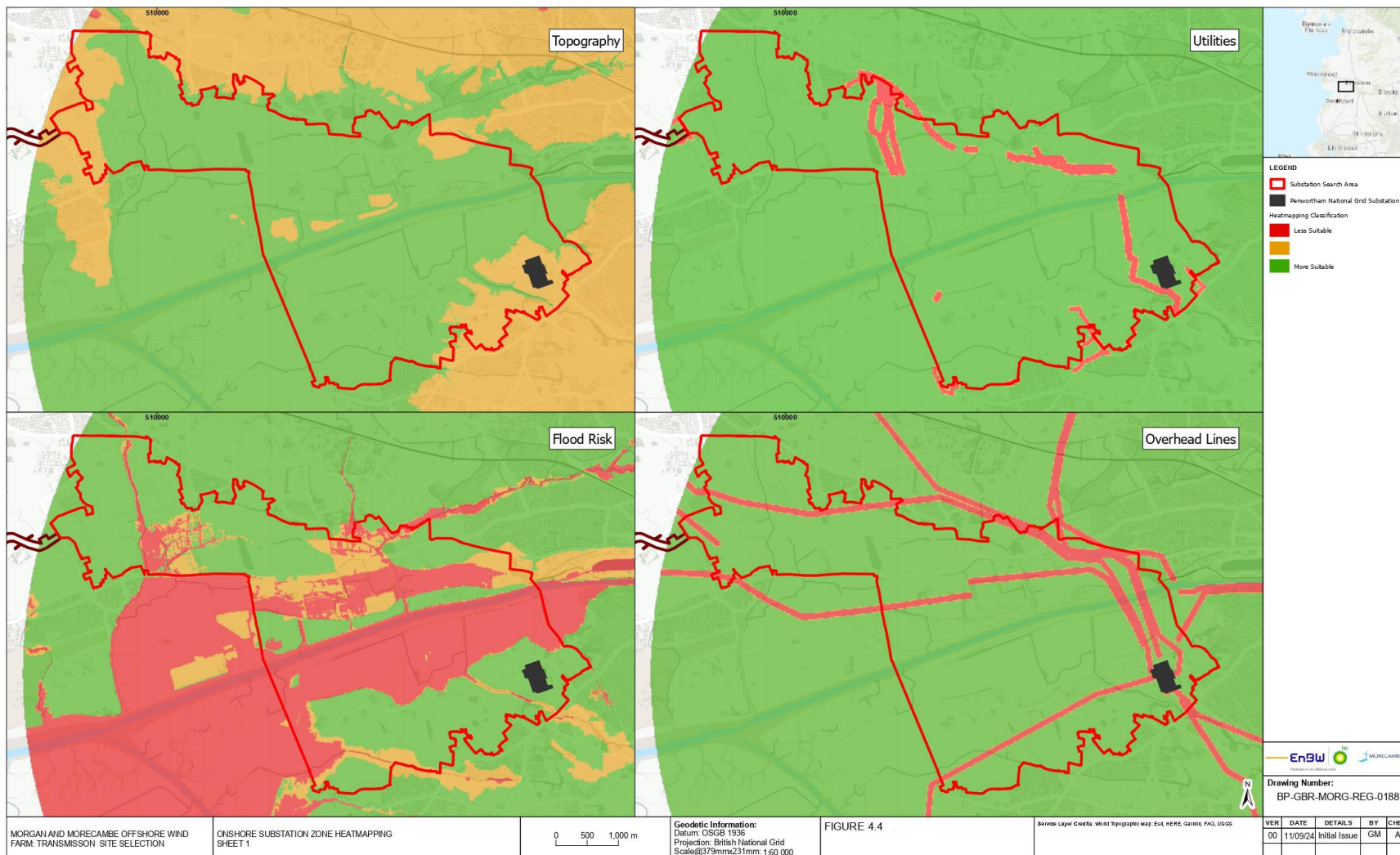


Figure 4.4: Substation Zone Heatmapping Sheet 1

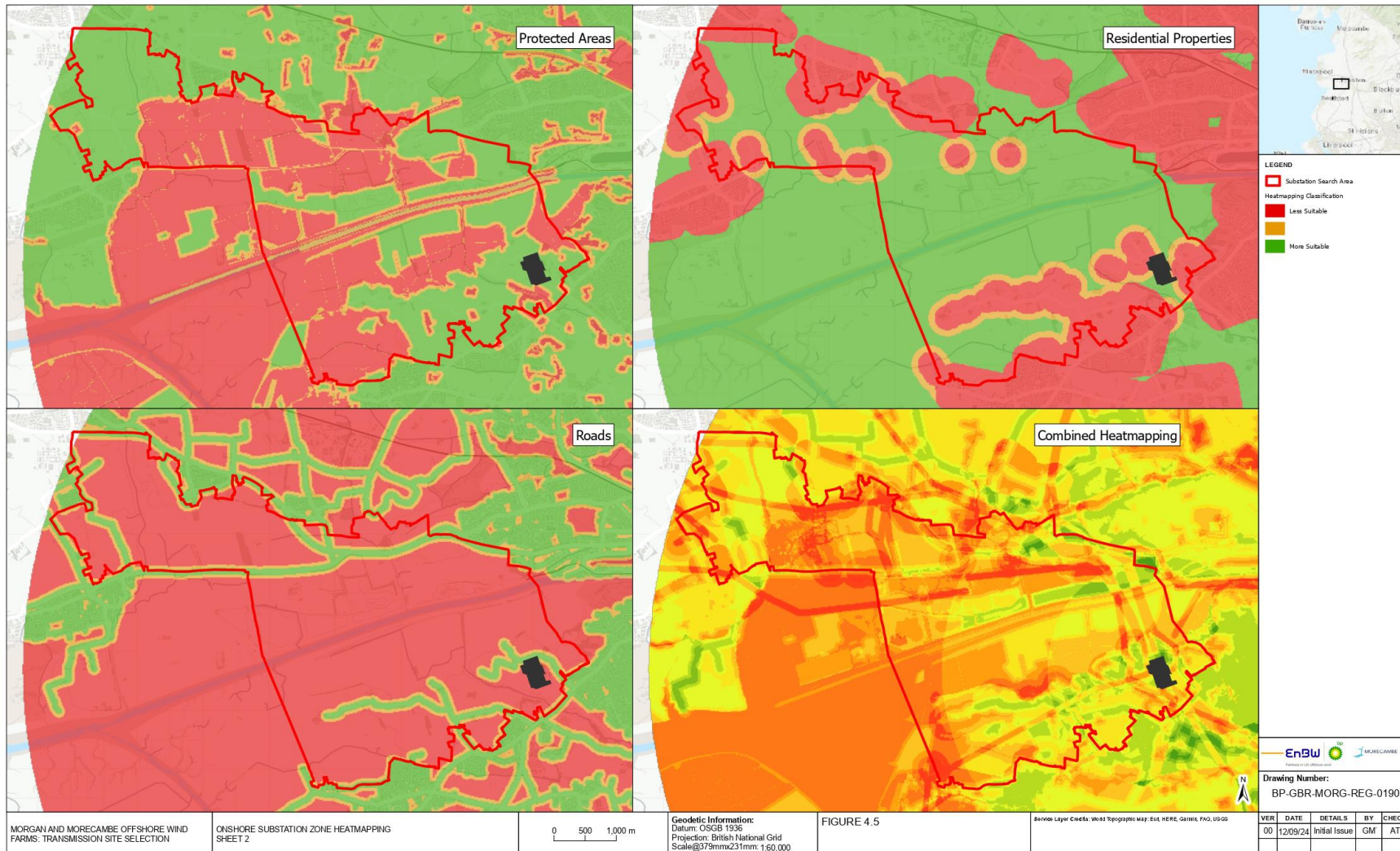


Figure 4.5: Substation Zone Heatmapping Sheet 2

Creation of Onshore Substations Search Zones

- 4.5.5.4 The next stage in the process was to refine the Onshore Substations Search Area into zones. Key constraints were initially used to refine the substation zones including flood risk, Site of Special Scientific Interest (SSSI) and historic landfills.
- 4.5.5.5 To maintain an aligned approach for the route planning and site selection of the onshore infrastructure, the Applicants aimed to site the substations in proximity to each other. The alignment of the siting of onshore infrastructure, through the site selection process has been undertaken to reduce impacts, for example to landowners and local communities.
- 4.5.5.6 The identification of a site of sufficient size to accommodate both substations was therefore a key consideration and areas not of a suitable size were excluded through the process.
- 4.5.5.7 Subsequently, four onshore substation search zones were identified as shown in **Figure 4.6** and **Figure 4.7** as follows:
- Zone 1 - is an area southeast of Kirkham, northeast of Freckleton and west of Newton-with-Scales. It did not include Kirkham Prison;
 - Zone 2 - is an area south of Newton-with-Scales bordered by the Preston New Road (A584) and the Blackpool Road (A583) to the northeast. It did not include Newton Bluecoat Primary School;
 - Zone 3 - is an area south of the River Ribble, north of Longton and west of Hutton. It did not include Hutton and Longton Marshes; and
 - Zone 4 - is an area south of the River Ribble, north of Hutton and east of Howick Cross and Penwortham. It included the existing National Grid substation near Penwortham.
- 4.5.5.8 The extent of the zones were determined by reference to existing geographic features such as roads, watercourses, or other existing highway infrastructure.

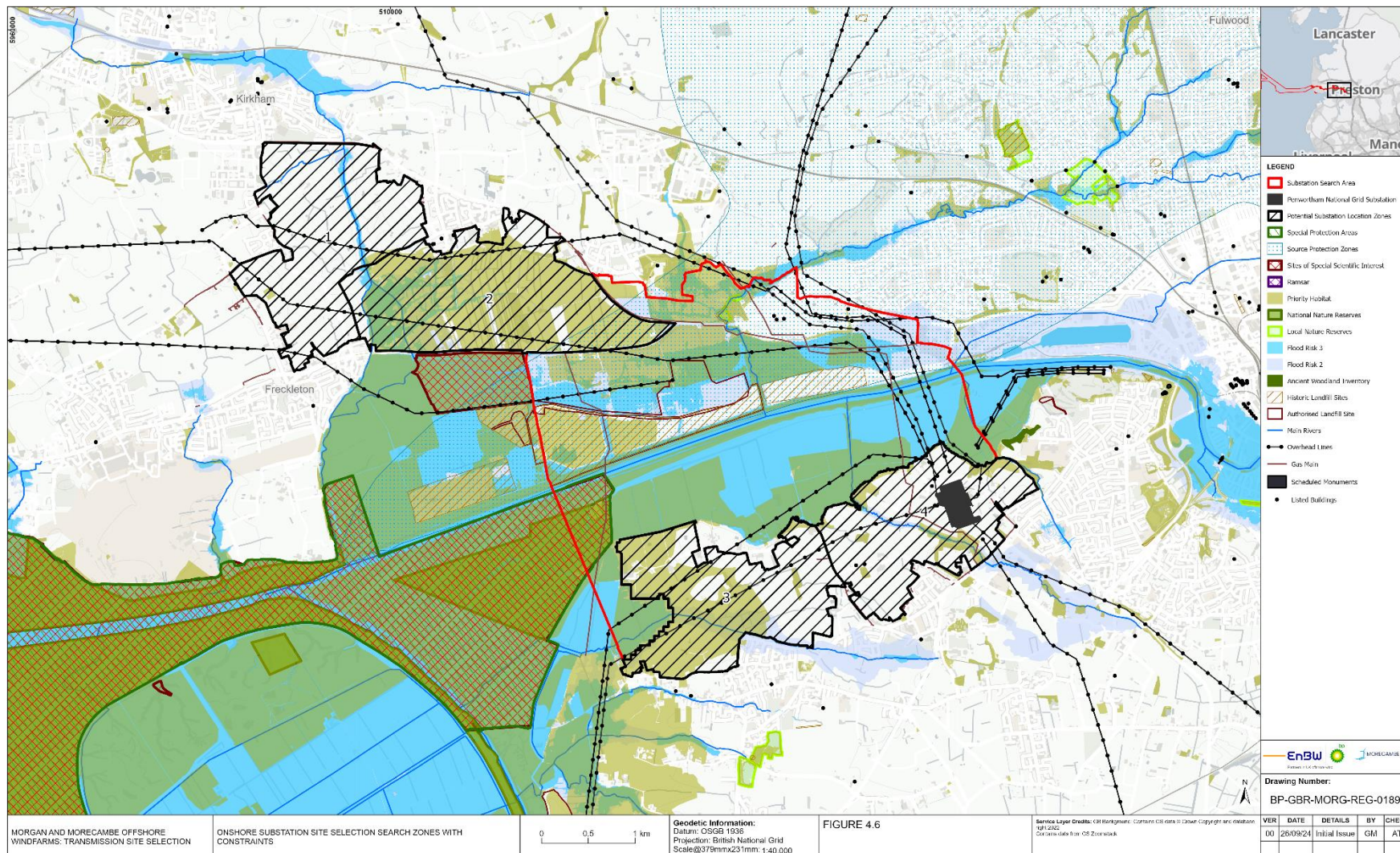


Figure 4.6: Onshore substation site selection search zones with constraints

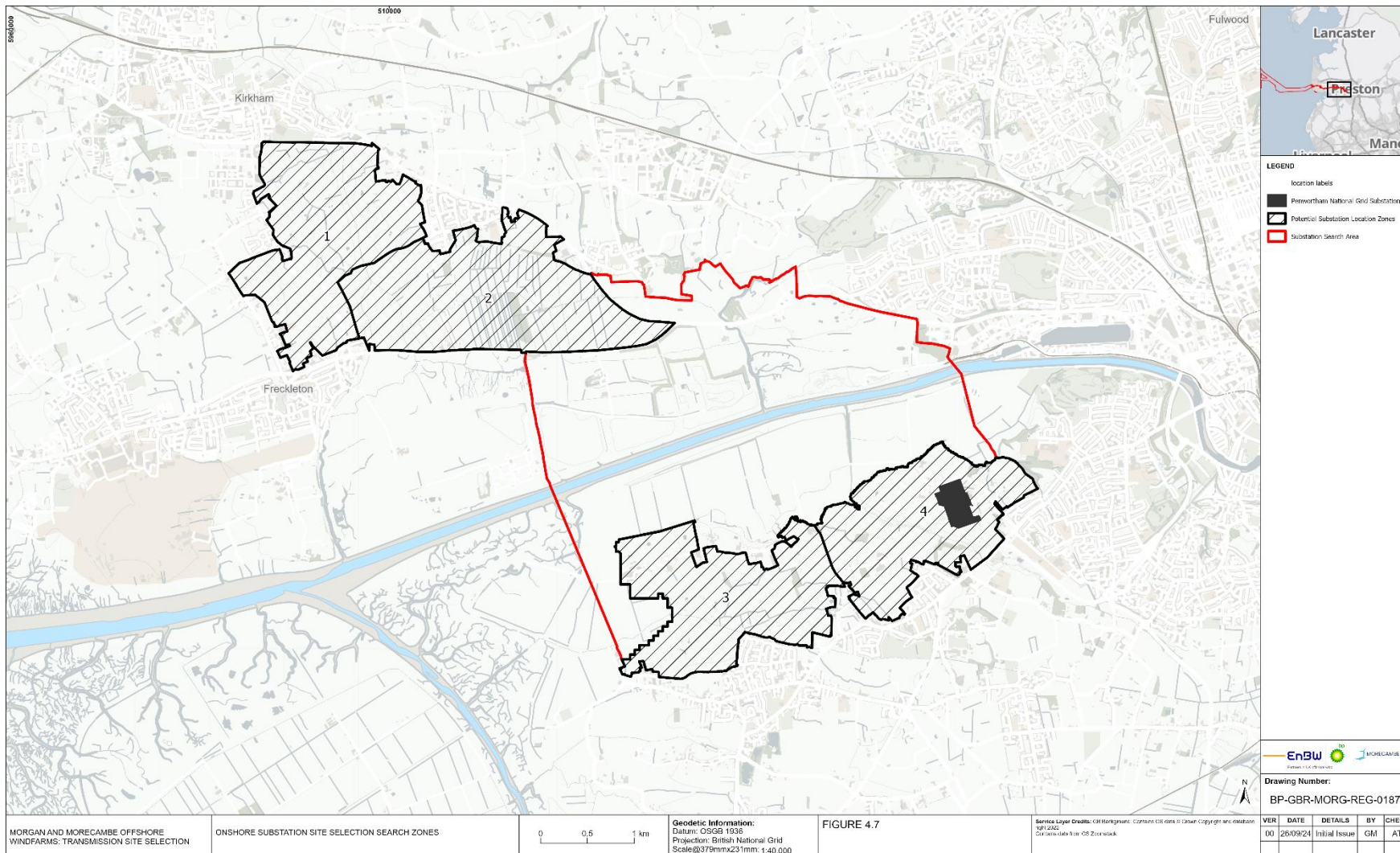


Figure 4.7: Onshore substation site selection search zones

BRAG Appraisal of Zones

4.5.5.9 The four zones were then analysed for their suitability for siting the onshore substations through an initial Black, Red, Amber, Green (BRAG) appraisal. However, no black constraints are identified, as these were discounted when establishing the zones.

4.5.5.10 The constraints considered within the BRAG appraisal included:

- Ground conditions e.g. topography;
- Other developments e.g. planning applications;
- Traffic and transport – access;
- Ecology and biodiversity;
- Utilities – cables and pipelines;
- Water resources - flood risk, Main Rivers and surface water features, Source Protection Zones; and
- Best and most versatile agricultural land (Grade 1, 2 and 3a ALC land).

4.5.5.11 There was no differentiation between the zones with respect to national landscape character areas, and this criterion was not considered further.

4.5.5.12 In addition to the above considerations, a non-statutory consultation event held between April and June 2023 sought feedback on the onshore substation zones.

The key themes that emerged from this consultation included but were not limited to: proximity to neighbouring communities; visual impact of the substations; impact on agricultural land; flood risk; ornithology constraints; and potential impacts on landowners and tenants. The feedback received from this consultation was considered alongside the environmental and constraints already identified. Information on the consultation responses received are provided in the Consultation Report (document reference E1). The BRAG appraisal for the onshore substation zones is presented in **Table 4.7**.

Table 4.7: Summary BRAG Appraisal of Onshore Substations Search Zones

Constraint	Zone 1 – Appraisal Summary	Zone 2 – Appraisal Summary	Zone 3 - Appraisal Summary	Zone 4 - Appraisal Summary
<p>Ground conditions (geology)</p> <p>Red: Unsuitable ground conditions with limited potential for mitigation</p> <p>Amber: Unsuitable ground conditions with large potential for mitigation</p> <p>Green: Suitable ground conditions</p>	<ul style="list-style-type: none"> No artificial ground Superficial deposits - Glacial Till Bedrock - Breckells Mudstone, Sherwood Sandstone group 	<ul style="list-style-type: none"> No artificial ground Superficial deposits - Glacial Till Bedrock - Sherwood Sandstone Group. 	<ul style="list-style-type: none"> Tidal Flats - silt, clay and sand Highly compressible - reclaimed land associated with the River Ribble Extensive pre-consolidation, ground improvement and / or piling likely to be required Bedrock - Sherwood Sandstone Group. 	<ul style="list-style-type: none"> Tidal Flats - silt, clay and sand Highly compressible - reclaimed land associated with the River Ribble Extensive pre-consolidation, ground improvement and / or piling likely to be required Bedrock - Sherwood Sandstone Group.
<p>Transport and access</p> <p>Red: High sensitivity of the highway network in the vicinity of the zone and long access route length from highway network to the zone;</p> <p>Amber: Medium sensitivity of the highway network in the vicinity of the zone and average access route length from highway network to the zone;</p> <p>Green: Low sensitivity of the highway network in the vicinity of the zone and short access route length from highway network to the zone;</p>	<ul style="list-style-type: none"> Average access route length can be provided via the nearest highway access - A583 road, Freckleton linking to the A583 or via the A584 No widening of existing highway road required. Fewer sensitive receptors are noted along these roads. 	<ul style="list-style-type: none"> Average access route length can be provided via the nearest highway access - A583 road or via Freckleton linking to the A583. No widening of existing highway road required. Potentially avoids most sensitive receptors. 	<ul style="list-style-type: none"> Potentially long access route length from high network as the nearest highway access is from Grange Lane, Back Lane and Skip Lane Presence of more sensitive receptors (e.g. along Skip Lane). Potentially require extensive road widening, requiring hedgerow clearance and acquisition of residential land to provide widening. 	<ul style="list-style-type: none"> Potentially long access route length from high network as the nearest highway access from Ratten Lane and Skip Lane Presence of more sensitive receptors (e.g. along Skip Lane and Ratten Road) Potentially require extensive road widening, hedgerow clearance and potential acquisition of residential land to provide widening.
<p>Presence of utilities - existing services</p> <p>Red: High pressure gas pipeline and overhead powerlines running through zone leaving no site of suitable size</p> <p>Amber: No high-pressure gas pipeline. Overhead powerlines running through zone but sites of suitable size available with appropriate buffer</p> <p>Green: No high-pressure gas pipelines or overhead powerlines within zone.</p>	<ul style="list-style-type: none"> Presence of overhead power lines. Mitigation available via design (substations layout) and possible option to divert overhead power line if required 	<ul style="list-style-type: none"> Presence of high-pressure gas mains and overhead power line 	<ul style="list-style-type: none"> Presence of overhead power lines. Mitigation available via design (substations layout) and possible option to divert overhead power line if required 	<ul style="list-style-type: none"> Presence of high-pressure gas mains and overhead power lines
<p>Planning policy and future development potential</p> <p>Red: None</p> <p>Amber: Located within the Green Belt and/or Area of Separation and proposal for further development or existing planning applications</p> <p>Green: Not located within the Green Belt and Area of Separation and no proposals for further development or existing planning applications</p>	<ul style="list-style-type: none"> The zone is largely within the Green Belt and Area of Separation under the Fylde Local Plan to 2032 Strategic Policy GD2; development must protect, enhance or restore landscape character, as appropriate. Bluefield Renewable Developments Ltd has submitted a planning application for a solar farm on land west of Parrox Lane, Newton-with-Scales which is partially situated within Zone 1 	<ul style="list-style-type: none"> A section of the western part of the zone is within the Green Belt under the Fylde Local Plan to 2032 Strategic Policy GD2; development must protect, enhance or restore landscape character, as appropriate. Bluefield Renewable Developments Ltd has submitted a planning application for a solar farm on land west of Parrox Lane, Newton-with-Scales which is partially situated within Zone 2 	<ul style="list-style-type: none"> The Zone is within the Central Lancashire Adopted Core Strategy Local Development Framework (July 2012). This sets out the overall strategic direction for the combined area of Preston, South Ribble and Chorley over the period of 2010 to 2026. It sets out a presumption in favour of sustainable development and strategic objective 22 encourages the generation and use of energy from renewable and low carbon sources. The zone is within the Green Belt under the current South Ribble Local Plan 2015 - policy G1; development must protect, enhance or restore landscape character, as appropriate. 	<ul style="list-style-type: none"> The Zone is within the Central Lancashire Adopted Core Strategy Local Development Framework (July 2012). This sets out the overall strategic direction for the combined area of Preston, South Ribble and Chorley over the period of 2010 to 2026. It sets out a presumption in favour of sustainable development and strategic objective 22 encourages the generation and use of energy from renewable and low carbon sources. The zone is within the Green Belt under the current South Ribble Local Plan 2015 - policy G1; development must protect, enhance or restore landscape character, as appropriate.

Constraint	Zone 1 – Appraisal Summary	Zone 2 – Appraisal Summary	Zone 3 - Appraisal Summary	Zone 4 - Appraisal Summary
<p>Ecology</p> <p>Red: Located within proximity to Nationally designated sites and larger presence of protected and/or notable species linked to the designated sites</p> <p>Amber: Located within Woodland pasture and BAP Priority Habitat, locally designated sites (e.g. Biological Heritage Sites), and/or limited presence of protected and/or notable species linked to the designated sites</p> <p>Green: Not located within designated sites and minimal presence of protected and/or notable species linked to the designated sites</p>	<ul style="list-style-type: none"> Not located close to a designated site. No priority habitat, except for a very small area adjacent to Zone 2. It is the least constrained with respect to the presence of protected and notable species within or in proximity during ornithological surveys undertaken in the April and July 2022 breeding season. The zone also contains a moderate number of hedgerows and mature trees. There are moderately sized areas within the Zone which comprise of woodland ecological networks and small area comprise grassland ecological networks. 	<ul style="list-style-type: none"> Located immediately north of Newton Marshes SSSI, across the A584 road High counts for wigeon and teal were regularly identified during ornithological surveys undertaken in the April and July 2022 breeding season. There is also an area of wet grassland and scrapes. There are also areas of coastal and floodplain grazing marsh priority habitat and a moderate number of hedgerows and mature trees. Moderately sized areas of this zone comprise of woodland ecological networks, but much larger areas comprise grassland ecological networks, and functionally linked to the Newton Marshes SSSI which is immediately south of the bordering A584 road. 	<ul style="list-style-type: none"> Located approximately 1 km east of the Ribble and Alt Estuaries SPA. High counts of pink footed geese were identified during ornithological surveys undertaken in the April and July 2022 breeding season. There are also areas of coastal and floodplain grazing marsh priority habitat within the zone and a small number of hedgerows and mature trees. Only small areas of this Zone comprise woodland ecological networks. 	<ul style="list-style-type: none"> Located approximately 2.5 km east of the Ribble and Alt Estuaries SPA An assemblage of breeding farmland birds and waders were identified during ornithological surveys undertaken in the April and July 2022 breeding season. A small area comprises good quality semi-improved grassland priority habitat, and a large number of hedgerows and mature trees. A large proportion of the Zone comprises of woodland ecological networks.
<p>Flood risk</p> <p>Red: Large areas of Flood Zone 3</p> <p>Amber: Large areas of Flood Zones 2 with presence of discrete areas of Flood Zone 3</p> <p>Green: Large areas of Flood Zone 1 with presence of discrete areas of Flood Zone 2</p>	<ul style="list-style-type: none"> The zone is largely located within Flood Zone 1. 	<ul style="list-style-type: none"> The western half of the zone is largely in Flood Zone 2 and 3 	<ul style="list-style-type: none"> The zone is largely located within Flood Zone 1 with discrete areas of Flood Zone 2 	<ul style="list-style-type: none"> The zone is largely located within Flood Zone 1 with discrete areas of Flood Zone 2
<p>Best and Most Versatile (BMV) agricultural land</p> <p>Red: Grade 1 (excellent) and high likelihood to be classified as BMV agricultural land</p> <p>Amber: Grade 2 (very good) and 3 (good to moderate) and moderate to high likelihood to be classified as BMV agricultural land</p> <p>Green: Grade 4 (poor) and 5 (very poor), and not a BMV agricultural land</p>	<ul style="list-style-type: none"> The zone is on Grade 2 and 3 agricultural lands based on Natural England's Provisional Agricultural Land Classifications. The zone is considered to have a moderate to high likelihood of being classified as BMV agricultural land according to the Natural England's BMV Strategic scale map Northwest Region (ALC014). Published agricultural soils data indicates that the zone could comprise mainly Subgrade 3a land. 	<ul style="list-style-type: none"> The zone is on Grade 3 agricultural land, based on Natural England's Provisional Agricultural Land Classifications. The zone is considered to have a moderate to high likelihood of being classified as BMV agricultural land according to the Natural England's BMV Strategic scale map Northwest Region (ALC014). 	<ul style="list-style-type: none"> The zone is on Grade 2 agricultural land based on Natural England's Provisional Agricultural Land Classifications. The zone is considered to have a moderate to high likelihood of being classified as BMV agricultural land according to the Natural England's BMV Strategic scale map Northwest Region (ALC014). 	<ul style="list-style-type: none"> The zone is on Grade 2 agricultural land based on Natural England's Provisional Agricultural Land Classifications. The zone is considered to have a moderate to high likelihood of being classified as BMV agricultural land according to the Natural England's BMV Strategic scale map North West Region (ALC014).
<p>Conclusion</p>	<p>Zone retained for further consideration in the absence of priority habitat, protected and notable bird species</p>	<p>Zone removed from further consideration due presence of ecological and ornithological receptors and presence of large areas of priority habitat and high-pressure gas mains</p>	<p>Zone removed from further consideration due presence of ecological and ornithological receptors, resulting insufficient space to site the onshore substations, Access to site is more highly constrained.</p>	<p>Zone removed from further consideration due presence of ecological and ornithological receptors, resulting insufficient space to site the onshore substations along the presence of a high pressure gas main. Access to site is more highly constrained.</p>

Outcome of Appraisal

- 4.5.5.13 An appraisal of each onshore substation search zone was made based on the number of red, amber, or green ratings given in the BRAG appraisal.
- Zones 3 and 4 were similarly constrained with respect to proximity to residential areas, available parcels of land for siting the substations, and vehicular access. Both zones are rich in protected ornithological receptors with high counts of pink footed geese (Zone 3), and an assemblage of breeding farmland birds and waders (Zone 4). There is also a high-pressure gas main within Zone 4.
 - Zones 1 and 2 had better access from the nearest highway (A583 road or via Freckleton) and would not require extensive road widening for delivery of supplies during construction and operation so less local disruption.
 - Zone 2 included coastal and floodplain priority habitats, and high counts of wigeon and teal (ornithological constraint) have been identified. Zone 2 was located adjacent to Newton Marshes SSSI which is functionally linked with the Newton Marshes and the Ribble. There was also the presence of high-pressure gas mains within Zone 2.
 - Zone 1 was least constrained (no red and most areas of green in BRAG appraisal) with an absence of priority habitat or protected and notable species within or in proximity compared to Zone 2.
- 4.5.5.14 Therefore, it was concluded that Zone 1 was preferable, and it was taken forward for further assessment as the onshore substations statutory consultation area at PEIR. The other three zones were discounted from further consideration for the reasons outlined in **Table 4.7** and summarised above.

Identification of Potential Sites within Zone 1

- 4.5.5.15 For the reasons set out above, the onshore substations statutory consultation area identified at PEIR was largely based on Zone 1. The boundary of Zone 1, illustrated at PEIR, was realigned to follow existing geographical boundaries (watercourses and hedgerows) and to align with Parrox Lane (see **Figure 4.8**).
- 4.5.5.16 The available land parcels within the onshore substations consultation area were further refined by discounting areas which did not have sufficient space to accommodate the substations. In addition, proximity to residential properties (with 150 m buffer), watercourses (with 15 m buffer), and solar farm development (Bluefield Renewable Developments - Grange Farm Solar Farm) were also considered in the analysis of land parcels.
- 4.5.5.17 A further site selection exercise was then undertaken to identify appropriate areas of land that could potentially accommodate the two onshore substations in line with the design requirements set out in **Table 4.6**. This incorporated the following for each substation:

- Proximity to residential receptors;
- Other developments; and,
- Watercourses.

4.5.5.18 The following potential substation site options, as shown in **Figure 4.8**, were identified within Zone 1 and consulted on as part of the PEIR statutory consultation:

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

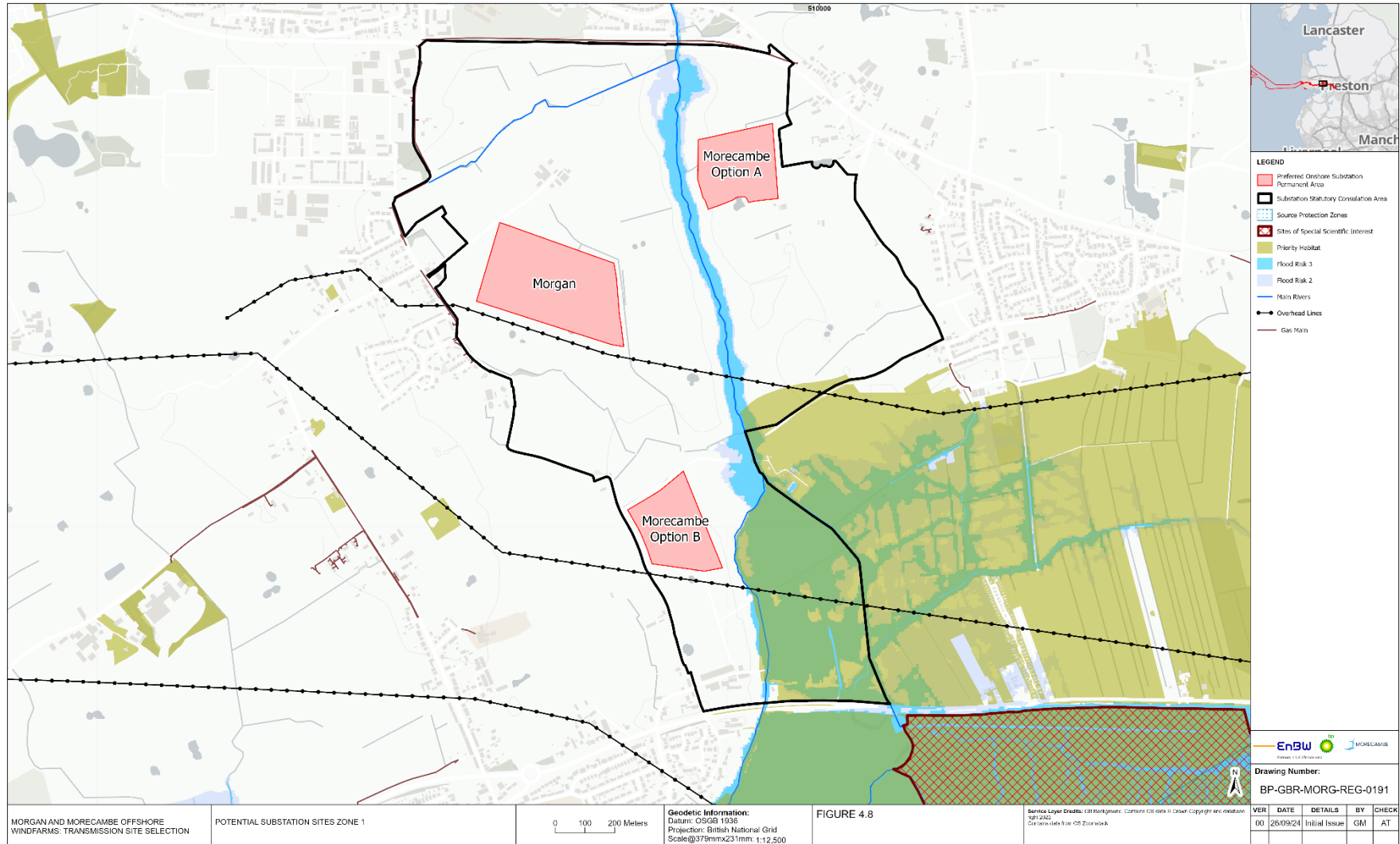


Figure 4.8: Potential substation sites zone 1

4.5.6 Stage 4c: Refinement of onshore substation search areas for DCO Application

Morgan OWL and Morecambe OWL aligned approach to onshore substation site selection

4.5.6.1 As outlined in **section 4.3.2**, one of the key guidelines set out within the Horlock Rules is Guideline III, Section 7, Design:

“Ensure that the design of high voltage and low voltage substations is co-ordinated by early consultation between NGC and its customers.”

4.5.6.2 The Applicants have sought to apply this approach and have established a site selection process which considers where only one wind farm may come forward or where both wind farms are built.

4.5.6.3 The Morgan selection process is outlined in **paragraph 4.5.6.4** and Morecambe site selection process is outlined in **paragraph 4.5.6.6**. The consideration of the onshore substations together is further detailed in **paragraph 4.5.6.14**.

Morgan Substation

4.5.6.4 The formal consultation period for PEIR provided the opportunity for statutory stakeholders, landowners, nearby residents and members of the public to comment on the site selected for the Morgan substation. Relevant comments received are summarised in **Table 4.8**, with a description of the resulting amendment, if required. Formal responses are provided for all consultation responses received and can be accessed in the Consultation Report (document reference E1).

Table 4.8: Morgan Substation Formal Consultation

Summary of consultation feedback	Applicants response to the feedback received
Nearby residents commented that the substation site was too close to residential areas, particularly Kirkham South and Hall Cross.	The substation platform identified at PEIR has been moved to the east, increasing the distance between the substation and Kirkham South.
Nearby residents raised concerns that Kirkham Road/Lower Lane is not suitable for the level of construction traffic.	Construction and operational and maintenance access will be taken from the A583 to the north of the site only. Proposed access from Kirkham Road/Lower Lane has not been taken forward for the construction of the Morgan Onshore Substation.
Impact on PRoW	The construction compound and substation platform have both been reconfigured so that they are both to the east of the PRoW. This will minimise disruption to the PRoW.

4.5.6.5 PEIR feedback received in response to formal and informal consultation with landowners and stakeholders, highlighted potential opportunities for further refinement including the relocation of the substation site to the east. Further details of the refinements made by Morgan OWL in response to the feedback received can be found in **paragraph 4.5.6.14**.

Morecambe Substation

- 4.5.6.6 The formal consultation period for PEIR provided the opportunity for statutory stakeholders, landowners, nearby residents and members of the public to comment on the two sites selected for the Morecambe substation. The feedback received was then considered alongside a range of other factors including environmental, engineering, and locational alignment associated with the onshore export cable corridors and 400kV grid connection cable corridors.
- 4.5.6.7 Notable comments received during the statutory consultation for PEIR with regards to the selection of a preferred substation for Morecambe are summarised in **Table 4.9**

Table 4.9: Morecambe Substation Formal Consultation

Substation Options	Formal Consultation Response
Morecambe Substation Option 1 (north)	<ul style="list-style-type: none"> • Option 1 was noted to be the best option because it will be in a dip so out of sight and can be accessed more easily from the A583. • Option 1 north was noted to be the preferred option. Closer to the A583. • Option 1 was noted to be close to a number of residential properties in the long-established village of Newton-with-Scales so would have an impact on communities and residential properties. • Further potential drainage concerns in the area were noted, as it already becomes flooded in heavy rain. Concerns were raised that the substation would take land that acts as a soakaway during heavy rain. • Potential access issues and traffic disruption was noted for Option 1. • Concerns were raised about the potential use of Parrox Lane for access, due to its narrow width. • Extra cabling and unnecessary disruption were noted if the onshore cables go northwards to Option 1 and then only to have to return southwards to connect to Penwortham. • Option 1 was noted to have tree sparrow present • Option 1 was noted to be within an Area of Separation. • Comments received from landowners in relation to the impact on farm businesses and a leisure business. • Option 1 opposite Carr Hill High School • Access to Morecambe Substation Site Option 1 conflicts with a very busy junction • Concerns raised by individual nearby property owners regarding option 1

Substation Options	Formal Consultation Response
Morecambe Substation Option 2 (south)	<ul style="list-style-type: none"> • Concerns raised that Option 2 severs the farms from a large block of land with no direct access to the northerly block. • Responses noted a preference for Option 2 citing less impact on housing and community with far fewer properties in the immediate area, hence would result in a much lower impact on residents and communities • Option 2 was noted to be closer to Penwortham and the Morgan substation and therefore more practical, cost effective and less disruptive. • Fewer traffic problems as it has better road links from both the A584 and the A583 from the north, along Lower Lane and Freckleton road. • Option 2 was noted to be furthest away from newton village and farms/ numerous stables in newton. • Concerns raised by individual nearby property owners regarding option 2 • Comments were made in relation to Option 2 being within Green Belt • Comments received from landowners in relation to the impact on farm businesses.

4.5.6.8 On review of responses, a greater number of responses stated a preference for the Option 2 (south); however, there were not a significant amount of these and thus it was important that the consultation feedback was considered alongside other factors. No statutory consultee stated a direct preference for one option over the other.

4.5.6.9 There were also a number of general responses from landowners, nearby residents and members of the community that the Morecambe onshore substation was too large both in footprint and height. As a result of these comments, the project has committed to reducing the maximum building height from 20 m to 13m. The maximum permanent footprint (including substation platform, landscaping, drainage and attenuation) of the Morecambe onshore substation has also been refined to 59,500m² (from 60,000m²).

Morecambe Substation Engineering Considerations

4.5.6.10 The decision-making process also included consideration of the respective export cable corridor lengths associated with the Morecambe substation options. Option 1 (north) would require an additional onshore export cable corridor length of approximately 1500 m and an additional 1700 m of 400kV grid connection cable corridor. Option 2 (south) does not require these additional cable corridors due to its geographic location in proximity to the respective cable corridors (see **section 4.6.3** for further information on the cable corridors).

Morecambe Substation BRAG Appraisal for Option 1 and Option 2

- 4.5.6.11 In parallel to a review of consultation responses and consideration of engineering constraints, the two Morecambe substation options were analysed for their suitability for siting the onshore substation through a BRAG appraisal.
- 4.5.6.12 During PEIR, dedicated access tracks to the two Morecambe substation options were not presented. To ensure a comprehensive approach to the BRAG appraisal, relevant constraints associated with access were included within the Morecambe Substations BRAG appraisal.
- 4.5.6.13 The BRAG appraisal for the two onshore substation options is presented in **Table 4.10**. As noted at PEIR, there was no difference with regard to maximum design scenario in landscape and visual terms between the two options as such landscape character was not used as a criterion below. One additional criterion was introduced which was consideration of proximity to residential receptors.

Table 4.10: Summary BRAG Appraisal of Morecambe Substations Options

Constraint	Substation Option 1 (north)	Substation Option 2 (south)
<p>Ground conditions (geology)</p> <p>Red: Unsuitable ground conditions with limited potential for mitigation</p> <p>Amber: Unsuitable ground conditions with large potential for mitigation</p> <p>Green: Suitable ground conditions</p>	<p>No artificial ground, superficial deposits is the Glacial Till and bedrock is the Breckells Mudstone, Sherwood Sandstone group</p>	<p>No artificial ground, superficial deposits is the Glacial Till and bedrock is the Breckells Mudstone, Sherwood Sandstone group</p>
<p>Transport and access</p> <p>Red: None (as highways access has been identified from the A583 and A584 which does not require the use of minor roads and/ or widening to minor roads for construction)</p> <p>Amber: Access required from A583, similar to the Morgan substation.</p> <p>Green: Access required from A584, utilising a different road than the Morgan substation.</p>	<p>Greater impact on the A583 due to both Morecambe and Morgan substations requiring access from this road.</p>	<p>The use of a construction access from the A584 Preston New Road splits the construction traffic from the Morgan substation.</p> <p>Access via Lower Lane for light goods vehicle during operation only.</p>
<p>Presence of utilities - existing services</p> <p>Red: None (in the absence of high-pressure gas pipeline)</p> <p>Amber: Overhead powerlines and main sewer crossing required</p> <p>Green: No overhead powerlines or sewer crossing required.</p>	<p>Two main sewer crossings would be required on the onshore export cable corridors route. There would also be two crossings required for High Voltage Overhead Lines (HV OHL), one on the onshore export cable corridors and one on the grid connection cable corridors</p>	<p>One main sewer crossing associated with the grid connection cable corridors. No cable crossings are required for HV OHL.</p>

Constraint	Substation Option 1 (north)	Substation Option 2 (south)
<p>Planning policy</p> <p>Red: None</p> <p>Amber: Located within the Green Belt and/or Area of Separation and proposal for further development or existing planning applications</p> <p>Green: Not located within the Green Belt and Area of Separation and no proposals for further development or existing planning applications</p>	<p>Located entirely within the Area of Separation (Fylde Local Plan - Policy GD3).</p> <p>Bluefield Renewable Developments Ltd has submitted a planning application for a solar farm on land south of Morecambe substation option 1 (north).</p>	<p>Located entirely within the designated Green Belt (Fylde Local Plan - Policy GD2)</p>
<p>Ecology</p> <p>Red: Located within proximity to Nationally designated sites and larger presence of protected and/or notable species linked to the designated sites</p> <p>Amber: Located within Woodland pasture and BAP Priority Habitat, locally designated sites (e.g. Biological Heritage Sites), and/or limited presence of protected and/or notable species linked to the designated sites</p> <p>Green: Not located within designated sites and minimal presence of protected and/or notable species linked to the designated sites</p>	<p>Not located within a designated site or priority habitat.</p>	<p>Not located within a designated site or priority habitat. However, the construction and permanent access track required to enable the delivery of substation components would cross ecological priority habitats</p>
<p>Flood Risk</p> <p>Red: Large areas of Flood Zone 3</p> <p>Amber: Large areas of Flood Zones 2 with presence of discrete areas of Flood Zone 3</p> <p>Green: Large areas of Flood Zone 1 with presence of discrete areas of Flood Zone 2</p>	<p>The permanent footprint is within Flood Zone 1; however, the temporary compounds are partially located within Flood Zone 2 and 3.</p>	<p>Both the permanent footprint and temporary compounds are within Flood Zone 1.</p> <p>The access track required for construction of the substation and to enable the delivery of substation components from the A584 would need to cross flood zone 2 and 3</p>

Constraint	Substation Option 1 (north)	Substation Option 2 (south)
<p>Best and most versatile agricultural land</p> <p>Red: Grade 1 and high likelihood to be classified as BMV agricultural land</p> <p>Amber: Grade 2 and 3 and moderate to high likelihood to be classified as BMV agricultural land</p> <p>Green: Grade 4 and 5, and not a BMV agricultural land</p>	<p>The site is on Grade 2 and 3 agricultural land (possibly mainly Subgrade 3a) and considered a moderate to high likelihood to be classified BMV agricultural land.</p>	<p>The site is on Grade 2 and 3 agricultural land (possibly mainly Subgrade 3a) and considered a moderate to high likelihood to be classified as BMV agricultural land.</p>
<p>Residential Receptors</p> <p>Red: High potential to constrain development with regard to residential receptors in proximity to the substation. Residential settlement (hamlet, village or town) with 200m.</p> <p>Amber: Moderate potential to constrain development with regard to residential receptors in proximity to the substation. Residential settlement within 500m.</p> <p>Green: Low potential to constrain development with regard to residential receptors in proximity to substation. Residential settlement beyond 500m.</p>	<p>Option 1 north is located in close proximity to properties on the edge of Kirkham and Newton-with-Scales. Several residential receptors are located within 200m of Option 1, with additional properties located within 300m. The eastern edge of Kirkham falls within 500m of this option. Within 1 km of this option lie two densely populated areas, including large numbers of properties within both Newton-with-Scales (the majority of Newton-with-Scales falls within this distance) and the eastern part of Kirkham.</p>	<p>Option 2 has fewer residential properties in proximity (when compared to Option 1) with a small number of individual properties north of Freckleton (Lower Lane), some of which are located within 200m of Option 2. The north eastern edge of Freckleton falls within 600m of this option. One densely populated area (the north eastern part of Freckleton) lies within 1 km of this option.</p>
<p>Conclusion</p>	<p>Morecambe Substation Option 1 (north) is less preferable in terms of BRAG appraisal due to proximity to residential receptors, higher number of sewer and High Voltage OHL crossings required and the access being required from the A583, which is also required by the Morgan substation.</p>	<p>Morecambe Substation Option 2 (south) is the preferred option in terms of BRAG appraisal due to its proximity to fewer residential receptors, reduced number of sewer crossings and absence of HV OHL crossings. Access will also be taken from the A584, thus avoiding the use of the A583, which the Morgan substation will utilise.</p>

Aligned considerations for site selection of the onshore substations

- 4.5.6.14 The site selection process also had due regard to the Horlock Rules and NPS EN1 (Section 4.3.2) considering:
- Site Access: Separate construction access from the A584 and A583 can be achieved by the selection of the relocated Morgan Substation site and Morecambe Substation Option 2 (South) mitigating potential traffic impacts associated with both projects utilising the A583 during construction;
 - Other developments: The Morecambe Substation Option 2 avoids crossing the proposed Bluefield Solar Farm Development will export cables; and,
 - Engineering Constraints: The selection of Morecambe Substation Option 2 negates the requirement for additional cable crossings between Morgan OWL and Morecambe OWL in that even that both Projects become operational.

Selection of Morgan OWL and Morecambe OWL Onshore Substations for Application

Morgan OWL

- 4.5.6.15 Morgan OWL responded to feedback received and relocated the Morgan onshore substation site to the east. Resulting changes have sought to minimise impacts to agricultural holdings and increase the distance from the residential areas of Kirkham South and Hall Cross (now moving the site more than 15 m away) while maintaining more than 150 m from Newton. The relocation of the site provides greater opportunity to utilise existing screening to reduce views of the substation from these areas. The final location was not initially identified as preferred based on more challenging topography of the land.
- 4.5.6.16 Further refinement saw the construction compound being located to the north of the permanent substation area. This meant that both construction and operational access can be taken along the same route directly from the A583, eliminating the requirement for any construction traffic to traverse Lower Lane.
- 4.5.6.17 **Figure 4.9** shows the Morgan OWL substation location presented at PEIR, and the revised and refined location taking forward for the DCO application.

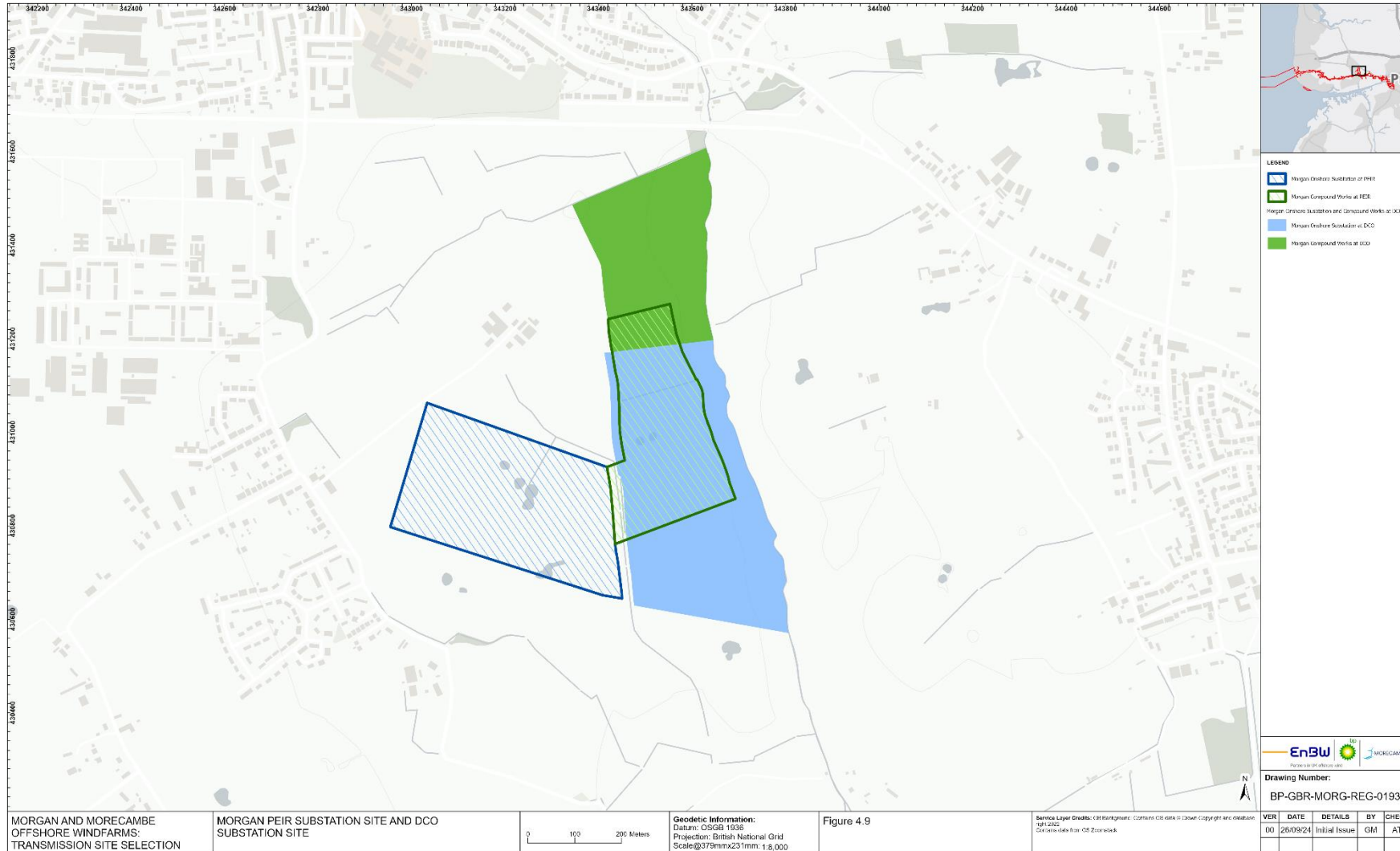


Figure 4.9: Morgan PEIR substation site and DCO substation site

- 4.5.6.18 The following amendments to the Mogan OWL substation between PEIR and DCO are shown on **Figure 4.9** and summarised below:
- An increased permanent landscaping and environmental mitigation area has been added, around the perimeter and more substantially to the east of the permanent substation area. This includes an allowance for water attenuation features (e.g. ponds) to allow for sustainable drainage systems (SuDS);
 - A583 Access Junction – after further design work and in response to stakeholder feedback, it was determined that access from the A583 would be most appropriate for both construction traffic and for operational and maintenance traffic. The selected access point has sufficient room to facilitate the change in topography and for visibility splays; and
 - An ecological mitigation and landscaping area has been included to the north-west of the substation site. This area has been allocated for pond replacement (the substation platform requires the removal of ponds) and natural screening.
- 4.5.6.19 It is noted that the total permanent area including landscape and environmental mitigation within the Order Limits for the Morgan substation area is 164,000 m², larger than the initial search criteria of 125,000 m². The temporary land take has reduced from 86,000m² to 70,000m².
- 4.5.6.20 This increase in area has resulted from three key drivers:
- Firstly, the topography of the new location requires a greater cut and fill exercise than the original location.
 - Secondly, the narrower fields in the new location require a non-standard, elongated platform which needs to be larger in size to accommodate the equipment in a non-optimal layout.
 - Thirdly, additional land was identified for landscaping and environmental mitigation.
- 4.5.6.21 The configuration of the Mogan OWL substation for the DCO application is shown on **Figure 4.10**.

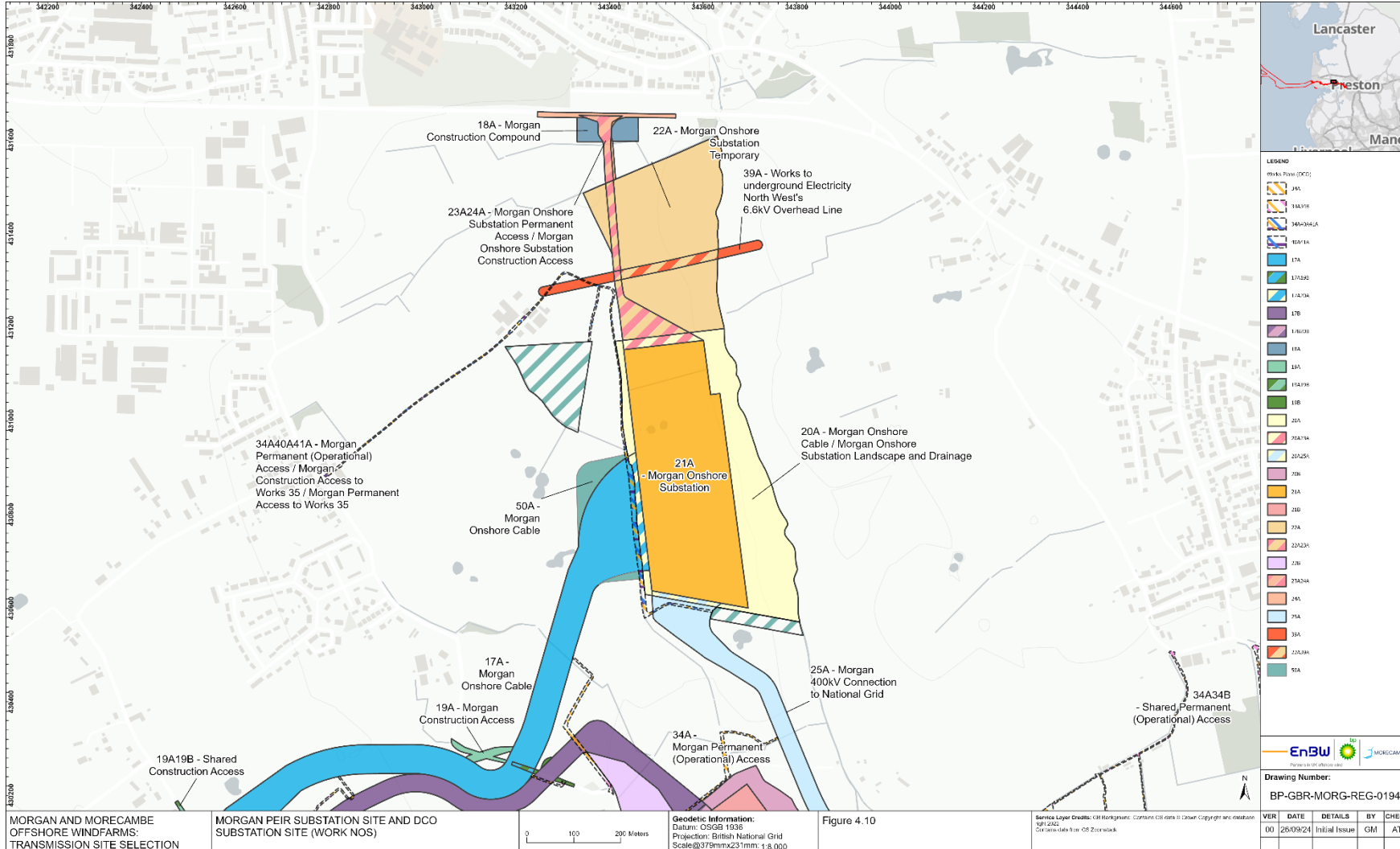


Figure 4.10: Morgan PEIR substation site and DCO substation site (Work Nos)

Morecambe OWL

- 4.5.6.22 The selection of a preferred substation option was based on the outcome of the BRAG appraisal with consideration of consultation responses received, engineering constraints and the onshore substation design principles (see **section 4.5.3**).
- 4.5.6.23 The outcome of the BRAG appraisal found that Option 1 (north) and Option 2 (south) have no significant constraints related to ground conditions and are similarly constrained with respect to agricultural land classification. Option 2 South is located within Green Belt. Option 1 (North) is located within an Area of Separation with the proposed Bluefields Renewable Developments solar farm to the south.
- 4.5.6.24 Both options would have the onshore cable corridors crossing utilities, with two main sewer and High Voltage Overhead Line crossings required for Option 1 (north) and one sewer crossing for Option 2 (south). Whilst the permanent footprint of both options is located within Flood Zone 1, Option 1 (north) has temporary compounds partially located within Flood Zone 2 and 3. Option 2 (south) has the construction and operational access track for the delivery of substation components crossing Flood Zone 2 and 3 and priority habitat. A greater number of residential receptors are present in proximity to Option 1 (north).
- 4.5.6.25 Option 2 (south) allows the use of construction access from the A584 Preston New Road. Selection of Option 1 (north) would mean all construction traffic would take access from the A583. Selection of Option 2 (south) thus avoids any potential knock-on impacts related to increased volume of traffic on the A583 during construction.
- 4.5.6.26 With regard to engineering factors, Option 2 (south) results in a significant reduction in cable length for both the Morecambe onshore export cable corridor and the 400kV grid connection cable corridor. Option 2 (south) would also avoid the need to cross the Morgan OWL onshore export cable corridor and grid connection cable corridor.
- 4.5.6.27 Therefore, it was concluded that Morecambe Option 2 (south) is the preferred option based on the consultation responses received, the technical considerations identified through the BRAG appraisal, and consideration of engineering constraints.

Further Refinement

- 4.5.6.28 Following the selection of Option 2 (south) dedicated access routes were designed to facilitate construction and operational access.
- 4.5.6.29 Due to existing developments to the south, west and north and Dow Brook adjacent to the east, there are no other reasonable available sites which the construction and permanent access tracks can be located to provide access between the onshore substation and public highway network. Thus, the routing of the substation construction access off the A584 road was considered suitable.

- 4.5.6.30 It should be noted that Lower Lane was not considered suitable as a construction access due to narrow geometry and presence of residential properties in close proximity to the road.
- 4.5.6.31 The routing of the substation construction access off the A584 included consideration of landowner feedback, environmental and engineering constraints. The key principles considered were:
- Proximity to Lower House Farm, avoiding interaction with existing farm buildings.
 - Make use of existing tracks where practicable.
 - Safe access from the A584 including consideration of visibility splays.
 - Consideration of environmental constraints –including potential for interaction with protected species, priority habitat and flood zone.
 - Topography.
 - Take the most direct route whilst considering the above.
- 4.5.6.32 Three construction access track options off the A584 are shown on **Figure 4.11** which were identified for the substation based on the principals outlined above:
- Access Track 1
 - Access Track 2
 - Access Track 3
- 4.5.6.33 Potential access track options closer to Lower House Farm were discounted from consideration to avoid interaction with the farm and its livestock. In addition, future farm infrastructure adjacent to existing buildings was considered as was the requirement of an additional sewer crossing.
- 4.5.6.34 **Table 4.11** presents a comparison of the three construction access track options with respect to key differentiating constraints. There was no differentiation between the three access track options with respect to the following:
- Ecology - all three access track options cross ecological priority habitats, with potential for mitigation. All three options require to cross Dow Brook.
 - Flood risk – majority of all three access track length is within Flood Zone 2 and 3, with a small section within Flood Zone 1.
 - Surrounding utilities – The three access track options contain overhead lines, and one sewer crossing would be required for each track option.

Table 4.11: Morecambe Substation Access Track Options

Constraints	Construction Access Track Options		
	Access Track 1	Access Track 2	Access Track 3
Land use	<p>Closer to the farm buildings.</p> <p>Track stays close to field boundaries in the south before routing across fields at it moves north to the substation.</p>	<p>Further away from farm buildings.</p> <p>Part of the access road route follows the alignment of an existing farm track before routing through fields.</p>	<p>Further away from farm buildings</p> <p>Part of the access road route follows the alignment of an existing farm track before routing through fields.</p>
Technical /Engineering	<p>Standard crossing would be required for Dow Brook</p> <p>Existing slope grade considered suitable and may require minimal regrading and earthworks.</p>	<p>Standard crossing would be required for Dow Brook</p> <p>Existing slope grade considered suitable and may require minimal regrading and earthworks.</p>	<p>Extensive work to cross the Dow Brook.</p> <p>Existing slope grade too steep for track and would require regrading and earthworks.</p>

4.5.6.35 Following the assessment of the three potential construction access options above, Access Track 2 was identified as the most appropriate route for the substation on balance when considering the above factors. This access track uses an existing track North from the A584, before heading west to the substation. Permanent rights will be retained over this access for future deliveries of large substation components.

4.5.6.36 The route of the main operational access for light goods vehicles off lower lane considered the following:

- Safe access off lower lane including consideration of visibility splays.
- Landowner feedback including position of the access in relation to field boundaries.
- Environmental constraints (presence of existing hedgerows)
- The most direct route when considering the above

Whilst the above constraints were considered for the operational access, the primary factor was ensuring a safe access from Lower Lane. This was achieved through the design of an appropriate visibility splay. From Lower Lane, the operational access is relatively short at approximately 130 m and takes a direct route into the substation. The access will be designed to allow livestock to pass between the fields to the north and south of the track.

4.5.6.37 In parallel to the selection of access tracks, the position of the temporary and permanent substation areas were reconfigured from those presented at PEIR. The location of the temporary compounds for Option 2 (south) were re-orientated west and optimised to align to the construction access from the A584. In addition, the permanent substation area, encompassing the substation platform, was moved to the east, thus moving it further away from receptors on Lower Lane (see **Figure 4.12**).

The Morecambe substation site presented at PEIR and the current location at ES is presented in Figure 4.19 of Volume 1, Chapter 3: Chapter 4: Site selection and consideration of alternatives of the ES.

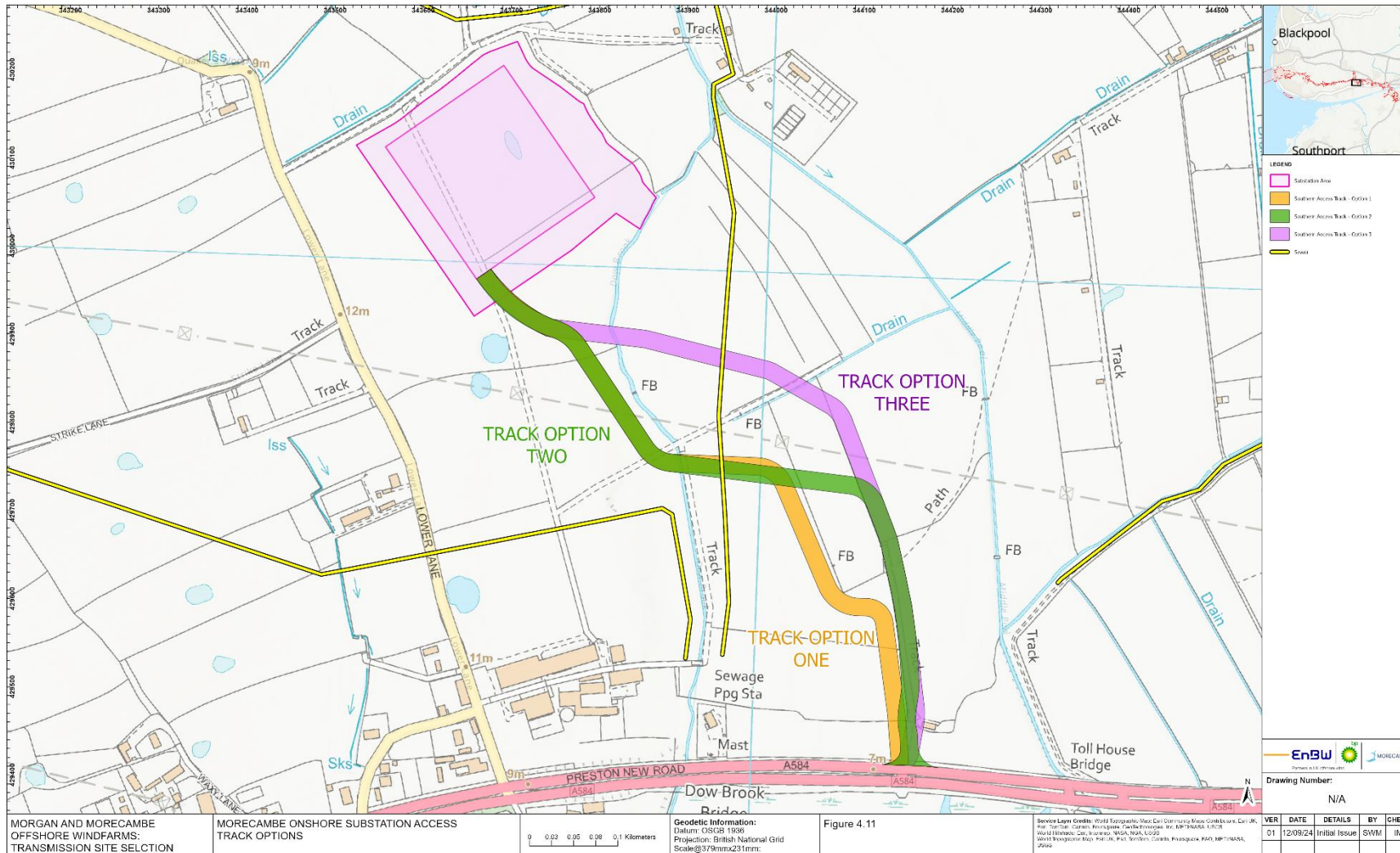


Figure 4.11: Morecambe Onshore Substation Access Track Options

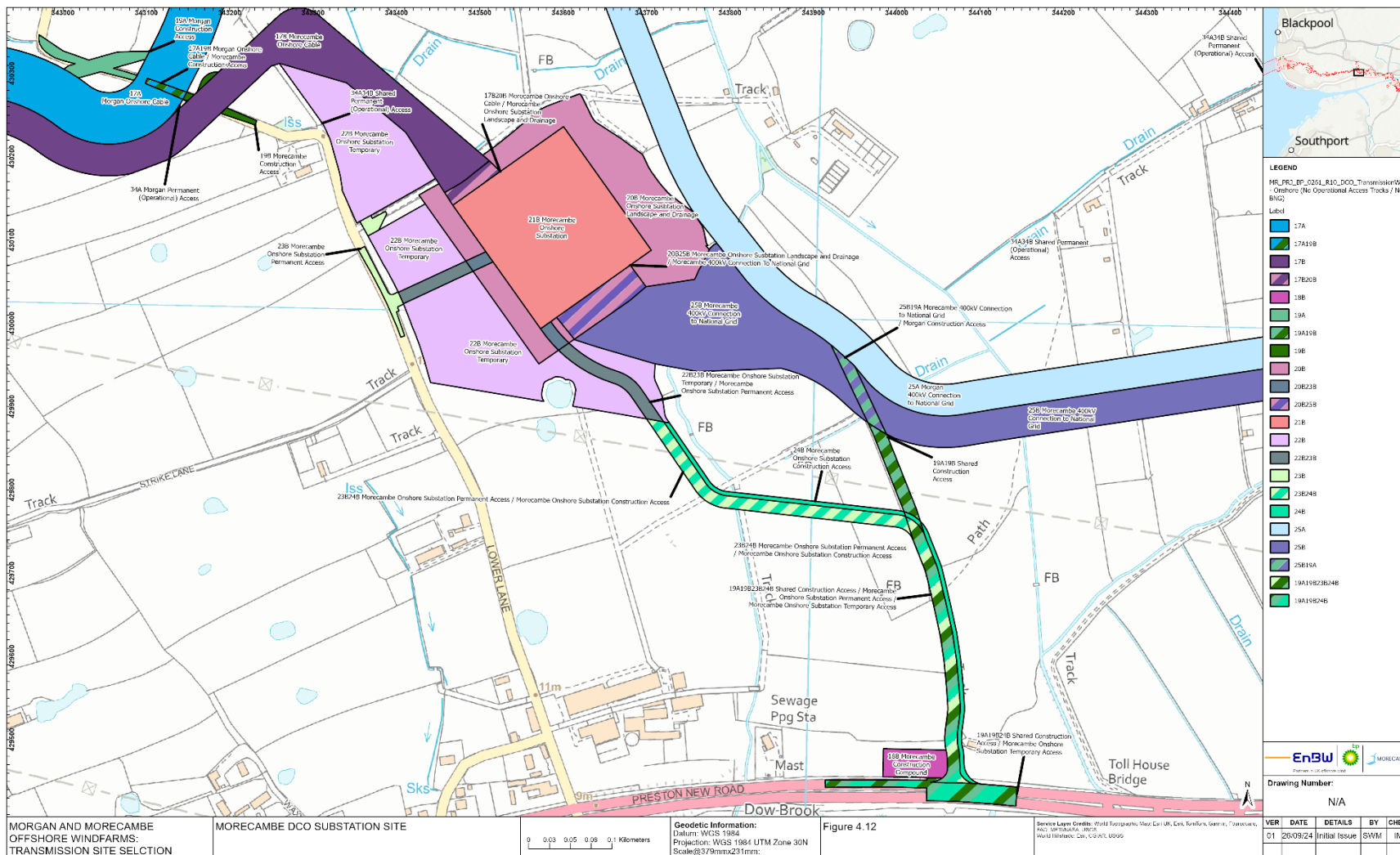


Figure 4.12: Morecambe DCO substation site

4.6 Onshore Cable Corridors Site Selection

4.6.1 Stage 2d: Identification of onshore cable route search area

- 4.6.1.1 The location of the initial onshore cable route search area was driven by the location of the prospective landfall zone near Lytham St Annes (See Volume 1, Annex 4.1) and the Point of Interconnection (PoI) at National Grid Substation at Penwortham.
- 4.6.1.2 The onshore cable route search area was created between the western point of landfall and the most eastern point of the PoI. The extent of the boundary was also determined by reference to existing geographic features such as field boundaries and roads or other existing highway infrastructure. For example, residential areas of Blackpool, and Kirkham combined with the A583 were used to create the northern extent of the search area. Whereas north of the River Ribble, the southern extent of the search area was defined by the residential areas of Freckleton and Lytham and the A584. South of the River Ribble the southern extent was formed by using the residential areas of Hutton, Longton and Penwortham.
- 4.6.1.3 Once the search area was defined, this became the Scoping boundary (**Figure 4.13**) encompassing a broad area to accommodate subsequent refinement of the onshore cable corridors route. To ensure early engagement with communities, the Applicants carried out a first phase of non-statutory consultation between 2 November – 13 December 2022.
- 4.6.1.4 The key themes which emerged from this consultation included but were not limited to, those outlined in **Table 4.12**.

Table 4.12: Summary of key themes of feedback received as part of Non-Statutory Consultation on Scoping Boundaries

Key themes of feedback received as part of Non-Statutory Consultation on Scoping Boundaries	Applicants response to the feedback received
<p>The onshore export cable route should follow the line of existing infrastructure (e.g. highways including the M55, and the Blackpool branch rail line routes from Preston to Blackpool) or the River Ribble. The feedback received highlighted that co-locating with existing infrastructure could help reduce the impact of construction on the surrounding countryside.</p>	<p>The guiding principles to the site selection of the onshore cable corridors includes but is not limited to avoiding areas of woodland and residential receptors. Existing infrastructure is normally lined with trees, hedges or residential receptors and therefore wasn't achievable to co-locate with existing infrastructure.</p>
<p>Reducing the impact on the existing infrastructure during construction was prioritised. There was also a suggestion that a new bridge could be constructed to the west of the current most westerly A59 Guild Way Bridge over the River Ribble, close to the existing National Grid substation at Penwortham, and that the cable route could then cross the river at this point, if it were built.</p>	<p>Another of the guiding principles outlined in Section 4.3, is to avoid designated sites which ruled out installing the onshore cable corridor along the River Ribble. Further information in regard to crossing the River Ribble can be found in section 4.6.3.</p>

Key themes of feedback received as part of Non-Statutory Consultation on Scoping Boundaries	Applicants response to the feedback received
<p>Potential impacts of the proposed landfall location on the Lytham St Anne’s Dunes Site of Special Scientific Interest (SSSI)</p>	<p>In response to the feedback received the applicants made a commitment (CoT 44) which sets out that the installation of the onshore export cable corridor at Lytham St Annes SSSI and the St Anne’s Old Links Golf Course will be undertaken by trenchless techniques, for example, direct pipe. The utilisation of trenchless techniques means that there will be no direct impact on Lytham St Annes Dunes SSSI.</p>
<p>There was also feedback from landowners calling for the Project to consider its impact on food production.</p>	<p>Best and Most Versatile Soils have been considered as part of the site selection process and included as a BRAG criteria (Table 4.14).</p> <p>The potential impacts of the Transmission Assets with respect to existing farming activities (e.g., agricultural land holdings) are considered in Volume 3, Chapter 6, Land Use and Recreation (document reference F3.6).</p>

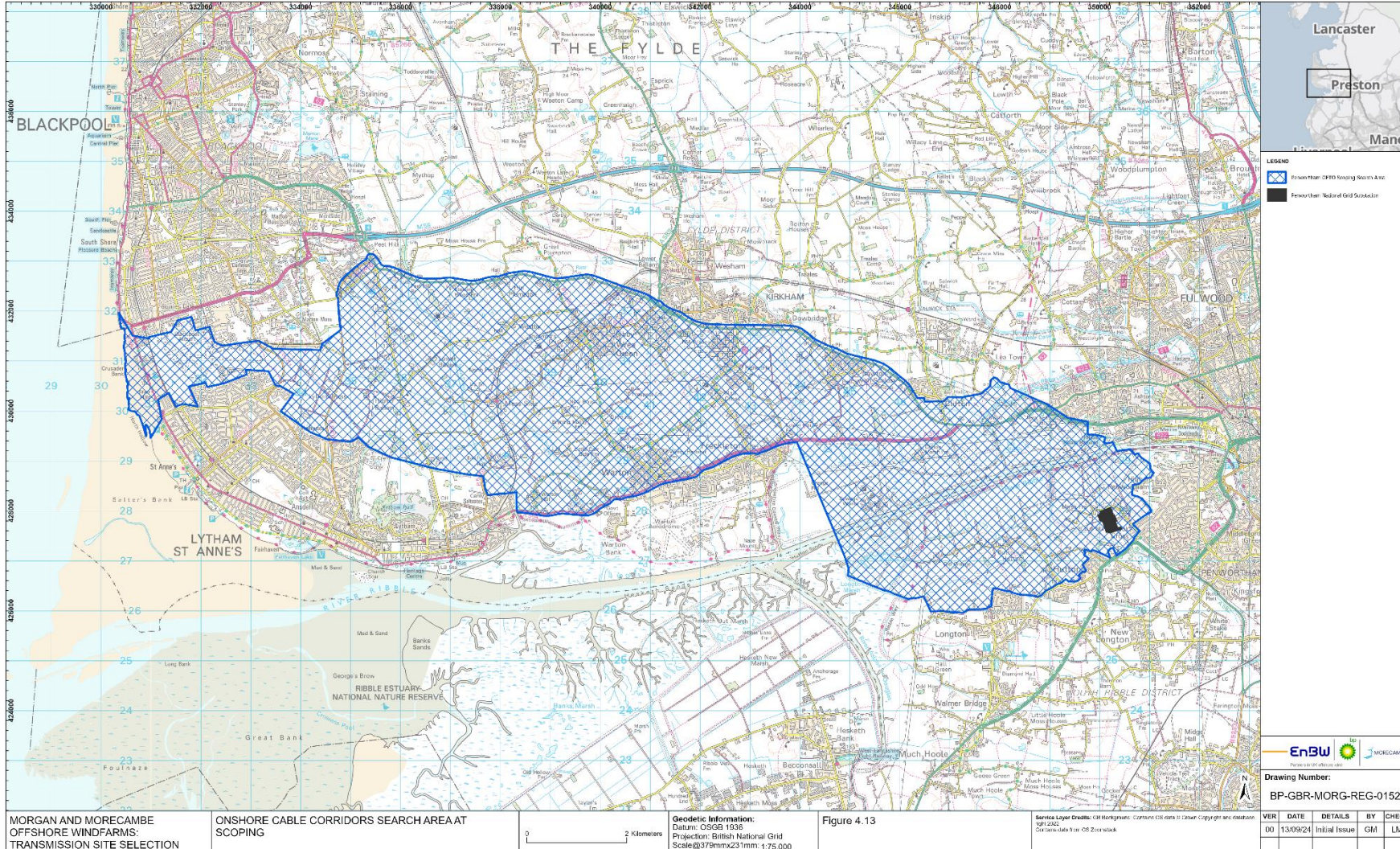


Figure 4.13: Onshore Cable Corridors Search Area at Scoping

4.6.2 Stage 3d: Refinement of onshore cable route options for PEIR

4.6.2.1 In preparation for the Statutory Consultation on the Preliminary Environmental Information Report (PEIR), the Applicants undertook further refinements to the search area driven by:

- Defining key infrastructure parameters; and
- Consultation (including non-statutory consultation and landowner feedback)

Defining key infrastructure parameters

4.6.2.2 Key infrastructure parameters associated with the onshore cable corridor that informed the Stage 3d site selection exercise are detailed in **Table 4.13**.

Table 4.13: Summary of key parameters for the Transmission Assets for Stage 3d relating to the onshore cable corridors

Parameter	Morgan Offshore Wind Project	Morecambe Offshore Windfarm	Total
Maximum number of onshore export cables	12 (4 circuits)	6 (2 circuits)	18 (6 circuits)
Width of construction cable corridors (temporary) (m)	74	48	122*
Number of haul roads	1	1	2
Width of haul road (m) excluding passing bays	6 (per haul road)	6 (per haul road)	6 (per haul road)
Type A compound size (m)	150 x 100	115 x 100	150 x 100 (sequential) 265 x 200 (concurrent)
Type B compound size (m)	150 x 100	115 x 100	150 x 100 (sequential) 265 x 200 (concurrent)
Type C compound size (m)	100 x 100	100 x 75	100 x 100 (sequential) 200 x 175 (concurrent)
Width of 400kV Grid Connection Cable Corridors (temporary) (m)	48	48	96

* Published PEIR documentation incorrectly cited a construction cable corridor width of 122 m. The correct width used in the EIA assessments underpinning PEIR and depicted in plans produced at PEIR, was 120 m.

Onshore Export Cable Corridors

4.6.2.3 In order to establish onshore export cable corridors up to 122 m in width during construction to connect the landfall zone to the onshore substation consultation zone (outlined in **section 4.5.4**), a BRAG analysis was undertaken (outlined in **section 4.3.3**).

4.6.2.4 The BRAG methodology was applied to the Scoping Boundary (area of search) to find the most suitable routing from the landfall to the onshore substation statutory consultation zone (described further in **section 4.5.5**). The constraints are shown on **Figure 4.14**. The BRAG is presented in **Table 4.14** with the results of the BRAG presented in **Figure 4.15**.

4.6.2.5 There were a number of constraints for the onshore export cable corridor that could not be completely avoided at this stage; however, consideration was given to minimising interaction with these constraints as far as practicable (e.g. the area of crossing interaction was minimised). These included environmental and consenting constraints (**Table 4.14**) such as:

- Hedges
- Public Rights of Ways (PRoWs)
- Non - Statutory designations including Priority Habitat, Farmland Conservation Area and associated Functionally Linked Land
- Tree Preservation Orders
- Historical Landfills
- Ponds

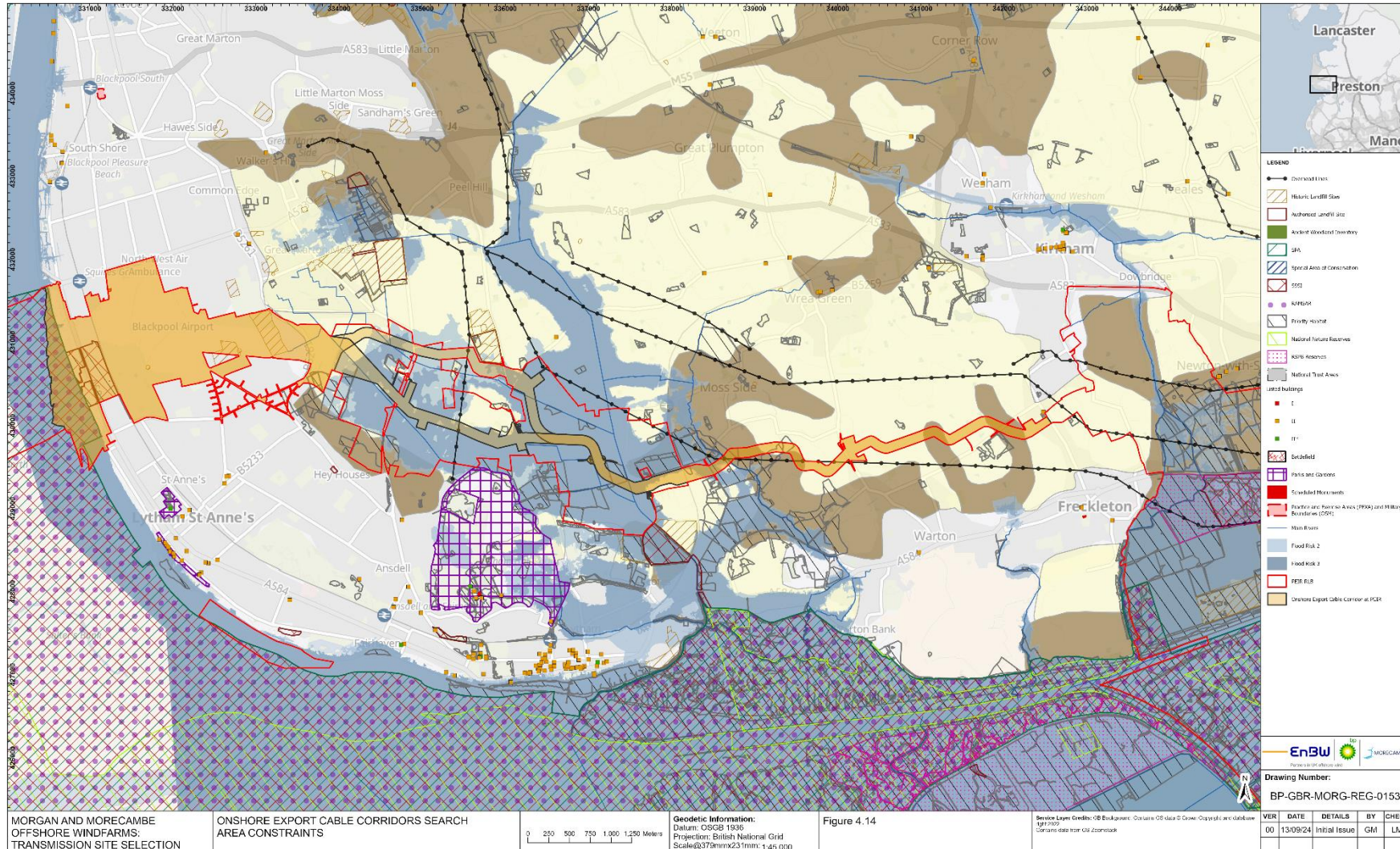


Figure 4.14: Onshore Export Cable Corridors Search Area Constraints

Table 4.14: Onshore Export Cable Corridors BRAG Criteria for Stage 3d

Package	Category	Black (Potential to be showstoppers)	Red (High potential to constrain the development)	Amber (Intermediate potential to constrain the development)	Green (Low potential to constrain the development)
Engineering and Environmental / Consenting	Contaminated Land	N/A	Presence of contaminated land e.g. known area of contaminated land, landfills, asbestos, mine etc.	N/A	N/A
Environmental & Consenting	Nature Conservation	<p>Route centreline directly intersecting</p> <ul style="list-style-type: none"> SSSI Units Ancient woodland National Parks SPAs/ SACs Ramsar sites Country Parks National Nature Reserves <p>For the following sites there are not considered to be any showstopper constraints to development:</p> <ul style="list-style-type: none"> Woodpasture and Parkland BAP Priority Habitat Locally Designated Sites e.g. Biological Heritage Sites 	<p>Route centreline within 0 - 100m of:</p> <ul style="list-style-type: none"> SSSI Units Ancient woodland National Parks SPAs/ SACs Ramsar sites Country Parks <p>Or directly intersecting:</p> <ul style="list-style-type: none"> Woodpasture and Parkland BAP Priority Habitat Locally Designated Sites e.g. Biological Heritage Sites 	<p>Route centreline within 100m - 500m</p> <ul style="list-style-type: none"> SSSI Units Ancient woodland National Parks SPAs/ SACs Ramsar sites Country Parks <p>Or between 0-100m of:</p> <ul style="list-style-type: none"> Woodpasture and Parkland BAP Priority Habitat Locally Designated Sites e.g. Biological Heritage Sites 	<p>Route centreline more than 500m</p> <ul style="list-style-type: none"> SSSI Units Ancient woodland National Parks SPAs/ SACs Ramsar sites Country Parks <p>Or more than 100m from:</p> <ul style="list-style-type: none"> Woodpasture and Parkland BAP Priority Habitat Locally Designated Sites e.g. Biological Heritage Sites
	Surface Water Flood Zone	There are no flood zone constraints considered to be showstoppers to development	Route centreline intersecting a Flood Zone 3 area	Route centreline intersecting a Flood Zone 2 area	Route centreline intersecting a Flood Zone 1 area

Package	Category	Black (Potential to be showstoppers)	Red (High potential to constrain the development)	Amber (Intermediate potential to constrain the development)	Green (Low potential to constrain the development)
	Cultural Heritage	Route centreline directly intersecting <ul style="list-style-type: none"> Listed Buildings; Scheduled Monuments boundaries; Registered parks and gardens; Registered battlefields 	Route centreline within 0m - 50m of: <ul style="list-style-type: none"> Listed Buildings; Scheduled Monuments boundaries; Registered parks and gardens; Registered battlefields 	Route centreline within 50m - 200m of: <ul style="list-style-type: none"> Listed Buildings; Scheduled Monuments boundaries; Registered parks and gardens; Registered battlefields 	Route centreline more than 200m. <ul style="list-style-type: none"> Listed Buildings; Scheduled Monuments boundaries; Registered parks and gardens; Registered battlefields
		For the conservation areas there are not considered to be any show stopping constraints to development	Route centreline directly intersecting conservation areas	Conservation areas within 0m – 50m of the route centreline	Route centreline more than 50m
	Other infrastructure & development	Route centreline directly intersecting <ul style="list-style-type: none"> Any land allocated for development in the Local Plan; Any area of Authorised Landfill 	Route centreline within 0m - 100m <ul style="list-style-type: none"> Any land allocated for development in the Local Plan; Any area of Authorised Landfill 	Route centreline within 100m - 200m <ul style="list-style-type: none"> Any land allocated for development in the Local Plan; Any area of Authorised Landfill 	Route centreline more than 200m <ul style="list-style-type: none"> Any land allocated for development in the Local Plan; Any area of Authorised Landfill
		Proximity to sensitive stakeholders	Route centreline directly intersecting: <ul style="list-style-type: none"> RSPB Reserves; National Trust Land; MoD Exercise Area (inclusive of any buffer zone) 	Route centreline within 0m – 100m <ul style="list-style-type: none"> RSPB Reserves; National Trust Land; MoD Exercise Area (inclusive of any buffer zone) 	Route centreline within 100m - 200m <ul style="list-style-type: none"> RSPB Reserves; National Trust Land; MoD Exercise Area (inclusive of any buffer zone)

Package	Category	Black (Potential to be showstoppers)	Red (High potential to constrain the development)	Amber (Intermediate potential to constrain the development)	Green (Low potential to constrain the development)
Land & Property	Land Quality – Agricultural Land Classification	N/A	Grade 1	Grade 2	Grade 3a & 3b
	Crown & Special Category Land	N/A	All red.	N/A	N/A
Engineering	Other infrastructure	A 400 kV tower within the ECC is considered to remove the option from further consideration	A 400 kV tower 0 m – 20 m from the outer most edge of the 80 m corridors	A 400 kV tower 20 m – 40 m from the outer most edge of the 80m corridors	A 400 kV tower more than 40m from the outer most edge of the 80 m corridors

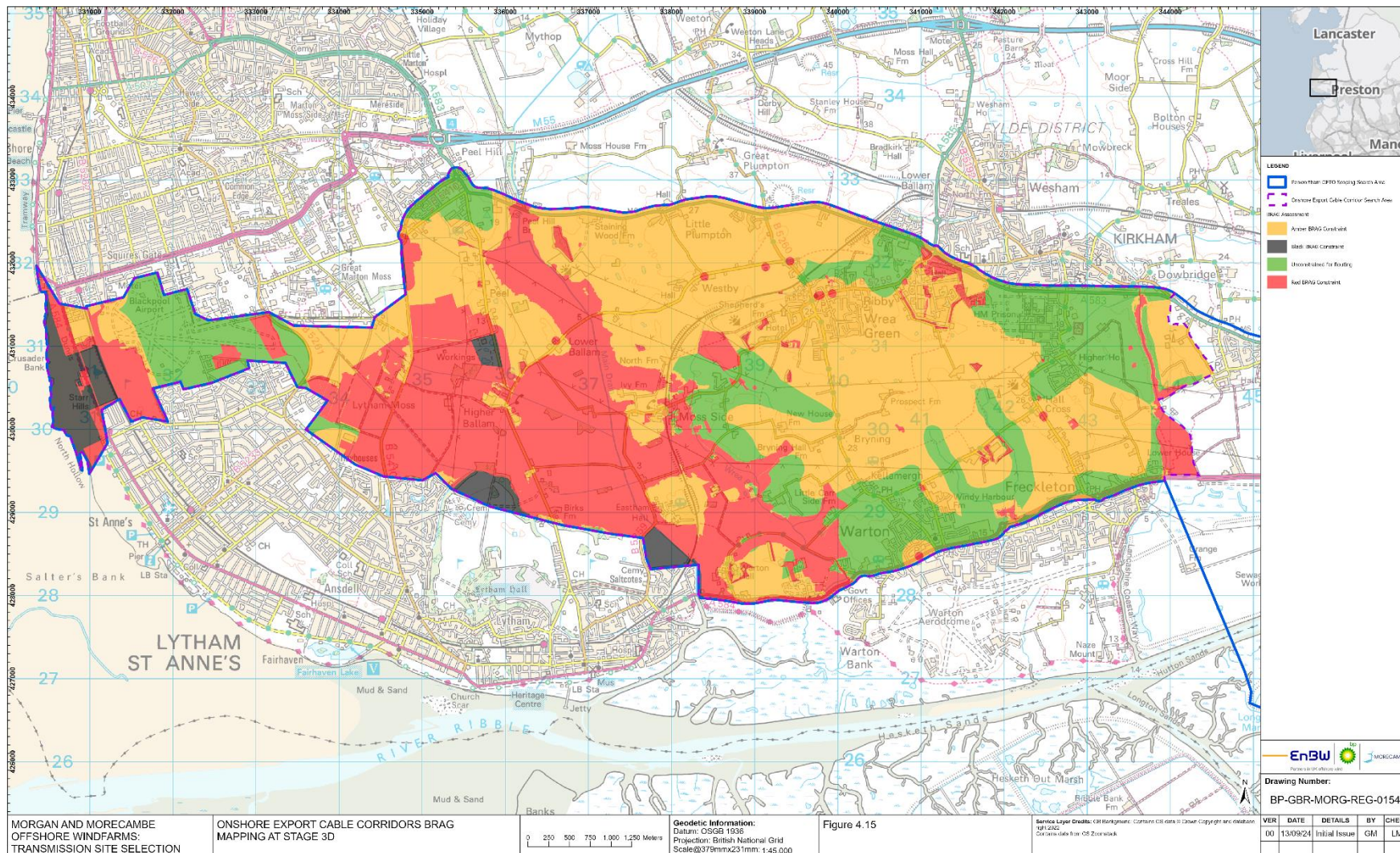


Figure 4.15: Onshore Export Cable Corridors BRAG Mapping at Stage 3d

Temporary access tracks

- 4.6.2.6 Principles were established in order to identify suitable temporary access requirements along the onshore export cable corridors and 400kV grid connection cable corridors. These principles were as follows:
- To facilitate a safe access to the onshore export cable corridors;
 - Areas where there were significant constraints to providing a new access (such as existing buildings, major watercourses, and proximity to existing junctions) were avoided. Where possible temporary access tracks looked at avoiding areas where accommodation works such as the removal of hedgerows and trees were required.
 - The geometry of routes to accommodate the project's traffic;
 - Roads which were typically wider than 5.5m (i.e. provided with a centre line and could therefore accommodate two-way HGV traffic) were preferred.
 - Roads were avoided, where practicable, if they were not wide enough to accommodate two-way HGV traffic and works to widen the road could be significant.
 - This defining principal also took account of any routes which were subject to HGV Traffic Regulation Orders (i.e. weight, height or environmental restrictions) and evaluated how that might impact the access strategy.
 - The road safety record of the potential construction routes in the vicinity of the accesses; and,
 - The road safety principle utilised the opensource Police traffic collision data ('Crashmap') for the most recent five recorded years to identify the collision clusters. Areas where there were more than three collisions clustered were avoided where possible.
 - The sensitivity of communities along the onshore export cable corridors to increases to traffic
 - The sensitive receptors appraisal looked to avoid areas where increases in construction traffic could potentially have an adverse impact on local communities. Where there were high concentrations of sensitive receptors (such as local communities, schools, shops etc.) these were avoided where practicable due to the reduced capacity of the highway environment to tolerate increases in traffic.
- 4.6.2.7 The identification of temporary access tracks encompassed all public roads that crossed the onshore export cable corridors and 400kV grid connection cable corridors as these could potentially provide a means of access.

4.6.2.8 Accesses were also identified based on the potential for lock outs, e.g. lock outs included constraints which could not be crossed easily, for example watercourses.

4.6.2.9 Initial temporary access tracks identified based on the principals above are shown in **Figure 4.16**.

Permanent Operational Access Tracks

4.6.2.10 Permanent Operation Access Points were also identified along the onshore export cable and 400kV grid connection corridors to ensure that access was available during the operational and maintenance phase of the project. These operational accesses were designed to be approximately 3.5 m in width and follow existing paths, openings and/or gates where practicable. If required, clearance of vegetation or other obstacles may be necessary to facilitate access

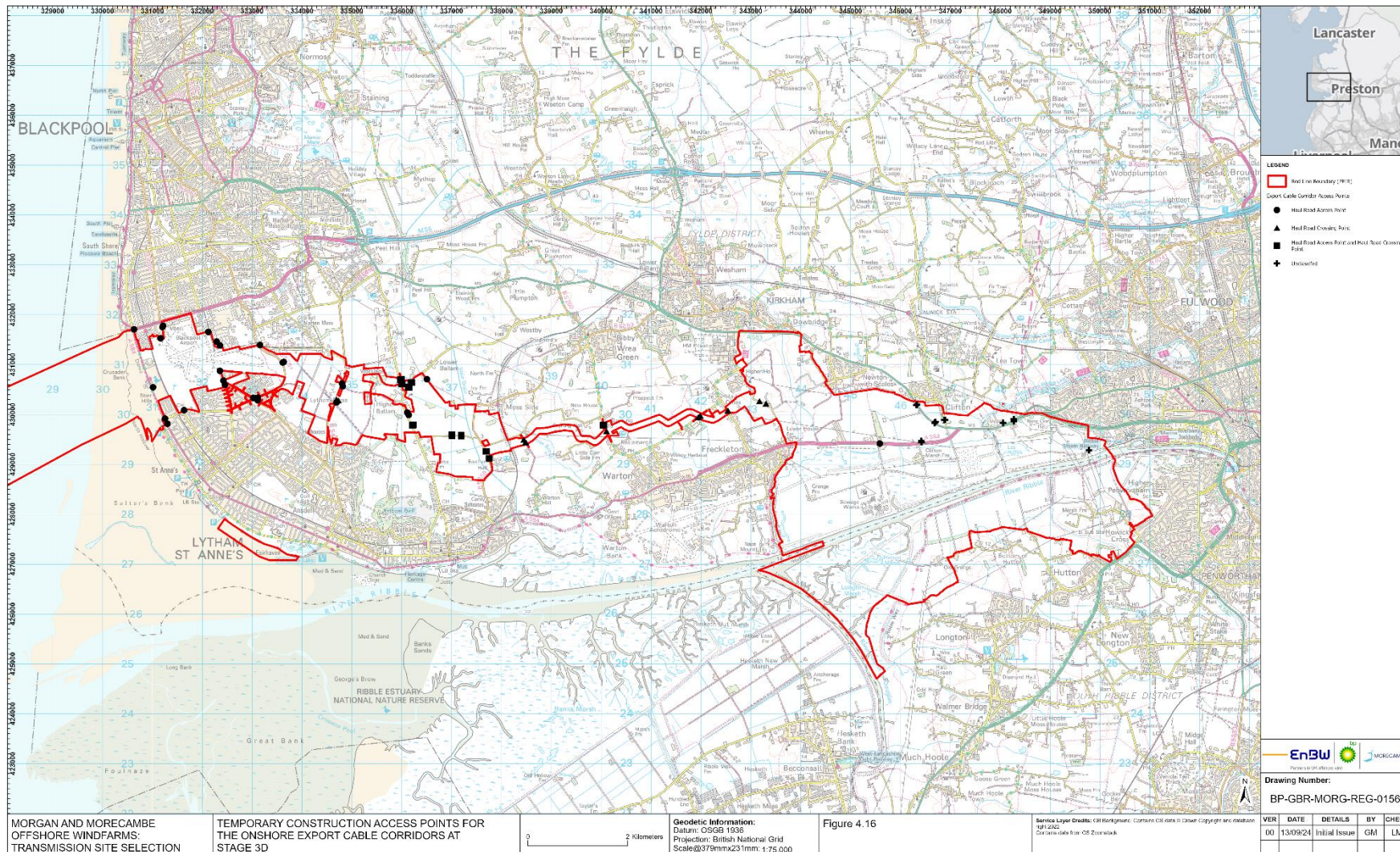


Figure 4.16: Temporary Construction Access Points for the Onshore Export Cable Corridors at Stage 3d

Construction Compound requirements for the Onshore Export Cable Corridors

- 4.6.2.11 Three different types of construction compounds were identified to facilitate the construction of the onshore export cable corridors. These included:
- Type A Compounds – have been designed to act as a Main Office and include an area for the storage of materials and equipment;
 - Type B Compounds – have been designed primarily for the storage of construction materials and equipment, however it is anticipated that a small area could be utilised for site offices and welfare facilities;
 - Type C Compounds – have been designed as smaller satellite compounds which would be used for offices and welfare as well as a minimal amount of storage of materials and equipment.
- 4.6.2.12 Further information on the construction compounds along the route can be found within Volume 1, Chapter 3: Project description of the ES.
- 4.6.2.13 The key consideration for the siting of the temporary construction compounds was the temporary access points requirements approximately every 5 km along the cable corridor. The frequency of temporary construction compounds along the onshore export cable corridors was to ensure there was sufficient space to be able to store enough cable drums for that section of cable corridor.
- 4.6.2.14 Each compound was identified and designed to be immediately adjacent to the onshore export cable corridor for logistical ease, preferably with an existing road or identified access point in close proximity.
- 4.6.2.15 The same BRAG criteria utilised for the onshore export cable corridors (see **Table**) was used to identify suitable locations for the temporary compounds. In addition, the BRAG criteria for the compounds also included situating them at least 30 m from residential properties.
- 4.6.2.16 The location of the compounds identified for the onshore export cable corridors for the statutory consultation are shown in **Figure 4.17**. Further refinements of the compounds between Stage 3d and 4d can be found in **section 4.6.3**.

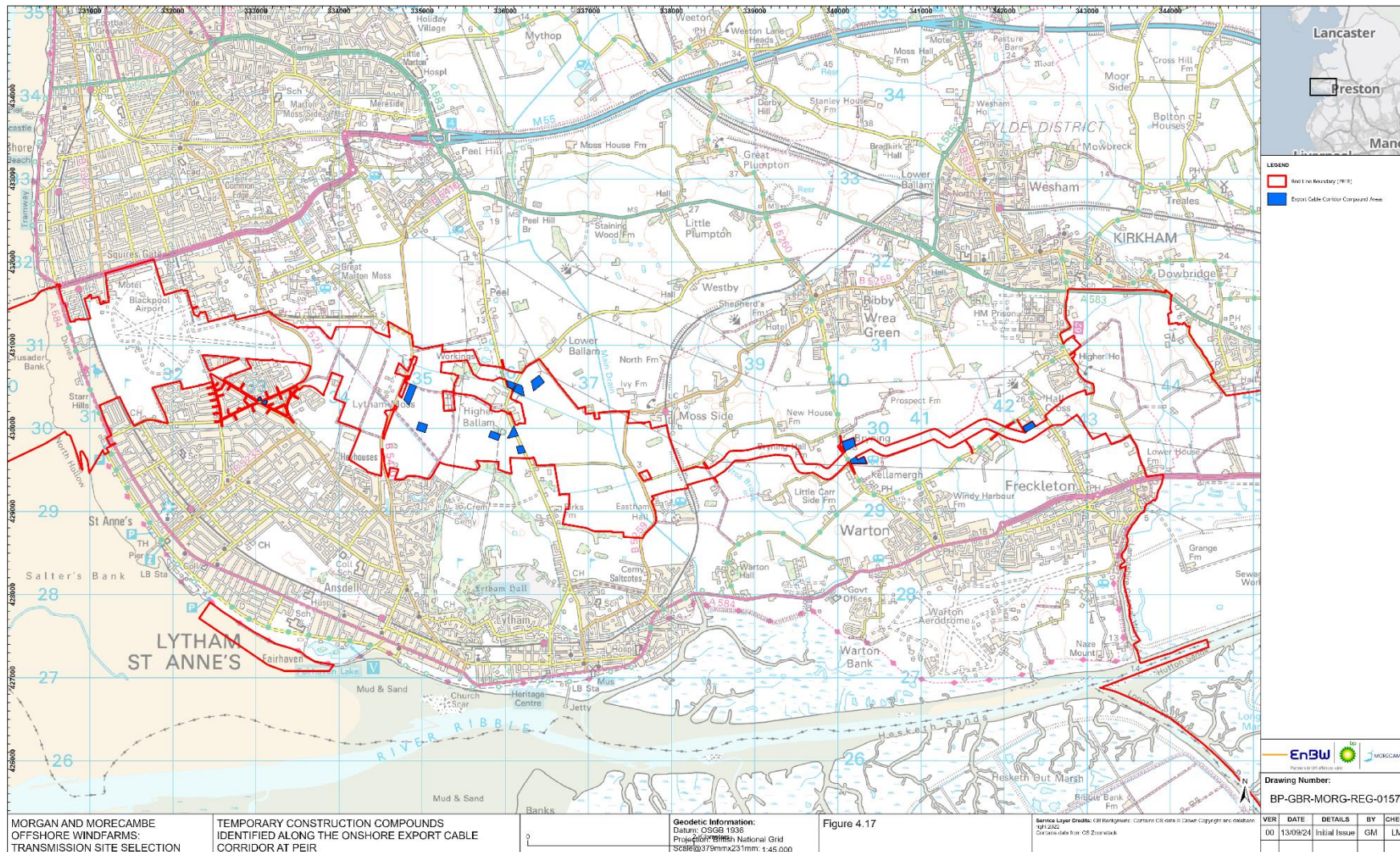


Figure 4.17: Temporary Construction Compounds for the Onshore Export Cable Corridors at Stage 3d

400kV grid connection cable corridors to the National Grid

- 4.6.2.17 Once the statutory consultation substation zone was selected as outlined above in **section 4.5.5**, a 400 kV grid connection cable corridors search area was created. The boundary of the search area was defined by using the PEIR substation statutory consultation zone as the most western boundary and the Pol at Penwortham as the most eastern boundary as shown in **Figure 4.18**. To establish the southern and northern extents of the 400 kV grid connection search area, towns and arterial roads were used to define boundary. The southwestern extent of the of 400 kV Grid Connection Cable Corridors was also established to avoid Newton Marsh SSSI and the majority of Ribble Estuary SSSI as the majority of these areas contain wetland habitat and are within Flood Zone 3.
- 4.6.2.18 The 400kV grid connection area remained broad due to various constraints which were under consideration, including, but not limited to, the presence of other developments (e.g. solar farms), utilities, historic landfill and ground conditions. Details regarding the refinement of the 400 kV grid connection cable corridor is provided in **section 4.6.3**.



Figure 4.18: 400kV Grid Connection Cable Corridors Search Area at Stage 3d

Areas of Environmental Mitigation and Biodiversity Benefit

- 4.6.2.19 The Applicants are required to mitigate for potential effects arising as a result of the project. In addition, the Applicants are aiming to deliver biodiversity benefit.
- 4.6.2.20 At the PEIR stage of the site selection process, prior to consultation, areas were identified for ecological mitigation, enhancement and or biodiversity benefit where the current habitat condition affords an opportunity to improve the habitat quality or where enhancements can be made to habitats identified as functionally linked to designated sites.
- 4.6.2.21 After the initial areas of environmental mitigation and/or biodiversity benefit were identified, the Applicants consulted the landowners to gauge whether they would be amenable to providing land. The feedback received was used to inform and refine the areas of environmental mitigation and biodiversity benefit, which were subsequently presented as part of the statutory consultation at PEIR as shown in **Figure 4.19**.

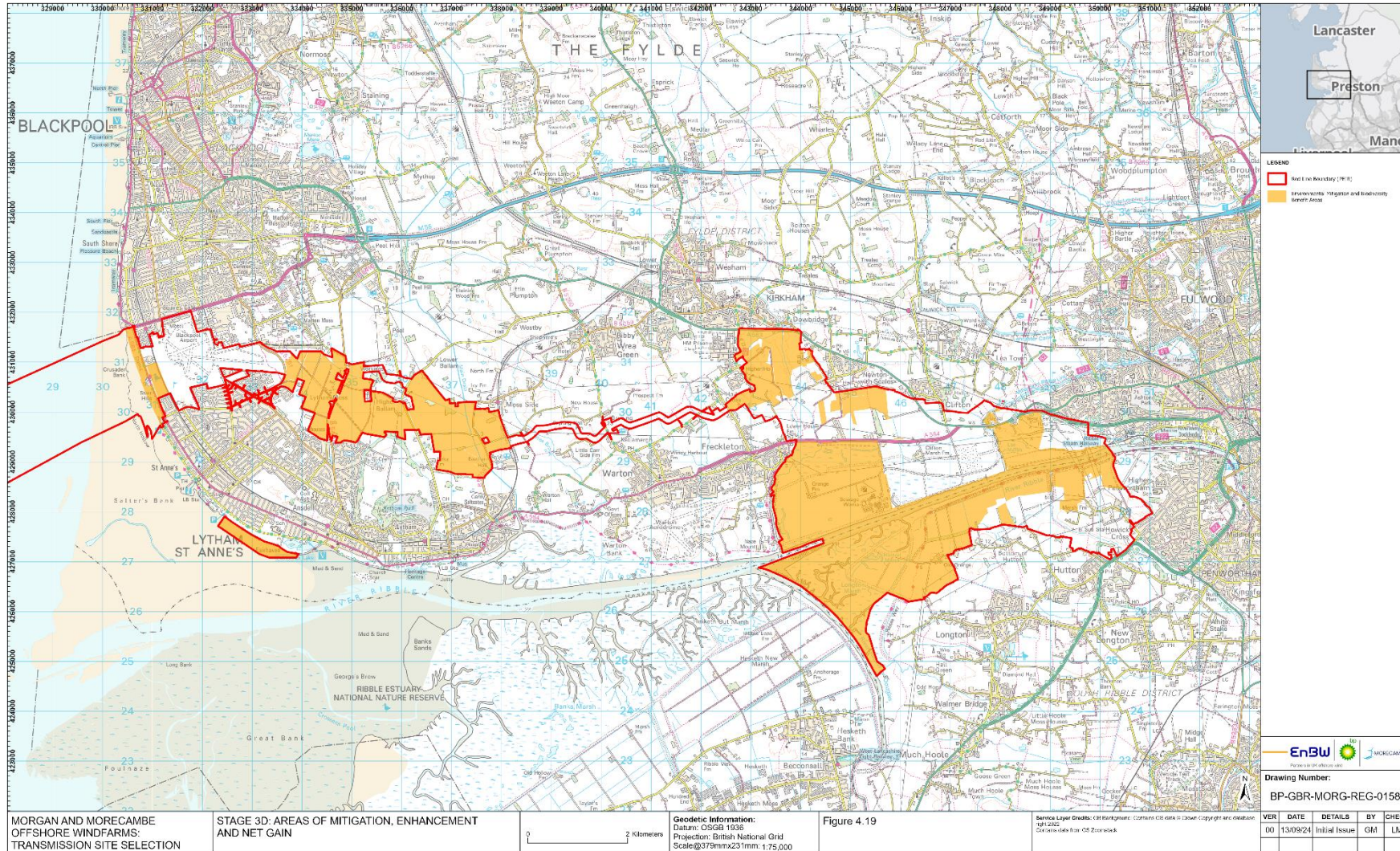


Figure 4.19: Stage 3d: Areas of Mitigation, Enhancement and Net Gain

Consultation

Non-Statutory Consultation

- 4.6.2.22 Between 19 April and 4 June 2023, a second phase of non-statutory consultation was held, which focused on potential cable route options, landfall options and onshore substation locations for the Transmission Assets. The information also confirmed National Grid point of interconnection at Penwortham.
- 4.6.2.23 As part of the non-statutory consultation, 122 m wide refined indicative onshore export cable corridors were presented along with indicative temporary compounds and access tracks (alongside presentation of the onshore substation zones).
- 4.6.2.24 The key theme which emerged from consultation included but were not limited to reducing impacts to the communities. This included suggestions to use the bed of the River Ribble for landfall/cabling or for cabling to follow the line of existing infrastructure (e.g. highways including the M55 and the Blackpool branch line rail routes from Preston to Blackpool).
- 4.6.2.25 Whilst the Applicants considered a range of options in the early stages of the route planning and site selection process. Laying the cables along the River Ribble was discounted as a feasible option with further details provided in Volume 1, Annex 4.1: Selection and refinement of landfall cabling.
- 4.6.2.26 Co-locating cabling with existing infrastructure within the search area was found to be constrained by trees, hedges or residential receptors, and did not accord with the guiding principles to the site selection of the onshore cable corridors which included avoiding areas of woodland and residential receptors.

Landowner Feedback

- 4.6.2.27 Landowner meetings were also held between February and May 2023 to obtain feedback on the route in order to allow the Applicants to incorporate feedback into the early site selection process, wherever possible. Where feedback was received, this was taken into account and fed into the key changes identified in **section 1029896560.509.61771952**.

Key Changes

- 4.6.2.28 As a result of defining key infrastructure parameters and consultation in the form of non-statutory consultation and landowner feedback, key changes were made to the Transmission Assets onshore cable corridors including:
- Residential areas removed from the PEIR Red Line Boundary;
 - Alignment of the PEIR Red Line Boundary along field margins to reduce severance to landowners; and,

- Avoidance of key ecological constraints such as ponds.

4.6.2.29 **Table 4.15** and **Figure 4.20** provides examples of the changes and refinements made.

Table 4.15: Examples of refinements made to the Onshore Export Cable Corridors at Stage 3d

Change ID	Description
Stage3d_ECC_1	Residential area removed from PEIR Red Line Boundary
Stage3d_ECC_2	Onshore Export Cable Corridors aligned along field boundaries and land parcels.
Stage3d_ECC_3	Onshore Export Cable Corridors aligned along field boundaries
Stage3d_ECC_4	Residential area removed from PEIR Red Line Boundary
Stage3d_ECC_5	Onshore Export Cable Corridors aligned along field boundaries and land parcels.
Stage3d_ECC_6	Onshore Export Cable Corridors aligned along field boundaries and land parcels.
Stage3d_ECC_7	Onshore Export Cable Corridors aligned along field boundaries and land parcels to avoid severing fields to the North. This refinement also avoids ponds and stays further away from patch of woodland.
Stage3d_ECC_8	Onshore Export Cable Corridors routed to avoids ponds, close proximity to residential properties, crossing of gas pipeline and priority habitat.
Stage3d_ECC_9	Onshore export cable corridors routed east to maintain as much distance from the SSSI to south as possible.
Stage3d_ECC_10	Onshore Export Cable Corridors routed north to stay within field boundaries and to cross EA Main River as close to 90 degrees as possible.
Stage3d_ECC_11	Onshore Export Cable Corridors aligned along field boundaries and land parcels.
Stage3d_ECC_12	Onshore Export Cable Corridors routed south to stay within field boundaries and avoid higher concentration of ponds and woodland to the north.
Stage3d_ECC_13	Onshore Export Cable Corridors routed south slightly to align with field boundaries and avoid higher concentration of ponds to the north, along with solar farm and potential more constrained residential and buildings to the north of the solar farm.
Stage3d_ECC_14	Onshore Export Cable Corridors routed northeast to avoid residential properties and to cross gas pipeline in road at 90 degrees.

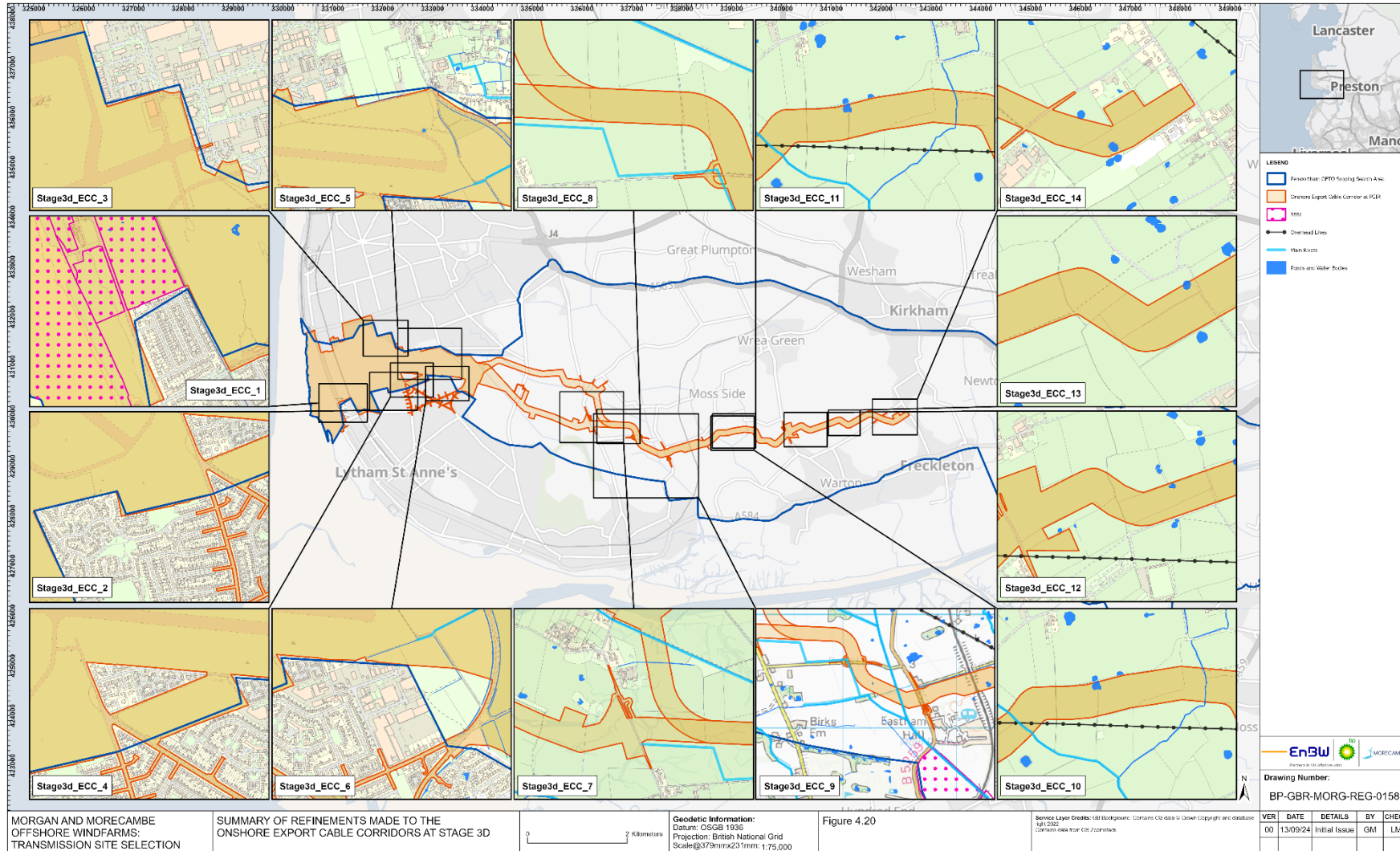


Figure 4.20: Summary of refinements made to the Onshore Export Cable Corridors at Stage 3d

4.6.3 Stage 4d: Refinement of onshore cable route options for DCO Application

4.6.3.1 Following consideration of feedback from stakeholders and members of the public as part of Section 42 and 47 consultations on the PEIR, the Applicants undertook further refinements on the onshore export cable corridors. The drivers for changes to the onshore export cable corridors can broadly be split into the following categories:

- Refinements to key infrastructure parameters;
- Consultation in the form of Section 42 / Section 47 feedback; and
- Review of baseline survey data and environmental constraints.

Refinements to key infrastructure parameters

4.6.3.2 **Table 4.16** identifies the key parameters which have been refined between Stage 3d and Stage 4d of the site selection process.

Table 4.16: Refinements to key infrastructure parameters at Stage 4d

Parameter	Morgan Offshore Wind Project		Morecambe Offshore Windfarm		Total	
	PEIR	DCO	PEIR	DCO	PEIR	DCO
Width of construction cable corridors (temporary) (m)	73	62	47	38	122*	100
Number of Type A compounds and size (m) along the onshore export cable corridors	2 150 x 100	1 150 x 100	2 115 x 100	1 115 x 100	4 150 x 100 (sequential) 265 x 200 (concurrent)	2 150 x 100 (sequential) 265 x 200 (concurrent)
Number of Type B compounds and size (m) along the onshore export cable corridors	4 150 x 100	4 150 x 100	4 115 x 100	4 115 x 100	8 150 x 100 (sequential) 265 x 200 (concurrent)	8 150 x 100 (sequential) 265 x 200 (concurrent)
Number of Type C compounds and size (m) along the onshore export cable corridors	2 100 x 100	1 100 x 100	2 100 x 75	1 100 x 75	4 100 x 100 (sequential) 200 x 175 (concurrent)	1 100 x 100 (sequential) 200 x 175 (concurrent)
Width of 400kV Grid Connection Cable Corridors (temporary) (m)	48	38	48	38	96	76
Number of Type A compounds and size (m) along the 400kV grid connection cable corridors	N/A	1 compound up to 15,000m ²	N/A	1 compound up to 11,270m ²	N/A	2 compounds totalling 26,270 m ²

Parameter	Morgan Offshore Wind Project		Morecambe Offshore Windfarm		Total	
	PEIR	DCO	PEIR	DCO	PEIR	DCO
Number of Type B compounds and size (m) along the 400kV grid connection cable corridors	N/A	2 compounds each up to 15,000m ²	N/A	2 compounds each up to 11,270m ²	N/A	4 compounds totalling 52,540 m ²
Number of Type C compounds and size (m) along the 400kV grid connection cable corridors	N/A	1 compound up to 10,000m ²	N/A	1 compound up to 7,500m ²	N/A	2 compounds totalling 17,500 m ²

* Published PEIR documentation incorrectly cited a construction cable corridor width of 122 m. The correct width used in the EIA assessments underpinning PEIR and depicted in plans produced at PEIR, was 120 m.

Onshore Export Cable Corridors

4.6.3.3 As outlined above in **Table 4.15**, the main refinement was the reduction of the temporary construction onshore export cable corridors width from 120 m to 100 m. **Figure 4.21** below shows the reduction in the cable corridors from PEIR (Stage 3d) to DCO (Stage 4d).

Constraints mapping

4.6.3.4 In order to refine the onshore export cable corridors, the constraints were mapped using the BRAG criteria (See **Table 4.14**). This along with the routing principles enabled the refinement of the onshore export cable corridors between landfall and the onshore substations.

4.6.3.5 There were a number of constraints for the onshore export cable corridors which could not be completely avoided, but interaction was minimised as far as practicable (e.g. the area of crossing interaction was minimised). These included:

Land and Property Considerations:

- Residential Receptors – The onshore export cable corridors, has avoided all residential properties. However, there were five areas where the corridors is less than 30 m from residential properties. Any potential impacts on human health and residential receptors during the construction phase have been assessed through the EIA process and mitigations measures have been specified within the CoCP (document reference: J1) in order to reduce the impact them.
- Agricultural holdings – The onshore export cable corridors have been sited to minimise disturbance to agricultural holdings and to reduce severance.

Environmental and Consenting:

- Hedges – where possible the project has looked to site the onshore export cable to avoid hedges; however, this was not always possible. A 15 m buffer from hedges was utilised where possible.
- Public Rights of Ways (PRoWs) – Any PRoWs or bridleways which could not be avoided would be diverted for the minimum required time or crossed using trenchless techniques where practicable (see CoT 32, 91 and 102, **Table 4.5**).
- Non - statutory designations – interaction with non-statutory designations such as Priority Habitat, Farmland Conservation Area and associated Functionally Linked Land was minimised as far as practicable.
- EA Main Rivers –The Applicants have made a commitment to use trenchless techniques where the onshore export cable corridors crosses an EA Main River (see CoT 10, **Table 4.5**)
- Ordinary watercourses – The project has looked to avoid Ordinary Watercourses where possible and utilise trenchless techniques where practicable. Control measures to avoid impacts to ordinary watercourses have also been detailed within the CoCP (document reference:J1)
- Historical Landfills – avoid or minimise interaction with historical landfill sites
- Ponds – Ponds identified during the route planning and site selection process have been avoided where possible. During construction any newly identified ponds will be avoided through micro-siting of the onshore export cable corridor and 400 kV grid connection cable corridor where reasonably practicable (CoT 31, **Table 4.5**)

Technical considerations:

- Railway crossings - where the onshore export cable corridors crosses railways, the cable corridors has been increased in width to up to 190 m wide to facilitate a ‘complex’ trenchless crossing.

Outcomes

4.6.3.6

As part of the refinement in the onshore export cable corridors temporary construction width, a greater number of sensitive receptors along the route have now been avoided. This includes but is not limited to:

- Trees subject to tree preservation orders have been avoided along the onshore export cable corridors;
- Planning Applications – all known planning applications have been avoided by the onshore export cable corridor;
- Ponds - The onshore export cable at Stage 3d impacted approximately 90 ponds; however, through the refinement only 19 are now anticipated to be impacted; and

- Landowner boundaries – The onshore export cable corridors has been aligned to landownership boundaries where possible to reduce impacts.

4.6.3.7 **Table 4.17** and **Figure 4.21** provides examples of the changes and refinements made.

Table 4.17: Examples of refinements made to the Onshore Export Cable Corridors at Stage 4d

Change ID	Description
Stage4d_ECC_1	Onshore Export Cable Corridors sited south away from building to the north.
Stage4d_ECC_2	Onshore Export Cable Corridors sited south to reduce overlap with priority habitat
Stage4d_ECC_3	Onshore Export Cable Corridors sited equidistant from buildings either side.
Stage4d_ECC_4	Onshore Export Cable Corridors sited north to increase distance to residential receptors and OHL pylon to south.
Stage4d_ECC_5	Onshore Export Cable Corridors sited south to miss ponds to the north.
Stage4d_ECC_5	Onshore Export Cable Corridors sited north to provide greater distance to hedges and trees to the south.
Stage4d_ECC_6	Onshore Export Cable Corridor sited north to minimise interference with trees to south.
Stage4d_ECC_7	Onshore Export Cable Corridors sited south align with field boundary and avoid ponds to the north.
Stage4d_ECC_8	Onshore Export Cable Corridors sited north to avoid impacting ponds to south as much as possible.

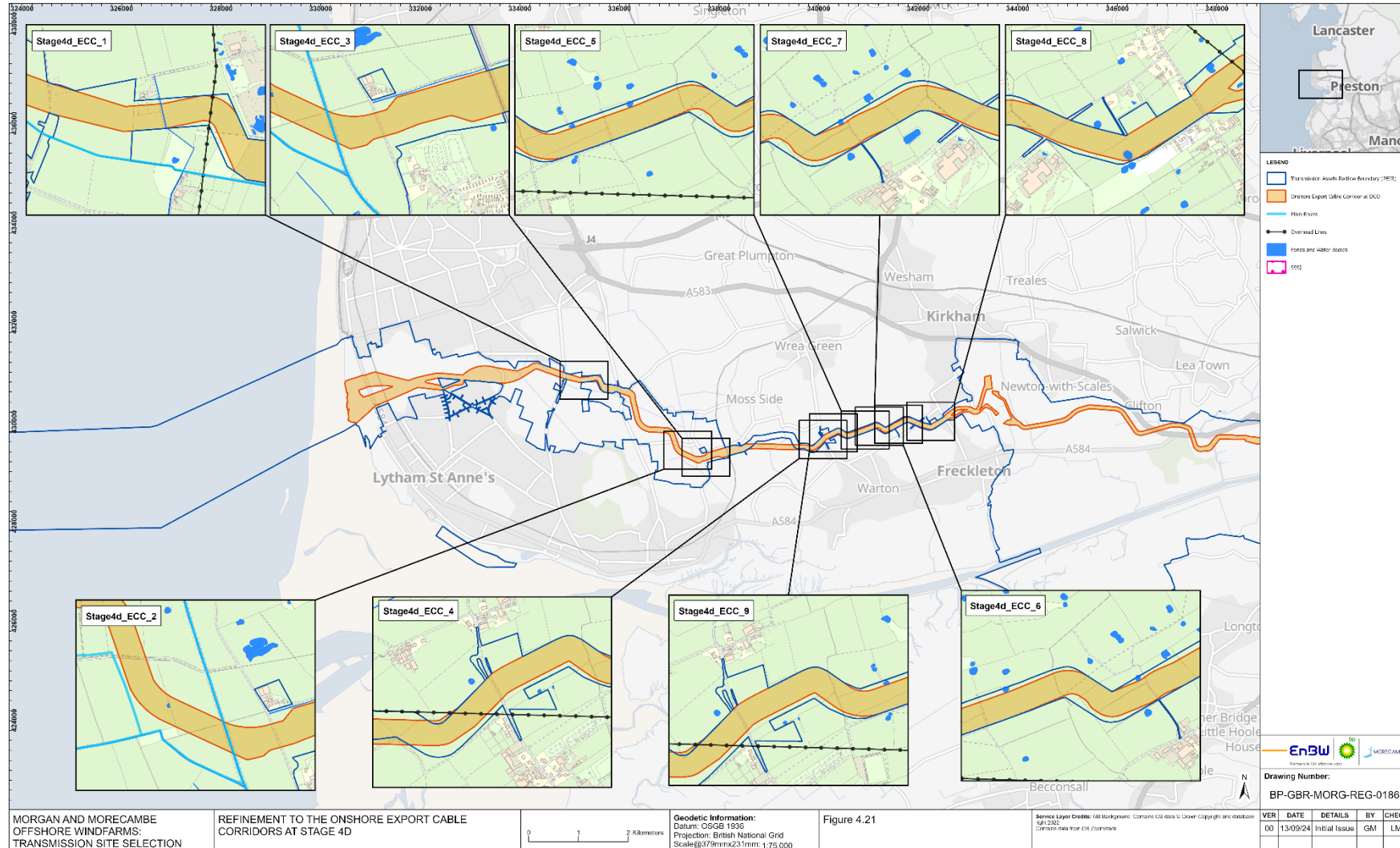


Figure 4.21: Changes to the Onshore Export Cable Corridors at Stage 4d

Temporary Access Tracks

- 4.6.3.8 Temporary access points were also refined at this stage based on changes to the onshore export cable corridors and 400kV grid connection corridors. Once the access points were confirmed, access tracks of up to 10 m were designed. **Figure 4.22** illustrates the changes in the temporary access points and the related temporary access tracks.

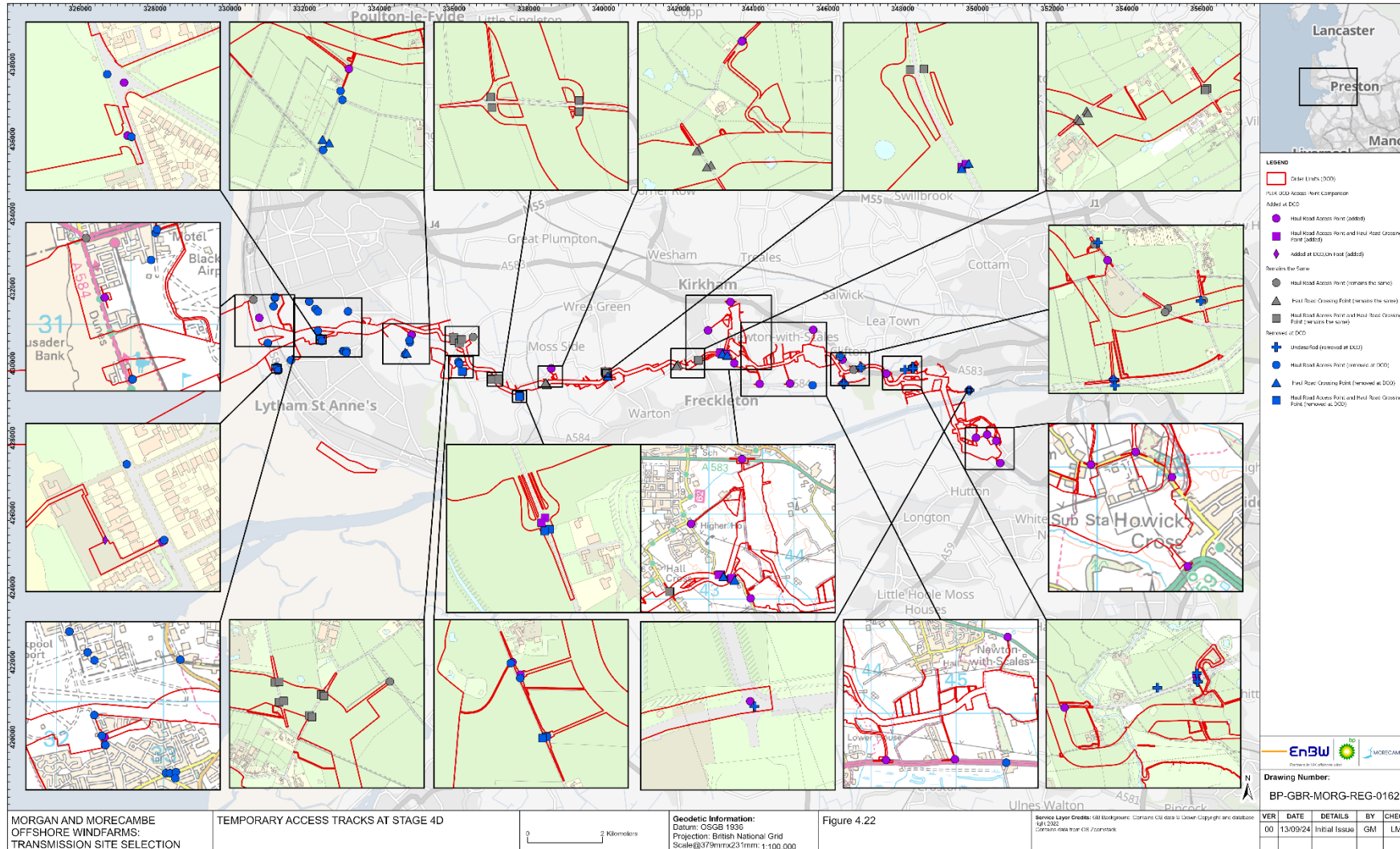


Figure 4.22: Temporary access tracks at Stage 4d

Temporary compound requirements

- 4.6.3.9 Similarly to the temporary access points, the temporary construction compounds were also refined along the onshore export cable corridors. The refinement mainly consisted of the realignment of the temporary construction compound perimeter to align with the reduced width of the onshore export cable corridors.
- 4.6.3.10 During this stage, three different types of temporary construction compounds were also identified along the 400kV grid connection corridors to facilitate the construction of the 400kV grid connection cable corridors. These included:
- Type A Compounds – have been designed to act as a Main Office and include an area for the storage of materials and equipment;
 - Type B Compounds – have been designed primarily for the storage of construction materials and equipment, however it is anticipated that a small area could be utilised for site offices and welfare facilities;
 - Type C Compounds – have been designed as smaller satellite compounds which would be used for offices and welfare as well as a minimal amount of storage of materials and equipment.
- 4.6.3.11 Further information can be found within Volume 1, Chapter 3: Project Description on the construction compounds along the route.
- 4.6.3.12 The key consideration for the siting of the temporary construction compounds was the temporary access points requirements (see **section 4.6.2**), alongside the ground conditions. The frequency of temporary construction compounds along the 400kV grid connection cable corridors was to ensure there was sufficient space to be able to store enough cable drums for that section of cable corridors.
- 4.6.3.13 Each compound was also identified and designed to be immediately adjacent to the grid connection cable corridors for logistical ease, preferably with an existing road or identified access point in close proximity.
- 4.6.3.14 The same BRAG criteria utilised for the onshore export cable corridors (**Table 4.14**) was used to identify suitable locations for the temporary compounds. The compounds BRAG criteria also included situation compounds at least 30 m from residential properties. **Figure 4.23** illustrates the temporary construction compounds along the 400kV grid connection corridors.

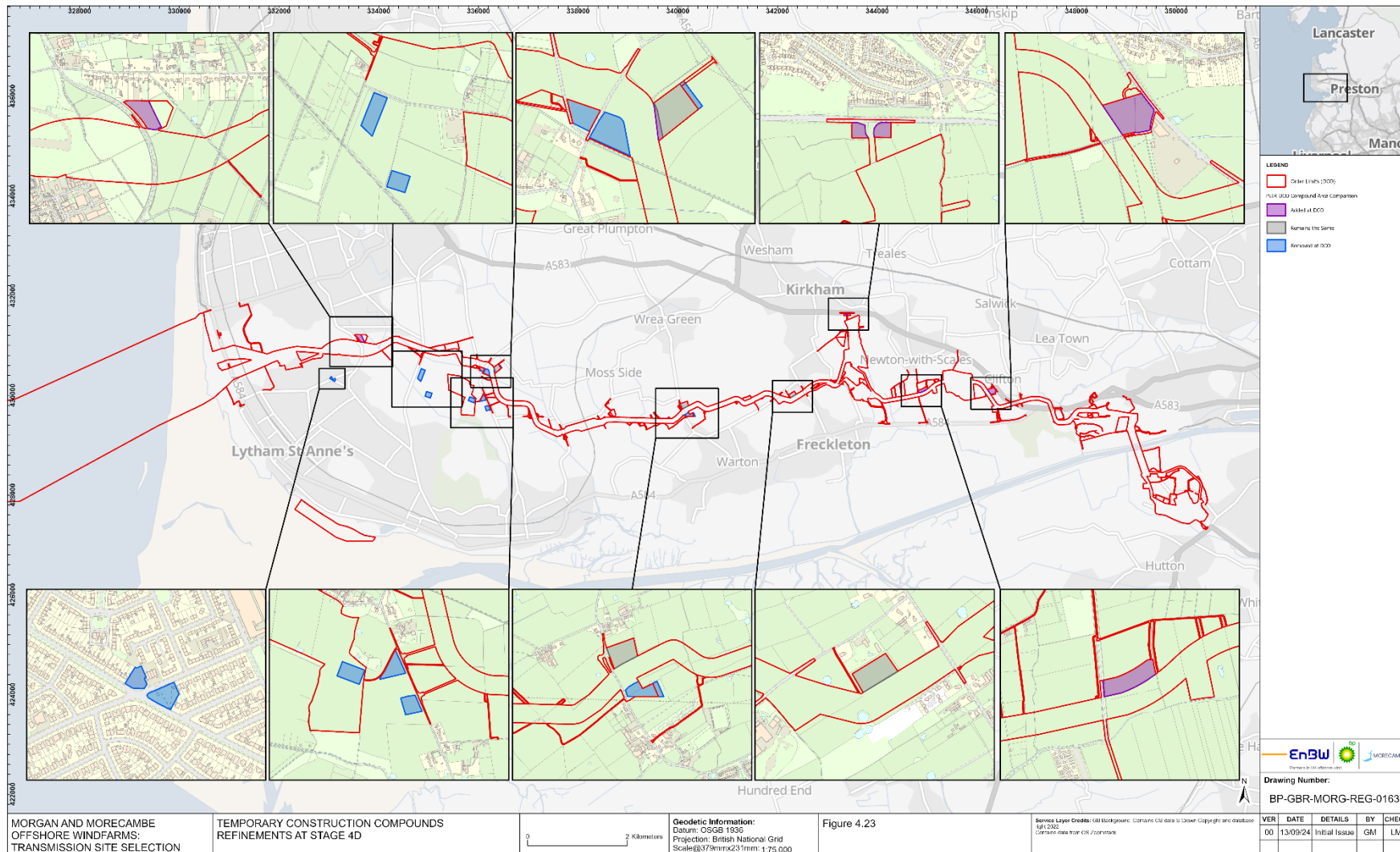


Figure 4.23: Temporary construction compounds refinements at Stage 4d

Permanent Operational Access Points

- 4.6.3.15 The operational access routes have been developed since PEIR to ensure full access along both the onshore export cable and 400 kV grid connection corridors can be achieved. Operation Access Routes have been designed along the onshore export cable corridors and 400kV grid connection cable corridors to the national grid, to enable access for routine operation and maintenance activities. The operational access tracks have been designed to be approximately 3.5 m in width and follow existing paths, openings and/or gates where practicable. If required, clearance of vegetation or other obstacles may be necessary to facilitate access.
- 4.6.3.16 The operational access tracks identified do not require construction, the Transmission Assets is only seeking consent for permanent access rights only.

400kV grid connection cable corridors to the national grid

- 4.6.3.17 A constraints analysis (**Figure 4.24**) and BRAG methodology (outlined in **section 4.3.3**) was applied to the 400kV Grid Connection Cable Corridors Search Area displayed at PEIR to find the most suitable routing from the onshore substations to Penwortham National Grid. The BRAG is presented in **Table 4.18**. **Figure 4.25** illustrates the constraints which were mapped using the BRAG criteria. This, along with the routing principles allowed for the establishment of the 400kV grid connection cable corridors from the onshore substations to the Point of Interconnection at National Grid Penwortham.

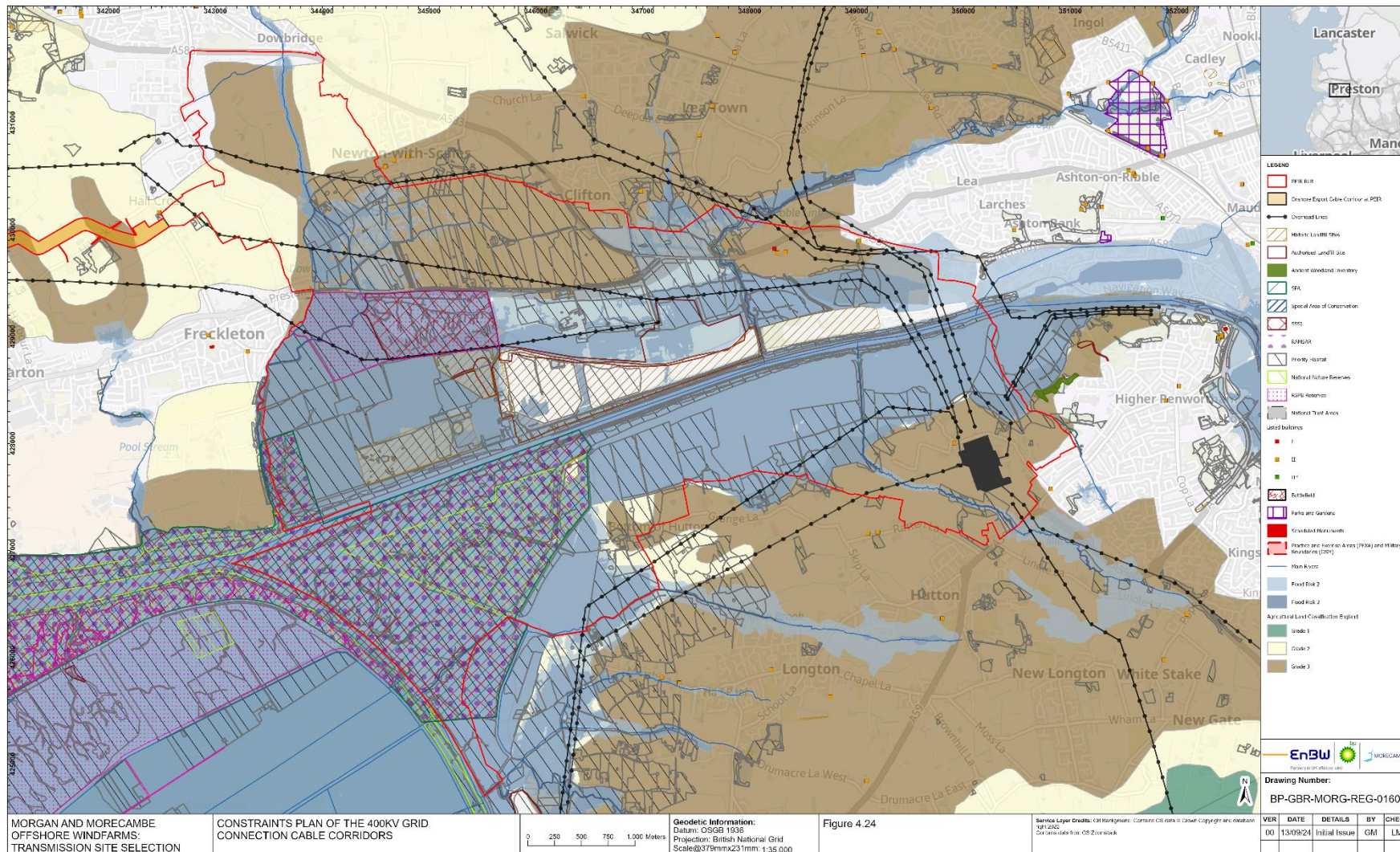


Figure 4.24: Constraints plan of the 400kV Grid Connection Cable Corridors

Table 4.18: 400kV Grid Connection Cable Corridors (excluding the River Ribble crossing) BRAG Criteria for Stage 4d

Package	Category	Black (Potential to be showstoppers)	Red (High potential to constrain the development)	Amber (Intermediate potential to constrain the development)	Green (Low potential to constrain the development)
Engineering and Environmental / Consenting	Contaminated Land		Presence of contaminated land e.g. known area of contaminated land, landfills, asbestos, mine etc.		
Environmental & Consenting	Nature Conservation	<p>Route centreline directly intersecting</p> <ul style="list-style-type: none"> SSSI Units Ancient woodland National Parks SPAs/ SACs Ramsar sites Country Parks National Nature Reserves <p>For the following sites there are not considered to be any showstopper constraints to development:</p> <ul style="list-style-type: none"> Woodpasture and Parkland BAP Priority Habitat 	<p>Route centreline within 0 - 100m of:</p> <ul style="list-style-type: none"> SSSI Units Ancient woodland National Parks SPAs/ SACs Ramsar sites Country Parks National Nature Reserves <p>Or directly intersecting:</p> <ul style="list-style-type: none"> Woodpasture and Parkland BAP Priority Habitat Locally Designated Sites e.g. Biological Heritage Sites 	<p>Route centreline within 100m - 500m</p> <ul style="list-style-type: none"> SSSI Units Ancient woodland National Parks SPAs/ SACs Ramsar sites Country Parks National Nature Reserves <p>Or between 0-100m of:</p> <ul style="list-style-type: none"> Woodpasture and Parkland BAP Priority Habitat Locally Designated Sites e.g. Biological Heritage Sites 	<p>Route centreline more than 500m</p> <ul style="list-style-type: none"> SSSI Units Ancient woodland National Parks SPAs/ SACs Ramsar sites Country Parks National Nature Reserves <p>Or more than 100m from:</p> <ul style="list-style-type: none"> Woodpasture and Parkland BAP Priority Habitat Locally Designated Sites e.g. Biological Heritage Sites

Package	Category	Black (Potential to be showstoppers)	Red (High potential to constrain the development)	Amber (Intermediate potential to constrain the development)	Green (Low potential to constrain the development)
		<ul style="list-style-type: none"> Locally Designated Sites e.g. Biological Heritage Sites 			
	Surface Water Flood Zone	There are no flood zone constraints considered to be showstoppers to development	Route centreline intersecting a Flood Zone 3 area	Route centreline intersecting a Flood Zone 2 area	Route centreline intersecting a Flood Zone 1 area
	Cultural Heritage	Route centreline directly intersecting <ul style="list-style-type: none"> Listed Buildings; Scheduled Monuments boundaries; Registered parks and gardens; Registered battlefields 	Route centreline within 0m - 50m of: <ul style="list-style-type: none"> Listed Buildings; Scheduled Monuments boundaries; Registered parks and gardens; Registered battlefields 	Route centreline within 50m - 200m of: <ul style="list-style-type: none"> Listed Buildings; Scheduled Monuments boundaries; Registered parks and gardens; Registered battlefields 	Route centreline more than 200m. <ul style="list-style-type: none"> Listed Buildings; Scheduled Monuments boundaries; Registered parks and gardens; Registered battlefields
		For the conservation areas there are not considered to be any show stopping constraints to development	Route centreline directly intersecting conservation areas	Conservation areas within 0m – 50m of the route centreline	Route centreline more than 50m
	Other infrastructure & development	Route centreline directly intersecting <ul style="list-style-type: none"> Any land allocated for development in the Local Plan; 	Route centreline within 0m - 100m <ul style="list-style-type: none"> Any land allocated for development in the Local Plan; 	Route centreline within 100m - 200m <ul style="list-style-type: none"> Any land allocated for development in the Local Plan; 	Route centreline more than 200m <ul style="list-style-type: none"> Any land allocated for development in the Local Plan;

Package	Category	Black (Potential to be showstoppers)	Red (High potential to constrain the development)	Amber (Intermediate potential to constrain the development)	Green (Low potential to constrain the development)
		<ul style="list-style-type: none"> Any area of Authorised Landfill 	<ul style="list-style-type: none"> Any area of Authorised Landfill 	<ul style="list-style-type: none"> Any area of Authorised Landfill 	<ul style="list-style-type: none"> Any area of Authorised Landfill
	Proximity to sensitive stakeholders	Route centreline directly intersecting: <ul style="list-style-type: none"> RSPB Reserves; National Trust Land; MoD Exercise Area (inclusive of any buffer zone) 	Route centreline within 0m – 100m <ul style="list-style-type: none"> RSPB Reserves; National Trust Land; MoD Exercise Area (inclusive of any buffer zone) 	Route centreline within 100m - 200m <ul style="list-style-type: none"> RSPB Reserves; National Trust Land; MoD Exercise Area (inclusive of any buffer zone) 	Route centreline more than 200m <ul style="list-style-type: none"> RSPB Reserves; National Trust Land; MoD Exercise Area (inclusive of any buffer zone)
	Residential receptors		Route corridors within 50m - 100m of any residential receptor	Route corridors within 100m - 150m of any residential receptor	Route corridors more than 150m from any residential receptor
Land & Property	Land Quality	No showstopper	Grade 1	Grade 2	Grade 3a & 3b
	Crown & Special Category Land		All red.		

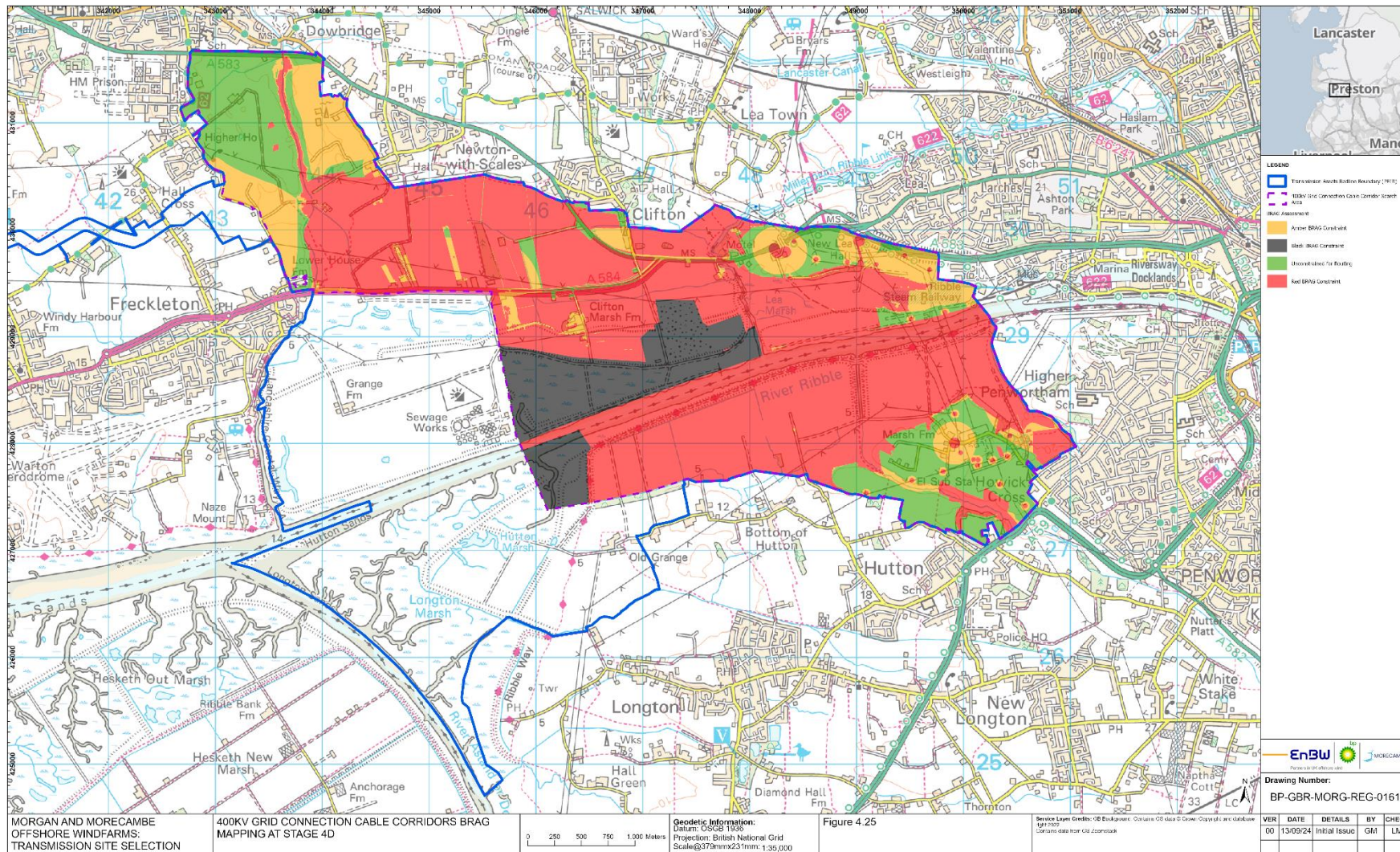


Figure 4.25: 400kV Grid Connection Cable Corridors BRAG Mapping at Stage 4d

4.6.3.18 There were a number of constraints for the 400kV Grid Connection Cable Corridors which could not be completely avoided, but interactions were minimised as far as practicable (e.g. the area of crossing interaction was minimised). These included:

Environmental and Consenting:

- Hedges – where possible the project has looked to site the onshore export cable to avoid hedges; however, this was not always possible. A 15 m buffer from hedges was utilised where possible.
- Public Rights of Ways (PRoWs) – Any PRoWs or bridleways which could not be avoided would be diverted for the minimum required time or crossed using trenchless techniques where practicable (see CoT 32, 91 and 102, **Table 4.5**).
- Priority Habitat – avoidance where possible or minimising interaction with priority habitat.
- EA Main Rivers –The Applicants have committed to using trenchless techniques where the onshore export cable corridors crosses an EA Main River where they couldn't be avoided (see CoT 10, Table 4.5)
- Ordinary watercourses – The project has looked to avoid Ordinary Watercourses where possible and utilise trenchless techniques where practicable. Control measures to avoid impacts to ordinary watercourses have also been detailed within the CoCP (document reference: J1).
- Historical Landfills – avoidance where possible or minimising interaction with historical landfill sites.
- Ponds – Ponds are widespread across the area, therefore where possible the Transmission Assets have avoided ponds to ensure that there are no direct or indirect impacts on flora and fauna.
- Gas Pipelines – minimising crossings of gas pipelines.

Ribble Crossing

4.6.3.19 An important refinement of the search area for the 400kV grid connection cables was the identification of the River Ribble crossing point.

4.6.3.20 The PEIR search area included over five kilometres of the length of the River Ribble. Roughly two kilometres of this length was excluded due to the presence of designated sites (Ribble & Alt Estuaries (SPA) and Ribble Estuary (SSSI) and Ribble & Alt Estuaries (Ramsar)) on the western extent which are considered a black constraint within the BRAG criteria. The remaining three kilometres was then subdivided into different zones (as seen in **Figure 4.26**) then refined using the BRAG criteria to a selected crossing point of 150 meters width.

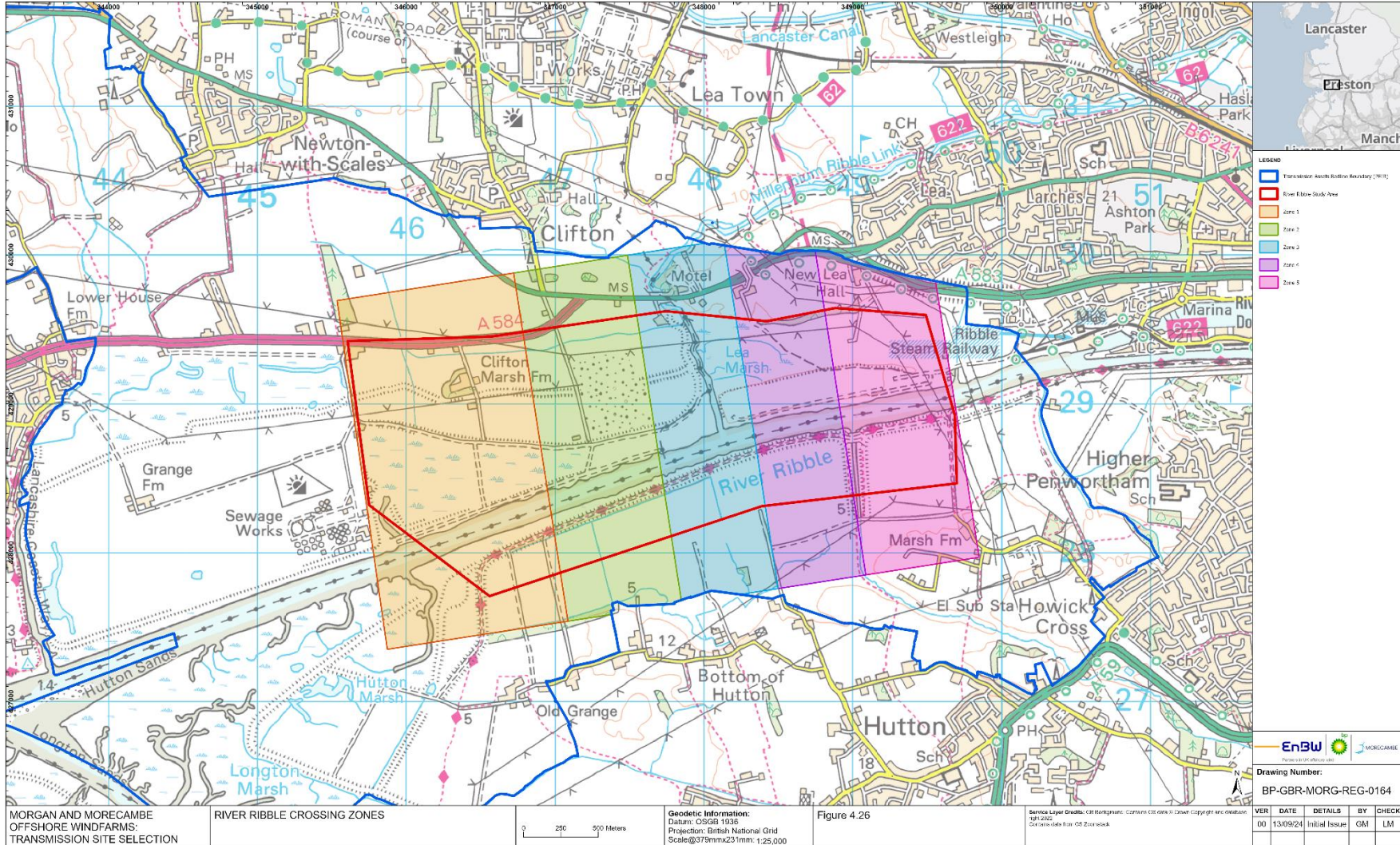


Figure 4.26: River Ribble Crossing Zones

- 4.6.3.21 To identify the most suitable crossing of the River Ribble, the BRAG methodology, outlined in **section 4.3.3** was utilised. The constraints are ranked in **Table 4.20**. The outcome of the BRAG ranking can be seen below in **Table 4.21**.
- 4.6.3.22 A BRAG assessment and comparative appraisal was undertaken based on the BRAG constraints in **Table 4.20**.
- 4.6.3.23 It was found that all Zones have historic landfill, however these are significantly wider in Zones 1 and 2, meaning that a higher proportion of the zone is situated within a landfill.
- 4.6.3.24 Zone 1 contains designated nature conservation sites (Ribble and Alt Estuaries Ramsar and SPA, Ribble Estuary SSSI, Newton Marsh SSSI and River Ribble Biological Heritage Site). These designations are considered black constraints and require avoidance.
- 4.6.3.25 Listed buildings are situated close to Zone 3 and within Zones 4 and 5 which are considered a red constraint within the BRAG methodology. Their presence would require siting the Ribble Crossing, and the cable corridors running to it, such that they maintain a reasonable distance from the listed buildings.
- 4.6.3.26 Zones 1, 2 and 3 contain an active landfill, as shown in **Figure 4.26**. The presence of active landfill is classified as a black constraint and require avoidance. Further, Zones 2 and 3 contain proposals for landfill extensions, which would further increase the associated risks.
- 4.6.3.27 Zone 4 contains poor marshy ground conditions north of the River Ribble and to the east of Savick Brook that cannot host a trenchless techniques entry or exit pit without significant land reclamation and environmental impact. This would lead to a longer crossing than is available in Zone 5.

Table 4.19: River Ribble BRAG Constraints Summary

	Zone 1	Zone 2	Zone 3	Zone 4	Zone 5
Number of black constraints	2	1	1	0	0
Number of red constraints	4	4	6	6	6
Number of amber constraints	0	1	1	1	0
Number of green constraints	5	5	3	4	5

- 4.6.3.28 Therefore, based on **Table 4.19**, Zone 5 was selected as the preferred crossing point due to it not containing being the least constrained with no black constraints and offering the shortest crossing.
- 4.6.3.29 Once the Zone was selected, a 150 m wide crossing was designed within the Zone, taking into consideration the constraints outlined in **Table 4.20**. The siting of the crossing ensured that a distance of 150 m was maintained from listed buildings and residential receptors.

Table 4.20: River Ribble crossing BRAG Criteria for Stage 4d

Package	Category	Black (Potential to be showstoppers)	Red (High potential to constrain the development)	Amber (Intermediate potential to constrain the development)	Green (Low potential to constrain the development)
Engineering and Environmental / Consenting	Contaminated Land	N/A	Presence of contaminated land e.g. known area of contaminated land, landfills, asbestos, mine etc.	N/A	N/A
Environmental & Consenting	Nature Conservation	<p>River Ribble Crossing Zone directly intersecting across:</p> <ul style="list-style-type: none"> • SSSI Units • Ancient woodland • National Parks • SPAs/ SACs • Ramsar sites • Country Parks • National Nature Reserves <p>For the following sites there are <u>not</u> considered to be any showstopper constraints to development:</p> <ul style="list-style-type: none"> • Woodpasture and Parkland BAP Priority Habitat • Locally Designated Sites e.g. Biological Heritage Sites 	<p>River Ribble Crossing Zone is within 0 - 100m of:</p> <ul style="list-style-type: none"> • SSSI Units • Ancient woodland • National Parks • SPAs/ SACs • Ramsar sites • Country Parks • National Nature Reserves • Tree Preservation Orders (TPOs) <p>Or directly intersecting:</p> <ul style="list-style-type: none"> • Woodpasture and Parkland BAP Priority Habitat • Locally Designated Sites e.g. Biological Heritage Sites 	<p>River Ribble crossing Zone within 100m - 500m of:</p> <ul style="list-style-type: none"> • SSSI Units • Ancient woodland • National Parks • SPAs/ SACs • Ramsar sites • Country Parks • National Nature Reserves • Tree Preservation Orders (TPOs) <p>Or between 0-100m of:</p> <ul style="list-style-type: none"> • Woodpasture and Parkland BAP Priority Habitat • Locally Designated Sites e.g. Biological Heritage Sites 	<p>River Ribble Crossing Zone further than 500m from:</p> <ul style="list-style-type: none"> • SSSI Units • Ancient woodland • National Parks • SPAs/ SACs • Ramsar sites • Country Parks • National Nature Reserves • Tree Preservation Orders (TPOs) <p>Or more than 100m from:</p> <ul style="list-style-type: none"> • Woodpasture and Parkland BAP Priority Habitat • Locally Designated Sites e.g. Biological Heritage Sites

Package	Category	Black (Potential to be showstoppers)	Red (High potential to constrain the development)	Amber (Intermediate potential to constrain the development)	Green (Low potential to constrain the development)
		<p>For the following sites there are <u>not</u> considered to be any showstopper constraints. This is due to the assessment considering a Zone, where siting within the Zone will be possible to avoid a small number of individual sites:</p> <ul style="list-style-type: none"> • Tree Preservation Orders (TPOs) 			
	Surface Water Flood Zone	There are no flood zone constraints considered to be showstoppers to development	River Ribble crossing intersecting a Flood Zone 3 area	River Ribble crossing intersecting a Flood Zone 2 area	River Ribble crossing intersecting a Flood Zone 1 area
	Cultural Heritage	<p>River Ribble Crossing Zone directly intersecting across:</p> <ul style="list-style-type: none"> • Registered parks and gardens; • Registered battlefields <p>For the following sites there are <u>not</u> considered to be any showstopper constraints. This is due to the assessment considering a Zone, where siting within the Zone will be possible to avoid a small number of individual sites:</p> <ul style="list-style-type: none"> • Listed Buildings; 	<p>River Ribble Crossing Zone Contains or is within 0m - 50m of:</p> <ul style="list-style-type: none"> • Listed Buildings; • Scheduled Monuments boundaries; • Registered parks and gardens; • Registered battlefields 	<p>River Ribble crossing within 50m - 200m of:</p> <ul style="list-style-type: none"> • Listed Buildings; • Scheduled Monuments boundaries; • Registered parks and gardens; • Registered battlefields 	<p>River Ribble crossing more than 200m.</p> <ul style="list-style-type: none"> • Listed Buildings; • Scheduled Monuments boundaries; • Registered parks and gardens; • Registered battlefields

Package	Category	Black (Potential to be showstoppers)	Red (High potential to constrain the development)	Amber (Intermediate potential to constrain the development)	Green (Low potential to constrain the development)
		<ul style="list-style-type: none"> Scheduled Monuments boundaries; 			
		For the conservation areas there are not considered to be any show stopping constraints to development	River Ribble crossing directly intersecting conservation areas	River Ribble crossing within 0m – 50m	River Ribble crossing more than 50m
	Other infrastructure & development	River Ribble crossing directly intersecting <ul style="list-style-type: none"> Any area of Authorised Landfill 	River Ribble crossing within 0m - 100m <ul style="list-style-type: none"> Any area of Authorised Landfill 	River Ribble crossing within 100m - 200m <ul style="list-style-type: none"> Any area of Authorised Landfill 	River Ribble crossing more than 200m <ul style="list-style-type: none"> Any area of Authorised Landfill
	Proximity to sensitive stakeholders	River Ribble crossing directly intersecting: <ul style="list-style-type: none"> RSPB Reserves; National Trust Land; MoD Exercise Area (inclusive of any buffer zone) 	River Ribble crossing within 0m – 100m <ul style="list-style-type: none"> RSPB Reserves; National Trust Land; MoD Exercise Area (inclusive of any buffer zone) 	River Ribble crossing within 100m - 200m <ul style="list-style-type: none"> RSPB Reserves; National Trust Land; MoD Exercise Area (inclusive of any buffer zone) 	River Ribble crossing more than 200m <ul style="list-style-type: none"> RSPB Reserves; National Trust Land; MoD Exercise Area (inclusive of any buffer zone)
	Residential receptors	There are <u>not</u> considered to be any showstopper constraints. This is due to the assessment considering a Zone, where siting within the Zone will be possible to avoid a small number of individual sites.	River Ribble Crossing Zone contains or is 100m of any residential receptor	River Ribble crossing within 100m - 150m of any residential receptor	River Ribble crossing more than 150m from any residential receptor
Land & Property	Land Quality	No showstopper	Grade 1	Grade 2	Grade 3a & 3b
	Crown & Special Category Land	N/A	All red.	N/A	N/A

Package	Category	Black (Potential to be showstoppers)	Red (High potential to constrain the development)	Amber (Intermediate potential to constrain the development)	Green (Low potential to constrain the development)
Engineering	Constructability	No showstopper	Presence of Quarries and or established marshland.	River Ribble crossing within 0 – 50m of a quarry and/or established marshland.	River Ribble crossing more than 50 m of a quarry and/or established marshland.
	Length of crossing	No showstopper	River Ribble crossing greater than 1250m	River Ribble crossing between 1250m and 750 m	River Ribble crossing less than 750 m

Table 4.21: River Ribble RAG Analysis Summary

Constraint	Zone 1 (Figure 4.26)	Zone 2 (Figure 4.26)	Zone 3 (Figure 4.26)	Zone 4 (Figure 4.26)	Zone 5 (Figure 4.26)
Engineering/Environmental/Consenting: Contaminated Land	<ul style="list-style-type: none"> Clifton Marsh (Phase 3) historical landfill is present 	<ul style="list-style-type: none"> Clifton Marsh (Phase 2) historical landfill is present 	<ul style="list-style-type: none"> Clifton Marsh (Phase 1) historical landfill is present 	<ul style="list-style-type: none"> Ashton and Lea Marshes historical landfill is present 	<ul style="list-style-type: none"> Ashton and Lea Marshes historical landfill is present
Environmental & Consenting: Nature Conservation	<ul style="list-style-type: none"> Ribble and Alt Estuaries Ramsar and SPA present Ribble Estuary SSSI and Newton Marsh SSSI are present onsite River Ribble Biological Heritage Site is present 	<ul style="list-style-type: none"> No statutory designations are present onsite. Tree Preservation Order is present onsite RAMSAR approximately 495 m from River Ribble Crossing SPA approximately 495 m from River Ribble Crossing River Ribble Biological Heritage Site is present 	<ul style="list-style-type: none"> No statutory designations are present onsite. River Ribble and Lea Marsh Biological Heritage Sites are present Tree Preservation Order is situated approximately 337 m from Zone 3 River Ribble Crossing 	<ul style="list-style-type: none"> No statutory designations are present onsite. River Ribble and Lea Marsh Biological Heritage Sites are present 	<ul style="list-style-type: none"> No statutory designations are present onsite. River Ribble Biological Heritage Site is present
Environmental & Consenting: Surface Water Flood Zone	Partially situated in Flood Zone 2 and 3	Partially situated in Flood Zone 2 and 3	Partially situated in Flood Zone 2 and 3	Partially situated in Flood Zone 2 and 3	Partially situated in Flood Zone 2 and 3
Environmental & Consenting: Cultural Heritage	All listed buildings, scheduled monument boundaries, registered parks and gardens and registered battlefields are more than 200m from the River Ribble crossing.	All listed buildings, scheduled monument boundaries, registered parks and gardens and registered battlefields are more than 200m from the River Ribble crossing.	<ul style="list-style-type: none"> A listed building is situated 52m east from Zone 3 River Ribble Crossing All scheduled monument boundaries, registered parks and gardens and registered battlefields are more than 200m from the River Ribble crossing. 	<ul style="list-style-type: none"> Three listed buildings are situated within Zone 4 All scheduled monument boundaries, registered parks and gardens and registered battlefields are more than 200m from the River Ribble crossing. 	<ul style="list-style-type: none"> A listed building in Zone 5 All scheduled monument boundaries, registered parks and gardens and registered battlefields are more than 200m from the River Ribble crossing.
Environmental & Consenting: Other infrastructure & development	<ul style="list-style-type: none"> An authorised landfill is present 	<ul style="list-style-type: none"> An authorised landfill is present Proposals for landfill extensions exist 	<ul style="list-style-type: none"> An authorised landfill is present (Clifton Marsh – Phase 4) Proposals for landfill extensions exist 	There are no authorised landfills presently	There are no authorised landfills presently
Environmental & Consenting: Proximity to sensitive stakeholders	<ul style="list-style-type: none"> River Ribble crossing is more than 200m from RSPB Reserves, National Trust Land and MoD Exercise Area (inclusive of any buffer zone). 	<ul style="list-style-type: none"> River Ribble crossing is more than 200m from RSPB Reserves, National Trust Land and MoD Exercise Area (inclusive of any buffer zone). 	<ul style="list-style-type: none"> River Ribble crossing is more than 200m from RSPB Reserves, National Trust Land and MoD Exercise Area (inclusive of any buffer zone). 	<ul style="list-style-type: none"> River Ribble crossing is more than 200m from RSPB Reserves, National Trust Land and MoD Exercise Area (inclusive of any buffer zone). 	<ul style="list-style-type: none"> River Ribble crossing is more than 200m from RSPB Reserves, National Trust Land and MoD Exercise Area (inclusive of any buffer zone).
Environmental & Consenting: Residential receptors	<ul style="list-style-type: none"> Residential receptors situated within the Zone. 	<ul style="list-style-type: none"> Residential receptors situated within the Zone. 	<ul style="list-style-type: none"> Residential receptors situated within the Zone. 	<ul style="list-style-type: none"> Residential receptors situated within the Zone. 	<ul style="list-style-type: none"> Residential receptors situated within the Zone.
Land & Property : Land Quality	Some Grade 3 Agricultural Soils are present but no Grade 1 or 2	Some Grade 3 Agricultural Soils are present but no Grade 1 or 2	Some Grade 3 Agricultural Soils are present but no Grade 1 or 2	Some Grade 3 Agricultural Soils are present but no Grade 1 or 2	Some Grade 3 Agricultural Soils are present but no Grade 1 or 2

Constraint	Zone 1 (Figure 4.26)	Zone 2 (Figure 4.26)	Zone 3 (Figure 4.26)	Zone 4 (Figure 4.26)	Zone 5 (Figure 4.26)
Land & Property : Crown & Special Category Land	No crown or special category land is present.	No crown or special category land is present.	No crown or special category land is present.	No crown or special category land is present.	No crown or special category land is present.
Engineering: Constructability:	No marsh or quarry is present.	No marsh or quarry is present.	<ul style="list-style-type: none"> Established marshland is present which is associated Lea Marsh No quarry is present. 	<ul style="list-style-type: none"> Established marshland is present which is associated Lea Marsh Former Ashton and Lea Marsh Gravel pit. 	<ul style="list-style-type: none"> No marsh is present. Former Ashton and Lea Marsh Gravel pit.
Engineering: Length of crossing	River Ribble crossing length is approximately 1500m	River Ribble crossing length is approximately 1200m	River Ribble crossing length is approximately 900m	River Ribble crossing length is approximately 1100m	River Ribble crossing length is approximately 600m

Biodiversity Benefit, Mitigation and Enhancement

Mitigation and Enhancement

- 4.6.3.30 Throughout the design of the Transmission Assets, the principles of the mitigation hierarchy of avoid, mitigate, and compensate were followed which influenced the approach to the engineering and environmental design.
- 4.6.3.31 Wherever possible, measures were taken to avoid impacts on ornithology and terrestrial ecology. Such features include designated sites, habitats, trees, visual receptors and species populations. Where this was not possible, solutions were sought to minimise the impacts. Only then were mitigation or compensation measures proposed.
- 4.6.3.32 Where potential significant effects have been predicted during either the construction or operation and maintenance phases, measures have been incorporated into the design to avoid, mitigate or compensate for these impacts and effects.
- 4.6.3.33 This has led to the identification of seven areas for ecological and or ornithological mitigation as shown on Figure 3.9 (Volume 1 Figures of the ES), further details can be found within Outline Ecological Management Plan (document reference: J6).
- 4.6.3.34 These environmental mitigation areas were identified using the following criteria:
- Ecological connectivity;
 - Spatial scale;
 - Deliverability / feasibility; and
 - Ecological efficacy.

Biodiversity Benefit

- 4.6.3.35 On 4 October 2022, the Secretary of State issued a direction under section 35 of the Planning Act 2008 that the Transmission Assets should be treated as development for which a DCO is required. Part 6 of the Environment Act 2021 includes provisions for Biodiversity Net Gain (BNG) with respect to developers looking to submit DCO applications. However Part 6 is not yet in force, so 10% Biodiversity Net Gain is not required for the Transmission Assets.
- 4.6.3.36 Therefore, in accordance with existing legislation, there is no legal requirement for the Transmission Assets to deliver BNG over the full extent of the Onshore Order Limits. In addition, an initial assessment of the Onshore Order Limits was undertaken, which indicated that delivering 10% BNG would not be practicable given the geographic extent of land take that would have been required.
- 4.6.3.37 Notwithstanding, the Project has an aspiration that the DCO application for the Transmission Assets would seek to achieve an overall biodiversity benefit for areas of permanent habitat loss associated with

the areas of habitat loss arising from above ground infrastructure (such as the onshore substations and associated permanent access tracks), noting that the export cable corridors, 400kV grid connection corridors and associated temporary areas would be reinstated to baseline habitat type and condition. In order to identify a suitable area for the Transmission Assets to deliver biodiversity benefit for above ground permanent infrastructure the following steps were taken:

1. The project's baseline habitat types, extent and condition were determined via Phase 1 habitat and National Vegetation Classification surveys undertaken in 2023 and 2024.
2. The identified habitats were then converted to the UK Habitat Classification system using the translation guidance in the Defra metric.
3. The geographic extent (or lengths) of identified habitats was then quantified using ArcGIS software, with the habitat type, extent and condition entered into the Defra Biodiversity Metric to obtain baseline biodiversity unit values
4. The geographic extent (or lengths) of identified habitats, taking into account the onshore substations, including landscaping, permanent access and biodiversity benefit land at Lea Marsh Fields was then calculated and entered into the Defra Biodiversity Metric to obtain biodiversity benefit unit values post construction
5. Once the area required to deliver 10% Biodiversity Benefit was calculated, a site selection exercise was undertaken to determine the best location. The site selection considerations included:
 - Phase 1 Habitat Survey Data
 - In close proximity to areas identified for other terrestrial mitigation
 - Not wholly situated within the onshore infrastructure area

4.6.3.38 These principles were then used to evaluate different areas shown at PEIR (**section 4.6.2**) to select the most appropriate location for the project to deliver biodiversity benefit.

4.6.3.39 This resulted in Lea Marsh Fields, shown in **Figure 4.27**, being selected due the close proximity to an area identified for mitigation and Masons Wood (BHS) which in turn provides further benefits due to the connectivity of the three sites.

4.6.3.40 Further information regarding Biodiversity Benefit can be found in the Outline Biodiversity Benefit Statement (document reference: J11).



Figure 4.27: Environmental Mitigation and Biodiversity Benefit areas at DCO Application

Consultation

Targeted Statutory Consultation

- 4.6.3.41 As a result of the number of changes made by the Applicants after formal Section 42 consultation, a further targeted consultation was undertaken on the 41 proposed minor onshore route amendments, including:
- The inclusion of permanent access rights for 23 additional operational access points in the event that access is required during operation for the inspection of link boxes;
 - Five changes to the routing of the onshore export cable corridors;
 - 11 changes to access tracks and highway access points; and,
 - Two changes to temporary construction compounds.
- 4.6.3.42 The main feedback received as part of the targeted statutory consultation included but was not limited to the following themes:
- Environmental impacts on the proposed design (such as the cable route crossing BMV land and impacts caused by the project on flooding); and
 - Impacts to the local communities as a result of the Transmission Assets.

Landowner Feedback

- 4.6.3.43 Landowner meetings were also held to obtain feedback on the route in order to allow the project to incorporate feedback into the site selection process early, wherever possible. Where feedback was received this was taken into account and fed into the key changes identified in **Table 4.20**.

Key changes made

- 4.6.3.44 Following the feedback received as part of the refinements to key infrastructure parameters, further changes and refinements were made to the onshore export cable corridors, construction compounds and temporary access tracks. These are highlighted with a description of change or refinement on **Figure 4.28** and **Table 4.22**.

Table 4.22: Examples of refinements made to the Transmission Assets Order Limits: Onshore at Stage 4d

Change ID	Description
Stage4d_OL_1	Reduction in the area at Blackpool Airport (see Figure 3.5, Volume 1: Figures) – a large reduction has been made to the Order Limits at Blackpool Airport to the north, including a section north of the runway, south of Heyhouses. An area at the eastern end of the main runway has been retained (Work No. 13A13B) to accommodate potential trenchless installation under the end of the runway and/or potential trenchless installation or open cut, parallel south of the main runway to Queensway (B5261).

Change ID	Description
Stage4d_OL_2	Refinements to proposals at Blackpool Road Recreation Ground (see Figure 3.5, Volume 1: Figures). The area within the recreation ground has been reduced since PEIR, and a commitment made to trenchless technique installation to minimise the duration of works and impact on the recreation grounds. (CoT 123, Table 4.5)
Stage4d_OL_3	Removal of the option to install the onshore export cables within roads - at PEIR the project including proposals to install the onshore export cables within Blackpool Road North, Leach Lane, Kilnhouse Lane, and part of Queensway (B5261). These proposals have now been removed from the final application to mitigation potential effects, including to local residents and the community. The project will not be installing onshore export cables within the roads, however, the option to install the onshore export cables across a northern section of Leach Lane using open cut techniques has been retained.
Stage4d_OL_4	Removal of the southern onshore export cable option (Option 2, south) (see Figure 3.6, Volume 1: Figures) – At PEIR two options were included in the Lytham Moss and Higher Balham area. In response to section 42 feedback, the southern option (Option 2) which passed through to the south of Higher Balham has been removed, to mitigate effects related the Farmland Conservation Area (see Volume 3, Chapter 4: Onshore and intertidal ornithology).
Stage4d_OL_5	Rerouting of the Onshore Export Cable Corridor due to landowner impacts
Stage4d_OL_6	Siting of the compound to the east minimises landowner impact
Stage4d_OL_7	Removal of access and vis-splay to the west to avoid impacts to the Tree Preservation Orders

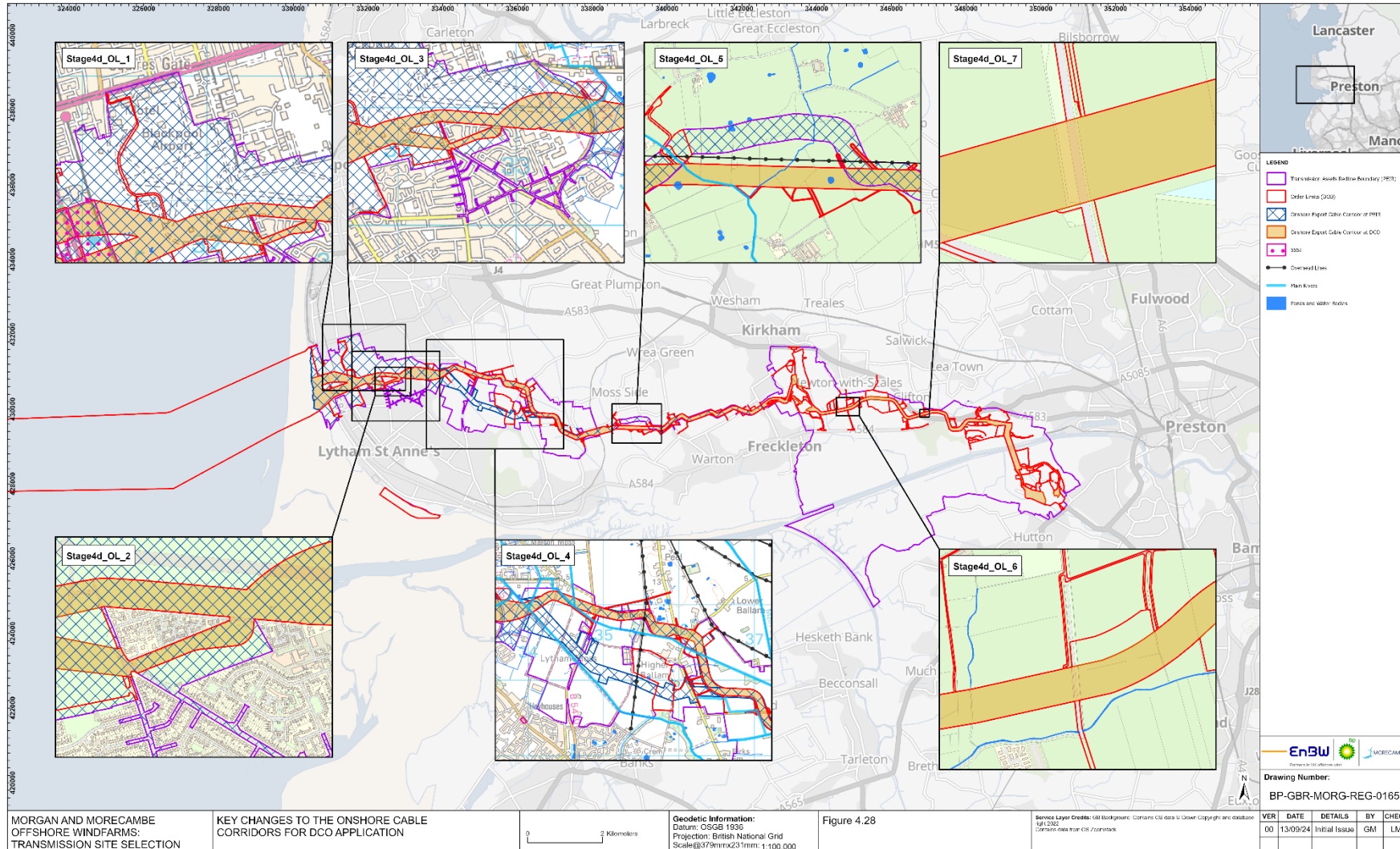


Figure 4.28: Key Changes to the Onshore Cable Corridors

4.7 Conclusion

- 4.7.1.1 The final onshore export cable corridors, onshore substations, 400kV grid connection cable corridors, temporary accesses, permanent accesses, environmental mitigation areas and biodiversity benefit areas as presented within this annex have evolved through a process of stakeholder engagement and a siting and design process that has sought to avoid and minimise environmental effects and impacts to the local community.
- 4.7.1.2 The information presented and the decisions made were conducted by a multi-disciplinary team, taking into consideration stakeholder feedback and site specific data .
- 4.7.1.3 The final Order Limits taken forward for the Transmission Assets application for Development Consent is described and shown in Volume 1, Chapter 3: Project description.

4.8 References

Department for Energy Security & Net Zero (2023a) Overarching National Policy Statement for Energy (EN-1). Available at: <https://assets.publishing.service.gov.uk/media/65bbfdbc709fe1000f637052/overarching-nps-for-energy-en1.pdf>. Accessed: July 2024

Department for Levelling Up, Housing and Communities and Ministry of Housing, Communities and Local Government (2024) Planning Practice Guidance. Natural environment <https://www.gov.uk/guidance/natural-environment#biodiversity-geodiversity-and-ecosystems> Accessed May 2024.