MORGAN AND MORECAMBE OFFSHORE WIND FARMS: TRANSMISSION ASSETS

Outline Design Principles

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Morgan and Morecambe offshore wind farms: transmission assets

Outline design principles

MORECAMBE
cobra | FLOTATION ENERGY

EnBW | bp
Partners in UK offshore wind

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This document has been prepared and checked in accordance with ISO 9001:2015

Glossary

Term	Meaning
400 kV grid connection cables	Cables that will connect the proposed onshore substations to the existing National Grid Penwortham substation.
400 kV grid connection cable corridor	The corridor within which the 400 kV grid connection cables will be located.
Applicants	Morgan Offshore Wind Limited (Morgan OWL) and Morecambe Offshore Windfarm Ltd (Morecambe OWL).
Code of Construction Practice	A document detailing the overarching principles of construction, contractor protocols, construction-related environmental management measures, pollution prevention measures, the selection of appropriate construction techniques and monitoring processes.
Construction Traffic Management Plan	A document detailing the construction traffic routes for heavy goods vehicles and personnel travel, protocols for delivery of Abnormal Indivisible Loads to site, measures for road cleaning and sustainable site travel measures.
Development Consent Order	An order made under the Planning Act 2008, as amended, granting development consent.
Direct pipe	A cable installation technique which involves the use of a mini (or micro) tunnel boring machine and a hydraulic (or other) thruster rig to directly install a steel pipe between two points.

Term	Meaning
Dust	Solid particles suspended in air or settled out onto a surface after having been suspended in air, as defined by the Institute of Air Quality Management.
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.
Export cable corridor	The specific corridor of seabed (seaward of Mean High Water Springs and land (landward of Mean High Water Springs) from the Generation Assets to the National Grid Penwortham substation.
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.
Greenhouse gas	A gas that absorbs and emits radiant energy within the thermal infrared range, causing the greenhouse effect. Examples include carbon dioxide and methane.

Term	Meaning
Horizontal directional drilling	A trenchless technique for installing cables and cable ducts involving drilling in an arc between two points.
Intertidal Infrastructure Area	The temporary and permanent areas between MLWS and MHWS.
Landfall	The area in which the offshore export cables make landfall (come on shore) and the transitional area between the offshore cabling and the onshore cabling. This term applies to the entire landfall area at Lytham St. Annes between Mean Low Water Springs and the transition joint bay inclusive of all construction works, including the offshore and onshore cable routes, intertidal working area and landfall compound(s).
Local Highway Authority	A body responsible for the public highways in a particular area of England and Wales, as defined in the Highways Act 1980.
Local Planning Authority	The local government body (e.g., Borough Council, District Council, etc.) responsible for determining planning applications within a specific area.
Main rivers	The term used to describe a watercourse designated as a Main River under the Water Resources Act 1991 and shown on the Main River Map. These are usually larger rivers or streams and are managed by the Environment Agency.

Term	Meaning
Marine Guidance Note	A system of guidance notes issued by the Maritime and Coastguard Agency which provide significant advice relating to the improvement of the safety of shipping and of life at sea, and to prevent or minimise pollution from shipping.
Mean High Water Springs	The height of mean high water during spring tides in a year.
Mean Low Water Springs	The height of mean low water during spring tides in a year.
Method Statements	A document that describes how a particular task or action should be undertaken correctly.
Micro-tunnel	A tunnelling technique involving the use of a hydraulic (or other) jacking rig and a mini (or micro) tunnel boring machine to install a concrete tunnel between two points.
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.

Glossary

Term	Meaning
Morgan and Morecambe Offshore Wind Farms: Transmission Assets	The offshore and onshore infrastructure connecting the Morgan Offshore Wind Project and the Morecambe Offshore Windfarm to the national grid. This includes the offshore export cables, landfall site, onshore export cables, onshore substations, 400 kV grid connection cables and associated grid connection infrastructure such as circuit breaker compounds.
Morgan Offshore Wind Project: Generation Assets	The offshore generation assets and associated activities for the Morgan Offshore Wind Project.
Morgan Offshore Wind Project: Transmission Assets	The offshore export cables, landfall and onshore infrastructure required to connect the Morgan Offshore Wind Project to the National Grid.
Morgan OWL	Morgan Offshore Wind Limited is a joint venture between bp Alternative Energy investments Ltd. and Energie Baden-Württemberg AG (EnBW).
Offshore export cables	The cables which would bring electricity from the Generation Assets to the landfall.
Offshore export cable corridor	The corridor within which the offshore export cables will be located.
Onshore export cables	The cables which would bring electricity from 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 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.
Order limits	The limits within which the Transmission Assets may be carried out.
Ordinary Watercourses	Watercourses (such as a river, stream, ditch, cut, sluice, dyke or non-public sewer) that are not designated a Main River under the Water Resources Act (1991). Responsibility for management lies with the Lead Local Flood Authority, or Internal Drainage Board for some watercourses where there is an Internal Drainage District.

Term	Meaning
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.
Safety zones	An area around a structure or vessel which should be avoided.
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.
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.
Substation	Part of an electrical transmission and distribution system. Substations transform voltage from high to low, or the reverse by means of electrical transformers.
The Secretary of State for Energy Security and Net Zero	The decision maker with regards to the application for development consent for the Transmission Assets.

Term	Meaning
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

Acronyms

Acronym	Meaning
AEZ	Archaeological Exclusion Zone
CoT	Project Commitment
CAA	Civil Aviation Authority
DEFRA	Department for Environment, Food & Rural Affairs
CBRA	Cable Burial Risk Assessment
CLFO	Company Fisheries Liaison Officer
CSIP	Cable Specificaion Installation Plan
DCO	Development Consent Order
EIA	Environmental Impact Assessment
ECCs	Export Cable Corridors
EMF	Electro-Magnetic Field
FLOWW	Fishing Liaison with Offshore Wind and Wet Renewables Group
HDD	Horizontal directional drilling
HGV	Heavy Goods Vehicle
IEMA	Institute for Environmental Management and Assessment

Acronym	Meaning
MCA	Maritime and Coastguard Agency
MCZ	Marine Conservation Zone
MMO	Marine Management Organisation
MMMP	Marine Mammal Mitigation Protocol
PAD	Protocol for Archaeological Discoveries
PEIR	Preliminary Environmental Information Report
RPSS	Route Planning and Site Selection
SPA	Special Protection Area
SSSI	Site of Special Scientific Interest
TAEZ	Temporary Archaeological Exclusion Zones
UKHO	United Kingdom Hydrographic Organisation
WSI	Written Scheme of Investigation

Units

Unit	Description
km	Kilometre
kV	Kilovolt
nm	Nautical mile

1.0 Introduction

Introduction

1.1 Background

1.1.1.1 This document forms the Outline Design Principles (Outline DP) prepared for the Morgan and Morecambe Offshore Wind Farms: Transmission Assets (referred to hereafter as 'the Transmission Assets').

1.1.1.2 The document is focussed on design elements associated with the two onshore substations.

1.2 Project overview

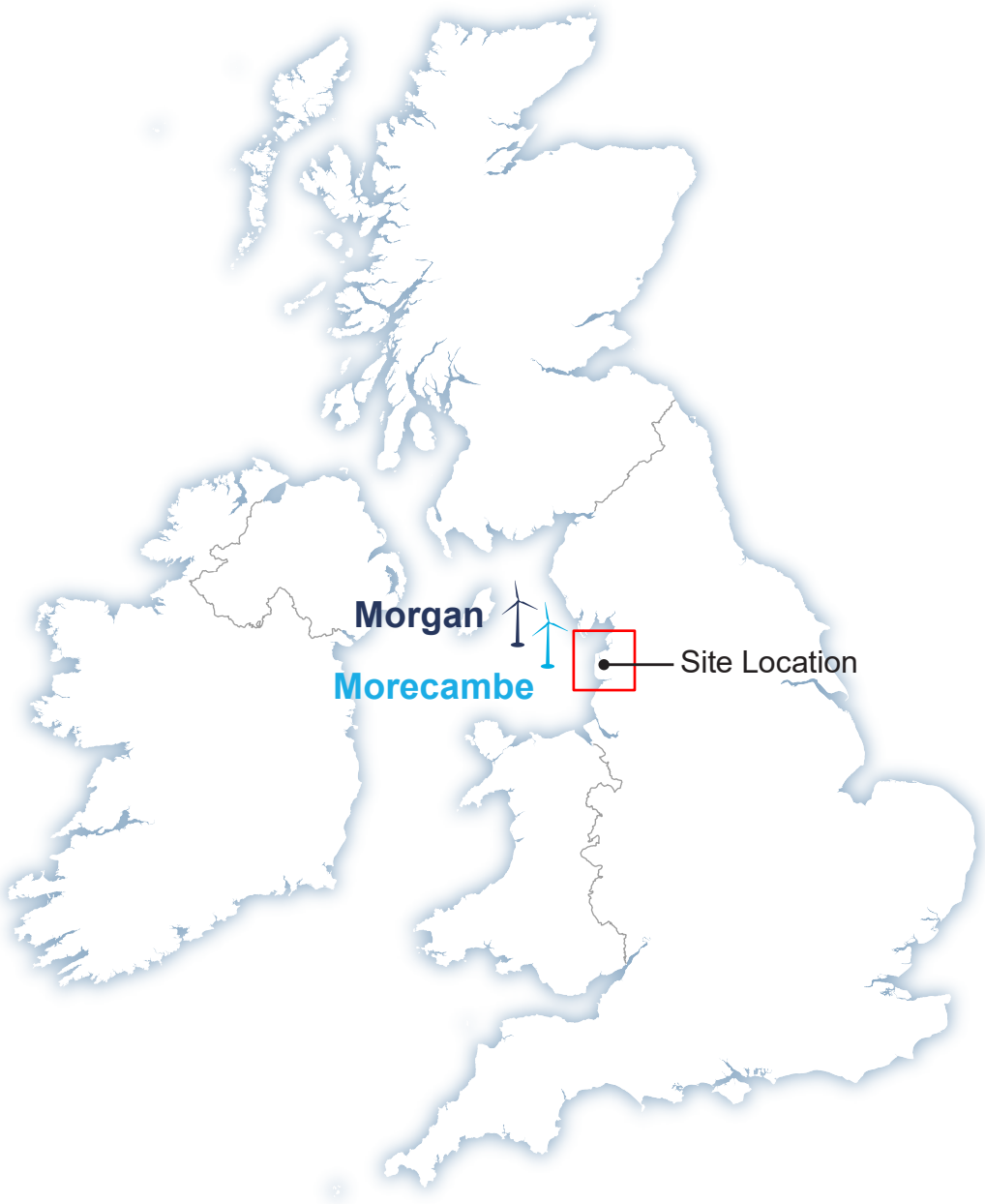
1.2.1.1 Morgan Offshore Wind Limited (Morgan OWL), a joint venture between bp Alternative Energy Investments Ltd. (bp) and Energie Baden-Württemberg AG (EnBW), is developing the Morgan Offshore Wind Project. The Morgan Offshore Wind Project is a proposed wind farm in the east Irish Sea.

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

1.2.1.3 Morgan OWL and Morecambe OWL (the Applicants), being in agreement with the output from the Holistic Network Design Review, are jointly seeking a single consent for their electrically separate Transmission Assets comprising aligned offshore export cable corridors to landfall and aligned onshore export cable corridors to separate substation(s), and onward connections to the National Grid at Penwortham, Lancashire.

1.2.1.4 The purpose of the Transmission Assets is to connect the Morgan Offshore Wind Project: Generation Assets and Morecambe Offshore Windfarm: Generation Assets (referred to collectively as the 'Generation Assets') to the National Grid. The key components of the Transmission Assets include offshore element, landfall and onshore elements.

1.2.1.5 Details of the activities and infrastructure associated with the Transmission Assets are set out in Volume 1, Chapter 3: Project description of the Environmental Statement (ES) (document reference F1.3).



1.3 Purpose and status

1.3.1.1 The Outline DP has been prepared pursuant to Regulation 5(2)(q) of The Infrastructure Planning (Applications: Prescribed Forms and Procedures) Regulations 2009 and forms part of a suite of supporting documents for the DCO application.

1.3.1.2 Its purpose is to demonstrate how the Applicants – in relation only to the two substations that will separately service the Generation Assets – have:

- Fulfilled the requirement for 'good design', as prescribed in the National Policy Statements EN-1, EN-3 and EN-5
- Established a set of design principles to guide design from the outset of the Project
- Has considered site constraints and consultation responses.
- Has embedded good design during the iterative process of selecting site and refining the sites of each substation
- Has championed good design across multiple disciplines
- Will ensure the principles of good design are maintained post-consent and throughout the detailed design process

1.3.1.3 The design proposals outlined in this document are indicative but are based on the Transmission Assets' maximum design scenarios (MDS), which describes a range of potential construction parameters for the Transmission Assets. The realistic worst case design and construction, operation, and decommissioning activities are considered.

1.3.1.4 This approach and use of the MDS allows flexibility in aspects such as infrastructure siting, foundation types, and construction methods, which will require further detailed consideration after the DCO submission. At the same time, the MDS offers enough certainty, in combination with design principles set out in this document, to support the ES assessments and provide clarity on the final design.

1.3.1.5 This document is to be read in conjunctions with the following ES chapters: Volume 1, Chapter 3: Project description (document reference F1.3) and Volume 1, Chapter 4: Site Selection and Alternatives (document reference F1.4).

1.4 Structure

1.4.1.1 This document is set out as follows:

- **Section 2.0 Site Context** presents an overview of the environmental context of the two substation sites.
- **Section 3.0 Good Design Policy Context** sets out the relevant policies, criteria for good design and guidance when planning for an substation.
- **Section 4.0 Design Framework** establishes how the Applicants have fulfilled the criteria of 'good design' through a clearly defined design framework, setting out the vision, objectives and design principles.
- **Section 5.0 Design Approach, Evolution and Response** demonstrates how the design of the substations has approached, evolved and responded to the environment and consultation responses.
- **Section 6.0 Securing Good Design Post Context** outlines how the Applicants will secure and govern the implementation of the detailed design on the Transmission Assets' substation, following a successful consenting process.

2.0 Site Context

Site Context

2.1 Introduction

2.1.1.1 Decisions about the design proposals of the two substations have been guided by an understanding of the natural and cultural influences shaping the landscape where they will be constructed, operated, and decommissioned.

2.1.1.2 To reflect Lancashire's unique landscape, a tailored design response has been developed, identifying potential impacts on existing environmental features and the visual environment. The Applicants have actively sought opportunities to avoid or mitigate potentially harmful environmental effects from the new infrastructure associated with each substation. These efforts aim to protect the character and qualities of the landscape while enhancing them, wherever possible.

2.1.1.3 The section provides a brief overview of key environmental and policy considerations that have informed the Applicants' design of each substation, It summarises relevant environmental resources and assets that have been considered.

2.1.1.4 Mitigation measures proposed by each relevant topic are documented in **Section 5.0 Design Approach, Evolution and Response.**

2.1.1.5 Figure 1 shows the location of the two substations in the context of the Order Limits of the Transmission Assets.

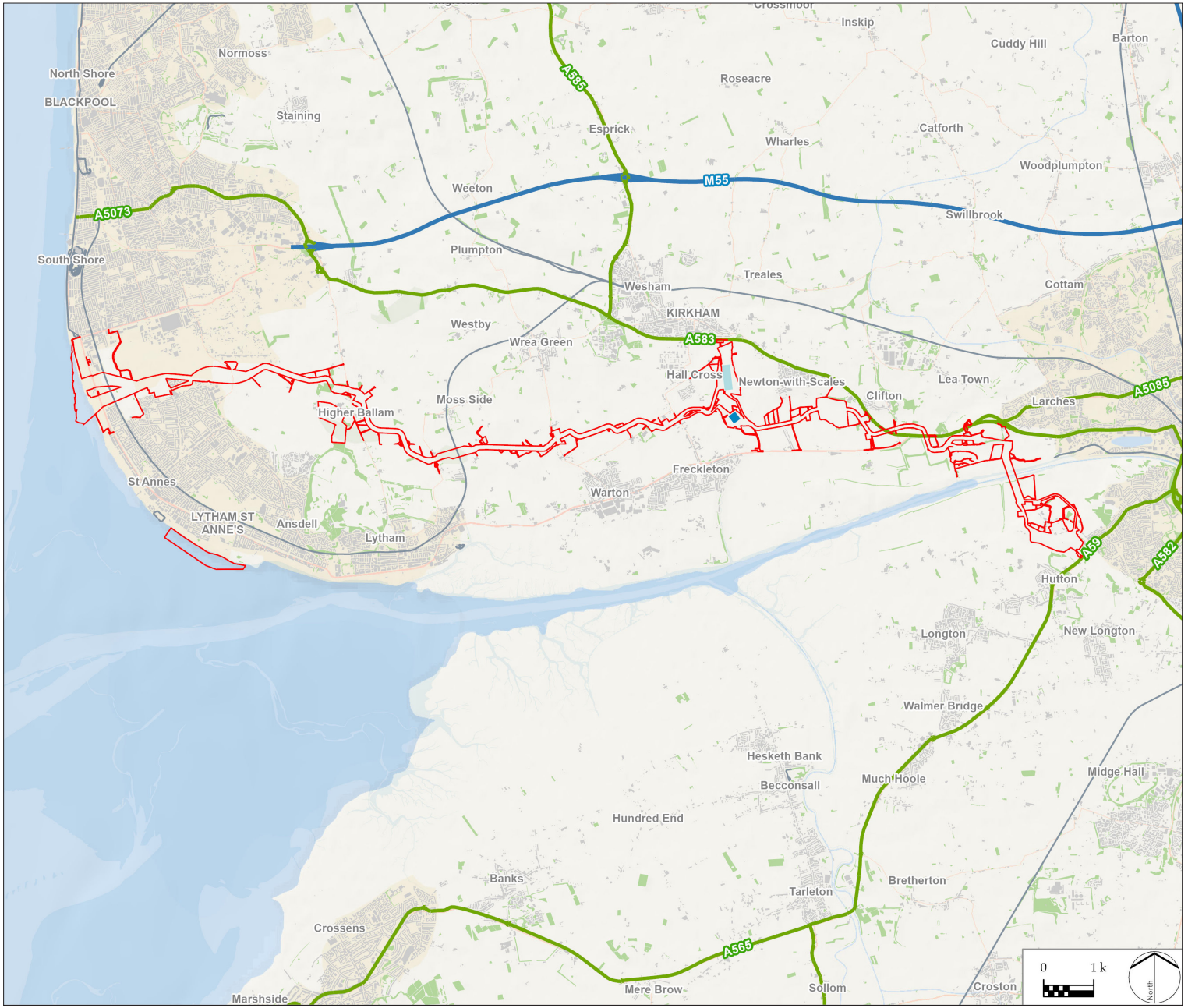


Figure 1: Location of the Morgan substation site and the Morecambe substation site in the context of the Order Limits

Figure 2: Location of the Morgan substation and the Morecambe substation in their immediate contexts

2.2 Overview of the substation sites

2.2.1 Morgan substation site

2.2.1.1 The Morgan substation site is situated between Kirkham and Freckleton, to the south of the A583 Kirkham Bypass and east of Hall Cross, to the north of the Morecambe substation site. Lower Lane, Greenbank Farm and Freshfield Farm are located to the west. HM Prison Kirkham is located to the north west and Newton-with-Scales is to the site's east.

2.2.1.2 The site is gently sloping, falling in an easterly direction from its highest point, at approximately 16 m AOD, towards Dow Brook, which is at approximately 6.5m AOD. The site is irregular in shape, delineated by field boundaries and Dow Brook, and is currently used for cattle grazing.

2.2.1.3 A public bridleway (BW0505016) runs to the west of the site from Hall Cross (Higher Hall) to connect to other public rights of way towards Freckleton. It passes to the west of the substation site Dow Brook lies to the east of the site.

2.2.2 Morecambe substation site

2.2.2.1 The Morecambe substation site is situated to the south of the Morgan substation site, east of Lower Lane and to the north of Freckleton. A public bridleway and Dow Brook run to the east of the site, which is relatively flat at between 9 to 12 m AOD.

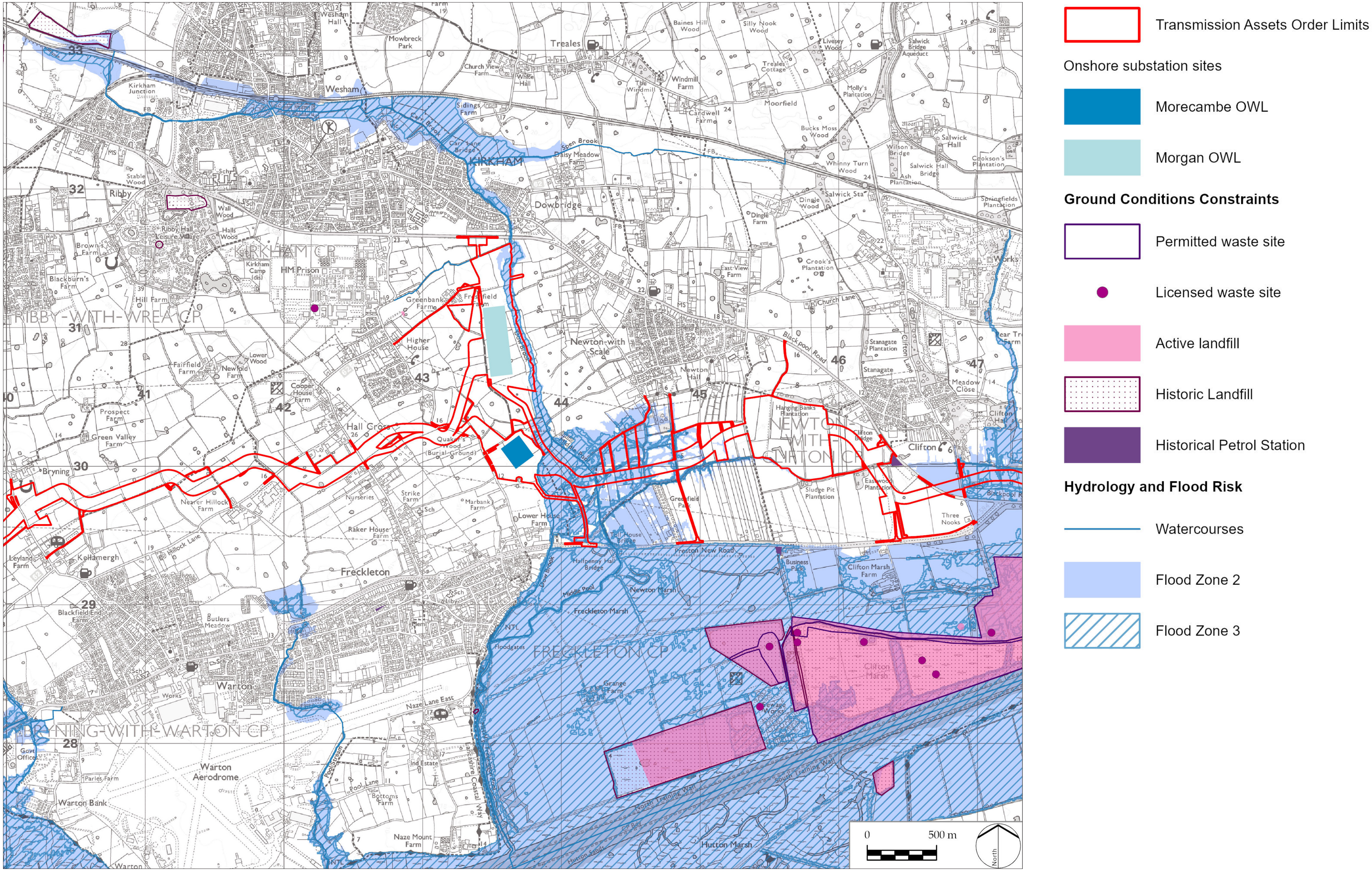


Figure 3: Ground conditions constraints, hydrology and flood risk

2.2.3 Geology, hydrogeology and ground conditions

2.2.3.1 Volume 3, Chapter 1 considers the likely impacts and effects of the Transmission Assets on geology, hydrogeology and ground conditions during the construction, operation and maintenance and decommissioning phases. An overview of the existing environment outlined below.

2.2.3.2 The Transmission Assets traverse a low-lying coastal region underlain by a thick sequence of superficial deposits. Near-surface sand and gravel layers are present around the substations. The substations are situated on drained marshland, characterised by numerous land drains and small watercourses, with limited evidence of springs or groundwater-fed wetlands.

2.2.3.3 For significant groundwater discharge to occur, these land drains and watercourses would need to connect with important aquifers. However, in most cases, they are underlain by clay-rich deposits such as Glacial Till and Tidal Flats, which have low permeability and do not contribute meaningfully to surface water flows. This is evidenced by the prevalence of small, isolated ponds and the scarcity of shallow groundwater abstractions.

2.2.3.4 As a result, groundwater-dependent features are not considered sensitive receptors across within and around either of the substations.

2.2.4 Hydrology and flood risk

2.2.4.1 Volume 3, Chapter 2 considers the likely impacts and effects of the Transmission Assets on hydrology and flood risk during the construction, operation and maintenance, and decommissioning phases. An overview of the existing environment outlined below.

2.2.4.2 The Transmission Assets are situated within the North West River Basin District, which is divided into fifteen Management Catchments. The substations fall within the Ribble Management Catchment.

2.2.4.3 The permanent Morgan substation, along with its permanent access tracks and surface water attenuation, is located within Flood Zone 1. Similarly, the permanent Morecambe substation and its surface water attenuation are also situated within Flood Zone 1, while the associated permanent access tracks extend across Flood Zones 1, 2, and 3.

2.2.4.4 In addition, construction compounds related to both substations, including temporary construction compounds and access tracks (haul roads), are spread across Flood Zones 1, 2, and 3.

2.2.4.5 This distribution across multiple flood zones reflects the planning and design considerations needed to manage flood risk in these areas while ensuring the operational integrity of the assets throughout their lifecycle.

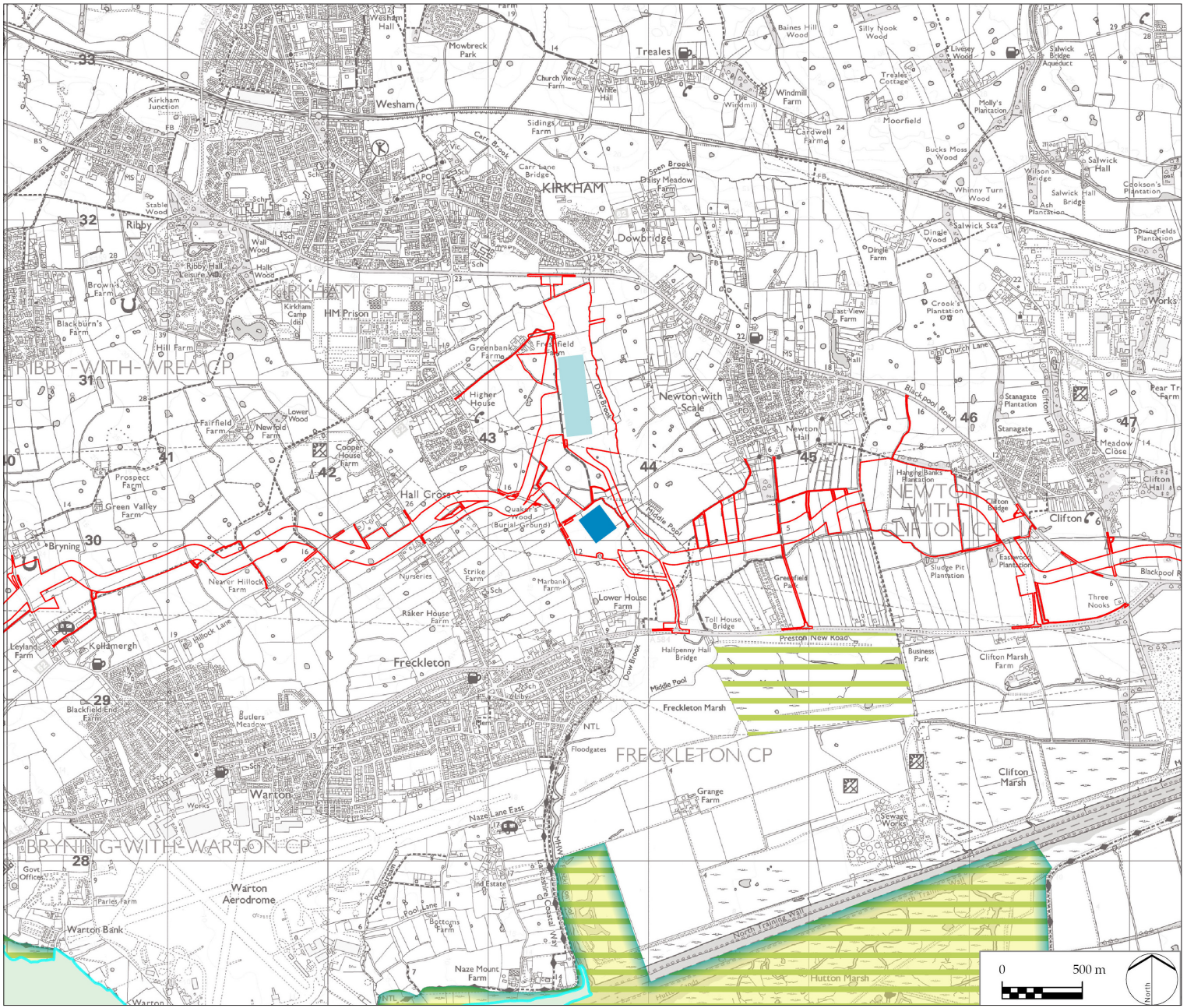


Figure 4: Onshore ecology and nature conservation

2.2.5 Onshore ecology and nature conservation

2.2.5.1 Volume 3, Chapter 3 considers the likely impacts and effects of the Transmission Assets on onshore ecology and nature conservation during the construction, operation and maintenance and decommissioning phases.

2.2.5.2 The baseline surveys for the Transmission Assets identified a variety of habitats of varying quality, including important types such as ancient and deciduous woodlands, coastal and floodplain grazing marshes, coastal saltmarshes, sand dunes, semi-improved grasslands, lowland fens and meadows, mudflats, mature broadleaved trees, scrub, waterbodies, watercourses, and species-rich hedgerows forming field boundaries. Additionally, the Transmission Assets are situated near a range of international, national, and locally designated ecological sites, including two locally designated sites within the footprint of the Morgan onshore substation.

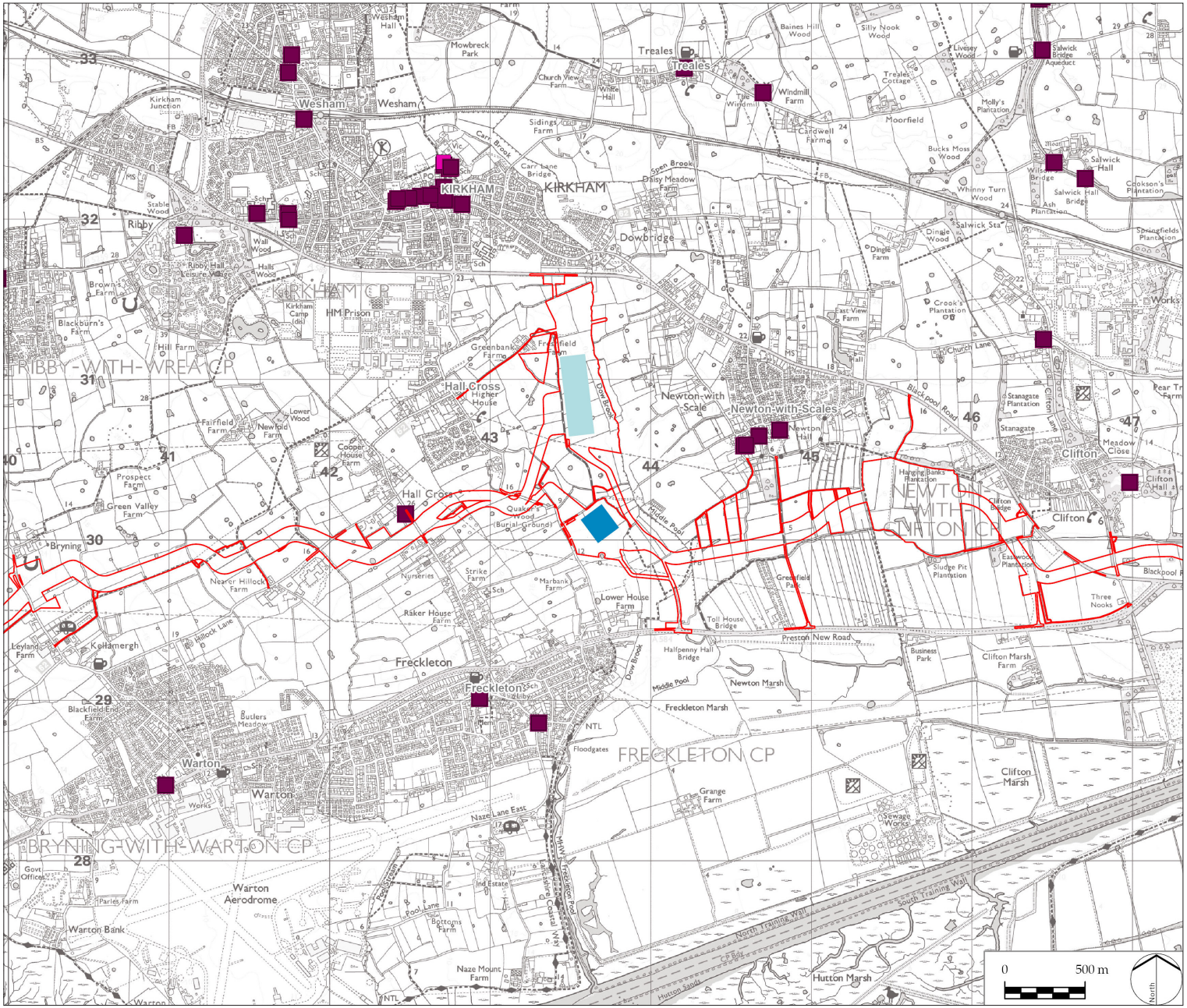


Figure 5: Historic environment

2.2.5.3 Historic environment

2.2.5.4 Volume 3, Chapter 5 considers the likely impacts and effects of the Transmission Assets on the historic environment during the construction, operation and maintenance, and decommissioning phases.

2.2.5.5 The construction, operation, and maintenance of the Transmission Assets would not result in any direct physical impacts on nearby designated heritage assets. Any impact on assets would be indirect and non-physical, arising from a change within the setting of the asset.

2.2.5.6 Within the 5 km radius of the substations, there are no Scheduled Monuments, Registered Parks and Gardens, Registered Battlefields, or Conservation Areas that would be affected by the construction, operation, or decommissioning activities.

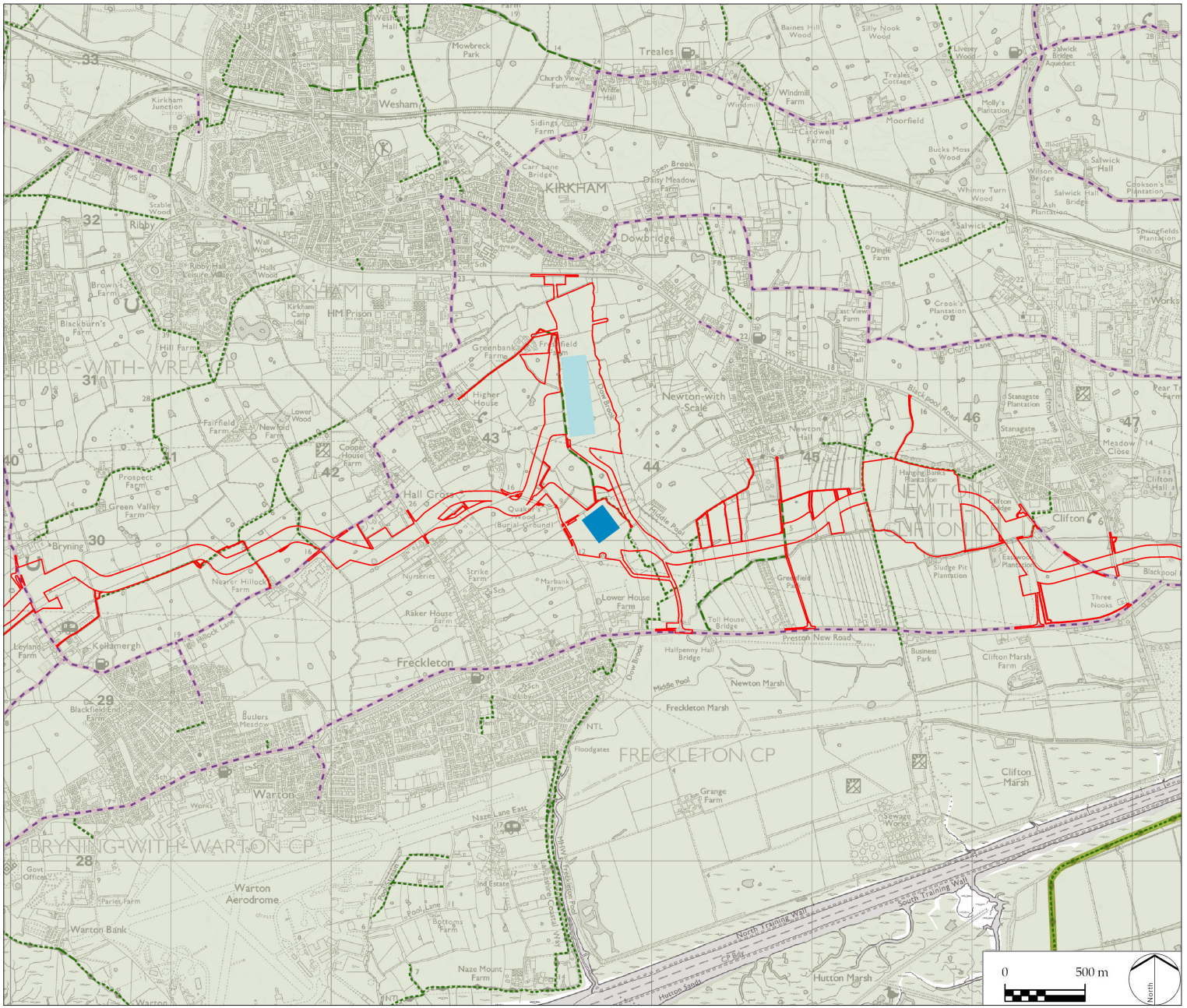


Figure 6: Landscape Character and Designations

2.2.6 Landscape Character and Designations

2.2.6.1 Volume 3, Chapter 6 considers the likely impacts and effects of the Transmission Assets on landscape and visual resources during the construction, operation and maintenance, and decommissioning phases.

2.2.6.2 The Transmission Assets are located within a diverse landscape characterised by a mix of urban areas with historic industrial buildings that juxtapose with surrounding agricultural areas. The landscape includes marginal upland pastures, extensive grasslands, and wooded river corridors of the Ribble Valley, as well as the arable fields of the Fylde and the drained horticultural landscapes of the mosslands.

2.2.6.3 Lancashire's landscape is distinguished by long views and inter-visibility between various landscape types, although the intimate and undulating countryside around the substation contrasts wider characteristics. Settlement patterns feature clusters of 18th and 19th-century red brick farm buildings and rural villages, heavily influenced by 20th-century development. Enclosed coastal marshes and intertidal flats, notably around the Ribble, Lune, and Wyre estuaries, which are valued for their beauty and prolific birdlife.

2.2.6.4 National Character Areas provide a broad overview of the landscape character across the county. Local character assessments are published by the local planning authority and provide a more detailed description of landscape character.

2.2.6.5 No designated landscape areas of international, national or local importance are located within, or near to, the substations.

2.2.7 Amenity and recreation

2.2.7.1 Recreational resources within or near the Transmission Assets Order Limits include coastal areas, beaches, open greenspaces (e.g., playing fields, parks, golf courses), National Cycle Routes 62 and 622, Long Distance Footpaths (Ribble Way, Lancashire Coastal Way), public rights of way (PRoW), and other facilities such as waterways, Blackpool Airport, holiday parks, and stables.

2.2.8 Traffic

2.2.8.1 Volume 3, Chapter 7 considers the likely impacts and effects of the Transmission Assets on traffic and transport during the construction, operation and maintenance, and decommissioning phases.

2.2.8.2 A study area was established in consultation with local highway authorities, covering relevant sections of the strategic and local road networks likely to be used by construction vehicles. Baseline conditions were assessed using publicly available traffic flow data, new traffic surveys, road safety evaluations, and analyses of public transport, pedestrian, and cyclist facilities.

2.2.9 Noise

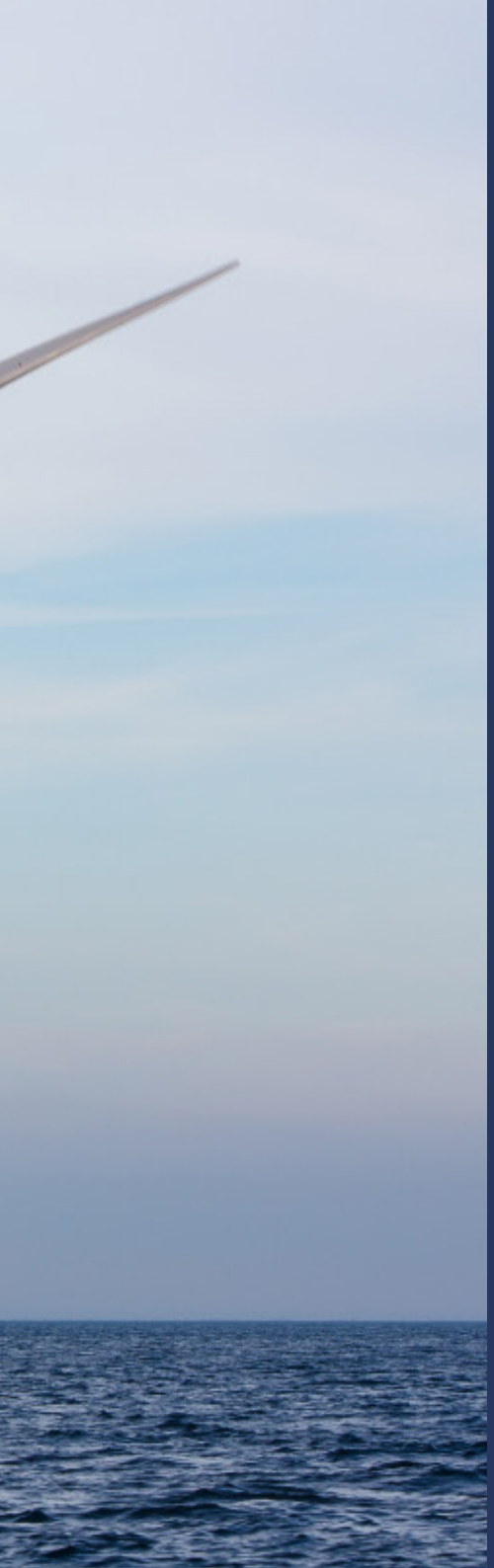
2.2.9.1 Volume 3, Chapter 8 considers the likely impacts and effects of the Transmission Assets of noise and vibration during the construction, operation and maintenance, and decommissioning phases on human receptors.

2.2.9.2 The long-term sound survey highlighted that much of the area affected by the Transmission Assets has a fairly low existing noise climate due to the rural nature of certain areas. The dominant source of noise was noted to be traffic on local highway networks.

2.2.10 Air Quality

2.2.10.1 Volume 3, Chapter 9 considers the likely impacts and effects of the Transmission Assets on air quality during the construction, operation and maintenance and decommissioning phases.

2.2.10.2 The nearest Air Quality Management Area (AQMA) is located approximately 3km east of the Transmission Assets Order Limits in Penwortham, designated due to elevated nitrogen dioxide levels.



3.0 Good Design Policy Context

Good Design Policy

3.1 Introduction

3.1.10.1 Government policy to secure good design for national infrastructure is embedded in National Planning Statement (NPS) and in the National Infrastructure Commission's (NIC) Design Principles for National Infrastructure.

3.1.10.2 The key design policies from these documents are summarised in this section.

- NPS EN-1 sets out policies for considering and assessing good design in a DCO application; supported by EN-3 and EN-5.
- The design principles for National Infrastructure focus on setting a framework for design, the process of design and considering design in all stages of a project.

3.1.10.3 Design policies in all these documents are complementary in promoting good design and are covered below.

3.2 National Policy Statements

3.2.10.1 This section summarises relevant aspects of NPS concerned with the concept of 'good design' that are relevant to the design of the substation.

3.2.1 National Policy Statement for Energy (EN-1) (January 2024)

3.2.1.1 NPS EN-1 sets out the Government's policy for the delivery of major energy infrastructure. It seeks to help deliver the Government's climate change objectives by clearly setting out the need for new low carbon energy infrastructure to contribute to climate change mitigation.

3.2.1.2 NPS EN-1 sets out criteria for good design for energy infrastructure, stating in paragraphs 4.7.1 to 4.7.2:

> *4.7.1 The visual appearance of a building, structure, or piece of infrastructure, and how it relates to the landscape it sits within, is sometimes considered to be the most important factor in good design. But high quality and inclusive design goes far beyond aesthetic considerations. The functionality of an object – be it a building or other type of infrastructure – including*

> *fitness for purpose and sustainability, is equally important.*
>
> *4.7.2 Applying good design to energy projects should produce sustainable infrastructure sensitive to place, including impacts on heritage, efficient in the use of natural resources, including land-use, and energy used in their construction and operation, matched by an appearance that demonstrates good aesthetic as far as possible. It is acknowledged, however that the nature of energy infrastructure development will often limit the extent to which it can contribute to the enhancement of the quality of the area.*

3.2.1.3 NPS EN-1 continues by setting out guidance for an Applicants' Assessment, stating at paragraph 4.7.5:

> *4.7.5 To ensure good design is embedded within the project development, a project board level design champion could be appointed, and a representative design panel used to maximise the value provided by the infrastructure. Design principles [footnote 122] should be established from the outset of the project to guide the development from conception to operation. Applicants should consider how their design principles can be applied post-consent.*

3.2.1.4 Footnote 122 adds:

> *Design principles should take into account any national guidance on infrastructure design, this could include for example the design principles for National Infrastructure published by the National Infrastructure Commission, the National Design Guide and National Model Design Code, as well as any local design policies and standards.*

3.2.1.5 Paragraph 4.7.6. states that whilst applicants may not have any or very limited choice in the physical appearance of some energy infrastructure, there may be opportunities for the applicant to demonstrate good design in terms of siting relative to existing landscape character, land form and vegetation.

3.2.1.6 In acknowledgement of this position and given the importance the Planning Act 2008, paragraph 4.7.10 states that:

> *4.7.10 ... places on good design and sustainability, the Secretary of State needs to be satisfied that energy infrastructure developments are sustainable and, having regard to regulatory and other constraints, are as attractive, durable, and adaptable (including taking account of natural hazards such as flooding) as they can be.*

3.2.1.7 Furthermore, paragraph 4.7.11 makes clear that:

> *4.7.11 In doing so, the Secretary of State should be satisfied that the applicant has considered both functionality (including fitness for purpose and sustainability) and aesthetics (including its contribution to the quality of the area in which it would be located, any potential amenity benefits, and visual impacts on the landscape or seascape) as far as possible.*

3.2.2 National Policy Statement for Renewable Energy Infrastructure (EN-3) (January 2024)

3.2.2.1 NPS EN-3 sets out how the Government expects offshore wind to play a significant role in decarbonising the energy system. It confirms that the Government has set a target for 50 GW of offshore wind capacity by 2030, with an expectation that there will be a need for substantially more installed offshore capacity beyond this to achieve net zero by 2050.

3.2.2.2 NPS EN-3 also sets expectations on 'good design', firstly outlining at paragraph 2.5.1 that "Section 4.7 of EN-1 sets out the criteria for good design that should be applied to all energy infrastructure", before stating that:

> *2.5.2 Proposals for renewable energy infrastructure should demonstrate good design, particularly in respect of landscape and visual amenity, opportunities for co-existence/co-location with other marine and terrestrial uses, and in the design of the project to mitigate impacts such as noise and effects on ecology and heritage.*

3.2.3 National Policy Statements for Electricity Networks (EN-5) (January 2024)

3.2.3.1 NPS EN-5 sets out important considerations for electricity networks infrastructure, including consenting, siting and design considerations. It sets out the general assessment principles for transmission infrastructure in circumstances where they may be separate from generating, referring back to NPS EN-1 where relevant.

3.2.3.2 NPS EN-5 outlines why co-ordination is expected by the Government to reduce overall environmental and community impacts associated with bringing offshore transmission onshore compared to an uncoordinated approach.

3.3 NIC Design Group Guidance

3.3.1 Design Principles for National Infrastructure

3.3.1.1 These principles, developed by the National Infrastructure Commission's Design Group in consultation with all infrastructure sectors, were created to guide the future projects which will upgrade and renew the UK's infrastructure system.

3.3.1.2 They should be applied to all economic infrastructure: digital communications, energy, transport, flood management, water and waste. The design principles for National Infrastructure are as follows:

Climate

Mitigate greenhouse gas emissions and adapt to climate change.

> *The design of our infrastructure must help set the trajectory for the UK to achieve net zero greenhouse gas emissions by 2050 or sooner. This means opportunities must be sought during design and construction to enable the decarbonisation of our society and mitigate and offset residual emissions. Our infrastructure has to support an environmentally sustainable society. It should enable the people and businesses using it to reduce their wider climate impacts too. The search for these opportunities should not be restricted to the area within the site boundary. And good design incorporates flexibility, allowing the project to adapt over time and build our resilience against climate change.*

People

Reflect what society wants and share benefits widely.

> *Infrastructure should be designed for people, not for architects or engineers. It should be human scale, easy to navigate and instinctive to use, helping to improve the quality of life of everyone who comes into contact with it. This means reliable and inclusive services. It means accessible, enjoyable and safe spaces with clean air that improve health and wellbeing.*
>
> *The range of views of communities affected by the infrastructure must be taken into account and reflected in the design. While it won't always be possible to please everyone, engagement should be diverse, open and sincere, addressing inevitable tensions in good faith and finding the right balance. And it should not just be designed for people today. Good design will plan for future changes in demographics and population.*

Places

Provide a sense of identity and improve our environment.

Well-designed infrastructure supports the natural and built environment. It gives places a strong sense of identity, and through that forms part of our national cultural heritage. It makes a positive contribution to local landscapes within and beyond the project boundary. Projects should be inspiring in form and detail, respecting and enhancing local culture and character without being bound by the past.

Good design supports local ecology, which is essential to protect and enhance biodiversity. Projects should make active interventions to enrich our ecosystems. They should seek to deliver a net biodiversity gain, contributing to the restoration of wildlife on a large scale while protecting irreplaceable natural assets and habitats.

Value

Achieve multiple benefits and solve problems well.

A good design process adds value by defining clearly issues from the outset and providing overall direction for everyone working on a project. It explores every option for increasing value alongside the creative process. This approach means the brief is interrogated rigorously so that opportunities to secure economic, environmental and social benefits are identified, pursued and articulated for local and national audiences.

Good design also finds opportunities to add value beyond the main purpose of the infrastructure. It looks beyond the site boundary to consider the wider benefits the project can bring. It seeks to solve multiple problems well with a single solution. It provides more for less with savings on cost, the environment, materials and space.

3.3.2 NIC Project Level design principles (May 2024)

3.3.2.1 This guidance explains why project level design principles should be made central to the delivery of major infrastructure projects and how principles can be most impactful in the very earliest stages, alongside the development of an overall design vision. It provides an overview of the suggested scope of any set of design principles; illustrating how principles should be used throughout the project lifecycle to support design governance and underpin delivery of the outcomes set out in the business case.

3.3.2.2 This document defines those Project Level Design Principles; outlining how they have been reached as part of a structured design process.

3.4 Local Planning Policy

3.4.2.1 The onshore elements of the Transmission Assets are located within the local authority areas of Fylde Borough Council, Blackpool Council, South Ribble Borough Council, Preston City Council and Lancashire County Council.

3.4.2.2 Volume 1, Chapter 2: Policy and legislation context (document reference F1.2) provides a summary of the policy and legislative context for the Transmission Assets'), with reference to the following:

- climate change and renewable energy legislation and policy;
- UK transmission infrastructure strategy and policy; and
- the consenting process, including details of the Planning Act 2008, as amended (referred to here as 'the Planning Act 2008') and associated planning policy.

3.4.2.3 Policy and legislation specific to individual environmental topics and the EIA are set out within each topic chapter of the ES (see Volumes 2, 3 and 4) and an assessment is carried out against each relevant policy within the Planning Statement that accompanies the application for development consent (document reference J7). Adopted and emerging local plan documents have been taken into account throughout the consenting process.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4.0 Design Framework

Design Framework

4.1 What is Good Design?

4.1.2.1 Good design matters. It has a direct impact on the quality of people's lives; being as much about processes and behaviours as it is about design outcomes.

4.1.2.2 In light of the overarching NPS, outlined in Section 3, the concept of 'good design' has been a fundamental consideration from the outset of the development of the substations' design.

4.2 Design Framework

4.2.2.1 Good design is reflected in both design process as well as design outcome, with the approaches for achieving good design best considered from the outset of a project.

4.2.2.2 A framework for good design was prepared as part of the Transmission Assets' design process, the purpose of which was to drive good design outcomes, while clearly setting out the expectations of the substations so that consultants, stakeholders and communities had clarity about the substations' designs and the extent of the Applicants' commitments.

4.2.2.3 The framework's development provides a transparent line of sight between the Transmission Assets' visions, objectives, design principles and post-consent Design Code; framing how the Applicants will fulfil the criteria of 'good design', as set out in NPS EN-1, NPS EN-3 and NPS EN-5. The use of design principles also aligns with the NIC's guidance.

4.2.2.4 The framework for this design process, and the subsequent guidance that instils 'good design' into the Transmission Assets, is set out in Figure 7.

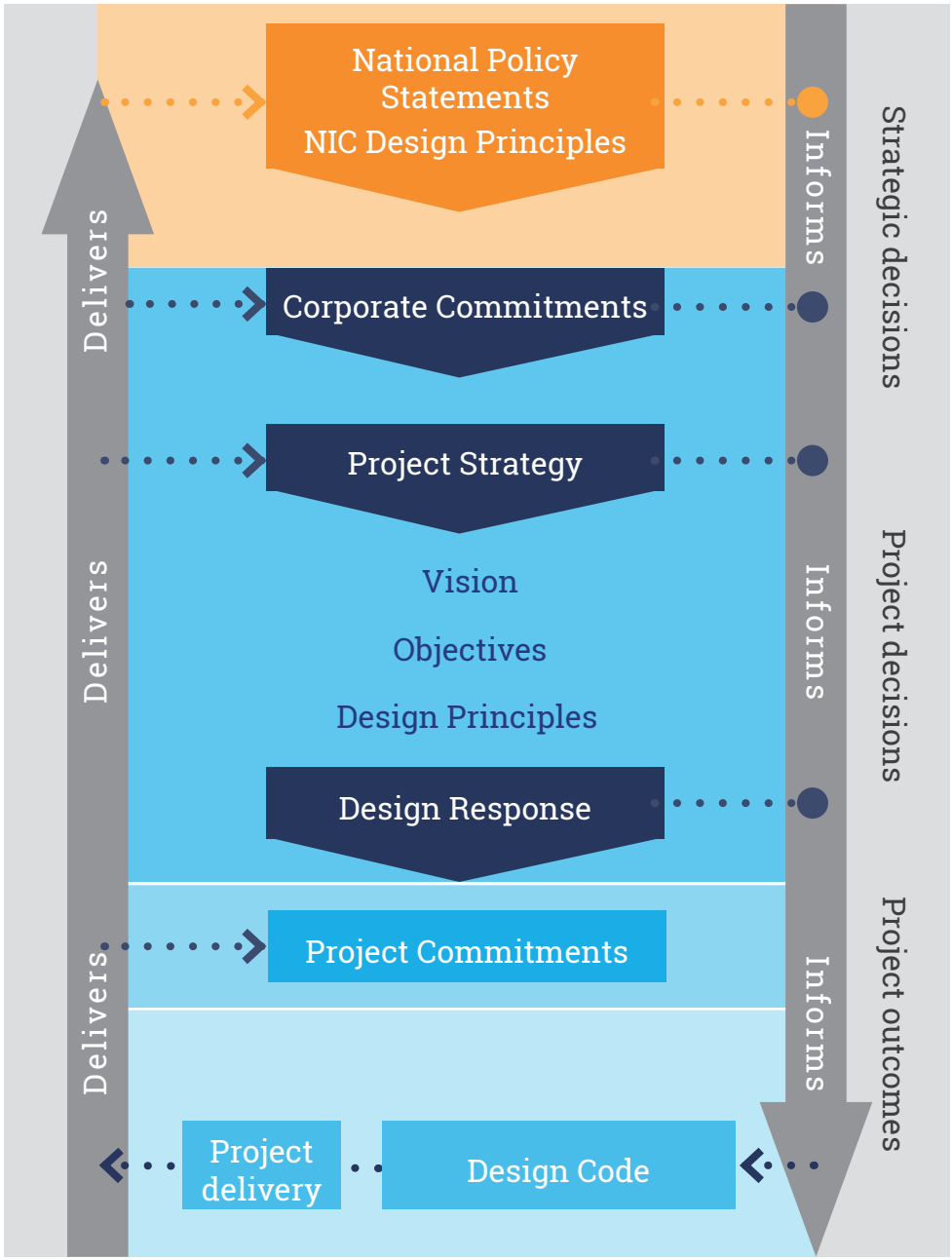

Figure 7: Design Framework

4.3 Vision

4.3.2.1 A vision sets the overall tone of a project and informs the approach to design – an intentional process that is not merely seeking to deliver an operationally efficient project that minimises impacts, but which also reflects wider ambitions reflected in a Transmission Assets' objectives and design principles.

4.3.2.2 The visions for each Applicant have been developed; combining each Applicant's corporate mission and values with their aspirations for the Transmission Assets, whilst reflecting the urgent need for the UK to transition to low carbon energy generation. Good design was central to this.

MORGAN OWL VISION

Climate change is one of the biggest challenges the world faces. It is affecting every country and we must all play a role in helping to combat it.

This project can play a role in the energy transition by delivering a significant volume of offshore wind in support of the UK Governments' targets by:

- Generating low carbon electricity from offshore wind farms in support of the decarbonisation of the UK electricity supply
- Optimising generation capacity within the constraints of available sites and grid infrastructure
- Contributing to achieving the aims of the UK's Energy Security Strategy.

MORECAMBE OWL VISION

Renewable energy is central to supporting the UK's ambitions to lead the world in combatting climate change, reducing ou reliance on fossil fuels and embracing a future where renewable energy power our homes and businesses.

Morecambe Offshore Windfarm has a nominal capacity of 480MW – enough to power over half a million households. It will also contribute to the UK Government's commitment to:

- Generate 50GW of power from offshore wind by 2030
- Reach net zero by 2050

4.4 Objectives

4.4.2.1 To deliver this vision and inform the Transmission Assets; development, the Applicant identified the following objectives:

- **Decarbonisation:** Generate low carbon electricity from an offshore windfarm, in support of the Net-Zero by 2050 target and UK Government ambition to deliver 50GW of offshore wind by 2030.
- **Security of supply:** Provide significant electricity generation capacity within the UK to support commitments for offshore wind generation and security of supply.
- **Affordability:** Maximise generation capacity at low cost to the consumer from viable, developable seabed within the constraints of available sites and grid infrastructure.
- **Coordination:** Coordinate and coexist with other activities, developers and operators to deliver the project and its skills, employment and investment benefits in the Local Economic Area.

4.4.2.2 To achieve the objectives, the Transmission Assets adopted the four thematic NIC design principles as a framework to guide and frame the Transmission Assets ongoing design process and support the achievement of good design outcomes.

4.4.2.3 The design principles, at a project-level, were subsequently structured to align with NIC guidance under the four thematic headings: *Climate, People, Places and Value.*

4.5 Design Principles

4.5.2.1 The following design principles have been adopted during the design process in accordance with the overarching objectives for the substation sites of the Transmission Assets; framed within the four thematic headings – C*limate, People, Places and Value* – of NIC guidance.

Figure 8: NIC Principles

Design Principles

Climate

Maximum generation capacity

Ensure that the Transmission Assets works within its constraints to maximise the Generation Assets' capacity and positively contribute to the UK energy transition and net-zero target by 2050.

Prioritise sustainability

Priority will be given to sustainable resource management and techniques and minimise carbon emissions throughout the project lifecycle.

Resilient design

Design for resilience and adaptation to future climate change

Background: The Applicants have looked within the Order Limits when seeking opportunities to mitigate climate change; design the infrastructure with the flexibility and resilience to adapt to changes in its environment and take advantage of new technology.

People

Coordinated approach

Recognise the advancing nature of technology, coordinate the application of the two electrically separate projects, with the aim of serving multiple needs to maximise efficiency.

Be a considerate neighbour

Behave as a considerate neighbour through both construction and operation. Engage openly, transparently and meaningfully with stakeholders taking their feedback into account and making use of local knowledge to improve the project.

Background: The Applicants have sought opportunities to minimise disruption to the quality of life for people who live and work nearby and taken steps to mitigate potentially adverse effects and disruption. The Applicants have also sought the views of local communities throughout the project to ensure the design complements the local character and culture and provides meaningful benefits to local communities.

Places

Landscape restoration

Retain and protect all existing trees, hedgerows and other vegetation wherever possible. Where landscape features have been removed, they will be restored wherever possible.

Ecological enhancement

Design proposals will seek to deliver a biodiversity benefit in relation to the above ground permanent infrastructure, using the current Defra Metric.

Background: The Applicants have looked for opportunities to use infrastructure to benefit the natural and built environment, to see how interventions can deliver improvements to see how interventions can deliver improvements to sustain local ecosystems and support local plans for growth and investment.

Value

Respect the landscape and avoid sensitive features

The location of the final substation sites has been selected to avoid sensitive features including settlements, landscape and habitat features (including designated nature conservation sites), and designated landscapes, as far as possible. Where this is not possible, the Applicants will ensure the mitigation of impacts are possible.

Background: The Applicants have sought to take a ‘people and landscape led’ approach putting these at the centre of design and decision making and utilised a collaborative team problem-solving approach to resolve concerns and design issues.

4.5.2.2 The indicative design proposals for the two substations' designs are outlined in **Section 5.0**. They describe how the design has evolved to date, and will continue to evolve, in response to the site context and the objectives and the design principles of the Transmission Assets.

4.5.2.3 The development of the design principles for the substation sites has informed and guided the design process towards design outcomes that ensure that the substation sites would fit sensitively into the local context; mitigate (as far as possible) adverse environmental effects; respects local communities; and provides enhancements where possible, whilst delivering low carbon energy.

4.5.2.4 The design principles in this document are intended to complement the core design documents listed below. These documents outline the design of the Proposed Development that would be secured by the DCO:

- Spatial extent set by the Work Plans;
- Parameters fixed by ES Volume 1, Chapter 3: Project description (document reference F1.3);
- Outline Landscape Management Plan (oLMP) (document reference J2); and
- Outline Ecological Management Plan (oEMP) (document reference J6).

4.5.2.5 The design principles will inform subsequent detailed design that is to be agreed at the post consent stage should the DCO be granted, pursuant to DCO Requirement(s). See **Section 6.0** for more details.


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5.0 Design Approach, Evolution and Response

Design Approach, Evolution and Response

5.1 Design Approach

5.1.2.1 The design proposals for the substation sites have been developed through a series of clearly defined stages which were closely aligned to the pre-application consultation process. These are defined as follows:

- Collation of environmental data to identify key constraints;
- Initial Site Selection;
- Consultation;
- Refinement and development of site selection; and
- Development of the Commitments Register.

5.1.2.2 Pre-application consultation is a legal requirement for DCO applications and an important part of the design process. The Applicants have consulted the local community, statutory bodies and other relevant stakeholders on their development proposals in accordance with the requirements of the Planning Act 2008.

5.1.2.3 The comments received at each stage of the consultation were recorded, analysed and used to inform the evolution of the proposals. Full details can be found in the submitted Consultation Report (document reference E1).

5.1.1 Consultation

5.1.1.1 The Applicants have undertaken an extensive programme of community and stakeholder consultation to inform the EIA process and the design of the Project.

5.1.1.2 The Applicants committed to early engagement with communities; delivering two stages of non-statutory consultation ahead of the statutory consultation.

5.1.1.3 The first non-statutory consultation took place between November and December 2022 and provided local people and stakeholders with the opportunity to give their feedback on the proposed development.

5.1.1.4 The second non-statutory consultation took place between April and June 2023 and provided local people and stakeholders with another opportunity to give their feedback on the latest proposals. During this period, the Applicants presented the following information:

- The four indicative onshore substation search areas – within which two new onshore substations will need to be constructed;
- An indicative onshore export cable corridor/grid connection area;
- The National Grid connection point at Penwortham substation; and
- The indicative landfall and indicative onshore export cable corridor, and related temporary compound areas.

5.1.1.5 The statutory consultation process took place between October and November 2023. The Applicant asked for feedback on the detailed information about, and the assessment undertaken for, the Transmission Assets and submitted for the PEIR.

5.1.1.6 Simultaneously, in October 2022 the Applicants published a Scoping Report, which set out what they understood, at the time, to be the Transmission Assets' likely effects on the environment and how they would assess them. The Secretary of State's Scoping Opinion, which was subsequently provided in December 2022.

5.1.1.7 Following scoping, engagement continued in order to facilitate proportionate EIA and the iterative design process. A key part of this engagement includes the Evidence Plan process.

5.1.1.8 In developing the Evidence Plan for the Transmission Assets, stakeholder engagement and input is of fundamental importance. An Evidence Plan Process ('EPP') Steering Group was set up to include the following:

- the Applicants and their EIA consultants;
- the Planning Inspectorate;
- Natural England;
- the Marine Management Organisation (MMO);

- the Centre for Environment, Fisheries and Aquaculture (Cefas);
- Historic England;
- Blackpool Council;
- Fylde Council;
- Preston City Council;
- South Ribble Borough Council; and
- Lancashire County Council.

5.1.1.9 The EPP Steering Group has met at key milestones throughout the Project consenting process. In addition, Expert Working Groups (EWGs) have been set up to discuss topic specific areas with the relevant stakeholders.

5.1.1.10 During the EIA process, environmental issues have been considered as part of an ongoing iterative design process. The process of EIA has therefore been used as a means of informing the design. This design process is shown in Figure 9, making allowance for the use of good design principles alongside the identification of key constraints to inform the design process.

5.1.1.11 The Consultation Report (document reference E1) provides full details of the consultation process and includes a description of key design decisions that have been made by the Applicants as a result of feedback received to date. Details of how the Applicants have taken account of the comments received are also provided in each assessment topic chapter of the ES, where relevant.

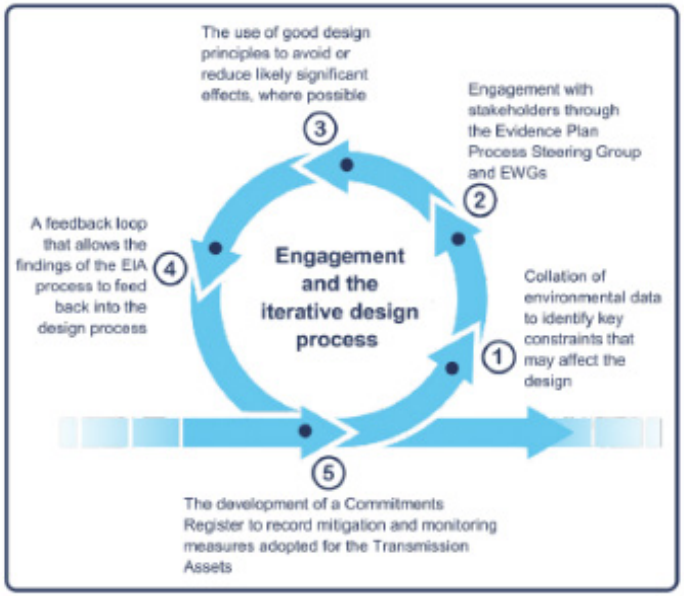


Figure 9: Engagement and the iterative design process

5.1.1.12 A summary of the most salient design decisions that have been made by the Applicants, as a result of the consultation process, are outlined below.

Morgan substation

- Refinement of the siting and orientation of the Morgane substation, to take into account consultation responses received from landowners. This has resulted in the following changes to the project design and Order Limit from PEIR to DCO:
  - The total permanent area for the onshore substation has increased from 125,000m2 to approximately 164,000 m2. An area has also been included in the total permanent area for the substation, to the east (adjacent to Dow Brook), to provide space for landscaping, environmental mitigation and biodiversity benefit. The additional area included since the PEIR was published are predominantly for the provision of landscaping and mitigation, including areas for drainage and attenuation.
- Inclusion of area to underground a low voltage (LV) line – within the temporary compound area, to provide more efficient use of this space, which will be used to facilitate construction of the permanent infrastructure.
- The temporary and permanent access of the substation is being taken from Kirkham Bypass (A583), in part, to separate the construction and operational traffic for each of the substations. The temporary access track width increased from 15 m to 20 m.
- Commitment made by Morgan OWL to proceed with gas insulated switchgear (GIS) technology only. Air insulated switchgear (AIS) will no longer be used.
- Onshore substation maximum height of main buildings was reduced from 20m to 15m.

Morecambe Substation

- Selection of Option 2 (South) was selected by Morecambe OWL as being the preferred location; following analysis of consultation feedback; consideration of key environmental and engineering constraints; and the emerging Morgan substation. This has resulted in the following changes to the project design and Order Limit from PEIR to DCO:
  - The total permanent footprint has reduced from 60,000m2 to 59,500m2.
  - Refinement of the siting, orientation and optimisation of the temporary compounds' location to align to the selected temporary access.
- Temporary and permanent access were selected and is being taken from Lower Lane to the west of the selected substation. The temporary access for construction will be from the A584, which is to the south of the preferred substation location. Permanent rights will be retained over this access to facilitate HGV and AIL deliveries. The location of the temporary compounds presented at PEIR for Option 2 (south) were reorientated and optimised to align to the temporary access from the A584.
- The temporary access track width increased from 15m to 20m.
- Onshore substation maximum height of main buildings was reduced from 20m to 13m.
- Commitment made by Morecambe OWL to retain the option for both GIS and AIS substation technologies in the application.

5.2 Design Evolution

5.2.1 Site selection rationale

5.2.1.1 The Transmission Assets is underpinned by its objectives (see section 4.4), which have driven the iterative site selection and design process from the outset to its final submission, as set out in the preceding sections.

5.2.1.2 A fundamental part of this process has been the Applicant's site selection process, which aimed to identify sites for the substations that will respect and enhance features in the landscape, address the biodiversity crisis and deliver the lowest energy costs to consumers in the long term; all while being environmentally acceptable, deliverable and consentable.

5.2.1.3 Prior to commencing site selection, principles for the permanent substation areas were established to provide a framework for making decisions at each stage of the process. A two-tier approach was applied, considering both "mandatory" and "preferred" areas. The list of Onshore Substations Design Principles for Site Selection is set out in Annex 4.3 Site Selection and Refinement of Onshore Infrastructure, in full.

5.2.1.4 The Applicants followed an iterative process in initial site selection, identifying areas for the substations within their environmental, physical, technical, commercial, and social contexts. The Applicants sought and explored opportunities where they are available, as well as ensuring that the engineering requirements can be achieved.

5.2.1.5 A Black/Red/Amber/Green (BRAG) methodology has been used to inform the different aspects of site selection. This was 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 in four fundamental categories, based on a qualitative assessment either using defined parameters, professional judgement, or assessing the issue relative to the other potential options. A BRAG assessment of this type enabled the Applicants to clearly and directly compare between areas.

5.2.1.6 At each stage of the process, information was collated, reviewed and appraised to reach a balanced cross-discipline decision, and had consideration of National Grid's Guidelines on Substation Siting and Design ('The Horlock Rules').

5.2.1.7 Volume 1, Chapter 4: Site Selection and Alternatives (document reference F1.4) sets out, in detail, the Applicants' comparison of the environmental effects between that different site options that were considered.

5.2.1.8 The final substation site was identified for the reasons set out below.

Morgan substation

5.2.1.9 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.

5.2.1.10 The key refinement made to address the comments received was to relocate the substation site further to the east. This move was requested by the landowner of the substation site to lessen the impact on agricultural activities. On further consideration, the new location also addressed concerns from nearby residents who felt the substation was too close to the residential areas of Kirkham South and Hall Cross. The increased distance allows more opportunity to utilise existing screening to reduce views of the substation from these areas.

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

Morecambe substation

5.2.1.12 Following the consultation at PEIR on two potential Morecambe substation locations, an assessment was undertaken to identify the preferred location for the substation within Zone 1. This considered consultation feedback from statutory stakeholders, landowners, nearby residents and members of the public, potential environmental constraints and engineering considerations.

5.2.1.13 The feedback indicated that a greater number of consultees stated a preference for the Option 2 (South), although this was not a significant number. The two potential Morecambe substation options were subjected to a BRAG assessment (detailed in Volume 1, Annex 4.3) including consideration of the location of the refinements of the Morgan substation to determine the preferred site. From this assessment, Option 2 (South) was identified as the preferred option for the Morecambe substation.

5.2.1.14 Once Option 2 (South) had been identified as the most suitable area for the substation location, potential construction and operational access routes were identified, which were subsequently appraised based on consideration of landowner feedback, environmental and engineering constraints.

5.2.1.15 The construction Access Track 2 was identified as the most appropriate route for the substation on balance given the land use and engineering constraints noted in Volume 1, Annex 4.3 (document reference 1.4.3). The main operational access for light goods vehicles was identified off Lower Lane.

5.3 Design Response

5.3.1.1 The following sections outline the key design parameters for each substation, as specified in the MDS (Volume 1, Chapter 3: Project Description, document reference F1.3).

5.3.1.2 The response to each substation's site context and necessary mitigation measures are highlighted (where appropriate), ensuring alignment with the overarching objectives and design principles that will guide the final substation design post-consent.

5.3.1 Function

5.3.1.1 Each substation will contain the electrical components for transforming the power supplied from the offshore wind farms to an 400 kV outgoing circuit to adjust the power quality and power factor, as required to meet the UK Grid Code for supply to the National Grid.

5.3.1.2 The import and export cables to the substations will be contained in underground ducts. The main purpose of the substations is to step-up the electrical voltage (via transformers) to 400kV, suitable for connecting to the National Grid substation at Penwortham. Both substations will also include equipment to facilitate protection, control and switching.

5.3.1.3 During normal operation, both substations would be unmanned, but remotely monitored continuously. Operation and maintenance staff are expected to visit the onshore substations approximately every 6 months to undertake preventative and corrective works. Vehicle movements associated with planned operation and maintenance of the onshore substations are expected to operate only during the daytime and evening periods (i.e., 07:00 – 23:00).

5.3.1.4 The substations would not typically be requiring lighting during normal operation. However, operational lighting requirements may include:

- security lighting around perimeter fence of the platform, to allow CCTV coverage;
- car park lighting – standard car park lighting, which may be motion sensitive; and
- repair/maintenance – task related flood lighting may be necessary.

5.3.1.5 Operational lighting will be low level and directional to ensure that the levels of light spill onto bat roosting, foraging and commuting habitats are not significant.

5.3.1.6 The operational lifetime of the substations is expected to be 35 years. At the end of its operational phase, each substation will be decommissioned, removed and the site will be reinstated.

5.3.1.7 Equipment and Buildings

5.3.1.8 Each substation will house the auxiliary equipment and facilities for operating, maintaining and controlling the substations. Both substation sites are likely to contain the following electrical equipment and buildings (but is not limited to):

- power transformers;
- switchgear;
- reactive compensation equipment;
- harmonic filters;
- cables;
- lightning protection masts;
- control buildings;
- communication masts;
- backup generators;
- access;
- fencing; and
- other associated equipment, structures or buildings.

5.3.1.9 For Morecambe OWL, two substation design options are included in the design envelope to maintain flexibility :

- Air Insulated Switchgear (AIS) design, with all equipment housed in an 'open yard' style; or
- Gas Insulated Switchgear (GIS) design with some equipment housed in single or multiple buildings, and other equipment located exteriorly.

5.3.1.10 It is also possible to have a combination of the above. There may also be some smaller buildings required to house components such as smaller equipment and control rooms.

5.3.1.11 The Morgan OWL will employ a GIS design.

5.3.1.12 The tallest features either of the substation sites will be the lightning protection masts at a height of 30m above ground level. These are included as part of the MDS and are subject to detailed lightning protection study. The maximum height of other buildings associated with each substation with be 15m for the Morgan substation; and 13m for the Morecambe substation

5.3.1.13 If required, acoustic enclosures would be installed around the transformers to mitigate potential noise impacts to residential properties.

Figure 10: View from BW0505016 towards Morgan substation, showing an indicative layout

Figure 11: View from footpath north of A584 towards Morecambe substation, showing an indicative layout

5.3.2 Layout

5.3.2.1 The platform for each substation is of sufficient size to accommodate the maximum footprints required for each of the and allow for the project development scenario.

5.3.2.2 The maximum design parameter for the substation platform footprint (and other associated components of each substation are as follows:

Parameter	Maximum design parameter		
	Morgan substation	Morecambe substation	Maximum design parameter
Maximum substation platform footprint (m2)	80,000	29,700	109,700
Maximum permanent footprint including substation platform, landscaping, access, drainage and attenuation (m2)	164,000	59,500	223,500
Maximum impermeable footprint (m2)	48,000	33,000	N/A
Maximum number of main buildings	4	4	8
Maximum main building height (m)	15	13	N/A
Main building - maximum lightning protection height (m)	30	30	N/A
Maximum length of main building (m)	140	30	N/A
Maximum width of main building (m)	80	15	N/A

5.3.2.3 The layout of electrical infrastructure is driven by the technical and functional requirements of each substation and must be set out in sequential order in accordance with all electrical transmission systems.

5.3.2.4 Figure 10 and Figure 11 show an indicative layout of each substation from nearby PRoWs.

5.3.3 Grading and Earthworks

5.3.3.1 To install each substation site's working platforms, some 'cut and fill' will be required (i.e., excavated material may be used to create a level site for substation construction after foundation installation). An indicative cut/fill exercise has been undertaken for both substation platforms. The final 'cut and fill' levels will be determined at detailed design stage. minimise the need for import or export of material from site.

5.3.3.2 The entire area will be stripped of all organic matter and loose rocks. Any waste material encountered will be removed as required by the environmental and geotechnical investigations. Once the surface has been cleared, the grading operation will begin. Topsoil and subsoil will be stored in separate stockpiles in line with the Defra Construction Code of Practice for the Sustainable Use of Soils on Construction Sites (PB13298) or the latest relevant available guidance. Any suspected or confirmed contaminated soils will be appropriately separated, contained and tested before removal, if required. Further information is contained in the Outline Soil Management Plan (document reference J1.7).

5.3.3.3 If it were to prove impossible or impractical to balance the earthwork quantities, it would be necessary to either export excess soil or import new fill soil. Any soil exported would be transported by a licensed waste carrier to an appropriate waste management facility. Excavations of foundations and trenches will commence following the completion of grading.

5.3.3.4 The methodology for grading and earthworks will be set out in the CoCP. An Outline CoCP is included in the DCO application (document reference J1).

5.3.4 Substation Compound

5.3.4.1 For operational, safety and maintenance reasons the landscape treatment within the substation platform is functional and defined by a very limited material palette of hard materials, typically comprising concrete pavers, concrete hard-standing, shingle and asphalt.

5.3.5 Materiality and Form

5.3.5.1 The choice of materials and form for each of the proposed substations' buildings is driven by their functional and structural requirements. The buildings are anticipated to comprise steel frames and external sheet cladding materials. The structural steelwork will be fabricated and prepared off site and delivered to site for assembly.

5.3.6 Colour

5.3.6.1 The final design of each substation will be informed by a colour study of the local landscape undertaken post-consent. The purpose of the colour study will be to inform the external appearance of each substation's buildings and structures, where it is reasonably practicable to so. This would include the identification of colours within the existing landscape to inform a possible colour palette that could be applied to the substations. It would support the integration of each substation into their local landscape context.

5.3.7 Security Fencing

5.3.7.1 Security fencing is required around the perimeter of each substation to prevent unauthorised access onto potentially dangerous areas. The fencing will be robust, fit for purpose and comply with the following technical standards: National Grid TS 2.10.02 Generic Electricity Substation Design Manual for Civil, Structural & Building Engineering – Perimeter Security and BS 1722-12 – 'Fences. Specification for steel palisade fences'.

5.3.7.2 The fencing will be a maximum of 3m high and may be electrified for security purposes. Access into the substation will be through inward opening double swing gates of similar construction to the perimeter fence.

5.3.8 Surface water drainage

Temporary Drainage

5.3.8.1 Prior to the commencement of cut/fill operations, existing field drains will be diverted where intercepted and cut off ditches/drains will be provided to intercept field surface runoff where required. The design of the temporary drainage measures will be set out in the CoCP and agreed with the relevant authorities prior to construction. The key principles are set out in the Outline CoCP (document reference J1).

Operational Drainage

5.3.8.2 During the operations and maintenance phase, drainage from both substations and the operational access roads will be managed in accordance with the Operational Onshore Substation Drainage Management Plan that will be agreed with the relevant local planning authority (as secured in the DCO).

5.3.8.3 An Outline Operational Drainage Management Plan is included in the DCO application (document reference J10).This has been developed in line with the latest relevant drainage guidance notes in consultation with the Environment Agency and the Lead Local Flood Authority (Lancashire County Council). It includes measures to ensure that existing land drainage is reinstated and/or maintained; measures to limit discharge rates and attenuate flows to maintain greenfield runoff rates at the onshore substations; and measures to control surface water runoff, including measures to prevent flooding of the working areas or offsite and to ensure any runoff is treated appropriately.

5.3.8.4 Based on current understanding and in line with the SuDS hierarchy, it is anticipated that surface water run-off from the Morgan and Morecambe onshore substations will be collected by perimeter drains and attenuated within water attenuation features, prior to controlled discharge to the Dow Brook. Additional SuDS components will be incorporated as necessary (source control) and confirmed at the detailed design stage. The indicative locations of the attenuation ponds is shown in Figure 1.2 and Figure 1.3 within the Outline Landscape Management Plan (document reference J2).

5.3.8.5 Access

5.3.8.6 The following maximum design parameters will apply to both the Morgan substation and the Morecambe substation:

- Maximum width of temporary construction access: 20m; and
- Maximum width of permanent access road and associated services: 15m

Morecambe substation

5.3.8.7 The temporary construction access for the Morecambe onshore substation runs north from the A584 road to the temporary construction compound. A new junction will be constructed from the A584 and will include a two way traffic control system where the temporary construction access meets the new junction. This will allow construction traffic to pass safely in both directions. The length of the temporary construction access will be approximately 760m and it will be 20m in width. Space for topsoil storage, drainage and temporary fencing has been incorporated into the temporary width. Approximately 325m of this temporary construction access is shared with a construction access to the 400kV cable corridor. The Outline Construction Traffic Management Plan (document reference J5) states how this shared construction access will be managed for the duration of construction.

5.3.8.8 This temporary access crosses two PRoWs. During construction, the PRoWs would be subject to appropriate temporary diversions to be agreed with Lancashire County Council as set out in the Outline Public Rights of Way Management Plan (document reference J1.5). This will include the installation of gates to the north and south of the temporary construction access to ensure the separation of construction traffic and the public.

5.3.8.9 This access will be retained post-construction as an operational access for Abnormal Indivisible Load (AIL) and Heavy Goods Vehicles (HGV) deliveries to the Morecambe onshore substation. The permanent area will be reduced to

15m in width. Access gates will be in place to control access to the substation site. This operational access will not be fenced where it crosses agricultural fields, thus ensuring agricultural activities can continue unhindered during the operational life of the substation.

5.3.8.10 The main operational access for the Morecambe onshore substation will be off Lower Lane. This operational access will be approximately 130m in length with a permanent width of 15m. This operational access will be used for routine visits by cars and light goods vehicles only and will facilitate safe access during normal operations. The operational access would be fenced with a gate in place to control access to the substation site. In addition, gates will be placed to the north and south of the operational access track to allow agricultural activities to continue during the operational phase.

Morgan substation

5.3.8.11 Temporary construction access for the Morgan substation will be taken via a new junction created from the A583, to the north of the site. From this new junction a temporary two-way road system to and from the site will be constructed, allowing construction traffic to pass in both directions. The length of this temporary access road will be approximately 600m and 20 m wide, comprising hard standing and remaining width for topsoil storage, drainage, services and fencing.

5.3.8.12 The permanent, operational access from the bell mouth to the Morgan substation will also be taken from this new junction. For operational purposes, the access will be a maximum of 15m wide, comprising hard standing (retained and upgraded from construction) and the remaining width required for underground services, track side drainage and any stabilisation works. The permanent access road would not include a fence, allowing for continuation of agricultural activities on the adjacent land. There would be a gated entrance to the substation which is likely to be on the northern boundary of the substation compound, close to the access road. The site will be unmanned during normal operation; however, the access provisions will allow for 24-hour access/egress for personnel and equipment for either emergency or required maintenance work requiring extended hours.

5.3.9 Landscaping

5.3.9.1 Landscape treatment of the areas surrounding the substation platform is designed to provide an appropriate setting that manages the potential landscape impacts responds to adjacent land uses and the landscape character of the area. The Applicants are committed to additional planting to further screen the two substations and provide to biodiversity benefits, in response to the conclusions of Volume 3, Chapter 10: Landscape and visual resources.

5.3.9.2 Where practicable, and as prescribed in in the oLMP (document reference J2) and the oEMP (document reference J6), existing vegetation (including woodland, trees and hedgerows) will be retained, except where temporary construction, access or enabling works are required.

5.3.9.3 New areas of planting, including woodland, tree belts, scrub and scrubby grassland, will provide landscape and ecological enhancements to the substation surrounds, which is currently an arable site.

5.3.9.4 Planting will be appropriate to the local landscape character and is intended to improve the green infrastructure network (as identified in the oLMP (document reference J2), and oEMP (document reference J6)), helping to screen and filter views of the substations from surrounding landscape and visual receptors, and integrate them into their landscape context.

5.3.9.5 Woodland will be planted sympathetically around each substations' perimeters to filter/screen views; breaking up the bulk and scale of the buildings and reducing the potential visual impact. This will integrate the development into its landscape context, over time.

5.3.9.6 Existing hedgerows will be strengthened and enhanced by planting gaps with new native species hedge plants and hedgerow trees that would provide further screening and filtering of views, enhance landscape character and provide enhanced habitats and habitat connectivity for wildlife.

5.3.9.7 Scrubby grassland planting will comprise a varied, tussocky grassland sward with wildflowers and a low density of scattered shrubs throughout the area. This botanically and structurally varied habitat will support a range of invertebrate species including moths, butterflies, beetles, spiders, bees and damselflies, amongst others. The habitat is also expected to support terrestrial mammals possibly including hedgehogs, voles, badgers and brown hare, breeding and foraging birds, foraging bats, reptiles and terrestrial activity by amphibians. Species-rich grassland areas will be established to provide low-maintenance ground cover, further enhancing biodiversity in non-agricultural and non-woodland areas. The presence of other enhanced and existing habitats nearby (including those outlined above) will further contribute to the overall attractiveness of the general areas around the substation site for a range of wildlife.

5.3.9.8 Surface water attenuation features are anticipated to be incorporated southeast of the substation sites to manage controlled discharge into Dow Brook. However, the exact location and form will be subject to detailed design.

5.3.9.9 Offsite soil deposition will be minimised by sensitive incorporation within the substations' locality, with appropriate storage and reuse of topsoil and subsoil to support vegetation establishment.

5.3.9.10 External areas will be impermeable, with surfacing comprising gravel on a permeable sub-base.

5.3.9.11 Further design measures will address the visual impact of the buildings, breaking down their mass in views from local roads and the bridleway.

5.3.9.12 Figure 12 and Figure 13 present the Landscape Strategy for each substation site, as reported in the oLMP (document reference J2).

5.3.9.13 Further details relating to the strategy for ecological enhancement are also provided in Volume 3, Chapter 3 Onshore ecology and nature conservation (document reference 3.3)

Figure 12: Landscape Strategy for Morgan Substation

Figure 13: Landscape Strategy for Morecambe Substation

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

5.4.9.1 Through the EIA process a range of mitigation and monitoring measures have been identified, to avoid or reduce potential effects. All measures to be adopted by the Transmission Assets are called 'Commitments' (CoTs); aligning with the Design Framework.

5.4.9.2 The CoTs will be used to guide the final design and details for construction, operation and maintenance, and decommissioning phases.

5.4.9.3 All CoTs relevant to the substations are listed below:

- **CoT03:** 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. These include, but are not restricted to:
  - 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); and
  - non-designated built heritage assets

  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.
- **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.
- **CoT11:** An Outline Operational Drainage Management Plan for the substation site(s) has been prepared and submitted with the application for development consent. The Plan will include measures to ensure that existing land drainage is reinstated and/or maintained. This will include measures to limit discharge rates and attenuate flows to maintain greenfield runoff rates at the onshore substations. It will also include measures

to control surface water runoff, including measures to prevent flooding of the working areas or offsite and to ensure any runoff is treated appropriately. Detailed Operational Drainage Management Plan(s) will be developed in accordance with the Outline Operational Drainage Management Plan and in line with the latest relevant drainage guidance notes in consultation with the Environment Agency and the Lead Local Flood Authority (Lancashire County Council).

- **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.
- **CoT15:** Detailed Landscape Management Plan(s) will be developed in accordance with the Outline Landscape Management Plan. Detailed Landscape Management Plan(s) will include details of mitigation planting at the onshore substation sites, including the number, location, species and details of management and maintenance of planting. Where practicable, landscape mitigation planting will be established as early as reasonably practicable in the construction phase.
- **CoT16:** All vegetation requiring removal will be undertaken outside of the bird breeding season. If this is not reasonably practicable, the vegetation requiring removal will be subject to a nesting bird check by a suitably qualified ecological clerk of works. If nesting birds are present, the vegetation will not be removed until the young have fledged or the nest failed.
- **CoT20:** All temporary working areas for the onshore export cable corridor, 400 kV grid connection cable corridor, temporary compounds, and the onshore substation sites will be clearly marked and secured with appropriate fencing. This will be done in accordance with the Outline Construction Fencing Plan, as part of the Outline CoCP and in accordance with Construction (Design and Management) Regulations 2015 requirements.
- **CoT27:** All temporary compounds will be removed and sites will be reinstated when construction has been completed.
- **CoT28:** Construction site lighting will only operate when required and will be positioned and directed to avoid unnecessary illumination to residential properties, sensitive ecological receptors and footpath users, and minimise glare to users of adjoining public highways. Construction site lighting will be designed in accordance with latest relevant available guidance and legislation and the details of the location, height, design and luminance of lighting to be used will be detailed within the Outline Construction Artificial Light Emissions Management Plan, as part of the Outline Code of Construction Practice (CoCP). The design of construction site lighting will accord with the details provided in the Outline Code of Construction Practice (CoT35) and Outline Ecological Management Plan (CoT76).

- **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 corridors and 400 kV grid connection cable corridors where reasonably practicable
- **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 minmise 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.
- **CoT35:** An Outline Code of Construction Practice (CoCP) has been prepared and submitted with the application for development consent. Detailed CoCP(s) will be developed in accordance with the outline CoCP. The Outline CoCP will include measures to maintain and address:
  - flood protection and control measures;
  - water environment and drainage;
  - pollution prevention;
  - geology and ground conditions;
  - ecology and nature conservation (including protected species and invasive species);
  - historic environment;
  - soil management;
  - traffic and transport;
  - noise management measures;
  - air quality and dust management;
  - landscape and visual;
  - recreation; and
  - bentonite breakout.
- **CoT76:** Detailed Ecological Management Plan(s) (EMP) will be developed in accordance with the Outline Ecological Management Plan (oEMP). The Outline Ecological Management Plan has been prepared and submitted as part of the application for development consent and includes but is not limited to pre-construction, construction and post-mitigation measures relating to habitats and protected or notable species, species mitigation licences and the role of the Ecological Clerk of Works (ECoW) where relevant. The Outline Ecological Management Plan also includes a Breeding Bird Protection Plan which will set out mitigation measures such as vegetation clearance in

winter (e.g., hedgerows), pre-construction breeding bird survey, appropriate protection zones upon confirmation of nest building/breeding taking place of key protected or sensitive species. In addition to the Breeding Bird Protection Plan, the oEMP sets out species-specific mitigation plans for Important Ecological Features identified as part of the assessment. Detailed Ecological Management Plan(s) will include details of any long term mitigation and management measures relevant to onshore ecology and nature conservation and in relation to onshore and intertidal ornithology. This will include the management of ecological mitigation areas. The Detailed EMPs will be developed in consultation with the relevant statutory advisors and regulators.

- **CoT79:** An Outline Construction Noise and Vibration Management Plan has been prepared as part of the Outline CoCP submitted as part of the application for development consent. It includes measures to mitigate noise from construction activities associated with the Transmission Assets. Detailed Construction Noise and Vibration Management Plan(s) will be developed in accordance with Detailed CoCPs. Bespoke method statement(s) will be developed to ensure suitable noise limits can be met on specific sensitive noise receptors.
- **CoT84:** An Outline Code of Construction Practice (CoCP) has been prepared and submitted with the application for development consent. Detailed CoCP(s) will be developed in accordance with the outline CoCP. In order to manage impacts to field drainage, the outline CoCP stipulates field drainage plans will be developed in consultation with the relevant landowners. If required, additional field drainage will be installed to ensure the existing drainage of the land is maintained during and after construction.
- **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.

5.4.9.4 The full list of CoTs can be found in Volume 1, Annex 5.3: Commitments Register (document reference F1.5.3).

6.0 Securing Good Design Post Consent

Securing Good Design Post Consent

6.1 Post-consent Design Process and Governance

6.1.9.1 The draft DCO at Requirements 4 of Schedules 2A and 2B require design details of the relevant onshore substation to be submitted to and approved by the relevant planning authority prior to the commencement of construction. Both Requirements 4 "Substation works" would specifically require submission of details, in respect of the substation, of:

(a) the layout;

(b) scale;

(c) proposed finished ground levels;

(d) hard surfacing materials;

(e) the dimensions, colour and materials used for the buildings;

(f) security fencing;

(g) vehicular and pedestrian access, parking and circulation areas; and

(h) proposed and existing functional services above and below ground, including drainage, power and communications cables and pipelines, manholes and supports.

Furthermore, under Requirements 3 of Schedules 2A and 2B no onshore substation works would proceed until details of the stages of those works have been notified to the relevant planning authority. Construction working hours would also be subject to the limits specified in Requirements 14 of Schedules 2A and 2B.

6.1.9.2 Additional requirements in Schedules 2A and 2B of the draft DCO would also require submission and approval, post-consent, of:

(1) A written landscaping scheme;

(2) A code of construction practice which would include the following as appropriate to the relevant stage:

- *"communications plan (in accordance with the outline communications plan);*
- dust management plan (in accordance with the outline dust management plan);
- *construction noise and vibration management plan (in accordance with the outline construction noise and vibration management plan);*

- *pollution prevention plan (in accordance with the outline pollution prevention plan);*
- *public rights of way management plan (in accordance with the outline public rights of way management plan);*
- *site waste management plan (in accordance with the outline site waste management plan);*
- *soil management plan (in accordance with the outline soil management plan);*
- *spillage and emergency response plan (in accordance with the spillage and emergency response plan);*
- *surface water and groundwater management plan (in accordance with the outline surface water and groundwater management plan);*
- *construction fencing plan (in accordance with the outline construction fencing plan);*
- *construction artificial light emissions management plan (in accordance with the outline construction artificial light emissions management plan);*
- *biosecurity protocol (in accordance with the outline biosecurity protocol);*
- *bentonite breakout plan (in accordance with the outline bentonite breakout plan); and*
- *contaminated land and groundwater discovery strategy (in accordance with the outline contaminated land and groundwater discovery strategy)".*

(3) A construction traffic management plan;

(4) Written details of the siting, design, layout, sequencing and timing and any access management measures for any new permanent or temporary means of access to a highway to be used by vehicular traffic, or any alteration to an existing means of access to a highway;

(5) An archaeological written scheme of investigation;

(6) written ecological management plan;

(7) pre-construction survey work has been carried out to establish whether a European protected species or nationally protected species under the Wildlife and Countryside Act 1981 is present on any of the land affected, or likely to be affected, by any part of that stage of the Project;

(8) details of all proposed permanent fences, walls or other means of enclosure for that phase have been submitted to and approved by the relevant planning authority;

(9) a written scheme for the management and mitigation of internal and external artificial light emissions;

(10) an operational noise management plan;

(11) an operational drainage management plan;

Schedules 2A and 2B also further require that "within six months of the permanent cessation of commercial operation of the Project [A/B] onshore works, an onshore decommissioning plan must be submitted".

6.1.9.3 The Project will therefore continue the development of the design of all project elements, including onshore substations, in accordance with the MDS and such design details will be submitted to the relevant planning authorities for determination prior to commencement of construction.

6.1.9.4 In order to continue to ensure good design is embedded within the development of the project details, post-consent, and to guide and oversee this process, the Project will continue to use its design team, including qualified and chartered professionals in the relevant fields. The Project will also appoint a board level design champion to champion the Project's Design Principles and the Post Consent Design Code below.

6.1.9.5 In addition to the above Requirements of the draft DCO, the onshore elements of the Project will be constructed according to the following post-consent Design Code.

6.1.9.6 The Design Code is a set of simple design requirements. It will be followed by the Applicant in the detailed design stages of the Project post consent and will guide design decisions to ensure good design is maintained. It will serve as a reference point for the relevant planning authority in discharging Requirements set out in the draft DCO.

6.2 Post-consent Design Code

No.	Project Element	Design Code	Relevant Parameters	Relevant Design Principles
DC1	Onshore Substations	**Reduce the visual impact of onshore substations.** The design of the onshore substations will be compliant with the maximum parameters prescribed in the draft DCO (document reference C1). Where cost effective and efficient to do so, the Applicants will seek to further reduce the visual extent of the onshore substations through appropriate equipment procurement and layout considerations.	Volume 1, ES Chapter 3 Project Description (document reference F1.3). Requirement 4 of the draft DCO (document reference C1)	**Climate** Maximum generation capacity Prioritise sustainability **People** Coordinated approach Be a considerate neighbour **Places** Landscape restoration Ecological enhancement **Values** Respect the landscape and avoid sensitive features

No.	Project Element	Design Code	Relevant Parameters	Relevant Design Principles
DC2	Onshore Substations	**Minimise the operational noise level at the onshore substations by design** In line with the draft DCO (document reference C1) the Applicant will produce an Operational Noise Management Plan (NMP) post-consent, subject to approval from the relevant Local Planning Authority, which will set out the following: • any necessary noise attenuation and mitigation measures • noise limits • scheme for monitoring noise attenuation and mitigation measures The Applicants will meet with the Councils as required to discuss the findings of the ONDR and will address reasonable queries arising from such engagement. The Applicants will seek to minimise the operational noise rating level below the limits set out in the draft DCO (document reference C1) and avoid any perceptible tones and other acoustic features at any residential receptor that would attract a correction in accordance with BS4142:2014+A1:2019, insofar as these mitigation measures do not add unreasonable costs or delays to the Projects or otherwise result in adverse impacts on other aspects of the environment (e.g. landscape and visual impacts).	Volume 3, Chapter 8 Noise and Vibration (document reference F3.8) Requirement 3 of the draft DCO (document reference C1)	**Climate** Prioritise sustainability **People** Coordinated approach Be a considerate neighbour
DC3	Design process	**Continue engagement with stakeholders** Continued engagement with the relevant stakeholders, such as the relevant planning authority, in relation to the detailed design of the onshore substations.	Communications Plan (document reference J1.1)	**Climate** Maximum generation capacity Prioritise sustainability Resilient design **People** Coordinated approach Be a considerate neighbour

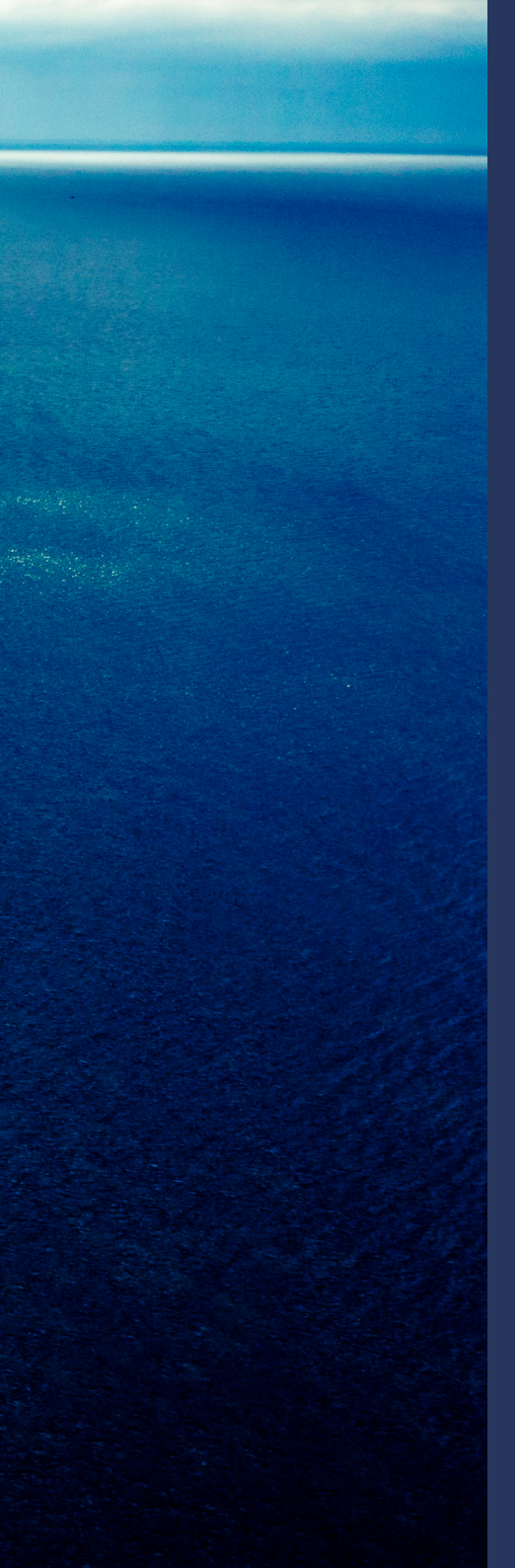
No.	Project Element	Design Code	Relevant Parameters	Relevant Design Principles
DC4	Design process	**Take account of feedback** This feedback will ensure opportunities are identified, tested and pursued to achieve an appropriate, fit-for-purpose design outcome. Through the Applicant's pre-application consultations with the relevant stakeholders, feedback has been received which has already influenced the Project's design.	Communications Plan (document reference J1.1)	**Climate** Maximum generation capacity Prioritise sustainability Resilient design **People** Coordinated approach Be a considerate neighbour
DC5	Design process	**Designate a senior business representative as the design champion** A board-level design champion for each project will be appointed and maintained throughout the design and construction phase, in order to maintain the necessary focal point, co-ordinate and monitor the progression of good design.	Requirement 3 of the draft DCO (document reference C1)	**Climate** Maximum generation capacity Prioritise sustainability Resilient design **People** Coordinated approach Be a considerate neighbour **Places** Landscape restoration Ecological enhancement

No.	Project Element	Design Code	Relevant Parameters	Relevant Design Principles
DC6	Design process	**Maintain Good Design** Consider 'Good Design' in line this Code, the Project's Design Principles and with the requirements of Overarching National Policy Statement for Energy (NPS EN-1) and the National Infrastructure Commission's 'Design Principles for National Infrastructure' (National Infrastructure Commission, February 2020) to inform the Project's design process.		**Climate** Maximum generation capacity Prioritise sustainability Resilient design **People** Coordinated approach Be a considerate neighbour **Places** Landscape restoration Ecological enhancement **Values** Respect the landscape and avoid sensitive features
DC7	Onshore substation	**Minimise the visual impacts of the onshore substation as far as possible** Appropriate building design, sensitive placing, use of appropriate design and materials, including shape, layout, colouration and finishes will be actively sought as part of the procurement process.	Requirement 4 of the draft DCO (document reference C1)	**Climate** Maximum generation capacity Prioritise sustainability Resilient design **Places** Landscape restoration Ecological enhancement **Values** Respect the landscape and avoid sensitive features

No.	Project Element	Design Code	Relevant Parameters	Relevant Design Principles
DC8	Onshore substation	**Maximise screening effect using softscaping, landscaping and planting** On-site mitigation planting proposals will be undertaken around the onshore substations in order to minimise their visual effect and to maximise screening opportunities from key viewpoints/receptors, while also responding to local landscape character, pattern and growing conditions.	Requirement 4 of the draft DCO (document reference C1)	**Climate** Prioritise sustainability Resilient design **People** Be a considerate neighbour **Places** Landscape restoration Ecological enhancement
DC9	Onshore substation	**Use of bunds to support visual screening** The overall site design will explore the opportunity for site won topsoil and subsoil materials to be reused on-site within landscape earthworks 'bunds'. These bunds will support the visual screening of the onshore substations while having a gradual external slope gradient that appears natural and complements the existing terrain (when looking towards the onshore substations).	Requirement 3 of the draft DCO (document reference C1)	**Climate** Prioritise sustainability Resilient design **People** Be a considerate neighbour **Places** Landscape restoration Ecological enhancement

No.	Project Element	Design Code	Relevant Parameters	Relevant Design Principles
DC10	General and onshore substation	**Using low maintenance ground cover species, establishing native woodland and returning surplus land to agricultural uses** Landscaping planting of species rich grassland areas will be established to provide a low maintenance ground cover for areas that are not to be returned to agricultural use or planted as woodland. Where feasible, the overall site design will also identify and maximise land around the onshore substations that will be returned to agricultural use during the operational period.	Requirement 4 of the draft DCO (document reference C1)	**Climate** Prioritise sustainability, Resilient design **People** Coordinated approach; Be a considerate neighbour **Places** Landscape restoration; Ecological Enhancement. **Values** Respect the landscape and avoid sensitive features
DC11	General	**Maximise the habitat creation within the Order Limits and incorporate ecological enhancement** On-site mitigation planting will promote Biodiversity Benefit and planting proposals will be considered along with building design and layout of ancillary structures. The overall site design should have regard to the potential for embedded ecological mitigation, biodiversity benefit. The SuDS solution for the onshore substations, as a minimum, will include a water attenuation feature which will deliver habitat creation on the site.	Requirement 4 of the draft DCO (document reference C1)	**Climate** Prioritise sustainability Resilient design **People** Coordinated approach Be a considerate neighbour **Places** Landscape restoration Ecological Enhancement **Values** Respect the landscape and avoid sensitive features

No.	Project Element	Design Code	Relevant Parameters	Relevant Design Principles
DC12	Lighting	**Minimise the use of artificial lighting** Artificial lighting during the construction of the onshore substations will be as low as practicable. The onshore substations will not be permanently lit. Implementation of a detailed design that aligns with the Design Principles document will ensure that levels of light spill on to bat roosting, foraging and commuting habitats are not significant.	Requirement 3 of the draft DCO (document reference C1) Outline Construction Artificial Light Emissions Management Plan (document reference J1.11)	**Climate** Prioritise sustainability Resilient design **People** Coordinated approach Be a considerate neighbour **Places** Landscape restoration Ecological enhancement **Values** Respect the landscape and avoid sensitive features
DC13	General	**Optimise the generation of renewable energy through design** The fundamental purpose of the Project is to combat climate change through the deployment of a renewable energy source. The functional nature of the onshore substations and the need to operate a safe and efficient electricity transmission asset is a fundamental design constraint that must be recognised at all times, whilst achieving the above-mentioned design principles.		**Climate** Maximum generation capacity Prioritise sustainability Resilient design



7.0 References

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