

MORGAN AND MORECAMBE OFFSHORE WIND FARMS: TRANSMISSION ASSETS

Outline Onshore and Intertidal Written Scheme of Investigation (Clean)



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Prepared by:

RPS

Prepared for:

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

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Glossary

Term	Meaning
400 kV grid connection cables	Cables that will connect the proposed onshore substations to the existing National Grid Penwortham substation.
400 kV grid connection cable corridor	The corridor within which the 400 kV grid connection cables will be located.
Applicants	Morgan Offshore Wind Limited (Morgan OWL) and Morecambe Offshore Windfarm Ltd (Morecambe OWL).
Bronze Age Period	The time period 1800 – 600 BCE.
Early Medieval Period	The time period AD 410 – 1066.
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.
Holocene epoch	The current geological epoch, commencing around 11,700 years ago.
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 bays inclusive of all construction works, including the offshore and onshore cable routes, intertidal working area and landfall compound(s).
Local Planning Authority	The local government body (e.g., Borough Council, District Council, etc.) responsible for determining planning applications within a specific area.
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.
Medieval Period	The time period AD 1066 – 1485.
Mesolithic Period	The time period 12000 – 4000 BCE.
Modern Period	The time period AD 1800 – present.
Morgan and Morecambe Offshore Wind Farms: Transmission Assets	The offshore and onshore infrastructure connecting the Morgan Offshore Wind Project and the Morecambe Offshore Windfarm to the national grid. This includes the offshore export cables, landfall site, onshore export cables, onshore substations, 400 kV grid connection cables and associated grid connection infrastructure such as circuit breaker compounds. Also referred to in this report as the Transmission Assets, for ease of reading.
Morecambe Offshore Windfarm: Transmission Assets	The offshore export cables, landfall and onshore infrastructure required to connect the Morecambe Offshore Windfarm to the National Grid.

Term	Meaning
Morgan Offshore Wind Project: Transmission Assets	The offshore export cables, landfall and onshore infrastructure required to connect the Morgan Offshore Wind Project to the National Grid.
National Grid Penwortham substation	The existing National Grid substation at Penwortham, Lancashire.
Neolithic Period	The time period 4000 – 1800 BCE.
Onshore export cables	The cables which would bring electricity from the landfall to the onshore substations.
Onshore export cable corridor	The corridor within which the onshore export cables will be located.
Onshore Infrastructure Area	The area within the Transmission Assets Order Limits landward of 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.
Palaeolithic Period	The time period 900,000 – 12,000 BCE.
Post-medieval Period	The time period AD 1486 – 1799.
Prehistoric Period	The time period 900,000 BCE – AD 43.
Quaternary Period	The current geological period covering the period from 2.58 million years ago through to the present.
Roman Period	The time period AD 43 – 410.
Substation	Part of an electrical transmission and distribution system. Substations transform voltage from high to low, or the reverse by means of electrical transformers.
Transmission Assets	See Morgan and Morecambe Offshore Wind Farms: Transmission Assets (above).
Transmission Assets Order Limits	The area within which all components of the Transmission Assets will be located, including areas required on a temporary basis during construction and/or decommissioning
Upper Palaeolithic Period	The time period 50,000 – 12,000 BCE.

Acronyms

Acronym	Meaning
AD	Anno Domini
BCE	Before the Christian Era
c.	Circa
CAT	Cable Avoidance Tool
ClfA	Chartered Institute for Archaeology
CoCP	Code of Construction Practice
DCO	Development Consent Order
ES	Environmental Statement
GNSS	Global Navigation Satellite System
HER	Historic Environment Record
HET	Historic Environment Team (Lancashire County Council)
IFA	Institute of Field Archaeologists
MGC	Museums and Galleries Commission
MHWS	Mean High Water Springs
NWWS	North West Wetlands Survey
OS	Ordnance Survey
RTK	Real-Time Kinetic
SMA	Society of Museum Archaeologists
SSWSI	Site Specific Written Scheme of Investigation

Units

Unit	Description
kV	Kilovolt
m	Metre
ml	Millilitre
mm	Millimetre

1 Outline Onshore and Intertidal Written Scheme of Investigation

1.1 Background

1.1.1.1 This document forms the Outline Onshore and Intertidal Written Scheme of Investigation (WSI) prepared for the Morgan and Morecambe Offshore Wind Farms: Transmission Assets (referred to hereafter as ‘the Transmission Assets’).

1.1.1.2 This Onshore and Intertidal WSI has been updated for Deadline 4 to include the following:

- Clarification that the measures within this outline management plan will be implemented during the onshore site preparation works.

1.1.1.3 The Outline Onshore and Intertidal WSI was also updated at Deadline 3 of the Transmission Assets Examination to address comments made by Historic England in their Written Representation (REP1-082).

1.1.2 Project Overview

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

1.1.2.2 Morecambe Offshore Windfarm Limited is owned by Copenhagen Infrastructure Partners' (CIP) fifth flagship fund, Copenhagen Infrastructure V (CI V) and is developing the Morecambe Offshore Windfarm, also located in the east Irish Sea.

1.1.2.3 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.

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

1.1.2.5 The key components of the Transmission Assets include offshore elements, landfall and onshore elements. Details of the activities and infrastructure associated with the Transmission Assets are set out in Volume 1, Chapter 3: Project Description of the Environmental Statement (ES) (document reference F1.3).

1.1.2.6 This Outline Onshore and Intertidal Written Scheme of Investigation has been developed for the onshore and intertidal elements of the Transmission Assets. These onshore and intertidal elements are located in Lancashire (**Figure 1.1**) and comprise the following.

- Intertidal Infrastructure Area between Mean High Water Springs (MHWS) and Mean Low Water Springs.
- Onshore export cables: these export cables will be jointed to the offshore export cables via the transition joint bays at the landfall site, and will bring the electricity generated by the Generation Assets to the onshore substations.
- Onshore substations: the two electrically separate onshore substations will contain the components for transforming the power supplied via the onshore export cables up to 400 kV.
- 400kV grid connection cables: these export cables will bring the electricity generated by the Generation Assets from the two electrically separate onshore substations to the existing National Grid substation at Penwortham.

1.1.2.7 These elements are included in the Intertidal Infrastructure Area and the Onshore Infrastructure Area together with the construction compounds, accesses and other land that will be temporarily or permanently occupied during the construction, operation and maintenance and decommissioning of the Transmission Assets.

1.1.2.8 Those parts of the Transmission Assets Order Limits proposed for ecological mitigation/biodiversity enhancement are excluded from this area.

1.1.3 Purpose of the Outline Onshore and Intertidal Written Scheme of Investigation

1.1.3.1 This Outline Onshore and Intertidal Written Scheme of Investigation provides outline measures required to mitigate impacts on the archaeological resource as a result of construction activities.

1.1.3.1 The Outline Onshore and Intertidal Written Scheme of Investigation should be read in conjunction with the Outline Code of Construction Practice (CoCP) (document reference J1) and its supporting appendices.

1.1.3.2 This Outline Onshore and Intertidal Written Scheme of Investigation has been drafted based on archaeological and geoarchaeological research and fieldwork undertaken ahead of the submission of the application for a DCO for the Transmission Assets as reported in the following documents.

- Volume 3, Annex 5.1: Historic environment desk based assessment of the ES (document reference F3.5.1). This provides a detailed review of the known and potential archaeological resources within the Onshore Infrastructure Area and Intertidal Infrastructure Area and a defined 500 m buffer zone around this area (the historic environment study area).
- Volume 3, Annex 5.2: Onshore archaeological geophysical survey report of the ES (document reference F3.5.2). This describes the results of a programme of purposive archaeological geophysical survey undertaken within the Onshore Infrastructure Area.

- Volume 3, Annex 5.3: Intertidal archaeological survey report of the ES (document reference F3.5.3). This describes the results of an archaeological walkover within the Intertidal Infrastructure Area.
- Volume 3, Annex 5.4: Geoarchaeological desk-based assessment of the ES (document reference F3.5.4). This provides a detailed review of the geoarchaeological potential within the Onshore Infrastructure Area and the Intertidal Infrastructure Area.
- Volume 3, Annex 5.6: Interim trial trenching report of the ES (document reference F3.5.6). This describes the results of a programme of archaeological trial trenching and geoarchaeological investigation undertaken within the Onshore Infrastructure Area.

1.1.3.3 The programme of trial trenching and geoarchaeological investigation referenced in the final bullet point above has been agreed with the relevant stakeholders, specifically the Historic Environment Team (HET) at Lancashire County Council and also Historic England. The trenches were located in order to examine anomalies of potential archaeological interest identified by the onshore geophysical survey, and also to examine areas that appear to be archaeologically 'blank' or which were not subject to geophysical survey. The geoarchaeological investigation was designed to provide additional data regarding the nature and extent of the deposit sequences in the areas traversed by the onshore export cable corridor and the 400 kV grid connection cable corridor.

1.1.3.4 The report regarding the programme of trial trenching (Volume 3, Annex 5.6: trial trenching report of the ES (document reference F3.5.6) describes the findings across a total of 139 trenches which were excavated and recorded during the period May-August 2024. Archaeological features and deposits were identified in 80 of the trial trenches, with a general low density and a reasonable correlation with the anomalies identified by the geophysical survey. Most of the recorded features were ditches considered likely to represent Post-medieval field boundaries. A concentration of features was recorded at one location, and these may be of Prehistoric date, whilst a second concentration of features at another location may also be of Prehistoric date or possibly Roman. A number of former drainage features and palaeochannels were also recorded. Any additional data recovered by the geoarchaeological investigation which forms part of this programme of fieldwork has been considered within Volume 3, Annex 5.4: Geoarchaeological desk-based assessment of the ES (document reference F3.5.4).

1.1.4 Structure of this document

1.1.4.1 This Outline Onshore and Intertidal Written Scheme of Investigation has been separated into the following sections.

- **Section 1.1:** this provides an introduction, overview of the project, purpose and scope of the Outline Onshore and Intertidal Written Scheme of Investigation.

- **Section 1.2:** describes how the detailed Onshore and Intertidal Written Scheme of Investigations will be implemented as part of the development consent order.
- **Section 1.3:** provides a summary of the archaeological and historic background.
- **Section 1.4:** summarises the geophysical, trial trenching and geoarchaeological investigations undertaken for the application.
- **Section 1.5:** describes further archaeological and geoarchaeological work to be undertaken post-consent.
- **Section 1.6:** lists the references used to prepare this Outline Onshore and Intertidal Written Scheme of Investigation.

1.2 Implementation

- 1.2.1.1 Following the granting of consent for the Transmission Assets, detailed Outline Onshore and Intertidal Written Scheme of Investigations will be prepared on behalf of Morgan OWL and/or Morecambe OWL, prior to commencement of the relevant stage of works and will follow the principles established in this Outline Onshore and Intertidal Written Scheme of Investigation. The detailed Outline Onshore and Intertidal Written Scheme of Investigation Plans will require approval by the relevant planning authority following consultation with relevant stakeholders. The Applicants and all appointed contractors will be responsible for the implementation of their respective detailed Outline Onshore and Intertidal Written Scheme of Investigations.
- 1.2.1.2 The Applicants have committed to implementation of detailed Outline Onshore and Intertidal Written Scheme of Investigations via the following commitment, CoT40 (see Volume 1, Annex 5.3: Commitments Register, document reference F1.5.3), and is secured by inclusion of Requirement 11 of the draft Development Consent Order (DCO) (document reference C1) Schedules 2A & 2B. Below sets out the requirement wording for Project A (Project B's requirement mirror those of Project A for this requirement and are, therefore, not repeated):
- 11- (1) No stage of the Project A onshore works or Project A intertidal works may commence until for that stage an archaeological written scheme of investigation in accordance with the outline onshore and intertidal written scheme of investigation has been submitted to and approved by Lancashire County Council, in consultation with Historic England*
- (2) Pre-commencement surveys and investigations, including those necessary to allow production of any scheme required under sub-paragraph (1) must only take place in accordance with the applicable details set out in the outline onshore and intertidal written scheme of investigation.*
- (3) Any archaeological works must be carried out by a suitably qualified and competent person or body previously notified to the relevant planning authority.*
- (4) Each written scheme of investigation submitted under sub-paragraph (1) must be implemented as approved.*
- 1.2.1.3 The Transmission Assets may adopt a staged approach to the approval of DCO requirements. This will enable requirements to be approved in part or in whole, prior to the commencement of the relevant stage of works in accordance with whether staged approach is to be taken to the delivery of the each of the offshore wind farms.
- 1.2.1.4 For onshore and intertidal works (landward of Mean Low Water Springs), this approach will be governed by the inclusion of Requirement 3 within the draft DCO, which requires notification to be submitted to the relevant planning authority/authorities detailing whether Project A or Project B relevant works will be constructed in a single stage; or in two or more stages to be approved prior to the commencement of the authorised development.

- 1.2.1.5 Onshore site preparation works are defined in article 2 of the draft DCO (document reference C1). This Outline Onshore and Intertidal WSI applies to the onshore site preparation works and construction activities for the Transmission Assets located landward of MLWS and does not consider impacts seaward of MLWS.
- 1.2.1.6 Onshore site preparation works will be undertaken prior to the commencement of construction. These works will be undertaken in accordance with the measures of this Outline Onshore and Intertidal WSI, as certified through the DCO.

1.3 Archaeological and historic background

- 1.3.1.1 The following information is derived from the appropriate elements of the historic environment desk-based assessment (Volume 3, Annex 5.1: Historic environment desk-based assessment of the ES (document reference F3.5.1) and the programmes of project-specific fieldwork comprising geophysical survey (document reference F3.4.2) and trial trenching (document reference 3.5.6).
- 1.3.1.2 For the purposes of the examination of the archaeological and historical background of the land to establish the baseline conditions within the Onshore Infrastructure Area and Intertidal Infrastructure Area, a study area was established comprising a buffer zone extending for 500 m from the edge of the Onshore Infrastructure Area. This is known as the historic environment study area. Data were collected from a number of sources in order to establish the archaeological, geoarchaeological and historical baseline within the historic environment study area.
- 1.3.1.3 Consideration of the occupation and use of the land within the historic environment study area over time is intrinsically linked to an understanding of the physical processes which have led to the development of the current landscape across the south western coastal plain of the Fylde peninsula. Due to the low-lying nature of this landscape, the history of the area throughout the Quaternary period and including the Holocene epoch is a complex one of marine transgressions and regressions as sea levels changed in accordance with the series of glacial episodes and the intervening interstadials.
- 1.3.1.4 Essentially there is a recurring pattern of change in which periods of lower sea levels resulted in an extensive area of exposed land within what is now Liverpool Bay, with this land being inundated as a result of rising sea levels during the warmer interstadial periods as the coastline retreated.
- 1.3.1.5 Amongst the products of this continuous reworking of the landscape are the substantial sand dunes known as Starr Hills within the Landfall area for the Transmission Assets, which are of relatively recent date. Behind the coastal strip was a series of wetlands, some interconnected and most of which have now been drained. Organic material accumulated over time within these wetlands to create raised bogs, known in the north west region as 'mosses'. The onshore export cable corridor crosses two named mosses (Lytham Moss and Marton Moss, although these were connected and both names seem to have been used to cover the wider wetland area) as well as several other areas of former wetland.

- 1.3.1.6 An extensive survey of the archaeological and geoarchaeological potential of the mosses in the Fylde peninsula was undertaken between 1989 and 1993 as part of the North West Wetlands Survey (NWWs), with the results published in 1995 (The Wetlands of North Lancashire – Middleton *et al.*, 1995). The fieldwork included systematic surface artefact collection (field-walking) across arable fields.
- 1.3.1.7 No definitive evidence of activity during the Palaeolithic period is recorded within the historic environment study area, although an elk skeleton of late Upper Palaeolithic date was found within peat deposits at Poulton-le-Fylde, approximately 6.5 km to the north of this study area. Material of Mesolithic date has been found at several locations within the historic environment study area, principally comprising pieces of worked flint recovered by the NWWs and also a mattock (a tool used for digging) made from a deer antler which was found on the south bank of the River Ribble.
- 1.3.1.8 Neolithic and Bronze Age activity is also attested by the presence of flint tools including arrowheads. These worked flints are often found in distinct concentrations known as ‘flint scatters’. The NWWs identified a total of 17 flint scatters dating to the Neolithic/early Bronze Age period; and a further 30 sites containing smaller assemblages were identified, located mostly on the northern edge of Lytham Moss close to Peel, with additional sites located towards Higher Ballam. Other artefacts of Neolithic or Bronze Age date found within the historic environment study area include a polished stone axe recovered from a location close to the Landfall area and also a stone axe or hammer.
- 1.3.1.9 Bronze Age artefacts recovered from within the historic environment study area include bronze and stone.
- 1.3.1.10 No evidence has been recovered to indicate activity during the Iron Age within the historic environment study area.
- 1.3.1.11 A Roman fort at Dowbridge (Kirkham) represents the focus for activity of this period within the historic environment study area. Beyond the fort, evidence for Roman activity is quite sparse, comprising a few metal objects such as coins and brooches along with a possible bath-house near to Freckleton.
- 1.3.1.12 Several settlements within the historic environment study area have place names that suggest an Early Medieval origin, and a few were almost certainly established during this period as they are named in the Domesday Survey of 1086. These include Freckleton, Newton-with-Scales and Clifton as well as Kirkham. Metalwork potentially of this period has been recovered from a couple of locations.
- 1.3.1.13 In addition to the documented Medieval settlements within the historic environment study area, coins and other artefacts have been recovered whilst there is also evidence of field systems and agricultural practices in the form of ridge and furrow earthworks.
- 1.3.1.14 Post-medieval activity within the historic environment study area includes the draining of former wetland areas and the establishment of new farmsteads as well as the expansion of existing settlements. Two fish traps recorded on the south bank of the River Ribble may also date from this period.

- 1.3.1.15 The Modern period saw the establishment of Blackpool Airport (from 1907 onwards) and associated defensive structures related to its use by the Royal Air Force during the Second World War. There is also a radar installation nearby, to the east of Blackpool Airport. The Blackpool and Lytham Railway opened in 1863. Other key developments included the substantial expansion of existing settlements, especially at Blackpool, Lytham and St Annes, and the changes to the estuary of the River Ribble such that the river now flows in a single canalised channel.

1.4 Surveys

1.4.1 Geophysical Survey

- 1.4.1.1 A programme of archaeological geophysical survey has been undertaken across much of the land within the Onshore Infrastructure Area. This comprised magnetometer survey; the methodology and scope of the survey was agreed in advance with the appropriate stakeholders. The extent of the survey to date is shown on Figures 1.23 – 1.25 in Volume 3, Annex 5.1: Historic environment desk-based assessment of the ES (document reference F3.5.1).
- 1.4.1.2 The archaeological geophysical survey has identified a number of anomalies of probable archaeological interest, potentially relating to field systems or low density occupation activity. A number of undetermined linear and discrete anomalies have also been identified which could relate to isolated boundary ditches, former trackways, or extraction pits. The majority of anomalies identified either related to Post-medieval or Modern farming practices or are considered natural in origin. The results of the geophysical survey are presented in Volume 3, Annex 5.2: Onshore archaeological geophysical survey report of the ES (document reference F3.5.2).

1.4.2 Trial trenching and geoarchaeological investigation

- 1.4.2.1 As described above the results of the trial trenching completed by August 2024 are presented in Volume 3, Annex 5.6: Interim trial trenching report of the ES (document reference F3.5.6). The locations of all trenches completed by 16 August 2024 are indicated on Figures 1.23 – 1.25 in Volume 3, Annex 5.1: Historic environment desk-based assessment of the ES (document reference F3.5.1).
- 1.4.2.2 Archaeological features and deposits were identified in 80 of the trial trenches, with a general low density and a reasonable correlation with the anomalies identified by the geophysical survey. Most of the recorded features were ditches considered likely to represent Post-medieval field boundaries. A concentration of features was recorded at one location to the east of Bryning Lane and south of the Wrea Green Equitation Centre; these may be of Prehistoric date. A second concentration of features was identified to the north and north west of Nearer Hillock Farm and these may also be of Prehistoric or possibly Roman date. Both of these concentrations of features are within the onshore export cable corridor.

1.5 Further archaeological and geoarchaeological work

1.5.1 Introduction

- 1.5.1.1 The programme of post-consent archaeological and geoarchaeological work will initially comprise further geophysical survey and trial trenching of land within the Onshore Infrastructure Area.
- 1.5.1.2 This will be followed by detailed archaeological investigation where the results of the historic environment desk-based assessment, the archaeological geophysical survey and the programme of trial trenching indicate the presence of archaeological sites or features of significance. These detailed archaeological investigations will be undertaken ahead of the commencement of construction in the areas where the further archaeological work is required.
- 1.5.1.3 Consultation will be undertaken with the HET at Lancashire County Council to determine the number and locations of the areas where detailed archaeological investigation is required. A staged approach to this determination process may be necessary as it will be linked to the review of the results of the further geophysical survey and trial trenching.
- 1.5.1.4 For each area of detailed archaeological investigation, a Site Specific Written Scheme of Investigation (SSWSI) will be submitted to, and agreed by, the HET at Lancashire County Council. The SSWSI will clearly identify the area to be investigated and will set out the justification in terms of the known and potential archaeology at that location. Site specific aims and objectives will be identified, with appropriate references to the North West England Regional Research Framework (Research Frameworks, 2024).
- 1.5.1.5 A single SSWSI will be developed for the recording of historic hedgerows and parish boundaries where these are to be removed during construction. The locations of these features are indicated on Figures 1.29 to 1.31 in Volume 3, Annex 5.1: Historic environment desk-based assessment of the ES (document reference F3.5.1).
- 1.5.1.6 No generic archaeological watching brief (monitoring of construction) is proposed, nor are any areas where archaeological remains will be preserved *in situ*. Within each area of detailed archaeological investigation, consideration will be given regarding the potential for the *in situ* preservation of significant archaeological remains should any such remains be identified. The outcome of the consideration will depend on the nature of construction activities at that location and also on the physical characteristics of the archaeological remains. The appropriate Historic England Science Advisor will be consulted, and any decision will have regard to the Historic England guidance document Preserving Archaeological Remains: Decision-taking for Sites under Development (Historic England, 2016).
- 1.5.1.7 The geoarchaeological desk based assessment (Volume 3: Annex 5.4: Geoarchaeological desk based assessment of the ES (document reference F3.5.4) provides a detailed review of the geoarchaeological potential within the Onshore Infrastructure Area and the Intertidal Infrastructure Area.

- 1.5.1.8 The programme of post-consent geoarchaeological work will be coordinated as far as possible with the programme of archaeological work; these programmes should not be seen as mutually exclusive. The initial aim will be to acquire sufficient data for the development of accurate deposit models where appropriate.
- 1.5.1.9 Geoarchaeological deposit models are likely to be required for locations where the onshore export cable corridor and the 400 kV grid connection cable corridor cross areas of former wetlands and tidal mudflats, and potentially also within the intertidal zone. The production of any geoarchaeological deposit model will have regard to the Historic England guidance document Deposit Modelling and Archaeology: Guidance for Mapping Buried Deposits (Historic England, 2020).
- 1.5.1.10 Subsequent geoarchaeological work is likely to comprise the recovery of samples suitable for a range of scientific analyses that will help towards the understanding of formation processes and of the responses of human populations to environmental change.

1.5.2 General

- 1.5.2.1 The detailed archaeological investigations and the geoarchaeological work will be undertaken by one or more specialist archaeological contractors who will be Registered Organisations with the Chartered Institute for Archaeologists (CIfA). Procurement of the specialist archaeological contractor(s) will be in accordance with the relevant CIfA standard and guidance (CIfA, 2020a).
- 1.5.2.2 The fieldwork, post-excavation, reporting and archiving will be managed by Members or Associated members of CIfA, and the CIfA Code of Conduct (CIfA, 2022) will be adhered to at all times.
- 1.5.2.3 The HET at Lancashire County Council and the appropriate Historic England Science Advisor will be given reasonable prior notice of any archaeological or geoarchaeological work within the Onshore Infrastructure Area. A programme of monitoring of the archaeological investigations in the field shall be agreed in advance between the archaeological contractor(s), the Applicants' appointed representative(s), the HET at Lancashire County Council and the appropriate Historic England Science Advisor. The timing and frequency of each monitoring visit will be agreed in advance with all parties.
- 1.5.2.4 As part of the works, opportunities will be taken, where feasible, to engage in outreach activities through which the results of the archaeological investigations can be made available to a wider audience. This may include the provision of information for web-based updates and communications.

1.5.3 Fieldwork

Archaeological fieldwork methods

- 1.5.3.1 The archaeological fieldwork will be undertaken in accordance with the relevant CifA standard and guidance documents (CifA, 2020b; 2023a; 2023b).
- 1.5.3.2 The areas of detailed archaeological investigation will be set out using a real-time kinematic (RTK) global navigation satellite system (GNSS), accurate to 0.02 m, based upon the agreed area plan. The area will then be scanned using an appropriate proprietary Cable Avoidance Tool (CAT), operated by a suitably qualified and experienced person. The position of any potential services will be marked out and demarcated, with the areas of potential services being avoided. Once the area has been deemed clear, mechanical excavation will commence.
- 1.5.3.3 The modern topsoil and subsoil will be removed by mechanical excavator using a toothless ditching bucket, under direct supervision of a suitably qualified and experienced archaeologist, in stratigraphic order to natural geology, stopping at the first significant archaeological remains. Machine excavation will proceed in level spits of approximately 50 to 200 mm until either the archaeological horizon or the natural geology is reached. The excavated material will be banded in a designated location. The plant movements will be restricted to running topsoil until signed off (to be confirmed by email by the HET at Lancashire County Council); there is to be no running of plant or vehicles on the stripped surface until this sign-off has occurred.
- 1.5.3.4 Once the mechanical excavation of the area has been completed, the archaeologists will inspect and survey the stripped surface, cleaning by hand where necessary, to map all the visible potentially significant archaeological remains. Any remains will be assessed for cleaning and hand excavation. The mapping of the archaeological remains will be undertaken by RTK GNSS tied into the Ordnance Survey (OS) grid and Ordnance Datum.
- 1.5.3.5 The appropriate levels of sampling of archaeological features will be agreed with the HET at Lancashire County Council (and where appropriate with the Historic England Science Advisor) and set out in the SSWSI for each area. The proposed general approach is the following.
- Intersections of potentially significant ditches and gullies will have all relationships defined, investigated and recorded though 100% excavation (all terminals will be excavated). Some 10% by length of linear features will be excavated to determine their character over the exposed course, achieved via a sequence of slots and excavation of terminals and junctions to aid understanding/dating.
 - A minimum of 50%, by volume, of all discrete features, post-holes and pits will be excavated.
 - There will be 20% excavation of ring gullies, including slots at each terminus and at strategic locations around the feature.

- All funerary contexts will be fully excavated and all relationships recorded.
- For other types of features, further investigation will be a matter of on-site judgement in discussion with the HET at Lancashire County Council.
- Sufficient artefact assemblages will be recovered (where possible) to assist in the dating of the stratigraphic sequence and for comparison with other sites.

1.5.3.6 The presumption is that all excavation works detailed above will be undertaken by hand. However, in limited circumstances mechanical plant may be used to assist the excavation methodology, in particular where:

- deep archaeological strata can only be safely investigated by stepping or battering a localised sondage;
- a large number of slots are proposed to meet percentage requirements across extensive features, particularly where the aim is to recover dating evidence beyond feature characterisation; or
- sterile/natural layers are encountered that mask archaeologically significant strata.

1.5.3.7 The use of mechanical plant within the area of investigation after the initial stripping phase will be confirmed and agreed with the HET at Lancashire County Council prior to any such use.

Recording

1.5.3.8 A context-based recording system acceptable to the HET at Lancashire County Council will be used to record all archaeological deposits, features etc. Pro-forma sheets will be used to record all relevant information.

1.5.3.9 A digital photographic record of the archaeological works will be compiled in accordance with the Historic England guidance document Digital Image Capture and File Storage: Guidelines for Best Practice (Historic England 2015a). Photographs will illustrate both the detail and context of the principal archaeological features discovered. A selection of representative feature group/area shots will also be taken, if appropriate. All photographic records will include information detailing: site name and number/code, date, context, scale and orientation. All photographs will be cross-referenced onto the context records.

Human remains

1.5.3.10 In the event of the discovery of human remains, these will be left *in situ* and not further examined. The Applicants' appointed representative(s) will be informed immediately along with the HET at Lancashire County Council. A recognised specialist will visit the site to provide further advice.

1.5.3.11 If removal of human remains is necessary, a license will be obtained from the appropriate authorities (the Ministry of Justice at the time of writing) by the archaeological contractor and all conditions attached to that license will be complied with. All excavation and post-excavation work regarding human

remains will be undertaken in line with the standards set out in the Institute of Field Archaeologists (IfA) Technical Paper No. 13 (McKinley and Roberts 1993) and other appropriate guidance (including Historic England 2018a).

Environmental archaeology and conservation

- 1.5.3.12 Environmental sampling will be targeted upon potentially significant archaeological deposits or features and will predominantly examine sealed and well-dated contexts. Sample size will take into account the frequency with which material appropriate for sampling will occur, but bulk samples will normally be a minimum of 30 litres. Sampling strategies (on- and off-site) will principally derive from the English Heritage (now Historic England) guidance document Environmental Archaeology: A Guide to the Theory and Practice of Methods, from Sampling and Recovery to Post-excavation (English Heritage 2011).
- 1.5.3.13 If archaeological deposits are found to have significant potential for the presence of palaeoenvironmental material, initial advice on sampling will be sought from the archaeological contractor's environmental specialist and from the HET at Lancashire County Council on the need to extract, process and further examine environmental samples. Where appropriate, further advice may be sought from the Historic England Science Advisor.
- 1.5.3.14 Bulk sampling may also be used to collect charcoal for radiocarbon dating where appropriate.
- 1.5.3.15 All artefacts and animal bones will be recorded, collected and labelled according to their individual stratigraphical context. Artefacts of clearly modern date will be recorded but not retained for off-site assessment. Finds from each archaeological context will be allocated an individual finds tray/bag and waterproof labels will be used for each tray/bag to identify unique individual contexts.
- 1.5.3.16 On-site conservation advice may be necessary prior to lifting of and initial treatment of fragile objects. All finds and samples will be exposed, lifted, cleaned, conserved, marked, bagged and boxed according to guidelines produced by the United Kingdom Institute for Conservation (UKIC) and other bodies (IFA 1992; UKIC 1983; Watkinson and Neal 2001). Iron finds may require X-rays prior to conservation; reference will be made to the English Heritage guidance document Guidelines on the X-radiography of archaeological metalwork (English Heritage, 2006). Residues on pottery may also require study ahead of any conservation.
- 1.5.3.17 In the event of the discovery of waterlogged wood and other organic material, this material will be dealt with in accordance with the relevant English Heritage and Historic England guidance documents: Waterlogged Wood: Guidelines on the recording, sampling, conservation and curation of waterlogged wood (English Heritage 2010); and Waterlogged Organic Artefacts: Guidelines on their recovery, analysis and conservation (Historic England 2018b).
- 1.5.3.18 Where there is evidence for industrial activity, macroscopic technical residues (or a sample of them) will be collected by hand. Separate samples (c. 10 ml) will be collected for micro-slugs (hammerscale and spherical

droplets). Collection and treatment will be in accordance with the Historic England guidance document Archaeometallurgy: Guidelines for Best Practice (Historic England 2015b). X-radiography of a sample of industrial debris will be carried out during the post-fieldwork stage of the work.

The Treasure Act 1996

- 1.5.3.19 In the event of the discovery of an artefact that may fall within the remit of the Treasure Act 1996, the Treasure (Designation) Order 2002 and the Treasure (Designation) (Amendment) Order 2023, the Applicants' appointed representative(s), the Coroner and the HET at Lancashire County Council will be informed within 14 days. All finds of potential treasure will be removed to a safe place. The latest definition of treasure is provided in the Treasure (Designation) (Amendment) Order 2023.
- Any object (other than a coin) which dates to over 300 years old, and any part of which is at least 10% gold or silver.
 - Any object, any part of which is metal, which dates to over 200 years old and which (a) provides an exceptional insight into an aspect of national or regional history, archaeological or culture by virtue of (i) its rarity as an example of its type found in the United Kingdom, or (ii) the location, region or part of the United Kingdom in which it was found, or (iii) its connection with a particular person or event, or (b) although it does not, on its own, provide such an insight, it is, when found, part of the same find as one or more other objects, and provides such an insight when taken together with those objects.
 - Any two or more coins, which are made of at least 10% gold or silver, which are found together and have a date of over 300 years old.
 - Any ten or more coins, which are made of base metal, which are found together and have a date of over 300 years old.
 - Any object, whatever it is made of, that is found in the same place as, or had previously been together with, another object that is Treasure.

Geoarchaeology fieldwork methods

- 1.5.3.20 Fieldwork relating specifically to geoarchaeological investigations will be subject to consultation with the HET at Lancashire County Council and the Historic England Science Advisor. All work will be undertaken in line with the relevant Historic England guidance: Geoarchaeology: Using earth sciences to understand the archaeological record (Historic England, 2015c); and Deposit Modelling and Archaeology: Guidance for Mapping Buried Deposits (Historic England, 2020).
- 1.5.3.21 The fieldwork may include the extraction of cores as well as examination of, and sampling from, deposits revealed within areas of archaeological investigation.
- 1.5.3.22 Where cores are required, these may be recovered using a Russian auger or a hand-operated power auger. In some locations a small tracked rig may be used to recover cores to a suitable depth.

- 1.5.3.23 The auger cores will be examined and described on site by the contractor's geoarchaeologist using conventional descriptive terminology. Where appropriate, samples will be retained for further assessment by a specialist geoarchaeologist and palaeoenvironmentalist.

1.5.4 Reporting

- 1.5.4.1 A draft interim report will be produced within six weeks of the completion of the archaeological and/or geoarchaeological work at each area of investigation. Following agreement of the draft interim report with the applicant, a digital copy (either in .pdf or .doc format) will be supplied to the HET at Lancashire County Council for verification and review. When the report has been agreed a digital final copy will be provided to the HET at Lancashire County Council. A digital copy in PDF format will be provided to the Lancashire Historic Environment Record (HER) on the understanding that it will become a public document after an appropriate period of time (generally not exceeding six months).
- 1.5.4.2 Following completion of the full programme of archaeological and geoarchaeological work within the Onshore Infrastructure Area, the archaeological contractor(s) will produce an assessment report outlining the results of the archaeological investigations. This assessment report will describe the programme of work undertaken including any sampling that was carried out. Samples will be quantified and a selection of samples will be assessed in order to provide information on their potential for further detailed analysis. The assessment report will include recommendations for further analysis and for any scientific dating that may be appropriate.
- 1.5.4.3 The report will include, as a minimum:
- a front sheet (setting out the project/site name, National Grid References to minimum eight figures, description of task(s) undertaken, date and duration of the fieldwork, site code/number);
 - a non-technical summary of the work including the results;
 - identity of the organisation(s) and individuals who carried out the work;
 - a general introduction to the project including site descriptions;
 - aims and objectives;
 - methodologies employed to undertake the works;
 - descriptive text presenting the results of the work including finds and environmental data where appropriate;
 - quantifications of the finds recovered and environmental samples taken;
 - interpretation and discussion of the results;
 - assessment of the significance of any archaeological remains and deposit sequences;
 - assessment of the potential of any data for further analysis including scientific dating where appropriate;

- proposals for publication of the further analysis in an appropriate format, subject to further discussion with the HET at Lancashire County Council regarding the appropriate publication vehicle and the nature/extent of the report;
- updated design;
- a synopsis of the envisaged final report(s) for publication;
- details of the scale, nature and location of the archive and the intended place of deposition;
- report bibliography; and
- sufficient illustrations to support the text including figures to show the location of the scheme in a regional and local context, locations of all works undertaken, detailed plans and sections as appropriate.

- 1.5.4.4 The draft assessment report will be produced within four months of the completion of the final fieldwork element. Following agreement of the draft report with the Applicants, a copy will be provided to the HET at Lancashire County Council.
- 1.5.4.5 Following agreement of the assessment report, a final report will be prepared for publication in an appropriate format as described within the assessment report. The timetable for the production of the final report will be described within the assessment report.
- 1.5.4.6 The involvement of the Applicants and the HET at Lancashire County Council will be acknowledged in any report or publication generated by the programme of archaeological and geoarchaeological work.
- 1.5.4.7 Copyright of all reports prepared by the archaeological contractor(s) will be retained by the archaeological contractor(s) under the terms of the Copyright, Designs and Patents Act 1988 with all rights reserved, excepting that the archaeological contractor(s) provides an exclusive licence to the Applicants for the use of the reports in all matters relating to the project and to the local planning authorities with regard to the provision of planning advice and public awareness of the historic environment.

1.5.5 Archive

- 1.5.5.1 The project archive consists of the records relating to the programme of archaeological and geoarchaeological work, including written records, photographs, drawings and artefacts. The archaeological contractor(s) will ensure that the archive is fully catalogued, indexed, cross-referenced and checked for consistency.
- 1.5.5.2 The archive will be prepared in accordance with procedures outlined in relevant standards and guidance documents (*cf.* ClfA 2020c; Museums and Galleries Commission (MGC) 1992; Society of Museum Archaeologists (SMA) 1995; UKIC 1984) and any procedures adopted by the recipient museum. The archaeological contractor(s) will ensure that the archive is deposited with the recipient museum and that a storage grant is provided in line with the requirements of the recipient museum.

- 1.5.5.3 The retained artefacts remain the property of the landowner with the exception of human remains and any artefacts that fall within the remit of the Treasure Act 1996 and the Treasure (Designation) (Amendment) Order 2023. Subject to obtaining written consent from the landowner, the artefacts will be deposited along with the rest of the archive. Arrangements for the finds to be viewed by the landowner will be made on request.
- No recovered finds will be discarded without the written consent of the recipient body. Selection and retention policy will be guided by the relevant standards and guidance documents (*cf.* ClfA 2020c, SMA 1993, LCCMS 2022).
- 1.5.5.4 GIS files will be submitted to the Lancashire HER in an appropriate format (such as Esri, shapefile or MapInfo Tab). The files will include the trench locations and will accurately depict archaeological features (where present). These will be accurately tied to the British National Grid using the OSGB36 projected coordinate system.
- 1.5.5.5 The digital data will be submitted to the Archaeological Data Service upon permission from the Applicants, subject to any dictated time embargoes.

1.6 References

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ClfA, (2020b) Standard and guidance for the collection, documentation, conservation and research of archaeological materials, Chartered Institute for Archaeologists, October 2020.

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ClfA, (2022) Code of Conduct; professional ethics in archaeology, Chartered Institute for Archaeologists, October 2022.

ClfA, (2023a) Standard for archaeological excavation, Chartered Institute for Archaeologists, December 2023.

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English Heritage, (2006), Guidelines on the X-radiography of archaeological metalwork, January 2006.

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Middleton, R., Wells, C.E. and Huckerby, E. (1995) The Wetlands of North Lancashire. Lancaster. Lancaster University Archaeological Unit.

Research Frameworks (2024). North West England Regional Research Framework. Available at: <https://researchframeworks.org/nwrf/> (Accessed: May 2024).

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UKIC, (1983) Conservation Guidelines No. 2: Packaging and storage of freshly excavated artefacts from archaeological sites, United Kingdom Institute for Conservation.

UKIC, (1984) Conservation Guidelines No.3: Environmental standards for the permanent storage of excavated material from archaeological sites, United Kingdom Institute for Conservation.

Watkinson, DE and Neal, V, (2001) First Aid for Finds, RESCUE/United Kingdom Institute for Conservation.