Hornsea Project Four

Outline Written Scheme of Investigation for Onshore Archaeology TRACKED

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Revision Summary				
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01	September 2021	Royal HaskoningDHV	Thomas Watts, Orsted	Julian Carolan, Orsted
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Revision Change Log			
Rev	*Page*	*Section*	*Description*
01	September 2021	N/A	Original Submission
02	April 2022	Paragraph 7.2.1.5, Page 23	Removal of reference to scientific dating at analysis stage
		Paragraph 7.6.1.3, Page 26	Updated to include further specific details of the safety and protection of the Beverley Sanctuary Limit Stone during construction and a requirement to produce a specific Mitigation Method Statement which will be referred to in the CoCP.
		Section 7.7, Page 26 - 27	Updated as ORPAD is no longer funded by the Crown Estate (or maintained by Wessex Archaeology) however the principles of ORPAD are still relevant to Offshore Windfarm projects. All unexpected discoveries will be reported promptly to HAP by the Archaeological Contractor.
		Paragraph 10.7.1.9, Page 38	Updated to include appropriate cross-referencing.
		Section 10.8, Page 38 - 39	Updated to included reference to undertaking environmental sampling, processing, assessment and analysis in accordance with Historic England's 'Environmental Archaeology' guidance.
		Paragraph 10.9.1.1, Page 39	Updated to include reference to the appropriate standards.
		References, Page 30- 31	Additional references added

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Glossary

Term	Definition
Archaeological Monitoring (Watching Brief)	Archaeological observation of intrusive groundworks (e.g. targeted areas of both top-soil stripping and excavation of the cable trench, if required and where possible) and any subsequent required investigation should archaeological remains be exposed. Archaeological monitoring often occurs in areas where the archaeological remains are of low sensitivity or the potential for archaeological remains to survive is uncertain.
Commitment	A term used interchangeably with mitigation and enhancement measures. The purpose of Commitments is to reduce and/or eliminate Likely Significant Effects (LSEs), in EIA terms. Primary (Design) or Tertiary (Inherent) are both embedded within the assessment at the relevant point in the EIA (e.g. at Scoping, Preliminary Environmental Information Report (PEIR) or ES). Secondary commitments are incorporated to reduce LSE to environmentally acceptable levels following initial assessment i.e. so that residual effects are acceptable.
Development Consent Order (DCO)	An order made under the Planning Act 2008 granting development consent for one or more Nationally Significant Infrastructure Projects (NSIP).
Effect	Term used to express the consequence of an impact. The significance of an effect is determined by correlating the magnitude of the impact with the importance, or sensitivity, of the receptor or resource in accordance with defined significance criteria.
Energy balancing infrastructure (EBI)	The onshore substation includes energy balancing Infrastructure. These provide valuable services to the electrical grid, such as storing energy to meet periods of peak demand and improving overall reliability.
Environmental Statement (ES)	A document reporting the findings of the EIA and produced in accordance with the EIA Directive as transposed into UK law by the EIA Regulations
Export cable corridor (ECC)	The specific corridor of seabed (seaward of Mean High-Water Springs (MHWS)) and land (landward of MHWS) from the Hornsea Project Four array area to the Creyke Beck National Grid substation, within which the export cables will be located.
Findspot	A findspot identifies a location where a single or group of artefacts of archaeological interest have been made and lodged with the Humber Historic Environment Record.
Geoarchaeological Assessment	Geoarchaeology is the application of earth science principles and techniques to the understanding of the archaeological record. Geoarchaeological approaches can inform site formation processes, preservation levels, and identify changes in the physical landscape through time.
Hornsea Project Four Offshore Wind Farm	The term covers all elements of the project (i.e. both the offshore and onshore). Hornsea Four infrastructure will include offshore generating stations (wind turbines), electrical export cables to landfall, and

Term	Definition
	connection to the electricity transmission network. Hereafter referred to as Hornsea Four.
Landfall	The generic term applied to the entire landfall area between Mean Low Water Spring (MLWS) tide and the Transition Joint Bay (TJB) inclusive of all construction works, including the offshore and onshore ECC, intertidal working area and landfall compound. Where the offshore cables come ashore east of Fraisthorpe.
National Grid Electricity Transmission (NGET) substation	The grid connection location for Hornsea Four at Creyke Beck.
Offshore Renewables Protocol for Archaeological Discoveries (ORPAD)	For all intrusive groundworks carried out onshore above Mean High Water Springs (MHWS) where an archaeologist is not present, the Applicant and the appointed Principal Contractor(s) will implement a protocol for reporting archaeological discoveries through the application of the Offshore Renewables Protocol for Archaeological Discoveries (ORPAD) (The Crown Estate 2014).
Onshore substation (OnSS)	Comprises a compound containing the electrical components for transforming the power supplied from Hornsea Project Four 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. If a HVDC system is used the OnSS will also house equipment to convert the power from HVDC to HVAC.
Order Limits	The limits within which Hornsea Project Four (the 'authorised project') may be carried out.
Orsted Hornsea Project Four Limited	The Applicant for the proposed Hornsea Project Four Offshore Wind Farm Development Consent Order (DCO).
Palaeoenvironmental Assessment	Palaeoenvironmental archaeology uses carefully selected recovery techniques to put archaeological sites into their environmental context and provides evidence on such things as diet, economy and living conditions.
Planning Inspectorate (PINS)	The agency responsible for operating the planning process for Nationally Significant Infrastructure Projects (NSIPs).
Restoration of Historic Earthworks	As part of the Principal Contractor's reinstatement works, the contours of historic earthworks located within pre-defined areas, such as ridge and furrow earthworks, will be restored to their pre-construction state.
Set Piece Excavation (SPE)	Set Piece Excavation is an intrusive form of fieldwork, which systematically identifies, examines and records archaeological deposits, features and structures, and recovers artefacts, ecofacts and other remains within a specified area. This type of investigation is recommended for areas containing complex and/or significant archaeological remains, and should be undertaken in advance of the construction phase or as part of an 'early works' programme at construction,
Strip, Map and Sample (SMS)	Strip, Map and Sample is often appropriate where archaeological remains are thought or known to be present, but their specific type(s) or exact extent are unknown or remain uncertain following earlier stages of survey

Term	Definition
	and evaluation or are not believed to warrant full in-advance SPE. This type of investigation can be undertaken as either part of an 'early works' programme at construction or as part of the Principal Contractor's topsoil stripping works.
Trenchless Techniques	Also referred to as trenchless crossing techniques or trenchless methods. These techniques include Horizontal Directional Drilling (HDD), thrust boring, auger boring, and pipe ramming, which allow ducts to be installed under an obstruction without breaking open the ground and digging a trench.

Acronyms

Acronym	Definition
ADS	Archaeology Data Service
ALGAO	Association of Local Government Archaeological Officers
BGS	British Geological Survey
CIfA	Chartered Institute for Archaeologists
DMV	Deserted Medieval Village
DCO	Development Consent Order
ERYC	East Riding of Yorkshire Council
EBI	Energy Balancing Infrastructure
ECC	Export Cable Corridor
EIA	Environmental Impact Assessment
ES	Environmental Statement
GPS	Global Positioning System
GIS	Geographic Information System
Lidar	Light Detection and Ranging
HAP	Humber Archaeology Partnership
HE	Historic England
HHER	Humber Historic Environment Record
HP4	Hornsea Project Four
HVAC	High Voltage Alternating Current
HVDC	High Voltage Direct Current
MHWS	Mean High Water Springs
MLWS	Mean Low Water Springs
MoRPHE	Management of Research Projects in the Historic Environment
NGET	National Grid Electricity Transmission
ORPAD	Offshore Renewables Protocol for Archaeological Discoveries
OASIS	Online Access to the Index of Archaeological Investigations
OnSS	Onshore Substation
PINS	Planning Inspectorate
PPE	Personal Protective Equipment
RAMS	Risk Assessment Method Statement

Acronym	Definition
SPE	Set Piece Excavation
SMS	Strip, Map and Sample
UXO	Unexploded Ordnance
UPD	Updated Project Design
WSI	Written Scheme of Investigation

Units

Unit	Definition
km	kilometre
m	metre

1 Introduction

1.1 General Project Background

1.1.1.1 Orsted Hornsea Project Four Limited (the 'Applicant') is proposing to develop Hornsea Project Four Wind Farm (hereafter 'Hornsea Four'). Hornsea Four will be located approximately 69 km offshore the East Riding of Yorkshire in the Southern North Sea and will be the fourth project to be developed in the former Hornsea Zone. Hornsea Four will include both offshore and onshore infrastructure including an offshore generating station (wind farm), export cables to landfall and on to an onshore substation (OnSS) with energy balancing infrastructure (EBI), and connection to the electricity transmission network.

1.1.1.2 Onshore, the Hornsea Four Order Limits consist of a landfall location at Fraisthorpe Sands (south of Bridlington), an approximately 39 km long, 80 m wide onshore export cable corridor (ECC) easement with eight logistics compounds, orientated south-westwards and crossing the River Hull before curving southwards to the west of Beverley and terminating at the OnSS, 4 km south of Beverley and 10 km north-west of Hull.

1.1.1.3 Royal HaskoningDHV provide environmental and consenting support services to the Applicant, including onshore archaeology and cultural heritage. Regular and ongoing consultation with the Historic Environment consultees has been undertaken, including Historic England (HE), Humber Archaeology Partnership (HAP; Archaeological Advisors to the East Riding of Yorkshire Council (ERYC)) and ERYC's Conservation Officer, to inform the archaeology and cultural heritage assessment (**Volume A3, Chapter 5: Historic Environment**).

1.1.1.4 Route Planning and Site Selection carried out to inform the Hornsea Four Order Limits has avoided all known designated heritage assets, with the exception of Beverley Sanctuary Limit Stone, Bishop Burton (NHLE 1012589) (Co2, **Volume A4, Annex 5.2: Commitments Register**). This process is detailed in **Volume A1, Chapter 3: Site Selection and Consideration of Alternatives**. Furthermore, known non-designated heritage assets were considered and, where practicable, avoided by onshore infrastructure whilst factoring in other constraints.

1.2 Purpose of the outline Onshore WSI Structure and Purpose

1.2.1.1 This outline Written Scheme of Investigation (WSI) will form the basis for a detailed WSI for onshore archaeology for all areas of Hornsea Four landward of Mean High Water Springs (MHWS), which will be prepared during the detailed design phase of the project. Construction of the connection works will not commence until the detailed WSI has been approved by ERYC in consultation with the HAP and the Historic Building and Monuments Commission for England (HE) This is supported by inclusion of Requirement 16 of the draft Development Consent Order (DCO) which states:

> ***16.***—*(1) No stage of the connection works may commence until a written scheme of archaeological investigation (which must accord with the outline onshore written scheme of investigation) for that part of the connection works has been submitted to and approved by the relevant planning authority in consultation with the Historic Buildings and Monuments Commission for England.*

> ***(2)*** *Archaeological investigations carried out as part of onshore site preparation works must only take place in accordance with a specific written scheme of investigation (which must accord with the details set out in the outline onshore written scheme of investigation) which has been submitted to and approved by the relevant planning authority in consultation with the Historic Buildings and Monuments Commission for England.*
>
> ***(3)*** *Any archaeological investigations must be carried out in accordance with the relevant approved scheme.*
>
> ***(4)*** *The archaeological site investigations and post investigation assessment must be completed in accordance with the programme set out in the written scheme of archaeological investigation and provision made for analysis, publication and dissemination of results and archive deposition.*

1.2.1.2 Hornsea Four will adopt a staged approach to the approval of DCO requirements enabling requirements to be approved in part or in whole prior to the commencement of the relevant stage of works according to whether a staged approach is to be taken to construction of the works in question. This approach will be governed by the inclusion of Requirement 27 within the draft DCO which requires a written scheme setting out the stages of construction to be approved prior to the commencement of the authorised development. The Construction Staging Scheme must be approved by the relevant Planning Authority in respect of the onshore connection works and by the MMO in relation to authorised works seaward of MHWS.

1.2.1.3 The Construction Staging Scheme will detail the stages of construction and the timing of approval of relevant DCO requirements with respect to the relevant construction stages identified within the scheme.

> ***27.—(1)****The authorised development may not be commenced until a written scheme setting out the stages of construction of the authorised development has been submitted to and approved by the relevant planning authority, in relation to the connection works, or the MMO, in relation to works seaward of MHWS.*
>
> ***(2)*** *The stages of construction referred to in sub-paragraph (1) shall not permit the authorised development to be constructed in more than one overall phase.*
>
> ***(3)*** *The scheme must be implemented as approved.*

1.2.1.4 The outline WSI for onshore archaeology as certified by the Secretary of State will be incorporated into the contracts for the principal contractors of all onshore works as authorised by the DCO. All principal contractors, subcontractors and their suppliers will be required to observe the relevant provisions of the outline WSI and subsequent detailed WSI and provide evidence of how they will ensure its requirements will be implemented.

1.2.1.5 A separate outline WSI for Marine Archaeology has also been produced for all works seaward of MHWS and submitted as part of the DCO application (**Volume F2, Chapter 4: Outline Marine Archaeological Written Scheme of Investigation**).

1.3 Broad Approach to Developing the Detailed WSI

1.3.1.1 This outline WSI sets out the proposed approaches, methodologies and commitments to archaeological survey and investigation which were identified as the outcomes to the EIA process as set out in **Volume A3, Chapter 5: Historic Environment** of the ES.

1.3.1.2 The results of the survey and evaluation work undertaken at the post-consent stage will further inform the detailed WSI; an iterative process to developing and refining the mitigation approach which will ensure that all potential impacts upon the onshore historic environment arising from Hornsea Four are fully identified and appropriately and proportionately mitigated, wherever possible.

1.3.1.3 Each post-consent stage of survey and evaluation work will be subject to a separate survey-specific WSI to be agreed following consultations with HAP (and HE, as required), (see **Section 6**), which will provide further survey-specific details in line with this outline WSI.

1.3.1.4 As part of the wider onshore archaeological mitigation strategy both pre-construction and construction related WSIs will be produced, detailing the mitigation measures to be undertaken within the onshore Order Limits. These WSIs will build upon the information within this outline WSI (see **Section 7**). Example (model) clauses (**Appendix 1 – Example (Model) Clauses – Mitigation Works Specification: SPE, SMS and Archaeological Monitoring / Watching Brief**) have been included as outline examples only of the likely approaches to mitigation works required and the associated specifications, with respect to methodologies for Set-Piece Excavation (SPE); Strip, Map and Sample (SMS); and archaeological monitoring / watching brief.

1.3.1.5 Effective cross referencing to all archaeological mitigation requirements detailed will be made within relevant engineering and environmental management plans, such as (but not limited to) the outline Code of Construction Practice (CoCP) (**Volume F2, Chapter 2: Outline Code of Construction Practice**) which has been submitted as part of the DCO application. The final CoCP(s), which will be further developed in post-consent (Co124), will need to make direct reference to both the onshore and offshore archaeological mitigation related WSIs for clarity and for the avoidance of doubt in respect of the archaeological requirements and obligations on the Applicant and their associated contractors (once appointed).

1.3.1.6 The flow chart below (**Figure 1**) provides a visual representation of the stages to producing the survey-specific WSIs which will inform the mitigation WSIs required to part discharge the DCO requirement.

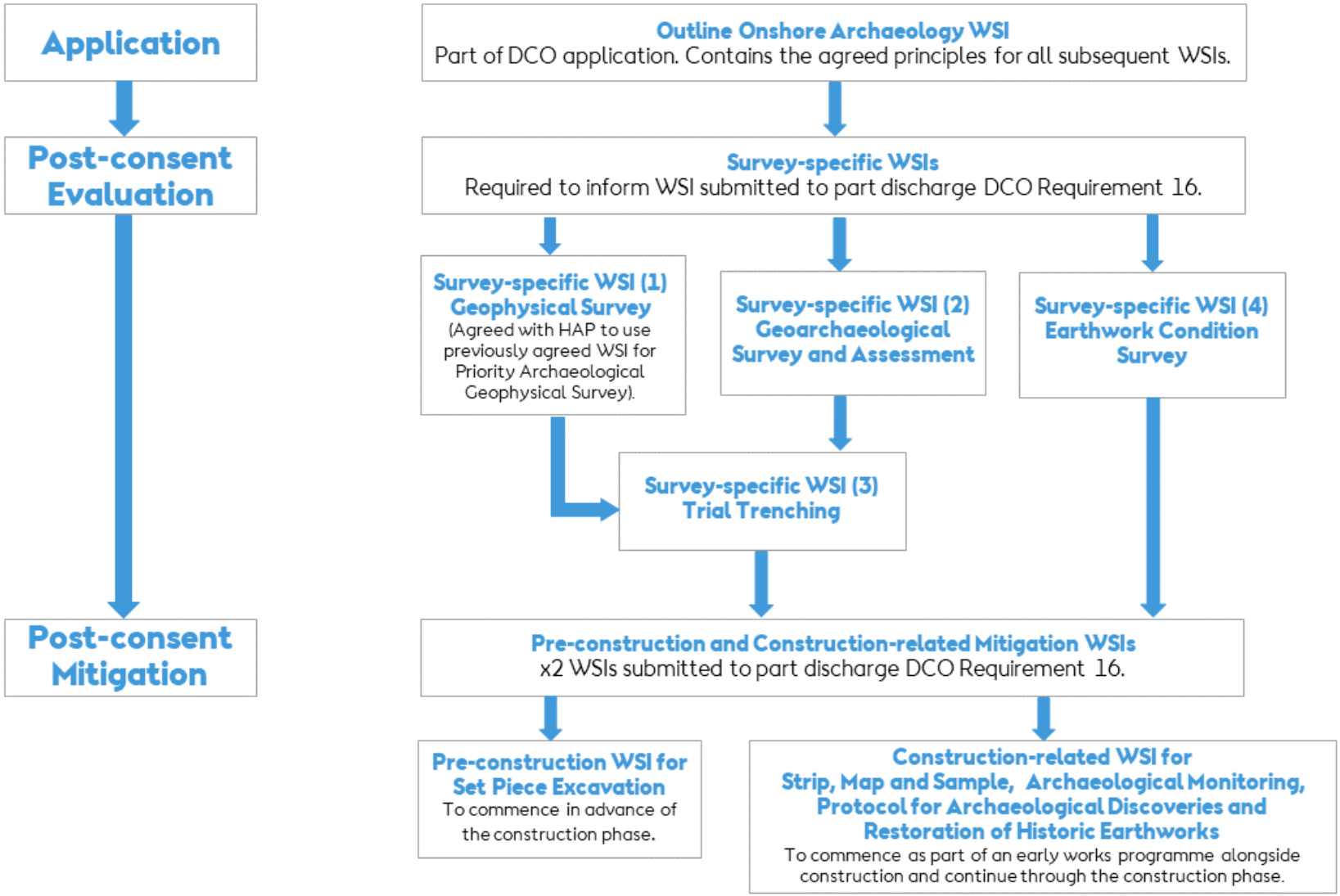

Figure 1: Staged approach to WSI production post-consent.

1.4 Topography and Geology

1.4.1.1 Onshore, Hornsea Four is located within the East Riding of Yorkshire, traversing through a landscape of varying character and geology. The most distinct landscapes are those of the Yorkshire Wolds and Holderness which have a complex archaeological and geoarchaeological history.

1.4.1.2 Hornsea Four passes through a relatively flat landscape, situated at approximately 7 m above Ordnance Datum (aOD) at the coast, and staying relatively level until reaching the hinterlands of the Wolds, where the land gently rises up to approximately 24 m aOD near Cherry Burton, rising to 40 m aOD near Walkington, before gently falling and levelling off to approximately 12 m aOD at the OnSS near Creyke Beck.

1.4.1.3 Topographically, evidence for settlement and land division can be seen ranging from elevations of up to 40 m aOD on the edge of the Yorkshire Wolds at Risby down to approximately 2 m aOD in the Hull Valley itself, although most sites are above 3 m aOD. Known archaeological settlement sites are commonly located on slightly higher ground which presumably would have ensured that they remained relatively dry, a trend that continued for settlements into the medieval period and beyond. However, the systematic draining of the land from the medieval period to form fertile agricultural land may have had a detrimental effect on any archaeological remains present either through desiccation or damage from ploughing regimes.

1.4.1.4 Geologically, Hornsea Four is located on a White Chalk subgroup bedrock, with most of the area overlain by glacial till deposits. The onshore ECC passes through low-lying areas containing superficial deposits of alluvium to the south of Carr House Farm, at the Driffield Canal and Nafferton Drain, Kilnwick Arm Drain, Beswick New Cut and Bryan Mills Beck. Superficial deposits at the coast contain a complex mixture of alluvium and late glacial glaciofluvial deposits.

1.4.1.5 These superficial deposits contain, or are entirely composed of, sand and gravel which can provide good results from aerial survey, dependent on the time of year and ground conditions. Clay and silt, also present in many of these superficial deposits, is similarly capable of providing good results. However, the gravel-based deposits can result in 'noisy' geophysical survey data, and deep deposits of alluvium (i.e. depths beyond 1 m) are not always conducive to geophysical survey as smaller, discrete archaeological features can be masked from detection.

1.4.1.6 The bedrock deposits are well drained and very well suited to the recording of crop and soil marks over buried features from the air, and the recording of archaeological anomalies from geophysical survey.

1.4.1.7 The soils are frequently mapped as semi-waterlogged, however the continued drainage within the Hull Valley from the medieval period onwards combined with the rich soils of

glacial till and alluvium have proved favourable to the visibility of archaeological features as cropmarks and geophysical anomalies.

1.4.1.8 Less well drained soils located within the Hull Valley, (between Foston on the Wolds and Rotsea, and those to the west and south of Beverley) provide less suitable conditions for crop and soil marks. These less well drained soil types in combination with low-lying areas of alluvium, such as those within the Hull Valley, tend to be less conducive to geophysical survey as these overlying waterlogged deposits can mask smaller or less magnetically susceptible archaeological features from detection. However, the ability to detect geomorphological features, such as palaeochannels, in these ground conditions can indirectly inform the presence of archaeological activity.

2 Legislation, Policy and Guidance

2.1 Legislation and Planning Policy

2.1.1.1 The primary legislation relating to the consent regime for Hornsea Four is provided by the Planning Act 2008. The Act designates a series of National Planning Statements (NPSs) setting out national policy in relation to NSIPs.

2.1.1.2 Of specific relevance to Hornsea Four project is EN-1 Overarching NPS for Energy (DECC 2011a) and EN-3 NPS for Renewable Energy Infrastructure (DECC 2011b). Also, of relevance is the National Planning Policy Framework (NPPF) Section 16: Conserving and enhancing the historic environment; although the NPPF is not directed specifically at NSIPs, this sets out the principal national policy on the importance, management and safeguarding of heritage assets within the planning process.

2.2 Standards, Guidance and Good Practice

2.2.1.1 The following relevant standards, guidance and good practice have been taken account of in the production of this outline WSI, produced by the Chartered Institute for Archaeology (CIfA) and the Association of Local Government Archaeological Officers (ALGAO):

- Standard and guidance for geophysical survey (CIfA 2014a);
- Standard and guidance for archaeological field evaluation (CIfA 2014b);
- Standard and guidance for an archaeological watching brief (CIfA 2014c);
- Standard and guidance for archaeological excavation (CIfA 2014d);
- Standard and guidance for the collection, documentation, conservation and research of archaeological materials (CIfA 2014e);
- Standard and guidance for the creation, compilation, transfer and deposition of archaeological archives (CIfA 2014f);
- Advice Note for Post-Excavation Assessment (ALGAO 2015);
- Code of Conduct (CIfA 2019a); and
- Standard and guidance for the archaeological investigation and recording of standing buildings or structures (CIfA 2019b).

2.2.1.2 Of further relevance is the following non-exhaustive list of publications from Historic England. Other survey and investigation specific guidelines will also apply in addition to those listed below:

- Environmental Archaeology: A Guide to the Theory and Practice of Methods, from Sampling and Recovery to Post-excavation (2nd Edition) (English Heritage, now Historic England 2011);
- Management of Research Projects in the Historic Environment (MoRPHE: Historic England 2015a);
- Geoarchaeology: Using Earth Sciences to Understand the Archaeological Record (Historic England 2015b);
- Preserving Archaeological Remains: Decision-taking for Sites under Development (Historic England 2016a);
- Guidelines for the Use of Geophysics in Archaeology. Questions to Ask and Points to Consider (EAC Guideline 2) (European Archaeologiae Consilium - EAC 2016);
- Understanding Historic Buildings. A Guide to Good Recording Practice (Historic England 2016b); and
- Understanding the Archaeology of Landscapes (Historic England 2017).

3 Archaeological and Historical Baseline

3.1 Summary

3.1.1.1 The area of East Riding has a rich historical and archaeological heritage, with nationally significant archaeological sites and monuments located across the landscape.

3.1.1.2 Early prehistoric activity is known within the region through pollen analysis, which indicates that forests were beginning to be cleared during the Mesolithic period. Following this, the Yorkshire Wolds and wider area became well settled during the Neolithic period, due to the wide range of natural resources. Evidence for seasonal occupation during the Mesolithic and Neolithic period within the wetlands of Holderness is also evident in environmental remains and flint scatters.

3.1.1.3 Settlement of the Wolds continued during the Bronze Age and Iron Age periods; this is evidenced from the vast number of Bronze Age round barrows and Iron Age square barrows surviving within the landscape.

3.1.1.4 Activity during the Romano-British period often relates to periods of enclosure and land division, seen in the form of cropmarks, which often originated from the Iron Age period.

3.1.1.5 The landscape went through a transformation during the medieval and post-medieval periods with the extensive drainage schemes and the move to enclosure and more intensive agricultural practices.

3.1.1.6 Full details of the baseline conditions established for the Historic Environment are provided in the following Technical Reports:

- **Volume A6, Annex 5.1: Historic Environment Desk Based Assessment**;
- **Volume A6, Annex 5.2: Aerial Photographic and Lidar Assessment**;
- **Volume A6, Annex 5.3: Priority Archaeological Geophysical Survey**; and
- **Volume A6, Annex 5.4: Geoarchaeological Desk Based Assessment**.

3.1.1.7 The historic environment resource identified as being, or potentially being, present within the Order Limits include buried archaeological and geoarchaeological remains, historic earthworks and non-listed structures.

3.1.1.8 The impact assessment presented in the Historic Environment ES Chapter (**Volume A3, Chapter 5: Historic Environment**) identified a direct (physical) impact upon the significance of known or as-yet unknown non-designated heritage assets as a result of intrusive groundworks and other construction-related activities associated with the Hornsea Four connection works.

3.1.1.9 The Historic Environment ES Chapter concluded that this impact was potentially significant in EIA terms following the implementation of archaeological mitigation. The rationale for this is that industry standard archaeological excavation and recording strategies cannot mitigate for the total loss of archaeological remains, as stated in the NPPF and NPS-EN1 and EN3. However, mitigation can be considered to allow for an off-setting of this EIA impact significance, as the work will ensure a full record of any remains is made, with the potential for the results to feed into local, regional and national research aims and further current archaeological understanding.

4 Schedule of Archaeological Requirements

4.1.1.1 This outline WSI should be read with reference to the outline Schedule of Archaeological Requirements table (**Appendix 2 – Outline Schedule of Archaeological Requirements** - Table 3), which presents a summary of the currently known and potential remains within the onshore Hornsea Four Order Limits. The location of these known and potential archaeological remains are presented on the figures within the Historic Environment ES Chapter (Volume A3, Chapter 5: Historic Environment) and the following Technical Reports:

- **Volume A6, Annex 5.1: Historic Environment Desk Based Assessment**;
- **Volume A6, Annex 5.2: Aerial Photographic and Lidar Assessment**; and
- **Volume A6, Annex 5.3: Priority Archaeological Geophysical Survey**.

4.1.1.2 The outline Schedule of Archaeological Requirements table (**Appendix 2 – Outline Schedule of Archaeological Requirements** - Table 3) is not definitive and will be subject to regular updates and refinements throughout the post-consent stages, as more information comes to light, and at key milestones as part of the post-consent archaeological works (for example, following each stage of evaluation works, see Section 6), prior to mitigation

measures being established and formalised within subsequent pre-construction and construction related mitigation WSIs (see **Section 7**).

4.1.1.3 In the early post-consent stages of the project, the programme and timetabling of archaeological works will be subject to appropriate consideration with respect to making effective and expedient provision for commencing required pre-construction archaeological survey and investigation work in a timely and efficient manner. Each of the survey-specific and subsequent pre-construction and construction related WSIs will include detail on anticipated timetabling and programme. With respect to intrusive work, this will also include anticipated post-excavation timeframes (where required).

4.1.1.4 It is also anticipated that the Applicant will retain the services of an archaeological consultant / coordinator in the post-consent stages of the project, in order to identify any programme pinch points early in the process, so that these can be effectively allowed for and managed within the wider project timescales. Every effort will be made for archaeological works to be appropriately planned with sufficient time allowance provided, within the confines of what can be realistically expected and anticipated at each stage.

4.1.1.5 During the construction phase, an archaeologist may not be on site to monitor all elements of the intrusive groundworks. In these instances, Hornsea Four and the relevant appointed Principal Contractor(s) will implement a protocol for reporting archaeological discoveries through the application of the Offshore Renewables Protocol for Archaeological Discoveries (ORPAD) (The Crown Estate 2014) (see **Section 7.7**).

5 Survey-specific WSIs

5.1 Introduction

5.1.1.1 Each post-consent stage of survey and evaluation work (ultimately informing subsequently required mitigation approaches) will be subject to a bespoke survey-specific WSI produced by the appointed Archaeological Contractor(s) and approved by ERYC in consultation with HAP and HE. Any variations to the survey-specific WSIs will be agreed with ERYC in consultation with HAP (and HE, as required) prior to their implementation.

5.1.1.2 The post-consent stages of survey and evaluation work will include:

- Further targeted Onshore Archaeological Geophysical Survey across areas not subject to the Priority Archaeological Geophysical Survey (Note: the survey-specific WSI for Priority Archaeological Geophysical Survey undertaken at targeted locations to inform the DCO application, is included as **Appendix 3 – WSI for Priority Archaeological Geophysical Survey** to this outline WSI);
- Targeted Archaeological Trial Trenching;
- Targeted Earthwork Condition (GPS/topographic) Survey; and
- Targeted Geoarchaeological Assessment / Palaeoenvironmental Survey.

5.1.1.3 Details on the methodologies for each post-consent stage of survey and evaluation work is presented in **Section 6**.

5.2 Aims and Objectives

5.2.1.1 The general aims and objectives for the post-consent stages of survey and evaluation work are to:

- Further establish the archaeological and historic environment resource within the onshore Order Limits, including clarifying the presence/absence and extent of any buried archaeological remains (and above ground remains, e.g. earthworks, extant buildings / structures, where present);
- Identify, within the constraints of the connection works, the date, character and condition of any surviving remains within the onshore Order Limits;
- Assess the degree of existing impacts to sub-surface horizons and to document the extent of archaeological survival of buried deposits within the Order Limits;
- Analyse and interpret the results; and
- Produce reports which will present the results of the works in sufficient detail, including information to allow informed decisions to be made concerning ongoing, and where appropriate additional mitigation strategies.

5.2.1.2 In addition to the above aims and objectives, the survey-specific WSIs and subsequent mitigation related WSIs produced in the post-consent/pre-construction phases will seek to identify further specific research aims and objectives (including overarching research questions) for the archaeological works associated with the Hornsea Four project. Where possible and applicable these will be directly linked to the Yorkshire Archaeological Research Framework (Roskams and Whyman 2007).

5.3 Monitoring

5.3.1.1 Having agreed the survey-specific WSIs, the Archaeological Coordinator / Contractor(s) will inform HAP (and HE, as required) of the proposed commencement dates of fieldwork for each survey / investigation type, and then provide regular updates on the progress of the surveys. Reasonable and regular access to the site will be arranged for representatives of HAP and HE, as appropriate, for inspection and monitoring visits. These will be accompanied by the Archaeological Coordinator / Archaeological Contractor(s).

5.4 Health and Safety

5.4.1.1 Health and Safety considerations will be of paramount importance in conducting all archaeological fieldwork. Safe working practices will override archaeological considerations at all times.

5.4.1.2 All work will be carried out in accordance with the Health and Safety at Work Act 1974 and the Management of Health and Safety Regulations 1992, as well as all other relevant Health and Safety legislation, regulations and codes of practice in force at the time.

5.4.1.3 The Archaeological Contractor(s) will supply a copy of their Health and Safety Policy and a site and task specific health and safety focused Risk Assessment Method Statement (RAMS) document to the Applicant before the commencement of any fieldwork. The Risk Assessment will have been read and understood by all staff attending the site before any survey and investigation works commence. The Risk Assessment will be subject to updates as any new risks are identified and regularly reviewed.

5.4.1.4 The appropriate landowner agreements will need to be in place and any environmental constraints will be highlighted, considered and managed both prior to any archaeological works commencing and during the survey and investigation works themselves.

6 Methodologies (Further Survey and Evaluation Work)

6.1 General Approach

6.1.1.1 Each stage of further survey and evaluation work will be undertaken post-consent and in advance of construction of the connection works, and in the event that non-designated heritage assets cannot be avoided this will be followed by subsequent mitigation measures, as and where required (see **Section 7**).

6.2 Additional Project-wide Archaeological Geophysical Survey

6.2.1.1 In the pre-application stages of Hornsea Four, in April 2019 and between August and November 2019, AOC Archaeology undertook a targeted programme of priority archaeological geophysical survey, which included 36 survey areas covering the landfall, sections of the onshore ECC and the OnSS.

6.2.1.2 The survey areas were agreed in advance with HAP and HE and undertaken in accordance with the WSI for Priority Archaeological Geophysical Survey (Orsted 2019f) (see **Appendix 3 – WSI for Priority Archaeological Geophysical Survey**).

6.2.1.3 In total, 33 survey areas were completed including the landfall and OnSS area, with three survey areas not completed due to being inaccessible for the duration of the geophysical survey programme.

6.2.1.4 The raw data of the areas subject to geophysical survey is held by Orsted Hornsea Project Four Limited and can be shared with HAP and HE on request.

6.2.1.5 A further geophysical survey effort will be agreed with HAP and HE (where required) and undertaken post-consent with the aim to identify further anomalies representing archaeological sites and features across the remainder of the onshore ECC. The outline Schedule of Archaeological Requirements (see **Appendix 2 – Outline Schedule of Archaeological Requirements**) provides an initial overview of which remaining areas require

a geophysical survey based on existing baseline information and which areas require further discussion with HAP.

6.2.1.6 Data collected from this additional programme of geophysical survey will then be analysed alongside the existing data, information and reporting from the priority survey programme, as well as a review of pre-enclosure maps. This will contribute directly to informing archaeological trial trench locations and positioning, and the production of trench location plans for approval by ERYC in consultation with HAP (and HE, as required).

6.2.1.7 Although detailed magnetometry will be the standard technique to be adopted and implemented for the outstanding post-consent geophysical survey work, as it is considered the most appropriate and feasible method to practically cover the area still requiring survey, additional and alternative geophysical survey techniques (if/where relevant) will also be considered within the post-consent stages of the project, to be agreed with HAP and HE (where required).

6.2.1.8 The results of the existing desk-based investigations and any results from the Geoarchaeological Assessment (**Section 6.5**) will be considered as to the most effective type of geophysical survey technique to use. Furthermore, any requirement for an additional geophysical survey technique to be used in a specific area to further characterise the geophysical anomalies of archaeological potential, will take into consideration the results of the initial geophysical survey and the effectiveness of trial trenching within the area identified.

6.2.1.9 The application and scope of any such alternative or additional methods (in discrete and defined areas) will be outlined in a separate survey-specific WSI post-consent, and if required, will be considered on a case-by-case (anomaly and suspected feature) basis through consultation with HAP and HE.

6.3 Archaeological Trial Trenching

6.3.1.1 Programmes of archaeological trial trenching will be undertaken post-consent. These will be focused primarily on potential archaeological anomalies identified from the analysis of the geophysical survey data, Aerial Photographic and Lidar Assessment and Geoarchaeological Assessment work.

6.3.1.2 The Archaeological Co-ordinator and the Archaeological Contractor will agree a trial trenching strategy with HAP which is appropriate and proportionate to the type of archaeological anomaly being targeted for evaluation to ensure its character is established and suitable mitigation is subsequently undertaken. A number of trenches will also need to sample and investigate apparent 'blank' areas identified from the geophysical survey.

6.3.1.3 The data and findings from the trial trenching programmes will then further inform the approaches to subsequent additional mitigation requirements (both pre-construction and at / during construction) on a case by case basis.

6.3.1.4 Next steps may include for example, set-piece (open-area) excavations (normally undertaken within the pre-construction programme as part of an early works programme for instance); strip, map and sample excavations (sometimes fitted into / alongside the construction programme or undertaken immediately in advance); archaeological monitoring (watching briefs) often undertaken during the construction topsoil strip, sometimes also on the excavation of the cable trench(es), and any subsequent / associated open cut trenching and ground intrusive works, e.g. at crossing locations, joint pits, compound and mobilisation areas etc., and where an archaeological presence is not required a protocol for archaeological discoveries is implemented.

6.4 Earthwork Condition (GPS/topographic) Survey

6.4.1.1 Earthwork Condition Surveys would target locations (for example in areas of pasture and non-arable, or any areas thought or known to contain important surviving or potentially important historic landscape features) to record the presence / absence, extent, profile and 'on the ground' condition of any surviving, above ground historic earthworks, which may be impacted by the construction works within the Hornsea Four Order Limits. Data collected from the topographical survey would predominantly feed into an additional approach (in certain identified areas) with respect to construction related backfilling and reinstatement (e.g. the 'restoration' of any historic earthwork features or trends and landform / shape, where possible).

6.4.1.2 One area of surviving historic earthworks identified during the pre-consent stage is the ridge and furrow earthworks located south of Gembling House (APS_224 and 225). Should these earthworks be impacted by the construction works (i.e. topsoil stripping and cable trench excavations) then the earthworks must be recorded in advance of construction and the results of the survey used to inform the restoration of the earthworks during the reinstatement phase of construction (see **Section 7.8**).

6.5 Geoarchaeological Assessment / Palaeoenvironmental Survey

6.5.1.1 Geoarchaeological assessment / palaeoenvironmental survey is largely designed to identify deposits that often lie outside the main areas of traditional archaeological interest along a large linear scheme, and that have a high potential for yielding information that would permit the reconstruction of the past environmental, vegetational and land use history of the areas within the onshore ECC. Where required and justified, such a survey often facilitates the recognition of localised palaeochannel sediments, small bogs or lake deposits, valley floodplain sediments and dry valley fills, as well as buried soils from which the palaeoenvironmental history of an area may be reconstructed through the analysis of a series of identified features. For example; any identified areas of peat-rich soils, with the potential for organic preservation and which will be impacted by the connection works.

6.5.1.2 The Geoarchaeological Desk Based Assessment (**Volume A6, Annex 5.4: Geoarchaeological Desk Based Assessment**) highlighted the geoarchaeological and palaeoenvironmental potential based on a desktop review of existing information. A summary of the

geoarchaeological and palaeoenvironmental potential within the Hornsea Four Order Limits is summarised in Table 1.

Table 1: Summary of geoarchaeological and palaeoenvironmental potential.

Location	Summary of Geoarchaeological and Palaeoenvironmental Potential	Potential
Landfall and the northern element of the onshore ECC (Fraisthorpe to North Pasture Farm)	The north-east of the onshore ECC is located within an area known to contain preserved alluvial deposits associated with the Earl's Dike and also lies close to the northern margin of the infilled Barmston Mere. Possible palaeochannel at Lissett Bridge.	High
Onshore ECC from North Pasture Farm to Rotsea	Sand and gravel deposits in the vicinity of Foston-on-the Wolds are indicative of better drained areas within Watton Carrs which may have been attractive for past settlement. Intra till glaciofluvial deposits identified at Rotsea. Alluvial deposits, palaeochannels and warp deposits known at Nafferton Drain and in the valley of River Hull near Skerne.	High
Onshore ECC from Rotsea to Scorborough	Laminated clays identified in a borehole at Throstle Nest potentially represent lake deposits. Possible alluvial deposits associated with Bryan Mills Beck.	Moderate
Onshore ECC from Scorborough to Killingwoldgraves	Superficial deposits in boreholes of dominantly clay and glaciofluvial and gravels overlying bedrock. No known palaeoenvironmental data. Glaciofluvial sands from possible river terrace deposits associated with River Hull and fluvial deposition.	Moderate
Onshore ECC from Killingwoldgraves to Cottingham	Superficial deposits in boreholes of dominantly clay and glaciofluvial and gravels overlying bedrock. No known palaeoenvironmental data. Glaciofluvial sands from possible river terrace deposits associated with River Hull and fluvial deposition	Moderate

6.5.1.3 A post-consent approach to geoarchaeology and the palaeoenvironment will be formulated for approval by ERYC, in consultation with HAP (and HE, as required), and subsequently implemented.

7 Methodologies (Mitigation Measures)

7.1 Introduction

7.1.1.1 The post-consent stages of survey and evaluation work have the potential to indicate the presence of previously unknown buried archaeological remains (and further verify previously known / anticipated above ground and buried site remains). This will enable the

archaeological and historic environment resource associated with and impacted by Hornsea Four to either be safe-guarded and / or better understood by means of subsequent mitigation measures in a manner that is both appropriate and proportionate to the significance of the remains present. This will be formally agreed with ERYC as part of separate pre-construction and construction related WSIs in consultation with HAP (and HE, as required).

7.1.1.2 Subsequent mitigation measures are expected to comprise a combination of the following recognised standard approaches both in advance of and / or during construction:

- Set-Piece Excavation (SPE);
- Strip, Map and Sample (SMS) Excavation;
- Archaeological Monitoring / Watching Brief;
- Preservation In-Situ;
- Sensitive and Precautionary Approaches to Construction Works;
- Protocol for Archaeological Discoveries; and
- Reinstatement of Field Boundaries and Hedgerows.

7.2 Set-Piece Excavation Methodology

7.2.1.1 SPE is an intrusive form of fieldwork, which systematically identifies, examines and records archaeological deposits, features and structures, and recovers artefacts, ecofacts and other remains within a specified area where the extents of the archaeological remains are well defined by previous survey and evaluation work.

7.2.1.2 This type of mitigation will be recommended where the presence of a known site of high archaeological importance and complexity has been highlighted by previous field survey and confirmed by trial trenching, and where micro-siting of the cables (for example) is not appropriate or achievable, and therefore the preservation in-situ of known archaeological deposits is not possible.

7.2.1.3 Should the archaeological remains extend beyond the limits of the pre-defined SPE area and continue within the Hornsea Four Order Limits, machine stripping will continue from the feature(s) of interest until the area is clear of archaeological remains.

7.2.1.4 SPE (and SMS – see **Section 7.3**) will lead to a programme of post-excavation assessment, analysis and publication.

7.2.1.5 Following completion of the SPE (and SMS – see **Section 7.3**) fieldwork, a post-excavation assessment would be carried out in accordance with HE's guidance MoRPHE (Historic England 2015a). This would result in the preparation of an Updated Project Design (UPD), which would include proposals and a timetable for further analysis ~~(including scientific dating, if appropriate)~~, publication of the results ~~(including a synopsis for publication)~~ in an appropriate academic journal or monograph series, and preparation of the archive (including all paper records, reports and finds assemblages) for deposition in an appropriate museum

or archive facility. HAP would be consulted on the proposals included in the UPD prior to issue.

7.2.1.6 Wherever possible any SPE would be carried out in advance of construction of the connection works, as this would ensure that the most sensitive sites of identified archaeological significance are dealt with well in-advance of relevant construction activity and that construction will be able to progress in an effective and timely manner in these areas during the construction window.

7.3 Strip, Map and Sample Excavation Methodology

7.3.1.1 SMS is often appropriate where archaeological remains are thought or known to be present, but their specific type(s) or exact extent are unknown or remain uncertain following earlier stages of survey and evaluation or are not believed to warrant full in-advance SPE.

7.3.1.2 In advance of or during construction, the topsoil and subsoil is removed ('stripped') under direct archaeological control and supervision, and the archaeology is then planned and excavated ('mapped' and 'sampled'). This type of mitigation is anticipated to take place during and / or dovetailing with the construction phase; utilising ground works construction (Principal Contractor) plant and drivers.

7.3.1.3 Where the archaeological remains are identified as extending beyond the limits of the pre-defined SMS area and continue into the Hornsea Four construction working areas, machine stripping will continue from the feature(s) of interest until the area is clear of archaeological remains.

7.3.1.4 Once all of the topsoil and subsoil has been 'stripped', the surface is cleaned back manually by the on-site archaeologists and archaeological features are 'mapped'. The features are drawn and compiled onto a site plan so that all the remains can be looked at in relation to one another. Decisions are then made in consultation with HAP as to which features to excavate and how much (% and location). A 'sample' of the archaeological features are then hand-excavated, enough to allow the clear identification of phases of human occupation on the site, where possible.

7.3.1.5 Advantages of this method include:

- Soil stripping for archaeological purposes can be undertaken within the construction programme, avoiding the need to strip, backfill / reinstate, and then strip the site again;
- Principal Contractor's plant can be used, and the work built into the construction programme;
- Sampling strategies required for dealing with the archaeology can be targeted at the most significant remains; and
- In the first instance a more generic recording and sampling strategy would be agreed with ERYC in consultation with HAP (and reflected in the Construction Related WSI), which would then be refined, as required, once the soil strip had been undertaken in areas specified as requiring a SMS approach.

7.4 Archaeological Monitoring / Watching Brief

7.4.1.1 Archaeological monitoring / watching brief involves archaeological observation and any subsequent required investigation conducted during certain groundworks (e.g. targeted areas of both top-soil stripping and excavation of the cable trench, if required and where possible) associated with the construction phase.

7.4.1.2 Where appropriate (as determined by an assessment of archaeological potential), (in locations identified and agreed in advance with ERYC in consultation with HAP), machine excavation would proceed under archaeological observation, but would not be controlled directly by the nominated on-site archaeologist(s). A contingency period would be included in the works programme to allow investigation and recording of archaeological remains that might be identified, disturbed or destroyed. Archaeological monitoring (watching brief) normally takes place where there is considered to be a lower potential of encountering archaeological remains, as part of construction-led ground intrusive works. Where there is demonstrably little to no archaeological remains present it is considered that archaeological monitoring is not required and any unexpected remains would be covered by the Protocol for Archaeological Discoveries (see **Section 7.7**).

7.4.1.3 An agreed mechanism would be established to allow for archaeological investigation during the archaeological monitoring works, where appropriate. However, it is not usually anticipated that substantial archaeological remains (which would generally be highlighted for SPE or SMS approaches where known about) will be found in areas that have been identified for archaeological monitoring, although the possibility still remains.

7.4.1.4 The programmes of archaeological monitoring would also result in the preparation of a report and ordered archive. Where archaeological remains are investigated and recorded, a further and/or integrated programme of post-excavation assessment, analysis and publication would be required, as appropriate in consultation with HAP, as outlined in **Paragraphs 7.2.1.4** and **7.2.1.5**.

7.5 Preservation In-Situ

7.5.1.1 Where well-preserved and / or significant archaeological remains survive within the Hornsea Four Order Limits, ERYC, through HAP, may state a preference for preservation 'in-situ' of certain remains.

7.5.1.2 Where opportunities remain for preserving sites (including important features) / certain areas or elements of sites / certain areas of significantly important archaeological remains in-situ through the pre-construction and construction stages, these will be considered on a case by case, site by site and area by area basis in further discussion with ERYC and HAP in the first instance, and with HE if deemed required.

7.5.1.3 As part of the post-consent detailed design phase, further consideration will be given, where possible, to micro-siting (within the confines of the established Order Limits) which will seek

to minimise impact upon those areas of highest sub-surface archaeological potential, within the confines of engineering and other environmental constraints.

7.6 Sensitive and Precautionary Approaches to Construction Works

7.6.1.1 Certain areas within the onshore Order Limits may require additional, sensitive and precautionary approaches to construction works, with the aim of ensuring no accidental damage or accidental physical interactions occur with certain existing sensitive structures and features (of a historic nature) in identified areas, for example the pillboxes located at the landfall (MHU 21076, 21081 and 21082), the extant ridge and furrow located south of Gembling House near Foston (APS_224 and 225), and the Scheduled Beverley Sanctuary Limit Stone off York Road, east of Bishop Burton (NHLE 1012589).

7.6.1.2 The onshore ECC may be more constrained at certain locations and construction works will need to be conducted in a sensitive and controlled manner, with associated signage and temporary barriers to ensure that no accidental damage or physical interactions occur, in certain instances.

7.6.1.3 In addition to the above identified heritage assets (see paragraph 7.6.1.1), s~~S~~pecific constrained areas will be identified in the post-consent detailed design stage and a specific Mitigation Method Statement will be produced detailing the additional measures to ensure the identified heritage asset(s) (for example, the Scheduled Beverley Sanctuary Limit Stone) is suitably protected and secure during the construction phase. The Mitigation Method Statement will also identify roles and responsibilities, working methodologies (including tool-box talks), lines of communication and reporting procedures. The ~~above~~ measures set out within the Mitigation Method Statement will be agreed in consultation with HAP and HE, and will be strictly adhered to and referenced ~~of precautionary working will likely need to be adopted and will be further detailed~~ in the final CoCP(s) (Co124, **Volume F2, Chapter 2: Outline Code of Construction Practice**), approved under Requirement 17 of the DCO.

7.7 Protocol for Archaeological Discoveries

7.7.1.1 For all intrusive groundworks carried out onshore above MHWS where an archaeologist is not present, Hornsea Four and the relevant appointed Principal Contractor(s) will implement a P~~p~~rotocol for reporting A~~a~~rchaeological D~~d~~iscoveries (PAD). The PAD will be based on the principles set out in the Offshore Renewables Protocol for Archaeological Discoveries ~~through the application of~~ (ORPAD) (The Crown Estate 2014).

7.7.1.2 Section 1.2.9 of The Protocol states that "*It is recognised that this Protocol refers primarily to offshore schemes of development. However, with offshore renewable schemes it is usual to have associated infrastructure (such as export cables) that impact not only the offshore historic environment, but also inshore, inter-tidal, and in fully terrestrial localities. Therefore this Protocol has been designed to operate in all of these environments, where an archaeologist is not present.*" (The Crown Estate 2014).

7.7.1.3 Groundwork activities during which previously unidentified sites or unexpected discoveries of material may be encountered include:

- The removal of topsoil anywhere across the Hornsea Four Order Limits;
- The excavation of transition joint bays at the landfall;
- Open cut trenching as part of the duct installation works;
- The excavation of Joint Bays, HDD pits and Link Boxes along the onshore ECC;
- Groundworks associated with the onshore ECC, logistic compounds, and associated access roads; and
- Groundworks associated with the OnSS.

7.7.1.4 ORPAD came into effect in December 2010 and applies to pre-construction, construction and installation activities in developing offshore renewable energy schemes where an archaeologist is not present on site. The main objective of the protocol is to reduce direct impacts from occurring on currently unrecorded heritage assets by allowing for the effective reporting of discoveries of archaeological material in a manner that is conducive to construction works in order to ensure that advice, concerning measures to address discoveries, is received and implemented in a timely and efficient manner.

7.7.1.5 Each worksite team will have a Site Champion, a single person who is responsible for reporting discoveries to a Nominated Contact within Hornsea Four's core team. The Nominated Contact will notify the Archaeological Contractor, who will seek further advice from HAP.~~uploads discoveries onto a secure web portal and the Implementation Service is alerted to the presence of new discoveries. The Crown Estate provides for the reporting and assessment of discoveries through the ORPAD Implementation Service, currently maintained by Wessex Archaeology.~~

7.7.1.6 The Nominated Contact will be the Environment Manager and/or Principal Contractor within Hornsea Four's project team. Individual Site Champions for specific activities will be specified in method statements. The identity of the Site Champion will be clearly communicated to work teams, via pre-commencement briefings (tool box talks) for example.

~~7.7.1.7~~ Hornsea Four will be responsible for ensuring that construction teams working within the Order Limits are provided with appropriate training in the application of ~~ORPAD~~ the PAD and that all staff and contractors are aware of their responsibilities under the protocol. ~~The ORPAD documentation, including a full description of the methodology and requirements for implementing the protocol, can be found via the following web link:~~

~~7.7.1.8~~7.7.1.7 ~~https://www.wessexarch.co.uk/sites/default/files/field_file/2_Protocol%20For%20Archaeological%20Discoveries.pdf~~

~~7.7.1.9~~7.7.1.8 Training to construction staff, site crews and work teams with regard to the practical application of the protocol in their day to day work can be provided by the Implementation Service or by an alternative sufficiently experienced and qualified Archaeological

Contractor. Hard copies of the ~~OR~~PAD document will be made available for use at each temporary construction compound.

~~7.7.1.10~~7.7.1.9 Provision will be made by Hornsea Four, in accordance with the ~~OR~~PAD, for the prompt reporting / recording to HAP of archaeological remains encountered or suspected during works.

~~7.7.1.11~~7.7.1.10 Following completion of the onshore construction works, a report will be produced by the Archaeological Contractor presenting the results of the ~~OR~~PAD implementation during relevant activities and submitted to HAP. In the event that no discoveries are made, a nil discoveries report should be compiled in order to demonstrate adherence to the measures as will be set out in the construction-related mitigation WSI, to be produced in the post-consent / pre-construction stages of the project.

7.8 Reinstatement of Field Boundaries and Hedgerows

7.8.1.1 Impact to the Historic Landscape Character (HLC) of the onshore Order Limits has been minimised through careful route selection and will be further off-set by returning field boundaries / hedgerows to their pre-construction condition and character post-construction (see also **Volume F2, Chapter 3: Outline Ecological Management Plan** and **Volume F2, Chapter 8: Outline Landscape Management Plan**), wherever possible, as part of a sensitive programme of backfilling and reinstatement / landscaping.

7.8.1.2 Certain hedgerows and field boundaries identified as being of historical value (e.g. county and parish boundaries, see **Table 2**) may require archaeological recording prior to and / or during the construction process and further enhanced provisions made and implemented during backfilling and reinstatement.

Table 2: Parish Boundaries intersected by the Hornsea Four Order Limits.

Name	Description
Ulrome / Barmston	Ditch embankment with hedge
Ulrome / Beeford	Ditch embankment
Beeford / Foston	Ditch Embankment
Foston / Skerne and Wansford	Ditch with hedge incorporating a section of Nafferton Drain (intersects with onshore ECC at two locations)
Foston / Hutton Cranswick	River Hull and embankments
Hutton Cranswick / Watton	Ditch embankment (Scurf Dyke) with hedge
Watton / Beswick	Ditch embankment
Beswick / Lockington	Ditch with hedge
Lockington / Leconfield	Ditch incorporating Bryan Mills Beck at north end (intersects with onshore ECC at three locations)
Bishop Burton / Walkington	Ditch with hedge
Walkington / Rowley	Hedges and track

Rowley / Skidby	Hedge with trees

8 Conclusion / Summary

8.1.1.1 This outline WSI has been produced to set out the principles and proposed approaches to archaeological survey and investigations that will be undertaken post-consent. This includes both survey and evaluation work and subsequent mitigation measures, as and where required.

8.1.1.2 This document sets out an initial overarching archaeological mitigation strategy that will be undertaken within the onshore Hornsea Four Order Limits once the DCO has been granted. The survey-specific WSIs and final pre-construction and construction mitigation WSIs will be agreed with and approved by ERYC in consultation with HAP and HE in the post-consent stages of the project. All documents will be produced in-line with relevant legislation, planning policy, guidance and good practice (**Section 2**).

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10 Appendix 1 – Example (Model) Clauses – Mitigation Works Specification: SPE, SMS and Archaeological Monitoring / Watching Brief

10.1 Introduction

10.1.1.1 The following sections provide example (model) clauses specific to the type of additional archaeological mitigation work (and the associated specifications) likely to be required following the evaluation stages post-consent. Preparation of pre-construction and construction related WSIs will be undertaken with reference to and inclusion of relevant model clauses, as outlined below.

10.1.1.2 The structure outlined below is anticipated to provide the framework only for the pre-construction and construction related mitigation WSIs, which would be tailored with specific requirements and circumstances on a case-by-case / site-by-site basis, as required.

10.1.1.3 The information provided is specific to the location of the project within the East Riding of Yorkshire, as well as more general local, regional and national-type approaches.

10.1.1.4 This appendix relates mainly to archaeological excavation and recording approaches and associated requirements to be undertaken under SPE, SMS and archaeological monitoring / watching brief scenarios.

10.2 General Approach

10.2.1.1 All WSIs will be prepared in accordance with:

- Chartered Institute for Archaeologists (CIfA): Standard and guidance for an archaeological watching brief (CIfA 2014c);
- CIfA: Standard and guidance for archaeological excavation (CIfA 2014d);
- CIfA: Code of Conduct (CIfA 2019a); and
- HE: Management of Research Projects in the Historic Environment: The MoRPHE Project Managers' Guide (Historic England 2015a).

10.2.1.2 The WSIs will also take account of the Yorkshire Regional Research Framework: research agenda (Roskams and Whyman 2007).

10.3 Site Briefings (Tool Box Talks)

10.3.1.1 Site briefings will include, as a minimum; the Applicant's Health and Safety requirements/procedures; the Principal Contractor's Health and Safety requirements/procedures; and Unexploded Ordnance (UXO) awareness. There may also be ecological briefings ('toolbox talks') and requirements in specific relation to archaeological works.

10.3.1.2 It is assumed that the Principal Contractor will be responsible for UXO survey and clearance across the onshore Order Limits by a specialist UXO survey team, in advance of construction.

10.4 Archaeological Monitoring of Soil Stripping

10.4.1.1 The location of SPE and SMS areas will be plotted on the ground using electronic survey equipment typically accurate to ±100 mm in the field with respect to the OS grid, in order to ensure that the positions are transcribed accurately from location plans.

10.4.1.2 Mechanical excavation will utilise suitable construction plant (and fully certified and experienced machine drivers), which for areas of a SPE and SMS is anticipated to be a tracked 360 degree excavator(s) or other suitable plant, fitted with a flat bladed 'toothless' ditching bucket. The top-soil and sub-soil within the SPE and SMS areas will be excavated in spits under the direct control and supervision of the Archaeological Contractor(s).

10.4.1.3 For areas outlined for SPE and SMS, the topsoil and subsoil will be removed until either the top of the latest archaeological horizon or undisturbed natural deposits are encountered. Particular attention will be paid to achieving a clean and well-defined horizon (surface) with the machine.

10.4.1.4 Topsoil and subsoil excavated from SPE and SMS areas will be stored separately. As far as practicable this will be beyond the limits of SPE and SMS areas. Or where possible, within the limits of the 'site' on archaeologically blank areas.

10.4.1.5 All spoil arising from SPE and SMS areas should also be investigated and scanned with a metal detector by the Archaeological Contractor(s) to recover any artefacts.

10.4.1.6 The extent of SPE and SMS should be clearly marked, and the ends enclosed / demarcated using high visibility fencing in order to highlight the archaeological excavation area and in order to ensure that no construction traffic can inadvertently enter the work area. The Archaeological Contractor(s) will make daily checks of any fencing.

10.4.1.7 If there are deep excavations (> c. 1.2-1.5 m deep) then alternative fencing arrangements will be required and agreed in conjunction with the Principal Contractor, the Archaeological Contractor(s) and Hornsea Four, this may involve fencing being erected around individual slots through features or over parts of the 'site'.

10.4.1.8 The machined surface will be cleaned by hand, where required, for the acceptable definition of archaeological remains. It is not anticipated that the entire SPE and SMS areas will require hand cleaning.

10.4.1.9 Provision will be made so that any areas in which sub-surface archaeological remains are identified as being present are not subject to prolonged periods of exposure. Archaeological remains and / or deposits left exposed to the elements for extended periods can suffer weathering which can accelerate their degradation, damage and / or loss. In addition, archaeology left exposed may be the target of heritage crime (e.g. illegal metal detecting). The Archaeological Contractor(s) will be responsible for ensuring that adequate security and

protection measures are put in place in order to alleviate this risk, alongside the Principal Contractor, where relevant.

10.5 Hand Excavation of Archaeological Features

10.5.1.1 Archaeological features and deposits will be excavated using appropriate hand tools, such as a mattock, shovel and hand trowel, in an archaeologically controlled and stratigraphic manner in order to meet the aims and objectives of the investigation.

10.5.1.2 Hand excavation will be targeted to provide sufficient information on the form, extent, level of preservation and function, with emphasis on stratigraphic relationships between features and recovery of dating evidence. Archaeological excavation and recording will be confined to the working width of the machined area.

10.5.1.3 A minimum of 10% of the identified feature will be excavated along the length of all linear and curvilinear features (with each excavated section not less than 1 m). Key intersections will be investigated to determine the stratigraphic relationship between features, and sections will be located at all ditch terminals and to provide equal spatial coverage along the length of the feature.

10.5.1.4 Discrete features, such as postholes and pits, less than 1 m in diameter, will be half sectioned (50%). Postholes which form part of a building will be 100% excavated.

10.5.1.5 A minimum 25% will be excavated from all discrete features, such as pits, greater than 1 m in diameter. Where possible, a complete section will be excavated across the feature to recover its full profile. Where fully justified, and safe to do so, the feature may be subject to 100% excavation.

10.5.1.6 Smaller discrete features, such as stake holes, will be 100% excavated.

10.5.1.7 Structures, such as sunken floor buildings or kilns, will be 100% excavated.

10.5.1.8 Ring ditches and / or eaves-drip gullies believed to relate to structures will be investigated by excavated sections up to 2 m wide, with all sections being fully recorded, to achieve a minimum 50% sample of the feature. Remaining deposits may require rapid hand excavation in order to achieve a 100% sample.

10.5.1.9 All burials and funerary contexts will be 100% excavated. The excavation of human remains requires an exhumation licence to be obtained from the Ministry of Justice (see **Section 10.9**). Features associated with funerary remains, such as postholes or enclosing ditches around barrows, will be initially 50% sample excavated and recorded with the remaining deposits rapidly hand excavated to achieve a 100% sample.

10.5.1.10 If deep features, such as shafts or wells, are encountered, hand-excavation will not proceed below a safe working depth of c. 1.2-1.5m from the machined surface. An appropriate methodology for achieving full excavation below this depth will be agreed in

consultation with the Archaeological Coordinator, the Principal Contractor (where applicable), the Archaeological Contractor(s), HAP and Hornsea Four.

10.5.1.11 A separate method statement for excavation of deep features would be prepared by the Archaeological Contractor(s), if required.

10.5.1.12 Machine-assisted excavation may be permissible if large / deep deposits or homogenous and non-archaeological layers are encountered, but only after consultation with the Archaeological Coordinator and HAP.

10.5.1.13 Any variation to the above would be agreed with the Archaeological Coordinator, Hornsea Four and / or their representatives, the Archaeological Contractor(s) and HAP on site and shall be confirmed in writing.

10.6 Archaeological Recording

10.6.1.1 SPE and SMS areas and any area excavated archaeologically during archaeological monitoring (watching brief) will be given a unique site code, and this will be written on all records, drawings, artefact bags and sample containers.

10.6.1.2 An accession number will also be obtained by the Archaeological Contractor(s) from East Riding Museum Service prior to commencing work.

10.6.1.3 Following machine excavation, the extent of SPE and SMS areas and any area excavated archaeologically during archaeological monitoring (watching brief) will be accurately recorded using electronic survey equipment typically accurate to ± 100 mm in the field with respect to the OS grid. The data will be overlaid at an appropriate scale onto the OS National Grid (using digital map data).

10.6.1.4 Archaeological remains will be recorded in plan using electronic survey equipment. All survey points used will be accurately tied into the OS National Grid.

10.6.1.5 A full written, drawn and photographic record will be made of archaeological features and deposits (contexts) with each context given a unique number and described on a separate record sheet. A context register, with brief details, will also be kept during the archaeological work.

10.6.1.6 In addition to the electronic survey of features, as a minimum, all interventions and areas of detailed archaeology will be planned by hand, using tape measures.

10.6.1.7 Hand drawn plans and sections of features will be produced at an appropriate scale (normally 1:20 for plans and 1:10 for sections) with Ordnance Datum (OD) heights recorded in metres, correct to two decimal places.

10.6.1.8 Each drawing will be given a unique drawing number. A drawing register, with brief details, will be maintained throughout the archaeological works.

10.6.1.9 Digital colour photography will form an integral part of the recording strategy, and all photographs will incorporate scales, an identification board and directional arrow. A photographic record will be maintained throughout. Photographs will be taken of all excavated features.

10.6.1.10 In addition to records of archaeological features, general photographs recording the context of the SPE and SMS and any area excavated archaeologically during archaeological monitoring (watching brief) will also be taken.

10.6.1.11 A photographic register, with brief details, will also be maintained throughout the archaeological works.

10.7 Artefact Recovery

10.7.1.1 With respect to finds and landowner permissions for the removal of artefacts and ecofacts, it is common practice on linear, multi-phase schemes to approach the landowners at the end of the project to request their permission to deposit any artefacts in an appropriate local museum, once all items are accounted for. This process will be adhered to as part of the project and will be facilitated and overseen by the Archaeological Contractor(s).

10.7.1.2 Artefacts will be collected and labelled with the unique site code and context number of the deposit in which they were recovered.

10.7.1.3 Each 'significant' find will be recorded three dimensionally using electronic survey equipment typically accurate to ± 100 mm in the field with respect to the OS grid and assigned a 'Special Finds' number. Similarly, if artefact scatters are encountered these will also be recorded three dimensionally.

10.7.1.4 Bulk finds will be collected and recorded by context.

10.7.1.5 All archaeological artefacts that are collected from SPE and SMS areas and any area excavated archaeologically during archaeological monitoring (watching brief) that do not clearly belong to a particular context will be recorded as un-stratified and assigned the topsoil context number.

10.7.1.6 All non-modern and significant modern artefacts will be stored and processed in a manner appropriate to the material to minimise further deterioration.

10.7.1.7 All retained artefacts will, as a minimum, be washed, weighed, counted and identified. Any artefacts requiring conservation or specific storage conditions will be dealt with immediately in line with First Aid for Finds (Watkinson & Neal 1998).

10.7.1.8 Artefacts will be properly conserved after excavation and will be stabilised for storage, where required. If necessary, a conservator will visit the site to undertake 'first aid' conservation treatment. If any of the SPE and SMS areas and any area excavated archaeologically during archaeological monitoring (watching brief) result in the recovery of unstable artefactual remains (e.g. metallic objects or preserved wood/leather), the Archaeological Contractor(s) will commission the services of a suitable specialist to advise and implement conservation of unstable artefacts; to undertake x-ray analysis and to provide an assessment of potential summary, which will then be attached to the main report(s).

10.7.1.9 All finds and environmental samples will be processed (cleaned and marked), as appropriate (see **Paragraph 10.8.1.7**). Each category of find or environmental/industrial material will be examined by a suitably qualified archaeologist or specialist and the results incorporated into the post-excavation assessment report.

10.7.1.10 The collection, documentation and conservation of all artefactual and ecofactual material will conform to CIfA Standards and guidance for the collection, documentation, conservation and research of archaeological materials (CIfA 2014e).

10.8 Soil Sampling Strategy

10.8.1.1 Environmental samples will be taken from a range of contexts and phases encountered on site, and from any deposit where it is expected that worthwhile environmental evidence may be recovered. Such deposits will include, though not be restricted to, waterlogged and burnt contexts. Provision will be made for the recovery of material suitable for scientific dating.

10.8.1.2 The soil sampling strategy for each SPE and SMS area will be informed by the results of the evaluation works, and any bespoke soil sampling strategy identified by the specialists as part of the post-excavation assessment of the evaluation works will be detailed in the site-specific WSIs/Method Statements. Where practicable and deemed important, an environmental specialist will visit individual 'sites' and advise on an appropriate strategy to maximise the potential recovery, tied into the regional research agenda (Roskams and Whyman 2007).

10.8.1.3 Flotation samples will be taken as part of a sampling strategy from a range of stratigraphically secure contexts, where present, and will typically be ~~up to 40~~between 40 and 60 litres in size. Where feasible, flotation samples will be taken as scatter samples, whereby tubs will be filled from different locations within the designated fill to avoid spatial preservation bias or missing biological remains invisible to the naked eye which can form discrete 'clusters' within the fill (English Heritage, now Historic England 2011).

10.8.1.4 Samples must be taken from appropriately cleaned surfaces, be collected with clean tools and be placed in clean containers. They will be adequately recorded and labelled and a register of all samples will be kept. Samples should be stored appropriately in a secure location prior to being sent to the appropriate specialist.

10.8.1.5 Radiocarbon, dendrochronology, archaeomagnetic, pollen, ~~and~~ monolith and coarse-sieved samples may be considered for collection where justified and warranted. These approaches would need to be agreed in consultation with the Archaeological Coordinator, the Archaeological Contractor(s), HAP and Hornsea Four.

10.8.1.6 Further advice on the appropriateness of the Archaeological Contractor('s/s') proposed strategies will be sought from the HE Science Advisor (Yorkshire), as appropriate, although HAP would provide advice and recommendations in the first instance, again as required.

10.8.1.7 The sampling strategy, post-excavation assessment and analysis of samples and subsequent reporting will follow best practice as recommended by HE (English Heritage, now Historic England 2011).

10.8.1.8 All environmental samples will be processed as appropriate. Each category of environmental material will be examined by a suitably qualified archaeologist or specialist and the results incorporated into the report.

10.9 Human Remains

10.9.1.1 If human remains are discovered, an application for a licence from the Ministry of Justice under Section 25 of the Burials Act 1857 will be made by the Archaeological Contractor(s). The works will also take place in accordance with the appropriate Environmental Health regulations and in accordance with the standards set out in *The Role of the Human Osteologist in an Archaeological Fieldwork Project* (Historic England 2018) and *Updated Guidelines to the Standards for Recording Human Remains* (CIfA 2017). Other specific and bespoke requirements may also be required, on a case-by-case / site-by-site basis. Excavation of the human remains will only take place after a licence is obtained.

10.10 Treasure

10.10.1.1 Any recovered artefacts that are designated Treasure as defined by the Treasure Act 1996 will be treated in accordance with said Act. All Treasure will be reported to H. M. Coroner. Hornsea Four and the Archaeological Coordinator will also be informed at the earliest opportunity.

10.10.1.2 Any Treasure will be removed to a secure store. Where removal cannot be effected on the same working day as the discovery, suitable security measures must be taken to protect the finds from theft.

10.11 Completion of Archaeological Fieldwork

10.11.1.1 The Archaeological Contractor(s) shall prepare and submit completion statements to Hornsea Four and the Archaeological Coordinator once each distinct SPE and SMS area and any area excavated archaeologically during archaeological monitoring / watching brief

have been vacated. Following internal review these will also be made available to HAP / HE (as appropriate) for information and comment.

10.11.1.2 The completion statements will include:

- A brief summary of the results of the works.
- A general location plan and all features plan of the SPE and SMS areas and any areas excavated archaeologically during monitoring / watching brief.
- Quantification of the primary archive including contexts, finds and samples.
- A brief chronological summary of the archaeological remains.

10.12 Reporting Requirements

10.12.1.1 Verbal progress reports and brief written progress reports will be provided to Hornsea Four and the Archaeological Coordinator regularly during the archaeological investigations and also at any stage during the works, upon reasonable request. HAP and HE will also be regularly updated with progress.

10.12.1.2 The reporting of the archaeological investigations will be commensurate with the results of the investigation and will be produced in accordance with the relevant CIfA Standards and Guidance documents (CIfA 2019a-b and 2014a-f). The *Management of Research Projects in the Historic Environment: The MoRPHE Project Mangers' Guide* (Historic England 2015) should also be considered relevant.

10.12.1.3 The post-excavation assessment report for SPE, SMS and any areas excavated archaeologically during monitoring / watching brief should ultimately incorporate the results of the earlier programmes of archaeological trial trenching. This will ensure the results from all fieldwork are fully integrated.

10.12.1.4 Records and finds from other previous archaeological works (where project applicable) should also be examined and integrated into the assessment report, wherever possible. All finds must be assessed in relation to latest existing local and regional artefact type series. The content provided within the assessment report will adhere to best practice and available guidance, where relevant.

10.12.1.5 A draft report will be issued for review by Hornsea Four and the Archaeological Coordinator prior to agreement and issue of the final report to HAP, and HE where required.

10.12.1.6 It is anticipated that issue of the final report should follow within XX weeks of comments being provided on the draft report (timeframe to be agreed with HAP post-consent).

10.12.1.7 A fully collated and completed version of the report shall be included in PDF format. Both hard and digital version copies of the report will ultimately be lodged with HHER. The Archaeological Contractor(s) will be responsible for ensuring this is done. Upon request, a project CD or USB shall also be submitted containing image files in JPEG or TIFF format,

digital text files shall be submitted in Microsoft Word format, and figures and drawings in recent / compatible version AutoCAD and / or ArcGIS format.

10.12.1.8 A digital version of the report will be placed with OASIS (Online Access to the Index of Archaeological Investigations) at - http://www.oasis.ac.uk/. An OASIS form will be included as part of all reports produced. The Archaeological Contractor(s) will be responsible for ensuring this is done.

10.13 Archive Preparation and Deposition

10.13.1.1 The archive will consist of the documentary and digital records and any archaeological material generated during all phases of the fieldwork.

10.13.1.2 All records and materials produced will be quantified, ordered, indexed, marked with the unique project, site and context number and internally consistent. The archive will be kept secure at all stages of the project.

10.13.1.3 The site archive will be deposited with the East Riding Museum Service within an agreed timeframe (to be determined with HAP post-consent) following completion of all archaeological fieldwork and reporting associated with the project. It will then become publicly accessible (timeframe to be agreed with HAP post-consent).

10.13.1.4 The Archaeological Contractor(s) will be responsible for identifying any specific requirements or policies of the museum / records office in respect of the archive, and for adhering to those requirements. The archive will conform to the standards required by the national guidelines in *Archaeological Archives: A guide to best practice in creation, compilation, transfer and curation* (AAF 2007) and *Standard and guidance for the creation, compilation, transfer and deposition of archaeological archives* (CIfA 2014f).

10.13.1.5 Finds must be appropriately conserved and stored in accordance with UK Institute of Conservators Guidelines (Walker 1990). The finds, as a permanent part of the site archive, should be deposited with the East Riding Museum Service. If this is not possible for all or any part of the finds archive, then provision must be made for additional recording (e.g. photography, illustration, analysis), as appropriate.

10.13.1.6 Prior to the commencement of archaeological fieldwork, the Archaeological Contractor(s) will contact the HHER regarding the acquisition of further event numbers or confirming previous event numbers still apply. Event numbers may be issued on an area by area / stage by stage or project wide basis, but this will be confirmed with HHER personnel prior to starting the next stage of archaeological works in each instance.

10.13.1.7 Also at the start of work (immediately before fieldwork recommences) an OASIS online record (http://ads.ahds.ac.uk/project/oasis/) must be initiated by the Archaeological Contractor(s) and main areas / stages of the Hornsea Four completed on details, location and creators forms.

10.13.1.8 All parts of the OASIS online form must be completed for submission to the Humber HER. This should include an uploaded .pdf version of entire final reporting (a paper copy should also be included with the archive), as relevant to each stage of fieldwork.

10.13.1.9 The deposition of the archive forms the final stage of the (archaeological) project. The Archaeological Contractor(s) must provide Hornsea Four and the Archaeological Coordinator with copies of all communication with the recipient museum / records office and written confirmation of the receipt / deposition of the archive.

10.13.1.10 The Archaeological Contractor(s) will liaise with Hornsea Four to address the transfer of ownership and any copyright issues.

10.14 Monitoring Progress and Site Visits

10.14.1.1 The archaeological investigations will be subject to regular monitoring visits by Hornsea Four's Archaeological Coordinator, who will have unrestricted access to the archaeological site, site records and any other information.

10.14.1.2 The work will be inspected to ensure that it is being carried out to the required standards and that it will achieve the stated aims and objectives.

10.14.1.3 The Archaeological Contractor(s) will only accept instruction from Hornsea Four and the Archaeological Coordinator. There may also be occasions where instructions are given by the Principal Contractor, where appropriate/relevant.

10.14.1.4 If any problems are encountered during the archaeological works these will be reported immediately to Hornsea Four and the Archaeological Coordinator.

10.14.1.5 Monitoring progress meetings between Hornsea Four, the Archaeological Coordinator and the Archaeological Contractor(s) will be held on site during the course of the SPE, SMS works, and any area excavated archaeologically during monitoring / watching brief. Representatives from HAP and HE (where applicable) shall be invited to attend in order to monitor the works on behalf of ERYC. These meetings will be arranged by the Archaeological Coordinator.

10.14.1.6 HAP will also be afforded access to the site on request (and as agreed with Hornsea Four and the Archaeological Contractor(s)), outside of any formal monitoring progress meetings. Arrangements should be made through the Archaeological Coordinator and the Archaeological Contractor's(s') key named contacts. Where appropriate, the Principal Contractor will also need to be informed in order that access can be facilitated in a safe manner.

10.14.1.7 Following top-soil strip and associated sub-soil removal across SPE and SMS areas, an initial meeting between the Archaeological Contractor(s), Hornsea Four, the Archaeological

Coordinator and HAP may be held to further agree the excavation / recording / sampling strategy for each area / site / stage etc.

10.14.1.8 Where necessary to achieve the objectives of the investigation within the overall project programme, variations to the scope of works will be agreed on site at progress meetings, as appropriate.

10.14.1.9 Any variations caused by ecological constraints, vegetation cover or ground conditions will be agreed with Hornsea Four, the Archaeological Contractor(s) and the Archaeological Coordinator and communicated to HAP / HE (as appropriate).

10.14.1.10 Following the discovery of any unexpected archaeological sites during archaeological monitoring / watching brief work, the Archaeological Contractor(s) will ensure that the archaeological remains are properly dealt with and sufficiently resourced beyond (in addition to) the monitoring / watching brief archaeologist(s) on site, where appropriate. A process for this will be agreed between the Archaeological Contractor(s), Hornsea Four and the Archaeological Coordinator. The Principal Contractor will also need to be informed of any additional personnel on site, where appropriate/relevant.

10.15 Security, Confidentiality and Publicity

10.15.1.1 Although information regarding the project is in the public domain, the archaeological investigation works may attract interest.

10.15.1.2 In the event of any enquiries by the public, the Archaeological Contractor(s) will refer all enquiries to Hornsea Four, the Archaeological Coordinator and the Principal Contractor without making any unauthorised statements or comments.

10.15.1.3 The Archaeological Contractor(s) will not disseminate information or images associated with the project for publicity or information purposes, without the permission of Hornsea Four.

10.16 Copyright

10.16.1.1 The Archaeological Contractor(s) shall assign copyright in all reports and documentation / images produced as part of this project to Hornsea Four. The Archaeological Contractor(s) shall retain the right to be identified as the author / originator of the material.

10.16.1.2 The Archaeological Contractor(s) may apply in writing to use / disseminate any of the project archive or documentation (including images), and any such permission will not be unreasonably withheld.

10.17 Resources and Timetable

10.17.1.1 All archaeological personnel involved in the project must be suitably qualified and experienced professionals. The Archaeological Contractor(s) will provide Hornsea Four and

the Archaeological Coordinator with staff CVs of the Project Manager, Project Officer(s), Site Supervisor(s) and any proposed specialists. These will in turn be provided to HAP, if requested.

10.17.1.2 Site assistants' CVs will not be required, but all site assistants should ideally have a minimum of six months excavation experience. Additional CVs must be made available upon request by Hornsea Four and the Archaeological Coordinator.

10.17.1.3 All equipment and tools required by the Archaeological Contractor(s) will be supplied by the Archaeological Contractor(s).

10.17.1.4 The Archaeological Contractor(s) must give immediate warning to Hornsea Four and the Archaeological Coordinator should any agreed programme date not be achievable, due to for example severe / extreme weather conditions.

10.18 Health and Safety

10.18.1.1 The Archaeological Contractor(s) will adhere to any overarching risk assessments and any project specific health and safety plan prepared by the Principal Contractor, Hornsea Four and / or their representatives.

10.18.1.2 The Archaeological Contractor(s) will provide Hornsea Four and / or their representatives with details of their public and professional indemnity insurance and all other insurances required by law.

10.18.1.3 The Archaeological Contractor(s) will have their own Health and Safety policies compiled using national guidelines, which conform to all relevant Health and Safety legislation. A copy of the Archaeological Contractor(s) Health and Safety policy will be submitted to Hornsea Four and / or their representatives.

10.18.1.4 The Archaeological Contractor(s) will prepare health and safety focused RAMS specific to the archaeological works to be undertaken and will submit these to Hornsea Four and / or their representatives for approval prior to entering the individual work sites.

10.18.1.5 Pre-Construction Information will be provided by Hornsea Four and / or their representatives in accordance with the Approved Code of Practice, as required.

10.18.1.6 The Archaeological Contractor(s) shall be responsible for identifying any buried or overhead services and taking the necessary precautions to avoid damage to such services, prior to the commencement of excavation works. Service location plans and UXO information (if available) will be provided by Hornsea Four and / or their representatives, where appropriate, but these must be checked through appropriate means prior to the commencement of archaeological investigation works.

10.18.1.7 The Archaeological Contractor(s) will not commence any excavation works unless authorised to do so by Hornsea Four and / or their representatives.

10.18.1.8 The Archaeological Contractor will adhere to the Principal Contractor's and Hornsea Four's Personal Protective Equipment requirements (PPE). As a minimum the following PPE will be worn at all times on site:

- High visibility vest / jacket;
- Approved work wear (e.g. overalls/trousers/long-sleeved tops);
- Hard hat;
- Safety boots with reinforced toes and mid-sole, with ankle support;
- Safety glass; and
- Gloves.

10.18.1.9 In undertaking the work the archaeologists are to abide by all statutory provisions and by-laws relating to the work in question, especially the Health and Safety at Work Act 1974.

10.18.1.10 No lone working will be permitted at any time.

10.18.1.11 The archaeological works may be halted in the event that adverse / extreme weather, ground conditions or health and safety requirements demand it and the site specific situation reassessed prior to any recommencement.

10.19 General Provisions

10.19.1.1 Following completion of the archaeological investigation and recording works, the Archaeological Contractor(s) will leave work sites in a tidy and workmanlike condition at the end of each day, and remove all materials brought onto the site, including any grid pegs or other markers.

10.19.1.2 The Archaeological Contractor(s) is to allow the site records to be inspected and examined at any reasonable time, during or after the investigations, by Hornsea Four and the Archaeological Coordinator.

10.19.1.3 Access for parking and use/provision of site welfare facilities shall be agreed between Hornsea Four and the Archaeological Contractor(s) prior to entering each discreet work site.

10.19.1.4 Provision must be made for fencing of archaeological remains, or potential archaeological remains, where identified at / during construction, whilst archaeological investigation and recording works continue.

10.19.1.5 The Archaeological Contractor(s) will need to make provision for site security, in conjunction with Hornsea Four and the Principal Contractor (where relevant), particularly where sensitive archaeological remains are uncovered.

11 Appendix 2 – Outline Schedule of Archaeological Requirements

This outlined schedule of archaeological requirements will feed into the survey-specific WSIs, and also inform subsequent mitigation measures (i.e. as part of pre-construction and construction mitigation related WSIs).

Table 3: Outline Schedule of Archaeological Requirements.

Project Element	HP4 ID / Walkover Survey ID / Aerial Photo/Lidar ref / HHER ID / Geophys ref	Name / Description	Heritage Importance	High-level results of Aerial Photographic and Lidar Assessment	High-level results of Priority Archaeological Geophysical Survey (where applicable)	Interaction	Easting	Northing	Post-consent Evaluation Stages to be agreed with HAP		
									Geophysical Survey	*Trial Trenching*	*Earthwork Survey*
Intertidal	HP4-1 / 0 / APS_258 / MHU21052, 21148, 21149 & 21150	World War II sea defences including anti-tank cubes and pillboxes.	Medium	Extent of area of coastal wartime defences, mostly characterised by Dragons Teeth mapped in detail by the NMP.	n/a	**No**: Interaction between these assets and the construction works is negligible due to the adoption of a trenchless methodology within the intertidal zone.	516950	461200	n/a	n/a	n/a
Onshore ECC / Landfall	HP4-2 / 1, 26 / APS_254, 255, 256 / MHU326, 21070, 21073, 21078, 21085, 21086, (Iron Age/Romano-British remains); MHU21076, 21077, 21080, 21081, 21082, 21090, 21154 (WWII Defences) / 1A-1Z, 1AA-1AJ & 26A-26E	Watermill Grounds cropmark complex: Iron Age to Romano-British enclosures and World War II defences including anti-glider trenches and pillboxes.	Medium	Enclosures and a field systems are visible as cropmarks on aerial imagery sources, the site likely relates to the HHER record of Iron Age to Romano-British enclosures at Watermill Grounds. The site of anti-glider ditches utilised during WWII, the ditches are no longer extant but have been observed from aerial sources as extant structures, earthworks and more recently as residual earthworks and cropmarks.	Completed. Geophysical survey data corroborates with the desk-based information and Aerial Photo / Lidar data. In some instances the survey provides more details on the extents of the enclosures and field systems. However, it provides less detail on the WWII anti-glider ditches.	**Yes**: Interaction between these assets and the locations of the Transition Joint Bays, Onshore ECC and Temporary Construction Compound is likely. Requires ground truthing (as part of the programme of archaeological trial trenching) post-consent.	516700	461050	No	Yes	No
Temporary Access Track (AP_002)	HP4-59 / APS_257 / MHU10044	Square Barrows, south-east of Fraisthorpe.	Low to High	Within the same field and to the north-east of the HHER record, a complex site made up of ditches and pits, the majority of which are visible as cropmark features. A few of the ditches are visible as residual earthworks.	Not targeted as part of the Priority Archaeological Geophysical Survey programme as forms part of a temporary access track.	**Yes** (slight): the access track may interact with cropmark features recorded to the northeast.	515900	461200	To be discussed with HAP due to nature of construction works.	To be discussed with HAP due to nature of construction works.	Yes
Onshore ECC	APS_249, 252	Former field boundaries.	Low	Two former field boundaries dating to the Post Medieval period are visible as earthworks. APS_249 is orientated approximately northwest – southeast and APS_252 is orientated approximately east - west then north - south.	Not targeted as part of the Priority Archaeological Geophysical Survey programme.	**Yes**: The onshore ECC intersects with the former field boundaries identified from Aerial Photo / Lidar data.	515983 and 516345	460760 and 460939	To be discussed with HAP post-consent.	To be discussed with HAP post-consent.	Yes

Project Element	HP4 ID / Walkover Survey ID / Aerial Photo/Lidar ref / HHER ID / Geophys ref	Name / Description	Heritage Importance	High-level results of Aerial Photographic and Lidar Assessment	High-level results of Priority Archaeological Geophysical Survey (where applicable)	Interaction	Easting	Northing	Post-consent Evaluation Stages to be agreed with HAP		
									Geophysical Survey	*Trial Trenching*	*Earthwork Survey*
Onshore ECC	HP4-4 / 27 / APS_247, 248 / MHU365 / 27D-27F	Winkton Deserted Medieval Village.	Medium	A group of ditches on a variety of orientations have been identified as earthworks and cropmarks through aerial imagery sources.	Completed (partial coverage of Order Limits). Geophysical survey identified a series of rectilinear enclosures located to the south of those recorded in the Aerial Photo / Lidar data.	**Yes**: The Onshore ECC intersects features of archaeological interest identified in the geophysical survey data. Requires ground truthing (as part of the programme of archaeological trial trenching) post-consent.	515250	460230	Yes	Yes	Yes
Onshore ECC	APS_244, 245	Ridge and Furrow and ditches.	Low	An area of Medieval / Post Medieval Ridge and Furrow (APS_244) which is orientated approximately northeast - southwest is visible as an earthwork and cropmark on aerial imagery sources, and a group of former field boundaries (APS_245) dating to the Post Medieval period are visible as cropmarks on aerial imagery sources.	Not targeted as part of the Priority Archaeological Geophysical Survey programme.	**Yes**: The onshore ECC interacts with features of archaeological interest identified from Aerial Photo / Lidar data.	514726	459085	Yes	Location to be discussed with HAP following results of geophysical survey.	Yes
Onshore ECC	HP4-6 / 28 / APS_236 / MHU11147 / 28A	Former Military Airfield, RAF Lissett.	Low to Medium	The site of a former Military Airfield, RAF Lissett, which was first used during WWII, the airfield is still partially in use and some areas have been repurposed for wind turbines.	Completed. Geophysical survey corroborates with desk-based information associated with RAF Lisset (anomalies 28A-E). A number of other archaeological anomalies are identified, including rectilinear enclosures, linear and curvilinear features (28F-M).	**Yes**: The Onshore ECC intersects features of archaeological interest identified from all non-intrusive work pre-consent. Requires ground truthing (as part of the programme of archaeological trial trenching) post-consent.	513500	458000	No	Yes	No
Onshore ECC	APS_219, 220, 222, 226, 234	Former field boundaries (APS_219, 220, 222) and banks (APS_226, 234).	Low	A group of former field boundaries dating to the Post Medieval period are visible as earthworks and later as cropmarks on aerial imagery sources. Two banks, one curvilinear, visible as earthworks have been identified through aerial imagery sources.	Not targeted as part of the Priority Archaeological Geophysical Survey programme.	**Yes**: The onshore ECC interacts with former field boundaries identified from Aerial Photo / Lidar data.	512127 to 513174	456532 to 456842	To be discussed with HAP post-consent.	To be discussed with HAP post-consent.	Yes

Project Element	HP4 ID / Walkover Survey ID / Aerial Photo/Lidar ref / HHER ID / Geophys ref	Name / Description	Heritage Importance	High-level results of Aerial Photographic and Lidar Assessment	High-level results of Priority Archaeological Geophysical Survey (where applicable)	Interaction	Easting	Northing	Post-consent Evaluation Stages to be agreed with HAP		
									Geophysical Survey	*Trial Trenching*	*Earthwork Survey*
Onshore ECC	HP4-58 / APS_217, 224, 225, 227, 228	Ridge and Furrow earthworks.	Low	An area of Medieval / Post Medieval Ridge and Furrow which are visible on aerial imagery sources. Some are visible as earthworks.	Not targeted as part of the Priority Archaeological Geophysical Survey programme.	**Yes**: The onshore ECC intersects with extant historic earthworks. Potential for archaeological remains to survive below ridge and furrow earthworks.	611450	456500	Yes	Location to be discussed with HAP following results of geophysical survey.	Yes
Onshore ECC	HP4-8 / 3 / APS_223, 212 / MHU22121 & 22148 / 3AE-F, 30A & C, 3BC-D, 31A-B, 3CA-E APS_211, 215 / 3BK-M, 3CM	Cropmarks of Iron Age and/or Romano-British Rectilinear enclosures. Field system (post-medieval).	Low to Medium	An Iron Age - Roman square ditched enclosure is visible as a cropmark on aerial imagery sources. A group of ditches on a variety of orientations have been identified as earthworks and later as cropmarks through aerial imagery sources. An area of former field systems which are visible as earthworks and later as cropmark ditches through aerial imagery sources.	Completed (partial coverage of Order Limits). Geophysical survey data corroborates with the desk-based information and provides additional information relating to potential archaeological remains located within the Onshore ECC, including rectilinear enclosure, linear, curvilinear and pit-like features.	**Yes**: The Onshore ECC intersects features of archaeological interest identified in the geophysical survey and Aerial Photo / Lidar data. Requires ground truthing (as part of the programme of archaeological trial trenching) post-consent.	510849 / 509654 / 509305	456531 / 456376 / 455781	Yes	Yes	No
Onshore ECC	APS_205, 206, 207	Former field boundary, ditches, banks and ridge and furrow.	Low	A series of ditches roughly orientated northeast - southwest which are visible as earthworks and later as cropmarks have been identified through aerial imagery sources (APS 206). An area of Medieval / Post Medieval Ridge and Furrow and field boundaries which are orientated approximately northeast - southwest are visible as earthworks and cropmarks on aerial imagery sources (APS_207).	Not targeted as part of the Priority Archaeological Geophysical Survey programme.	**Yes**: The onshore ECC intersects the linear features identified from Aerial Photo / Lidar data.	508223 to 509106	455055 to 455459	Yes	Location to be discussed with HAP following results of geophysical survey.	No

Project Element	HP4 ID / Walkover Survey ID / Aerial Photo/Lidar ref / HHER ID / Geophys ref	Name / Description	Heritage Importance	High-level results of Aerial Photographic and Lidar Assessment	High-level results of Priority Archaeological Geophysical Survey (where applicable)	Interaction	Easting	Northing	Post-consent Evaluation Stages to be agreed with HAP		
									Geophysical Survey	*Trial Trenching*	*Earthwork Survey*
Onshore ECC	HP4-53 / APS_203, 313 / MHU8161 / 32A-D	Early Iron Age to Romano-British settlement complex.	Low to Medium	An area of former field systems (Iron Age / Romano-British (APS-203) and post-medieval (APS_313)) which are visible as earthwork and cropmark ditches through aerial imagery sources.	Completed (partial coverage of Order Limits). Geophysical survey partially corroborates with Aerial Photo / Lidar data and identifies additional archaeological anomalies, including a square enclosure and probable field system.	**Yes**: The Onshore ECC intersects features of archaeological interest identified in the geophysical survey and Aerial Photo / Lidar data. Requires ground truthing (as part of the programme of archaeological trial trenching) post-consent.	507740	454710	Yes	Yes	No
Onshore ECC	HP4-57 / APS_203 / MHU7177	Cropmarks of an undated site (possibly associated with HP4-53).	Low to Medium	An area of former field systems (Iron Age / Romano-British) which are visible as earthwork and cropmark ditches through aerial imagery sources.	Not targeted as part of the Priority Archaeological Geophysical Survey programme.	**Yes** (slight): although the continuation of cropmark features into the Onshore ECC cannot be discounted, based on information to date, no cropmark features indicative of sub-surface remains are intersected by the Onshore ECC at this location. Requires geophysical survey in the first instance post-consent.	507250	454650	Yes	Yes	No
Onshore ECC	HP4-62 / APS_202	Undated ring ditches and post-medieval field boundaries.	Low to Medium	A group of former field boundaries dating to the Post Medieval period and undated ring ditches are visible as earthworks and later as cropmarks on aerial imagery sources.	Not targeted as part of the Priority Archaeological Geophysical Survey programme.	**Yes** (slight): The Onshore ECC intersects the cropmarks relating to post-medieval field boundaries, however, the Onshore ECC is unlikely to intersect with the cropmarks associated with the ring ditches although there is potential for other associated archaeological remains to be present.	506925	453910	Yes	Yes	No

Project Element	HP4 ID / Walkover Survey ID / Aerial Photo/Lidar ref / HHER ID / Geophys ref	Name / Description	Heritage Importance	High-level results of Aerial Photographic and Lidar Assessment	High-level results of Priority Archaeological Geophysical Survey (where applicable)	Interaction	Easting	Northing	Post-consent Evaluation Stages to be agreed with HAP		
									Geophysical Survey	*Trial Trenching*	*Earthwork Survey*
Onshore ECC	HP4-10 / 33 / APS_195 / MHU2252 / 33A-F	Ditch system and possible ring ditches (undated).	Low to Medium	An area of former field systems (Prehistoric) which are visible as cropmark ditches through aerial imagery sources.	Completed. Geophysical survey corroborates with cropmarks identified from Aerial Photo / Lidar data, and identifies additional anomalies of archaeological interest, including ring ditch, trackway, curvilinear and pit-like features.	**Yes**: The Onshore ECC intersects features of archaeological interest identified in the geophysical survey and Aerial Photo / Lidar data. Requires ground truthing (as part of the programme of archaeological trial trenching) post-consent.	506550	452150	No	Yes	No
Onshore ECC	HP4-11 / APS_194 / MHU8109 / 34A-E	Square ditched enclosure (undated).	Low to Medium	An enclosure which is visible as a cropmark and residual earthworks on aerial imagery sources.	Completed. Geophysical survey corroborates with cropmarks identified from Aerial Photo / Lidar data, and provides more details on the extent of features located within the enclosure, and identifies additional anomalies of archaeological interest comprising possible trackway, linear and curvilinear features.	**Yes**: The Onshore ECC intersects features of archaeological interest identified in the geophysical survey and Aerial Photo / Lidar data. Requires ground truthing (as part of the programme of archaeological trial trenching) post-consent.	506205	451905	No	Yes	Yes
Onshore ECC	HP4-13 / APS_190, 191 / MHU9878 / 35A-I	Undated trackway and field systems.	Low to Medium	Two trackways roughly orientated northeast - southwest which are visible as earthworks and later as cropmarks has been identified through aerial imagery sources. A group of former field boundaries dating to the Post Medieval period and groups of pits are visible as cropmarks on aerial imagery sources.	Completed. Geophysical survey corroborates with cropmarks identified from Aerial Photo / Lidar data, and identifies additional anomalies of archaeological interest, including rectilinear enclosures, linear and pit-like features.	**Yes**: The Onshore ECC intersects features of archaeological interest identified in the geophysical survey and Aerial Photo / Lidar data. Requires ground truthing (as part of the programme of archaeological trial trenching) post-consent.	505745	451016	No	To be discussed with HAP post-consent.	No
Onshore ECC	APS_185, 186, 188, 189	Former field boundaries.	Low	A group of former field boundaries dating to the Post Medieval period which were visible as banks and ditches and are now visible as cropmarks on aerial imagery sources.	Partially covered by survey area 36. Geophysical survey data doesn't corroborate with cropmarks of field boundary at APS 185.	**Yes**: The Onshore ECC intersects with linear features identified from Aerial Photo / Lidar data.	505020 to 505570	449680 to 450615	To be discussed with HAP post-consent.	To be discussed with HAP post-consent.	No

Project Element	HP4 ID / Walkover Survey ID / Aerial Photo/Lidar ref / HHER ID / Geophys ref	Name / Description	Heritage Importance	High-level results of Aerial Photographic and Lidar Assessment	High-level results of Priority Archaeological Geophysical Survey (where applicable)	Interaction	Easting	Northing	Post-consent Evaluation Stages to be agreed with HAP		
									Geophysical Survey	*Trial Trenching*	*Earthwork Survey*
Onshore ECC	HP4-14 / APS_182, 183, 184 / MHU19432 / 37A-D	Possible enclosures near Carr Lane.	Low to Medium	A ditch roughly orientated north - south which is visible as an earthwork has been identified through aerial imagery sources. A group of pits of unknown date are visible as cropmarks on aerial imagery sources. A group of former field boundaries dating to the Post Medieval period are visible as earthworks and later as cropmarks on aerial imagery sources.	Completed. Geophysical survey corroborates with cropmarks identified from Aerial Photo / Lidar data, with the exception of the group of pits identified as cropmarks.	**Yes**: The Onshore ECC intersects features of archaeological interest identified in the geophysical survey and Aerial Photo / Lidar data. Requires ground truthing (as part of the programme of archaeological trial trenching) post-consent.	504700	449000	No	Yes	No
Onshore ECC	HP4-15 / 38 / MHU13107 / 38A-H	Old sand and gravel pits (post-medieval).	Low	A bank is mapped by the NMP. No earthwork or cropmark evidence for the old sand and gravel pits.	Completed. Geophysical survey partially corroborates with the HER data at this location. A number of other anomalies of archaeological interest are identified, including possible curvilinear and rectilinear enclosures.	**Yes**: The Onshore ECC intersects features of archaeological interest identified in the geophysical survey data. Requires ground truthing (as part of the programme of archaeological trial trenching) post-consent.	504340	448590	No	To be discussed with HAP post-consent.	No
Onshore ECC	APS_176	Former field boundary (post-medieval).	Low	A ditch roughly orientated northeast - southwest which is visible as an earthwork and later as a cropmark has been identified through aerial imagery sources.	Not targeted as part of the Priority Archaeological Geophysical Survey programme.	**Yes**: The Onshore ECC intersects with the former field boundary.	503970	448315	To be discussed with HAP post-consent.	To be discussed with HAP post-consent.	No
Onshore ECC	APS_171	Cropmarks of ditches.	Low	A series of ditches of unknown date, roughly orientated northeast - southwest which are visible as cropmarks have been identified through aerial imagery sources.	Not targeted as part of the Priority Archaeological Geophysical Survey programme.	**Yes** (slight): The Onshore ECC partially intersects with the most north-westerly linear feature.	503495	447505	Yes	To be discussed with HAP following results of geophysical survey.	No

Project Element	HP4 ID / Walkover Survey ID / Aerial Photo/Lidar ref / HHER ID / Geophys ref	Name / Description	Heritage Importance	High-level results of Aerial Photographic and Lidar Assessment	High-level results of Priority Archaeological Geophysical Survey (where applicable)	Interaction	Easting	Northing	Post-consent Evaluation Stages to be agreed with HAP		
									Geophysical Survey	*Trial Trenching*	*Earthwork Survey*
Onshore ECC	HP4-17 / 39 / APS_172, 173, 174, 175 / MHU979, 12875 / 39A-B & H	Undated ditches and trackways, ring ditch and a post-medieval artesian well.	Low to Medium	A ditch has been identified as a cropmark and residual earthwork through aerial imagery sources. A group of pits of unknown date are visible as an earthwork on aerial imagery sources. A former field boundary dating to the Post Medieval period is visible as an earthwork and later as a cropmark and is orientated approximately north - south.	Completed. Geophysical survey corroborates with cropmarks identified from Aerial Photo / Lidar data at this location.	**Yes**: The Onshore ECC intersects features of archaeological interest identified in the geophysical survey and Aerial Photo / Lidar data. Requires ground truthing (as part of the programme of archaeological trial trenching) post-consent.	502950	447680	No	Yes	Yes
Onshore ECC	HP4-18 / APS_167, 169 / MHU19425 / 40A-C	Iron Age Square Barrows, SSE of Brickyard Farm.	Low to High	The site of a possible square barrow is visible as an earthwork on aerial imagery sources.	Completed. Geophysical survey corroborates with earthwork identified from Aerial Photo / Lidar data at this location, and enhances the existing information showing additional rectilinear and curvilinear trends indicative of enclosures.	**Yes**: The Onshore ECC intersects features of archaeological interest identified in the geophysical survey and Aerial Photo / Lidar data. Requires ground truthing (as part of the programme of archaeological trial trenching) post-consent.	502250	447350	No	Yes	Yes
Onshore ECC (DCO Option A)	HP4-63 / APS_157, 158, 159, 161, 165 / 41C-F	Possible enclosures and pit-like features (identified from geophysical survey), and Ridge and Furrow.	Low to Medium	Evidence of former field boundaries (APS_157, 158, 159, 161) dating to the Post Medieval period and an area of ridge and furrow (APS_165) visible as earthworks and orientated approximately east - west. No evidence of enclosures or pits recorded in geophysical survey.	Completed. Geophysical survey identified a group of archaeological features not visible on Aerial Photo / Lidar data, including possible rectilinear enclosures and pit-like features indicative of settlement activity.	**Yes**: The Onshore ECC intersects features of archaeological interest identified in the geophysical survey data. Requires ground truthing (as part of the programme of archaeological trial trenching) post-consent.	501770	446830	No	Yes	Yes
Onshore ECC (DCO Option A)	APS_156	Ridge and Furrow.	Low	An area of Medieval / Post Medieval Ridge and Furrow which is orientated approximately east - west is visible as an earthwork and later as a soil mark on aerial imagery sources.	Targeted but no access. Area to form part of 2020 survey programme pending COVID-19 movement restrictions.	**Yes**: The Onshore ECC intersects with features identified from Aerial Photo / Lidar data.	501600	446700	TBC	To be discussed with HAP following results of geophysical survey.	No

Project Element	HP4 ID / Walkover Survey ID / Aerial Photo/Lidar ref / HHER ID / Geophys ref	Name / Description	Heritage Importance	High-level results of Aerial Photographic and Lidar Assessment	High-level results of Priority Archaeological Geophysical Survey (where applicable)	Interaction	Easting	Northing	Post-consent Evaluation Stages to be agreed with HAP		
									Geophysical Survey	*Trial Trenching*	*Earthwork Survey*
Onshore ECC (DCO Option A)	HP4-21 / 43 / APS_155 / MHU12882 / 43A-C	Old gravel pit, Bryan Mills.	Low to Medium	An area of Medieval / Post Medieval Ridge and Furrow which is orientated approximately east - west, a former field boundary dating to the Post Medieval period and a hollow are visible as earthworks on aerial imagery sources.	Completed. Geophysical survey did not corroborate with features identified on Aerial Photo / Lidar data, however other features of archaeological interest were visible including linear and pit-like features.	**Yes**: The Onshore ECC intersects features of archaeological interest identified in the geophysical survey data. Requires ground truthing (as part of the programme of archaeological trial trenching) post-consent.	501461	446626	No	To be discussed with HAP post-consent.	Yes
Onshore ECC (DCO Option B)	HP4-54 / 6 / APS_163, 306 / MHU22336 , 12881	Cropmarks of Iron Age/Romano-British enclosures and a post-medieval artesian well.	Low to Medium	An area of former field systems of unknown date which are visible as earthwork ditches through aerial imagery sources (APS_163). A partial enclosure of Iron Age/Romano-British date which is visible as a cropmark on aerial imagery sources to the north of the Onshore ECC (APS_306).	New route option forming part of further survey work in 2020 pending COVID-19 movement restrictions.	**Yes** (slight): The Onshore ECC intersects the cropmarks relating to field systems of unknown date, however, the Onshore ECC is unlikely to intersect with the cropmarks associated with the Iron Age/Romano-British enclosures to the north although there is potential for other associated archaeological remains to be present.	501500	447160	TBC	To be discussed with HAP following results of geophysical survey.	TBC
Onshore ECC Compound (LC_005_B)	HP4-55 / 42 / MHU3147	Bronze Age round barrow and ditch.	Low to Medium	Bronze Age round barrow and ditch not identified from aerial imagery.	New route option forming part of further survey work in 2020 pending COVID-19 movement restrictions.	**Yes** (slight): although the presence of cropmark features within the Onshore ECC compound cannot be discounted, based on information to date, no cropmark features indicative of sub-surface remains have been identified at this location.	501302	446818	TBC	To be discussed with HAP following results of geophysical survey.	TBC

Project Element	HP4 ID / Walkover Survey ID / Aerial Photo/Lidar ref / HHER ID / Geophys ref	Name / Description	Heritage Importance	High-level results of Aerial Photographic and Lidar Assessment	High-level results of Priority Archaeological Geophysical Survey (where applicable)	Interaction	Easting	Northing	Post-consent Evaluation Stages to be agreed with HAP		
									Geophysical Survey	*Trial Trenching*	*Earthwork Survey*
Onshore ECC	HP4-22 / 9, 44 / APS_153 / MHU22179 / 44A-H	Cropmarks of an Iron Age and/or Romano-British rectilinear enclosure.	Low to Medium	A rectilinear enclosure is visible as a cropmark and residual earthwork on aerial imagery sources.	Completed. Geophysical survey corroborated with cropmarks identified on Aerial Photo / Lidar data.	**Yes** (slight): although the continuation of cropmark features into the Onshore ECC cannot be discounted, based on information to date, no cropmark features indicative of sub-surface remains are intersected by the Onshore ECC at this location. Requires ground truthing (as part of the programme of archaeological trial trenching) post-consent.	500969	446078	No	Yes	Yes
Onshore ECC	APS_149, 150	Ridge and Furrow.	Low	An area of Medieval / Post Medieval Ridge and Furrow which is orientated approximately east - west is visible as an earthwork and later as a cropmark on aerial imagery sources.	Not targeted as part of the Priority Archaeological Geophysical Survey programme.	**Yes**: The onshore ECC intersects with areas of ridge and furrow identified from Aerial Photo / Lidar data.	500550	445645	Yes	To be discussed with HAP following results of geophysical survey.	No
Onshore ECC	HP4-24 / 10 / APS_147 / MHU3725 / 45A-F	Site of Winthorpe Manor and House.	Low to Medium	The site of Winthorpe Manor and House which is visible as earthwork ditches on aerial imagery sources and more recently on Google Earth as cropmarks.	Completed. Geophysical survey did not corroborate with the cropmarks identified from Aerial Photo / Lidar data. Areas of enhanced magnetism which may relate to a former building were recorded (45A-C), along with other curvilinear and linear features of possible archaeological origin (45D-F).	**Yes** (slight): Cropmarks and geophysical anomalies associated with the Manor site are located outside the Onshore ECC boundary. Archaeological remains potentially associated with the Manor are recorded in the Aerial Photo / Lidar data within the Onshore ECC boundary, requires ground truthing (as part of the programme of archaeological trial trenching) post-consent.	500113	445257	No	Yes	No

Project Element	HP4 ID / Walkover Survey ID / Aerial Photo/Lidar ref / HHER ID / Geophys ref	Name / Description	Heritage Importance	High-level results of Aerial Photographic and Lidar Assessment	High-level results of Priority Archaeological Geophysical Survey (where applicable)	Interaction	Easting	Northing	Post-consent Evaluation Stages to be agreed with HAP		
									Geophysical Survey	*Trial Trenching*	*Earthwork Survey*
Onshore ECC	APS_143, 146, 148 / 45G-I	Former field boundaries.	Low	Three former field boundaries dating to the Post Medieval period are visible as earthworks and later as cropmarks.	Completed. Geophysical Survey corroborates with former field boundaries identified from Aerial Photo / Lidar data. Curving boundary 45G appears to follow a former Authority/Parish boundary which may have once followed a former river channel.	**Yes**: The Onshore ECC intersects with linear features identified from geophysical survey and Aerial Photo / Lidar data.	500380	445220	No	To be discussed with HAP post-consent.	No
Onshore ECC	HP4-64 / APS_140	A complex site comprising a trackway, ditches, pits, and curvilinear ditched features.	Low to Medium	A complex site comprising a trackway, ditches, pits, and curvilinear ditched features. The trackway is mostly visible as cropmarks however some residual earthwork remains at the southern extent.	Not targeted as part of the Priority Archaeological Geophysical Survey programme.	**Yes**: The Onshore ECC intersects the cropmarks identified in the Aerial Photo / Lidar data.	500425	444370	Yes	Yes	Yes
Onshore ECC	APS_133, 137 / 46 & 47	Ridge and Furrow.	Low	An area of Medieval / Post Medieval Ridge and Furrow which is orientated approximately northeast - southwest is visible as an earthwork and later as a cropmark on aerial imagery sources.	Completed. Geophysical survey corroborates with cropmarks identified from Aerial Photo / Lidar data.	**Yes**: The Onshore ECC intersects with cropmarks of ridge and furrow.	500505 to 500410	443720 to 443150	No	To be discussed with HAP post-consent.	No
Onshore ECC	HP4-26 / 13 / APS_129 / MHU3350 / 13A-E	Raventhorpe deserted medieval settlement.	Medium to High	The site of a deserted Medieval settlement of Raventhorpe is visible as earthworks on aerial imagery sources.	Completed. Geophysical survey corroborates with Aerial Photo / Lidar data (13A-C). Additional features of possible archaeology were recorded, including a ring ditch feature (13D) and sub-circular feature (13E).	**Yes**: The Onshore ECC intersects features of archaeological interest identified from all non-intrusive work pre-consent. Requires ground truthing (as part of the programme of archaeological trial trenching) post-consent.	500325	442435	No	Yes	Yes

Project Element	HP4 ID / Walkover Survey ID / Aerial Photo/Lidar ref / HHER ID / Geophys ref	Name / Description	Heritage Importance	High-level results of Aerial Photographic and Lidar Assessment	High-level results of Priority Archaeological Geophysical Survey (where applicable)	Interaction	Easting	Northing	Post-consent Evaluation Stages to be agreed with HAP		
									Geophysical Survey	*Trial Trenching*	*Earthwork Survey*
Onshore ECC	HP4-28 / MHU3346, 19099, 13020 / 48A-B	Undated ditches, possible enclosure, Soilmark west of Parkhouse, and Dog Kennel Farm (post-medieval).	Low to Medium	No evidence of cropmarks or earthworks from AP/Lidar assessment.	Completed. Geophysical survey recorded features of archaeological interest likely associated with the HHER record (48A-B).	**Yes**: The Onshore ECC intersects features of archaeological interest identified from geophysical survey data. Requires ground truthing (as part of the programme of archaeological trial trenching) post-consent.	500202	442038	No	Yes	-
Onshore ECC	APS_126, 127 / 49	Ridge and Furrow.	Low	An area of Medieval / Post Medieval Ridge and Furrow is visible as an earthwork and later as a cropmark on aerial imagery sources.	Partially covered by targeted geophysical survey which corroborates with cropmarks.	**Yes**: The Onshore ECC intersects with linear features identified from geophysical survey and Aerial Photo / Lidar data.	500660	441480	Yes	To be discussed with HAP following results of geophysical survey.	No
Onshore ECC	HP4-31 / 16 / APS_118, 122 / MHU22297	Cropmarks of an Iron Age and/or Romano-British enclosure and former field boundaries (post-medieval).	Low to Medium	A partial enclosure which is visible as a cropmark on aerial imagery sources (APS_118). A group of former field boundaries dating to the Post Medieval period are visible as cropmarks on aerial imagery sources (APS_122).	Targeted but no access. Area to form part of 2020 survey programme pending COVID-19 movement restrictions.	**Yes** (slight): limited to the more peripheral looking ditches to the west of the main enclosure site. However, the Onshore ECC fully intersects with former field boundaries.	500358	440463	TBC	To be discussed with HAP following results of geophysical survey.	No
Onshore ECC	HP4-56 / NHLE 1012589 / MHU711	Beverley Sanctuary Limit Stone, Bishop Burton.	High	n/a	n/a	**No**: Interaction between the designated asset and the construction works is negligible due to the adoption of a trenchless methodology at this location.	500547	439681	No	No	No
Onshore ECC	HP4-32 / 50 / APS_110, 112 / MHU13179 / 50E	Inclosure bank (medieval).	Low to Medium	A bank roughly orientated northeast - southwest which is visible as an earthwork has been identified through aerial imagery sources.	Partially (area to west surveyed). Geophysical survey corroborates with feature recorded from Aerial Photo / Lidar data.	**Yes**: The Onshore ECC intersects the bank. Requires further survey post-consent.	500450	439550	Yes	To be discussed with HAP following results of geophysical survey.	Yes
Onshore ECC	APS_101, 104, 105, 106, 107 / 50F & J	Former field boundaries (post-medieval), ditches and bank of unknown date and Ridge and Furrow (medieval / post-medieval).	Low	A group of former field boundaries dating to the Post Medieval period, ditches and a bank of unknown date, and an area of ridge and furrow are visible as earthworks and as cropmarks.	Completed. Geophysical survey corroborates with Aerial Photo / Lidar data.	**Yes**: The Onshore ECC intersects with the linear features identified from the geophysical survey and Aerial Photo / Lidar data.	500580 to 500585	439420 to 43810	No	Yes	Yes

Project Element	HP4 ID / Walkover Survey ID / Aerial Photo/Lidar ref / HHER ID / Geophys ref	Name / Description	Heritage Importance	High-level results of Aerial Photographic and Lidar Assessment	High-level results of Priority Archaeological Geophysical Survey (where applicable)	Interaction	Easting	Northing	Post-consent Evaluation Stages to be agreed with HAP		
									Geophysical Survey	*Trial Trenching*	*Earthwork Survey*
Onshore ECC	APS_093, 095 / 51C	A hollow of unknown date and former post-medieval field boundaries.	Low	A hollow is visible as an earthwork on aerial imagery sources. A group of former field boundaries dating to the Post Medieval period are visible as earthworks and later as cropmarks on aerial imagery sources.	Completed. Geophysical survey partially corroborates with hollow and field boundary identified on Aerial Photo / Lidar data.	**Yes** (slight): The onshore ECC partially intersects with the location of the hollow identified from Aerial Photo / Lidar data, and fully intersects with the former field boundary.	500825	437795	No	To be discussed with HAP post-consent.	Yes
Onshore ECC	APS_083	Ditches of unknown date.	Low	A group of ditches on a variety of orientations have been identified as earthworks and later as cropmarks through aerial imagery sources.	Not targeted as part of the Priority Archaeological Geophysical Survey programme.	**Yes**: The Onshore ECC intersects linear features identified from Aerial Photo / Lidar data.	501135	437125	Yes	To be discussed with HAP following results of geophysical survey.	No
Onshore ECC	APS_051, 064	A former field boundary (post-medieval) and ditch.	Low	A bank (former field boundary) and a ditch roughly orientated northeast - southwest, are visible as earthworks identified through aerial imagery sources.	Completed. Geophysical survey (Areas 52 and 53) did not corroborate with earthworks identified from Aerial Photo / Lidar data.	**Yes**: The Onshore ECC intersects linear features identified from Aerial Photo / Lidar data.	501375 / 501507	435868 / 435712	No	To be discussed with HAP post-consent.	Yes
Onshore ECC	APS_040, 042, 043, 044, 045, 301	Ditch, banks, a former field boundary (post-medieval), and Ridge and Furrow (medieval / post-medieval).	Low	A ditch roughly orientated northeast – southwest, two banks orientated north-south, a former field boundary orientated northwest – southeast and an area of ridge and furrow visible as earthworks.	Not targeted as part of the Priority Archaeological Geophysical Survey programme.	**Yes**: The Onshore ECC intersects linear features identified from Aerial Photo / Lidar data.	501670 / 502110	435468 / 345355	Yes	To be discussed with HAP following results of geophysical survey.	Yes
Onshore ECC	HP4-65 / APS_039	Square enclosure (prehistoric).	Low to Medium	A square enclosure which is visible as a cropmark on aerial imagery sources.	Not targeted as part of the Priority Archaeological Geophysical Survey programme.	**Yes** (slight): although the continuation of cropmark features into the Onshore ECC cannot be discounted, based on information to date, no cropmark features indicative of sub-surface remains are intersected by the Onshore ECC at this location. Requires geophysical survey in the first instance post-consent.	502297	435389	Yes	To be discussed with HAP following results of geophysical survey.	No

Project Element	HP4 ID / Walkover Survey ID / Aerial Photo/Lidar ref / HHER ID / Geophys ref	Name / Description	Heritage Importance	High-level results of Aerial Photographic and Lidar Assessment	High-level results of Priority Archaeological Geophysical Survey (where applicable)	Interaction	Easting	Northing	Post-consent Evaluation Stages to be agreed with HAP		
									Geophysical Survey	*Trial Trenching*	*Earthwork Survey*
Onshore ECC	HP4-66 / APS_034	Linear alignment of mounds (undated).	Low to Medium	The site of an undated mound which is visible as an earthwork on aerial imagery sources.	Not targeted as part of the Priority Archaeological Geophysical Survey programme.	**Yes**: The Onshore ECC intersects the earthworks identified in the Aerial Photo / Lidar data, requires geophysical survey post-consent.	502364	435131	Yes	To be discussed with HAP following results of geophysical survey.	Yes
Onshore ECC	APS_019, 020	Field boundary (post-medieval) and a bank of unknown date.	Low	A former field boundary is visible as an earthwork and later as a cropmark, and a bank roughly orientated northeast - southwest which is visible as an earthwork has been identified through aerial imagery sources.	Not targeted as part of the Priority Archaeological Geophysical Survey programme.	**Yes**: The Onshore ECC intersects the linear features identified in the Aerial Photo / Lidar data.	502905	434725	To be discussed with HAP post-consent.	To be discussed with HAP post-consent.	Yes
Onshore ECC	HP4-67 / APS_012, 013 / 58B-D & 58O-P	Group of ditches indicative of enclosures and field systems	Low to Medium	A group of undated ditches on a variety of orientations have been identified as earthworks and cropmarks through aerial imagery sources.	Completed. Geophysical survey partially corroborates with cropmarks from Aerial Photo / Lidar data. Additional features of possible archaeology have been recorded to the east of the cropmarks, including (58O and 58P)	**Yes**: The Onshore ECC intersects with the features of archaeological interest identified on the geophysical survey and Aerial Photo / Lidar data. Requires ground truthing (as part of the programme of archaeological trial trenching) post-consent.	503500	434705	No	Yes	Yes
Onshore ECC / OnSS Permanent Space / Grid Connection Works	HP4-49 / 58 / APS_028 / MHU1381, 6599 / 58E-M & 58Q	Site of two round barrows and Burn Park cropmark complex, Iron Age / Romano-British occupation.	Medium to High	An area of former field systems (Iron Age / Romano-British) which are visible as cropmark ditches through aerial imagery sources.	Completed. Geophysical survey corroborated with Aerial Photo / Lidar data of cropmarks relating to Burn Park cropmark complex, Iron Age / Romano-British occupation (MHU6599). No evidence of round barrows to northwest of datasets (MHU1381).	**Yes**. The Onshore ECC and OnSS permanent space intersects with the area of archaeological interest. Requires ground truthing (as part of the programme of archaeological trial trenching) post-consent.	503870	435016	No	Yes	Yes

Project Element	HP4 ID / Walkover Survey ID / Aerial Photo/Lidar ref / HHER ID / Geophys ref	Name / Description	Heritage Importance	High-level results of Aerial Photographic and Lidar Assessment	High-level results of Priority Archaeological Geophysical Survey (where applicable)	Interaction	Easting	Northing	Post-consent Evaluation Stages to be agreed with HAP		
									Geophysical Survey	*Trial Trenching*	*Earthwork Survey*
OnSS Temporary Works	HP4-68 / 58 / APS_026, 030 / 58R, 58T-U	Possible enclosures adjacent to a former palaeochannel, post-medieval field boundaries.	Low to Medium	A group of former field boundaries dating to the Post Medieval period are visible as cropmarks on aerial imagery sources. No evidence of possible enclosures or palaeochannel recorded.	Completed. Geophysical survey data shows linear trends of possible archaeological origin, a palaeochannel or river course and former field boundaries.	**Yes**: Interaction between the temporary works area and the features of archaeological interest is likely. Requires ground truthing (as part of the programme of archaeological trial trenching) post-consent.	503220	434986	No	Yes	No
Grid Connection Works	APS_009, 021	Ridge and Furrow.	Low	Two areas of Medieval / Post Medieval Ridge and Furrow which is orientated approximately northeast – southwest (APS_009) and east - west (APS_021), are visible as cropmarks on aerial imagery sources.	Not targeted as part of the Priority Archaeological Geophysical Survey programme.	**Yes**: The Grid Connection Works intersect with the cropmarks identified from Aerial Photo / Lidar data.	504545	434770	Yes	To be discussed with HAP following results of geophysical survey.	No
OnSS Permanent Access Road	HP4-69 / APS_053	Undated field system	Low	An area of former field systems and ditches which are visible as cropmark ditches through aerial imagery sources.	Not targeted as part of the Priority Archaeological Geophysical Survey programme.	**Yes:** The Permanent Access Road intersects with the cropmarks identified from Aerial Photo / Lidar data.	503518	435784	To be discussed with HAP post-consent.	To be discussed with HAP post-consent.	No

12 Appendix 3 – WSI for Priority Archaeological Geophysical Survey

Hornsea Project Four: Written Scheme of Investigation for Priority Archaeological Geophysical Survey

Prepared	Sarah Mounce 11 February 2019
Checked	Patrick Moan 27 February 2019
Accepted	Thomas Watts 07 March 2019
Approved	Julian Carolan 08 March 2019

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Acronyms

Acronym	Definition
ADS	Archaeology Data Service
BGS	British Geological Survey
CIfA	Chartered Institute for Archaeologists
DCO	Development Consent Order
ECC	Electrical Cable Corridor
EIA	Environmental Impact Assessment
ES	Environmental Statement
GPS	Global Positioning System
GIS	Geographic Information System
Lidar	Light Detection and Ranging
HAP	Humber Archaeological Partnership
HER	Historic Environment Record
HSE	Health, Safety and Environment
OASIS	Online Access to the Index of Archaeological Investigations
PEIR	Preliminary Environmental Information Report
PPE	Personal Protective Equipment
RAMS	Risk Assessment Method Statement
WSI	Written Scheme of Investigation

1 Introduction

1.1 General Project Background

1.1.1.1 Ørsted Hornsea Project Four (UK) Ltd. (hereafter referred to as the Applicant), is promoting the development of the Hornsea Project Four Offshore Wind Farm (hereafter referred to as Hornsea Four). Hornsea Four will be located approximately 65km offshore of East Riding of Yorkshire in the Southern North Sea and will be the fourth project to be developed in the former Hornsea Zone. Hornsea Four will include both offshore and onshore infrastructure including an offshore generating station (wind farm), export cables to landfall, and connection to the electricity transmission network.

1.1.1.2 The Scoping Report for Hornsea Four was submitted to the Secretary of State on 15th October 2018 with the Scoping Opinion adopted by the Secretary of State on 23rd November 2018. Route Planning and Site Selection (RPSS) has been undertaken throughout the scoping phase and subsequent to the scoping opinion, to inform the final design of the landfall area, onshore electrical cable corridor (ECC) and onshore substation location. As part of this appraisal and refinement process, the location of known designated and non-designated heritage assets have been considered and, where practicable, the onshore infrastructure has been designed to avoid known heritage assets whilst factoring in other environmental and engineering constraints (primary mitigation, embedded into the design).

1.1.1.3 The current Development Consent Order (DCO) application programme for the project is as follows:

- Preliminary Environmental Information Report (PEIR) submission – Summer 2019
- Environmental Statement (ES) and DCO application submission – Q1 2020

1.1.1.4 The Applicant has commissioned Royal HaskoningDHV as the lead Environmental Impact Assessment (EIA) coordinator and Environmental Statement (ES) author for Hornsea Four and are providing environmental and consenting support services to the Applicant, including onshore archaeology. Regular and ongoing consultation with the Historic Environment Consultees with respect to onshore archaeology and cultural heritage forms an important and central element to the archaeology and cultural heritage assessment, as well as survey and evaluation work to be undertaken as part of the EIA process and beyond.

1.1.1.5 The Priority Archaeological Geophysical Survey will be undertaken by the appointed Archaeological Contractor and managed by Royal HaskoningDHV (as the Archaeological Coordinator) on behalf of the Applicant. The progress of the survey and reporting will be monitored by the Archaeological Coordinator and the Humber Archaeology Partnership (HAP).

1.1.1.6 This Written Scheme of Investigation (WSI) sets out the requirement for a Priority Archaeological Geophysical Survey programme and reporting across targeted onshore areas associated with Hornsea Four and to ultimately inform the Historic Environment ES

Chapter and identify the necessity of further stages of (non-intrusive and intrusive) archaeological evaluation, where necessary.

1.1.1.7 This WSI has been prepared in accordance with the Chartered Institute for Archaeologists' Standard and guidance for archaeological geophysical survey (CIfA, 2014a), and Historic England's guide to Geophysical Survey in Archaeological Field Evaluation (English Heritage, 2008). This WSI has been submitted to HAP for approval prior to the commencement of the Priority Archaeological Geophysical Survey.

1.2 Site Description and Geology

1.2.1.1 The British Geological Survey (BGS) online viewer shows that the solid geology beneath the onshore project area in respect to the onshore ECC compromises White Chalk Subgroup bedrock, overlain by variable superficial deposits along the route, including river terrace gravels, alluvium, glacial till, sand and gravels.

1.2.1.2 The majority of the Hornsea Four onshore project area is within agricultural land, interspersed with predominantly small rural settlements, such as Beswick, Bishop Burton, Cherry Burton, Foston-on-the-Wolds, Leconfield, and Walkington, along with larger urban centres, including the towns of Beverley and Bridlington. The preferred site for the onshore substation is located approximately 10km north-west of Hull. Numerous watercourses are located throughout the local area, predominantly the River Hull and Foston Beck, and their associated tributaries.

1.3 Archaeological Background

1.3.1.1 The following baseline is a summary of the general archaeological background produced for the Historic Environment Scoping Report Chapter (Ørsted, 2018), and details the known historic environment baseline within the scoping parameters for Hornsea Four.

1.3.1.2 Upper Palaeolithic, Mesolithic and early Neolithic find spots of struck-flint artefacts are found near to the northern end of the study area. Potential later Neolithic ceremonial activity is evidenced by an oval enclosure or the outer ditch of a ploughed-down oval barrow (burial mound) which is visible as cropmarks within the study area at Barmston. Similarly, the cropmark remains of a possible late-Neolithic henge, visible at Woodmansey, suggests further ceremonial activity. Numerous Early Bronze Age round barrows are known within the area, depicted on historic mapping or are visible as cropmarks on aerial photographs singly or in pairs at 11 locations within the study area.

1.3.1.3 'Ancient British Urns' found at Rotsea and an inhumation cemetery at Bryan Mills may both be cemeteries of Middle or Late Bronze Age date. Only two potential settlement sites of Bronze Age date are known within the study area, at Barmston and Ulrome. High-status later Bronze Age metalwork, has been recovered from eight locations within the study area.

Their topographical contexts suggest that many of these artefacts were deposited in watery environments, including the River Hull and its tributaries.

1.3.1.4 A distinctive material culture called the 'Arras Culture' prevailed throughout East Yorkshire during the Iron Age. A well-known element of this culture is burial within a square barrow, a subset of which contain high-status chariot burials. Square barrows survive as cropmarks on aerial photographs, usually in small groups, at six locations within the study area and as low earthworks comprising a larger cemetery containing about 120 square barrows just south of Scorborough.

1.3.1.5 Settlement sites of Iron Age or Roman date, once again visible principally as cropmarks on aerial photographs, are known at 20 locations within the study area. A single possible Roman villa has been identified in the cropmark record within the study area, at Skidby.

1.3.1.6 The Humber Historic Environment Record (HER) contains only four entries for the early medieval period within the study area, although the wider area also contains the archaeological remains of the earliest phases of Beverley Minster, then known as Inderauda. It was founded at the turn of the 8th century and refounded after the reconquest from the Danes by King Athelstan in the 10th century. It is during the later centuries of the early medieval period that many of East Yorkshire's settlements and their open-field systems were established.

1.3.1.7 The medieval resource is more extensive. There are no monastic sites within the study area, but it does contain parts of the sites of two monastic granges at Beeford and Lockington (Belagh Grange). Moats, which flourished between about 1150 and 1350, are known at four locations within the study area. Sites of deer parks lie partially within it at Leconfield, Bentley, Skidby and Cottingham, Risby, Beverley and Woodmansey.

1.3.1.8 During the late medieval period, a worsening climate (the 'Mini Ice Age') and poor rural economic stability, along with outbreaks of the Bubonic Plague reduced the quantity and quality of grain production, leading land being lain to pasture and creating opportunity to encourage peasant migration to urban centres. Deserted or shrunken settlements lie entirely or partially within the 500m study area at Wilsthorpe, Auburn, Hartburn (Fraisthorpe), Winkton (Barmston), Gembling, Raventhorpe (Cherry Burton), Risby, Winthorpe (Etton) and Bentley. Beverley Minster and most parish churches within the 5km study area were built in the medieval period and retain most or much of their medieval fabric.

1.3.1.9 Except for some ecclesiastical buildings, most built-heritage assets within the study area and wider area (up to 5km), including many of the built-heritage assets at Beverley, were constructed during the post-medieval and early modern periods. Formal gardens were laid out at Risby Hall during the late 17th century and were extended with pleasure grounds and ornamental lakes a century later.

1.3.1.10 A number of World War II pillboxes, anti-tank defences, searchlight batteries, observation posts and other military installations and structures, including the Royal Observer Corps

underground monitoring post at Skipsea, a scheduled monument, are common along the Holderness coast and many are located within the 500m study area.

2 Survey Objectives

2.1.1.1 The key objectives for the Priority Archaeological Geophysical Survey are to:

- undertake a detailed geophysical survey across targeted sections along the Hornsea Four onshore elements;
- identify and characterise sub-surface anomalies that may have an archaeological origin (including defining the spatial limits of already known or suspected heritage assets);
- discount areas within the survey area that are found to have been subject to previous 'modern' disturbance, for example where geophysical survey data indicate the presence of 'made' or previously heavily disturbed ground;
- provide an interpretation (in written form with accompanying GIS data) of geophysical anomalies to inform the Historic Environment ES Chapter;
- prepare a fully illustrated report on the results of the priority archaeological geophysical survey that is compliant with all relevant standards, guidance and good practice; and
- produce a site archive for deposition with the East Riding of Yorkshire Museum Service and to provide information for accession to the Humber HER.

3 Methodology

3.1 General Approach

3.1.1.1 All Priority Archaeological Geophysical Survey work for Hornsea Four will be carried out in accordance with this WSI, or via further instruction provided by the Archaeological Coordinator, following consultation with HAP.

3.1.1.2 This WSI has been prepared in accordance with the *Standard and guidance for archaeological geophysical survey* (CIfA, 2014a) and Historic England's guide to *Geophysical Survey in Archaeological Field Evaluation* (English Heritage, 2008).

3.1.1.3 The Archaeological Contractor will also prepare and submit a Risk Assessment Method Statement (RAMS) document prior to the commencement of survey for approval by the Applicant, the focus of which will be on Health, Safety and Environment (HSE) considerations.

3.1.1.4 The programme (timetable) for Priority Archaeological Geophysical Survey will be agreed between the Applicant's Site and Land Rights Team, the Archaeological Coordinator and the Archaeological Contractor and be communicated to HAP via the Archaeological Coordinator.

3.2 Geophysical Survey Methodology

3.2.1.1 A Leica GS08 RTK NetRover GPS (or equivalent survey grade GPS) will be used by the Archaeological Contractor to plot the route in the relevant field and establish the correct

spatial position for the survey. Plastic orange pegs or wooden canes with hazard tape attached will be used to mark out the route.

3.2.1.2 The detailed magnetometer survey will be carried out using Bartington Grad601-2 Duel Fluxgate Gradiometers with on-board automatic DL601 data logger. This instrument is a highly stable magnetometer which utilises two vertically aligned fluxgates, one positioned 1m above the other. This arrangement is then duplicated and separated by a 1m cross bar. The 1m vertical spacing of the fluxgates provides for deeper anomaly detection capabilities than 0.5m spaced fluxgates with the dual arrangement allowing for rapid assessment of the archaeological potential of the survey area.

3.2.1.3 Data storage from the two fluxgate pairs is automatically combined into one file and stored using the on-board data logger. Data collection will be undertaken in a zig-zag traverse pattern, with readings taken every 0.25m along lines (traverse intervals) 1m apart.

3.2.1.4 The survey will be conducted using a grid system accurately tied to the OS National Grid. Grid intersections and should be located on the ground to an accuracy of +/- 10cm and all location information must be fully georeferenced, 30m grids will be used as standard.

3.2.1.5 The survey will be carried out by experienced surveyors (site-based geophysicists) to provide quality, consistent results with regard to pattern recognition and to initially screen out any noise produced by local magnetic 'pollution' and/or any recent ferrous disturbance.

3.2.1.6 On completion of each day's site operations, the survey results will be processed and reviewed.

3.2.1.7 A record will be maintained of surface conditions and of possible sources of modern geophysical interference that may have a bearing on subsequent interpretation of field data. The surveyors on site will have access to and will have read all relevant previous archaeological desk-based reporting to ensure an informed data review and interpretation of the results.

3.2.1.8 The interpretation of the survey data will be undertaken by an experienced archaeological geophysicist. The specialist will also be knowledgeable of the prevailing conditions across the large survey area that could affect the interpretation of the results.

3.2.1.9 Any areas where it is unsafe to work will be excluded from the survey. If any problems are encountered during the priority archaeological geophysical survey these will be reported immediately to the Applicant's Site and Land Rights Team and the Archaeological Coordinator.

3.2.2 Geophysical Survey Areas

3.2.2.1 The Humber HER data was assessed with a view to identifying areas along the Hornsea Four onshore project area in which buried archaeological remains have been previously recorded (i.e. from aerial photographs, historic mapping, documentary evidence and/or the national

mapping programme) and which may still be present, and therefore require further non-intrusive investigation. Records for assets near or adjacent to the Hornsea Four onshore ECC have also been considered and the nearest section of the onshore ECC has been included in the Priority Archaeological Geophysical Survey. This is due to the potential for the archaeological remains to extend into the proposed footprint of the Hornsea Four onshore ECC.

3.2.2.2 In November 2018 and February 2019, historic environment walkover surveys were undertaken which included condition surveys of HER assets which had the potential for surviving earthworks or the opportunity to observe any cropmarks. The condition surveys also informed the Priority Archaeological Geophysical Survey by confirming which areas were suitable for further survey i.e. arable or pasture fields.

3.2.2.3 The total area identified as requiring/benefitting from Priority Archaeological Geophysical Survey equates to approximately 345 hectares (ha). These areas are based on a 120m wide study area around the proposed onshore ECC and the full extent of the proposed onshore substation site and landfall area options.

3.2.2.4 Data collected from the Priority Archaeological Geophysical Survey within the Hornsea Four onshore project area boundary will ultimately directly inform the necessity for archaeological trial trenching, and the subsequent survey-specific WSI for trial trenching and proposed locations. Trial trenching is, however, proposed to be undertaken post-consent when, for example, land access rights are more strongly in favour of required intrusive project surveys being granted access.

3.2.2.5 The sections of the onshore elements of Hornsea Four which require priority geophysical survey coverage are set out **Table 1** and presented on **Figures 1-7** in **Annex A**.

Table 1: Priority Archaeological Geophysical Survey Areas (*from landfall westwards*).

RHDHV Ref. No.	Associated Humber HER Ref.	Brief HER Description	Area (ha)
TBC (within landfall search area)	MHU 21075, 21076, 21077, 21078, 21080, 21086	Prehistoric cropmarks & findspots	Circa 92 as a minimum
	MHU 327, 331, 21055, 21056,	Prehistoric cropmarks & findspots	
	MHU 10044, 21065, 21069, 21070,	Prehistoric cropmarks & findspots	
	MHU 365	Winkton DMV	
	MHU 11147, 13470, 21798	Iron Age linear features, World War 2 airfield	
3a	MHU 22121	Iron Age/ Romano-British Rectilinear enclosures	7
30	MHU 8806, 22158	Iron Age Enclosure, medieval moat	6
3b	MHU 22239	Iron Age/ Romano-British Rectilinear enclosures	8
31	MHU 22239, 22148	Iron Age Enclosures (associated with site 3)	2
3c	MHU 22148	Iron Age/ Romano-British Rectilinear enclosures	7
32	MHU 8161	Iron Age to Roman features to west	9
33	MHU 2252, 4550, 19369	Prehistoric Cropmarks (barrows)	12
34	MHU 8109	Undated Enclosure (cropmark)	5.5
35	MHU 9878, 18079	Undated cropmark & prehistoric finds	9
36	MHU 10371	Undated field boundary	3
37	MHU 19432	Possible enclosures	9
38	MHU 123107	Old Sand Pit	5
39	MHU 2979, 12875	Ditches, ring ditch, well	7
40	MHU 19425	Square Barrow	6
41	MHU 22336	Bronze Age Barrows nearby, Medieval cropmarks, potential for further features	8
42	MHU 3147	Round Barrow	2.5
43	MHU 2802, 12780, 12882	Iron Age Occupation site, medieval windmill	10
44	MHU 12884, 1519, 6590	Bronze Age barrow, Iron Age Square Barrow, Undated building	7

RHDHV Ref. No.	Associated Humber HER Ref.	Brief HER Description	Area (ha)
45	MHU 22017	Field adjacent to medieval manor and cropmarks	11
46	MHU 12725	Medieval windmill	9
47	MHU 14919	Gravel pit, adjacent to medieval cropmarks	10
13	MHU 3350	Ravensthorpe DMV	2
48	MHU 3346	Oval enclosure	5
49	MHU 19099	Undated cropmarks	7
16	MHU 22297	Iron Age to Romano-British enclosure	9
50	MHU 13179	'Old enclosure bank', earthwork	18
51	MHU 12974	Milestone marker	8.5
52	MHU 12981	Chalk pit	13
53	MHU 9751, 12378	Post-medieval barn and findspots	2.5
TBC (within OnSS search area)	MHU 1381, 6559	Polygonal Enclosure & Barrow	Circa 35 as a minimum
Total			**345**

3.3 Reporting

3.3.1.1 Verbal progress reports and brief written weekly progress reports will be provided to the Archaeological Coordinator during the survey, and at any stage upon request.

3.3.1.2 Raw greyscale imagery and ultimately draft interim plots (greyscales and interpretations), including brief summaries of results (as they become available) will be submitted to the Archaeological Coordinator, on a regular basis. The Archaeological Coordinator will issue these to the Applicant.

3.3.1.3 Weekly updates and results of a significant nature will be communicated to HAP via the Archaeological Coordinator.

3.3.1.4 The formal draft report on the geophysical survey will be submitted to the Archaeological Coordinator for review within four working weeks of the completion of survey. The report will consist of a fully illustrated text containing the following information:

- Site code/project number; dates for fieldwork visits, grid references;
- A non-technical summary of the reason, aims and main results of the survey;
- An introduction to outline the circumstances leading to the commission of the project and any restrictions encountered;
- Aims and objectives;
- Site location and description;

- Geology, soils and land use;
- Planning background;
- Archaeological and historical background;
- The methodology used;
- Survey location information and overall plan of the route showing surveyed areas, accurately located to the national grid;
- Detailed survey results of individual fields (plots) and interpretation;
- Plans showing detailed and summary interpretation of results, including both processed and unprocessed data (at appropriate scales). Figures will also include cross reference to and correlation with relevant HER data, where appropriate. The summary and synthesis of the archaeological results in relation to the methods used shall be supported by survey location plans and plots of minimally processed (X-Y traceplot) and fully processed (greyscale) data at a minimum scale of 1:2500 with larger scale (1:1000) plots of all areas of archaeological significance. Each plan/plot will have a scale bar and accurately oriented north arrow;
- A consideration of the significance of the remains found, in local, regional, national and international terms, using recognised evaluation criteria; and
- A review of the effectiveness of the methodology, within different areas, locations and 'landscapes' (i.e. differing geology and topography).

3.3.1.5 Following relevant internal review by the Archaeological Coordinator and the Applicant, a copy of the report will be issued to HAP for external review.

3.3.1.6 In addition to including a copy of the geophysical survey results and reporting (as available at the time) within the DCO application submission documents, copies of the final geophysical survey report will be supplied separately to the Humber HER in PDF/A format upon the completion of the survey, and following relevant internal reviews and sign off by the Applicant, as well as external reviews by HAP.

3.3.1.7 At the start of work (immediately before fieldwork commences) an Online Access to the Index of archaeological investigations (OASIS) record (http://ads.ahds.ac.uk/project/oasis/) must be initiated by the Archaeological Contractor and main areas completed on details, location and creators forms. All parts of the OASIS online form must be completed for submission to the Humber HER. This should include an uploaded .pdf version of the entire report (a paper copy should also be included with the archive).

3.4 Archive Preparation and Deposition

3.4.1.1 The archiving of data associated with the Priority Archaeological Geophysical Survey will follow the advice provided in the Archaeological Data Service (ADS) *Guide to Good Practice: Geophysical Data in Archaeology* (Schmidt & Ernenwein, 2011).

3.4.1.2 The archive will consist of the final geophysical survey report within which the raw and processed digital data records generated during the fieldwork will be presented. This should

include a georeferenced .dxf or MapInfo .tab file copy of the interpretation of the results for the HERs.

3.4.1.3 The site archive will be deposited with the East Riding of Yorkshire Museum Service within six months of the completion of all archaeological fieldwork, including reporting, associated with Hornsea Four. It will then become publicly accessible. A museum accession number will be obtained by the Archaeological Contractor from the Museum Service before works commence.

3.4.1.4 The Archaeological Contractor will be responsible for identifying any specific requirements or policies of the museum/records office in respect of the archive, and for adhering to those requirements. The archive will conform to the standards required by the national guidelines in *Archaeological Archives: A guide to best practice in creation, compilation, transfer and curation* (AAF, 2007) and *Standard and guidance for the creation, compilation, transfer and deposition of archaeological archives* (CIfA, 2014c).

3.4.1.5 Prior to the commencement of work the Archaeological Contractor will contact the Humber HER regarding the acquisition of an event number(s). Event numbers are likely to be issued on a project wide basis, but this will be confirmed with the HER personnel prior to starting the priority archaeological geophysical survey.

3.4.1.6 The deposition of the archive forms the final stage of the project. The Archaeological Contractor shall provide the Archaeological Coordinator with copies of all communication with the recipient museum/records office and written confirmation of the receipt/deposition of the archive.

3.4.1.7 The Archaeological Contractor will liaise with the Archaeological Coordinator and the Applicant to address the transfer of ownership and any copyright issues.

4 Monitoring, Progress Reporting, Site Visits

4.1.1.1 The Archaeological Coordinator will monitor the survey fieldwork progress on behalf of the Applicant.

4.1.1.2 A minimum of one week's notice will be given to HAP in advance of the survey works commencing.

4.1.1.3 The Archaeological Contractor will only accept direct instruction from the Archaeological Coordinator.

4.1.1.4 If any problems are encountered during the survey these will be reported to the Archaeological Coordinator.

4.1.1.5 Any variations to the survey area caused by ecological constraints, vegetation cover or ground conditions will be agreed with and approved by the Archaeological Coordinator in communication with the Applicant, and communicated to HAP.

5 Confidentiality and Publicity

5.1.1.1 Although some information regarding Hornsea Four is in the public domain, the archaeological works may attract interest.

5.1.1.2 In the event of any enquiries by the public, the Archaeological Contractor will refer all enquiries to the Archaeological Coordinator and ultimately the Applicant without making any unauthorised statements or comments.

5.1.1.3 The Archaeological Contractor will not disseminate information or images associated with the project for publicity or information purposes, without the permission of the Applicant.

6 Copyright

6.1.1.1 The Archaeological Contractor shall assign copyright in all reports and documentation/images produced as part of this project to the Applicant. The Archaeological Contractor shall retain the right to be identified as the author/originator of the material.

6.1.1.2 The Archaeological Contractor may apply in writing to use/disseminate any of the project archive or documentation (including images), and any such permission will not be unreasonably withheld.

7 Resources and Timetable

7.1.1.1 All archaeological personnel involved in the project should be suitably qualified and experienced professionals. The Archaeological Contractor shall provide the Archaeological

Coordinator with staff CVs of the Project Manager and Project Geophysicist(s). These will also be provided to HAP upon request.

7.1.1.2 It is currently anticipated that the Priority Archaeological Geophysical Survey work will commence from late early March 2019.

7.1.1.3 All equipment required by the Archaeological Contractor will be supplied by the Archaeological Contractor.

7.1.1.4 The Archaeological Contractor shall give immediate warning to the Archaeological Coordinator should any agreed programme date not be achievable, due to for example unforeseen access issues, and early warning must be given to the Archaeological Coordinator on any costing and/or budget concerns.

8 Health and Safety

8.1.1.1 The Archaeological Contractor will adhere to any risk assessments and project specific health and safety plan prepared by the Applicant. They will also prepare their own project specific Method Statement Risk Assessment (RAMS) documentation for review by the Archaeological Coordinator and the Applicant prior to commencement.

8.1.1.2 The Archaeological Contractor will provide the Archaeological Coordinator with details of their public and professional indemnity insurance and all other insurances required by law.

8.1.1.3 The Archaeological Contractor will have their own Health and Safety policies compiled using national guidelines, which conform to all relevant Health and Safety legislation. A copy of the Archaeological Contractors Health and Safety policy will be submitted to the Archaeological Coordinator.

8.1.1.4 The Archaeological Contractor shall not access the plots unless authorised to do so by the Applicant's Site and Land Rights Team.

8.1.1.5 As a minimum, the following Personal Protective Equipment (PPE) will be worn at all times on site:

- High visibility vest / jacket;
- Hard hat (to be available and worn, as appropriate);
- Non-metallic boots with ankle support, or wellington boots at the Archaeological Contractors survey personnel's own risk;
- Light eye protection and gloves should be available and used wherever necessary; and
- Due to surveying restrictions and to maintain the effectiveness of the instrumentation no metal is to be present on the survey team during survey.

8.1.1.6 In undertaking the work, the archaeologists are to abide by all statutory provisions and by-laws relating to the work in question, especially the Health and Safety at Work Act 1974.

8.1.1.7 No lone working will be permitted at any time.

9 General Provisions

9.1.1.1 The Archaeological Contractor shall leave all work sites and areas accessed for survey in a tidy and workmanlike condition. The sub-contractor shall remove any material brought onto site, including grid pegs and other markers.

9.1.1.2 Access for parking shall be agreed between the Applicant's Site and Land Rights Team and the Archaeological Contractor prior to commencing the survey.

10 References

AAF, 2007, *Archaeological Archives: A guide to best practice in creation, compilation, transfer and curation*, Archaeological Archives Forum

Chartered Institute for Archaeologists, 2014a, *Standard and guidance for archaeological geophysical survey*, CIfA, Reading.

Chartered Institute for Archaeologists, 2014b, *Standard and guidance for the collection, documentation, conservation and research of archaeological materials*, CIfA, Reading.

Chartered Institute for Archaeologists, 2014c, *Standard and guidance for the creation, compilation, transfer and deposition of archaeological archives*, CIfA, Reading.

English Heritage, 2008, *Geophysical Survey in Archaeological Field Evaluation*, English Heritage: Reference 51430.

Ørsted, 2018, *Hornsea 4, Environmental Impact Assessment: Scoping Report*. Report Ref. EN010098-000021- EN010098.

Schmidt & Ernenwein, 2011, *Guide to Good Practice: Geophysical Data in Archaeology*. Archaeological Data Service (ADS).

Annex A: Geophysical Survey Locations - Figures 1 to 7

Hornsea Project Four

Location of Priority Archaeological Geophysical Survey Areas

Page 1 of 7

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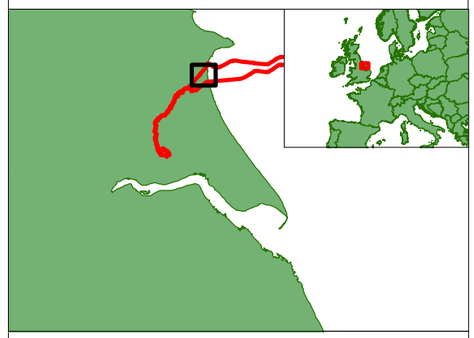
PEIR Interim Boundary

Geophysical Survey Areas



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Location of Priority Archaeological Geophysical Survey Areas
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Checked by: SM
Approved by: SM

Ørsted

Date: 05-Mar-19 Author: 303011 Name: PriorityArchGeophysSurveyWSI_20190305

Hornsea Project Four

Location of Priority Archaeological Geophysical Survey Areas

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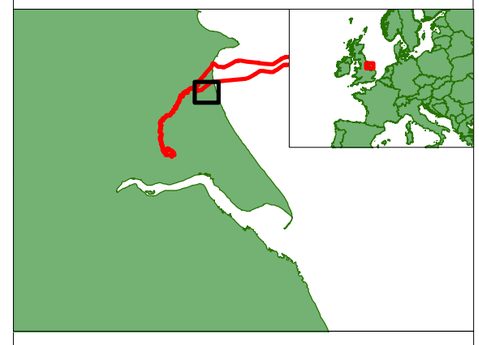
PEIR Interim Boundary

Geophysical Survey Areas



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Date: 05-Mar-19 Author: 303011 Name: PriorityArchGeophysSurveyWSI_20190305

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Location of Priority Archaeological Geophysical Survey Areas

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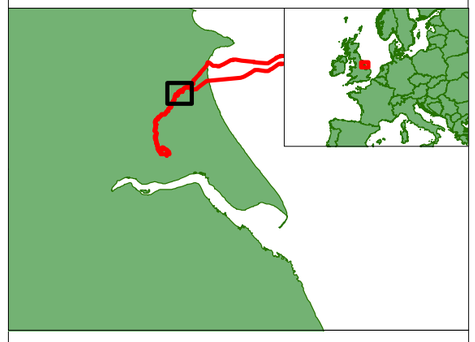
PEIR Interim Boundary

Geophysical Survey Areas



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Location of Priority Archaeological Geophysical Survey Areas

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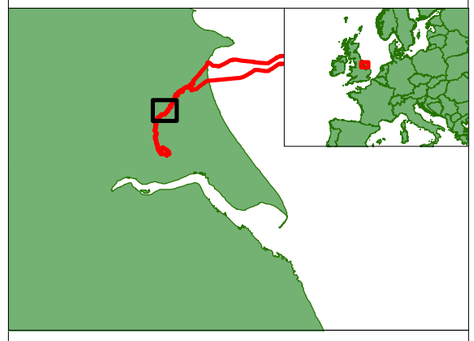
PEIR Interim Boundary

Geophysical Survey Areas



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Hornsea Project Four

Location of Priority Archaeological Geophysical Survey Areas

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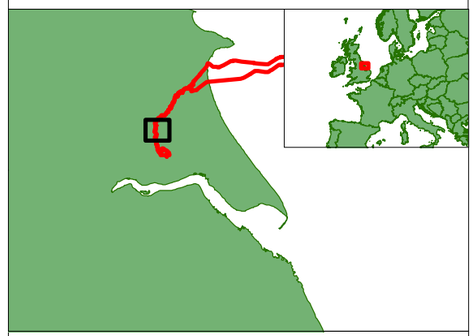
PEIR Interim Boundary

Geophysical Survey Areas



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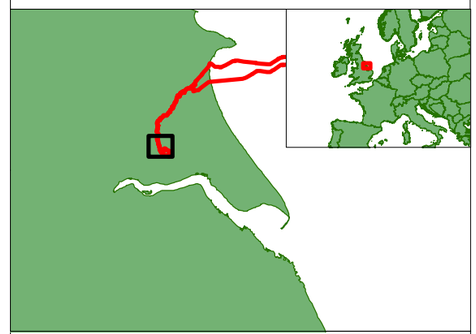
Location of Priority Archaeological Geophysical Survey Areas

PEIR Interim Boundary

Geophysical Survey Areas



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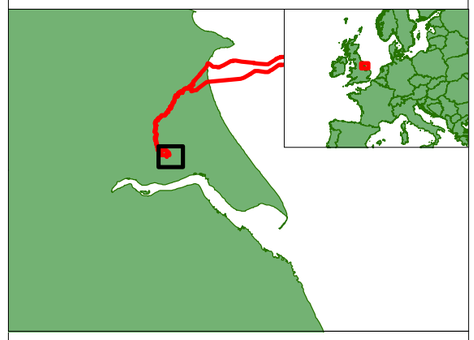
Location of Priority Archaeological Geophysical Survey Areas

PEIR Interim Boundary

Geophysical Survey Areas



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