Hornsea Project Four: Environmental Statement (ES)

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Glossary

Term	Definition
Code of Construction Practice (CoCP)	A document detailing the overarching principles of construction, contractor protocols, construction-related environmental management measures, pollution prevention measures, the selection of appropriate construction techniques and monitoring processes.
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 Environmental Statement (ES)). Secondary commitments are incorporated to reduce LSE to environmentally acceptable levels following initial assessment i.e. so that residual effects are acceptable.
Cumulative effects	The combined effect of Hornsea Four in combination with the effects from a number of different projects, on the same single receptor/resource. Cumulative impacts are those that result from changes caused by other past, present or reasonably foreseeable actions together with Hornsea Project Four.
Design Envelope	A description of the range of possible elements that make up the Hornsea Project Four design options under consideration, as set out in detail in the project description. This envelope is used to define Hornsea Project Four for Environmental Impact Assessment (EIA) purposes when the exact engineering parameters are not yet known. This is also often referred to as the "Rochdale Envelope" approach.
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.
EIA Directive	European Union Directive 85/337/EEC, as amended by Directives 97/11/EC, 2003/35/EC and 2009/31/EC and then codified by Directive 2011/92/EU of 13 December 2011 (as amended in 2014 by Directive 2014/52/EU).
EIA Regulations	Infrastructure Planning (Environmental Impact Assessment) Regulations 2017.
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 Impact Assessment (EIA)	A statutory process by which certain planned projects must be assessed before a formal decision to proceed can be made. It involves the collection and consideration of environmental information, which fulfils the assessment requirements of the EIA Directive and EIA Regulations, including the publication of an Environmental Statement (ES).
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.

Term	Definition
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.
Haul Road	The track along the onshore ECC which the construction traffic would use to access work fronts.
High Voltage Alternating Current (HVAC)	High voltage alternating current is the bulk transmission of electricity by alternating current (AC), whereby the flow of electric charge periodically reverses direction.
High Voltage Direct Current (HVDC)	High voltage direct current is the bulk transmission of electricity by direct current (DC), whereby the flow of electric charge is in one direction.
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 connection to the electricity transmission network. Hereafter referred to as Hornsea Four.
Key Heritage Asset	These are heritage assets identified through the baseline data collation which are considered sensitive to an impact arising from the construction, operation and maintenance or decommissioning of 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.
Locally listed building	These are buildings which are considered of local heritage significance, but do not meet the criteria for being nationally listed. They are taken account of during any planning process.
Maximum Design Scenario (MDS)	The maximum design parameters of each Hornsea Four asset (both on and offshore) considered to be a worst case for any given assessment.
Mitigation	A term used interchangeably with Commitment(s) by the Applicant. Mitigation measures (Commitments) are embedded within the assessment at the relevant point in the EIA (e.g. at Scoping, PEIR or ES).
National Grid Electricity Transmission (NGET) substation	The grid connection location for Hornsea Four at Creyke Beck.
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 Ltd.	The Applicant for the proposed Hornsea Project Four Offshore Wind Farm Development Consent Order (DCO).
Planning Inspectorate (PINS)	The agency responsible for operating the planning process for Nationally Significant Infrastructure Projects (NSIPs).
Trenchless Techniques	Also referred to as trenchless crossing techniques or trenchless methods. These techniques include Horizontal Directional Drilling (HDD), thrust boring, auger boring,

Term	Definition
	and pipe ramming, which allow ducts to be installed under an obstruction without breaking open the ground and digging a trench.

Acronyms

Acronym	Definition
BGS	British Geological Survey
CITiZAN	Coastal and Intertidal Zone Archaeological Network
CoCP	Code of Construction Practice
DBA	Desk-Based Assessment
DCO	Development Consent Order
EBI	Energy balancing infrastructure
ECC	Export Cable Corridor
EIA	Environmental Impact Assessment
ERYC	East Riding of Yorkshire Council
ES	Environmental Statement
HAP	Humber Archaeological Partnership
HHER	Humber Historic Environment Record
HLC	Historic Landscape Characterisation
HVAC	High Voltage Alternating Current
HVDC	High Voltage Direct Current
MDS	Maximum Design Scenario
MHWS	Mean High Water Springs
MLWS	Mean Low Water Springs
NE	Natural England
NHLE	National Heritage List for England
NGET	National Grid Electricity Transmission
NMP	National Mapping Programme
NPS	National Policy Statement
NSIP	Nationally Significant Infrastructure Project
OnSS	Onshore Substation
PEIR	Preliminary Environmental Information Report
PINS	Planning Inspectorate
SoCC	Statement of Community Consultation
TJB	Transition Joint Bay
WSI	Written Scheme of Investigation
ZoI	Zone of Influence
ZTV	Zone of Theoretical Visibility

Units

Unit	Definition
kV	Kilovolt
km	kilometre
m	metre

5.1 Introduction

5.1.1.1 Orsted Hornsea Project Four Limited (the 'Applicant') is proposing to develop Hornsea Four Offshore Wind Farm (hereafter 'Hornsea Four'). Hornsea Four will be located approximately 69 km from 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.

5.1.1.2 This chapter of the Environmental Statement (ES) presents the results of the Environmental Impact Assessment (EIA) for the potential impacts of Hornsea Four on the historic environment. Specifically, this chapter considers the potential impact of Hornsea Four landward of Mean Low Water Springs (MLWS) during its construction, operation and maintenance, and decommissioning phases. **Volume A2, Chapter 9: Marine Archaeology** presents the potential impacts on the offshore heritage resource seaward of Mean High Water Springs (MHWS).

5.1.1.3 This chapter summarises information contained within **Volume A6, Annex 5.1: Historic Environment Desk Based Assessment** (DBA) and further baseline data from an Aerial Photographic and Lidar Assessment, results of a Priority Archaeological Geophysical Survey and a Geoarchaeological DBA (**Volume A6, Annex 5.2: Aerial Photographic and Lidar Assessment Technical Report**, **Volume A6, Annex 5.3: Priority Archaeological Geophysical Survey** and **Volume A6, Annex 5.4: Geoarchaeological Desk Based Assessment**).

5.2 Purpose

5.2.1.1 The primary purpose of the ES is to support the Development Consent Order (DCO) application for Hornsea Four under the Planning Act 2008 (the 2008 Act). This ES constitutes the environmental information for Hornsea Four and sets out the findings of the EIA.

5.2.1.2 The ES has been finalised following completion of pre-application consultation (see **Volume B1, Chapter 1: Consultation Report** and **Table 5.3: Consultation Responses**.) and the Environmental Statement will accompany the application to the Planning Inspectorate (PINS) for Development Consent.

5.2.1.3 This ES chapter:

- Presents the existing historic environment baseline established from desk studies and non-intrusive field surveys undertaken to date, and consultation;
- Presents commitments identified for Hornsea Four which avoid or minimise harm to the historic environment;

- Presents the potential impacts and effects on the historic environment arising from the onshore elements of Hornsea Four, based on the information gathered and the analysis and assessments undertaken;
- Identifies any assumptions and limitations encountered in compiling the historic environment baseline information; and
- Highlights any necessary evaluation, monitoring and/or mitigation measures which could prevent, minimise, reduce or offset the possible impacts and effects identified in the EIA process.

5.3 Planning and Policy Context

5.3.1.1 Planning policy on offshore renewable energy Nationally Significant Infrastructure Projects (NSIPs), specifically in relation to the historic environment, is contained in the Overarching National Policy Statement (NPS) for Energy (EN-1; DECC, 2011a), the NPS for Renewable Energy Infrastructure (EN-3, DECC, 2011b) and the NPS for Electricity Networks Infrastructure (EN-5, DECC, 2011c).

5.3.1.2 The Infrastructure Planning (Decisions) Regulations 2010 (Regulation 3) also states the Secretary of State (SoS) is to hold regard to the desirability of preserving a Listed Building, Conversation Area or Scheduled Monument, its setting, or any features of special architectural or historic interest, and also for preserving or enhancing the character of the asset.

5.3.1.3 The National Planning Policy Framework (NPPF) (Ministry of Housing, Communities & Local Government, updated 2019) forms the basis for the Government's planning policy direction. It gives protection to designated and non-designated heritage assets. Provision for the historic environment is detailed within Section 16: Conserving and Enhancing the Historic Environment.

5.3.1.4 The East Riding Local Plan (East Riding of Yorkshire Council ((ERYC) 2016) details the direction that ERYC wish to take in their planning decisions, up to 2029. Section 8, Policy ENV3 of the local plan describes how local planning decisions will consider the historic environment and protect, preserve and enhance it.

5.3.1.5 Full details of legislation, policy and guidance (inclusive of local policy) relevant to the historic environment is included in **Volume A6, Annex 5.1: Historic Environment Desk-Based Assessment**.

5.3.1.6 NPS EN-1 and NPS EN-3 include guidance on what matters are to be considered in the assessment. These are summarised in **Table 5.1**.

Table 5.1: Summary of NPS EN-1, EN-3 and EN-5 provisions relevant to the historic environment.

Summary of NPS EN-1, NPS EN-3 and NPS EN-5 provisions	How and where considered in the ES
"*As part of the ES the applicant should provide a description of the significance of the heritage assets affected by the proposed development and the contribution of their setting to that significance. The level of detail should be proportionate to the importance of the heritage assets and no more than is sufficient to understand the potential impact of the proposal on the significance of the heritage asset*" (EN-1, paragraph 5.8.8).	A description of the significance of the heritage assets affected by the development and a detailed heritage settings assessment has been undertaken, detailed in **Volume A6, Annex 5.1: Historic Environment Desk Based Assessment**. This assessment identifies heritage assets where there is potential for their heritage significance to be harmed through alteration to their setting as a result of Hornsea Four and includes statements summarising the heritage significance of the affected heritage assets, focussing on the contribution made by their setting. This assessment is proportionate and follows Historic England's staged approach to setting assessment. .
"*As a minimum the applicant should have consulted the relevant Historic Environment Record (or, where the development is in English or Welsh waters, English Heritage or Cadw) and assessed the heritage assets themselves using expertise where necessary according to the proposed development's impact*" (EN-1, paragraph 5.8.6).	A search of the Humber Historic Environment Record (HHER) has been undertaken, the data of which forms part of the baseline data consulted for this assessment. All HHER data is included in gazetteers in **Volume A6, Annex 5.1: Historic Environment Desk Based Assessment**. This data set has been used to inform the impact assessment, undertaken by Historic Environment experts.
"*Where a development site includes, or the available evidence suggests it has the potential to include, heritage assets with an archaeological interest, the applicant should carry out appropriate desk-based assessment and, where such desk-based research is insufficient to properly assess the interest, a field evaluation.* *Where proposed development will affect the setting of a heritage asset, representative visualisations may be necessary to explain the impact*". (EN-1, paragraph 5.8.9).	**Volume A6, Annex 5.1: Historic Environment Desk Based Assessment** informs this ES chapter and included a walkover survey to confirm the location of known heritage assets and to examine other features of possible archaeological interest (e.g. those identified as surviving earthworks in existing data). The DBA also includes a setting assessment which has been progressed using the latest landscape and visual impact assessment tools-kits (the ES stage Zones of Theoretical Visibility (ZTV) and visualisations). The DBA both informs and is summarised within **Section 5.7**, as relevant. In addition, a Priority Archaeological Geophysical Survey was undertaken to gather information to establish the presence / absence, character and extent of any archaeological remains within the landfall, onshore ECC and OnSS, to inform this chapter (**Section 5.7.7**) and identify any, as yet, unknown heritage assets with archaeological interest. Similarly, an Aerial Photographic and Lidar Assessment (**Volume A6: Annex 5.2: Aerial Photographic and Lidar Assessment Technical Report**) and a Geoarchaeological DBA (**Volume A6: Annex 5.4: Geoarchaeological Desk Based Assessment**) were undertaken to identify any unrecorded non-designated heritage assets and

Summary of NPS EN-1, NPS EN-3 and NPS EN-5 provisions	How and where considered in the ES
	attempt to add further detail to recorded non-designated assets within the study areas.
"*The applicant should ensure that the extent of the impact of the proposed development on the significance of any heritage assets affected can be adequately understood from the application and supporting documents.*" (EN-1, paragraph 5.8.10).	This ES chapter provides a summary of the potential impact of the proposed Hornsea Four project upon heritage assets and their significance (**Section 5.11**). Further details can be found in **Volume A4, Annex 5.1: Impact Register**. This ES chapter has been informed by a Historic Environment DBA (see **Volume A6: Annex 5.1: Historic Environment Desk Based Assessment**). This ES chapter is also supported by an Aerial Photographic and Lidar Assessment (**Volume A6, Annex 5.2: Aerial Photographic and Lidar Assessment Technical Report**), a Priority Archaeological Geophysical Survey (**Volume A6, Annex 5.3: Priority Archaeological Geophysical Survey**) and a Geoarchaeological DBA (**Volume A6, Annex 5.4: Geoarchaeological Desk Based Assessment**), walkover survey results and setting assessment (see **Volume A6, Annex 5.1: Historic Environment Desk Based Assessment**).
"*Consultation with the relevant statutory consultees should be undertaken by the applicants at an early stage of the development.*" (EN-3, paragraph 2.6.140).	Regular consultation has been undertaken with the Historic Environment consultees through the Technical Panel meetings as part of the Evidence Plan Process (See **Section 5.4** and **Volume B1, Chapter 1: Consultation Report**).
"*Assessment should be undertaken as set out in Section 5.8 of EN-1. Desk-based studies should take into account any geotechnical or geophysical surveys that have been undertaken to aid the wind farm design.*" (EN-3, paragraph 2.6.141).	The assessment for this ES chapter has been undertaken in accordance with section 5.8 of EN-1. It has been informed by a Historic Environment DBA (**Volume A6, Annex 5.1: Historic Environment Desk Based Assessment**) and results of an Aerial Photographic and Lidar Assessment (**Volume A6, Annex 5.2: Aerial Photographic and Lidar Assessment Technical Report**). A Geoarchaeological DBA has also been undertaken (**Volume A6, Annex 5.4: Geoarchaeological Desk Based Assessment**), which has informed the baseline data for this chapter. Results of a Priority Archaeological Geophysical Survey (**Volume A6, Annex 5.3: Priority Archaeological Geophysical Survey**) have also fed into this ES. The results of the desk-based and non-intrusive surveys referenced above have been used to inform the onshore route refinement process for Hornsea Four (**Volume A1, Chapter 3: Site Selection and Consideration of Alternatives**).
"*Developers will be influenced by Schedule 9 to the Electricity Act 1989, which places a duty on all generation, supply, transmission and distribution licence holders, in formulating proposals for new electricity networks infrastructure, to have regard to the desirability of protecting sites, buildings and objects of architectural, historic or archaeological interest*" (EN-5, paragraph 2.2.6).	Designated heritage assets have been considered (and, with the exception of one asset, have been avoided, Co2) as part of the route planning and site selection process, outlined in **Volume A1, Chapter 3: Site Selection and Consideration of Alternatives**. Where avoidance of designated heritage assets is not possible, these are fully assessed in **Section 5.11**.

5.3.1.7 NPS EN-1 also highlights several factors relating to the determination of an application and in relation to mitigation measures. These are summarised in **Table 5.2**.

Table 5.2: Summary of NPS EN-1 policy on decision making relevant to the historic environment.

Summary of NPS EN-1 provisions	How and where considered in the ES
"In considering the impact of a proposed development on any heritage assets, the IPC [hereafter referred to as SoS] *should take into account the particular nature of the significance of the heritage assets and the value that they hold for this and future generations. This understanding should be used to avoid or minimise conflict between conservation of that significance and proposals for development."* (EN-1, paragraph 5.8.12).	Heritage importance (and associated significance) is identified in line with the methodology set out in **Section 5.10** based on available data. With regards to potential below ground remains (buried archaeology), this data is predominantly non-intrusive in nature and as such, heritage importance (and associated significance) is based on professional judgement and experience, rather than any fully substantiated and established levels of heritage significance, often achieved as part of intrusive ground truthing for instance. On this basis, a precautionary approach to impact assessment has been undertaken whereby heritage assets of an uncertain level of significance have been assigned the highest likely level of importance as a worst-case.
"The SoS should take into account the desirability of sustaining and, where appropriate, enhancing the significance of heritage assets, the contribution of their settings and the positive contribution they can make to sustainable communities and economic vitality. The SoS should take into account the desirability of new development making a positive contribution to the character and local distinctiveness of the historic environment. The consideration of design should include scale, height, massing, alignment, materials and use. The SoS should have regard to any relevant local authority development plans or local impact report on the proposed development in respect of the factors set out (below): • *heritage assets having an influence on the character of the environment and an area's sense of place;* • *heritage assets having a potential to be a catalyst for regeneration in an area, particularly through leisure, tourism and economic development;* • *heritage assets being a stimulus to inspire new development of imaginative and high quality design;* • *the re-use of existing fabric, minimising waste; and* • *the mixed and flexible patterns of land use in historic areas that are likely to be, and remain, sustainable."* (EN-1, paragraph 5.8.13).	In order to assess the positive contributions of the Hornsea Four in the context of the historic environment, the magnitude of positive impact has also been subject to consideration in this ES chapter. The magnitude of positive impact directly relates to the level of public value (e.g. where opportunities exist for the project to enhance the historic environment and / or public understanding by adding to the archaeological record for example). This is discussed further and assessed in **Section 5.11**. Further details of enhancing the public's awareness of the local historic environment are presented in **Volume F2, Chapter 14: Outline Enhancement Strategy**. Opportunities to minimise harm to the historic environment (e.g. by means of route refinement / micro-siting which seek to avoid heritage assets) have been considered and developed as the Hornsea Four project progressed, with feedback from community and stakeholder consultation taken on-board where appropriate. Further details can be found in **Volume A1, Chapter 3: Site Selection and Consideration of Alternatives**, **Volume A3, Annex 3.1: Selection and Refinement of the Cable Landfall and Volume A3, Annex 3.3: Selection and Refinement of the Onshore Infrastructure**.

Summary of NPS EN-1 provisions	How and where considered in the ES
"*There should be a presumption in favour of the conservation of designated heritage assets and the more significant the designated heritage asset, the greater the presumption in favour of its conservation should be. Once lost, heritage assets cannot be replaced, and their loss has a cultural, environmental, economic and social impact. Significance can be harmed or lost through alteration or destruction of the heritage asset or development within its setting. Loss affecting any designated heritage asset should require clear and convincing justification. Substantial harm to or loss of a grade II listed building, park or garden should be exceptional. Substantial harm to or loss of designated assets of the highest significance, including Scheduled Monuments; registered battlefields; grade I and II* listed buildings; grade I and II* registered parks and gardens; and World Heritage Sites, should be wholly exceptional.*" (EN-1, paragraph 5.8.14).	Following the route refinement process (as set out in **Volume A1, Chapter 3: Site Selection and Consideration of Alternatives**), the onshore development area avoids designated heritage assets (e.g. listed buildings / scheduled monuments) (Co2) with the exception of one Scheduled Monument, and as such, direct physical impacts to designated heritage assets are assessed in **Section 5.11**. Indirect (non-physical) impacts resulting in change in the setting of heritage assets, including designated and key non-designated assets, are assessed in **Volume A6: Annex 5.1: Historic Environment DBA**. The heritage setting assessment has been updated between the Preliminary Environmental Information Report (PEIR) and ES to include further consideration of the OnSS design and review of heritage assets considered for impacts, following updates to the Order Limits. Results indicate that impacts upon heritage significance due to change in the setting of heritage assets, from the presence and operation of Hornsea Four, are within the realms of 'less than substantial harm' as a maximum and more commonly result in no material harm to heritage significance.
"*Any harmful impact on the significance of a designated heritage asset should be weighed against the public benefit of development, recognising that the greater the harm to the significance of the heritage asset the greater the justification will be needed for any loss. Where the application will lead to substantial harm to or total loss of significance of a designated heritage asset the SoS should refuse consent unless it can be demonstrated that the substantial harm to or loss of significance is necessary in order to deliver substantial public benefits that outweigh that loss or harm.*" (EN-1, paragraph 5.8.15).	Hornsea Four will avoid all but one designated heritage asset (Co2). This is assessed in **Section 5.11**.
"*Not all elements of a World Heritage Site or Conservation Area will necessarily contribute to its significance. The policies set out in paragraphs 5.8.11 to 5.8.15 (see above) apply to those elements that do contribute to the significance. When considering proposals, the decisionmaker should take into account the relative significance of the element affected and its contribution to the significance of the World Heritage Site or Conservation Area as a whole*" (EN-1, paragraph 5.8.16)	The significance of Conservation Areas and those elements of a Conservation Area which contribute to its character and significance has been considered as part of the setting assessment and used to inform the assessment of how their significance may be affected. This is presented in **Volume A6, Annex 5.1: Historic Environment DBA**.
"*Where loss of significance of any heritage asset is justified on the merits of the new development, the SoS should consider imposing a condition on the consent or requiring*	This ES chapter has concluded, based on the assessments and Order Limits location, that following mitigation Hornsea Four will not result in the loss of significance of

Summary of NPS EN-1 provisions	How and where considered in the ES
the applicant to enter into an obligation that will prevent the loss occurring until it is reasonably certain that the relevant part of the development is to proceed." (EN-1, paragraph 5.8.17).	any designated heritage assets identified in this chapter or its appendices (**Section 5.7**) and are within the realms of 'less than substantial harm'. This conclusion has been based on the results of desk-based assessment, and further supported by heritage-specific site visits and the incorporation and use of landscape and visual impact assessment tool-kits (e.g. ZTV and photomontages as set out in **Volume A6, Annex 4.1: Landscape and Visual Resources: Photography and Photomontages**), to inform the heritage setting assessment. The significance of non-designated heritage assets has to date been established through the Historic Environment DBA (**Volume A6, Annex 5.1: Historic Environment Desk Based Assessment** – including walkover survey results and heritage setting assessment), the results of an Aerial Photographic and Lidar Assessment (**Volume A6,: Annex 5.2: Aerial Photographic and Lidar Assessment Technical Report**), assessment of Priority Archaeological Geophysical Survey data (**Volume A6, Annex 5.3: Priority Archaeological Geophysical Survey**) and a Geoarchaeological DBA (**Volume A6, Annex 5.4: Geoarchaeological Desk Based Assessment**). Where the loss of significance to non-designated heritage assets has been identified, approaches to mitigate the loss are detailed within **Volume F2, Chapter 10: Outline Onshore WSI**. Following mitigation, the effects of Hornsea Four will result in less than substantial harm.
"*When considering applications for development affecting the setting of a designated heritage asset, the SoS should treat favourably applications that preserve those elements of the setting that make a positive contribution to, or better reveal the significance of, the asset. When considering applications that do not do this, the SoS should weigh any negative effects against the wider benefits of the application. The greater the negative impact on the significance of the designated heritage asset, the greater the benefits that will be needed to justify approval.*" (EN-1, paragraph 5.8.18).	Findings (reported and detailed in **Volume A6, Annex 5.1: Historic Environment Desk Based Assessment**) indicate that impacts upon heritage significance resulting from change in the setting of heritage assets, as a result of Hornsea Four, are within the realms of 'less than substantial harm' as a maximum and more commonly result in no material harm to heritage significance.

5.4 Consultation

5.4.1.1 Consultation is a key part of the DCO application process. Consultation regarding historic environment has been conducted through the EIA scoping process (Orsted 2018) and formal consultation on the Preliminary Environmental Information Report (PEIR) (Orsted 2019) under section 42 of the 2008 Act. An overview of the project consultation process is presented within **Volume A1, Chapter 6: Consultation**. Agreements made with consultees within the Evidence Plan process are set out in the topic specific Evidence Plan Logs which are appendices to the Hornsea Four Evidence Plan (**Volume B1, Annex 1.1: Evidence Plan**), an annex of the Hornsea Four Consultation Report (**Volume B1, Chapter 1: Consultation Report**). All agreements within the Evidence Plan Logs have unique identifier codes which have been used throughout this document to signpost to the specific agreements made (e.g. ONS-HE-1.1).

5.4.1.2 The Technical Panel consultees for onshore historic environment consists of representatives from Hornsea Four, the heritage specialist from Royal HaskoningDHV, Historic England's Inspector of Ancient Monuments for Hull and East Riding of Yorkshire and the Principal Archaeologist at Humber Archaeological Partnership (HAP) (archaeological advisors to ERYC), the ERYC's Conservation Officer and Planning Officer.

5.4.1.3 A summary of the key issues raised during consultation specific to the historic environment is outlined below in **Table 5.3** together with how these issues have been considered in the production of this ES.

Table 5.3: Consultation Responses.

Consultee	Date, Document, Forum	Comment	Where addressed in the ES
PINS	November 2018 Scoping Opinion	"Direct impacts on designated heritage assets: Construction & Decommissioning phase. "*From the information in the Scoping Report and Annex I it remains uncertain that all designated assets have been identified and can be avoided. In light of this, the Inspectorate considers that significant effects could arise, and therefore cannot agree to scope this matter out. Impacts on designated heritage assets must be assessed in the ES where significant impacts could occur.*"	All designated heritage assets located within the defined Study Areas are presented in **Volume A6: Annex 5.1: Historic Environment Desk Based Assessment**. Their locations have informed the project design with the route positioned to ensure where possible designated heritage assets are not directly (physically) impacted (Co2, see **Section 5.8.2** for further details). Following the route refinement process one designated heritage asset is located within the Order Limits; this has been assessed and is presented in **Section 5.11**.

Consultee	Date, Document, Forum	Comment	Where addressed in the ES
Historic England	November 2018 Scoping Opinion	*"Methodologies that can inform the extent of the study area include Visual Impact Assessment and ZTV."*	A ZTV and photomontages have been produced for the OnSS (**Volume A6, Annex 4.1 Landscape and Visual Resources: Photography and Photomontages**) and reviewed by the heritage team to ensure heritage assets that may be affected are appropriately considered.
Historic England	November 2018 Scoping Opinion	*"Consideration should be given to undertaking a practical exercise with either a crane or balloons erected at the height of the proposed structures so that all parties are to better able to understand the landscape impact of the proposals."*	The ZTV and the approach to identifying key heritage assets within the defined Study Areas, along with the photomontages of the OnSS, are considered to be of suitable detail for assessment and a standard approach to assessment of the historic environment (**Section 5.5**).
Historic England	November 2018 Scoping Opinion	*"The assessment should also take account of the potential impact which associated activities (such as construction, servicing and maintenance, and associated traffic) might have upon perceptions, understanding and appreciation of the heritage assets in the area."*	**Volume A6, Annex 5.1: Historic Environment Desk Based Assessment** presents the assessment of any potential impacts resulting from a change in the setting of designated and non-designated heritage assets.
Historic England	November 2018 Scoping Opinion	*"The presence of World War One and World War II archaeology (specifically anti-invasion remains) is poorly represented in the HER and is likely to survive in greater quantity than is currently anticipated."*	This was a principal factor considered during the walkover survey (see **Volume A6: Annex 5.1: Historic Environment Desk Based Assessment**). The HER data was found to be quite detailed due to the Coastal and Intertidal Zone Archaeological Network (CITiZAN) project which has recorded coastal heritage assets. A summary of these heritage assets is presented in **Section 5.7**.
Historic England	November 2018 Scoping Opinion	*"Recent research has indicated that large areas of the Vale of Holderness are covered by deposits of medieval and modern 'warp' material. The implication of this is that extensive prehistoric land surfaces are likely to remain intact and could be at risk*	**Volume A6: Annex 5.4: Geoarchaeological Desk Based Assessment** identifies areas of high geoarchaeological potential which may require further investigation prior to, or during, construction. These results are summarised in **Section 5.7**.

Consultee	Date, Document, Forum	Comment	Where addressed in the ES
		from interventions associated with the insertion of cabling. It would be of benefit to the project that contact was made with Professor Nicky Milner, University of York to discuss the potential for Mesolithic period remains along the route, and to contact Dr Jim Leary, University of Reading, Skipsea Project to discuss the presence of warp deposits along the cable route."	Correspondence was sent to both recommended specialists. Dr Jim Leary provided information regarding Skipsea Castle and its potential Iron Age origins (see **Section 5.7.2**). Professor Nicky Milner also provided a response highlighting the potential for Mesolithic remains and would like to be kept informed of any fieldwork results of relevance. .
Historic England	November 2018 Scoping Opinion	*"The impact of changes in hydrology, which may then have an impact on the significance of designated and non-designated heritage assets has not been given an appropriate level of assessment."*	**Section 5.11** presents the potential direct (physical) impacts to known and potential buried archaeological remains and deposits including the potential for hydrological changes (**paragraph 5.11.1.18**). This is also considered in **Volume A6, Annex 5.4: Geoarchaeological Desk Based Assessment**.
Historic England	November 2018 Scoping Opinion	*"A greater amount of archaeological evaluation will be required to 'ground truth' the geophysical survey results."*	A programme of Priority Archaeological Geophysical Survey was undertaken as part of the pre-application works. Consideration of further non-intrusive and intrusive archaeological evaluation is set out within **Volume F2, Chapter 10: Outline Onshore WSI**.
ERYC (Conservation Officer)	November 2018 Scoping Opinion	*"I have concerns firstly about the lack of identification of non-designated built heritage structures and secondly about the creation of the compound areas referred to in the last bullet of 7.5.4.1 and feel the latter need to be assessed the same as any other affected area and any underlying features avoided or further investigation / recovery archaeology carried out."*	Identification of unrecorded non-designated heritage assets has been undertaken as part of the Historic Environment DBA (**Volume A6, Annex 5.1: Historic Environment Desk Based Assessment**) and the Aerial Photographic and Lidar Assessment (**Volume A6, Annex 5.2: Aerial Photographic and Lidar Assessment Technical Report**). Compounds have been assessed as forming part of the onshore ECC, ensuring they receive the same level

Consultee	Date, Document, Forum	Comment	Where addressed in the ES
			of assessment as any other part of the project footprint (Section 5.11).
ERYC (Conservation Officer)	November 2018 Scoping Opinion	*"The information on non-designated heritage assets in the form of buildings or standing structures, (see 1 above), is limited and not generally included in the HER within the East Riding. We rely on identification of these at the application stage. Whilst such structures, unless lost or damaged, are unlikely to be impacted on by the cable route, they may be affected by the land fall or sub-station work, along with their settings."*	Identification of unrecorded non-designated heritage assets has been undertaken as part of the Historic Environment DBA (Volume A6, Annex 5.1: Historic Environment Desk Based Assessment). How Hornsea Four may affect heritage significance as a result of changes to setting has also been considered within the DBA, following the Historic England 5 step guidelines.
ERYC (Conservation Officer)	November 2018 Scoping Opinion	*"Impact on setting will be limited other than short term, except potentially for the sub-station and possible landfall point. Listed Buildings, Parks and gardens or SAM's with a wider setting or inter-related setting, (such as church towers) are most likely to be affected by above ground structures."*	A setting assessment has been undertaken as part of the Historic Environment DBA (Volume A6, Annex 5.1: Historic Environment Desk Based Assessment) and potential impacts to heritage significance caused as a result of change in the setting is presented within the Historic Environment DBA, following the Historic England's staged approach to setting assessment.
HAP	3 January 2019 Scoping Opinion	*"A number of national mapping programmes (NMP) have taken place in East Yorkshire (Hull Valley, RCZA, Yorkshire Wolds, Vale of York and Humberside Aggregates); the data from these will largely have been incorporated into the HER, however, there are instances where sites/crop-marks will not have been assigned an HER record. Therefore, I would recommend that the NMP data be obtained and incorporated."*	NMP data was reviewed and forms part of the baseline data within Volume A6, Annex 5.1: Historic Environment Desk Based Assessment, and in more detail within Volume A6, Annex 5.2: Aerial Photographic and Lidar Assessment Technical Report.
Technical Panel (Historic England)	16/01/19 Historic Environment Technical	The largest area of concern was that surrounding the decision not to undertake any pre-submission archaeological evaluation. The rationale behind this is broadly	Hornsea Four has identified the need for a programme of pre-submission evaluation surveys; a Priority Archaeological Geophysical Survey has been undertaken (Volume A6,

Consultee	Date, Document, Forum	Comment	Where addressed in the ES
	Panel Meeting 2	accepted however, of particular concern is the application of this approach to the OnSS. In reality you have much less 'wiggle room' for this structure and I would recommend that you revise the approach here to include geophysical survey and archaeological evaluation.	Annex 5.3: Priority Archaeological Geophysical Survey) and includes the landfall and OnSS. The results of which have informed the ES and stakeholder consultation. Further non-intrusive and intrusive evaluation surveys are detailed within Volume F2, Chapter 10: Outline Onshore WSI.
Technical Panel (ERYC Conservation Officer)	16/01/19 Historic Environment Technical Panel Meeting 2	The council would not have any issues with temporary effects resulting from the onshore ECC but the OnSS area is of greater interest to them, particularly the presence of unlisted historic farmsteads in this area.	Assessment of previously unrecorded historic farmsteads is presented within Volume A6. Annex 5.1: Historic Environment Desk Based Assessment, with cartographic sources consulted and consideration given to historic farmsteads within the OnSS study area during walkover surveys.
Technical Panel (ERYC Planning Officer)	16/01/19 Historic Environment Technical Panel Meeting 2	A setting assessment from St Mary's Church in Cottingham should be considered.	Setting assessment for the Church of Saint Mary and Cottingham Conservation Area has been undertaken as part of the baseline data collation and assessment of photomontages produced by Landscape Visual Impact Assessment (LVIA) specialists from this location. This can be found in Volume A6, Annex 5.1: Historic Environment Desk Based Assessment with the photomontages presented in Volume A6, Annex 4.1: Landscape and Visual Resources: Photography and Photomontages.
Technical Panel (HAP and ERYC Conservation Officer)	02/04/19 Historic Environment Technical Panel Meeting 3	Stakeholders generally agreed that as long as the working area for decommissioning is similar to the construction activities, an assessment of decommissioning impacts may not be required.	Consideration of impacts from decommissioning are summarised within Volume A4, Annex 5.1: Impact Register and agreed with Historic England (ON-HIS-5.2).
Email correspondence (Historic England)	17/06/19	*"I think we can agree that direct physical impacts on designated assets can be scoped out if you can*	The terms direct (physical) impacts and indirect (non-physical) impacts are described in Section 5.10.

Consultee	Date, Document, Forum	Comment	Where addressed in the ES
	(email correspondence)	*demonstrate that the designated sites have been avoided. But I am concerned about the use of the word 'direct' as it is often used when discussing 'setting' and implies a lesser form of impact, when – in fact – the impact within setting can be 'direct' on the significance of the place. "*	The impacts scoped out and not considered in detail in the ES chapter are presented in **Section 5.8.1** and summarised within **Volume A4, Annex 5.1: Impact Register**.
Historic England	PEIR Section 42 Response	*"Although we consider the assessment presented in Chapter 5 (Historic Environment) to be a coherent summary of the archaeological potential of the terrestrial route, it is clear that gaps still remain in this phase of the work. As noted above, the Priority Archaeological Geophysical survey is incomplete which also means that the correlation between it and the Geoarchaeological work is also incomplete, as is the formulation of a comprehensive Written Scheme of Investigation (WSI). We note that further work is to be undertaken with regard to assessment of visual impacts on designated and non-designated heritage assets (5.11.3.19 and 5.11.3.23)"*	The results from the completed Priority Archaeological Geophysical Survey is presented in **Volume A6, Annex 5.3: Priority Archaeological Geophysical Survey**. These results have been cross-referenced with the Aerial Photograph and Lidar Assessment data and Geoarchaeological DBA to identify any further key heritage assets. These are assessed in **Section 5.11**. Three areas identified for Priority Archaeological Geophysical Survey were not completed; these will be surveyed along with any additional areas as detailed in **Volume F2, Chapter 10: Outline Onshore WSI**.
Historic England	PEIR Section 42 Response	*"Paragraphs 5.11.2.29 to 5.11.2.41 the suggested mitigation of both buried archaeological remains and built heritage is sensible and proportionate, but we note that an outline WSI will only be submitted to support the DCO"*	An outline Onshore WSI has been drafted in consultation with the heritage stakeholders (**Volume F2, Chapter 10: Outline Onshore WSI**).
Historic England	14/11/19 Historic Environment Technical Panel Meeting 4	*'Indirect Impacts Methodology: Whilst I agree with the suggested approach, I cannot confirm the conclusions of the work until I have seen the effects (or lack of them) clearly demonstrated. It would be*	Historic England's guidance on heritage setting advises that 'the Applicant considers approaches such as a 'Zone of Visual Influence' or 'Zone of Theoretical Visibility' in relation to the proposed development in order to

Consultee	Date, Document, Forum	Comment	Where addressed in the ES
		useful to know whether assessment of impact and effects was undertaken using a balloon or mast, raised to the height of the proposed intervention.'	better identify heritage assets and settings that may be affected'. As such, the assessment has utilised ZTV's produced to inform the Landscape and Visual Impact Assessment which were generated based on the maximum design scenario for the OnSS and EBI, and appropriate photomontages. The setting assessment is presented in **Volume A6, Annex 5.1: Historic Environment Desk Based Assessment**.
Historic England	Draft chapter, annexes and Historic Environment Position Paper – Data Validity and Next Steps	Draft copies of the chapter and supporting annexes were issued to Historic England for review and comment ahead of finalisation and submission. A position paper which set out the findings of a review of the validity of baseline data used in the assessment, in light of the decision to delay the DCO submission until September 2021 and DCO examination into 2022, was also issued.	All comments received have been taken into account and the chapter (and supporting annexes) updated where required. Where comments have not been actioned, this has been discussed with Historic England and agreed through the consultation process. The Position Paper was reviewed and agreed by Historic England (ON-HIS-2.11).

5.5 Study area

5.5.1.1 Four historic environment study areas of varying size were established around the onshore elements of the Hornsea Four Order Limits, to ensure a full assessment of any potential impacts can be undertaken (**Figure 5.2**). These study areas were decided through professional judgement and industry guidance, alongside consideration of the ZTV produced for the OnSS (**Chapter 4: Landscape and Visual**).

5.5.1.2 These study areas were deemed appropriate by all heritage stakeholders during Technical Panel Meetings (ON-HIS-2.9) and comprise:

- Onshore ECC Boundary (including landfall):
  - A 500 m study area either side of the onshore ECC and 400 kV National Grid Electricity Transmission (NGET) connection area for non-designated heritage assets; and
  - A 1 km study area either side of the onshore ECC and 400 kV NGET connection area for designated heritage assets.

- OnSS Boundary (including the EBI):
  - A 5 km study area from the OnSS for designated heritage assets and non-designated built heritage assets; and
  - A 1 km study area from the OnSS for other non-designated heritage assets (i.e. buried archaeological remains and findspots).

5.5.1.3 The onshore ECC study area starts at Mean Low Water Springs (MLWS) with the offshore ECC study area starting at Mean High Water Springs (MHWS), resulting in a slight overlap at the intertidal zone (see **Volume A2, Chapter 9: Marine Archaeology**).

5.5.1.4 These study areas have allowed for a proportionate assessment of any potential direct and indirect impacts upon designated and non-designated heritage assets and identification of any impacts which may be significant in EIA terms

5.5.1.5 These study areas have been refined since PEIR to take account of changes to the Order Limits following the route refinement process as set out in **Volume A1, Chapter 3: Site Selection and Consideration of Alternatives**. Following this, the heritage data sets (included in **Volume A6, Annex 5.1: Historic Environment Desk-Based Assessment**) were updated. This ensures all relevant historic environment data (designated and non-designated) is included for assessment.

5.5.1.6 Separate study areas were utilised for the Aerial Photographic and Lidar Assessment (**Section 5.6.4**), Priority Archaeological Geophysical Survey (**Section 5.6.5**) and Geoarchaeological DBA (**Section 5.6.6**).

5.6 Methodology to inform baseline

5.6.1.1 The documents produced to aid in the production of this ES chapter are outlined in **Table 5.4**.

5.6.1.2 The baseline data set out in this chapter (**Section 5.7**) is a summary of the data produced as part of the Historic Environment DBA (**Volume A6, Annex 5.1: Historic Environment Desk Based Assessment**). This data has been refined and updated following completion of the Aerial Photographic and Lidar Assessment, the Priority Archaeological Geophysical Survey and the Geoarchaeological DBA (**Volume A6, Annex 5.2: Aerial Photographic and Lidar Assessment Technical Report**, **Volume A6, Annex 5.3: Priority Archaeological Geophysical Survey** and **Volume A6, Annex 5.4: Geoarchaeological Desk Based Assessment**).

Table 5.4: Historic environment baseline studies and resulting reports undertaken for Hornsea Four to date.

Document	Summary	Annex
Historic Environment DBA	Details the baseline environment with respect to the onshore historic environment within the defined study areas. It incorporates available archaeological assessment data, including desk-based research, a high-level review of historic mapping and a setting assessment of heritage assets identified as potentially being affected by Hornsea Four.	**Volume A6, Annex 5.1: Historic Environment Desk Based Assessment**
Heritage Asset Gazetteers	Historic environment data obtained from the HHER has been collated into gazetteers, presenting all known designated and non-designated heritage assets within the Hornsea Four heritage study areas.	**Volume A6, Annex 5.1: Historic Environment Desk Based Assessment (Appendices B and C)**
Aerial Photographic and Lidar Assessment report	Assessment and interpretation of aerial imagery, Lidar and NMP data was undertaken to identify any earthworks or cropmarks within a 150 m study area either side of the onshore ECC and OnSS permanent footprint. The results were cross-referenced with the HHER data. Information from this assessment feeds into the updated baseline data within this chapter.	**Volume A6, Annex 5.2: Aerial Photographic and Lidar Assessment Technical Report**
Priority Archaeological Geophysical Survey Report	A report detailing the results of the priority archaeological geophysical surveys undertaken along sections of the Hornsea Four onshore ECC, and across the full extent of the landfall and OnSS, totalling 348 ha to date. These results have informed the updated baseline presented within this chapter, identifying new archaeological sites / confirming and adding to the HHER data.	**Volume A6, Annex 5.3: Priority Archaeological Geophysical Survey**
Geoarchaeological DBA	A scheme-wide review of existing geotechnical and geoarchaeological sources of information was undertaken. This data identified areas of geoarchaeological potential and has been cross referenced with the results of the Priority Archaeological Geophysical Survey and Aerial Photographic and Lidar Assessment.	**Volume A6, Annex 5.4: Geoarchaeological Desk Based Assessment**

Document	Summary	Annex
	Includes the results of the Geoarchaeological watching brief of the geotechnical site investigations undertaken at the landfall.	

5.6.2 Historic Environment Desk-Based Assessment

5.6.2.1 A Historic Environment DBA (**Volume A6, Annex 5.1: Historic Environment Desk Based Assessment**) was undertaken to collate baseline data to inform this ES chapter. This detailed desk-based review of existing historic environment data was used to identify the archaeological potential within the historic environment study areas (as detailed in **Section 5.5**).

5.6.2.2 A setting assessment was also undertaken as part of the Historic Environment DBA (**Volume A6, Annex 5.1: Historic Environment Desk Based Assessment**), which followed the Historic England guidance on setting assessment (Historic England, 2017a), completing steps one to four.

5.6.2.3 The specific objectives of the Historic Environment DBA were to:

- outline and describe the known and potential heritage assets, based on a review of existing information to provide an archaeological and historical baseline within defined study areas;
- assess the significance of the known and potential heritage assets through a consideration of their archaeological, architectural, artistic and historic interests, and to provide a consideration of the contribution that setting makes to their heritage significance, where relevant;
- identify the potential impacts of Hornsea Four upon heritage assets, including impacts resulting from change in setting; and
- identify potential opportunities to minimise harm or enhance heritage assets.

5.6.3 Walkover Surveys

5.6.3.1 To inform the ES, two historic environment walkover surveys were completed between 28 to 30 November 2018 and 11 to 15 February 2019. The walkover surveys were undertaken to confirm the presence/absence of heritage assets identified on the HHER and through desk-based review of historic maps and aerial imagery, to assess their preservation, extent and setting, and to identify any previously unrecorded heritage assets within the historic environment study areas (as detailed in **Section 5.5**). A total of 73 locations containing known heritage assets were visited as part of the walkover surveys; these were agreed in consultation with the heritage stakeholders at the Technical Panel meetings (ON-HIS-2.9). Please note that the setting assessment was undertaken during the winter months when vegetation cover was at a minimum and therefore likely representing a worst-case scenario in terms of visibility with Hornsea Four.

5.6.3.2 The aims of the walkover surveys were to:

- assess the condition of upstanding/above ground archaeological remains within identified sites (i.e. earthworks or structures);
- identify any currently unrecorded heritage assets (i.e. earthworks or structures);
- establish the potential for currently unknown heritage assets (e.g. buried archaeology) within the landfall, onshore ECC and OnSS footprints;
- assess the potential impact from other modern developments within the study areas which may have reduced the significance/preservation of known heritage assets;
- assess the viability of Priority Archaeological Geophysical Survey at targeted locations along the onshore ECC and OnSS; and
- undertake setting assessment site visits of and in the vicinity of identified key heritage assets.

5.6.4 Aerial Photography and Lidar Assessment

5.6.4.1 The Aerial Photographic and Lidar Assessment (**Volume A6, Annex 5.2: Aerial Photographic and Lidar Assessment Technical Report**) reviewed available datasets within a 150 m buffer either side of the Hornsea Four Order Limits. This buffer was considered appropriate in establishing the presence of cropmarks and earthworks within and adjacent to the Hornsea Four Order Limits.

5.6.4.2 The assessment utilised aerial and Lidar imagery from:

- the Historic England Archive;
- the Cambridge University Collection;
- the Humber Historic Environment Record Archive;
- Online Aerial and Satellite-derived Images;
- APEM Aerial Photo Survey of the route;
- Historic England National Mapping Programme (NMP); and
- Environment Agency Lidar Data.

5.6.4.3 The data from these resources was assessed, collated and presented within a GIS project. The results were then interpreted and cross-referenced with known heritage asset data held by the HHER and Historic England.

5.6.5 Priority Archaeological Geophysical Survey

5.6.5.1 The aim of the Priority Archaeological Geophysical Survey (**Volume A6, Annex 5.3: Priority Archaeological Geophysical Survey**) was to identify any potential archaeological anomalies that would enhance current understanding of the archaeological resource at targeted locations within the Hornsea Four Order Limits.

5.6.5.2 A total of 33 areas, covering 348 ha, were surveyed as part of the Priority Archaeological Geophysical Survey. These areas were targeted based on known locations of recorded heritage assets relating to buried archaeology within the HHER. Records of heritage assets

located near or adjacent to the onshore ECC were also considered and the nearest section of the onshore ECC was identified for survey. This was due to the potential for the archaeological remains to extend into the footprint of the onshore ECC. These were agreed in consultation with the heritage stakeholders at the Technical Panel meeting held on the 2nd April 2019 (ON-HIS-2.8).

5.6.5.3 Three priority areas were not surveyed due to landowner access constraints; however, these will be surveyed as part of a further programme of geophysical survey as detailed in **Volume F2, Chapter 10: Outline Onshore WSI**.

5.6.5.4 The Priority Archaeological Geophysical Survey was based on a 120 m wide corridor which included a 20 m buffer either side of the onshore ECC and comprised the full extent of the fields associated with the landfall and OnSS. The survey was undertaken within a grid system, tailored to each survey area. The survey grid squares measured 30 m by 30 m and were set out by GPS.

5.6.5.5 Specifically, the aims of the Priority Archaeological Geophysical Survey were to:

- locate, record and characterise any surviving sub-surface archaeological remains at targeted locations within Hornsea Four;
- inform the Historic Environment ES Chapter and the next stage of (non-intrusive and intrusive) evaluation post-consent, as required and as detailed in **Volume F2, Chapter 10: Outline Onshore WSI**;
- provide an assessment of the potential significance of any identified archaeological remains in a local, regional and (if relevant) national context; and
- produce a comprehensive site archive and report.

5.6.6 Geoarchaeological Desk-Based Assessment

5.6.6.1 A Geoarchaeological DBA (**Volume A6, Annex 5.4: Geoarchaeological Desk Based Assessment**) was undertaken to inform the ES chapter. Sources of information included in the assessment comprise but are not limited to geological and soil maps, existing reports on previous environmental, geoarchaeological and archaeological works relevant to Hornsea Four and academic research papers related to the wider area.

5.6.6.2 A 200 m geoarchaeology study area for historic geotechnical (borehole) data was used either side of the Hornsea Four Order Limits. Palaeoenvironment records and literature within 10 km of Hornsea Four have also been reviewed to identify relevant sites surrounding the project area.

5.6.6.3 The aims of this study were to:

- further understand geological changes across the Hornsea Four Order Limits;
- better understand the varying depths of deposits likely to be present;
- build towards a better understanding of the archaeological and geoarchaeological landscape; and

- review available existing/historic geotechnical and geoarchaeological sources of information in order to target suitable locations for further geoarchaeological works.

5.6.7 Geoarchaeological Watching Brief of Geotechnical Works

5.6.7.1 A programme of geotechnical site investigations carried out at the landfall were subjected to geoarchaeological monitoring, consisting of four boreholes. Full details of the results of the geoarchaeological monitoring are presented in **Volume A6, Annex 5.4: Geoarchaeological Desk Based Assessment: Appendix A**.

5.6.7.2 The results of the borehole monitoring alongside reviews of other nearby geotechnical investigations have been used to create a series of Projected Profiles across the landfall and to the south of the landfall, showing the main deposits encountered. These Profiles have been used to further discuss and understand the geoarchaeological and palaeoenvironmental potential at the landfall.

5.6.7.3 The specific aims of the monitoring of the geotechnical site investigations at the landfall were to:

- further understand geological changes across the landfall;
- better understand the varying depths of deposits present;
- build a better understanding of the archaeological and geoarchaeological landscape;
- prepare a fully illustrated report on the results of the geoarchaeological desk based review and the results of the geoarchaeological watching brief that is compliant with all relevant policy, guidance and good practice, and which is proportionate to the results, making recommendations for further assessment and analysis in a manner proportionate to the impact of the scheme; and
- produce a site archive for deposition with an appropriate local museum service and to provide information for accession to the HHER.

5.6.8 Heritage asset numbering

5.6.8.1 **Volume A6: Annex 5.1: Historic Environment Desk Based Assessment** has used the preferential references as defined by the National Heritage List for England (NHLE) and HHER for all heritage assets described throughout the report and presented on the Historic Environment DBA figures (**Volume A6, Annex 5.1: Historic Environment Desk Based Assessment**). Following the baseline data collation, walkover survey and setting assessment, heritage assets that were identified as being potentially affected, in addition to potential heritage assets not currently recorded which could also be affected, were given project-specific numbers (prefixed with 'HP4-'), establishing these assets as key to the project and brought forward for impact assessment (**Section 5.11**). Following updates to baseline data within the Historic Environment DBA, Aerial Photography and Lidar assessment, Priority Archaeological Geophysical Survey and Geoarchaeological DBA, further heritage assets or potential heritage assets have been brought through to the assessment.

5.6.8.2 A list of these key assets is provided in **Section 5.7.11** following a summary of the historic environment baseline. For those key heritage assets identified as resulting in a potential direct (physical) impact have been taken forward to impact assessment as presented in **Section 5.11**. The key heritage assets identified as a result of potential changes to their setting which may alter their significance are discussed in **Volume A6, Annex 5.1: Historic Environment Desk Based Assessment** and presented within **Volume A4, Annex 5.1: Impact Register**.

5.6.8.3 These 'HP4'--specific numbers are used within this chapter and detailed within **Section 5.7.11**. Please see **Figure 5.2** to **Figure 5.24** for their location. **Table 5.5** details all key heritage assets and cross references them with any relevant Priority Archaeological Geophysical Survey anomalies and Aerial Photographic and Lidar-specific references.

5.7 Baseline environment

5.7.1.1 The following Section summarises the currently known heritage assets within the study areas, as detailed within **Volume A6: Annex 5.1: Historic Environment Desk Based Assessment**, **Volume A6: Annex 5.2: Aerial Photographic and Lidar Assessment Technical Report**, **Volume A6: Annex 5.3: Priority Archaeological Geophysical Survey** and **Volume A6: Annex 5.4: Geoarchaeological Desk Based Assessment**. These assessments/surveys form the baseline upon which the potential impacts of Hornsea Four are assessed (**Section 5.11**) within this ES Chapter.

5.7.1.2 In summary, the Historic Environment DBA (**Volume A6: Annex 5.1: Historic Environment Desk Based Assessment**) identifies a total of 618 designated heritage assets within the study areas. These consist of 31 Scheduled Monuments, 557 Listed Buildings (most within Beverley), two Registered Parks and Gardens, 18 Conservation Areas and ten areas of Ancient Woodland. Only one designated heritage asset is located within the Hornsea Four Order Limits; HP4-56, Beverley Sanctuary Limit Stone, Bishop Burton.

5.7.1.3 A total of 223 non-designated heritage assets, or HHER entries of potential non-designated assets, are located within the study areas (186 within the onshore ECC 500 m study area and 37 within the OnSS 1 km study area) as presented in the Historic Environment DBA. A large number of buildings of historic interest are also locally listed within the study areas; 12 are located within the onshore ECC 1 km study area and 668 within the OnSS 5 km study area (348 of which correlate with Listed Buildings).

5.7.1.4 Where gaps in the baseline data are present (e.g. areas of the Order Limits where Priority Archaeological Geophysical Survey was not possible), further survey will be undertaken during the post-consent stage. Following completion of the geophysical survey and in combination with the results of the geoarchaeological assessment, trial trenching will be undertaken following consultation with stakeholders. Upon completion of this evaluation work, appropriate and proportionate archaeological mitigation will be undertaken where archaeological remains have been identified within the Order Limits and where preservation in situ cannot be achieved. **Volume F2, Chapter 10: Outline Onshore WSI** details the

proposed methodologies for archaeological evaluation and mitigation and has been produced in consultation with the heritage stakeholders.

5.7.2 Historic and archaeological background summary

5.7.2.1 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 that of the Yorkshire Wolds and Holderness. The Wolds encompass the land west of Hull, heading northwards and eastwards, culminating at the North Sea Coast between Bridlington and Scarborough. These low-lying chalk hills form a distinct landscape, which border the onshore ECC to the west. The gently rolling plateau is cut by deep valleys of glacial origin. Holderness is markedly different, characterised by its flat, low lying landscape, with the River Hull valley dominating the western half of Holderness. This landscape was formed through drainage of marshland during the medieval and post-medieval periods and has similar characteristics to the silt and peat fens of East Anglia and Lincolnshire.

5.7.2.2 Geologically, the Order Limits are located on a White Chalk subgroup bedrock, with the majority of the area overlain by glacial till deposits. The onshore ECC passes through an area containing superficial deposits of alluvium near to Wansford, whilst the coast contains a complex mixture of alluvium and late glacial glaciofluvial deposits (see **Volume A6, Annex 5.4: Geoarchaeological Desk Based Assessment** for more information).

5.7.2.3 The East Riding of Yorkshire has a rich historical and archaeological heritage, with nationally significant archaeological sites and monuments located across the landscape, particularly within the Wolds. 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 its hinterlands towards Holderness (then marshland) became well settled during the Neolithic period, due to the wide range of natural resources. Evidence for this habitation is seen in the surviving Neolithic ceremonial/funerary monuments in the Wolds landscape, such as long barrows and henges.

5.7.2.4 Settlement of the Wolds continued during the Bronze Age period. This is evidenced by over 140 Early Bronze Age round barrows known across the region, particularly on the higher ground overlooking river valleys. Groupings of barrows are notable within the valley of the River Hull and its tributaries. These funerary monuments indicate the landscape was well settled, although direct evidence for these settlements in the archaeological record is limited.

5.7.2.5 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, and as low earthworks, such as those at a cemetery containing about 120 square barrows just south of Scorborough, and the grouping of earthworks at Westwood Pasture, south-west of Beverley. Interestingly, radiocarbon dating of charcoal from Skipsea Castle's mound's makeup layers has identified the potential for the mound to have Iron Age origins, which was later utilised for a castle during the

medieval period (Jamieson et al. 2019). This would make it a unique Iron Age monument in Britain.

5.7.2.6 Activity during the Romano-British period often relates to periods of land division, seen in the form of field system cropmarks. Enclosures were the most common recorded feature-type during the NMP, often rectilinear in plan and isolated, although occasionally they were found in groups, aligned with trackways. Some of these identified enclosures survive as existing earthworks such as those at Westwood Pasture, which are scheduled (HP4-34 and 35, **Figure 5.20**).

5.7.2.7 Whilst there is little evidence recorded on the HHER for the Anglo-Saxon period within the 500 m onshore ECC study area, the surrounding region of East Yorkshire itself contains several important Anglo-Saxon archaeological sites, evidencing the potential for Anglo-Saxon remains to be present. One such example includes an extensive inhumation cemetery at Sewerby (approximately 14km north-east of landfall) (NHLE 1013625), with 59 graves being uncovered within the farmyard and grounds of Home Farm (Historic England 2021). Also in East Yorkshire are the early Anglo-Saxon cemetery at Sancton and recently discovered early Germanic burials at Kilham (Historic England - pers comm.).

5.7.2.8 The earliest phases of Beverley Minster, Beverley being known at the time as *Inderawuda* meaning *'in the wood of the men of Deira'* (Baggs *et al.* 1989; Information-Britain 2021), were constructed during the Anglo-Saxon period. It was founded at the turn of the 8th century and re-founded after the reconquest from the Danes by King Athelstan in the 10th century. It is during the later centuries of the Anglo-Saxon period that many of East Yorkshire's settlements and their open-field systems were established, with evidence suggesting many of the fields maintained a large open layout to that used during the Roman period (Muir, 1997, pp. 107).

5.7.2.9 Medieval activity is better attested to within the region. A total of 29 moated or defended sites were recorded during the NMP, with six sites potentially indicative of monastic granges. Deserted settlements are relatively common within the region, found at Wilsthorpe, Auburn, Hartburn (Fraisthorpe), Winkton (Barmston), Gembling, Raventhorpe (Cherry Burton), Risby, Rotsea, Winthorpe (Etton) and Bentley. Rotsea is worthy of distinction (NHLE 1005212), consisting of 15 ha of preserved earthworks, with an associated nearby moated site. Beverley Minster (NHLE 1084028) and most parish churches within the region were built in the medieval period and retain most or much of their late medieval fabric.

5.7.2.10 Except for some ecclesiastical buildings, most built-heritage assets within the region, including most of the 450 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 (NHLE 1001419).

5.7.2.11 A large number of World War II pillboxes, anti-tank defences, searchlight batteries, observation posts and other military installations and structures are common along the Holderness coast. This includes the Royal Observer Corps underground monitoring post at

Skipsea and the anti-aircraft gunsite at Butt Farm, near Beverley, both of which are Scheduled Monuments. A WWII crash site is recorded to the north of Barmston; the Spitfire BL246 crashed after colliding with a Beaufighter EL 394 on 22nd November 1942 (MHU 20480).

5.7.3 Designated Heritage Assets

5.7.3.1 There is a total of 31 Scheduled Monuments, 557 Listed Buildings, two Registered Parks and Gardens, 18 Conservation Areas and 10 areas of ancient woodland within the study areas. A further three Scheduled Monuments located outside the onshore ECC study area were included in the baseline following consultation with stakeholders.

5.7.3.2 A total of 12 Scheduled Monuments relate to significant remains at Westwood Pasture, directly west of Beverley. These monuments comprise a Bronze Age oval barrow and three bowl barrows, nine Iron Age square barrows, and the extant earthwork remains of Romano-British enclosures.

5.7.3.3 Sixteen entries within the study areas relate to the medieval history of the local area, including five moated manor sites, one deserted village, two castles and two monastic sites. Moated sites and deserted medieval villages are relatively common monuments within the region.

5.7.3.4 Of the 556 Listed Buildings within the study areas, 530 are within the OnSS 5 km study area, principally due to the proximity of the historic town of Beverley, which contains 447. A further 27 Listed Buildings are located within the historic cores of smaller rural settlements, often in the form of parish churches. In total, there are 12 Grade I Listed Buildings and 46 Grade II* Listed Buildings with the remaining 498 Listed Buildings designated at Grade II within the study areas.

5.7.4 Non-Designated Heritage Assets

5.7.4.1 Non-designated heritage assets are buildings, monuments, sites, places, areas or landscapes identified by plan-making bodies as having a degree of heritage significance meriting consideration in planning decisions, but which do not meet the criteria for designated heritage assets. Much of this resource consists of data obtained from the HHER which details monuments, buildings, archaeological sites, identified through previous fieldwork, the recovery of chance artefacts, historic landscape characterisation, reviews of aerial photography and any other research and development-led work undertaken and recorded in the HHER.

5.7.4.2 Within the 500 m onshore ECC study area, there is a total of 51 findspots and 190 monuments currently recorded within the HHER. Within the 1 km OnSS study area there are six findspots and 29 monuments.

5.7.4.3 At the landfall, the HHER records an area of complex cropmark remains indicative of an Iron Age to Romano-British settlement(s) with evidence of potential square barrows, multiple

enclosures, associated field systems and a trackway (HP4-2) (**Figure 5.4**). The HHER also records WWII pillboxes and anti-glider trenches at this location.

5.7.4.4 Other known non-designated heritage assets along the onshore ECC include five records of Bronze Age round barrows of which one is recorded within the Order Limits, to the south of Beswick (HP4-55) (**Figure 5.15**). Further cropmarks indicative of Iron Age to Romano-British enclosures are recorded in proximity to the Order Limits at Foston-on-the-Wolds (HP4-8) (**Figure 5.9**), and cropmarks indicative of Iron Age square barrows are also recorded in proximity to the Order Limits including those near Beswick (HP4-18) (**Figure 5.15**).

5.7.4.5 The onshore ECC also crosses the western extent of Raventhorpe deserted medieval village (HP4-26) (**Figure 5.18**), as well as an area of surviving ridge and furrow (HP4-58) (**Figure 5.8**). Archaeological remains of medieval date are also known at Rotsea (MHU4539), Carr House Farm (MHU3734) and at Winthorpe Manor House where associated buried remains may extend into the Order Limits (HP4-24) (**Figure 5.17**).

5.7.4.6 Within and directly south of the OnSS, are cropmarks of an undated polygonal enclosure with associated trackways and other field system ditches (HP4-49) (**Figure 5.3** and **Figure 5.24**). These archaeological remains of a probable settlement are visible as cropmarks within aerial photographs and are far reaching, with the potential to extend further northwards across the OnSS location and eastwards across the 400 kV onshore ECC. These remains may date to the Iron Age and are possibly associated with the Iron Age activity identified during archaeological investigation prior to the construction of the Creyke Beck NGET substation. The aerial photographs also record evidence for medieval ridge and furrow within the area which has the potential to mask earlier archaeological remains.

5.7.5 Setting Assessment

5.7.5.1 A setting assessment was undertaken as part of the Historic Environment DBA (**Volume A6, Annex 5.1: Historic Environment Desk Based Assessment**), informed by baseline information obtained from the ZTV for the OnSS and during the walkover surveys. The setting assessment was further supported by photomontages for the OnSS. This work identified which heritage assets may be impacted by Hornsea Four, as a result of changes in their setting and builds upon the work undertaken previously and commented on by stakeholders under Section 42 of the 2008 act. Further setting assessment work on newly identified heritage assets, following the route refinement process, was undertaken in accordance with Historic England guidance (2017a) and is presented in the Historic Environment DBA. This was agreed in consultation with Historic England (ON-HIS-2.4).

5.7.5.2 Overall, assessment of the potential setting effects has identified that the OnSS would form a new permanent intrusive visual element within the wider setting of some heritage assets, however this change in setting would not adversely affect the ability to appreciate heritage significance or historic connections between the heritage assets and the existing historic landscape character, or adversely impact the significance of those heritage assets identified and described throughout the assessment undertaken in **Volume A6, Annex 5.1: Historic Environment Desk Based Assessment**. It was concluded at PEIR that the operation of the

OnSS would not significantly impact the heritage significance of heritage assets through alterations to their setting, as summarised in **Volume A4, Annex 5.1: Impact Register**. In further consideration of the design of the OnSS at the ES stage, no material changes to the conclusions of the impact assessment at PEIR have been identified, as presented in **Volume A6, Annex 5.1: Historic Environment Desk Based Assessment**.

5.7.6 Aerial Photographic and Lidar Assessment

5.7.6.1 An Aerial Photographic and Lidar Assessment report has been produced (**Volume A6, Annex 5.2: Aerial Photographic and Lidar Assessment Technical Report**) for this ES. The results have identified 281 archaeological sites with the study area, many of which have been previously identified and recorded within the HHER or by the NMP. Overall, the results highlight that Hornsea Four passes through a landscape with high archaeological potential.

5.7.6.2 The cropmark remains, recorded in the HHER and discussed in the Historic Environment DBA, around the OnSS (a complex settlement of potentially Iron Age origin; HP4-49, **Figure 5.3**) were confirmed and further detailed within **Volume A6, Annex 5.2: Aerial Photographic and Lidar Assessment Technical Report**; **Map Book Figure 11**. The assessment revealed the cropmarks around the OnSS are extensive and indicate a large settlement(s) was located there. Further cropmark evidence was recorded to the south-west, along the onshore ECC, indicative of enclosures and field systems (HP4-67) (**Figure 5.24**).

5.7.6.3 Similarly, the cropmarks recorded within the HHER around the landfall location (HP4-02, **Figure 5.4**) are also extensive and indicate a large settlement(s) was located there, possibly with Iron Age origins, and later the location of WWII coastal defences (**Volume A6, Annex 5.2: Aerial Photographic and Lidar Assessment Technical Report**; Map Book Figures 41 and 43).

5.7.6.4 Further supporting evidence for the cropmark sites recorded by the HHER and NMP along the onshore ECC have been provided for the following records:

- A potential early Iron Age to Romano-British settlement complex to the north of Brigham (HP4-53 and HP4-57) (**Figure 5.11**);
- A ditch system and possible ring ditches (HP4-10), a square enclosure (HP4-11) and trackway and field systems (HP4-13) at Rotsea (**Figure 5.12**);
- Undated ditches, trackways and ring ditches (HP4-17), an Iron Age square barrow (HP4-18) and cropmarks of Iron Age to Romano-British enclosures and a post-medieval field system (HP4-54) between Carr House Farm and Bryan Mills Farm (**Figure 5.15**);
- Cropmarks of an Iron Age and/or Romano-British rectilinear enclosure (HP4-22) to the north of Scorborough (**Figure 5.16**);
- The site of Winthorpe Manor and House (HP4-24) located to the west of Scorborough (**Figure 5.17**);
- Raventhorpe Deserted Medieval Settlement (HP4-26) at Rose Cottage Farm, east of Cherry Burton (**Figure 5.18**); and

- Cropmarks of an Iron Age and/or Romano-British enclosure and former field boundaries (HP4-31) and a medieval Inclosure bank (HP4-32) to the north and east of Killingwoldgraves Farm, respectively (**Figure 5.19**).

5.7.6.5 Cropmark remains not recorded by the HHER and located within or adjacent to the Order Limits include:

- A group of undated ring ditches and post-medieval field systems (HP4-62) located to the west of Brigham (**Figure 5.11**);
- A complex site comprising a trackway, ditches, pits and curvilinear ditches (HP4-64) located to the north-west of Leconfield (**Figure 5.17**);
- A square enclosure (HP4-65) and a linear alignment of mounds (HP4-66) located just to the east of the A164 (**Figure 5.23**); and
- An undated field system to the north of the OnSS (HP4-69) (**Figure 5.21**).

5.7.6.6 The Aerial Photographic and Lidar Assessment also recorded evidence of former field boundaries and ridge and furrow.

5.7.7 Priority Archaeological Geophysical Survey

5.7.7.1 A total of 33 areas, covering 348 ha, were surveyed as part of the priority archaeological geophysical survey (**Figure 5.1**). Full details of the result of the survey are presented in **Volume A6, Annex 5.3: Priority Archaeological Geophysical Survey**.

5.7.7.2 The results of the Priority Archaeological Geophysical Survey successfully identified anomalies of 'certain' archaeological origin within seven survey areas and anomalies of 'potential' archaeological origin within 20 survey areas. The following is a summary of these findings:

- Area 1 (landfall): anomalies identified which correlate with cropmarks recorded in the HHER (HP4-02), with further detail added to what was previously recorded. The remains consist of a complex settlement of probable Iron Age to Romano-British date. Numerous intercutting enclosures are clearly visible, along with potential trackways and wider field systems (**Figure 5.4** and **Figure 5.5**);
- Area 3: potential rectilinear enclosure, linear, curvilinear and pit-like features possibly associated with HP4-8 (**Figure 5.9**);
- Area 13: anomalies identified which correlate with HHER entry (MHU3350), a continuation of Raventhorpe Deserted Medieval Village (HP4-26, **Figure 5.18**);
- Area 25: field to the north of Area 1, possible field system and enclosure ditches likely associated with the settlement located directly to the south in Area 1;
- Area 26: continuation of archaeological features from the settlement to the east in Area 1;
- Area 28: undated field system ditches in the northern half whilst remains associated with the former World War II airfield at Lissett were revealed in the southern half (HP4-6, **Figure 5.7**);

- Area 32: potential settlement remains in the form of ditches and trackways were revealed, partially masked by east to west and north-east to south-west ridge and furrow remains (HP4-53; **Figure 5.11**). These anomalies were further supported by the cropmarks recorded as part of the Aerial Photographic and Lidar Assessment (**Volume A6, Annex 5.2**);
- Area 33: two potential linear trackway features along with a potential ring ditch, curvilinear and pit-like features (HP4-10**,** **Figure 5.12**);
- Area 34: a square enclosure was identified which correlates with HHER entry (MHU8109; HP4-11, **Figure 5.12**). Along with the results from the Aerial Photographic and Lidar Assessment, further details of other linear and rectilinear features associated with the enclosure, along with the continuation of a possible trackway from Area 33 (HP4-10) have been recorded;
- Area 35: a possible trackway and associated enclosures have been identified which support the findings of the Aerial Photographic and Lidar Assessment (**Volume A6, Annex 5.2: Aerial Photographic and Lidar Assessment Technical Report**) (HP4-13; **Figure 5.12**);
- Area 44: potential enclosure ditch identified, associated with HHER record (MHU22179) and the findings from the Aerial Photographic and Lidar Assessment (**Volume A6, Annex 5.2: Aerial Photographic and Lidar Assessment Technical Report**) (HP4-22; **Figure 5.16**);
- Area 48: a potential prehistoric pit alignment and a number of small rectilinear features with associated pit-like anomalies were identified. These remains are located near to a potential enclosure recorded within the HHER (MHU3346; HP4-28, **Figure 5.18**); and
- Area 58 (OnSS): complex remains of a large, likely Iron Age to Romano-British, settlement and associated field system, with a palaeochannel located to the west. The remains correlate with those recorded in the HHER from cropmark evidence (MHU6599) and the findings of the Aerial Photographic and Lidar Assessment (**Volume A6, Annex 5.2: Aerial Photographic and Lidar Assessment Technical Report**) (HP4-49, HP4-67 and HP4-68; **Figure 5.24**).

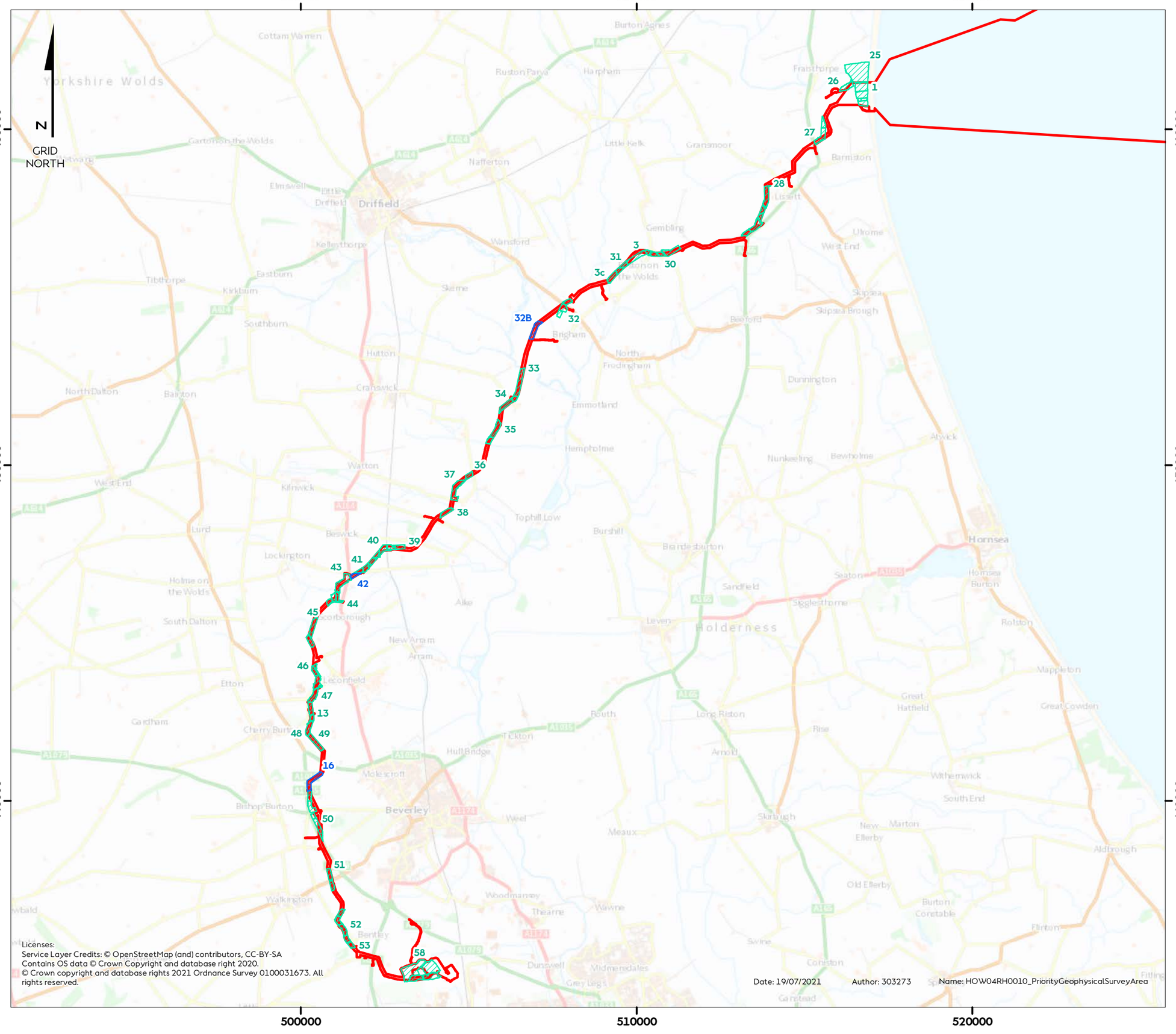
5.7.7.3 A number of survey areas contained no discernible archaeological remains, *i.e.* returned negative results, or contained remains of low archaeological interest (*e.g.* former field boundaries). However, it is noted that the absence of archaeological remains from the geophysical survey does not preclude their presence. Smaller features of high archaeological interest (*e.g.* inhumation and cremation burials, or Neolithic pit clusters) are generally not well defined or clearly visible on geophysical survey results, whilst ridge and furrow can mask earlier remains, if present.

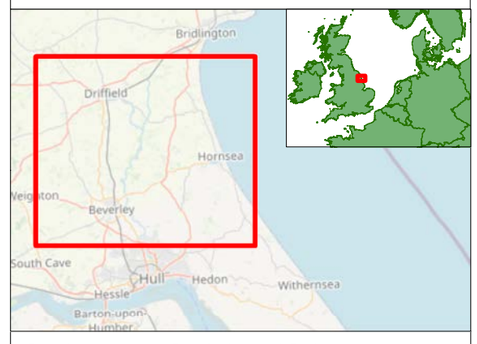
Hornsea Four

Figure 5.1

Priority Geophysical Survey Areas

- Order Limits
- Completed Geophys Survey Areas
- Uncompleted Geophys Surveys Areas





Coordinate system: British National Grid

Scale@A3: 1:110,000

0 1 2 4 Kilometres

0 0.5 1 2 Miles

REV	REMARK	DATE
	First Issue for PEIR	20/06/2019
A	Updated following PEIR consultations, for DCO	19/07/2021

Title: Geophysical Survey Areas Undertaken During the PEIR Stage
Document no: HOW04RH0010
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Date: 19/07/2021 Author: 303273 Name: HOW04RH0010_PriorityGeophysicalSurveyArea

5.7.8 Geoarchaeological Desk-based Assessment

5.7.8.1 The review of geological and palaeoenvironmental data revealed that Hornsea Four is located in an area rich in evidence of landscape evolution from the Quaternary and Holocene periods. Along the onshore ECC between Fraisthorpe and Rotsea, areas of high geoarchaeological potential have been identified with the remaining areas of Hornsea Four identified as having moderate potential. Full details are provided in **Volume A6, Annex 5.4: Geoarchaeological Desk Based Assessment**.

5.7.8.2 The results of the Priority Archaeological Geophysical Surveys have been compared with the details within the Geoarchaeological DBA as well as any potential remains of geoarchaeological importance visible within the survey results.

5.7.8.3 The areas containing glaciofluvial deposits recorded clear anomalies of archaeological origin at the landfall (HP4-2) and around Lissett (HP4-6). Well-defined anomalies of archaeological origin were also recorded to the north of Foston-on-the Wolds (HP4-8), to the north of Brigham (HP4-53) and around Rotsea (HP4-10, HP4-11 and HP4-13) where sand and gravel deposits and glaciofluvial deposits have been recorded. An area to the south of Nafferton Drain was targeted for Priority Archaeological Geophysical Survey however the survey was not completed. The Aerial Photographic and Lidar Assessment recorded ring ditches of unknown date (HP4-62) in this location.

5.7.8.4 To the south of Carr Lane and around Bryan Mills Beck, the areas of completed Priority Archaeological Geophysical Survey only recorded ridge and furrow anomalies and very little discernible features of archaeological origin. Similar results were recorded to the west of Leconfield across Areas 46 and 47 within Section 4 and across areas 51, 52 and 53 to the southwest of Beverley within Section 5. Across these areas pockets of alluvium and former channel deposits of glacial sand and gravels and glacial head deposits have been mapped on the British Geological Survey (BGS).

5.7.8.5 One significant geoarchaeological feature identified through the geophysical survey was a large palaeochannel, identified within geophysical survey area 58 (to the west of the OnSS permanent infrastructure). This palaeochannel appears to be flanked by an Iron Age to Romano-British settlement which was likely sited on its banks.

5.7.9 Geoarchaeological Watching Brief of Geotechnical Works

5.7.9.1 A programme of geotechnical site investigations carried out at the landfall were subjected to geoarchaeological monitoring, consisting of four boreholes. Full details of the results of the geoarchaeological monitoring are presented in Appendix A of **Volume A6, Annex 5.4: Geoarchaeological Desk Based Assessment.**

5.7.9.2 The results of the geoarchaeological monitoring of the boreholes, alongside reviews of other nearby geotechnical investigations were used to create a series of Projected Profiles across the landfall and to the south of the landfall, showing the main deposits encountered.

5.7.9.3 Within the northern area of the landfall, thin alluvial deposits of likely Holocene date and relating to Earl's Dyke have been identified. There was no evidence for organic horizons within these deposits. These alluvial deposits are underlain by glaciofluvial sand and gravel deposits of Pleistocene date which, in turn, are underlain by diamicton glacial till of Pleistocene date which also contain occasional lenses of sand and gravel. The Tertiary Rowe Chalk formation was encountered in all four boreholes at depths of between 19.25m and 24.5m below the ground surface.

5.7.9.4 In summary, no significant archaeological deposits or artefactual material were encountered during the monitoring of the geotechnical site investigations. The coring programme revealed no evidence for peat or organic clay deposits which might preserve palaeoenvironmental remains, however the boreholes were located beyond the mapped extent of alluvium. This means that there is a possibility that organic alluvial deposits survive elsewhere at the landfall. Additionally, examination of the exposed cliff section revealed a thin band of dark organic sediment which may represent an old ground surface or area of waterlogged peat extending into the south of the landfall.

5.7.9.5 In conclusion, while the four monitored boreholes suggest low potential for palaeoenvironmental deposits, the presence of organic materials within the exposed cliff section, as well as the results of the geoarchaeological desk-based assessment, suggest that, overall, there is high potential at the landfall for geoarchaeological and palaeoenvironmental deposits. Further evaluation and investigations post-consent will assist in clarifying the potential for deposits further.

5.7.10 Summary of Potential

5.7.10.1 The baseline information has indicated that Hornsea Four traverses a rich historic landscape with numerous heritage assets, in the form of buried archaeological remains, earthworks and historic buildings. Some of these known assets can be identified as of medium (regional) or high (national) heritage importance. Other assets are, however, considered to be of negligible or low (local) importance.

5.7.10.2 The potential for encountering archaeological remains (of varying importance) within the Hornsea Four boundary is considered high. In consideration of the known heritage assets indicative of buried archaeological remains and the findings from the project-specific surveys, the following list presents those assets which are likely to survive and be of possible low, medium or at most high heritage importance:

- **Landfall**:
  - areas of Iron Age to Romano-British cropmarks identified from aerial photographic sources (HP4-02, **Figure 5.4** and **Figure 5.5**);
  - areas of World War II defences, including anti-tank cubes, pillboxes, and anti-glider trenches (HP4-01, HP4-02, **Figure 5.4** and **Figure 5.5**);
- **Onshore ECC**:
  - north of Barmston, series of rectilinear enclosures and ditches possibly associated with Winkton Deserted Medieval Village (HP4-4, **Figure 5.6**);

- Lissett airfield, remains associated with the former RAF airfield as well as earlier undated field systems (HP4-6, Figure 5.7);
- north and west of Foston-on-the-Wolds, Iron Age to Romano-British enclosures and field systems (HP4-08, 53 and 57, Figure 5.9 to Figure 5.11);
- south of Nafferton Drain, cropmarks of ring ditches (HP4-62, Figure 5.11);
- north, west and south-west of Rotsea Farm, cropmarks of enclosures, field systems and trackways of unknown date (HP4-10, HP4-11 and HP4-13, Figure 5.12);
- adjacent to cropmarks of an Iron Age to Romano-British rectilinear enclosure, and other undated rectilinear enclosures between Scorborough and Beswick (HP4-22, HP4-54 and HP4-63, Figure 5.16);
- west of Scorborough, possible remains associated with the site of Winthorpe Manor and House (HP4-24, Figure 5.17);
- north-west of Leconfield, a complex site of ditches, pits, curvilinear features and a trackway (HP4-64, Figure 5.17);
- directly adjacent to earthworks and buried remains associated with Raventhorpe Deserted Medieval Village (HP4-26, Figure 5.18);
- east of Bishop Burton, adjacent to cropmarks of an Iron Age to Romano-British enclosure (HP4-31, Figure 5.19);
- west of Platwoods Farm, a square enclosure and a linear alignment of mounds (HP4-65 and HP4-66, Figure 5.23);
- south of Burn Park Farm, enclosures and field systems (HP4-67) (Figure 5.24);

- **OnSS and 400 kV NGET connection area**:
  - cropmarks associated with a large settlement(s) of probable Iron Age to Romano-British date extending across the OnSS permanent footprint and 400 kV NGET connection area (HP4-49, Figure 5.24);
  - field systems and possible enclosures flanking a palaeochannel (HP4-68, Figure 5.24); and
  - an undated field system along the permanent access road (HP4-69, Figure 5.21).

5.7.11 Key heritage assets

5.7.11.1 A total of 69 heritage assets, or groupings of heritage assets (both designated and non-designated), have been identified as 'key' to Hornsea Four due to their susceptibility to an impact arising during construction, operation and maintenance, or decommissioning (Table 5.5, Figure 5.2). These were initially identified as part of the Historic Environment DBA and then refined and updated for this chapter following the information provided from the other archaeological assessments (Aerial Photographic & Lidar Assessment, Priority Archaeological Geophysical Survey and Geoarchaeological DBA). These assets are identified with an "HP4" prefix.

5.7.11.2 These key heritage assets are those which have the potential to be affected either directly or indirectly by the project and have been identified through the assessment work undertaken up to ES. Note that some of these Hornsea Four project-specific locations are groupings of HHER entries, which identifies an area with multiple nearby records which might indicate a high archaeological potential (e.g. HP4-02 or HP4-28).

5.7.11.3 The key non-designated heritage assets which are likely to be subject to a direct (physical) impact have been brought forward into the impact assessment as presented in **Section 5.11**. Following the route refinement process (as set out in **Volume A1, Chapter 3: Site Selection and Consideration of Alternatives**), a single designated heritage asset is incorporated within the onshore ECC (HP4-56); this key asset has been included in the impact assessment at ES (see **Section 5.11**).

5.7.11.4 The key designated and non-designated heritage assets which were identified as having visibility or potential visibility of Hornsea Four, and therefore possibly subject to alterations to their setting, are discussed in detail in **Volume A6, Annex 5.1: Historic Environment Desk Based Assessment**. Identification of any potential setting effects to these key heritage assets is included in Section 6.8 of **Volume A6, Annex 5.1: Historic Environment Desk Based Assessment**. Further setting assessment work on newly identified key heritage assets following the route refinement process is also presented in **Volume A6, Annex 5.1: Historic Environment Desk Based Assessment**.

5.7.11.5 The current baseline description above provides an accurate reflection of the current state of the existing environment. The earliest possible start of construction for the onshore elements of Hornsea Four is 2024 with an expected operational life of 35 years, and therefore there exists the potential for the baseline to evolve between the time of assessment and point of impact. Outside of short-term or seasonal fluctuations, changes to the baseline in relation to the historic environment usually occur over an extended period of time (considered in **Section 5.7.12**). Based on current information regarding reasonably foreseeable events over the next four years, the baseline environment is not anticipated to have fundamentally changed from its current state at the point in time when impacts occur.

Table 5.5: Hornsea Four Key Heritage Assets.

HP4 ID	Name	Priority Geophysical Survey Area	Aerial Photo/Lidar Assessment Ref.	Designation	HHER/NHLE Reference	Heritage Importance	Type of Impact Assessed	Figure/Annex Reference
1	World War II sea defences including anti-tank cubes and pillboxes	n/a	APS_258	Non-Designated	MHU21052, 21148, 21149 & 21150	Medium	Direct (physical) impact and indirect (non-physical) impact	Figure 5.4 and Figure 5.5 Volume A6, Annex 5.1: Historic Environment Desk Based Assessment
2	Watermill Grounds cropmark complex: Iron Age to Romano-British enclosures and World War II defences including anti-glider trenches and pillboxes.	1, 25, 26	APS_254, 255, 256	Non-Designated	MHU326, 21070, 21073, 21078, 21085, 21086, (Iron Age/Romano-British remains); MHU21076, 21077, 21080, 21081, 21082, 21090, 21154 (WWII Defences)	Medium	Direct (physical) impact	Figure 5.4 and Figure 5.5
3	St Edmunds Chapel	n/a	n/a	Grade II listed	NHLE 1083849	High	Indirect (non-physical) impact	Volume A6, Annex 5.1: Historic Environment Desk Based Assessment
4	Winkton Deserted Medieval Village	27	APS_247, 248	Non-Designated	MHU365	Medium	Direct (physical) impact and	Figure 5.5 and Figure 5.6

HP4 ID	Name	Priority Geophysical Survey Area	Aerial Photo/Lidar Assessment Ref.	Designation	HHER/NHLE Reference	Heritage Importance	Type of Impact Assessed	Figure/Annex Reference
							indirect (non-physical) impact	Volume A6, 5.1: Historic Environment Desk Based Assessment
5	Medieval complex, Church of All Saints and Old Hall	n/a	n/a	Scheduled Monument (medieval complex) and Grade II* (Old Hall) & I (church) listed	NHLE 1007846, 1083851 & 1204832	High	Indirect (non-physical) impact	Volume A6, Annex 5.1: Historic Environment Desk Based Assessment
6	Lissett Airfield & Church of St James Geoarchaeological potential within area	28	APS_236	Non-Designated (airfield) & Grade II listed (church)	MHU11147 & NHLE 1083826	Low (airfield), Medium (buried remains), High (church)	Direct (physical) impact and indirect (non-physical) impact	Figure 5.7and Figure 5.8 Volume A6, Annex 5.1: Historic Environment Desk Based Assessment
7	Skipsea Castle & Halgarth moated site	n/a	n/a	Scheduled Monuments	NHLE 1011212 & 1013705	High	Indirect (non-physical) impact	Volume A6, Annex 5.1: Historic Environment Desk Based Assessment

HP4 ID	Name	Priority Geophysical Survey Area	Aerial Photo/Lidar Assessment Ref.	Designation	HHER/NHLE Reference	Heritage Importance	Type of Impact Assessed	Figure/Annex Reference
8	Cropmarks of Iron Age and/or Romano-British Rectilinear enclosures. Field system (post-medieval).	3a-c, 30, 31	APS_223, 212 APS_211, 215	Non-Designated	MHU22121 & 22148	Low to Medium	Direct (physical) impact	Figure 5.8 and Figure 5.10
9	Foston-on-the-Wolds	n/a	n/a	Conservation Area	N/A	High	Indirect (non-physical) impact	Volume A6, Annex 5.1: Historic Environment Desk Based Assessment
10	Ditch system and possible ring ditches (undated).	33	APS_195	Non-Designated	MHU2252	Low to Medium	Direct (physical) impact	Figure 5.12
11	Square ditched enclosure (undated).	34	APS_194	Non-Designated	MHU8109	Low to Medium	Direct (physical) impact	Figure 5.12
12	Rotsea Deserted Medieval Settlement	n/a	n/a	Scheduled Monument	NHLE 1005212	High	Indirect (non-physical) impact	Volume A6, Annex 5.1: Historic Environment Desk Based Assessment
13	Undated trackway and field systems.	35	APS_190, 191	Non-Designated	MHU9878	Low to medium	Direct (physical) impact	Figure 5.12 and Figure 5.13

HP4 ID	Name	Priority Geophysical Survey Area	Aerial Photo/Lidar Assessment Ref.	Designation	HHER/NHLE Reference	Heritage Importance	Type of Impact Assessed	Figure/Annex Reference
14	Possible enclosures near Carr Lane	37	APS_182, 183, 184	Non-Designated	MHU19432	Low to medium	Direct (physical) impact	Figure 5.14
15	Old sand and gravel pits (post-medieval).	38	n/a	Non-Designated	MHU13107	Low	Direct (physical) impact	Figure 5.14
16	Wilfholme Road bridge	n/a	n/a	Non-Designated	MHU12871	Low	Indirect (non-physical) impact	Volume A6, Annex 5.1: Historic Environment Desk Based Assessment
17	Undated ditches and trackways, ring ditch and a post-medieval artesian well.	39	APS_172, 173, 174, 175	Non-Designated	MHU979, 12875	Low to medium	Direct (physical) impact	Figure 5.14- and Figure 5.15
18	Iron Age Square Barrows, SSE of Brickyard Farm.	40	APS_167, 169	Non-Designated	MHU19425	Low to High	Direct (physical) impact	Figure 5.15 and Figure 5.16
19	Beswick	n/a	n/a	Conservation Area	N/A	High	Indirect (non-physical) impact	Volume A6, Annex 5.1: Historic Environment Desk Based Assessment
20	Lockington	n/a	n/a	Conservation Area	N/A	High	Indirect (non-physical) impact	Volume A6, Annex 5.1: Historic Environment

HP4 ID	Name	Priority Geophysical Survey Area	Aerial Photo/Lidar Assessment Ref.	Designation	HHER/NHLE Reference	Heritage Importance	Type of Impact Assessed	Figure/Annex Reference
								Desk Based Assessment
21	Old gravel pit, Bryan Mills.	43	APS_155	Non-Designated	MHU12882	Low to medium	Direct (physical) impact	Figure 5.15 and Figure 5.16
22	Cropmarks of an Iron Age and/or Romano-British rectilinear enclosure.	44	APS_153	Non-Designated	MHU22179	Low to medium	Direct (physical) impact	Figure 5.16
23	Scorborough Listed Buildings, Scheduled Monuments and village	n/a	n/a	Grade I and II and Scheduled Monuments	NHLE 1015613, 1015818, 1160555, 1103451 & 1160548	High	Indirect (non-physical) impact	Volume A6, Annex 5.1: Historic Environment Desk Based Assessment
24	Site of Winthorpe Manor and House.	45	APS_147	Non-Designated	MHU3725	Low to Medium	Direct (physical) impact	Figure 5.17
25	Leconfield Castle moated site	n/a	n/a	Scheduled Monument	NHLE 1007949	High	Indirect (non-physical) impact	Volume A6, Annex 5.1: Historic Environment Desk Based Assessment
26	Raventhorpe deserted medieval settlement.	13	APS_129	Non-Designated	MHU3350	Medium to High	Direct (physical) impact and indirect (non-physical) impact	Figure 5.18 Volume A6, 5.1: Historic Environment

HP4 ID	Name	Priority Geophysical Survey Area	Aerial Photo/Lidar Assessment Ref.	Designation	HHER/NHLE Reference	Heritage Importance	Type of Impact Assessed	Figure/Annex Reference
								Desk Based Assessment
27	Moated sites at Parkhouse Farm	n/a	n/a	Scheduled Monument	NHLE 1008292	Medium	Indirect (non-physical) impact	Volume A6, Annex 5.1: Historic Environment Desk Based Assessment
28	Undated ditches, possible enclosure, Soilmark west of Parkhouse, and Dog Kennel Farm (post-medieval).	48	n/a	Non-Designated	MHU3346, 13020, 19099	Low to medium	Direct (physical) impact	Figure 5.18
29	Cherry Burton	n/a	n/a	Conservation Area	N/A	High	Indirect (non-physical) impact	Volume A6, Annex 5.1; Historic Environment Desk Based Assessment
30	Bishop Burton	n/a	n/a	Conservation Area	N/A	High	Indirect (non-physical) impact	Volume A6, Annex 5.1: Historic Environment Desk Based Assessment
31	Cropmarks of an Iron Age and/or Romano-British enclosure and former field boundaries (post-medieval).	Targeted but no access (16)	APS_118, 122	Non-Designated	MHU22297	Low to medium	Direct (physical) impact	Figure 5.18 and Figure 5.19

HP4 ID	Name	Priority Geophysical Survey Area	Aerial Photo/Lidar Assessment Ref.	Designation	HHER/NHLE Reference	Heritage Importance	Type of Impact Assessed	Figure/Annex Reference
32	Inclosure bank (medieval).	50	APS_110, 112	Non-Designated	MHU13179	Low to medium	Direct (physical) impact	Figure 5.19
33	Burton Bushes Ancient Woodland	n/a	n/a	Ancient Woodland	NE 1115366	Medium	Indirect (non-physical) impact	Volume A6, Annex 5.1: Historic Environment Desk Based Assessment
34	Scheduled earthworks on Westwood Pasture	n/a	n/a	Scheduled Monument	NHLE 1013999	High	Indirect (non-physical) impact	Volume A6, Annex 5.1: Historic Environment Desk Based Assessment
35	Scheduled barrows and The Black Mill on Westwood Pasture	n/a	n/a	Scheduled Monuments & Grade II Listed Building	NHLE 1013994 1013992 1013998 1310087	High	Indirect (non-physical) impact	Volume A6, Annex 5.1: Historic Environment Desk Based Assessment
36	Beverley	n/a	n/a	Conservation Area	N/A	High	Indirect (non-physical) impact	Volume A6, Annex 5.1: Historic Environment Desk Based Assessment

HP4 ID	Name	Priority Geophysical Survey Area	Aerial Photo/Lidar Assessment Ref.	Designation	HHER/NHLE Reference	Heritage Importance	Type of Impact Assessed	Figure/Annex Reference
37	St Mary's Church, Beverley	n/a	n/a	Grade I Listed	NHLE 1162693	High	Indirect (non-physical) impact	Volume A6, Annex 5.1: Historic Environment Desk Based Assessment
38	Beverley Minster	n/a	n/a	Grade I Listed	NHLE 1084028	High	Indirect (non-physical) impact	Volume A6, Annex 5.1: Historic Environment Desk Based Assessment
39	Grosvenor Place	n/a	n/a	Conservation Area	N/A	High	Indirect (non-physical) impact	Volume A6, Annex 5.1: Historic Environment Desk Based Assessment
40	Beverley Limit Stone, Walkington Cross	n/a	n/a	Scheduled Monument	NHLE 1012591	High	Indirect (non-physical) impact	Volume A6, Annex 5.1: Historic Environment Desk Based Assessment
41	Butt Farm Scheduled Monument (anti-aircraft gunsight)	n/a	n/a	Scheduled Monument	NHLE 1019186	High	Indirect (non-physical) impact	Volume A6, Annex 5.1: Historic Environment

HP4 ID	Name	Priority Geophysical Survey Area	Aerial Photo/Lidar Assessment Ref.	Designation	HHER/NHLE Reference	Heritage Importance	Type of Impact Assessed	Figure/Annex Reference
								Desk Based Assessment
42	Beverley Sanctuary Limit Stone, Bentley Cross	n/a	n/a	Scheduled Monument	NHLE 1012590	High	Indirect (non-physical) impact	Volume A6, Annex 5.1: Historic Environment Desk Based Assessment
43	Cellar Heads moated site	n/a	n/a	Scheduled Monument	NHLE 1015312	High	Indirect (non-physical) impact	Volume A6, Annex 5.1: Historic Environment Desk Based Assessment
44	Risby Hall	n/a	n/a	Scheduled Monument and Grade II Registered Park & Garden	NHLE 1018600, 1001419	High	Indirect (non-physical) impact	Volume A6, Annex 5.1: Historic Environment Desk Based Assessment
45	Risby Hall Folly	n/a	n/a	Grade II Listed	NHLE 1161815	High	Indirect (non-physical) impact	Volume A6, Annex 5.1: Historic Environment Desk Based Assessment
46	Birkhill Woodland	n/a	n/a	Ancient Woodland	NE 1115368	Medium	Indirect (non-physical) impact	Volume A6, Annex 5.1: Historic

HP4 ID	Name	Priority Geophysical Survey Area	Aerial Photo/Lidar Assessment Ref.	Designation	HHER/NHLE Reference	Heritage Importance	Type of Impact Assessed	Figure/Annex Reference
								Environment Desk Based Assessment
47	Skidby Windmill and outbuildings	n/a	n/a	Grade II* (Mill) and Grade II Listed	NHLE 1103339 & 1276984	High	Indirect (non-physical) impact	Volume A6, Annex 5.1: Historic Environment Desk Based Assessment
48	Undated pit near buried archaeological remains HP4-49	58	n/a	Non-Designated	MHU12381	Low to medium	Direct (physical) impact	Figure 5.24
49	Site of two round barrows and Burn Park cropmark complex, Iron Age / Romano-British occupation.	58	APS_028	Non-Designated	MHU1381, 6599	Medium to High	Direct (physical) impact	Figure 5.24
50	Round Barrow cemetery north-east of Creyke Beck NGET Substation	n/a	n/a	Non-Designated and a Scheduled Monument	NHLE 1007731 and MHU833, 6618, 18737	Medium to High	Indirect (non-physical) impact	Volume A6, Annex 5.1: Historic Environment Desk Based Assessment
51	White Hall	n/a	n/a	Grade II Listed	NHLE 1161458	High	Indirect (non-physical) impact	Volume A6, Annex 5.1: Historic Environment Desk Based Assessment

HP4 ID	Name	Priority Geophysical Survey Area	Aerial Photo/Lidar Assessment Ref.	Designation	HHER/NHLE Reference	Heritage Importance	Type of Impact Assessed	Figure/Annex Reference
52	Old Hall and outbuildings	n/a	n/a	Grade II Listed	NHLE 1103419, 1103420 & 1346992	High	Indirect (non-physical) impact	Volume A6, Annex 5.1: Historic Environment Desk Based Assessment
53	Early Iron Age to Romano-British settlement complex.	32	APS_203, 313	Non-Designated	MHU8161	Low to Medium	Direct (physical) impact	Figure 5.10 and Figure 5.11-
54	Cropmarks of Iron Age/Romano-British enclosures and a post-medieval artesian well.	n/a	APS_163, 306	Non-Designated	MHU22336, 12881	Low to Medium	Direct (physical) impact	Figure 5.15 and Figure 5.16
55	Bronze Age round barrow and ditch.	n/a	n/a	Non-Designated	MHU3147	Low to High	Direct (physical) impact	Figure 5.15 and Figure 5.16
56	Beverley Sanctuary Limit Stone, Bishop Burton.	n/a	n/a	Scheduled Monument	NHLE 1012589	High	Direct (physical) impact and indirect (non-physical) impact	Figure 5.19 Volume A6, Annex 5.1: Historic Environment Desk Based Assessment
57	Cropmarks of an undated site (possibly associated with HP4-53).	n/a	APS_203	Non-designated	MHU7177	Low to Medium	Direct (physical) impact	Figure 5.10 and Figure 5.11

HP4 ID	Name	Priority Geophysical Survey Area	Aerial Photo/Lidar Assessment Ref.	Designation	HHER/NHLE Reference	Heritage Importance	Type of Impact Assessed	Figure/Annex Reference
58	Ridge and furrow earthworks.	n/a	APS_217, 224, 225, 227, 228	Non-Designated	Unrecorded	Low	Direct (physical) impact	Figure 5.8 and Figure 5.9
59	Square Barrows, south-east of Fraisthorpe.	n/a	APS_257	Non-Designated	MHU10044	Low to High	Direct (physical) impact	Figure 5.4 and Figure 5.5
60	Platwoods Farm	n/a	n/a	Non-designated	MHU7845	Low to Medium	Indirect (non-physical) impact	Volume A6, Annex 5.1: Historic Environment Desk Based Assessment
61	Church of Saint Mary, Cottingham	n/a	n/a	Grade I Listed	NHLE 1103394 and MHU4952	High	Indirect (non-physical) impact	Volume A6, Annex 5.1: Historic Environment Desk Based Assessment
62	Undated ring ditches and post-medieval field boundaries.	n/a	APS_202	Non-Designated	Unrecorded	Low to Medium	Direct (physical) impact	Figure 5.11
63	Possible enclosures and pit-like features (identified from geophysical survey), and Ridge and Furrow.	41	APS_157, 158, 159, 161, 165	Non-Designated	Unrecorded	Low to Medium	Direct (physical) impact	Figure 5.15- and Figure 5.16
64	A complex site comprising a trackway, ditches, pits, and curvilinear ditched features.	n/a	APS_140	Non-Designated	Unrecorded	Low to Medium	Direct (physical) impact	Figure 5.17

HP4 ID	Name	Priority Geophysical Survey Area	Aerial Photo/Lidar Assessment Ref.	Designation	HHER/NHLE Reference	Heritage Importance	Type of Impact Assessed	Figure/Annex Reference
65	Square enclosure (prehistoric).	n/a	APS_039	Non-Designated	Unrecorded	Low to Medium	Direct (physical) impact	Figure 5.23
66	Linear alignment of mounds (undated).	n/a	APS_034	Non-Designated	Unrecorded	Low to Medium	Direct (physical) impact	Figure 5.23
67	Group of ditches indicative of enclosures and field systems.	58	APS_012, 013	Non-Designated	Unrecorded	Low to Medium	Direct (physical) impact	Figure 5.23- and Figure 5.24
68	Possible enclosures adjacent to a former palaeochannel, post-medieval field boundaries.	58	APS_026, 030	Non-Designated	Unrecorded	Low to Medium	Direct (physical) impact	Figure 5.23- and Figure 5.24
69	Undated field system.	n/a	APS_053	Non-Designated	Unrecorded	Low	Direct (physical) impact	Figure 5.21

Hornsea Four

Figure 5.2

Heritage Assets Identified as Key to Hornsea Four Study Area

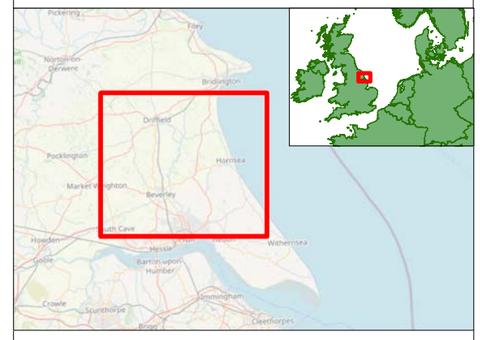
490000 500000 510000 520000

460000 450000 440000 430000

N

GRID NORTH

- Order Limits
- Historic Environment Onshore ECC 500m Study Area
- Historic Environment Onshore ECC 1km Study Area
- Historic Environment OnSS 5km Study Area
- Key Heritage Assets Point
- Key Heritage Assets Poly
- Key Heritage Assets Line



Coordinate system: British National Grid

Scale@A3: 1:130,000

0 1.5 3 6 Kilometres

0 0.75 1.5 3 Miles

REV	REMARK	DATE
	First Issue for PEIR	20/06/2019
A	Updated following PEIR consultations, for DCO	19/07/2021

Title: Heritage Assets Identified as Key to Hornsea Four Study Area

Document no: HOW04RH0001

Created by: AZ

Checked by: PM

Approved by: CS

Royal HaskoningDHV

Ørsted

Date: 19/07/2021 Author: 303273 Name: HOW04RH0001_KeyHeritageAssets

5.7.12 Evolution of the Baseline

5.7.12.1 The Infrastructure Planning (Environmental Impact Assessment) Regulations 2017 require that "an outline of the likely evolution thereof without implementation of the development as far as natural changes from the baseline scenario can be assessed with reasonable effort on the basis of the availability of environmental information and scientific knowledge" is included within the ES (EIA Regulations, Schedule 4, Paragraph 3). From the point of assessment, over the course of the development and operational lifetime of the Hornsea Four (operational lifetime anticipated to be 35 years), long-term trends mean that the condition of the baseline environment is expected to evolve. This section provides a qualitative description of the evolution of the baseline environment, on the assumption that Hornsea Four is not constructed, using available information and specialist technical knowledge of the historic environment.

5.7.12.2 The future baseline scenario without Hornsea Four is expected to change adversely in the future due to several factors. Changes would occur within the OnSS study area through further development work, particularly around Hull and Beverley, which could impact buried archaeological remains and built heritage assets (e.g. impacts through changes in setting). Other changes to known and potential buried archaeological remains would also occur, mostly within the onshore ECC study area, through a continuation of modern agricultural practices. Modern agricultural practices, particularly modern ploughing and drainage techniques within arable fields have the potential to result in the gradual degradation and / or disturbance of sub-surface archaeological remains. Given that the study area extends across a rural landscape, the physical impacts upon buried archaeological remains are considered likely to have largely occurred. Depending on the depths of modern farming practices, it is possible that ongoing impacts are occurring, resulting in new and further loss and / or disturbance, especially where deep ploughing activity is employed.

5.7.12.3 In broader terms, the historic environment is vulnerable to the effects of climate change (Atkins, 2013). Increased coastal erosion, inland water inundation, extremes of wetting and drying, and increased fire risk from warmer conditions all present a significant risk to heritage assets which is increasing due to climate change. Similarly, changes in the environment (e.g. alteration in the type and range of flora and fauna) has the potential to alter the setting of heritage assets, which could affect its significance. Furthermore, buried archaeological remains are particularly sensitive to climate change. For example, changes in ground water levels due to drought has the potential to significantly damage palaeoenvironmental remains and the preservation of archaeological remains.

5.7.12.4 One of the main elements of climate change relevant to the historic environment within the onshore ECC study areas are those associated with sea level changes and the effects of coastal erosion. This could significantly impact the World War II assets along the coastline. Erosion was clearly noticeable along the coast at landfall during the walkover survey and further coastal erosion processes will result in the destruction and loss of some of the heritage assets, such as the pillboxes located on the edge of the cliffs along the coast. Erosion of the other World War II concrete objects along the beach will also occur. Although

this is a relatively limited change, with in fact minimal erosion occurring over the previous 70 years, they are still vulnerable to for example storm events.

5.7.12.5 Coastal erosion has the potential to destroy buried archaeological remains located along or within the coastline. As the cliff erodes, buried archaeological remains located within the fields adjacent to the coast will also erode, destroying the remains before there is the opportunity for them to be recorded (e.g. HP4--02, **Figure 5.4**).

5.7.12.6 Increased flood risk due to climate change is another important consideration. Holderness is a very low lying, flat landscape and heritage assets within the area are at risk of flooding due to increased storms or coastal inundations. These floods can have a major effect upon buried archaeological remains and built heritage. In particular, floods can cause costly damage to historic buildings in low lying areas.

5.7.12.7 Overall, the degree of change in the future baseline condition for the historic environment is difficult to predict. It is expected to undergo a gradual negative change however, for the reasons outlined above.

5.7.13 Data Limitations

5.7.13.1 The HHER is not a complete record, as it relies on non-designated assets being recorded and reported. Dependant on how much archaeological work has been undertaken in an area and whether findspots have been reported, limits what level of records may be held within the HHER. Similarly, unknown heritage assets are being found regularly, as part of new developments or new local research. As such, the HHER is not a complete and final record and does not preclude further heritage assets being found in the future.

5.8 Project basis for assessment

5.8.1 Impact register and impacts "Not considered in detail in the ES"

5.8.1.1 Upon consideration of the baseline environment, the project description outlined in **Volume A1, Chapter 4: Project Description**, the Hornsea Four Commitments (**Volume A4, Annex 5.2: Commitments Register**) and response to formal consultation on the PEIR, all indirect (non-physical) impacts on designated and non-designated heritage assets are "Not considered in detail in the ES". These impacts are outlined, together with a justification for why they are not considered further, in **Table 5.6**, which should be read in conjunction with **Volume A4, Annex 5.1: Impacts Register**.

5.8.1.2 In July 2019, Highways England issued an update to the Design Manual for Roads and Bridges (DMRB) significance matrix (see **Volume A1, Chapter 5: Environmental Impact Assessment Methodology**). Impacts formerly assessed within the category medium sensitivity and minor magnitude, as Minor (Not Significant), under the new guidance are now within the significance range of Slight or Moderate and therefore require professional judgement. Following a review of impacts, it was considered that the changes do not alter the overall significance of the impacts assessed at Scoping and in the PEIR (see **Volume A4, Annex 5.1: Impacts Register**). Therefore, impacts assessed as not significant at PEIR have

not been considered in detail within this ES chapter, unless there has been a material change to Hornsea Four, baseline characterisation, or the assessment methodology that necessitates re-assessment.

5.8.1.3 Subsequent to PEIR and the route refinement process, a single Scheduled Monument (HP4-56 – Beverley Sanctuary Limit Stone, Bishop Burton) is located within the Hornsea Four Order Limits For this reason, direct (physical) impacts on designated heritage assets has been assessed within this ES chapter. All other designated heritage assets have been avoided by the Order Limits as detailed in Commitment Co2 (**Volume A4, Annex 5.2: Commitments Register**).

Table 5.6: Historic environment impact register - Impacts scoped out of assessment and justification.

Project activity and impact	Likely significance of effect	Approach to assessment	Justification
Direct (physical) impacts on designated heritage assets: Decommissioning phase (HE-D-7)	Not significant	Not considered in detail in the ES	All above ground infrastructure will be removed and the land reinstated (see **Volume A1, Chapter 4: Project Description** for further details). All project mitigation and commitments apply for decommissioning and a decommissioning plan will be developed in line with the latest relevant available guidance (Co127) (**Volume A4, Annex 5.2: Commitments Register**). The conclusion of No LSE is set out in **Volume A4, Annex 5.1: Impact Register**.
Direct impacts on non-designated heritage assets: Decommissioning phase (HE-D-8)	Not significant	Not considered in detail in the ES	
Indirect impacts on designated heritage assets: Decommissioning phase (HE-D-9)	Not significant	Not considered in detail in the ES	
Indirect impacts on non-designated heritage assets: Decommissioning phase (HE-D-10)	Not significant	Not considered in detail in the ES	
Indirect (non-physical) impacts on designated heritage assets: Construction Phase (HE-C-2)	Not significant	Not considered in detail in the ES. No likely significant effect identified at PEIR.	As set out in **Section 5.5.1.5**, changes to the Order Limits since PEIR have not had a material impact on the assessment. The setting assessment to reflect the design changes is presented in **Volume A6, Annex 5.1: Historic Environment Desk Based Assessment**. This approach was agreed with Historic England on the 14th November 2019 (ON-HIS-5.4). In addition to this, following the change in the basis for assessment in the ES (i.e. the change to the updated DMRB assessment methodology) this impact is considered 'slight' (not significant)

Project activity and impact	Likely significance of effect	Approach to assessment	Justification
			and is therefore not considered in detail in the ES. A new access will be taken directly from the A1079, to route construction traffic away from Cottingham (designated as a Conservation Area and comprising a number of Listed Buildings, a Scheduled Monument and Registered Park and Garden) as detailed in Commitment Co150.
Indirect (non-physical) impacts on non-designated heritage assets: Construction Phase (HE-C-4)	Not significant	Not considered in detail in the ES. No likely significant effect identified at PEIR.	As set out in **Section 5.5.1.5**, changes to the Order Limits since PEIR have not had a material impact on the assessment. The setting to reflect the design changes and is presented in **Volume A6, Annex 5.1: Historic Environment Desk Based Assessment**. This approach was agreed with Historic England on the 14th November 2019 (ON-HIS-5.4). In addition to this, following the change in the basis for assessment in the ES (i.e. the change to the updated DMRB assessment methodology) this impact is considered 'slight' (not significant) and is therefore not considered in detail in the ES. A new access will be taken directly from the A1079, to route construction traffic away from Cottingham (designated as a Conservation Area and comprising a number of Listed Buildings, a Scheduled Monument and Registered Park and Garden) as detailed in Commitment Co150.
Indirect (non-physical) impacts on designated heritage assets: Operation Phase (HE-O-5) .	Not significant	Not considered in detail in the ES. No likely significant effect identified at PEIR.	As set out in **Section 5.5.1.5**, changes to the Order Limits since PEIR have not had a material impact on the assessment. The setting assessment to reflect the design changes and is presented in **Volume A6, Annex 5.1: Historic Environment Desk Based Assessment**. This approach was agreed with Historic England on the 14th November 2019 (ON-HIS-5.4).

Project activity and impact	Likely significance of effect	Approach to assessment	Justification
			In addition to this, following the change in the basis for assessment in the ES (i.e. the change to the updated DMRB assessment methodology) this impact is considered 'slight' (not significant) and is therefore not considered in detail in the ES.
Indirect (non-physical) impacts on non-designated heritage assets: Operation Phase (HE-O-6)	Not significant	Not considered in detail in the ES. No likely significant effect identified at PEIR.	As set out in Section 5.5.1.5, changes to the Order Limits since PEIR have not had a material impact on the assessment. The setting assessment to reflect the design changes and is presented in Volume A6, Annex 5.1: Historic Environment Desk Based Assessment. This approach was agreed with Historic England on the 14th November 2019 (ON-HIS-5.4).. In addition to this, following the change in the basis for assessment in the ES (i.e. the change to the updated DMRB assessment methodology) this impact is considered 'slight' (not significant) and is therefore not considered in detail in the ES.

Notes:
Red – Potential impact is not considered in detail in the ES with no consensus between PINS and Hornsea Four at EIA Scoping and further justification provided during the pre-application stage.
Purple - Not considered in detail in the ES. No likely significant effect identified at PEIR.

5.8.2 Commitments

5.8.2.1 Hornsea Four has adopted commitments (primary design principles inherent as part of Hornsea Four, installation techniques and engineering designs/modifications) as part of its pre-application consultation and design phase, to eliminate and/or reduce the likely significant effect (LSE) of a number of impacts. These are outlined in Volume A4, Annex 5.2: Commitments Register. Further commitments (adoption of best practice guidance), referred to as tertiary commitments in Table 5.7 below, are embedded as an inherent aspect of the EIA process. Secondary commitments are incorporated to reduce LSE to environmentally acceptable levels following initial assessment i.e. so that residual effects are reduced to environmentally acceptable levels.

5.8.2.2 The commitments adopted by Hornsea Four that relate to the historic environment are presented in Table 5.7.

Table 5.7: Relevant Historic Environment Commitments.

Commitment ID	Measure Proposed	How the measure will be secured
Co2	Primary: A range of sensitive historical, cultural and ecological conservation areas (including statutory and non-statutory designations) have been directly avoided by the permanent Hornsea Four footprint, at the point of Development Consent Order Submission (DCO). These include, but are not restricted to: Listed Buildings (564 sites); Scheduled Monuments (30 sites) with the exception of Beverley Sanctuary Limit Stone, Bishop Burton; Registered Parks and Gardens (Thwaite Hall and Risby Hall); Onshore Conservation Areas (18 sites); Onshore National Site Network s (one site); Offshore National Site Network (three sites); Offshore Marine Conservation Zones (two sites); Sites of Special Scientific Interest (two sites); Local Nature Reserves (none have been identified); Local Wildlife sites (33 sites); Yorkshire Wildlife Trust Reserves (none have been identified); Royal Society for the Protection of Birds (RSPB) Reserves (none have been identified); Heritage Coast; National Trust land; Ancient Woodland (10 sites and known Tree Preservation Orders (TPOs)); non-designated built heritage assets (334 sites); and historic landfill (none have been identified). Where possible, unprotected areas of woodland, mature and protected trees (i.e. veteran trees) have and will also be avoided.	DCO Works Plan - Onshore
Co7	Primary: The construction work area associated with onshore export cable corridor will be 80 m working width to minimise the construction footprint, except at the Network Rail Crossing near Beswick, the approach to landfall and the approach to the onshore substation. At the Network Rail Crossing the working width is extended up to 120 m to facilitate HDD of the railway line. The permanent onshore export cable corridor width will be 60 m except where obstacles are encountered such as the Network Rail Crossing near Beswick (where the permanent footprint may be extended up to 120 m to facilitate HDD of the railway line), and on the approach to the landfall and onshore substation.	DCO Works Plan - Onshore
Co25	Primary: The onshore export cable corridor (inclusive of the 400 kV export cables) will be completely buried underground for its entire length. No overhead pylons will be installed as part of the consented works for Hornsea Four.	DCO Schedule 1, Part 1 Authorised Development
Co26	Primary: Where hedgerows and/or trees require removal, this will be undertaken prior to topsoil removal. Sections of hedgerows and trees which are removed will be replaced using like for like hedgerow species.	DCO Requirement 17 (CoCP); and; DCO Requirement 10 (Ecological Management Plan)

Commitment ID	Measure Proposed	How the measure will be secured
Co28	Primary: Joint Bays will be completely buried, with the land above reinstated except where access will be required from ground level, e.g. via link box chambers and manholes.	DCO Requirement 17 (CoCP) DCO Requirement 20 (Restoration of land used temporarily for construction)
Co30	Secondary: A Landscape Management Plan will be developed in accordance with the outline Landscape Management Plan. The Landscape Management Plan will include details of mitigation planting at the onshore substation site, including number, location, species and details of management and maintenance of planting. Where practical, landscape mitigation planting will be established as early as reasonably practicable in the construction phase.	DCO Requirement 8 (Provision of landscaping)
Co69	Secondary: Construction site lighting will only operate when required and will be positioned and directed to avoid unnecessary illumination to residential properties, sensitive ecological receptors, footpath users, and minimise glare to users of adjoining public highways. Construction site lighting will be designed in accordance with latest relevant available guidance and legislation and the details of the location, height, design and luminance of lighting to be used will be detailed within the final Code of Construction Practice. The design of construction site lighting will accord with the details provided in the outline Code of Construction Practice (Co124) and outline Ecological Management Plan (Co168).	DCO Requirement 17 (CoCP) DCO Requirement 10 (Ecological Management Plan)
Co124	Tertiary: A Code of Construction Practice (CoCP) will be developed in accordance with the outline CoCP. The outline CoCP will include measures to reduce temporary disturbance to residential properties, recreational users, and existing land users.	DCO Requirement 17 (CoCP)
Co127	Tertiary: An Onshore Decommissioning Plan will be developed prior to decommissioning in a timely manner. The Onshore Decommissioning Plan will include provisions for the removal of all onshore above ground infrastructure and the decommissioning of below ground infrastructure and details relevant to flood risk, pollution prevention and avoidance of ground disturbance. The Onshore Decommissioning Plan will be in line with the latest relevant available guidance.	DCO Requirement 24 (Onshore decommissioning)
Co145	Primary: Views of Beverley Minster from the A1079 will not be obstructed by the siting of the onshore substation.	DCO Requirement 7 (Detailed design approval onshore)
Co150	Primary: A new temporary and permanent access for the onshore substation, and temporary construction access for the onshore export cable corridor will be taken directly from the A1079, to route construction and operation and maintenance traffic away from Cottingham and Dunswell.	DCO Requirement 18 (Construction traffic management plan)

Commitment ID	Measure Proposed	How the measure will be secured
Co151	Primary: No above ground infrastructure associated with Hornsea Four will obstruct the view from St Mary's Church Cottingham to Beverley Minister through considered design of the OnSS and site selection.	DCO Requirement 7 (Detailed design approval onshore)
Co159	Secondary: Operational noise from the onshore substation will be at a noise level no greater than 5dB above the representative background ($L_{A90,T}$) during the day time and night at the identified noise Sensitive Receptors, as stated within the onshore noise assessment (document reference A3.8).	DCO Requirement 21 (Control of noise during operational phase)
Co160	Secondary: An Onshore Archaeological Written Scheme of Investigation (WSI) will be developed in line with an outline Onshore Archaeological Written Scheme of Investigation (WSI). The onshore WSI will detail the survey and archaeological mitigation requirements in advance of and during construction.	DCO Requirement 16 (Onshore archaeology)
Co193	Secondary: Operational site lighting at the onshore substation will be designed in accordance with latest relevant available guidance and legislation and the details of the location, height, design and luminance of lighting to be used will be provided as part of detailed design for the onshore substation. The design of operation site lighting will accord with the details provided in the outline Design Plan (Co195) and outline Ecological Management Plan (Co168).	DCO Requirement 8 (Detailed design approval onshore)
Co195	Secondary: Detailed design will be developed for the Onshore Substation in accordance with the outline Design Plan which will include details regarding design and access. Examples of such detailed design information includes (but are not limited to): building heights and form; site layout; external appearance and colours; vehicular and pedestrian access.	DCO Requirement 8 (Detailed design approval onshore)

5.9 Maximum Design Scenario

5.9.1.1 This section describes the parameters on which the historic environment assessment has been based. These are the parameters which are judged to give rise to the maximum levels of effect for the assessment undertaken, as set out in **Volume A3, Chapter 4: Project Description** on historic environment sensitive receptors. Should Hornsea Four be constructed to different parameters within the design envelope, then impacts would not be any greater than those set out in this ES using the MDS presented in **Table 5.8**.

Table 5.8: Maximum design scenario for impacts on the historic environment.

Impact and Phase	Embedded Mitigation Measures	Maximum Design Scenario / Rochdale Envelope	Justification
Construction			
Direct (physical) impacts on designated heritage assets. Construction activities which may lead to disturbance of or removal of assets. (HE-C-1)	Primary: Co2 Co7 Tertiary: Co124 Secondary: Co160	**Onshore Export Cable Corridor:** • Construction duration: 30 months • Primary logistics compounds: Number: 1, Size: 140x140 m, Duration: 36 months • Secondary Logistics compounds: Number: 7, Size: 90x90 m, Duration: 36 months • ECC: Length: 39 km (approximate), Width: 80 m, Area: 3,120,000 m^2 • Number of cable circuits (HVAC system): 6 • Cable trench: Depth: 1.5 m, Width at base: 1.5 m, Width at surface: 5 m • Haul Road: Number: 1, Width: 6 m (with 7 m passing places), Length: 39 km, Maximum Depth: 1 m, Average Depth: 0.4 m • Temporary access roads: Number: 36, Width: 6 m (with 7 m passing places), Maximum Depth: 1m, Average Depth: 0.4 m • HDDs: Number: 112, HDD compounds (entry and exit):224 70x70 m compounds, HDD compounds hardstanding: 46 50x50 m (at approximately 20% of all HDD locations)	These parameters present the maximum disturbances which could impact the Scheduled Monument (HP4-56) within the onshore ECC.
Direct (physical) impacts on non-designated heritage assets. Construction activities which may lead to disturbance of or removal of assets. (HE-C-3)	Primary: Co2 Co7 Tertiary: Co10 Co124 Secondary:	**Landfall:** • Landfall compound: Number: 1, Total Area: 40,000 m^2, Duration: 32 months • Transition Joint Bays (located within Landfall compound area): Number: 8, Depth: 6 m Trenchless techniques (deeply buried archaeology MDS): • HDD cable ducts: Number: 8, Diameter: 1m, Length: 1.5 km • HDD Entry Pits: Area: 125 m^2 per entry pit, Depth: 6 m • HDD burial depth: Maximum: 40 m, Minimum: 5 m • HDD Exit Pits: Number: 8, Area: 900 m^2 per exit pit, Depth: 5 m • Temporary onshore/intertidal exit pit working area: 1,600 m^2 per exit pit	These parameters present the maximum below ground disturbances which could occur on buried archaeological and geoarchaeological remains at the landfall, onshore ECC, OnSS, Energy Balancing Infrastructure and 400

Impact and Phase	Embedded Mitigation Measures	Maximum Design Scenario / Rochdale Envelope	Justification
	Co160	**Onshore Export Cable Corridor:** • Construction duration: 30 months • Primary logistics compounds: Number: 1, Size: 140x140 m, Duration: 36 months • Secondary Logistics compounds: Number: 7, Size: 90x90 m, Duration: 36 months • ECC: Length: 39 km (approximate), Width: 80 m, Area: 3,120,000 m^2 • Number of cable circuits (HVAC system): 6 • Cable trench: Depth: 1.5 m, Width at base: 1.5 m, Width at surface: 5 m • Haul Road: Number: 1, Width: 6 m (with 7 m passing places), Length: 39 km, Maximum Depth: 1 m, Average Depth: 0.4 m • Temporary access roads: Number: 36, Width: 6 m (with 7 m passing places), Maximum Depth: 1 m, Average Depth: 0.4 m • Distance between Joint Bay/ Link Box: Minimum: 750 m, Maximum: 3,000 m • Joint Bays: Number: 240, Depth 2.5 m, Area: 225 m^2 per Joint Bay, Joint Bay compounds: 240 40x40 m compounds • Link Boxes: Number: 240, Depth: 2 m, Area: 9 m^2 per Link Box • HDDs: Number: 112, HDD compounds (entry and exit):224 70x70 m compounds, HDD compounds hardstanding: 46 50x50 m (at approximately 20% of all HDD locations) **Onshore Substation and Energy Balancing Infrastructure:** • Construction duration: 43 months • Permanent infrastructure area: 164,000 m^2 • Temporary works area: 130,000 m2 • Temporary access road: Number: 1, Length: 1,800 m, Width: 15 m (7 m road, 8 m soil storage)	kV export cable including temporary compounds and access routes.

Impact and Phase	Embedded Mitigation Measures	Maximum Design Scenario / Rochdale Envelope	Justification
		400 kV NGET connection area: • Number of cable circuits: 4 • Cable trench depth: 1.5 m • Approximate Length: 1 km • Width: 60 m	
Operation			
Not considered in detail in the ES			
Decommissioning			
Not considered in detail in the ES			

5.10 Assessment methodology

5.10.1 Impact assessment criteria

5.10.1.1 The criteria for determining the significance of effects is a two-stage process that involves defining the sensitivity (heritage importance) of the heritage assets and the magnitude of the impacts (equivalent to degree of harm to heritage significance). This section describes the criteria applied in this chapter to assign values to the sensitivity of receptors (importance of assets) and the magnitude of potential impacts. The terms used to define sensitivity (importance) and magnitude are based on those used in the DMRB methodology, which is described in further detail in **Volume A1, Chapter 5: EIA Methodology**.

5.10.1.2 The use of direct or indirect impact has followed the methodology set out within the Scoping Report (Orsted 2018). In summary, direct is used where the impact could cause a physical change (via excavation, change in hydrology, etc.) to an asset through removal or disturbance or change of the asset's fabric (which could impact their heritage significance). Indirect has been used where the impact could cause a non-physical change to a heritage asset (e.g. through an alteration to the setting of an asset, which could impact heritage significance).

5.10.1.3 **Table 5.9** contains criteria for defining sensitivity (heritage importance). For this chapter, sensitivity directly relates to the heritage importance of an asset. This is in part identified through consideration of the asset's significance which comprises one or a combination of its historic, archaeological, architectural and artistic interests.

5.10.1.4 Heritage significance is specifically defined as '*the value of a heritage asset to this and future generations because of its heritage interest. The interest* [as above] *may be archaeological, architectural, artistic or historic. Significance derives not only from a heritage asset's physical presence, but also from its setting.*' (NPPF 2019, Annex 2). The *importance* of a heritage asset is a measure of the degree to which the protection of an asset is sought (e.g. through protection via legislation, policy or the weight given to them in planning decisions).

5.10.1.5 The examples used in **Table 5.9** are only general and in some instances are indicative only. Non-designated heritage assets can (in certain circumstances) be as significant and important as designated heritage assets. Some heritage assets, principally buried archaeological remains, will often have limited information known about them (e.g. through a lack of archaeological evaluation/investigation) to confidently identify their heritage significance and likely importance. As such, where uncertainty occurs, the precautionary approach is to assign the highest likely level of importance. This is to ensure impacts to them are not underestimated. Where this is the case, the heritage importance will often be given in a range, e.g. low to medium or low to high, with the higher end used in consideration of the significance of effect when combined with impact magnitude.

Table 5.9: Definition of terms relating to receptor sensitivity (Heritage Importance).

Sensitivity (Heritage Importance)	Definition used in this chapter
Very High	Perceived international heritage importance. For example: World Heritage Sites and some Scheduled Monuments and Grade I and II* Listed Buildings and Registered Parks and Gardens Significance is related to an outstanding or very high degree of evidential, archaeological, historic, aesthetic, architectural or communal heritage interest, or combination of these.
High	Perceived national heritage importance. For example: Scheduled Monuments, Grade I, II* and II Listed Buildings, Registered Parks and Gardens and Conservation Areas. Significance is related to a high degree of evidential, archaeological, historic, aesthetic, architectural or communal heritage interest, or combination of these.
Medium	Perceived regional heritage importance. For example: some buried archaeological remains, 'locally listed' buildings or structures, and locally designated historic landscapes. Significance related to a moderate degree of evidential, archaeological, historic, aesthetic, architectural or communal heritage interest, or combination of these.
Low	Perceived local heritage importance. For example: assets which contribute to local research objectives, assets with a local value, educational interest or cultural appreciation, assets which may have been heavily compromised by poor preservation or poor contextual associations. Significance related to a certain (lower) level of evidential, archaeological, historic, aesthetic, architectural or communal heritage interest, or combination of these.

5.10.1.6 The criteria for defining magnitude of impact in this chapter are outlined in **Table 5.10**.

Table 5.10: Definition of terms relating to magnitude of an impact.

Magnitude of impact	Definition used in this chapter
Major	Total loss of, or substantial harm to, a heritage asset and / or its setting (adverse).
	Improvement to a heritage asset's significance, through restoration, enhancement or increased ability to appreciate that significance (beneficial).
Moderate	Partial loss of, harm to, or alteration of, a heritage asset and / or its setting which will detrimentally affect its significance (adverse).

Magnitude of impact	Definition used in this chapter
	An enhancement to a heritage asset and / or its setting which affects its significance, or ability to appreciate the significance, moderately (beneficial).
Minor	Minor loss of or alteration to an asset and / or its setting which leaves its significance largely intact (adverse).
	Minor beneficial improvement to a heritage asset and / or its setting which provides some benefit to the historic environment (beneficial).
Negligible	Minimal alteration to an asset which does not affect its significance in any notable way (adverse or beneficial).

5.10.1.7 The significance of the effect upon the historic environment is determined by correlating the magnitude of the impact and the sensitivity (heritage importance) of the receptor (heritage asset). The method employed for this assessment is presented in **Table 5.11**. Where a range of significance of effect is presented in **Table 5.11**, the final assessment for each effect is based upon professional judgement.

5.10.1.8 For the purposes of this assessment, any effects with a significance level of slight or less are considered not significant in EIA terms.

Table 5.11: Matrix used for the assessment of the significance of the effect.

		Magnitude of impact (degree of change)			
		Negligible	*Minor*	*Moderate*	*Major*
Environmental value (sensitivity)	*Low*	Neutral or Slight (Not Significant)	Neutral or Slight (Not Significant)	Slight (Not Significant)	Slight (Not Significant) or Moderate (Significant)
	Medium	Neutral or Slight (Not Significant)	Slight (Not Significant) or Moderate (Significant)	Moderate or Large (Significant)	Moderate or Large (Significant)
	High	Slight (Not Significant)	Slight (Not Significant) or Moderate (Significant)	Moderate or Large (Significant)	Large or Very Large (Significant)
	Very High	Slight (Not Significant)	Moderate or Large (Significant)	Large or Very Large (Significant)	Very Large (Significant)

5.11 Impact assessment

5.11.1 Construction

5.11.1.1 The impacts of the onshore construction of Hornsea Four have been assessed on the historic environment. The potential significant environmental impacts arising from the construction of Hornsea Four are listed in **Table 5.8** along with the maximum design scenario against which each construction phase impact has been assessed.

5.11.1.2 A description of the potential significance of effect on heritage assets caused by each identified impact (also described) is given below. In general terms, any intrusive groundwork associated with site preparation and construction of the landfall, the onshore ECC, the OnSS and 400 kV NGET connection area, inclusive of any temporary works areas, could result in physical damage and partial or complete removal of heritage assets such as structures, earthworks, buried archaeology, geoarchaeology or palaeoenvironmental remains.

Direct Impacts on designated heritage assets (HE-C-1).

5.11.1.3 Direct (physical) impacts could occur to the Beverley Sanctuary Limit Stone, Bishop Burton (HP4-56) located within the onshore ECC to the south of York Road. The types of construction-related activities which could directly impact this Scheduled Monument (and its associated heritage significance) are, but not limited to:

- Removal of topsoil within the onshore ECC;
- Open-cut excavation of the cable trenches within the onshore ECC;
- Excavation of joint bays, HDD pits and link boxes along the onshore ECC;
- Groundworks associated with temporary works area along the onshore ECC;
- Groundworks associated with other infrastructure for the project (i.e. temporary access points, new drainage etc.);
- Vibration from HDD drilling and other intrusive groundworks; and
- Accidental damage from plant movement and other construction traffic.

5.11.1.4 Any direct (physical) impact to the Beverley Sanctuary Limit Stone (HP4-56) (and its associated heritage significance) should be weighed against the public benefit of development, recognising that the greater the harm to the significance of the heritage asset the greater the justification will be needed for any loss (EN-1, paragraph 5.8.15). Any direct (physical) impact could be permanent and irreversible. If disturbed or removed without an appropriate record having been made, their context and relationship to other heritage assets is partially or completely lost and their heritage significance is as such likely to be reduced.

Magnitude of impact

5.11.1.5 Direct (physical) impacts have the potential to partially or completely disturb the Beverley Sanctuary Limit Stone (HP4-56). Heritage significance could be lost or partially lost. Therefore, the magnitude of direct (physical) impact upon this designated heritage asset is considered **moderate** to **major** adverse, as a likely worst-case.

Sensitivity of the receptor

5.11.1.6 The Beverley Sanctuary Limit Stone (HP4-56) is considered to have a **high** heritage importance.

Significance of the effect

5.11.1.7 In consideration of the high heritage importance of the designated heritage asset within the Hornsea Four Order Limits, there is the potential for permanent **moderate** or **very large adverse** effects upon this asset, prior to any mitigation, an impact which would be considered significant in EIA terms.

Further mitigation: built heritage

5.11.1.8 The Beverley Sanctuary Limit Stone (HP4-56) is located next to York Road. As per Co1 (**Volume A4, Annex 5.2: Commitment Register**), all main roads are to be crossed via HDD or other trenchless technology as set out in **Volume A4, Annex 4.2: Onshore Crossing Schedule**. This will avoid any direct physical impact upon the asset, as the cables will be drilled beneath the road and beyond the location (to the south) of the Scheduled Monument.

5.11.1.9 A wooden fence is located around the Scheduled Monument to prevent damage from current agricultural activities within the field. However additional fencing and signage identifying an exclusion zone will be erected to avoid any accidental damage to the designated heritage asset. The requirements and extent of the exclusion zone will be identified and agreed with the heritage stakeholders prior to construction.

5.11.1.10 With these mitigation measures in place, alongside the Commitments set out by Hornsea Four, it is considered that the residual level of impact would be reduced to **negligible**. This would reduce the overall impact significance to **slight** which is considered non-significant in EIA terms.

5.11.1.11 These mitigation measures are secured through the Onshore WSI (Co160) and CoCP (Co124). An outline Onshore WSI (**Volume F2, Chapter 10: Outline Onshore WSI**) and outline CoCP (**Volume F2, Annex 2: Outline Code of Construction Practice**) are submitted as part of the DCO application.

Direct Impacts on non-designated heritage assets (HE-C-3).

5.11.1.12 Direct (physical) impacts could occur as a result of intrusive groundworks and other construction-related activities associated with the construction works at the landfall, onshore ECC, OnSS and 400 kV NGET connection area. The construction-related works could impact upon the significance of known or as-yet unknown non-designated heritage assets including buried geoarchaeological and archaeological remains, historic earthworks and structures. The types of construction-related activities which could directly impact these types of heritage assets (and their associated heritage significance) are, but not limited to:

- Removal of topsoil and subsoil within the Hornsea Four Order Limits;
- Excavation of Transition Joint Bays (TJBs) at the landfall;
- Open-cut excavation of the cable trenches within the onshore ECC;
- Excavation of joint bays, HDD pits and link boxes along the onshore ECC;

- Groundworks associated with temporary works areas at landfall, along the onshore ECC, OnSS and 400 kV NGET connection area;
- Groundworks associated with other infrastructure for the project (i.e. new roads, temporary access points, new drainage etc.);
- Intrusive groundworks associated with the construction of the OnSS; and
- Hydrological changes as a result of intrusive works including HDD drilling.

5.11.1.13 Any direct (physical) impacts to non-designated heritage assets (and their associated heritage significance) would be permanent and irreversible. In particular, once buried archaeological and geoarchaeological remains, as well as earthworks/built heritage assets, are disturbed or removed without an appropriate record having been made, their context and relationship to other archaeological features and deposits is partially or completely lost and their heritage significance is as such likely to be reduced.

5.11.1.14 The non-designated heritage assets (**Figure 5.2**) identified as being potentially subject to direct (physical) impact by Hornsea Four, and areas where there is a high potential for other buried non-designated heritage assets to survive in association with the known non-designated heritage assets are detailed in **Table 5.5**.

5.11.1.15 There is a potential for further, as yet, unknown non-designated heritage assets (i.e. archaeological sites) to be identified within the Order Limits following further non-intrusive evaluation work (geophysical surveys) and subsequent intrusive evaluation (trial trenching) post-consent, at the relevant juncture, which will be agreed with ERYC and heritage stakeholders. This is in part due to the large amount of buried archaeological remains and findspots already identified and recorded by HHER within the study areas, and large areas of the onshore ECC not having been subject to previous development or ground intrusive impacts.

5.11.1.16 Certain areas will likely be 'quieter' or contain no remains or remains of lesser importance (e.g. post-medieval boundaries already recorded on historic mapping) than other areas. An indication of this has been made from the findings of the Priority Archaeological Geophysical Survey (**Volume A6, Annex 5.3: Priority Archaeological Geophysical Survey**)and Aerial Photographic and Lidar Assessment (**Volume A6, Annex 5.2: Aerial Photographic and Lidar Assessment Technical Report**), where some areas have little evidence for buried archaeological remains, or only evidence for furrows or post-medieval boundary ditches. This will ultimately be confirmed through ground truthing, again as part of subsequent future intrusive evaluation (trial trenching) post-consent at the relevant juncture, agreed with Hornsea Four and the heritage stakeholders.

5.11.1.17 Two broad areas of high geoarchaeological potential (**Volume A6, Annex 5.4: Geoarchaeological Desk Based Assessment**) have currently been identified between:

- Fraisthorpe to North Pasture Farm; and
- North Pasture Farm to Rotsea.

5.11.1.18 In terms of potential hydrological changes to geoarchaeological or archaeological deposits caused by any intrusive groundworks, the Geoarchaeological Assessment (**Volume A6, Annex 5.4: Geoarchaeological Desk Based Assessment**) and **Chapter 2: Hydrology and Flood Risk** have identified that the depth of excavation work is one that could result in localised changes to groundwater. Deeper groundwater is not affected. As such, hydrological changes are expected within the direct locality of the cable trenches (which are 1.5 m deep), with any potentially deeper geoarchaeological deposits not affected by hydrological changes.

5.11.1.19 The built heritage resource potentially affected include the World War II pillboxes and anti-tank cubes located at the landfall (HP4-01 and 02) and the concrete tracks associated with Lissett Airfield (HP4-06**,** **Figure 5.7**) along the onshore ECC. A pillbox is located within the centre of a field at landfall, along with another located on the field boundary at landfall (**Figure 5.2**). The anti-tank cubes are in linear sections along the beach, within the intertidal zone (see **Volume A2, Chapter 9: Marine Archaeology**).

Magnitude of impact

5.11.1.20 Direct (physical) impacts have the potential to partially or completely disturb or remove buried geoarchaeological and/or archaeological remains, along with the potential to disturb or remove the World War II defences at the landfall and the World War II concrete tracks at Lissett Airfield. Heritage significance could be lost or partially lost. Therefore, the magnitude of direct (physical) impacts upon certain non-designated heritage assets is considered **moderate** to **major** adverse, as a likely worst-case.

5.11.1.21 In consideration of buried archaeological and geoarchaeological remains, the extent and severity of the direct (physical) impact will depend upon the presence, nature and depth of the buried remains, comparative to the depth and extent of the construction-related groundworks. A reduction in magnitude could occur where interaction between the groundworks and potential buried archaeological and/or geoarchaeological remains is unlikely or limited.

Sensitivity of the receptor

5.11.1.22 The non-designated heritage assets potentially affected by Hornsea Four and brought forward to impact assessment have been identified as part of the baseline collation (**Table 5.5**). The baseline also identified a medium to high potential for as-yet unknown buried archaeological remains to be located within the Hornsea Four Order Limits. These known heritage assets and potential buried archaeological remains are considered to have an unclear level of significance, due to a lack of information and could be anywhere from **low** to **high** heritage importance. In particular, the known and potential buried remains around the landfall (HP4-2) and OnSS (HP4-49) could be of **high** heritage importance. The built heritage assets potentially affected are considered to be of **low** or **medium** heritage importance.

Significance of the effect

5.11.1.23 In consideration of the (at most) high heritage importance of the known non-designated heritage assets and potential buried archaeological remains within the Hornsea Four Order Limits, there is the potential for permanent **slight** to **very large adverse** effects upon these assets, prior to any mitigation, an impact which would be considered significant in EIA terms.

Further mitigation: buried archaeological remains and above ground earthworks

5.11.1.24 Archaeological trial trenching will be undertaken at the post-consent/pre-construction stage, the methodology of which will be set out within an Onshore WSI (Co160). An outline Onshore WSI has been produced and supports the application for development consent (**Volume F2, Chapter 10: Outline Onshore WSI**). Any areas of archaeological trial trenching will be agreed through ongoing consultation with the heritage stakeholders and will be subject to landowner access agreements.

5.11.1.25 Further micro-route refinement (within the redline boundary) and preservation of remains *in-situ* could also be considered where buried remains are revealed during post-consent/pre-construction evaluation works to be of high importance, and where direct impacts upon their heritage significance were also relevant.

5.11.1.26 Following the non-intrusive and intrusive archaeological evaluation stages and where preservation in-situ is not possible (e.g. due to other environmental and engineering constraints), archaeological mitigation will be implemented to off-set any direct impact upon non-designated heritage assets. These mitigation measures are considered industry standard in terms of ensuring archaeological remains are appropriately preserved by record and the residual impact is generally considered **non-significant** in EIA terms. Industry standard good practices for archaeological mitigation includes:

- **Open area or detailed excavation.**
  Including presentation of results within an archive and publication. This option results in machine stripping of topsoil/subsoil to the archaeological horizon. Features are excavated by hand to a percentage agreed with the heritage stakeholders. This is used where buried archaeological remains are of an importance and associated significance which requires a high sampling percentage of the remains.

- **Strip, Map and Sample excavation.**
  Including presentation of results within an archive and publication. This option is used where archaeological remains require hand excavation and recording and is undertaken following the same principles as open area excavation. However, the archaeological remains are identified as being of possibly lesser importance and associated significance and therefore can be understood through a lower sampling percentage as agreed with the heritage stakeholders.

- **Watching briefs/archaeological monitoring of groundworks.**
  Including presentation of results within an archive and (where appropriate) publication. This option is used where the heritage importance and associated significance of a known asset is considered low or very low, or where there is a lower potential for unknown remains to be present. Monitoring of intrusive groundworks is undertaken by a qualified archaeologist and any remains identified are excavated and recorded.

5.11.1.27 Areas of Hornsea Four where these standard mitigation practices may be required will be identified through further evaluation post-consent. Any areas where these approaches could be required will be identified and agreed upon between the Applicant and the heritage stakeholders and detailed within the Onshore Archaeology WSI (Co160).

5.11.1.28 Potential impacts to geoarchaeological deposits as a result of intrusive ground works or hydrological changes will be assessed and addressed through phases of geoarchaeological investigation / assessment of geotechnical logs produced as part of Ground Investigation (GI) works for Hornsea Four at the post-consent/pre-construction phase. This work would be detailed within the Onshore Archaeology WSI(s), to be agreed between Hornsea Four and heritage stakeholders.

Further mitigation: built heritage

5.11.1.29 In consideration of the built heritage assets located within the landfall area (World War II defences, HP4-01 and 02), recommended mitigation options include the use of exclusion zones during construction and potentially historic building recording prior to construction works.

5.11.1.30 The pillboxes located within the landfall footprint (HP4-02), just above the cliff edge, could be protected through use of exclusion zones during construction. An area around the heritage assets could be secured with HERAS fencing, along with signage identifying the exclusion zone. The requirements and location of any exclusion zones will be identified and agreed between Hornsea Four and the heritage stakeholders prior to construction.

5.11.1.31 Within the intertidal zone, the built heritage assets which could be affected are the anti-tank blocks (part of HP4-01); these may require moving to allow access for construction-related activities. To mitigate any impact, the blocks could be recorded to Historic England's Level 1 historic building recording standard and a report produced prior to the blocks being moved and stored on-site. Following construction works, the anti-tank cubes could be reinstated to their original location; the requirement and practicalities of this would be discussed in consultation with the heritage stakeholders and agreed through the approval of the Onshore WSI (Co160).

5.11.1.32 To minimise any impact upon the Lissett Airfield concrete tracks (HP4-06) it is recommended that, should these be removed to enable construction, the concrete tracks are then reinstated once construction work is complete. A level of historic building recording prior to removal may also be appropriate.

Residual Impact

5.11.1.33 With the above mitigation measures in place for buried archaeological remains, earthworks and built heritage assets, alongside the Commitments set out by Hornsea Four, it is considered that the residual level of impact can be reduced or offset to levels considered non-significant in EIA terms.

5.11.1.34 These mitigation measures are secured through the Onshore WSI (Co160) and CoCP (Co124). An outline Onshore WSI (**Volume F2, Chapter 10: Outline Onshore WSI**) and outline CoCP (**Volume F2, Annex 2: Outline Code of Construction Practice**) will be submitted as part of the DCO application.

Future monitoring

5.11.1.35 Direct (physical) impacts would be offset or reduced through either preservation in-situ or archaeological fieldwork and reporting, undertaken by professional archaeologists and monitored by an Archaeological Coordinator / Archaeological Contractor(s) (as identified in **Volume F2, Chapter 10: Outline Onshore WSI** and the Archaeological Advisor to ERYC during the construction phase.

5.11.2 Operation and Maintenance

5.11.2.1 No potentially significant impacts have been identified in relation to the operation and maintenance of Hornsea Four on the historic environment, and therefore have not been considered in detail in this ES, as summarised in **Table 5.6**. Further details are provided in **Volume A4, Annex 5.1: Impacts Register**.

5.11.3 Decommissioning

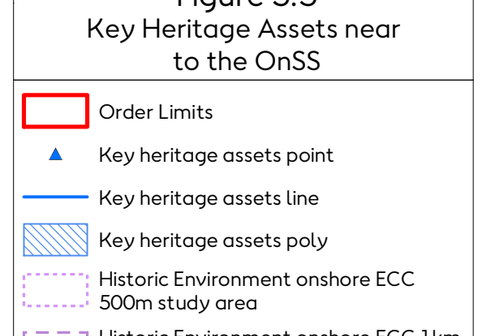
5.11.3.1 No potentially significant impacts have been identified in relation to the decommissioning of Hornsea Four on the historic environment, and therefore have not been considered in detail in this ES, as summarised in **Table 5.6**. Further details are provided in **Volume A4, Annex 5.1: Impacts Register**.

Hornsea Four

Figure 5.3

Key Heritage Assets near to the OnSS

- Order Limits
- Key heritage assets point
- Key heritage assets line
- Key heritage assets poly
- Historic Environment onshore ECC 500m study area
- Historic Environment onshore ECC 1km study area



Coordinate system: British National Grid

Scale@A3: 1:15,000

0 125 250 500 Metres

0 125 250 500 Yards

REV	REMARK	DATE
	First Issue for PEIR	20/06/2019
A	Updated following PEIR consultations, for DCO	19/07/2021

Title: Key Heritage Assets near to the OnSS
Document no: HOW04RH0045
Created by: AZ
Checked by: PM
Approved by: CS

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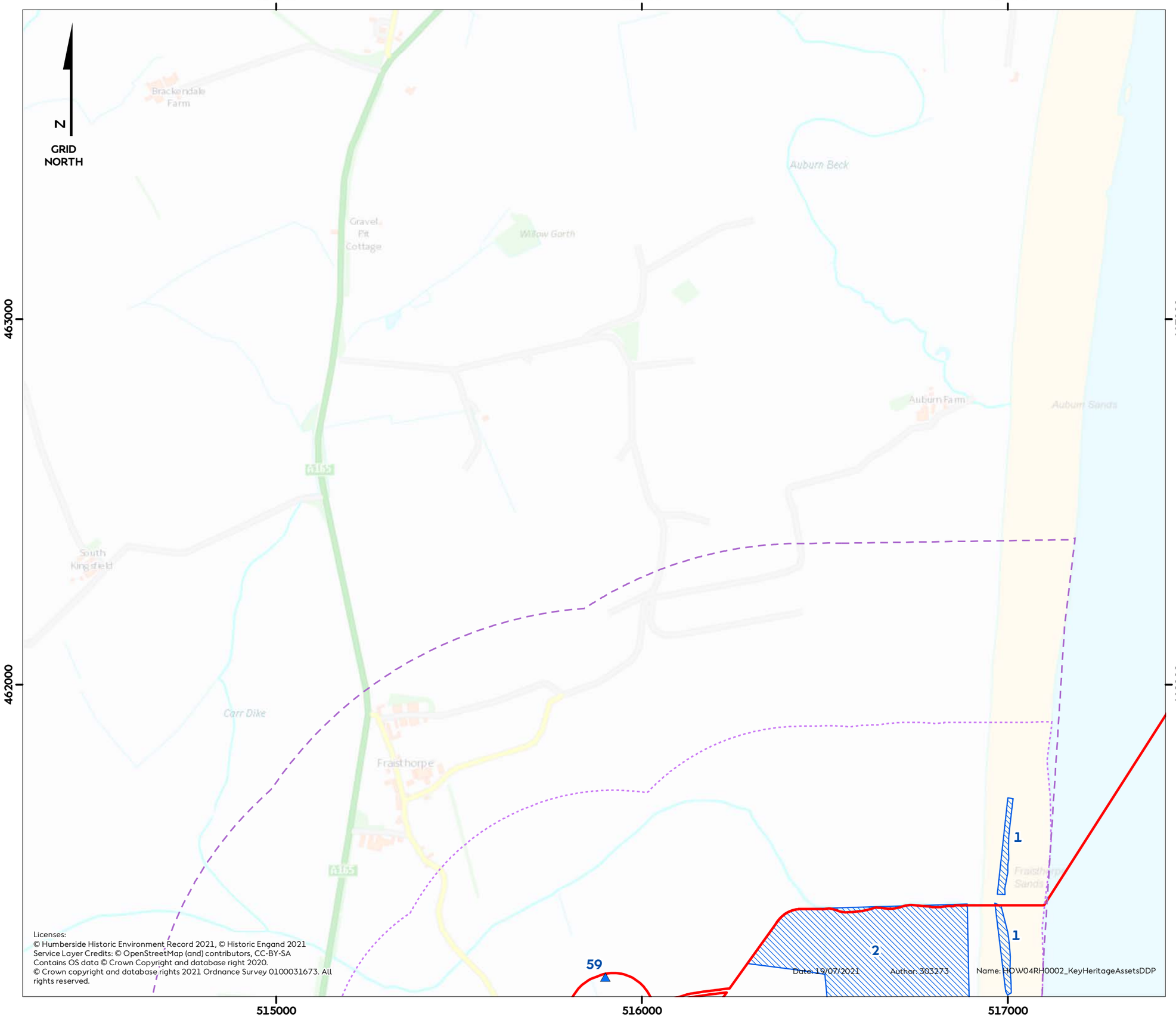
Ørsted

Date: 19/07/2021 Author: 303273 Name: HOW04RH0045_KeyHeritageAssetsOnSS

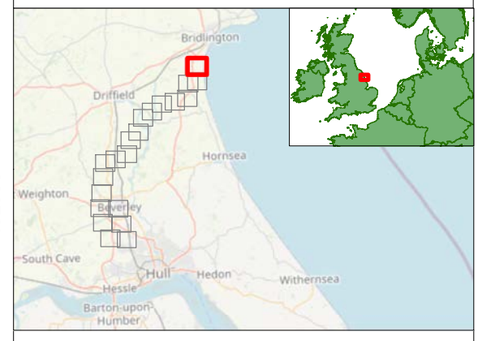


Hornsea Four

Figure 5.4

Heritage Assets Identified as Key to Hornsea Four Study Area - Sheet 1 of 21

- Order Limits
- Historic Environment Onshore ECC 500m Study Area
- Historic Environment Onshore ECC 1km Study Area
- Key Heritage Assets Point
- Key Heritage Assets Poly



Coordinate system: British National Grid

Scale@A3: 1:10,000

0 125 250 500 Metres

0 125 250 500 Yards

REV	REMARK	DATE
	First Issue for PEIR	20/06/2019
A	Updated following PEIR consultations, for DCO	19/07/2021

Title: Heritage Assets Identified as Key to Hornsea Four Study Area
Document no: HOW04RH0031
Created by: AZ
Checked by: SM
Approved by: CS

Royal HaskoningDHV

Ørsted

Hornsea Four

Figure 5.5

Heritage Assets Identified as Key to Hornsea Four Study Area - Sheet 2 of 21

515000 516000 517000

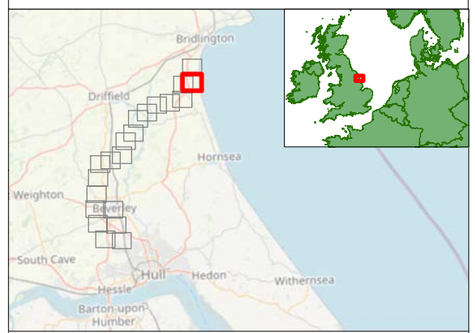
461000 460000 459000

N GRID NORTH

59 1 2 1 4

Low Stonehills Searchlight Cottage High Stonehills Bridlington Rd Quarry Bungalow Barnston Fox Covert Barnston Sands Low Grounds Hamiltonhill Farm Hamiltonhill Rd Sands La Barnston Bridlington Rd

- Order Limits
- Historic Environment Onshore ECC 500m Study Area
- Historic Environment Onshore ECC 1km Study Area
- Key Heritage Assets Point
- Key Heritage Assets Poly



Coordinate system: British National Grid

Scale@A3: 1:10,000

0 125 250 500 Metres

0 125 250 500 Yards

REV	REMARK	DATE
	First Issue for PEIR	20/06/2019
A	Updated following PEIR consultations, for DCO	19/07/2021

Date: 19/07/2021 Author: 303273 Name: HOW04RH0002_KeyHeritageAssetsDDP

Title: Heritage Assets Identified as Key to Hornsea Four Study Area
Document no: HOW04RH0031
Created by: AZ
Checked by: SM
Approved by: CS

Royal HaskoningDHV

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Hornsea Four

Figure 5.6

Heritage Assets Identified as Key to Hornsea Four Study Area - Sheet 3 of 21

513000 514000 515000

461000 460000 459000

N

GRID NORTH

4

Searchlight Cottage

High Stonehills

Burton Drain

Bridlington Rd

Quarry Bungalow

Gransmoor Lodge

Hill Farm

Barmston Fox Covert

Plantation

Gransmoor Lodge Gates

Gransmoor Rd

Red Roofs

Monument Farm

New Cut

Sands Ln

Bridlington Rd

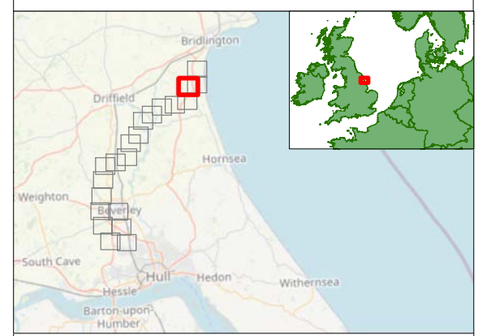
A165

Order Limits

Historic Environment Onshore ECC 500m Study Area

Historic Environment Onshore ECC 1km Study Area

Key Heritage Assets Poly



Coordinate system: British National Grid

Scale@A3: 1:10,000

0 125 250 500 Metres

0 125 250 500 Yards

REV	REMARK	DATE
	First Issue for PEIR	20/06/2019
A	Updated following PEIR consultations, for DCO	19/07/2021

Title: Heritage Assets Identified as Key to Hornsea Four Study Area
Document no: HOW04RH0031
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Checked by: SM
Approved by: CS

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Date: 19/07/2021 Author: 303273 Name: HOW04RH0002_KeyHeritageAssetsDDP

Hornsea Four

Figure 5.7

Heritage Assets Identified as Key to Hornsea Four Study Area - Sheet 4 of 21

513000 514000 515000

458000 457000 456000

N

GRID NORTH

6

Tithe La

Fisher La

Main St

New Cut

A165

B1242

Lissett

Allison La

The Swallows

The Moors

Barmston Main Drain

North Field

Goose Island Farm

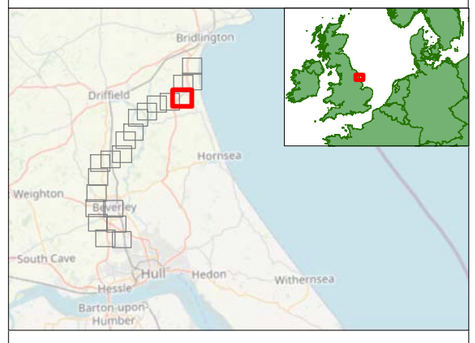
West Furze

Long Bealsmn

Skipsea Drain

Dringhoe Drain

- Order Limits
- Historic Environment Onshore ECC 500m Study Area
- Historic Environment Onshore ECC 1km Study Area
- Key Heritage Assets Poly



Coordinate system: British National Grid

Scale@A3: 1:10,000

0 125 250 500 Metres

0 125 250 500 Yards

REV	REMARK	DATE
	First Issue for PEIR	20/06/2019
A	Updated following PEIR consultations, for DCO	19/07/2021

Date: 19/07/2021 Author: 303273 Name: HOW04RH0002_KeyHeritageAssetsDDP

Title: Heritage Assets Identified as Key to Hornsea Four Study Area
Document no: HOW04RH0031
Created by: AZ
Checked by: SM
Approved by: CS

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Hornsea Four

Figure 5.8

Heritage Assets Identified as Key to Hornsea Four Study Area - Sheet 5 of 21

511000 512000 513000

458000 457000 456000

N

GRID NORTH

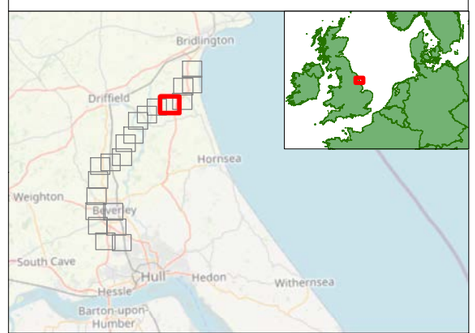
6 6 6 6

58

8

Gembling Out Gates Crow Wood Northpasture Farm North Pasture Old Howe House Beeford Grange Woodhouse Farm East Redcar Plantation

- Order Limits
- Historic Environment Onshore ECC 500m Study Area
- Historic Environment Onshore ECC 1km Study Area
- Key Heritage Assets Line
- Key Heritage Assets Poly



Coordinate system: British National Grid

Scale@A3: 1:10,000

0 125 250 500 Metres

0 125 250 500 Yards

REV	REMARK	DATE
	First Issue for PEIR	20/06/2019
A	Updated following PEIR consultations, for DCO	19/07/2021

Title: Heritage Assets Identified as Key to Hornsea Four Study Area
Document no: HOW04RH0031
Created by: AZ
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Approved by: CS

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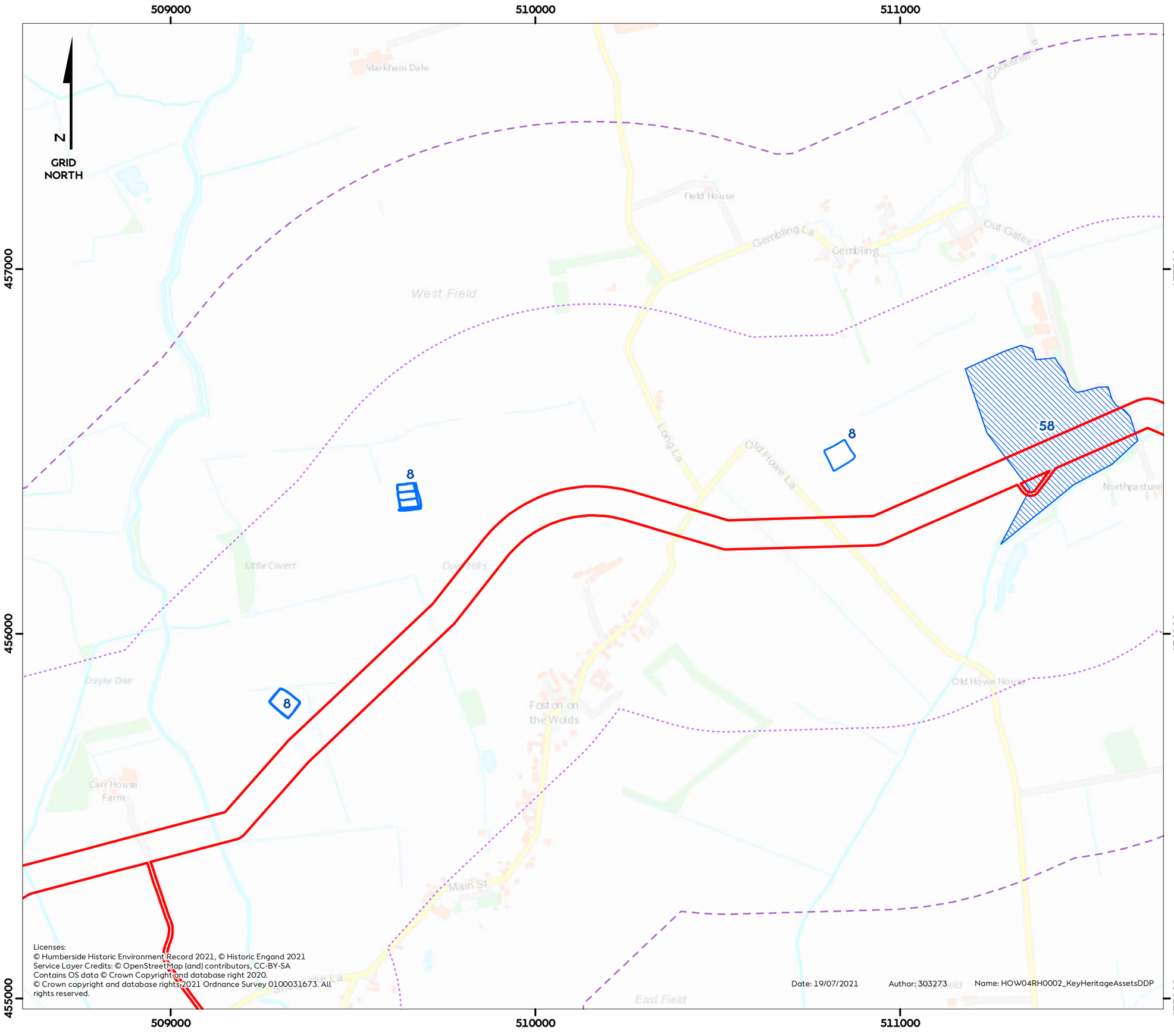
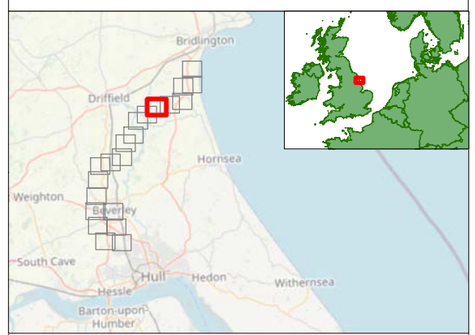
Hornsea Four

Figure 5.9

Heritage Assets Identified as Key to Hornsea Four Study Area - Sheet 6 of 21



- Order Limits
- Historic Environment Onshore ECC 500m Study Area
- Historic Environment Onshore ECC 1km Study Area
- Key Heritage Assets Line
- Key Heritage Assets Poly



Coordinate system: British National Grid

Scale@A3: 1:10,000

0 125 250 500 Metres

0 125 250 500 Yards

REV	REMARK	DATE
	First Issue for PEIR	20/06/2019
A	Updated following PEIR consultations, for DCO	19/07/2021

Title: Heritage Assets Identified as Key to Hornsea Four Study Area
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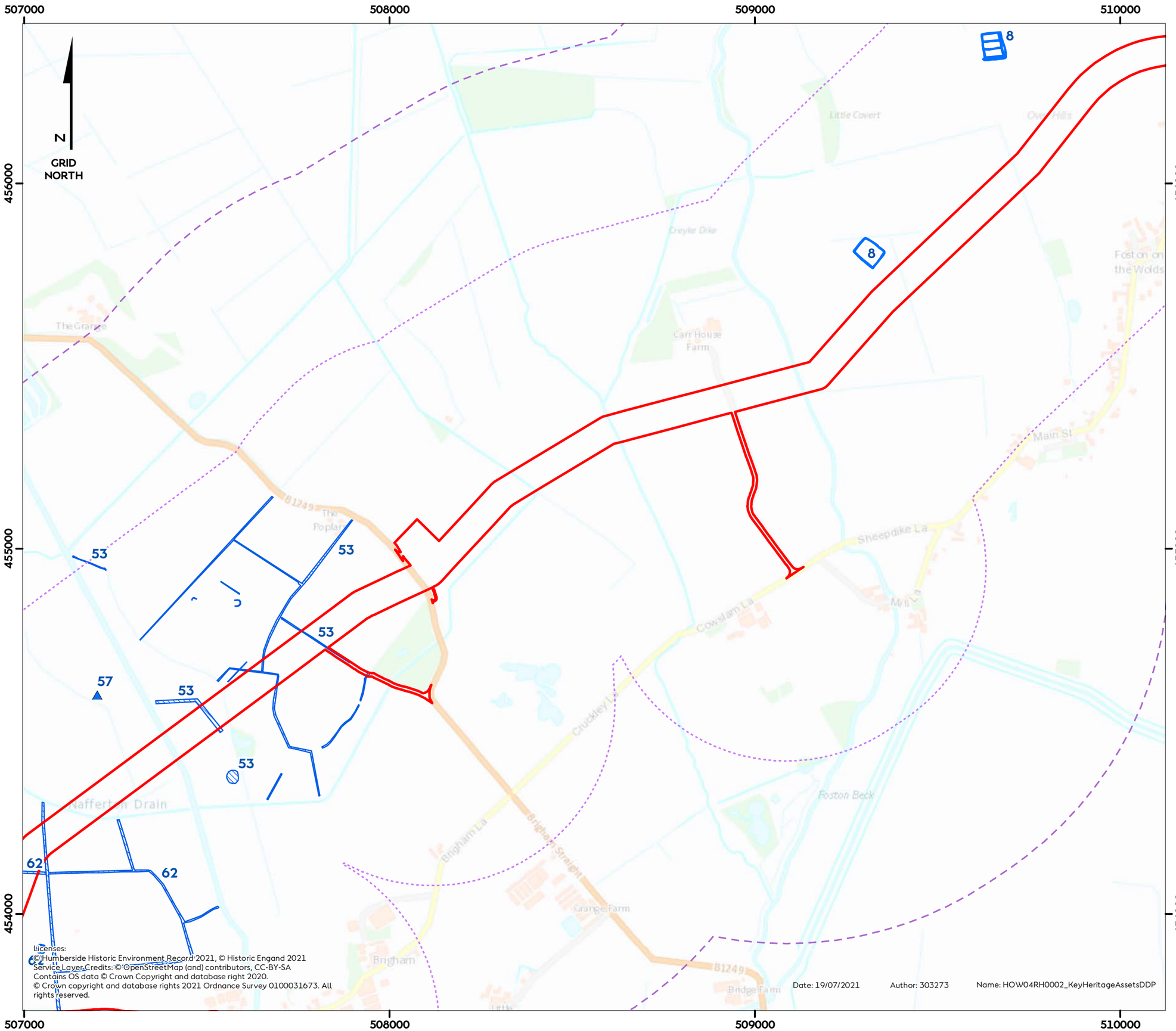
Date: 19/07/2021 Author: 303273 Name: HOW04RH0002_KeyHeritageAssetsDDP

Hornsea Four

Figure 5.10

Heritage Assets Identified as Key to Hornsea Four Study Area - Sheet 7 of 21



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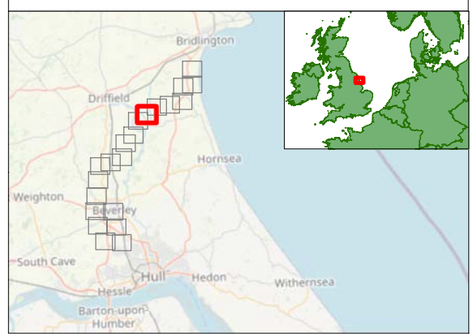
- Order Limits
- Historic Environment Onshore ECC 500m Study Area
- Historic Environment Onshore ECC 1km Study Area
- Key Heritage Assets Point
- Key Heritage Assets Line
- Key Heritage Assets Poly



Coordinate system: British National Grid
Scale@A3: 1:10,000

0 125 250 500 Metres

0 125 250 500 Yards

REV	REMARK	DATE
	First Issue for PEIR	20/06/2019
A	Updated following PEIR consultations, for DCO	19/07/2021

Title: Heritage Assets Identified as Key to Hornsea Four Study Area
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Hornsea Four

Figure 5.11

Heritage Assets Identified as Key to Hornsea Four Study Area - Sheet 8 of 21

506000 507000 508000

455000 454000 453000

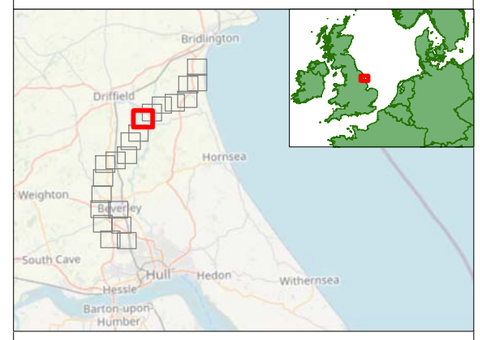
N

GRID NORTH

West Beck
Copper Hall
Cleaves Farm
Chaffertop Drain
Corpslanding
River Hull
Over Hills
Brigham
Little Brigham
Grange Farm
Frodingham Beck
B1249
The Poplars
Brigham La
Cruckley La
Brigham Straight

53 53 53 53 53 57 62 62 62 0 10 10 10

- Order Limits
- Historic Environment Onshore ECC 500m Study Area
- Historic Environment Onshore ECC 1km Study Area
- Key Heritage Assets Point
- Key Heritage Assets Poly



Coordinate system: British National Grid

Scale@A3: 1:10,000

0 125 250 500 Metres

0 125 250 500 Yards

REV	REMARK	DATE
	First Issue for PEIR	20/06/2019
A	Updated following PEIR consultations, for DCO	19/07/2021

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Date: 19/07/2021 Author: 303273 Name: HOW04RH0002_KeyHeritageAssetsDDP

Hornsea Four

Figure 5.12

Heritage Assets Identified as Key to Hornsea Four Study Area - Sheet 9 of 21

505000 506000 507000

453000 452000 451000

N

GRID NORTH

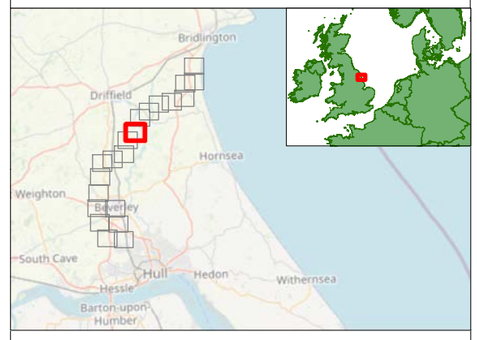
10 11 13

Order Limits

Historic Environment Onshore ECC 500m Study Area

Historic Environment Onshore ECC 1km Study Area

Key Heritage Assets Poly



Coordinate system: British National Grid

Scale@A3: 1:10,000

0 125 250 500 Metres

0 125 250 500 Yards

REV	REMARK	DATE
	First Issue for PEIR	20/06/2019
A	Updated following PEIR consultations, for DCO	19/07/2021

Title: Heritage Assets Identified as Key to Hornsea Four Study Area
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Approved by: CS

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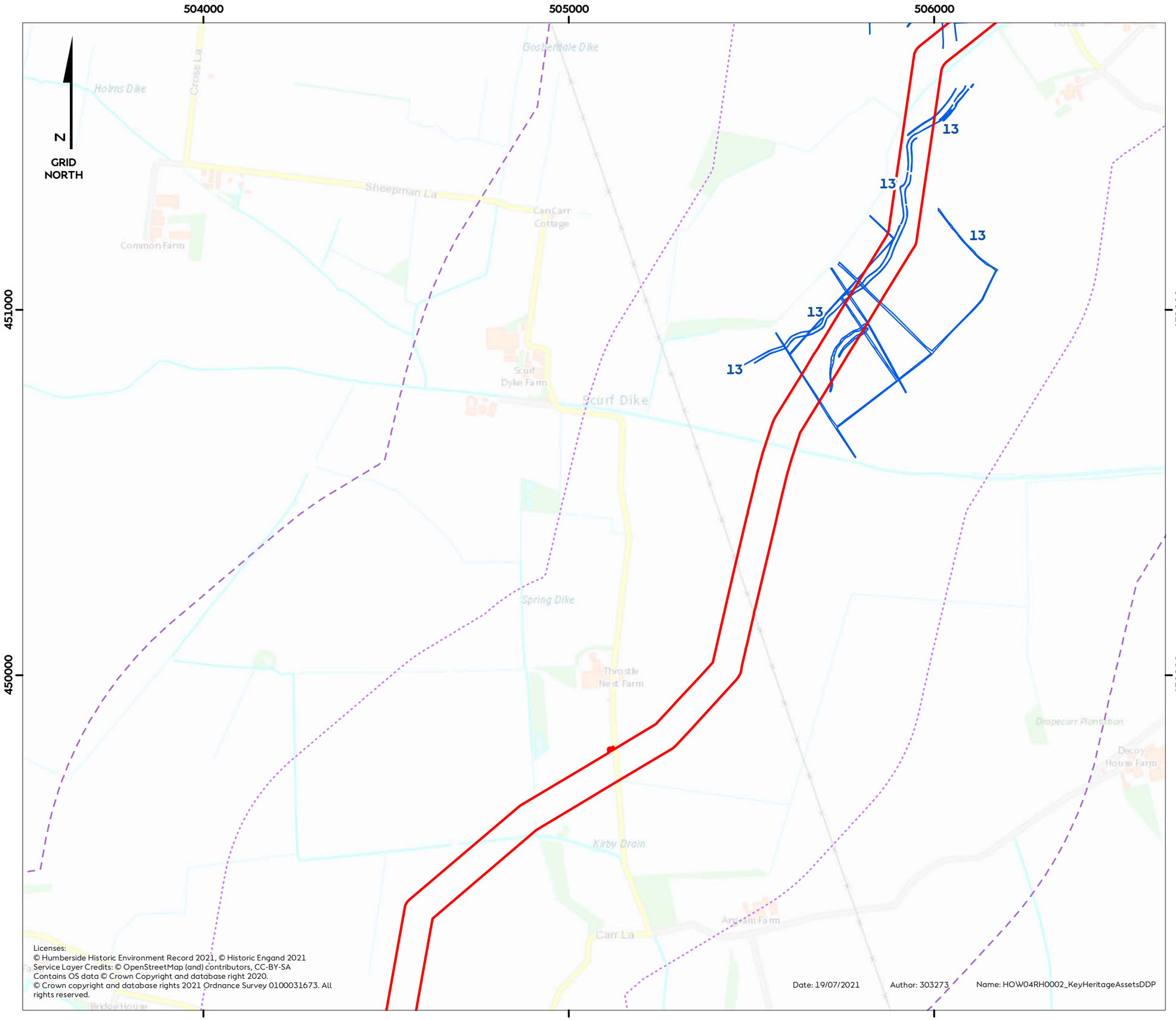
Date: 19/07/2021 Author: 303273 Name: HOW04RH0002_KeyHeritageAssetsDDP

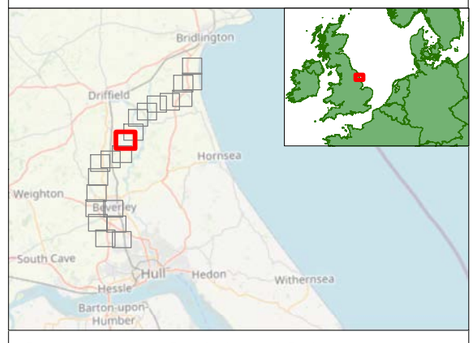


Hornsea Four

Figure 5.13

Heritage Assets Identified as Key to Hornsea Four Study Area - Sheet 10 of 21

- Order Limits
- Historic Environment Onshore ECC 500m Study Area
- Historic Environment Onshore ECC 1km Study Area
- Key Heritage Assets Poly



Coordinate system: British National Grid

Scale@A3: 1:10,000

0 125 250 500 Metres

0 125 250 500 Yards

REV	REMARK	DATE
	First Issue for PEIR	20/06/2019
A	Updated following PEIR consultations, for DCO	19/07/2021

Title: Heritage Assets Identified as Key to Hornsea Four Study Area
Document no: HOW04RH0031
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503000 504000 505000 506000

449000 448000 447000

N
GRID NORTH

14

15

17

17

Watton Beck
Bridge Farm
Bridge House
Carr La
Arrayain Farm
Wilfholme Farm
Beswick New Cut
Beswick Rush Plantation
Kilnwick Arm Drain
Wilfholme Rd
Old Rush
Low Farm
Barfhill Causeway
Barfhill Covert
Solebill Farm
Ashfield Farm
Carr House
Barff Hill Farm
Black Dike
Coal Dike
Station Rd

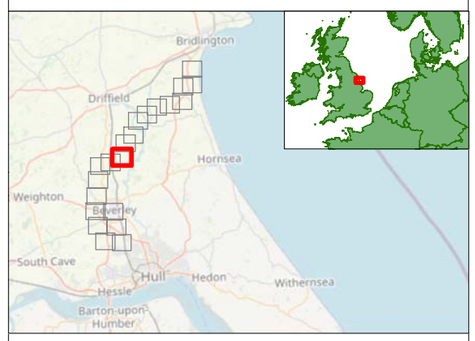
Date: 19/07/2021 Author: 303273 Name: HOW04RH0002_KeyHeritageAssetsDDP

Hornsea Four

Figure 5.14

Heritage Assets Identified as Key to Hornsea Four Study Area - Sheet 11 of 21

- Order Limits
- Historic Environment Onshore ECC 500m Study Area
- Historic Environment Onshore ECC 1km Study Area
- Key Heritage Assets Point
- Key Heritage Assets Poly



Coordinate system: British National Grid
Scale@A3: 1:10,000

0 125 250 500 Metres

0 125 250 500 Yards

REV	REMARK	DATE
	First Issue for PEIR	20/06/2019
A	Updated following PEIR consultations, for DCO	19/07/2021

Title: Heritage Assets Identified as Key to Hornsea Four Study Area
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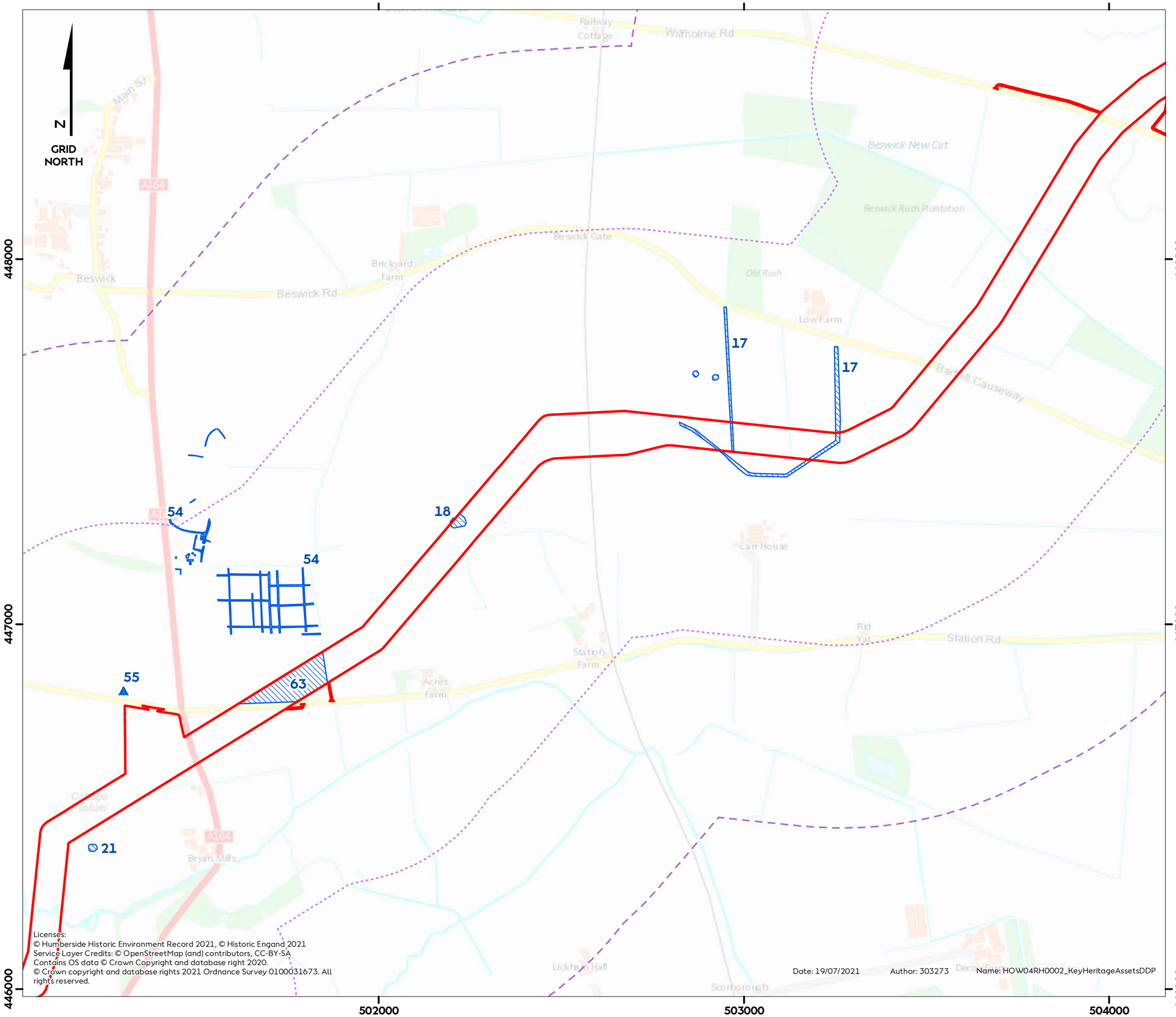
Hornsea Four

Figure 5.15

Heritage Assets Identified as Key to Hornsea Four Study Area - Sheet 12 of 21



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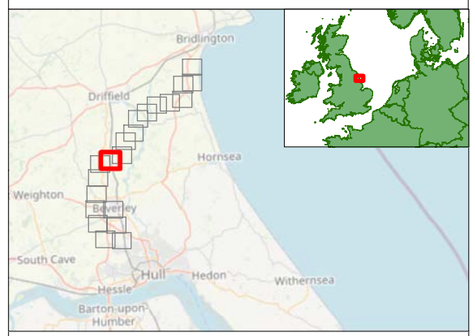
Date: 19/07/2021 Author: 303273 Name: HOW04RH0002_KeyHeritageAssetsDDP

- Order Limits
- Historic Environment Onshore ECC 500m Study Area
- Historic Environment Onshore ECC 1km Study Area
- Key Heritage Assets Point
- Key Heritage Assets Poly



Coordinate system: British National Grid
Scale@A3: 1:10,000

0 125 250 500 Metres

0 125 250 500 Yards

REV	REMARK	DATE
	First Issue for PEIR	20/06/2019
A	Updated following PEIR consultations, for DCO	19/07/2021

Title: Heritage Assets Identified as Key to Hornsea Four Study Area
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Hornsea Four

Figure 5.16

Heritage Assets Identified as Key to Hornsea Four Study Area - Sheet 13 of 21

500000 501000 502000

448000 447000 446000

N
GRID NORTH

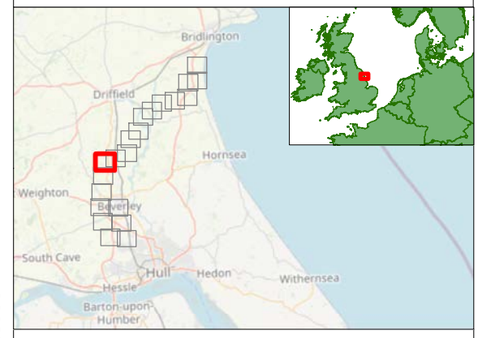
Order Limits

Historic Environment Onshore ECC 500m Study Area

Historic Environment Onshore ECC 1km Study Area

Key Heritage Assets Point

Key Heritage Assets Poly



Coordinate system: British National Grid

Scale@A3: 1:10,000

0 125 250 500 Metres

0 125 250 500 Yards

REV	REMARK	DATE
	First Issue for PEIR	20/06/2019
A	Updated following PEIR consultations, for DCO	19/07/2021

Title: Heritage Assets Identified as Key to Hornsea Four Study Area
Document no: HOW04RH0031
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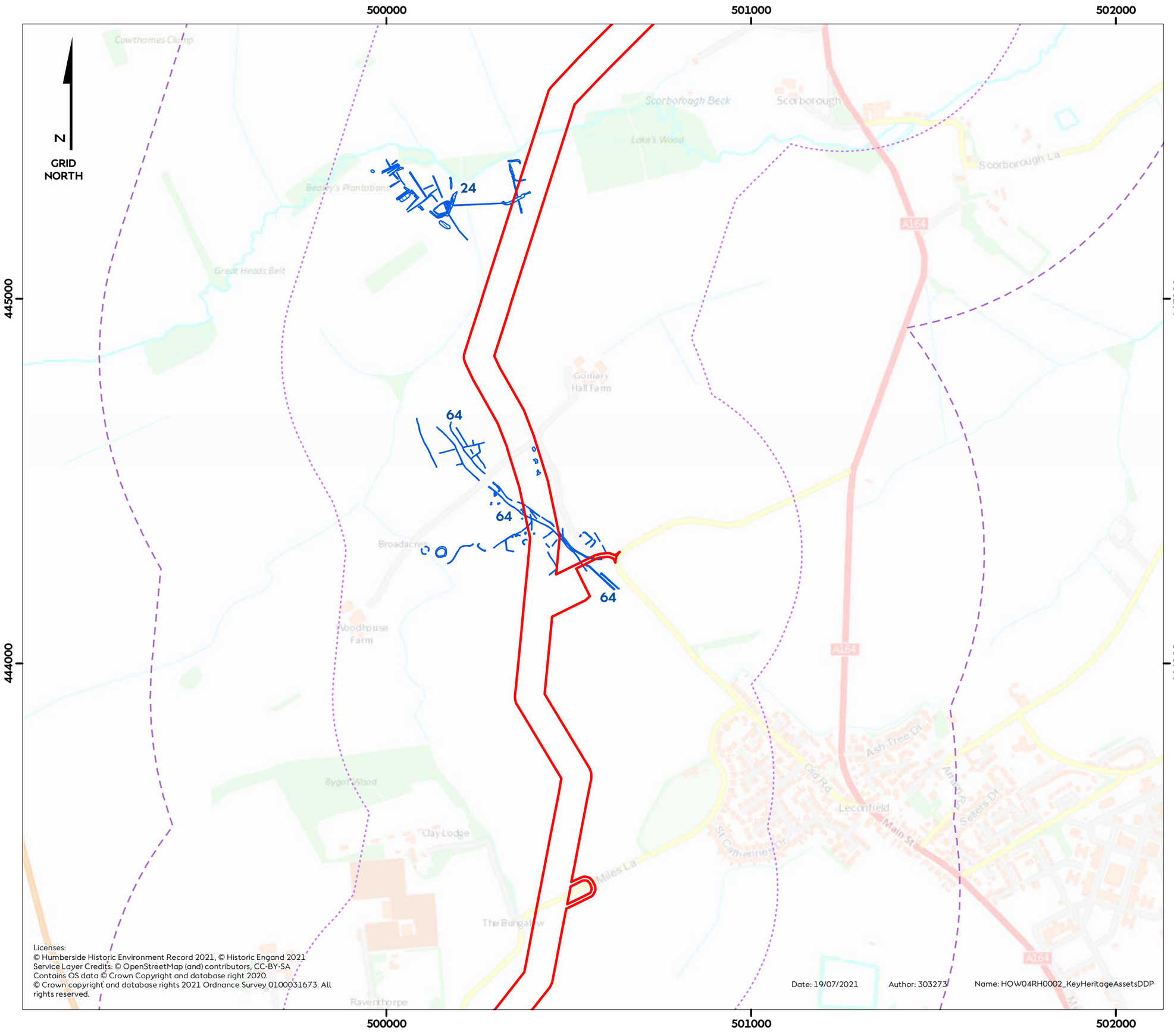
Date: 19/07/2021 Author: 303273 Name: HOW04RH0002_KeyHeritageAssetsDDP

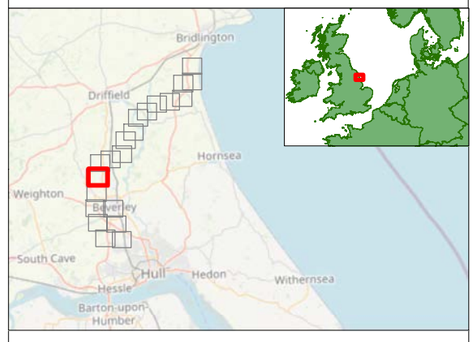
Hornsea Four

Figure 5.17

Heritage Assets Identified as Key to Hornsea Four Study Area - Sheet 14 of 21



- Order Limits
- Historic Environment Onshore ECC 500m Study Area
- Historic Environment Onshore ECC 1km Study Area
- Key Heritage Assets Poly



Coordinate system: British National Grid

Scale@A3: 1:10,000

0 125 250 500 Metres

0 125 250 500 Yards

REV	REMARK	DATE
	First Issue for PEIR	20/06/2019
A	Updated following PEIR consultations, for DCO	19/07/2021

Title: Heritage Assets Identified as Key to Hornsea Four Study Area

Document no: HOW04RH0031

Created by: AZ

Checked by: SM

Approved by: CS

Date: 19/07/2021 Author: 303273 Name: HOW04RH0002_KeyHeritageAssetsDDP

Hornsea Four

Figure 5.18

Heritage Assets Identified as Key to Hornsea Four Study Area - Sheet 15 of 21

499000 500000 501000

443000 442000 441000

N

GRID NORTH

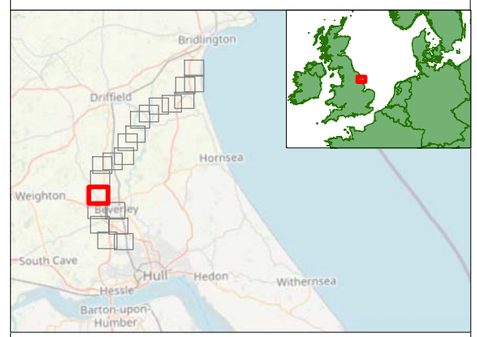
Order Limits

Historic Environment Onshore ECC 500m Study Area

Historic Environment Onshore ECC 1km Study Area

Key Heritage Assets Line

Key Heritage Assets Poly



Coordinate system: British National Grid

Scale@A3: 1:10,000

0 125 250 500 Metres

0 125 250 500 Yards

REV	REMARK	DATE
	First Issue for PEIR	20/06/2019
A	Updated following PEIR consultations, for DCO	19/07/2021

Title: Heritage Assets Identified as Key to Hornsea Four Study Area
Document no: HOW04RH0031
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Checked by: SM
Approved by: CS

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Date: 19/07/2021 Author: 303273 Name: HOW04RH0002_KeyHeritageAssetsDDP

Hornsea Four

Figure 5.19

Heritage Assets Identified as Key to Hornsea Four Study Area - Sheet 16 of 21

499000 500000 501000

440000 439000 438000

N

GRID NORTH

31 31 56 32

Order Limits

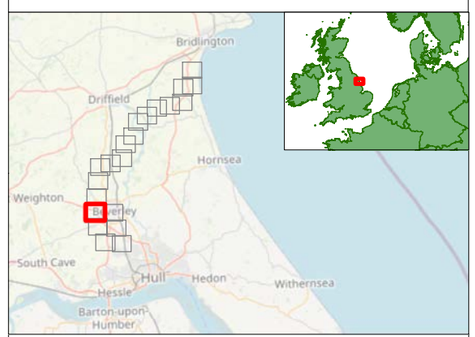
Historic Environment Onshore ECC 500m Study Area

Historic Environment Onshore ECC 1km Study Area

Key Heritage Assets Point

Key Heritage Assets Line

Key Heritage Assets Poly



Coordinate system: British National Grid

Scale@A3: 1:10,000

0 125 250 500 Metres

0 125 250 500 Yards

REV	REMARK	DATE
	First Issue for PEIR	20/06/2019
A	Updated following PEIR consultations, for DCO	19/07/2021

Title: Heritage Assets Identified as Key to Hornsea Four Study Area
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Checked by: SM
Approved by: CS

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Date: 19/07/2021 Author: 303273 Name: HOW04RH0002_KeyHeritageAssetsDDP

Hornsea Four

Figure 5.20

Heritage Assets Identified as Key to Hornsea Four Study Area - Sheet 17 of 21

502000 503000 504000

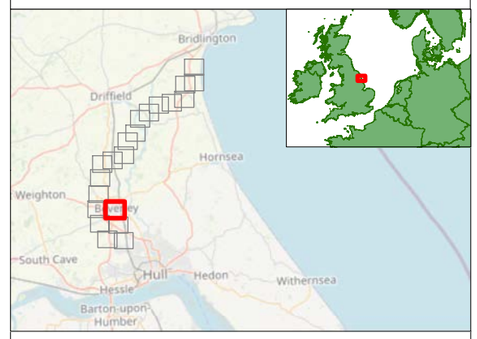
440000 439000 438000

N

GRID NORTH

Historic Environment Onshore

ECC 1km Study Area



Coordinate system: British National Grid

Scale@A3: 1:10,000

0 125 250 500 Metres

0 125 250 500 Yards

REV	REMARK	DATE
	First Issue for PEIR	20/06/2019
A	Updated following PEIR consultations, for DCO	19/07/2021

Title: Heritage Assets Identified as Key to Hornsea Four Study Area
Document no: HOW04RH0031
Created by: AZ
Checked by: SM
Approved by: CS

Royal HaskoningDHV

Ørsted

Date: 19/07/2021 Author: 303273 Name: HOW04RH0002_KeyHeritageAssetsDDP

Hornsea Four

Figure 5.21

Heritage Assets Identified as Key to Hornsea Four Study Area - Sheet 18 of 21

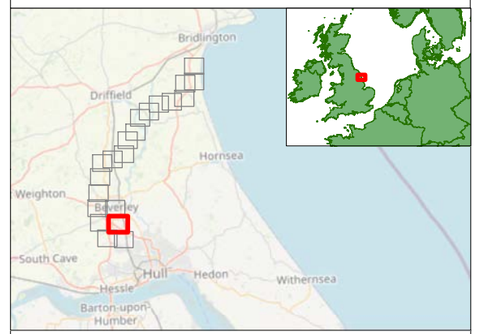
503000 504000 505000

438000 437000 436000

N

GRID NORTH

- Order Limits
- Historic Environment Onshore ECC 500m Study Area
- Historic Environment Onshore ECC 1km Study Area
- Key Heritage Assets Poly



Coordinate system: British National Grid

Scale@A3: 1:10,000

0 125 250 500 Metres

0 125 250 500 Yards

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Date: 19/07/2021 Author: 303273 Name: HOW04RH0002_KeyHeritageAssetsDDP

Hornsea Four

Figure 5.22

Heritage Assets Identified as Key to Hornsea Four Study Area - Sheet 19 of 21

499000 500000 501000 502000

438000 437000 436000

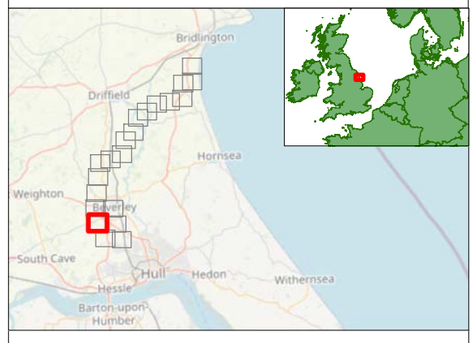
N

GRID NORTH

Order Limits

Historic Environment Onshore ECC 500m Study Area

Historic Environment Onshore ECC 1km Study Area



Coordinate system: British National Grid

Scale@A3: 1:10,000

0 125 250 500 Metres

0 125 250 500 Yards

REV	REMARK	DATE
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Hornsea Four

Figure 5.23

Heritage Assets Identified as Key to Hornsea Four Study Area - Sheet 20 of 21

501000 502000 503000

435000

434000

N

GRID NORTH

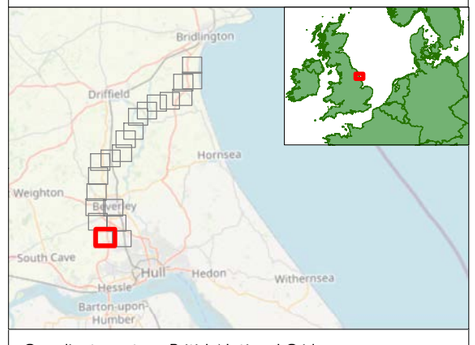
65 66 66 68 67

Order Limits

Historic Environment Onshore ECC 500m Study Area

Historic Environment Onshore ECC 1km Study Area

Key Heritage Assets Poly



Coordinate system: British National Grid

Scale@A3: 1:10,000

0 125 250 500 Metres

0 125 250 500 Yards

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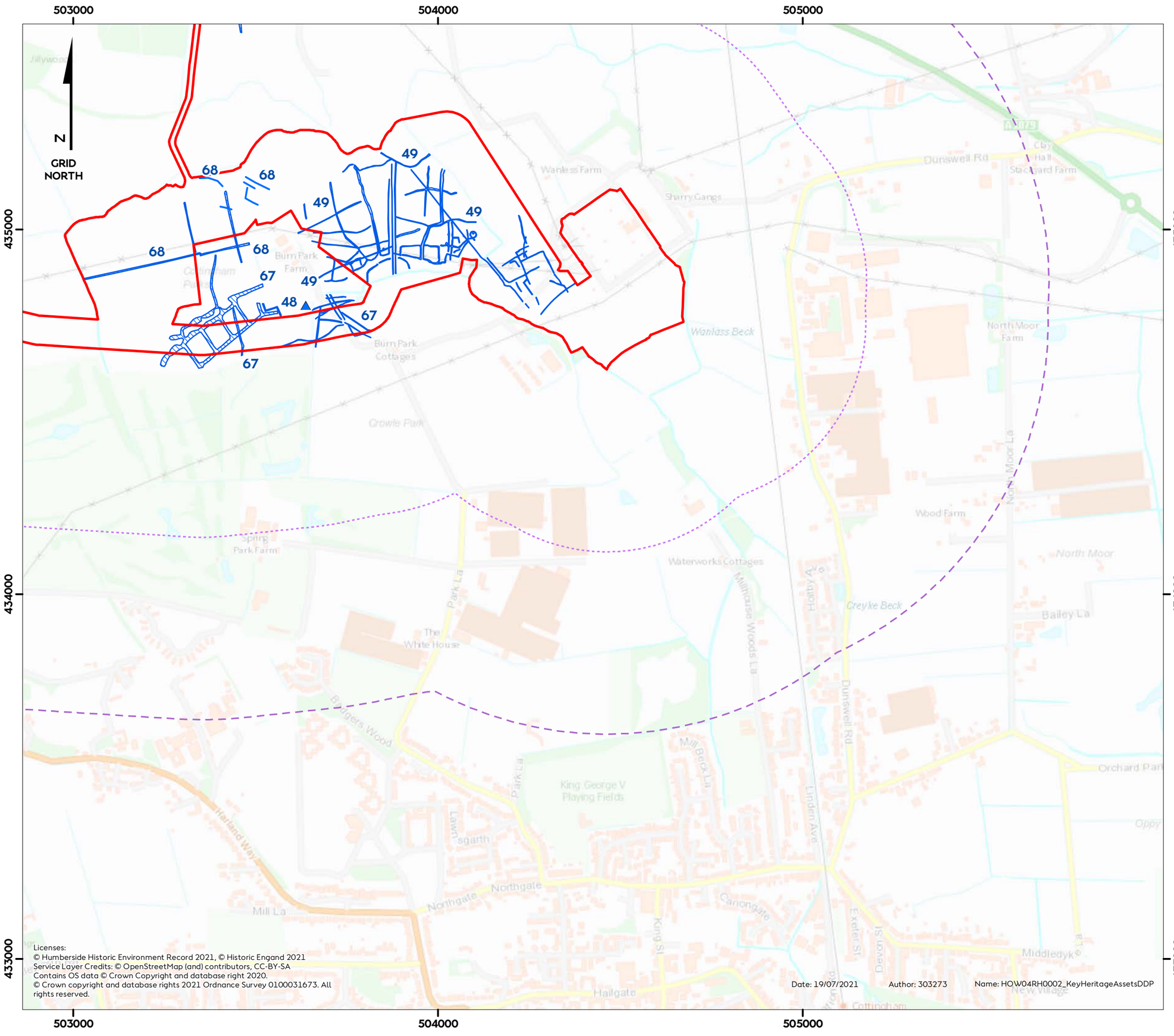
Date: 19/07/2021 Author: 303273 Name: HOW04RH0002_KeyHeritageAssetsDDP

Hornsea Four

Figure 5.24

Heritage Assets Identified as Key to Hornsea Four Study Area - Sheet 21 of 21



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Date: 19/07/2021 Author: 303273 Name: HOW04RH0002_KeyHeritageAssetsDDP

- Order Limits
- Historic Environment Onshore ECC 500m Study Area
- Historic Environment Onshore ECC 1km Study Area
- Key Heritage Assets Point
- Key Heritage Assets Line
- Key Heritage Assets Poly

Coordinate system: British National Grid

Scale@A3: 1:10,000

0 125 250 500 Metres

0 125 250 500 Yards

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Royal HaskoningDHV

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5.12 Cumulative effect assessment (CEA)

5.12.1.1 Cumulative effects can be defined as:

- effects upon a single receptor to arise as a result of impact interaction between different environmental topics from Hornsea Four; and
- incremental effects on that same receptor from other proposed and reasonably foreseeable projects and developments in combination with Hornsea Four. This includes all projects that result in a comparative effect that is not intrinsically considered as part of the existing environment and is not limited to offshore wind projects.

5.12.1.2 The overarching method followed in identifying and assessing potential cumulative effects in relation to the onshore environment is set out in **Volume A4, Annex 5.5: Onshore Cumulative Effects** and **Volume A4, Annex 5.6: Location of Onshore Cumulative Schemes**. The approach is based upon the Planning Inspectorate (PINS) Advice Note 17: Cumulative Effects Assessment (PINS 2019). The approach to the CEA is intended to be specific to Hornsea Four and takes account of the available knowledge of the environment and other activities around the Hornsea Four Order Limits.

5.12.1.3 The CEA followed a four-stage approach developed from Advice Note 17. These stages are set out in Table 2 of **Volume A4, Annex 5.5: Onshore Cumulative Effects**, with **Table 4** detailing the onshore long list search areas extents or Zone of Influence (ZoI) for each topic area. The proposed tier structure that is intended to ensure that there is a clear understanding of the level of confidence in the cumulative assessments provided in the Hornsea Four ES is set out in Table 3 of **Volume A4, Annex 5.5**.

5.12.2 CEA Stage 2 Shortlist and Stage 3 Information Gathering

5.12.2.1 A reduced list of projects for CEA has been produced using the screening buffer/criteria set out in Table 2 of **Volume A4, Annex 5.5: Onshore Cumulative Effects**. Information regarding all projects is provided in **Volume A4, Annex 5.5: Onshore Cumulative Effects** and **Volume A4, Annex 5.6: Location of Onshore Cumulative Schemes**.

5.12.2.2 Thirty identified projects have been included on the short-list of projects to be assessed cumulatively. The remaining projects have not been considered as resulting in likely cumulative significant effects as they are located in excess of 1 km from the Hornsea Four onshore ECC boundary and 5 km of the OnSS. The 26 projects can be summarised as:

- Dogger Bank A and B substation and associated cabling projects;
- Other infrastructure projects near to the OnSS, such as a battery storage facility;
- Large housing development with park and ride facility north of Minster Way; and
- A number of "smaller" projects located within 5 km of the OnSS or 1 km of the onshore ECC including: power generation, energy storage projects, onshore components associated with other offshore wind farm projects, highway improvement schemes, retail development and agricultural related development.

5.12.3 CEA Stage 3 Assessment

5.12.3.1 As stated in Table 2 of Volume A4, Annex 5.5: Onshore Cumulative Effects, the assessment is undertaken in two phases:

- Table 5.12 sets out the potential impacts assessed in this chapter and identifies the potential for cumulative effects to arise, providing a rationale for such determinations; and
- Table 5.13 sets out the CEA for each of the projects/developments that have been identified on the short-list of projects screened.

5.12.3.2 It should be noted that the second phase of this assessment is only undertaken if the first phase identifies that cumulative effects are possible. This summary assessment is set out in Table 5.13.

Table 5.12: Potential Cumulative Effects.

Impact	Potential for Cumulative Effect?	Rationale
Construction		
Indirect (non-physical) impacts on designated heritage assets	Yes	In combination effects of developments' construction could result in a cumulative impact to designated heritage assets through a change in their setting.
Direct (physical) impacts on non-designated heritage assets	Yes	Developments acting in-combination can have a cumulative impact on an archaeological resource which overlaps or intersects more than one development as well as affecting the nature of the wider archaeological landscape.
Indirect (non-physical) impacts on non-designated heritage assets	Yes	In combination effects of developments' construction could result in a cumulative impact to non-designated heritage assets through a change in their setting.
Operation		
Indirect (non-physical) impacts on designated heritage assets	Yes	In combination effects of developments' operation could result in a cumulative impact to designated heritage assets through a change in their setting.
Indirect (non-physical) impacts on non-designated heritage assets	Yes	In combination effects of developments' operation could result in a cumulative impact to non-designated heritage assets through a change in their setting.
Decommissioning		
The detail and scope of the decommissioning works will be determined by the relevant legislation and guidance at the time of decommissioning and agreed with the regulator. A decommissioning plan will be provided (Co124). As such, cumulative impacts during the decommissioning stage are assumed to be the same as those identified during the construction stage. Additionally, PINS have stated in their Scoping Opinion that cumulative decommissioning effects are scoped out of the EIA.		

5.12.3.3 The second phase of the CEA is a project specific assessment of the potential for any significant cumulative effects to arise due to the construction and/or operation and maintenance of Hornsea Four. To identify whether this may occur each shortlisted project is discussed in **Table 5.13**.

5.12.3.4 The CEA has been based on information available on each potential project (e.g. as set out on ERYC planning portal or in an attendant, available ES) and it is noted that the project details available may change in the period up to construction or may not be available in detail at all. The assessment presented here is therefore considered to be conservative, with the level of impacts expected to be reduced compared to those presented here.

5.12.3.5 The CEA has not identified any potential impacts that are considered to be of any greater significance than those identified in isolation and no cumulative effects of significance are forecast.

Table 5.13: CEA for Historic Environment

Project Name	Tier	Discussion	Likelihood and Significance of Cumulative Effects
Lawns Farm Park Battery Storage	1	Due to the proximity of the development to the project there is the potential for cumulative effects of a direct and / or indirect nature to heritage assets. The impact to archaeological resource will have been mitigated through appropriate archaeological mitigation. Indirect impacts to the setting of designated and non-designated heritage assets is not considered to be a significant concern, due to the scale of this development resulting in no impact greater than that of Hornsea Four as assessed individually as part of this chapter.	No potential for significant cumulative effects.
Jocks Lodge Highway Improvement Scheme	1	Due to the overlap of the redline boundary of the development with the project there is the potential for cumulative effects of a direct and / or indirect nature to heritage assets. However, with planning permission for the Jocks Lodge improvement scheme granted in July 2020, it is anticipated that the majority of construction works will have been completed prior to the start of construction works at Hornsea Four in 2024. In addition, the size of the proposed development and the assumption that appropriate archaeological mitigation measures will be incorporated into the design of the Jocks Lodge development will limit the potential for cumulative effects to occur.	No potential for significant cumulative effects.
Dogger Bank A and B	1	Due to the nature and scale of the development there is the potential for the onshore elements of the project to have direct and / or indirect cumulative effects on heritage assets through a direct impact on the shared archaeological resource (most likely around the NGET substation at Creyke Beck) and potential for indirect effects on heritage assets through a change in their setting. However, this is expected to be limited due to the archaeological mitigation measures in place for the project.	No potential for significant cumulative effects.
Great Gutter Lane Housing Development	1	Due to the nature and scale of the development there is the potential for cumulative effects of an indirect nature to heritage assets through a change in their setting. However, the assumption that appropriate archaeological mitigation measures will be incorporated into the design will limit the potential for cumulative effects to occur.	No potential for significant cumulative effects.
Low Farm Development	1	Due to the proximity of the development to the project there is the potential for cumulative effects of an indirect nature to heritage assets through a change in their setting. However, the assumption that appropriate archaeological mitigation measures will be incorporated into the design will limit the potential for cumulative effects to occur.	No potential for significant cumulative effects.

Project Name	Tier	Discussion	Likelihood and Significance of Cumulative Effects
Focus School Campus Housing Redevelopment	1	Due to the nature, scale and proximity of the development to the project there is the potential for cumulative effects of an indirect nature to heritage assets through a change in their setting. However, the assumption that appropriate archaeological mitigation measures will be incorporated into the design of the project and will limit the potential for cumulative effects to occur.	No potential for significant cumulative effects.
Veterans Village	1	Due to the nature and scale of the development there is the potential for cumulative effects of an indirect nature to heritage assets through a change in their setting. However, the assumption that appropriate archaeological mitigation measures will be incorporated into the design will limit the potential for cumulative effects to occur.	No potential for significant cumulative effects.
Minster Way Housing Development	1	Due to the location of the development to the project there is the potential for cumulative effects of an indirect nature to heritage assets through a change in their setting. However, the assumption that appropriate archaeological mitigation measures will be incorporated into the design will limit the potential for cumulative effects to occur.	No potential for significant cumulative effects.
Leconfield Post Office Development #1	1	Due to the location of the development to the project there is the potential for cumulative effects of an indirect nature to heritage assets through a change in their setting. However, the assumption that appropriate archaeological mitigation measures will be incorporated into the design will limit the potential for cumulative effects to occur.	No potential for significant cumulative effects.
Tokenspire Business Park	1	Due to the nature and scale of the development there is the potential for cumulative effects of an indirect nature to heritage assets through a change in their setting. However, the assumption that appropriate archaeological mitigation measures will be incorporated into the design will limit the potential for cumulative effects to occur.	No potential for significant cumulative effects.
Canada Drive Housing Development	1	Due to the location of the development to the project there is the potential for cumulative effects of an indirect nature to heritage assets through a change in their setting. However, the assumption that appropriate archaeological mitigation measures will be incorporated into the design will limit the potential for cumulative effects to occur.	No potential for significant cumulative effects.
Sir Leo Schultz Centre Development	1	Due to the nature, scale and proximity of the development to the project there is the potential for cumulative effects of an indirect nature to heritage assets through a change in their setting. However, the assumption that appropriate archaeological mitigation measures will be incorporated into the design of the project and will limit the potential for cumulative effects to occur.	No potential for significant cumulative effects.

Project Name	Tier	Discussion	Likelihood and Significance of Cumulative Effects
Total Fitness Health Club	1	Due to the location of the development to the project there is the potential for cumulative effects of an indirect nature to heritage assets through a change in their setting. However, the assumption that appropriate archaeological mitigation measures will be incorporated into the design will limit the potential for cumulative effects to occur.	No potential for significant cumulative effects.
Connaught Road Development	1	Due to the nature and scale of the development there is the potential for cumulative effects of an indirect nature to heritage assets through a change in their setting. However, the assumption that appropriate archaeological mitigation measures will be incorporated into the design will limit the potential for cumulative effects to occur.	No potential for significant cumulative effects.
Beverley Racecourse	1	Due to the nature, scale and proximity of the development to the project there is the potential for cumulative effects of an indirect nature to heritage assets through a change in their setting. However, the assumption that appropriate archaeological mitigation measures will be incorporated into the design of the project and will limit the potential for cumulative effects to occur.	No potential for significant cumulative effects.
White House Farm Development	1	Due to the location of the development to the project there is the potential for cumulative effects of an indirect nature to heritage assets through a change in their setting. However, the assumption that appropriate archaeological mitigation measures will be incorporated into the design of the project and will limit the potential for cumulative effects to occur.	No potential for significant cumulative effects.
Beverley Road Telecommunications Mast	1	Due to the nature and scale of the development there is the potential for cumulative effects of an indirect nature to heritage assets through a change in their setting. However, the assumption that appropriate archaeological mitigation measures will be incorporated into the design will limit the potential for cumulative effects to occur.	No potential for significant cumulative effects.
Model Farm Development	1	Due to the proximity of the development to the project there is the potential for cumulative effects of an indirect nature to heritage assets through a change in their setting. However, the assumption that appropriate archaeological mitigation measures will be incorporated into the design of the project and will limit the potential for cumulative effects to occur.	No potential for significant cumulative effects.
Harland Way Development	1	Due to the location of the development to the project there is the potential for cumulative effects of an indirect nature to heritage assets through a change in their setting. However, the assumption that appropriate archaeological mitigation measures will be incorporated into the design of the project and will limit the potential for cumulative effects to occur.	No potential for significant cumulative effects.

Project Name	Tier	Discussion	Likelihood and Significance of Cumulative Effects
Walkington House Development	1	Due to the location of the development to the project there is the potential for cumulative effects of an indirect nature to heritage assets through a change in their setting. However, the assumption that appropriate archaeological mitigation measures will be incorporated into the design of the project and will limit the potential for cumulative effects to occur.	No potential for significant cumulative effects.
Dorothy House Development	1	Due to the nature, scale and location of the development there is the potential for cumulative effects of an indirect nature to heritage assets through a change in their setting. However, the assumption that appropriate archaeological mitigation measures will be incorporated into the design will limit the potential for cumulative effects to occur.	No potential for significant cumulative effects.
Dene Park Sports Club	1	Due to the location of the development to the project there is the potential for cumulative effects of an indirect nature to heritage assets through a change in their setting. However, the assumption that appropriate archaeological mitigation measures will be incorporated into the design of the project and will limit the potential for cumulative effects to occur.	No potential for significant cumulative effects.
Woodbine Cottage Development	1	Due to the location of the development to the project there is the potential for cumulative effects of an indirect nature to heritage assets through a change in their setting. However, the assumption that appropriate archaeological mitigation measures will be incorporated into the design of the project and will limit the potential for cumulative effects to occur.	No potential for significant cumulative effects.
Cherry Blossom Barn Development	1	Due to the location of the development to the project there is the potential for cumulative effects of an indirect nature to heritage assets through a change in their setting. However, the assumption that appropriate archaeological mitigation measures will be incorporated into the design of the project and will limit the potential for cumulative effects to occur.	No potential for significant cumulative effects.
Westwood Park Residential Home	1	Due to the nature, scale and location of the development there is the potential for cumulative effects of an indirect nature to heritage assets through a change in their setting. However, the assumption that appropriate archaeological mitigation measures will be incorporated into the design will limit the potential for cumulative effects to occur.	No potential for significant cumulative effects.
Albanwise Solar Farm	1	The earliest construction start date for Hornsea Four is anticipated to be in 2024. A planning application for the solar farm and battery storage area has been submitted in August 2021, and although a start date for construction works is as yet unknown, there is the possibility that construction works could overlap.	No potential for significant cumulative effects.

Project Name	Tier	Discussion	Likelihood and Significance of Cumulative Effects
		Due to the nature, scale and location of the development there is the potential for cumulative effects of an indirect nature to heritage assets through a change in their setting. However, the assumption that appropriate archaeological mitigation measures will be incorporated into the design will limit the potential for cumulative effects to occur.	
Creyke Beck Substation Expansion	3	The earliest construction start date for Hornsea Four is anticipated to be in 2024. Whilst the Creyke Beck substation expansion is currently at the pre-submission stage at the time of writing and as such the construction works is as yet unknown, there is the possibility that the construction works could overlap and has been considered for the CEA. Due to the nature, scale and location of the development there is the potential for cumulative effects of an indirect nature to heritage assets through a change in their setting. Whilst no significant impacts have been identified for Hornsea Four in isolation, the potential for cumulative effects to occur is further reduced with the assumption that appropriate archaeological mitigation measures will be incorporated into the design of the Creyke Beck expansion.	No potential for significant cumulative effects.
Scotland England Green Link 2 (SEGL2)	3	The earliest construction start date for Hornsea Four is anticipated to be in 2024. Whilst the SEGL2 is currently at the pre-submission stage at the time of writing and as such the construction works is as yet unknown, there is the possibility that the construction works could overlap and has been considered for the CEA. Due to the nature, scale and location of the development there is the potential for temporary cumulative effects of an indirect nature to heritage assets through a temporary change in their setting during the course of construction works only. However, these are not anticipated to be of a significant nature in EIA terms, being limited to the duration of the respective construction programmes. There is also the potential for direct cumulative effects to sub-surface archaeological remains with the projects being within close proximity to each other. However, the assumption that appropriate archaeological mitigation measures will be incorporated into the design of both projects will limit the potential for cumulative effects to occur. Any such effects would be mitigated through the archaeological approaches agreed for each of the projects.	No potential for significant cumulative effects.

5.12.3.6 The CEA for historic environment does not identify and reasonably foreseeable projects or developments where significant cumulative effects could arise.

5.13 Transboundary effects

5.13.1.1 A screening of transboundary impacts has been carried out and is presented in Appendix K of the Scoping Report (Orsted 2018). This screening exercise identified that there was no potential for significant transboundary effects regarding the historic environment from the onshore components of Hornsea Four upon the interests of other EEA States and this is not discussed further.

5.14 Inter-related effects

5.14.1.1 Inter-related effects consider impacts from the construction, operation or decommissioning of Hornsea Four on the same receptor (or group). The potential inter-related effects that could arise in relation to the historic environment are presented in **Table 5.14**. Such inter-related effects include both:

- **Project lifetime effects**: i.e. those arising throughout more than one phase of the project (construction, operation, and decommissioning) to interact to potentially create a more significant effect on a receptor than if just one phase were assessed in isolation; and
- **Receptor led effects**: Assessment of the scope for all effects to interact, spatially and temporally, to create inter-related effects on a receptor (or group). Receptor-led effects might be short term, temporary or transient effects, or incorporate longer term effects.

5.14.1.2 A description of the process to identify and assess these effects is presented in **Section 2** of **Volume A1 Chapter 5: Environmental Impact Assessment Methodology**.

Table 5.14: Inter-related effects assessment on the historic environment.

Project phase(s)	Nature of inter-related effect	Assessment alone	Inter-related effects assessment
Project-lifetime effects			
Construction and Operation (HE-C-2, HE-C-4, HE-O-5 and HE-O-6)	Combination of indirect (non-physical) impacts upon heritage assets (designated and non-designated)	Impacts were assessed as being of minor significance through construction and operation.	The assessment of indirect (non-physical) impacts to designated and non-designated heritage assets was undertaken separating out construction and operation effects. There is the potential for the impacts to increase further than that identified within the assessment alone at the OnSS as any other construction works will combine with ongoing construction of the OnSS, which could increase impact and associated effect as the OnSS construction progresses.

Project phase(s)	Nature of inter-related effect	Assessment alone	Inter-related effects assessment
			This inter-relationship of impacts between construction and operation has been considered and it is not expected to cause an increase in impact significance. This is due to the effect during construction being temporary and should reduce during progression of the construction.
Receptor-led effects			
Geology and Ground Conditions: Historic assets can be affected by changes in ground conditions (e.g. subsidence, erosion, hydrology) (GGC-C-6. GGC-C-7 and GGC-C-8) (**Chapter 1: Geology and Ground Conditions**).			Changes to ground conditions are considered as part of the main impact assessment as this could result in an impact to buried archaeological and geoarchaeological remains. It is not anticipated that any inter-related effects will be produced that are of greater significance than those assessed individually in the main impact assessment.
Ecology: Loss of ecological features (especially hedgerows) can directly or indirectly affect an asset (ENC-C-2) (**Chapter 3: Ecology and Nature Conservation**).			The loss of hedgerows in combination with the effect on the historic environment is considered as part of the main impact assessment, due to hedgerows forming part of the HLC. The inter-related effect is not expected to produce a greater effect than that identified in the individual assessment. This is especially due to the commitment for hedgerows to be reinstated post-construction (Co10 and Co26).
Landscape and Visual: Changes in landscape and views could change the setting of heritage assets (LV-C-1) (**Chapter 4: Landscape and Visual Amenity**).			Changes in the landscape are considered as part of the main impact assessment as it forms an integral part of assessing the change to the setting of heritage assets, which could alter their significance/importance. As such, this inter-related effect is not considered to result in an effect of greater significance than those identified in the main impact assessment.
Land Use and Agriculture: Change in land-use at the OnSS could indirectly affect the setting of an asset (LUA-C-1, LUA-O-6 and LUA-D-7) (**Chapter 6: Land Use and Agriculture**).			Changes in the land use at the OnSS are considered as part of the main impact assessment as it forms an integral part of assessing the change to the setting of heritage assets, which could alter their significance/importance. As such, this inter-related effect is not considered to result in an effect of greater significance than those identified in the main impact assessment.

5.14.1.3 Consideration of the inter-related effects has identified some project lifetime effects, whilst receptor-led effects have also been identified. The results of these inter-related effects are not considered to result in an effect of greater significance than when assessed individually.

5.15 Conclusion and summary

5.15.1.1 This ES chapter presents the assessment results for direct (physical) impacts upon designated and non-designated heritage assets as a result of Hornsea Four. These impacts are assessed as being non-significant in EIA terms once mitigation has been implemented.

5.15.1.2 Other potential impacts (i.e. indirect, non-physical impacts to designated and non-designated heritage assets) were assessed as not being significant in EIA terms during the PEIR stage of Hornsea Four. The results of this are presented within **Volume A4, Annex 5.1: Impact Register** and further details on the alteration to setting (and associated heritage significance) is provided in **Volume A6, Annex 5.1: Historic Environment Desk-Based Assessment**.

5.15.1.3 **Table 5.15** presents a summary of the direct (physical) impacts assessed within this historic environment ES chapter. This table should be used for summary purposes only, with the additional narrative explanations set out within **Section 5.11** referred to for further detail.

Table 5.15: Summary of potential impacts assessed for the historic environment.

Impact and Phase	Receptor and importance	Magnitude and Significance	Mitigation	Residual impact
Construction				
Direct (physical) impacts on designated heritage assets (HE-C-1)	56: Beverley Sanctuary Limit Stone, Bishop Burton, High	Moderate to Major magnitude of impact. Permanent moderate to very large adverse significance of effect.	Co2, Co7, Co124, Co160 Trenchless methodologies (HDD) / Exclusion zones	Predicted to be non-significant in EIA terms following the application of mitigation (avoidance measures)
Direct (physical) impacts on non-designated heritage assets (HE-C-3)	Any potential (as yet unknown) archaeological remains within the Hornsea Four footprint	Minor to Major magnitude of impact. Permanent slight to very large adverse significance of effect (as a worst-case).	Co2, Co7, Co150, Co162, Co124, Co160 Exclusion zones / route refinement / micro-siting, industry standard archaeological mitigation (excavation / watching brief / historic building recording)	Predicted to be non-significant in EIA terms following the application of mitigation (both avoidance and offsetting measures)
	1: World War II sea defences, Medium			
	2: Watermill Grounds cropmark complex (Iron Age to Romano-British settlement) and World War II defences, Medium			
	4: Winkton Deserted Medieval Village, Medium			
	6: Former Military Airfield, RAF Lissett, Medium to High			
	8: Cropmarks of Iron Age and/or Romano-British rectilinear enclosures, and Post-medieval field system, Low to Medium			
	10: Ditch system and possible ring ditches (undated), Low to Medium			
	11: Square ditched enclosure (undated), Low to Medium			
	13: Undated trackway and field systems, Low to Medium			
	14: Possible enclosures near Carr Lane, Low to Medium			

Impact and Phase	Receptor and importance	Magnitude and Significance	Mitigation	Residual impact
	15: Old sand and gravel pits (post-medieval), Low			
	17: Undated ditches and trackways, ring ditch and a post-medieval artesian well, Low to Medium			
	18: Iron Age Square Barrows, SSE of Brickyard Farm, Low to Medium			
	21: Old gravel pit (Bryan Mills), Low to Medium			
	22: Cropmarks of an Iron Age and/or Romano-British rectilinear enclosure, Low to Medium			
	24: Site of Winthorpe Manor and House, Low to Medium			
	26: Ravensthorpe Deserted Medieval Settlement, Medium to High			
	28: Undated ditches, possible enclosure, Soilmark west of Parkhouse, and Dog Kennel Farm (post-medieval), Low to Medium			
	31: Cropmarks of an Iron Age and/or Romano-British enclosure and former field boundaries (post-medieval), Low to Medium			
	32: Medieval Inclosure Bank (earthwork), Low to Medium			
	48. Undated pit near Burn Park cropmark complex (HP4-49), Low to Medium			
	49: Site of two round barrows and Burn Park cropmark complex, Iron Age / Romano-British occupation, Medium to High			
	53: Early Iron Age to Romano-British settlement complex, Low to Medium			

Impact and Phase	Receptor and importance	Magnitude and Significance	Mitigation	Residual impact
	54: Cropmarks of Iron Age / Romano-British enclosures and a post-medieval field system and artesian well, Low to Medium			
	55: Bronze Age round barrow and ditch), Low to High			
	57: Cropmarks of an undated site (possibly associated with HP4-53), Low to Medium			
	58: Ridge and Furrow earthworks, Low			
	59: Square Barrows, south-east of Fraisthorpe, Low to High			
	62: A grouping of undated ring ditches and post-medieval field boundaries, Low to Medium			
	63: Buried archaeological remains indicative of enclosures and pit-like features, Low to Medium			
	64: A complex site comprising a trackway, ditches and pits, Low to Medium			
	65: A square enclosure, likely to date to the prehistoric period, Low to Medium			
	66: A linear alignment of mounds, Low to Medium			
	67: A group of ditches indicative of enclosures and field systems, Low to Medium			
	68: Possible enclosures adjacent to a former palaeochannel and post-medieval field boundaries, Low to Medium			
	69: An undated field system, Low			

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